

# Full Line Catalog



# **ROSS** CONTROLS



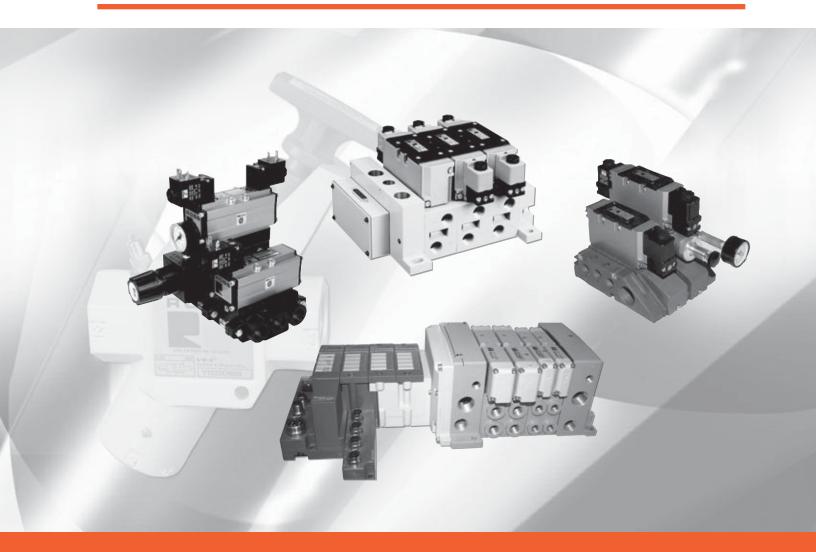
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# ROSS CONTROLS®

# BASE MOUNTED VALVES AND SERIAL BUS COMMUNICATION



ISO	ISO 15407-1 & 2			ISO 5599/I & /II						Serial Communications													
											-												
	ANSI				S	SAE					N	linia	ture	14 \$	Serie	es		5	solend	oid P	lot \	/alve	es Pack
VALVE TYPE	VALVE SERIES	DESCRI ISO Size	ool & Sleeve	Poppet	1/8				POF 3/4	T SI	<b>ZES</b>		3/2 Single	5/2 Single		5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	Pressure Control	Page
ISO						I													1				
ISO 15407-1	W66	00 (18mm)	)																0.55				A1.3 - A1.6
	W66	0 (26mm)																	1.1				A1.3 - A1.6
ISO 15407-2	W66	00 (18mm)	)																0.55				A1.7 - A1.11
	W66	0 (26mm)																	1.1				A1.7 - A1.11
ISO 5599/I	W60 & W64	1																	0.8				A2.3 - A2.10
	W60 & W64	2																	1.9				A2.3 - A2.10
	W60 & W64	3																	3.8				A2.3 - A2.10
ISO 5599/II	W65	1																	0.8				A2.11 - A2.19
	W65	2																	1.9				A2.11 - A2.19
	W65	3																	3.8				A2.11 - A2.19
SERIAL BUS		ATIONS				1	1					1	1										<u> </u>
<b>ROSS Serial</b>	Bus Commu	nications																					A3.1 – A3.11
<b>ROSS Serial</b>	Bus System	with TURC	K M	odu	lar I/	0																	A4.1 - A4.10
ANSI		1							1		1												
	W70 & W74	1																	1.0				A5.1 - A5.15
	W70 & W74	2.5																	2.5				A5.1 - A5.15
	W70 & W74	4																	4.2				A5.1 - A5.15
	W70 & W74	10																	10.0				A5.1 - A5.15
	W70 & W74	20																	22.0				A5.1 - A5.15
SAE		1																					
	80 & 84	125																	1.8				A6.1 - A6.10
	80 & 84	250																	5.7				A6.1 - A6.10
	80 & 84	500																	8.0				A6.1 - A6.10
MINIATURE	14/4																		0.1				47.0
PACK VALVE	W14	L																	0.1				A7.3
ACK VALVE	PACK																		0.1				A7.4 - A7.5
		1							1	1		L										I	

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Conter	nts	Page
ISO 15407-1 & ISO 15407-2		Α
<ul> <li>Size 00 (18mm) &amp; 0 (26mm)</li> <li>5/2-Way &amp; 5/3-Way</li> <li>Drop cord &amp; plug in versions</li> </ul>	<ul> <li>Single sub-base &amp; manifolds</li> <li>Serial Communication Compatible</li> </ul>	A1.1 – A1.11
ISO 5599/I & ISO 5599/II		
<ul> <li>Size 1, 2 &amp; 3</li> <li>5/2-Way &amp; 5/3-Way</li> <li>Drop cord &amp; plug in versions</li> </ul>	<ul> <li>Single sub-base &amp; manifolds</li> <li>Spool &amp; sleeve or poppet construction</li> <li>Serial Communication Compatible</li> </ul>	A2.1 – A2.19
Serial Communications		
<ul> <li>ISO 15407-2 &amp; 5599/II Compatible</li> <li>Serial bus gateway options include ControlNet, DeviceNet, EtherNet, Profibus and CANopen</li> </ul>	<ul> <li>Centralized &amp; remote configurations</li> <li>Analog &amp; digital inputs &amp; outputs</li> </ul>	A3.1 – A3.11 A4.1 – A4.10
ANSI		
<ul> <li>ANSI sizes 1, 2.5, 4, 10 &amp; 20</li> <li>Solenoid and pressure control</li> <li>Direct and pilot solenoid</li> </ul>	<ul> <li>Spool &amp; sleeve construction</li> <li>Single sub-base &amp; manifold base mounting</li> </ul>	A5.1 – A5.19
SAE		
<ul> <li>SAE</li> <li>SAE sizes 125, 250 &amp; 500</li> <li>Spool &amp; sleeve or poppet construction</li> </ul>	<ul><li>Solenoid pilot control</li><li>Single sub-base mounting</li></ul>	A6.1 – A5.10

# **Miniature Valves 14 Series**

- 1/8" ports
   3-Way
   A7.1 A7.5
   Solenoid Pilot Pack Valves
- 3-Way & 4-Way
- Low power solenoid power controlled

## **Cautions and Warranty**

- Compatible Lubricants
- Cautions and Warnings

ROSS

- 8, 16, 24 station manifolds
- Individual valve shutoff

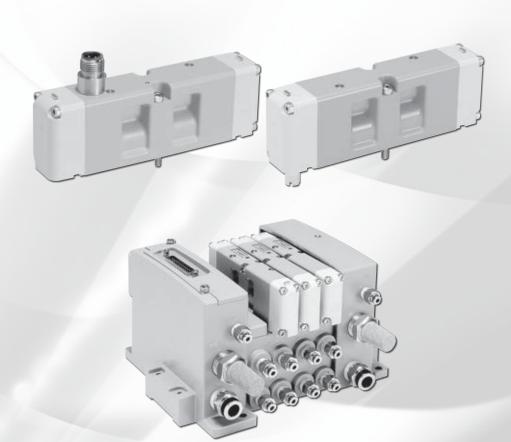
#### Turk Warranty - A4.10 ROSS Warranty - Inside Cover





# **ROSS** CONTROLS®

# ISO 15407-1 & 15407-2 Valves W66 Series



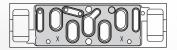
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#### ISO W66 SERIES VALVES - KEY FEATURES

- ISO Sizes 00 (18mm) & 0 (26mm)
- Drop cord (15407-1) & Plug-In (15407-2) options
- 5/2 Single, 5/2 Double, & 5/3 Double Solenoid Pilot Controlled Valves
- Serial Bus Communication compatible
- UL, C-UL, and CE certified

#### **Standard Definitions**

15407-1: Drop-cord Standards for Size 0 (26mm) & Size 00 (18mm) Wide Valves



15407-2: Plug-in Standards for Size 0 (26mm) & Size 00 (18mm) Wide Valves

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		DESCRI	PTIO	N		AVA		BLE	POR	T SIZ	ZES			FL	JNC	τιοι	IS						
VALVE TYPE	VALVE SERIES	Size	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	3/2 Single	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	Pressure Control	Page
ISO	ISO																						
ISO 15407-1	W66	00 (18mm)																	0.55				A1.3 - A1.4
	W66	0 (26mm)																	1.1				A1.3 - A1.4
Single Sub-B	ases S	ub-Base M	anifo	lds 8	k End	d Pla	te Ki	its															A1.5-A1.6
Accessories															-								A1.6
ISO 15407-2	W66	00 (18mm)																	0.55				A1.7 - A1.8
	W66	0 (26mm)																	1.1				A1.7 - A1.8
Single Sub-Bases & Sub-Base Manifolds								A1.9															
End Plate Kit	s & Ac	cessories																					A1.10 - A1.11

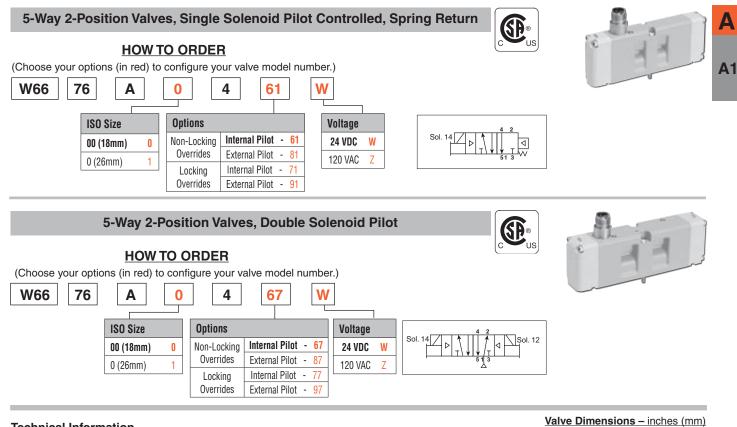
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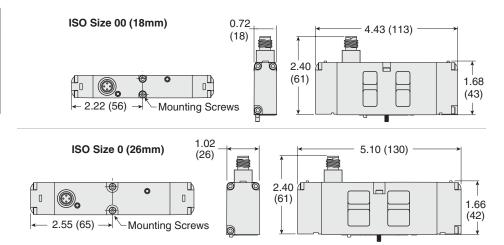
# ISO 15407-1 W66 Series

# **Solenoid Pilot Controlled Valves**



#### **Technical Information**

ISO Size	Valve Type	Avg. C <sub>v</sub>	Weight Ib (kg)
00 (18mm)	5/2 Single	0.55	0.3 (0.15)
00 (18mm)	5/2 Double	0.55	0.4 (0.16)
0 (26mm)	5/2 Single	1.1	0.6 (0.25)
0 (26mm)	5/2 Double	1.1	0.6 (0.25)



#### \* Sub-bases and sub-base manifolds ordered separately, refer to page A1.5-A1.6.

#### Accessories ordered separately, refer to page A1.6.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Solenoids: Bi-polar, surge suppression (standard), indicator lights. Standard Voltages: 1.0, 24 volts DC; 2.0 VA, 120 volts AC. Flow Media: Filtered air; 5 micron recommended. Operating Pressure: Vacuum to 145 psig (9.9 bar). *Minimum Operating Pressure:* 2-position: 20 psig (1.37 bar). 3-position: 30 psig (2.07 bar). Manifolds: Terminal Block Wiring (HA Only). Collective Wiring: 25-Pin' D-Sub; 19-Pin Round; 16 Point Terminal Strip; M23, 12-Pin; Isysnet Field Bus. Materials of Construction: Valve Body: Die Cast Aluminum. End Caps: Polybutylene Terephthalate (PBT). Fasteners: Zinc Plated Steel. Coils: Thermoset Plastic.

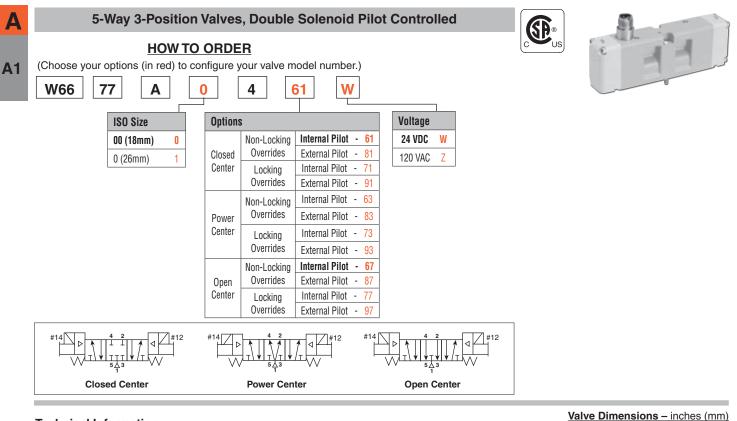
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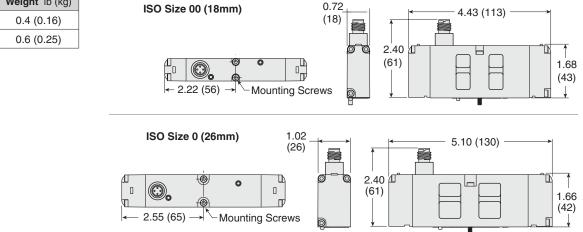
# **Solenoid Pilot Controlled Valves**

# ISO 15407-1 W66 Series



#### **Technical Information**

ISO Size	Avg. $C_v$	Weight Ib (kg)				
00 (18mm)	0.55	0.4 (0.16)				
0 (26mm)	1.1	0.6 (0.25)				



\* Sub-bases and sub-base manifolds ordered separately, refer to page A1.5-A1.6.

#### Accessories ordered separately, refer to page A1.6.

#### STANDARD SPECIFICATIONS (for valves on this page):

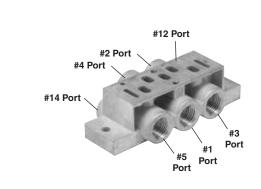
Construction: Spool and sleeve. Solenoids: Bi-polar, surge suppression (standard), indicator lights. Standard Voltages: 1.0, 24 volts DC; 2.0 VA, 120 volts AC. Flow Media: Filtered air; 5 micron recommended. Operating Pressure: Vacuum to 145 psig (9.9 bar). *Minimum Operating Pressure:* 2-position: 20 psig (1.37 bar). 3-position: 30 psig (2.07 bar). Manifolds: Terminal Block Wiring (HA Only). Collective Wiring: 25-Pin' D-Sub; 19-Pin Round; 16 Point Terminal Strip; M23, 12-Pin; Isysnet Field Bus. Materials of Construction: Valve Body: Die Cast Aluminum. End Caps: Polybutylene Terephthalate (PBT). Fasteners: Zinc Plated Steel. Coils: Thermoset Plastic.



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Individual Sub-Base Kit with Side Ports											
ISO Size Port Size Model Number*											
ISU Size	Port Size	NPT Threads	BSPP Threads								
00 (18mm)	1/8	RPL02-01-80	RPL02-01-70								
0 (26mm) 1/4 RPL01-02-80 RPL01-02-70											
* Can be use	* Can be used for external, single, or double remote pilot.										



Two Station Manifold Base with Side Ports											
	Davit Cine	Model N	Model Number*								
ISO Size	Port Size	NPT Threads	BSPP Threads								
00 (18mm)	1/8	RPJLP02-201-80	RPJLP02-201-70								

\*Can be used for external pilot supply, cannot be used with pressure controlled valves.

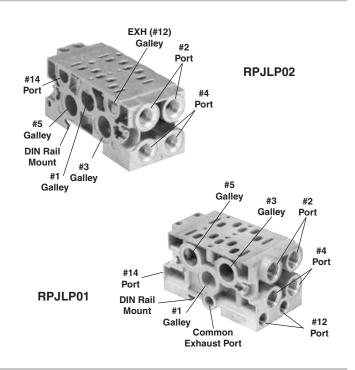
Note: Gaskets and assembly hardware included.

#### **Two Station Manifold Base with Side Ports**

ISO Size	Port Size	Model Number*							
ISO Size Port Size		NPT Threads	BSPP Threads						
0 (26mm)	1/4	RPJLP01-202-80	RPJLP01-202-70						

\* Can be used for external pilot supply, or can be used with pressure controlled valves.

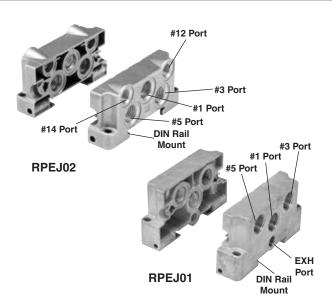
Note: Gaskets and assembly hardware included.



End P	End Plate Kit for Side Ported Two Station Manifold Base									
	End Stations Kit Number									
ISO Size	Port Size	NPT Threads	BSPP Threads							
00 (18mm)	1/4	RPEJ02-02-80*	RPEJ02-02-80*							
0 (26mm) 3/8 RPEJ01-03-80 <sup>†</sup> RPEJ01-03-80 <sup>†</sup>										
	* Use with RPJLP02									

Use with RPJLP01 or RPJL01.....

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**Online Version** 

## for ISO 15407-1 Valves W66 Series





#### Interposed Pressure Regulators

Remote Air Pilot Operated for hard-to-reach pressure control Unregulated Pilot Pressure to valve for consistent valve shifting regardless of pressure adjustment.

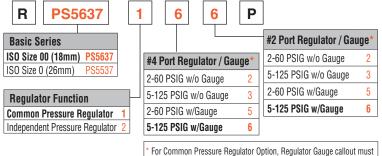




Size 00 - 18mm (Dual Interposed Regulator Shown) Size 0 - 26mm (Single Interposed Regulator Shown)

#### HOW TO ORDER

(Choose your options (in red) to configure your valve model number.)



be the same number for both Port #4 and Port #2. (Example: 166)

#### **Interposed Supply & Exhaust Modules**

ISO S	Sizo	Part Number							
100 0	120	NPT Threads	<b>BSPP</b> Threads						
00 (18mm)	Supply	RPS562600P	RPS562601P						
00 (18mm)	Exhaust	RPS562700P	RPS562701P						
0 (26mm)	Supply	RPS552600P	RPS552601P						
0 (26mm) Exhaust RPS552700P RPS552701P									
	Quantity 1. Used on Size 00 & Size 0 valves to provide a pressure or exhaust path to individual valves.								

#### **Blank Station Kits**

ISO Size	Kit Number	
00 (18mm)	RDX02BLK	
0 (26mm)	RDX01BLK	
Kit includes: Bla Gasket, and Mou	ank Station Plate, Inting Bolts.	

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#### Gauge Adapter Kit

Included with all Size 00 Regulators. Both kits are required on all Size 0 & 00 Regulators when the Regulator is on the last Station on the Right (14) End.

Description	Part Number
Gauge Kit	RPS5651160P
1/8" Female to 1/8" Female Coupling	R207P-2*
1/8" Male to 1/8" Male Long Nipple	RVS215PNL-2-15*
* Included in Gauge Kit RPS5651160P.	

#### **Interposed Flow Controls**

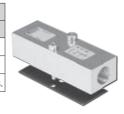
Both adjustment screws are located on the 12 end of the unit. Interposed Flow Control mounts with its own studs, which means the valve uses standard bolts for mounting. Interposed Flow Control is not to be used as a shut off device and is not bubble tight when needles are fully turned down.

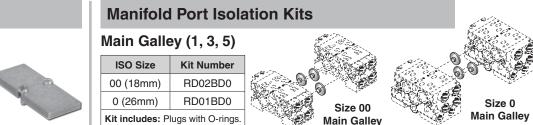
ISO Size	Part Number
00 (18mm)	RPS5642P
0 (26mm)	RPS5542P



## **Intermediate Air Supply Bases**

ISO Size	Port	Part Number
ISU Size	Size	NPT Threads
00 (18mm)	1/8"	RD02P-01-80
0 (26mm)	1/4"	RD01P-02-80
Kit includes:	Gasket ar	nd Mounting Bolts





#### Silencers

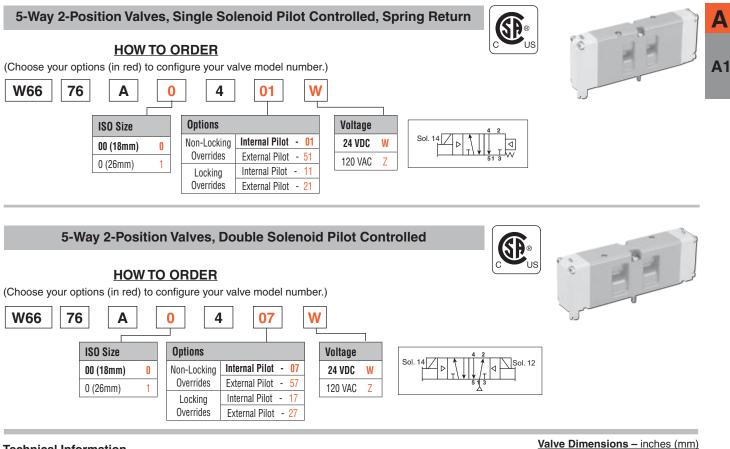
Port	Thread	Model I	Number	Avq.	Dimension	s inches (mm)	Weight			
Size	Туре	NPT Threads	BSPT Threads	C <sub>v</sub>	Α	В	lb (kg)			11
1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	2.0 (51)	0.1 (0.1)			a ····
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		B	H
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)			
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.									





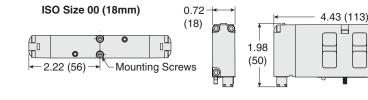
# ISO 15407-2 W66 Series

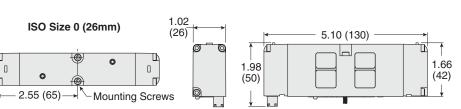
# **Solenoid Pilot Controlled Valves**



#### **Technical Information**

ISO Size	Valve Type	Avg. $C_v$	Weight Ib (kg)
00 (18mm)	5/2 Single	0.55	0.3 (0.15)
00 (18mm)	5/2 Double	0.55	0.4 (0.16)
0 (26mm)	5/2 Single	1.1	0.6 (0.25)
0 (26mm)	5/2 Double	1.1	0.6 (0.25)





#### \* Sub-bases and sub-base manifolds ordered separately, refer to page A1.9.

#### Accessories ordered separately, refer to page A1.10-A1.11.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. For other voltages, consult ROSS. Power Consumption (each solenoid): 11 VA inrush, 8.5 VA holding on 50 or 60 Hz; 6 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS.

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Flow Media: Filtered air. Inlet Pressure: Vacuum to 145 psig (10 bar). Pilot Pressure: At least 25 psig (1.7 bar). Pilot Supply: Internal or external pilot supply. Manual Override: Flush; metal, non-locking.



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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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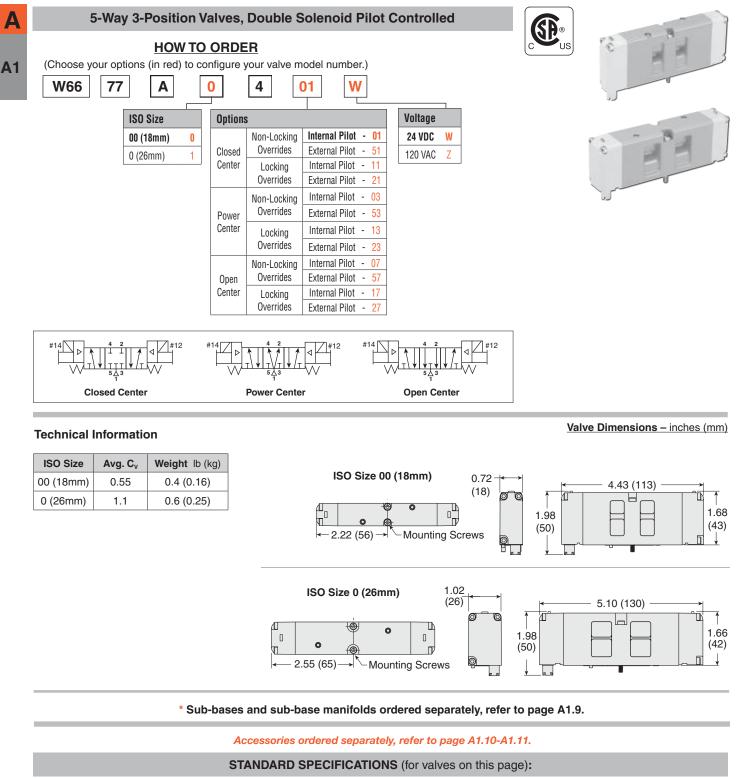
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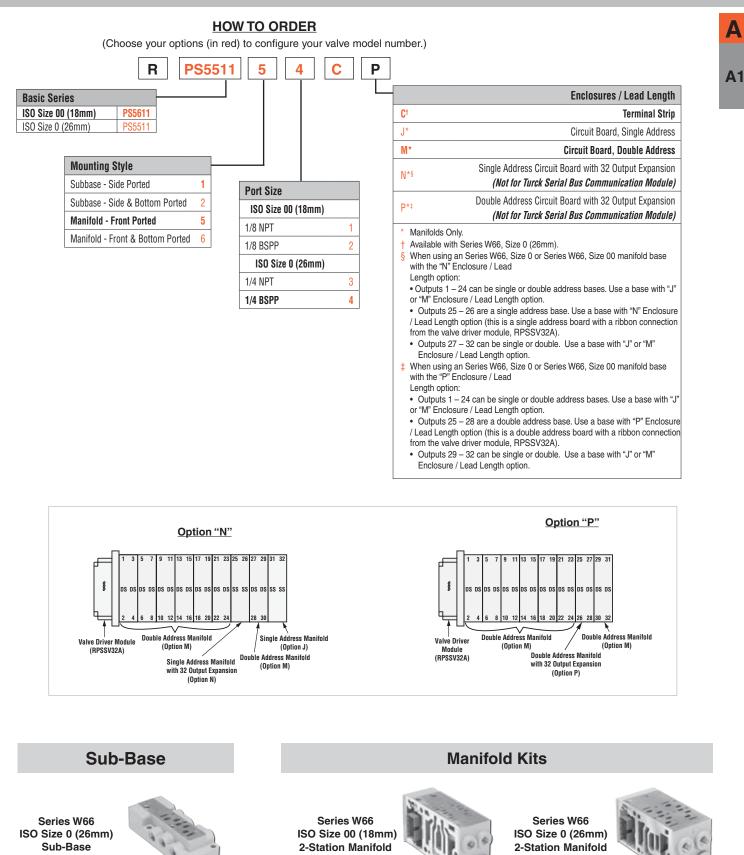
# ISO 15407-2 W66 Series



Construction: Spool and sleeve. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. For other voltages, consult ROSS. Power Consumption (each solenoid): 11 VA inrush, 8.5 VA holding on 50 or 60 Hz; 6 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air. Inlet Pressure: Vacuum to 145 psig (10 bar). Pilot Pressure: At least 30 psig (2 bar). Pilot Supply: Internal or external pilot supply. Manual Override: Flush; metal, non-locking.



# Single Sub-Bases & Sub-Base Manifolds



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

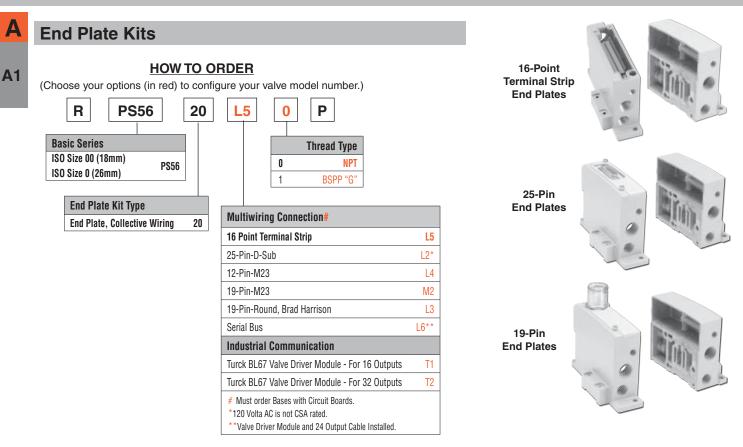


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# **End Plate Kits & Accessories**

# for ISO 15407-2 Valves W66 Series



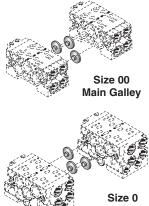
#### **Blank Station Kits**

ISO Size	Kit Number					
00 (18mm)	RPS5634P					
0 (26mm)	RPS5534P					
Kit includes: Blank Station Plate, Gasket, and Mounting Bolts.						

#### **Manifold Port Isolation Kits**

#### Main Galley (1, 3, 5)

ISO Size	Kit Number					
00 (18mm)	RD02BD0					
0 (26mm)	RD01BD0					
Kit includes: Plugs with O-rings.						

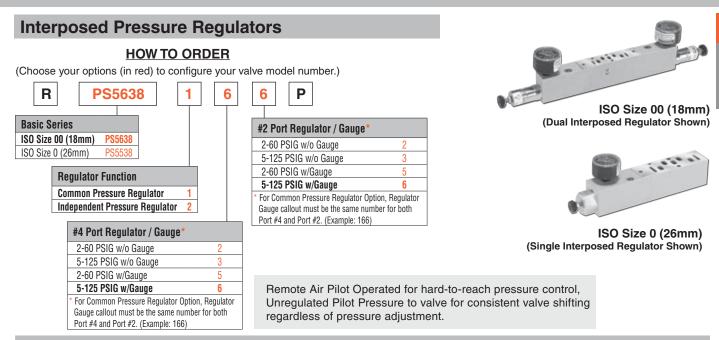


Main Galley



# Accessories

## for ISO 15407-2 Valves W66 Series



#### Gauge Adapter Kit

Description	Part Number
Gauge Kit	RPS5651160P
1/8" Female to 1/8" Female Coupling	R207P-2*
1/8" Male to 1/8" Male Long Nipple	RVS215PNL-2-15*
*Included in Gauge Kit RPS5651160P.	

Included with all Size 00 Regulators. Both kits are required on all Size 0 & 00 Regulators when the Regulator is on the last Station on the Right (14) End.



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#### **Interposed Supply & Exhaust Modules**

ISO Size		Part Number					
		NPT Threads	BSPP Threads				
00 (10mm)	Supply	RPS561600P	RPS561601P				
00 (18mm)	Exhaust	RPS561700P	RPS561701P				
0 (06mm)	Supply	RPS551600P	RPS551601P				
0 (26mm)	Exhaust	RPS551700P	RPS551701P				
Quantity 1. Used on Size 00 & Size 0 valves to provide a pressure or exhaust path to individual valves.							



#### **Interposed Flow Controls**

ISO Size	Part Number
00 (18mm)	RPS5635P
0 (26mm)	RPS5535P

Both adjustment screws are located on the 12 end of the unit. Interposed Flow Control mounts with its own studs, which means the valve uses standard bolts for mounting. Interposed Flow Control is not to be used as a shut off device and is not bubble tight when needles are fully turned down.



#### Silencers

Port	Thread	Model I	Number	Avg.	Dimensions inches (mm)		Weight		
Size	Туре	NPT Threads	BSPT Threads	Cv	Α	В	lb (kg)		~ * *
1/4	Male	5500A2003	D5500A2003	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		El
Pressu	ire Rang	e: 0 to 150 psig	(0 to 10.3 bar) ma	aximum	Flow Mee	dia: Filtered a	uir.		



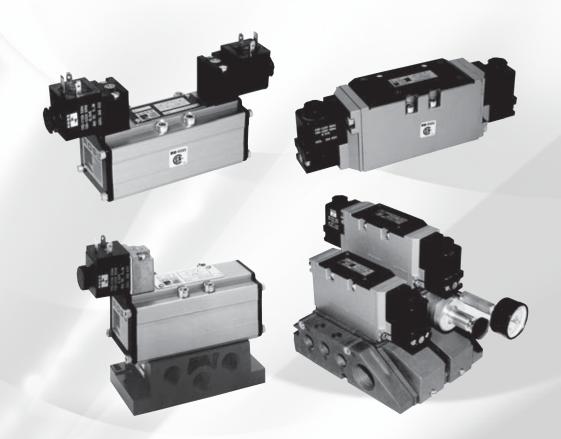
Online Version Rev. 11/14/16





# **ROSS** CONTROLS®

# ISO 5599/I VALVES W60 & W64 SERIES ISO 5599/II VALVES W65 SERIES

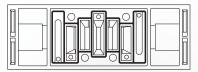


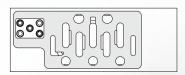
#### ISO W60, W64, & W65 SERIES VALVES - KEY FEATURES

- ISO Sizes 1, 2, & 3
- 5/2 Single, 5/2 Double, & 5/3 Double Solenoid Pilot & Pressure Controlled Valves
- Available with Buna-N and Fluororelastomer seals for a wide temperature and resistance range
- W60 Series Precision Finish Stainless Steel Spool & Sleeve internals that provide high shifting • speed, long life, non-lube service, and easy maintenance
- W64 Series Poppet construction is highly tolerant to dirty air
  - W65 Series Precision Finish Stainless Steel Spool & Sleeve internals that provide high shifting speed, long life, non-lube service, and easy maintenance
    - Serial Bus Communication compatible
    - Plug-In valve to base electrical connector eliminates need to disconnect wires to remove valve

#### **Standard Definitions**

5599/I: Drop-cord Standards for Sizes 1, 2, 3





5599/II: Plug-in Standards for Size 1, 2, 3

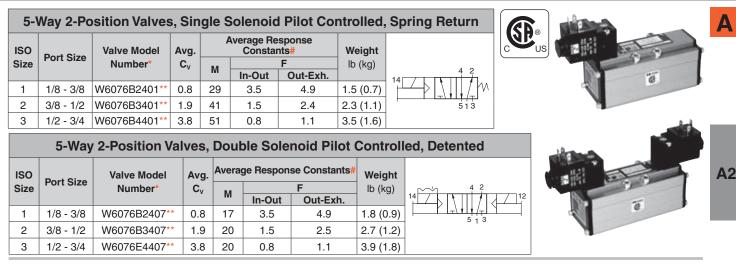
		DESCR	IPTI	ON		AVA	ILAE	BLE	POR	T S	ZES			F	UNC	TION	IS						
VALVE TYPE	VALVE SERIES	ISO Size	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	3/2 Single	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	Pressure Control	Page
ISO 5599/I	W60	1																	0.8				A2.3 - A2.7
	W60	2																	1.9				A2.3 - A2.7
	W60	3																	3.8				A2.3 - A2.7
	W64	1																	1.0				A2.3 - A2.7
	W64	2																	2.0				A2.3 - A2.7
	W64	3																	4.0				A2.3 - A2.7
Single Sub-	Bases & Sub	-Base M	ani	fold	s																		A2.8
Accessorie	S																						A2.9 - A2.10
ISO 5599/II	W65	1																	0.8				A2.10 - A2.13
	W65	2																	1.9				A2.10 - A2.13
	W65	3																	3.8				A2.10 - A2.13
Sub-Bases	& Modular M	anifolds																					A2.14 - A2.15
Accessories	s for Sub-Ba	ses & Mo	odul	ar N	lani	folds	\$																A2.16
Single Sub-	Bases & Moo	dular Sul	b-Ba	ase	Man	ifold	ls																A2.17
End Plate K	its & Access	ories																					A2.18 - A2.19

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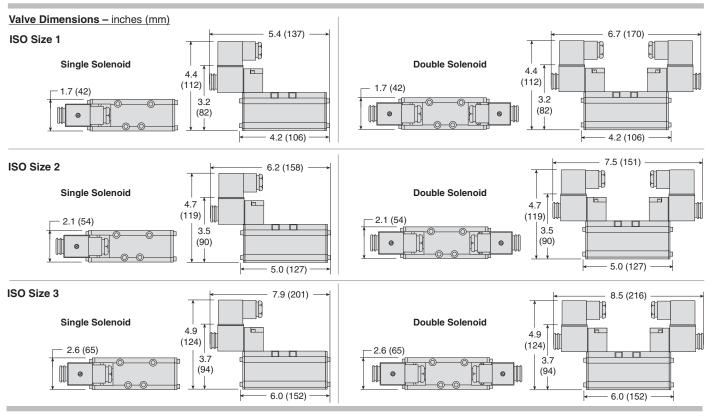
# **Solenoid Controlled Valves**

# ISO 5599/I W60 Series



\* Sub-bases and sub-base manifolds ordered separately, refer to page A2.8.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., W6076B2401W. For other voltages, consult ROSS. # Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



Options: Indicator Light (in electrical connectors), refer to page A2.9. Accessories ordered separately, refer to page A2.9-10.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

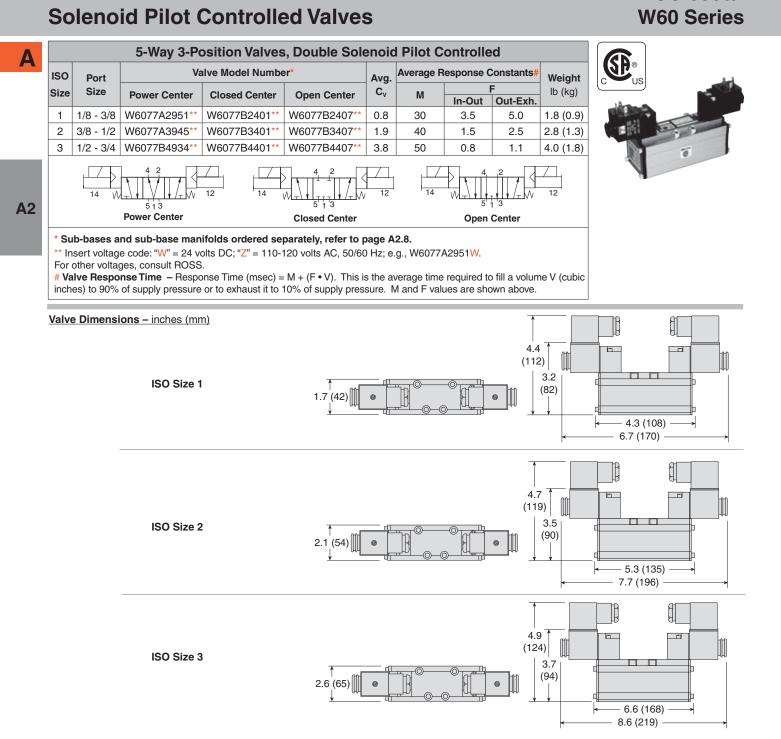
Construction: Spool and sleeve. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 11 VA inrush, 8.5 VA holding on 50 or 60 Hz; 6 watts on DC. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form A connector.

Ambient Temperature: 40° to 120°F (4° to 50°C).
Media Temperature: 40° to 175°F (4° to 80°C).
For other temperature ranges, consult ROSS.
Flow Media: Filtered air.
Inlet Pressure: Vacuum to 150 psig (10 bar).
Pilot Pressure: ISO size 1 models: At least 30 psig (2 bar). ISO Size 2 & 3 models: At least 15 psig (1 bar).
Internal/External Supply: Selected automatically.
Manual Override: Flush; metal, non-locking.

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Options: Indicator Light (in electrical connectors), refer to page A2.9. Accessories ordered separately, refer to page A2.9-10.

#### STANDARD SPECIFICATIONS (for valves on this page):

Media Temperature: 40° to 175°F (4° to 80°C). Construction: Spool and sleeve. Mounting Type: Base. For other temperature ranges, consult ROSS. Solenoid Pilot: Rated for continuous duty. Flow Media: Filtered air. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Inlet Pressure: Vacuum to 150 psig (10 bar). Power Consumption (each solenoid): 11 VA inrush, 8.5 VA holding on **Pilot Pressure:** 50 or 60 Hz; 6 watts on DC. Size 1 models: At least 30 psig (2 bar). Enclosure Rating: IP65, IEC 60529. Size 2 & 3 models: At least 15 psig (1 bar). Internal/External Supply: Selected automatically. Electrical Connections: EN 175301-803 Form A connector. Ambient Temperature: 40° to 120°F (4° to 50°C). Manual Override: Flush; metal, non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

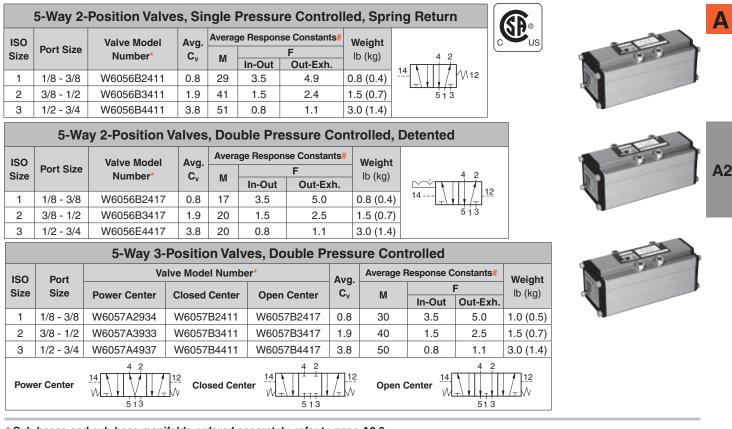
#### A2.4



ISO 5599/I

# **Pressure Controlled Valves**

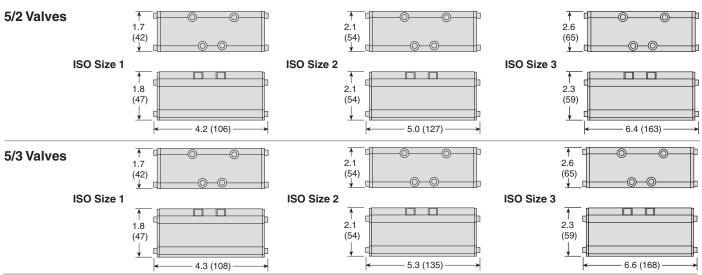
# ISO 5599/I W60 Series



#### \* Sub-bases and sub-base manifolds ordered separately, refer to page A2.8.

# Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

#### Valve Dimensions - inches (mm)



#### Accessories ordered separately, refer to page A2.9-10.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air.

Inlet Pressure: Vacuum to 150 psig (10 bar). **Pilot Pressure:** Size 1 models: At least 30 psig (2 bar). Size 2 & 3 models: At least 15 psig (1 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

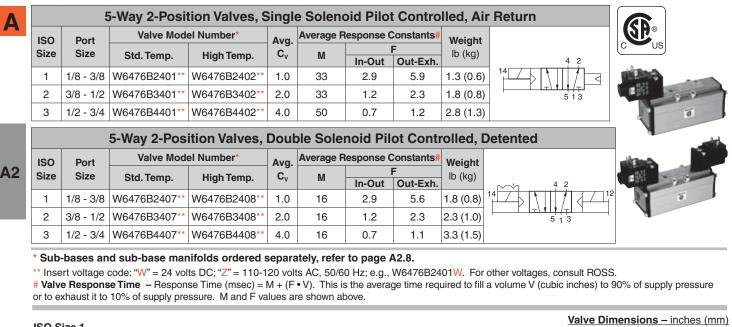


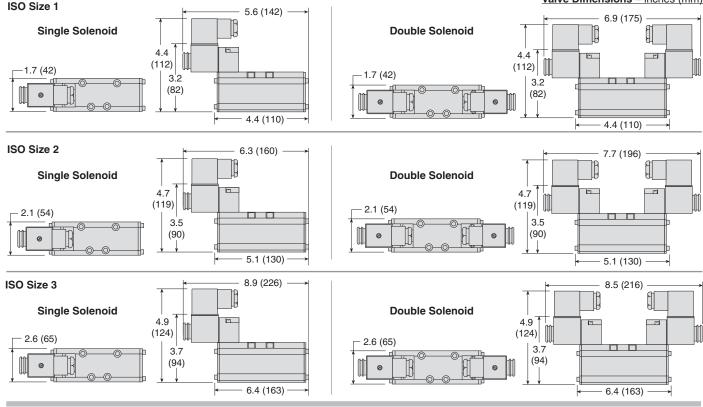
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# **Solenoid Pilot Controlled Valves**

# ISO 5599/I W64 Series





Options: Indicator Light (in electrical connectors); refer to page A2.9. Accessories ordered separately, refer to page A2.9-10.

STANDARD SPECIFICATIONS (for valves on this page):					
Construction: Poppet.	Electrical Connections: EN 175301-803 Form A or Form C connector.				
Mounting Type: Base.	MediaTemperature: 40° to 175°F (4° to 80°C); extended to 220°F (105°C)				
Solenoid Pilot: Rated for continuous duty.	for High Temperature models.				
Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz.	For other temperature ranges, consult ROSS.				
Power Consumption (each solenoid): 11 VA inrush, 8.5 VA holding on	Flow Media: Filtered air.				
50 or 60 Hz; 6 watts on DC.	Inlet Pressure: 30 to 150 psig (2 to 10 bar).				
Ambient Temperature: 40° to 120°F (4° to 50°C); extended to 175°F	Pilot Pressure: Must be equal to or greater than inlet pressure.				
(80°C) for High Temperature models.	Internal/External Supply: Selected automatically.				
Enclosure Rating: IP65, IEC 60529.	Manual Override: Flush; metal non-locking.				

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



# **Pressure Controlled Valves**

	5-Way 2-Position Valves, Single Pressure Controlled, Air Return								
ISO	Port	Valve Model Number*		Avg.	Average R	esponse C	Constants#	Weight	
Size	Size	Ctd Tomp	High Temp.	C <sub>v</sub>	м		F	lb (kg)	
0120	0120	Std. Temp.	nigh temp.	Οv	IVI	In-Out	Out-Exh.	ib (kg)	4
1	1/8 - 3/8	W6456B2411	W6456B2412	1.0	33	2.9	5.9	0.8 (0.4)	
2	3/8 - 1/2	W6456B3411	W6456B3412	2.0	33	1.2	2.3	1.3 (0.6)	
3	1/2 - 3/4	W6456B4411	W6456B4412	4.0	50	0.7	1.2	2.3 (1.1)	

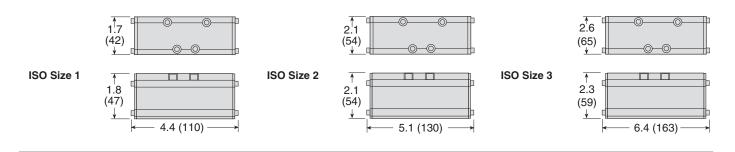
	5-Way 2-Position Valves, Double Pressure Controlled, Detented								
ISO	Port	Valve Mode	Valve Model Number*		Average R	erage Response Constants#		Weight	
Size	Size	Ctd Tamm	Link Town	Avg. C <sub>v</sub>	м		F	lb (kg)	
0120	0120	Std. Temp.	High Temp.	Οv	IVI	In-Out	Out-Exh.	ib (kg)	
1	1/8 - 3/8	W6456B2417	W6456B2418	1.0	16	2.9	5.6	1.8 (0.8)	14
2	3/8 - 1/2	W6456B3417	W6456B3418	2.0	16	1.2	2.3	2.3 (1.0)	513
3	1/2 - 3/4	W6456B4417	W6456B4418	4.0	18	0.7	1.1	3.3 (1.5)	

\* Sub-bases and sub-base manifolds ordered separately, refer to page A2.8.

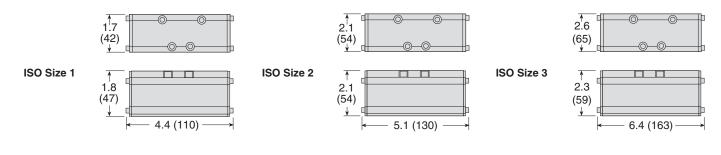
# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions - inches (mm)

Single Pressure Controlled



#### **Double Pressure Controlled**



#### Accessories ordered separately, refer to page A2.9-10.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air. Inlet Pressure: Vacuum to 150 psig (10 bar). Pilot Pressure: Size 1 models: At least 30 psig (2 bar). Size 2 & 3 models: At least 15 psig (1 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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A2.7

Δ

A2

# Single Sub-Bases & Sub-Base Manifolds

## for ISO 5599/I Valves W60 & W64 Series

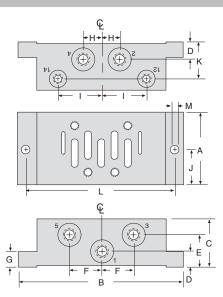
#### ISO 5599/I Sub-Bases

Α

**A2** 

ISO	Port		Port Siz	Sub-Base	
Size	Threads	2, 4	1, 3, 5	12, 14	Model Number (Side Ported)
	NPT	1/8	1/4	1/8	654K91
1	NPT	1/4	1/4	1/8	600C01
	G	1/4	1/4	1/8	D600C01
	NPT	3/8	3/8	1/8	642K91
	NPT	3/8	3/8	1/8	601C01
2	G	3/8	3/8	1/8	D601C01
	NPT	1/2	1/2	1/8	643K91
	NPT	1/2	1/2	1/8	602C01
3	G	1/2	1/2	1/8	D602C01
	NPT	3/4	3/4	1/8	644K91

S	ub-Base Din	nensions incl	hes (mm)
	ISO 1	ISO 2	ISO 3
Α	1.89 (48)	2.24 (57)	2.80 (71
В	4.33 (110)	4.88 (124)	5.87 (149)
С	1.26 (32)	1.57 (40)	1.26 (32)*
D	0.41 (38)	0.55 (14)	0.67 (17)
Е	0.85 (39)	1.02 (26)	0.67 (17)
F	0.85 (23)	1.10 (28)	1.34 (34)
G	0.39 (23)	0.51 (13)	0.71 (18)
н	0.47 (92)	0.59 (15)	0.63 (16)
Ι	1.14 (29)	1.46 (37)	1.77 (45)
J	0.94 (58)	1.12 (29)	1.40 (36)
К	0.93 (24)	1.518(30)	0.87 (22)
L	3.86 (22)	4.41 (112)	5.35 (136
М	0.22 (6)	0.26 (7)	0.26 (7)
* 1.7	77 (45) on su	ub-base 644	K91.



#### ISO 5599/I Sub-Base Manifolds

ISO	Port Size			Manifold Model Number					
Size	2, 4	1, 3, 5	12, 14	Bottom Ported Station*	End Ported Station*	End Station Kit*			
1	1/4	3/8	1/8	460K91	664K91	326K86			
2	3/8	1/2	1/8	461K91	665K91	327K86			
3	1/2	1	1/8	462K91	666K91	328K86			
*NPT	port thread	ds. For BS	PP thread	ls, add a "D" prefix to	o the model numb	er, e.g., <mark>D</mark> 460K91.			

In addition to the manifold stations, an end station kit must be ordered for each manifold installation. End-ported stations are assemblies consisting of a bottom-ported station and an end-ported adaptor plate. Adaptor plates are cross-hatched in the drawings below.

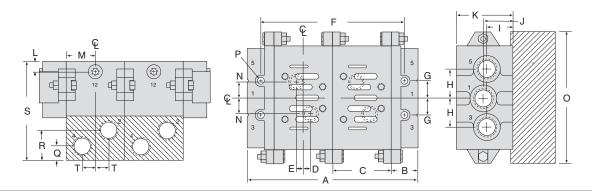
**NOTE:** Lined portions of drawings are end-ported adaptors which are included only with end-ported stations.

A and F dimensions are for a 2-station manifold.

For each additional station add the C dimension to obtain new A and F dimensions.

#### ACCESSORIES and OPTIONS for MANIFOLDS

Blank Station Kits, Blocking Discs, Pressure Plates, Transition Plates and other available options are shown on page A2.10.



I	Manifolds Din	nensions inch	nes (mm)
	ISO 1	ISO 2	ISO 3
Α	5.12 (130)	6.46 (164)	7.95 (202)
В	0.87 (22)	1.02 (26)	1.18 (30)
С	1.69 (43)	2.20 (56)	2.80 (71)
D	0.30 (8)	0.24 (6)	0.31 (8)
Е	0.06 (2)	0.20 (5)	0.24 (6)
F	4.25 (108)	5.43 (138)	6.77 (172)
G	0.55 (14)	0.69 (18)	1.02 (26)
Н	0.94 (24)	1.24 (32)	1.85 (47)
Ι	0.83 (21)	0.87 (22)	1.22 (31)
J	0.94 (24)	0.94 (24)	1.34 (34)
К	1.81 (46)	1.85 (47)	2.20 (56)
L	0.33 (9)	0.35 (9)	0.39 (10)
М	0.85 (22)	1.10 (28)	1.40 (36)
Ν	0.51 (13)	0.59 (15)	0.75 (19)
Р	0.27 (7)	0.35 (9)	0.47 (12)
Q	0.47 (12)	0.55 (14)	0.67 (17)
R	0.98 (25)	1.02 (26)	1.14 (29)
S	3.19 (81)	3.54 (90)	3.90 (99)
Т	0.43 (11)	0.57 (15)	0.71 (18)



# Accessories

Interposed Pressure Regulators

# for ISO 5599/I Valves W60 & W64 Series

**Regulator Model Number** 

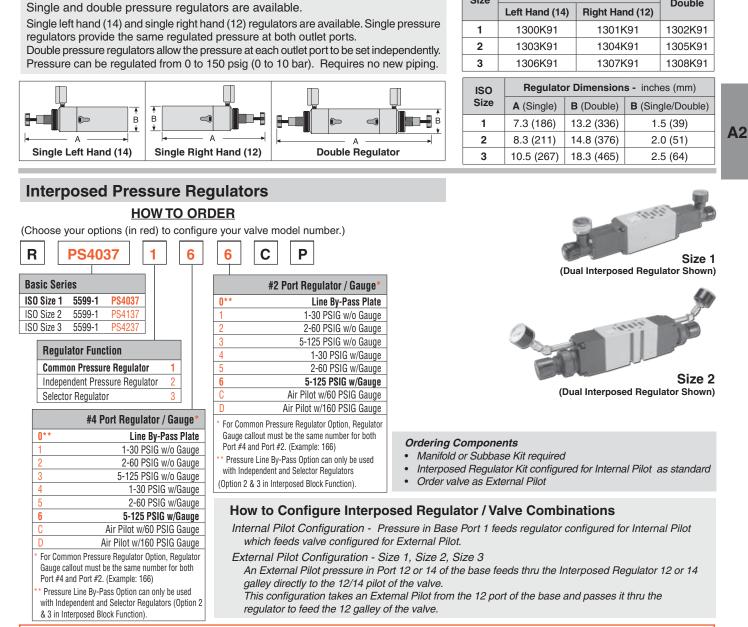
Single

ISO

Size

Δ

Double



WARNING: Double interposed regulators will reverse output ports, the 12 solenoid will pressurize the 4 port, the 14 solenoid will pressurize the 2 port which may cause unexpected, potentially dangerous cylinder movement at valve pressurization.

#### Interposed Flow Controls

An interposed flow control unit regulates the exhaust flow of air from a pneumatic cylinder, thereby controlling the extension and retraction speeds. Separate controls regulate the air flow from each end of the cylinder. Being located between the valve and base, the unit requires no additional piping. Available only for W60 Series valves.

ISO Size	Part Number
1	701B77
2	702B77
3	722B77

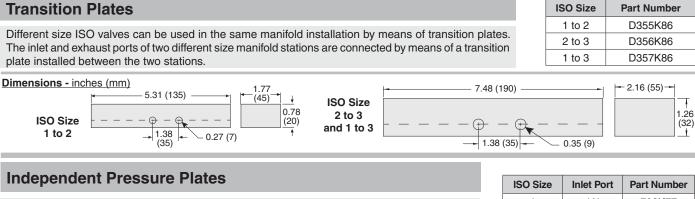
#### **ISO Size** Part Number **Blank Station Kits** 1 546H77 2 694K77 A blank station plate is used to cover the top of a manifold station that is not in use. A kit consists of a metal plate 0.32 inch (8 mm) thick, a gasket, and mounting bolts. 3 537H77

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# Accessories

**A2** 

# for ISO 5599/I Valves W60 & W64 Series



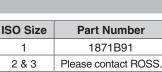
When a valve in a manifold installation must work at a different pressure than that supplied to the manifold, an independent supply can be provided via an independent pressure plate. The pressure plate mounts between valve and base and isolates the valve from the manifold inlet pressure. The independent supply is connected to an inlet port in the end of the pressure plate.

Inlet Port	Part Number
1/4	703K77
3/8	692K77
1/2	715K77
	1/4 3/8

 $\square$ 

Г

**Interposed Shut-Off** Manually actuated with a 1/4 turn, the interposed shut-off isolates all 1 ports, including the pilot.





1	 3.75 (95.3) —— 3.23 (8

ISO Size 1

**ISO Size** 

1 2

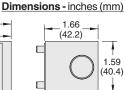
3

(82.0)

0

0

A



Kit of 3 Disks

1007K77

1008K77

1009K77

<b>Blocking D</b>	lisks
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Ports between manifold stations can be closed by means of blocking disks.

## **Flying Solenoids Leads**

Flying leads are available with 18 gauge insulated wires with spade connectors at one end. A kit of flying leads consists of three wires, each 39 inches (991 mm) long.

**Electrical Connectors** 

	Courd Longath	Cond	Electrical				
Electrical Connector Type	•		Without	Lighted C	onnector*		
			Light	24 Volts DC	120 Volts AC		
Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z		
Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z		
EN 175301-803 Form A Connector for threaded conduit (1/2 inch electrical conduit fittings) – – – 723K77 724K77-W 724K77-Z							
EN 175301-803 Form A Connector Only – – 937K87 936K87-W 936K87-Z							
	Prewired Connector (18 gauge) Prewired Connector (18 gauge) Connector for threaded conduit (1/2 inch electrical conduit fittings)	Prewired Connector (18 gauge)2 (6½)Prewired Connector (18 gauge)2 (6½)Connector for threaded conduit (1/2 inch electrical conduit fittings)	Electrical Connector Typemeters (feet)DiameterPrewired Connector (18 gauge)2 (6½)6-mmPrewired Connector (18 gauge)2 (6½)10-mmConnector for threaded conduit (1/2 inch electrical conduit fittings)	Electrical Connector TypeCord Length meters (feet)Cord DiameterWithout LightPrewired Connector (18 gauge)2 (6½)6-mm721K77Prewired Connector (18 gauge)2 (6½)10-mm371K77Connector for threaded conduit 	Electrical Connector TypeCord Length meters (feet)Cord DiameterWithout LightLighted CPrewired Connector (18 gauge)2 (6½)6-mm721K77720K77-WPrewired Connector (18 gauge)2 (6½)10-mm371K77383K77-WConnector for threaded conduit (1/2 inch electrical conduit fittings)723K77724K77-W	Lighted Connector Typemeters (feet)DiameterWithoutLighted Connector'Prewired Connector (18 gauge)2 (6½)6-mm721K77720K77-W720K77-ZPrewired Connector (18 gauge)2 (6½)10-mm371K77383K77-W383K77-ZConnector for threaded conduit (1/2 inch electrical conduit fittings)723K77724K77-W724K77-Z	

#### Silencers

Port	Thread	Mode	l Number	Avg.	Ava. Dimensions inches (r		Weight			
Size	Туре	NPT Threads	<b>BSPT</b> Threads	C <sub>v</sub>	Α	В	lb (kg)		-A-	
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		0 - 0	
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)		() · · · ·	H
3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (91)	0.2 (0.1)		B	
1 Male 5500A6003 D5500A6003 14.6 2.0 (51) 5.4 (138) 0.6 (0.3)										
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.									

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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Kit Number

Single Disk

235A40

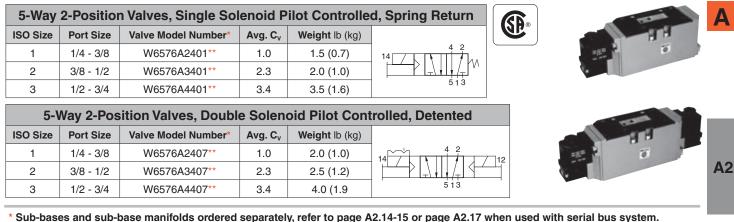
236A40

237A40

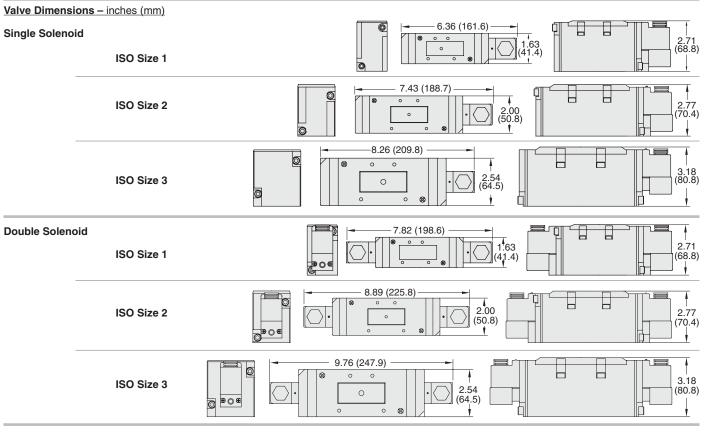
725K77

# **Solenoid Pilot Controlled Valves**

# ISO 5599/II W65 Series



\* Sub-bases and sub-base manifolds ordered separately, refer to page A2.14-15 or page A2.17 when used with serial bus system.
\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., W6576A2401W. For other voltages, consult ROSS.



Accessories ordered separately, refer to page A2.16 or page A2.18-19 when used with serial bus system.

The W65 Series has a base electrical connector which eliminates the need to disconnect wires to remove the valve. This eliminates drop cords, simplifies maintenance and connection to Serial Data Communication systems.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Solenoids: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 6.5 VA holding on 50 or 60 Hz; 3.5 watts on DC (at 10 bar). Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air.
Inlet Pressure:
Size 1 models: 30 to 150 psig (2 to 10 bar);
Size 2 & 3 models: 15 to 150 psig (1 to 10 bar).
All sizes also available up to 232 psig (16 bar).
Pilot Supply: Internal/external supply selected automatically. Required pressure at least 30 psig (2 bar).
Indicator Light: Included, one per solenoid.
Manual Override: Flush; metal, non-locking.

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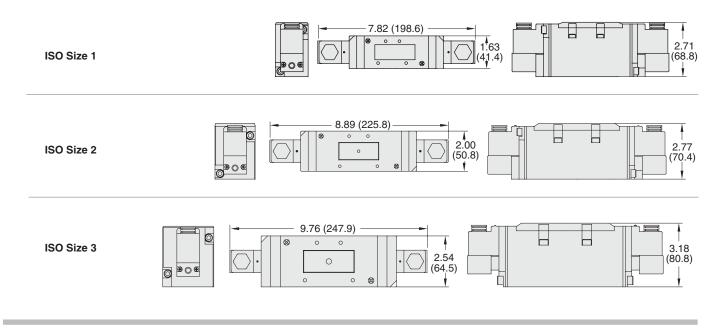
# **Solenoid Pilot Controlled Valves**

# ISO 5599/II W65 Series

	5-Way 3-Position Valves, Double Solenoid Pilot Controlled								
ISO	Port	Valve Model Number* Avg. Cv	Weight						
Size	Size	Power Center	Closed Center	Open Center	Avg. C <sub>v</sub>	lb (kg)			
1	1/4 - 3/8	W6577A2902**	W6577A2401**	W6577A2407**	1.0	2.0 (1.0)			
2	3/8 - 1/2	W6577A3901**	W6577A3401**	W6577A3407**	2.3	2.5 (1.2)			
3	1/2 - 3/4	W6577A4900**	W6577A4401**	W6577A4407**	3.4	4.0 (1.9)			
14	4 2 W513				4 2 + 1 + 1 5 1 3				
	Power Ce	enter	Closed Center		Open Cen	nter			

\* Sub-bases and sub-base manifolds ordered separately, refer to page A2.14-15 or page A2.17 when used with serial bus system. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., W6577A2902W. For other voltages, consult ROSS.

#### Valve Dimensions - inches (mm)



#### Accessories ordered separately, refer to page A2.16 or page A2.18-19 when used with serial bus system.

The W65 Series has a base electrical connector which eliminates the need to disconnect wires to remove the valve. This eliminates drop cords, simplifies maintenance and connection to Serial Data Communication systems.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Solenoids: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 6.5 VA holding on 50 or 60 Hz; 3.5 watts on DC (at 10 bar). Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air.

#### **Inlet Pressure:**

Size 1 models: 30 to 150 psig (2 to 10 bar); Size 2 & 3 models: 15 to 150 psig (1 to 10 bar). All sizes also available up to 232 psig (16 bar). Pilot Supply: Internal/external supply selected automatically. Required pressure at least 30 psig (2 bar). Indicator Light: Included, one per solenoid. Manual Override: Flush; metal, non-locking.



# **Pressure Controlled Valves**

#### 5-Way 2-Position Valves, Single Pressure Controlled, Spring Return **ISO Size** Port Size Valve Model Number\* Avg. C<sub>v</sub> Weight lb (kg) 2 1/4 - 3/8 W6556A2411 1.0 0.8 (0.4) 1 1/12 2 3/8 - 1/2 W6556A3411 2.3 1.5 (0.7) 3 1/2 - 3/4 W6556A4411 3.4 3.0 (1.4)

5-\	5-Way 2-Position Valves, Double Pressure Controlled, Detented									
ISO Size	Port Size	Valve Model Number*	Avg. C <sub>v</sub>	Weight Ib (kg)	4.0					
1	1/4 - 3/8	W6556A2417	1.0	0.8 (0.4)						
2	3/8 - 1/2	W6556A3417	2.3	1.5 (0.7)						
3	1/2 - 3/4	W6556A4417	3.4	3.0 (1.4)						

	5-Way 3-Position Valves, Double Pressure Controlled										
ISO	Port	v	alve Model Numbe	Avg C <sub>v</sub>	Weight						
Size	Size	Power Center	Closed Center	Open Center	Avg C <sub>v</sub>	lb (kg)					
1	1/4 - 3/8	-	W6557A2411	W6557A2417	1.0	0.8 (0.4)					
2	3/8 - 1/2	W6557A3901	W6557A3411	W6557A3417	2.3	1.5 (0.7)					
3	1/2 - 3/4	W6557A4900	W6557A4411 W6557A441		3.4	3.0 (1.4)					
$\begin{array}{c} 4 & 2 \\ 14 \\ W_{-} & 12 \\ 5 & 13 \end{array}$			$\frac{14}{M_{T}} \underbrace{\downarrow}_{T} \underbrace{\downarrow}_{$	M	4 2 14 W51 3 Open Co	12					

\* Sub-bases and sub-base manifolds ordered separately, refer to page A2.14-15 or page A2.17 when used with serial bus system.

0

0

0

0

Valve Dimensions - inches (mm)

ISO Size 1

ISO Size 2

ISO Size 3

0

Accessories ordered separately, refer to page A2.16 or page A2.18-19 when used with serial bus system.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air. Inlet Pressure: *Size 1 models:* 30 to 150 psig (2 to 10 bar); *Size 2 & 3 models:* 15 to 150 psig (1 to 10 bar). All sizes also available up to 232 psig (16 bar). **Pilot Supply:** Internal/external supply selected automatically. Required pressure at least 30 psig (2 bar).

1.63

(41.4)

2.00 (50.8)

ŧ.

4

2.54

0

0 0

0

0

0

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.







4.86 (123.5)

5.93 (150.6)

6.75 (171.5)

2.71

(68.8)

2.77

(70.4)

3.18

(80.8)

**SP**®

12

Α

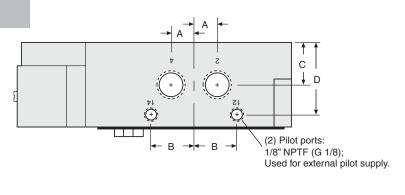
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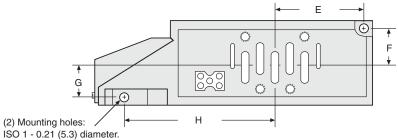
# **Sub-Bases**

## Side and Bottom-Ported Sub-Bases

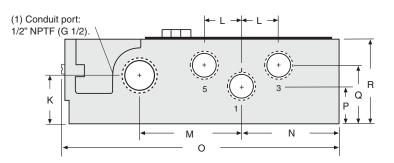
ISO Size	Port Threads	Port Size	Sub-Base Model Number
	NPT	1/4Side	949N91
	NPT	1/4 Side/Bottom	971N91
	NPT	3/8 Side	950N91
1	NPT	3/8 Side/Bottom	972N91
	G	1/4 Side	D949N91
	G	3/8 Side	D950N91
	NPT	3/8 Side	951N91
	NPT	3/8 Side/Bottom	952N91
2	NPT	1/2 Side	953N91
	NPT	1/2 Side/Bottom	954N91
	G	1/2 Side	D953N91
	NPT	1/2" Side	955N91
	NPT	1/2" Side/Bottom	956N91
	NPT	3/4" Side	957N91
3	NPT	3/4" Side/Bottom	958N91
3	G	1/2 Side	D955N91
	G	1/2 Side/Bottom	D956N91
	G	3/4 Side	D957N91
	G	3/4 Side/Bottom	D958N91

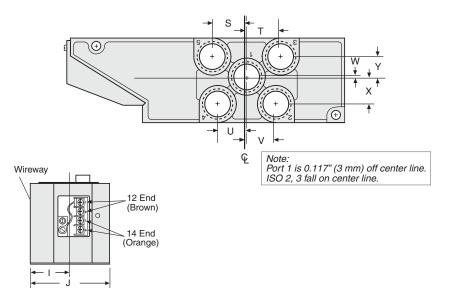
	Sub-Base Din	nensions incl	nes (mm)
	ISO 1	ISO 2	ISO 3
Α	0.5 (13)	0.6 (16)	0.8 (21)
В	1.0 (26)	1.3 (33)	1.8 (45)
С	0.8 (21)	1.2 (31)	1.3 (34)
D	1.5 (38)	1.9 (49)	2.7 (70)
Е	1.6 (39)	2.3 (57)	2.5 (63)
F	0.9 (23)	1.1 (29)	1.5 (39)
G	0.9 (23)	1.1 (29)	1.4 (36)
Н	3.6 (92)	4.3 (108)	5.4 (137)
Т	1.1 (29)	1.4 (35)	1.8 (45)
J	2.3 (58)	2.8 (70)	3.5 (90)
К	0.9 (24)	1.5 (37)	1.8 (47)
L	0.9 (22)	1.1 (27)	1.5 (38)
М	2.4 (60)	3.0 (75)	4.1 (104)
Ν	1.8 (46)	2.5 (64)	2.7 (69)
0	6.5 (164)	7.8 (197)	9.3 (235)
Р	0.8 (21)	1.1 (28)	1.3 (34)
Q	1.3 (34)	1.7 (44)	2.0 (51)
R	1.9 (47)	2.4 (60)	3.3 (85)
S	0.8 (21)	1.1 (27)	1.6 (42)
т	1.1 (27)	1.1 (27)	1.6 (42)
U	0.5 (13)	0.9 (22)	1.1 (27)
V	0.6 (15)	0.9 (22)	1.1 (27)
W	0.3 (8)	0.1 (3)	0.8 (20)
Х	0.7 (17)	0.8 (20)	0.8 (20)
Y	0.6 (16)	0.9 (20)	0.8 (20)





ISO 2, 3 - 0.25 (6.4) diameter.





Assembled manifolds also available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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#### A2.14



#### **Bottom or End-Ported Manifolds**

Ma	Manifold Station Assembly Numbers*							
ISO SIze	Part Number**							
4	1/4" End/Bottom	959N91						
1	3/8" End/Bottom	960N91						
	3/8" End/Bottom	961N91						
2	1/2" End/Bottom	962N91						
3	1/2" End/Bottom	963N91						
	3/4" End/Bottom	964N91						
*	· · · · · · · · · · · · · · · · · · ·							

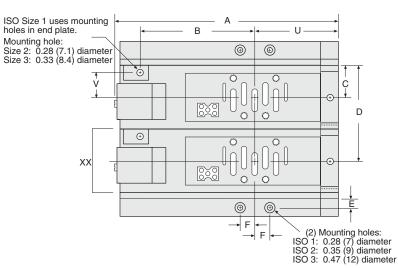
\*Each manifold station assembly includes a manifold assembly, socket head screws, nuts and seals. \*\*NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D959N91.

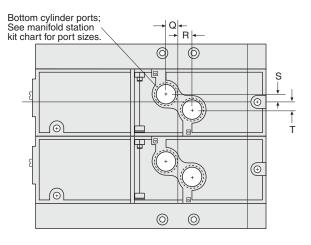
End Station Kit Numbers*									
ISO SIze	Size Port Size Part Number**								
<b>1</b> 3/8" 493N86									
2	1/2"	494N86							
3	<b>3</b> 1" 495N86								
	*Each end station kit includes left and right end								

plates, socket head screws, nuts and seals. \*\*NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D493N86.

	Manifold Dim	ensions inches	s (mm)
	ISO 1	ISO 2	ISO 3
Α	7.2 (183)	9.0 (229)	10.6 (270)
В	4.9 (125)	6.0 (152)	7.1 (180)
С	1.0 (26)	1.3 (33)	1.7 (43)
D	3.1 (79)	3.9 (100)	5.1 (128)
Е	0.6 (14)	0.6 (16)	0.6 (15)
F	0.6 (14)	0.7 (17)	1.0 (26)
G	1.3 (34)	1.7 (42)	1.8 (46)
Н	1.0 (25)	1.2 (30)	1.2 (31)
I	1.1 (28)	1.4 (35)	2.1 (52)
J	2.5 (64)	3.1 (79)	4.1 (104)
К	1.2 (31)	1.6 (40)	1.7 (42)
L	0.9 (22)	1.0 (25)	1.2 (30)
М	0.5 (13)	0.6 (16)	0.8 (21)
Ν	2.1 (53)	2.6 (67)	3.4 (86)
0	2.2 (55)	2.6 (66)	3.1 (78)
Р	0.6 (16)	0.9 (22)	0.8 (20)
Q	0.5 (13)	0.6 (15)	0.7 (18)
R	0.5 (13)	0.6 (15)	0.8 (21)
S	0.3 (7)	0.3 (8)	0.5 (13)
Т	0.3 (7)	0.3 (8)	0.5 (12)
U	2.0 (51)	2.8 (67)	3.1 (79)
V		1.0 (26)	1.3 (31)

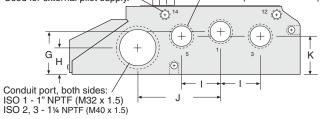
holes in end plate.



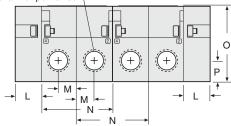


(2) Pilot ports: 1/8" NPTF (G 1/8); Used for external pilot supply.

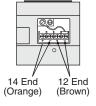
(3) Side ports, both sides; See end plate kit chart for port sizes.



(2) Side cylinder ports: See manifold block kit chart for port sizes \



View XX with conduit cover removed



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# for ISO 5599/II Valves W65 Series

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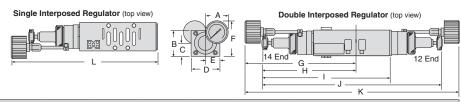
# Accessories

#### NOTE: Accessories from this page are to be used only with sub-bases and manifolds on page A2.14-15.

#### **Interposed Regulators**

The interposed regulator controls the pressure through the base-mounted valve. These interposed devices are "sandwich" style, mounting between a valve and base or manifold. When using a dual interposed regulator for a W65 Series solenoid valve, the valve **must be externally piloted (port 14)**.

**WARNING:** Double interposed regulators will reverse output ports, the 12 solenoid will pressurize the 4 port, the 14 solenoid will pressurize the 2 port which may cause unexpected, potentially dangerous cylinder movement at valve pressurization.



ISO	Model	Model Dimensi								mensions inches (mm)				
Size	Number	Α	В	С	D	E	F	G	н	I	J	К	L	
1 (Sgl.)	965N91	1.6 (39)	1.8 (45)	0.9 (23)	1.7 (43)	0.9 (22)	2.5 (63)	6.2 (157)	7.2 (182)	8.0 (204)	11.6 (295)	13.6 (345)	9.0 (229)	
1 (Dbl.)	966N91	1.6 (39)	1.8 (45)	0.9 (23)	1.7 (43)	0.9 (22)	2.5 (63)	6.2 (157)	7.2 (182)	8.0 (204)	11.6 (295)	13.6 (345)	9.0 (229)	
2 (Sgl.)	967N91	1.6 (39)	1.8 (45)	0.9 (23)	2.0 (51)	1.0 (26)	2.5 (63)	6.5 (166)	7.5 (191)	9.0 (229)	12.6 (320)	14.6 (370)	10.0 (254)	
2 (Dbl.)	968N91	1.6 (39)	1.8 (45)	0.9 (23)	2.0 (51)	1.0 (26)	2.5 (63)	6.5 (166)	7.5 (191)	9.0 (229)	12.6 (320)	14.6 (370)	10.0 (254)	
3 (Sgl.)	969N91	2.1 (52)	2.7 (67)	1.3 (34)	2.6 (66)	1.3 (33)	3.4 (85)	9.5 (242)	8.0 (203)	10.6 (270)	18.2 (463)	15.2 (386)	13.0 (330)	
3 (Dbl.)	970N91	2.1 (52)	2.7 (67)	1.3 (34)	2.6 (66)	1.3 (33)	3.4 (85)	9.5 (242)	8.0 (203)	10.6 (270)	18.2 (463)	15.2 (386)	13.0 (330)	

#### **Flow Control Kits**

The interposed flow control independently adjusts the speed of a cylinder's extend and retract motions. This action is achieved by throttling the flow of exhaust air through ports 3 and 5 by means of a separate needle valve across each of these ports. These interposed devices are "sandwich" style, mounting between a valve and a base or manifold.

ISO	Part	Dimen	sions inch	es (mm)	B
Size	Number	Α	В	С	
1	1371N77	0.9 (24)	3.8 (97)	1.7 (43)	
2	1372N77	1.3 (33)	5.1 (130)	2.0 (51)	
3	1373N77	1.6 (41)	5.6 (142)	2.6 (66)	

2

2

#### **Blank Station Kits**

	150 5120	1	2	3		
A blank station plate is used to cover the top of a manifold station not in use.	Kit Number	1381N77	1382N77	1383N77	φφ	🖗 🖗
Blocking Disk Kits		SO Size	1	2	3	
A blocking disk closes the ports between manifold stations.	Ki	t Number	1376N77	1378N77	1380N77	
Pilot Port Blocking Plug		ISO Size	1	2	3	
The pilot blocking plug blocks the pilot ports between manifold s	stations.	Kit Numbe	er 1375N7	7 1377N77	1379N77	

		Left Manifold ISO Size	Right Manifold ISO Size	Part Number
ransition Plates		1	2	1387N77
		2	1	1388N77
b bank different manifold sizes together.		2	3	1389N77
		3	2	1390N77

#### Silencers

Port	Thread	Mode	l Number	Avg.	Dimensions inches (mm)		Weight			
Size	Туре	NPT Threads	BSPT Threads	Cv	Α	В	lb (kg)		μ- Δ	
1/4	Male	5500A2003	D5500A2003	1.2	0.9 (21)	2.2 (55)	0.1 (0.1)			H
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)			
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)		B	
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)			
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.									

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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# Single Sub-Bases & Modular Sub-Base Manifolds

	HOW TO ORDER									
	(Choose your options (in red) to configure your valve model number.)									
	R									
		Basic Series Size 1	PS4011			E	Enclosure	es / Lead	Length	
			PS4111			J <sup>†</sup> Cir	rcuit Boar	d, Single <i>I</i>	Address	
	-		PS4211			M <sup>†</sup> Circi	uit Board	, Double A	Address	
						+ Not Available with Su	ubbase Kit	ts.		
						Note: When using the l or "M" option: 12 volts DC - Maximur 24 volts DC - Maximur 120 volts AC - Coils lim available in the connectc 19-Pin Brad Harrison = 240 volts AC - Must use Wires or Terminal Blocks	m number m number nited by the or (25-Pin 16, 12-Pin e "A" or "(	of coils is of coils is number o D-Sub = 2- M23 = 8) C" Option, I	13 21 of pins 4 coils, Lead	
Mountin	ng Base Style / Port Size		Mountir	ng Base St	yle / Po	ort Size		Mountin	ng Base Style / Port Size	
	Sub-base: 3/8 NPT Side Ports	15				PT Side Ports	17		Sub-base: 3/4 NPT Side Ports 19	
-	Sub-base: 3/8 BSPP Side Ports	16*	2		= = •	SPP Side Ports	18*	ŝ	Sub-base: 3/4 BSPP Side Port 10*	
ISO Size	Manifold: 3/8 NPT End Ports	55	Size			PT Bottom / End Port	27	Size	Sub-base: 3/4 NPT Bottom / End Port 29	
ISO	Manifold: 3/8 BSPP End Ports	<b>56*</b>	ISO			SPP Bottom / End Port	28*	ISO	Sub-base: 3/4 BSPP Bottom / End Port 20*	
	Manifold: 3/8 NPT Bottom / End Port	65 <sup>†</sup>			.,	T Bottom / End Port	67		Manifold: 3/4 NPT Bottom / End Port 69	
	Manifold: 3/8 BSPP Bottom / End Port	66*†		ivianifold:	1/2 BS	PP Bottom / End Port	68*		Manifold: 3/4 BSPP Bottom / End Port 60*	

# \*BSPP ISO 1179 Specifications. \*BSPP ISO 1179 Specifications. \*BSPP ISO 1179 Specifications. \*BSPP ISO 1179 Specifications.

# Sub-Base Kits

Automotive Connectors Mounted in 1/2" Conduit Port

- 3-Pin Wired for Single Solenoid
- 4-Pin / 5-Pin Wired for Double Solenoid







# **Sub-Base Manifold Kits**

Automotive Connectors

Mounted in Individual Manifold Conduit Cover

- 3-Pin Wired for Single Solenoid
- 4-Pin / 5-Pin Wired for Double Solenoid







IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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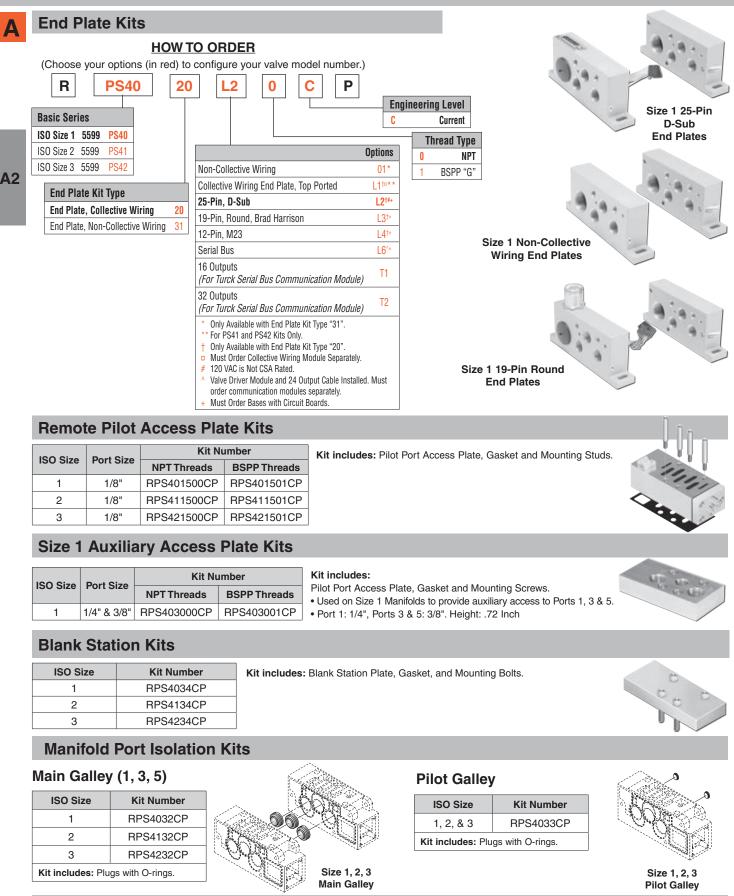
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# End Plate Kits & Accessories

# for ISO 5599/II Valves W65 Series



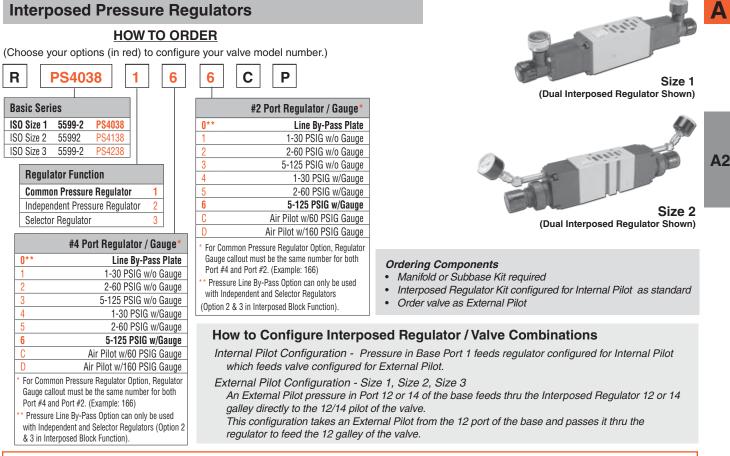
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

A2.18



# Accessories

# for ISO 5599/II Valves W65 Series



WARNING: Double interposed regulators will reverse output ports, the 12 solenoid will pressurize the 4 port, the 14 solenoid will pressurize the 2 port which may cause unexpected, potentially dangerous cylinder movement at valve pressurization.

#### **Gauge Adapter Kit**

Description	Part Number	
Gauge Kit	RPS5651160P	Included with all Size 00 Regulators. Both kits are required on all
1/8" Female to 1/8" Female Coupling	R207P-2*	Size 0 & 00 Regulators when the Regulator is on the last Station
1/8" Male to 1/8" Male Long Nipple	RVS215PNL-2-15*	on the Right (14) End.
* Included in Gauge Kit RPS5651160P.		

#### **Interposed Flow Controls**

ISO Size	Part Number	Both adjustment screws are located on the 12 end of the unit. Interposed Flow Control mounts with its own studs, which means the valve uses standard bolts for mounting.
1	RPS4035CP	Interposed Flow Control is not to be used as a shut off device and is not bubble tight when needles are fully turned down.
2	RPS4135CP	A Interposed Flow Control and Common Port Interposed Regulator may be sandwiched together on a Manifold or Sub-Base.
3	RPS4235CP	The Interposed Flow Control MUST be located between the manifold/subbase and the Common Port Interposed Regulator.

#### Silencers

Port	Thread	Mode	l Number	Avg.	Dimension	<b>s</b> inches (mm)	Weight		
Size	Туре	NPT Threads	<b>BSPT</b> Threads	Cv	Α	В	lb (kg)		1
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		in the
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)	B	9
3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (91)	0.2 (0.1)		
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.								

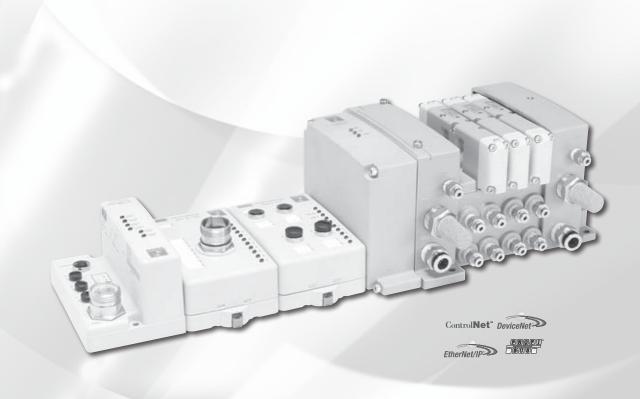






# **ROSS** CONTROLS®

# ROSS Serial Bus Communications



#### **ROSS SERIAL BUS COMMUNICATIONS – KEY FEATURES**

- A complete Serial Bus communication offering for all ISO valves
- Centralized and decentralized pneumatics and I/O configurations
- Communication module supports up to 63 I/O modules, 264 Inputs, and 264 Outputs
- Input modules accept signals from sensors, photo eyes, limits and other field input devices
- Output modules provide signals to remote solenoid valves and other field output devices
- UL, C-UL, and CE certified

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# **ROSS Serial Bus Communications**

#### I/O - Centralized Configuration

A complete Serial Bus communication offering for all ISO valves. UL, C-UL and CE certifications (as marked) Centralized Serial Bus system. Pneumatics and I/O are in close proximity to one another. I/O density per module = 8.

#### I/O - Remote Configuration

A complete Serial Bus communication offering for all ISO valves.

UL, C-UL and CE certifications (as marked) Centralized Serial Bus system.

Pneumatics and I/O are in close proximity to one another. M23, 12-Pin output extension to remote valve island. I/O density per module = 8.



#### I/O - Compartmentalized Remote Configuration

A complete Serial Bus communication offering for all ISO valves. UL, C-UL and CE certifications (as marked). Α

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# Components Selection Steps

1. Select Communication Interface Module

- 2. Select I/O Modules
- 3. Select Valve Driver Module
- 4. Select Terminating Base Module
- 5. Select Optional Power Component
- 6. Select Accessories

## **Serial Bus Product Compatibility**

	DeviceNet™ Adapter RPSSCDM	ControlNet Adapter RPSSCCNA	EtherNet Adapter RPSSCENA	PROFIBUS Adapter RPSSCPBA
PLC-5 <sup>™</sup> with Network Port	IOD	NS	NS	NA
SLC 500 <sup>™</sup> with Network Port	IOD	NS	NS	NA
PLC-5 Processor via Network Module	IOD	NS	NS	3
1756 Logix™ Communication Interface	IOD	IOD	IOD	3
PanelView <sup>™</sup> Terminal	NA	NA	NA	NA
RSLinx™ Software	NA	NA	NA	NA
1769-L20, -L30 Controller with 1761- NET Interface	NA	NS	NS	NA
1769-L32E, -35E	NA	NA	IOD	NA
1769-L32C, -35CR	NA	IOD	NA	NA
1769 CompactLogix™ Communication Interface	IOD	NA	NA	3*
SoftLogix5800™ Communication Interface	IOD	IOD	IOD	3*
PC with RSLinx Only	NS	NS	NS	NA
FlexLogic <sup>™</sup> Communication Interface	IOD	IOD	IOD	3
IOD = I/O Data, NS = Not Supported, NA = Not Applicable 3 = Requires third party scanner module * Hilscher North America				<u>.</u>

# **Communication Considerations**

Serial Bus features are impacted by your network choice.

Network	Impact
DeviceNet™ RPSSCDM12A and RPSSCDM18PA	The RPSSCDM12A and RPSSCDM18PA provide two means of connecting a node of I/O to DeviceNet <sup>™</sup> . A total of 63 Serial Bus modules can be assembled on a single DeviceNet <sup>™</sup> node. Expansion power supplies may be used to provide additional PointBus backplane current.
ControlNet™ RPSSCCNA	A total of 63 Serial Bus modules can be assembled on a single ControlNet™ node. Expansion power supplies may be used to provide additional PointBus backplane current. Up to 25 direct connections and 5 rack connections are allowed.
EtherNet/IP™ RPSSCENA	A total of 63 Serial Bus modules can be assembled on a single EtherNet / IP node. Expansion power supplies may be used to provide additional PointBus backplane current. Refer to the User Manual, Bulletin 601 (form #A10311) to determine the ratings for direct and rack connections allowed.
PROFIBUS DP™ RPSSCPBA	A total of 63 Serial Bus modules can be assembled on a single PROFIBUS node. Expansion power supplies may be used to provide additional PointBus backplane current.



# **ROSS Serial Bus Communications**

#### **Communication Modules\***

Network	Model Number	Voltage
<sup>†§</sup> DeviceNet <sup>™</sup> (M18 or M12)	RPSSCDM18PA (M18) or RPSSCDM12A (M12)	10 to 28.8 volts DC
<sup>†§</sup> ControlNet™	RPSSCCNA	10 to 28.8 volts DC
<sup>†§</sup> Ethernet I/P™	RPSSCENA	10 to 28.8 volts DC
†§ Profibus-DP®	RPSSCPBA	10 to 28.8 volts DC
* ID67 Cortified		

IP67 Certified.

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- <sup>+</sup> Reference the following Documents for Installation Instructions. DeviceNet<sup>™</sup> A10313, A10311; ControlNet<sup>™</sup> A10315.
- Ethernet I/P A10316; Profibus-DP A10314.

§ Requires a RPSST8M23A or RPSSV32A in all manifold assemblies. RPSSV32A is included in factory assembled manifolds and Serial Bus End Plate Kits.

EDS and GSD files located at www.rosscontrols.com

#### **A3** I/O Modules\*

Ne	etwork	Model Number	Voltage
t	8 Digital Inputs M12 (NPN Sinking - Requires PNP Sourcing Input Device)	RPSSN8M12A	10 to 28.8 volts DC
t	8 Digital Inputs M12 (PNP Sourcing - Requires NPN Sinking Input Device)	RPSSP8M12A	10 to 28.8 volts DC
t	8 Digital Inputs M8 (NPN Sinking - Requires PNP Sourcing Input Device)	RPSSN8M8A	10 to 28.8 volts DC
t	8 Digital Inputs M8 (PNP Sourcing - Requires NPN Sinking Input Device)	RPSSP8M8A	10 to 28.8 volts DC
t	8 Digital Inputs M23 12-Pin (PNP Sourcing - Requires NPN Sinking Input Device)	RPSSP8M23A	10 to 28.8 volts DC
t	8 Digital Inputs M23 12-Pin (NPN Sinking - Requires PNP Sourcing Input Device)	RPSSN8M23A	10 to 28.8 volts DC
+	8 Digital Outputs M12 (PNP Sourcing)	RPSST8M12A	10 to 28.8 volts DC
+	8 Digital Outputs M8 (PNP Sourcing)	RPSST8M8A	10 to 28.8 volts DC
§	4 Digital Output, High Watt Relay M12 (PNP Sourcing) (2 Amp)	RPSTR4M12A	24 volts DC
+#	8 Digital Outputs M23 (PNP Sourcing)	RPSST8M23A	10 to 28.8 volts DC
ŧ	2 Analog Inputs Voltage (M12)	RPSSNAVM12A	0 to 10V ± 10V
ŧ	2 Analog Inputs Current (M12)	RPSSNACM12A	4 to 20mA or 0 to 20mA
	2 Analog Outputs Voltage (M12)	RPSSTAVM12A	0 to 10V ± 10V
		RPSSTACM12A	4 to 20mA or 0 to 20mA

**RPSSCENA** .... **RPSSCCNA** 



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# Can be used with RPSSTERM.

# **ROSS Serial Bus Communications**









**RPSSEXT1** 



RP8BPA00MA

#### **Valve Driver Module**

Description	ISO Size	Model Number			
32 Point Module	00, 0, 1, 2, & 3	RPSSV32A*†			
24 Output Cable	00 & 0	RPS5624P <sup>†</sup>			
25 - 32 Output Cable	00 & 0	RPS5632P <sup>†</sup>			
24 Output Cable	1, 2, & 3	RPS4024P <sup>†</sup>			
<ul> <li>* Reference Document A10312 for Installation Instructions. See www.rosscontrols.com</li> <li>* Serial Bus Manifold assemblies and end plate kits include a valve driver module (RPSSV32A) and cable. Series W66, Size 00 / Series W66, Size 0 24 output manifolds require a RPS5624P.</li> </ul>					

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Series W66, Size 00 / Series W66, Size 0 32 output manifolds require a RPS5624P + RPS5632P.

Size 1, 2, & 3 manifolds require a RPS4024P, allowing 21 outputs.

# **Terminating Base Module**

Description	Model Number			
Terminating Module	RPSSTERM			
Used as the last Terminating Module for a Stand Alone Serial Bus Assembly. A RPSST8M23A must be located in the Serial Bus assembly.				

# **Power Extender Module**

Description	Voltage	Model Number					
Field Power Module         24 volts DC         RPSSSE24A							
A Power Extender Module must be used on every 12th Module in an Serial Bus assembly. See www.rosscontrols.com							
Reference Document A10317 and A10311 for configuration instructions.							
See www.rosscontrols.com							

# **Bus Extender Cable**

Description	escription Voltage Model Nu		
1 Meter Cable*	24 volts DC	RPSSEXT1	
3 Meter Cable*	24 volts DC	RPSSEXT2	
* Requires a RPSSSE24A Power Extender Module. IP67 Certified.			
See www.rosscontrols.com			

## **Devicebus Terminating Resistor**

Description	Model Number
DeviceNet™ M12 Type A	RP8BPA00MA
Profibus-DP M12 Type B	RP8BPA00MB

**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS**, **WARNINGS** on the inside back cover.



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# **ROSS Serial Bus System**

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#### **Communication Modules\***

Network		Model Number	Voltage	
<sup>†§</sup> DeviceNet <sup>™</sup> (M18 or M12)	RPSSCDM18PA (M18) or RPSSCDM12A (M12)		10 to 28.8 volts	DC
<sup>†§</sup> ControlNet™	RPSS	CCNA	10 to 28.8 volts	DC
<sup>†§</sup> Ethernet I/P <sup>™</sup>	RPSS	CENA	10 to 28.8 volts	DC
<sup>†§</sup> Profibus-DP®	RPSS	СРВА	10 to 28.8 volts	DC
<ul> <li>* IP67 Certified.</li> <li>* Reference the following Documents for Installation Instructions. DeviceNet<sup>™</sup> - A10313, A10311; ControlNet<sup>™</sup> - A10315. Ethernet I/P - A10316; Profibus-DP - A10314.</li> <li>§ Requires a RPSST8M23A or RPSSV32A in all manifold assemblies. RPSSV32A is included in factory assembled manifolds and Serial Bus End Plate Kits.</li> </ul>				
EDS and GSD files located at www.rosscontrols.com				
General Environmental				
Operating Temperature		-4° to 140° F		
Storage Temperature		-40° to 185° F		
Relative Humidity		5 to 95% non-condensing		
Vibration		5g @ 10 to 500Hz		
Protection Class		Operating 30g; Non-operating 50g		
Shock IP 6		IP 65/66/67		

UL, C-UL, CE



## Maximum Size Layout

Approvals

Part Number	PointBus Current (mA)	Maximum I/O Modules with 24VDC Backplane Current at 75 mA each	Maximum I/O Modules with Expansion Power Supplies	Maximum Number of I/O Module Connections
RPSSCDM12A on DeviceNet™				
RPSSCDM18PA on DeviceNet™	1000			
RPSSCCNA on ControlNet™				5 rack and 20 direct
RPSSCENA on EtherNet/IP™			22	20 total connections including rack and direct
RPSSCPBA on PROFIBUS		Up to 13	63	
RPSSSE24A Expansion Power	Horizontal mounting: 1A@5V DC for 1019.2V input; 1.3A @ 5V DC for 19.228.8V input Vertical mounting: 1A @ 5V DC for 1028.8V input			Not to exceed scanner capacity

# **Power Supply Distance Rating**

Modules are placed to the right of the power supply. Each Serial Bus module can be placed in any of the slots to the right of the power supply until the usable backplane current of that supply has been exhausted. An adapter provides 1 A current to the PointBus. The RPSSSE24A provides up to 1.3 A and I/O modules require from 75 mA (typical for the digital and analog I/O modules) up to 90 mA or more.

#### **PointBus Current Requirements**

Part Number	PointBus Current Requirements
RPSSN8xxx	
RPSSP8xxx	75 mA
RPSST8xxx	
RPSSTR4MRA	90 mA
RPSSNACM12A	
RPSSTACM12A	
RPSSNAVM12A	75 mA
RPSSTAVM12A	
RPSSV32A	

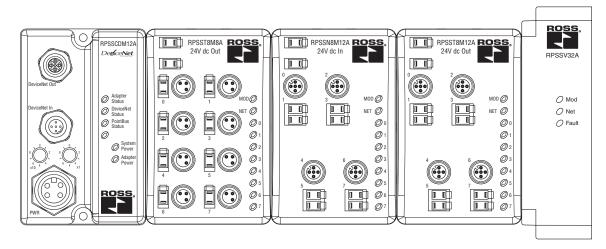


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The Serial Bus family of I/O modules includes:

- Digital I/O Modules
- Analog I/O Modules
- Valve Driver Module



# **Digital DC Input Modules**

	RPSSN8M8A RPSSN8M12A RPSSN8M23A	RPSSP8M8A RPSSP8M12A RPSSP8M23A	
Number of Inputs	8 Sinking	8 Sourcing	
Keyswitch Position	1	1	
Voltage, On-State Input, Nom.	24 volts DC	24 volts DC	
Voltage, On-State Input, Min.	10 volts DC	10 volts DC	
Voltage, On-State Input, Max.	28.8 volts DC	28.8 volts DC	
Input Delay Time, ON to OFF	0.5 ms Hardware + (065 ms selectable)*	0.5 ms Hardware + (065 ms selectable)*	
Current, On-State Input, Min.	2 mA	2 mA	
Current, On-State Input, Max.	5 mA	5 mA	
Current, Off-State Input, Max.	1.5 mA	1.5 mA	
PointBus Current (mA)	75	75	
Power Dissipation, Max.	1.0 W @ 28.8 volts DC	1.0 W @ 28.8 volts DC	
* Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.			

# **Digital DC Output Modules**

	RPSST8M8A RPSST8M12A RPSST8M23A
Number of Outputs	8 sourcing
Keyswitch Position	1
Voltage, On-State Output, Nom.	24 volts DC
Voltage, On-State Output, Min.	10 volts DC
Voltage, On-State Output, Max.	28.8 volts DC
Output Current Rating, Max.	3.0 A per module, 1.0 A per channel
PointBus Current (mA)	75
Power Dissipation, Max.	1.2 W @ 28.8 volts DC

# **Relay Output Module**

	RPSSTR4M12A	
Number of Outputs	4 Form A (N.O.) relays, isolated	
Keyswitch Position	7	
Output Delay Time, ON to OFF, Max.	26 ms*	
Contact Resistance, Initial	30 mΩ	
Current Leakage, Off-State Output, Max.	1.2 mA and bleed resistor thru snubber circuit @ 240 volts AC	
PointBus Current (mA)	90	
Power Dissipation, Max.	0.5 W	
*Time from valid output off signal to relay de-energization by module.		

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#### **Analog Input Modules**

#### **Analog Output Modules**

- · ·		
Model Number	RPSSNACM12A	RPSSNAVM12A
Number of Inputs	2	2
Keyswitch Position	3	3
Input Signal Range	420 mA 020 mA	010V ±10V
Input Resolution, Bits	16 bits - over 21 mA 0.32 μA/cnt	15 bits plus sign 320 μV/cnt in unipolar or bipolar mode
Absolute Accuracy, Current Input	0.1% Full Scale @ 25°C*†	—
Absolute Accuracy, Voltage Input	_	0.1% Full Scale @ 25°C* <sup>†</sup>
Input Step Response, per Channel	70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz	70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz
Input Conversion Type	Delta Sigma	Delta Sigma
PointBus Current (mA)	75	75
Power Dissipation, Max.	0.6 W @ 28.8 volts DC	0.6 W @ 28.8 volts DC
* Includes offset gain	non-linearity and repeatability	error terms

5 1		
Model Number	RPSSTACM12A	RPSSTAVM12A
Number of Outputs	2	2
Keyswitch Position	4	4
Output Signal Range	420 mA 020 mA	010V ±10V
Output Resolution, Bits	13 bits - over 21 mA 2.5 μA/cnt	14 bits (13 plus sign) 1.28 mV/cnt in unipolar or bipolar mode
Absolute Accuracy, Current Output	0.1% Full Scale @ 25°C* <sup>†</sup>	_
Absolute Accuracy, Voltage Output	_	0.1% Full Scale @ 25°C*†
Step Response to 63% of FS,	24 µs	— Current Output
Step Response to 63% of FS,	_	20 µs Voltage Output
Output Conversion Rate	16 µs	20 µs
PointBus Current (mA)	75	75
Power Dissipation, Max.	1.0 W @ 28.8 volts DC	1.0 W @ 28.8 volts DC
* Includes offset, gain, non-lir	nearity and repeatability er	ror terms.
<sup>†</sup> Analog output modules sup	port these configurable par	rameters and diagnostics

Analog output modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting (RPSSTACM12A only); fault mode; idle mode; alarms; channel signal range and on-board scaling.

\* Includes offset, gain, non-linearity and repeatability error terms.

Analog input modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting; four-alarm and annunciation set-points; calibration mode and electronic reporting; under- and over-range and electronic reporting; channel signal range and update rate and on-board scaling; filter-type; channel update rate.

# Step 3 Select Valve Driver Module for ROSS Bus System

#### Valve Driver Module Specifications

Model Number	RPSSV32A	
Outputs per Module	32, sourcing	
Voltage Drop, On-State Output, Maximum	0.2 volts DC	
Voltage, Off-State Output, Maximum	28.8 volts DC	
Voltage, On-State Output, Maximum Minimum Nominal	28.8 volts DC 10 volts DC 24 volts DC	
Output Current Rating	200 mA per channel, not to exceed 6.0 A per module	
Output Surge Current, Maximum	0.5 A for 10 ms, repeatable every 3 seconds	
Current Leakage, Off-State Output, Maximum	0.1 mA	
Current, On-State Output Minimum	200 mA per channel	
Output Delay Time OFF to ON, Maximum <sup>1</sup>	0.1 ms	
Output Delay Time, ON to OFF, Maximum <sup>1</sup>	0.1 ms	
External DC Power Supply Voltage Range	10 to 28.8 volts DC	
External DC Power Supply Voltage Nominal	24 volts DC	
<ol> <li>OFF to ON or ON to OFF delay is time from a valid output "on" or "off" signal to output energization or de-energization.</li> </ol>		



The RPSSV32A valve driver module provides an interface between the Serial Bus system and the valve assembly. This module will always be the last module on the Serial Bus. It controls 32 digital outputs at 24 volts DC. Depending on the valve selection, it can control up to 32 single solenoid valves or 16 double solenoid valves.



# Select the Appropriate Power Supply Unit

Serial Bus adapters have built-in PointBus power supplies. All Serial Bus modules are powered from the PointBus by either an adapter or expansion power supply.

#### **Power Specifications**

Part Number	Power Supply Input Voltage, Nom.	Operating Voltage Range	Field Side Power Requirements, Max.	Power Supply Inrush Current, Max.	Input Overvoltage Protection	Power Supply Interruption Protection
RPSSCDM12A						
RPSSCDM18PA						
RPSSCCNA	24 volts DC	10 00 0 volto DC	24 volts DC	C A for 10 mg	Reverse polarity	Output voltage will stay within specifications when
RPSSCENA	24 VOIIS DC	1028.8 volts DC	(+20% = 28.8VDC) @ 400 mA	6 A for 10 ms	protected	input drops out for max. load
RPSSCPBA						
RPSSSE24A						
	Power units are divided into two categories: • Communication adapters with built-in power supply (DC-DC)					

Expansion power supply

Expansion Power Unit

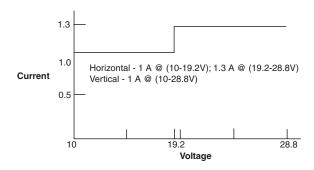
The RPSSSE24A expansion power unit passes 24 volts DC field power to the I/O modules to the right of it. This unit extends the backplane bus power and creates a new field voltage partition segment for driving field devices for up to 13 I/O modules. The expansion power unit separates field power from I/O modules to the left of the unit, effectively providing functional and logical partitioning for:

- Separating field power between input and output modules
- Separating field power to the analog and digital modules
- Grouping modules to perform a specific task or function

You can use multiple expansion power units with any of the communication adapters to assemble a full system. If you are using the RPSSCDM12A adapter, you may use a RPSSSE24A expansion power unit to add additional modules. For example, if you had a 36 module system with a RPSSCDM12A adapter, you would have at least two or more RPSSSE24A expansion power units to provide more PointBus current for modules to the right of the supply.

- · 24 volts DC to 5 volts DC converter
- 1.3A, 5 volts DC output (extend backplane power)
- Starts new voltage distribution
- Partitioning

#### **RPSSSE24A Current Derating for Mounting**



#### **Power Distribution General Specifications**

Model Number	RPSSSE24A
Power Supply Requirements	Note: In order to comply with CE Low Voltage Directives (LVD), you must use a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter
Field Side Power Requirements	24 volts DC (+20% = 28.8 volts DC max.) @ 400 mA
Inrush Current, Max.	6 A for 10 ms
Input Overvoltage Protection	Reverse polarity protected
Power Supply Interruption Protection	Output voltage will stay within specifications when input drops out for 10 ms at 10V with max. load
Power Supply Input Voltage, Nom.	24 volts DC
Operating Voltage Range	1028.8 volts DC
Power Consumption, Max.	9.8 W @ 28.8 volts DC
Power Dissipation, Max.	3.0 W @ 28.8 volts DC
Thermal Dissipation, Max.	10.0 BTU/hr @ 28.8 volts DC
Isolation Voltage	1250 V rms
Field Power Bus Supply Voltage, Nom.	12 volts DC or 24 volts DC
Field Power Bus Supply Current, Max.	10 A



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# Serial Bus Digital Input Module Cables

Part Number	For Using:	Recommended Rockwell Automation Patchcord (double-ended)	Recommended Rockwell Automation Male Cordset (single-ended)	
RPSSN8M12A	2 inputs per connector	879D-F4ACDM-x	879-C3AEDM4-5	
RPSSP8M12A	1 input per connector	889D-F4ACDM-x	889D-M4AC-y	
RPSSN8M8A	3-Pin Pico connectors 889P-F3ABPM-x			
RPSSP8M8A	4-Pin Pico connectors	889P-F4ABPM3-x	889P-M3AB-y	
RPSSN8M23A				
RPSSP8M23A	M23, 12-Pin	889M-F12AHMU-z	_	
RPSST8M23A				
x = length in meters (1, 2, 3, 5, and 10 standard) y = length in meters (2, 5, and 10 standard) z = length in meters (1, 2, and 3 standard)				
For more cables and cordsets, please refer to www.connector.com				

# Serial Bus Analog Inputs and Outputs

Part Number	For Using:	Recommended Cable	
RPSSNAVM12A	1 input per connector		
RPSSNACM12A	1 input per connector	804507P20M020 (Shielded)*	
RPSSTAVM12A	1		
RPSSTACM12A	- 1 output per connector		
* Refer to www.connector.com			

# Serial Bus Digital Output Module Cables

Part Number	For Using:	Recommended Rockwell Automation Patchcord (double-ended)	Recommended Rockwell Automation Male Cordset (single-ended)	
RPSST8M12A	2 inputs per connector	879D-F4ACDM-x	879-C3AEDM4-5	
RESSIONIZA	1 input per connector	889D-F4ACDM-x	889D-M4AC-y	
RPSST8M8A	3-Pin Pico connectors	889P-F3ABPM-x		
RPSSTOWOA	4-Pin Pico connectors	889P-F4ABPM3-x	889P-M3AB-y	
x = length in meters (1, 2, 3, 5, and 10 standard) y = length in meters (2, 5, and 10 standard)				
For more cables and cordsets, please refer to www.connector.com				

# Serial Bus Relay Output Module Cables

Part Number	Recommended Rockwell Automation Patchcord (double-ended)	Recommended Rockwell Automation Male Cordset (single-ended)		
RPSSTR4M12A	889D-F4ACDM-x	889D-M4AC-y		
x = length in meters (1, 2, 3, 5, and 10 standard) y = length in meters (2, 5, and 10 standard) For more cables and cordsets, please refer to www.connector.com				



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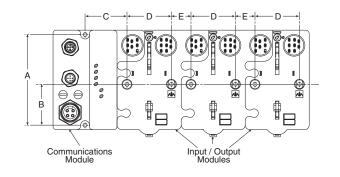
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## Serial Bus DeviceNet<sup>™</sup> and Auxiliary Power Cables

Part Number	Network	Recommended Rockwell Automation Network Cable	Recommended Rockwell Automation Auxiliary Power Cables	
		KwikLink Flat Media system standard drop cable: 1485K-PzF5-R5		
RPSSCDM12A RPSSCDM18PA	DeviceNet™	Thin Round system standard drop cable: 1485R-PzN5-M5		
		Thick Round system standard drop cable: 1485C-PzN5-M5		
RPSSCCNA ControlNet™		BNC to TNC Connector is required when using BNC Cordsets. See www.amphenolrf.com	Standard Cordset (single-ended): 889N-F5AFC-y Standard Patchcord (double-ended): 889N-F4AFNC-x	
RPSSCENA	EtherNet/IP™	_		
RPSSCPBA PROFIBUS DP —		Standard Cordset (single-ended): 889N-F5AFC-y		
x = length in meters (1, 2, y = length in feet (6, 12, ar z = length in feet (1, 2, 3, 4 For more cables and cords	nd 20 standard) 4, 5, and 6 standard)	v.connector.com		

#### Serial Bus Valve Driver Module Harness Assemblies

ISO Size	Part Number		
150 5126	1 to 24 Outputs	25 to 32 Outputs	
0 and Size 00	RPS5624P	RPS5632P	
1, 2, & 3	RPS4024P	RPS4032P	



Dimensions - inches (mm)					
Α	В	С	D	E	F
4.0 (102)	1.8 (46)	1.9 (48)	2.0 (50)	0.87 (22)	0.43 (11)

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



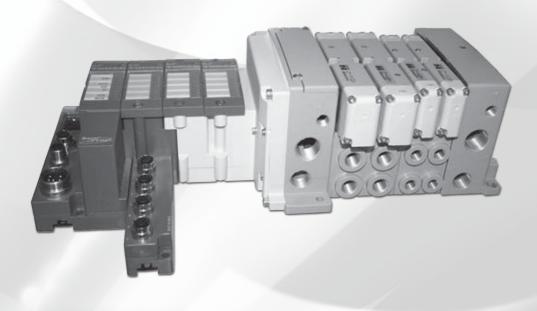
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# **ROSS** CONTROLS®

# **ROSS SERIAL BUS SYSTEM** WITH **TURCK MODULAR I/O**



#### ROSS Serial Bus System with TURCK Modular I/O – KEY FEATURES

- A complete Centralized Serial Bus communication offering for all ISO valves
- I/O system based on the TURCK Modular Industrial I/O System BL 67
- Communication module supports up to 32 station modules each supporting up to 8 I/O modules
- Input modules accept signals from sensors, photo eyes, limits and other field input devices
- Output modules provide signals to remote solenoid valves and other field output devices
- UL, C-UL, and CE certified

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I/O System BL 67	A4.3 - A4.4
Select Communication Module	A4.5
Select Input/Output Module	A4.6
Select Optionals	A4.7
Select Base Modules for BL67 I/O	A4.8
Base Module Dimensions and Pinouts	A4.9
Turck Warranty	A4.10



**A4** 

# The BL67 Solution

BL67 combines all the flexibility of an in-the-cabinet PLC I/O system with modularity, ruggedness and connectorization.

BL67 complements the AIM<sup>™</sup>, BL20 and piconet<sup>®</sup> product families to meet the needs of unique applications, such as small machine or conveyor systems requiring IP 67 protection.

## The BL67 Concept

The BL67 modular concept is a very flexible approach to connectorized I/O. The gateway, base and electronic modules provide many benefits to the user.

- The gateway provides communication between the fieldbus and I/O modules; modules are not dependent on the fieldbus protocol.
- DIN-rail or frame mountable base modules are available with eurofast® (M12), minifast® (7/8-16UN), M23 and picofast® (M8) connectors.
- Electronic modules are hot swappable.
- · Power distribution module (24 volts DC) supplies the connected I/O signals.

BL67's openness, flexibility, connectorization, compact housing and ruggedness provide a viable alternative to in-the-cabinet I/O.

# **Environmental Conditions**

#### Intended Application Environments

- BL67 does not need an enclosure
- · Mount directly on machine or conveyor
- Rugged design provides protection against dirt, dust and liquids

#### Not intended for These Environments

- Continuous submersion
- 100 percent humidity
- High pressure washdown

Note: For higher levels of protection consider fully potted AIM stations.

General Environmental			
Potential isolation	Via optocoupler		
Operating temperature	32° to +131°F (0° to +55°C)		
Storage temperature	-13° to +185°F (-25° to +85°C)		
Relative humidity	5 to 95% (indoor), noncondensing		
Vibration	1.0 g 5-10 Hz		
Shock	15 g		
Protection class	IP 67, NEMA 1, 3, 4, 12, 13		
Electromagnetic compatibility (EMC)	According to EN 61131-2		
Housing material	PC-V0 (Lexan), Nickel plated brass		
Approvals	CE		
	UL		
	CSA		

#### Maximum Size of a BL67 Station

BL67 stations consist of a gateway and a maximum of 32 modules (equivalent to 1 m station length). Some high-tech and analog I/O modules may consume or produce large amounts of data, and therefore may limit the number of modules that may be used per system. It is highly recommended that the I/O assistant software is used when planning and commissioning BL67 systems. This program allows you to build the BL67 node on your computer and verify that all restrictions with regard to power and size are met. The free I/O assistant software is available for download from www.turck.com.

#### Addressing

As a node on a network, BL67 stations are addressed dependent on the network system being used. Each network gateway has a set of rotary switches used to set the address for the node. DeviceNet<sup>™</sup> and CANopen gateways may be addressed between 0 and 63 via two switches (one for the 10's digit and one for the 1's digit). For example, to set the address to 37 you would set the 10's switch to 3 and the 1's switch to 7. The third switch on the gateway may be used to set the communication rate of the network interface. PROFIBUS®-DP gateways may be set from 1 to 125 by using three switches (one for the 10's, one for the 10's and one for the 1's).

Ethernet gateways allow different addressing schemes depending on the Ethernet addressing method being used in the overall system. Dynamic addressing schemes include BootP and DHCP, while hard-coding a static address is also allowed.



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www.rosscontrols.com

# **BL67 Power Distribution**

#### **Power Overview**

The power supply for a BL67 station is fed via the power connector on the PROFIBUS<sup>®</sup> gateway or directly from the network on the DeviceNet<sup>™</sup> gateway. Power feeder modules can be added to the system at any point to provide a fresh isolated supply of power to all I/O connected to its right.

## Internal Power Consumption via Module Bus

The amount of BL67 modules that may be supplied via the internal module bus depends on the respective nominal current IMB of the individual modules on the module bus. The sum of the nominal current inputs of the connected BL67 module must not exceed 1.5 A. If the I/O assistant software is used, an error message is generated automatically via the <Station - Verify> as soon as the system supply via the module bus is no longer sufficiently guaranteed.

To calculate current draw on DeviceNet: Add IMB(24) for all modules. Then add VI and VO for electronic modules to the left of the first power feed module. Next, add the current draw of the I/O devices.

To calculate current draw on PROFIBUS gateway power connector for VI: Add IMB for all modules. Then add VI current for all modules to the left of the first power feed module. Next, add the current draw of the input devices.

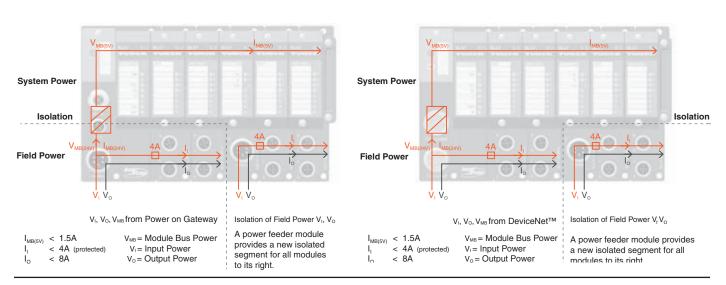
For VO, add the VO current for all modules to the left of the first power feed module. Next, add the current draw of the output devices.

VMB = Module bus power VI = Input power VO = Output power IMB = Module bus current IMB(24) = Effective current draw from gateway at 24 volts DC supply.

Module	Nominal 1 Current at 5 V I <sub>MB</sub>	Effective Draw 2 from Gateway at 24 VDC I <sub>MB(24)</sub>	Nominal 3 Current from V <sub>1</sub>	Nominal 4 Current from V <sub>o</sub>
BL67-GW-DPV1	-	≤150 mA		
BL67-GW-DN	-	≤100 mA		
BL67-PF-24VDC	≤30 mA	≤9 mA		
BL67-4DI-P	≤30 mA	≤9 mA	≤40 mA	
BL67-8DI-P	≤30 mA	≤9 mA	≤40 mA	
BL67-4DO-0.5A-P	≤30 mA	≤9 mA		≤100 mA
BL67-4DO-2A-P	≤30 mA	≤9 mA		≤100 mA
BL67-8DO-0.5A-P	≤30 mA	≤9 mA		≤100 mA
BL67-2AI-V	≤35 mA	≤10 mA	≤12 mA	
BL67-2AI-I	≤35 mA	≤10 mA	≤12 mA	
BL67-2AI-TC	≤35 mA	≤10 mA	≤30 mA	
BL67-2AI-PT	≤45 mA	≤13 mA	≤45 mA	
BL67-2AO-I	≤40 mA	≤12 mA		≤50 mA
BL67-2AO-V	≤60 mA	≤17 mA		≤50 mA
BL67-1RS232	≤100 mA	≤28 mA	≤50 mA	
BL67-8XSG-PD	≤30 mA	≤9 mA		≤100 mA
BL67-1SSI	≤50 mA	≤15 mA	≤50 mA	
BL67-4DI-PD	≤30 mA	≤9 mA		≤100 mA
BL67-8DI-PD	≤30 mA	≤9 mA		v100 mA

# **Applying Power to BL67**

DeviceNet<sup>™</sup> System



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

# PROFIBUS<sup>®</sup>, Ethernet and CANopen System

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Reserved.



#### General Environmental

DeviceNet Gateway	BL67-GW-DN
ModBus TCP/IP, Ethernet Gateways	BL67-GW-EN BL67-PG-EN (programmable)
Ethernet IP, Ethernet Gateways	BL67-GW-EN-IP BL67-PG-EN-IP (programmable)
Profinet, Ethernet Gateways	BL67-GW-EN-PN
PROFIBUS-DP Gateway	BL67-GW-DPV1 BL67-PG-DP (programmable)
CANopen Gateway	BL67-GW-CO
IP67 Certified	

IP67 Certified.

Reference the following Document for installation instructions: AXXXXX See www.rosscontrols.com

#### Electrical:

- Operating Current: <600 mA from  $V_{MB}$
- Input Supply Current: <4 A (from V<sub>1</sub>)
- Output Supply Current: <8 A (from V<sub>o</sub>)
- Backplane Current: <1.5 A (from  $V_{\mbox{\scriptsize MB})}$

#### Mechanical: • Operating Temperature: -12 to +55°C (-13 to +131°F)

- Protection: IP 67
- Vibration: 5 g @ 10-500 Hz

#### Material:

Housing: PC-V0 (Lexan)

#### **Diagnostics (Logical)**

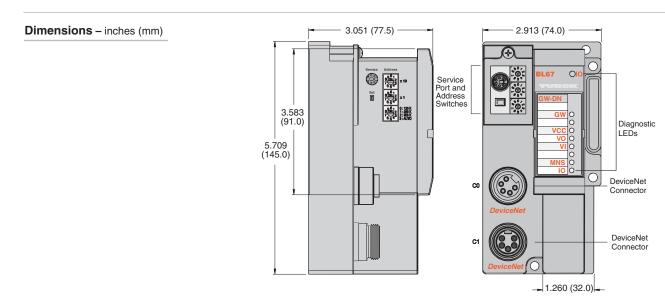
Diagnostic information available through the DeviceNet I/O map

#### **Diagnostics (Physical)**

• LEDs to indicate status of DeviceNet and Module Bus communication

#### Programmability

- PG in part number designates a programmable gateway
- Progammable according to IEC 61131.3 using CodeSys (includes ladder logic)
- Use CodeSys to create logic programs to control local I/O





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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

# **TURCK Serial Bus System**



**A**4

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# Step 2 Select Input/Output Module

# **TURCK Serial Bus System**

# A

#### **Power Distribution**

Inputs: V<sub>1</sub> Outputs: V<sub>0</sub> Logic: V<sub>MB</sub>

#### Mechanical:

Operating Temperature: +32 to +131°F (0 to +55°C) Protection: NEMA 1,3,4,12,13 / IEC IP 67 Vibration: 5 g @ 10 – 500 Hz

#### Material:

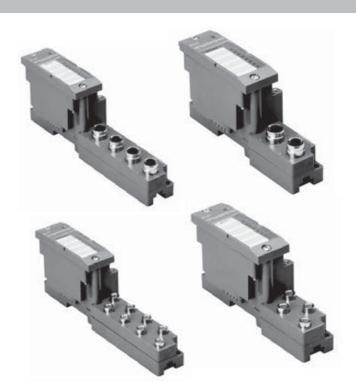
Connectors: Nickel-plated brass Housing PC-VO (Lexan)

#### **Diagnostics (Logical)**

Diagnostic information available through the fieldbus gateway

#### A4 Diagnostics (Physical)

LEDs to indicate status of DeviceNet and Module Bus communication LEDs for each I/O point to indicate on/off status



				Оре	rating Curre	ent	Output	_		
Model Description	Inputs	Outputs	Part Number	from V <sub>MB</sub>	from V <sub>1</sub>	from V <sub>o</sub>	Current from V <sub>o</sub>	Туре		
Inputs	1		1	I	1			1		
Discrete Inputs	4		BL67-4DI-P	<30 mA	<40 mA			PNP		
Discrete Inputs	4		BL67-4DI-N	<30 mA	<1 mA			NPN		
Discrete Inputs	8		BL67-8DI-P	<30 mA	<40 mA			PNP		
Discrete Inputs	8		BL67-8DI-N	<30 mA	<1 mA			NPN		
Discrete Inputs	4		BL67-4DI-PD	<30 mA	<100 mA			PNP		
Discrete Inputs	8		BL67-8DI-PD	<30 mA	<100 mA			PNP		
Analog Inputs	2		BL67-2AI-V	<35 mA	<12 mA			-10/0 to 10V		
Analog Inputs	2		BL67-4DI-I	<35 mA	<12 mA			0/4 to 20mA		
Analog Inputs	2		BL67-4DI-V/I	<35 mA	A <12 mA			-10/0 to 10V, 0/4 to 20mA		
Temperature Inputs	2		BL67-2AI-TC	<35 mA	:35 mA <30 mA			Thermocouple		
Temperature Inputs	2		BL67-2AI-PT	<45 mA	nA <30 mA			RTD		
Outputs										
Discrete Outputs		4	BL67-4DO-0.5A-P	<30 mA		<100 mA	<0.5 A	PNP		
Discrete Outputs		4	BL67-4DO-2A-P	<30 mA	<100 m		<2 A	PNP		
Discrete Outputs		4	BL67-4DO-2A-N	<30 mA		<100 mA	<2 A	NPN		
Discrete Outputs		8	BL67-8DO-0.5A-P	<30 mA		<100 mA	<0.5 A	PNP		
Discrete Outputs		16	BL67-16DO-0.5A-P	<30 mA		<100 mA	<0.5 A	PNP		
Analog Outputs		2	BL67-2AO-V	<60 mA	<50 mA			-10/0 to 10V		
Analog Outputs		2	BL67-2AO-I	<40 mA	<50 mA			0/4 to 20mA		
Inputs / Outputs		·	• •					• •		
Discrete Inputs /Outputs	8	8	BL67-8XSG-P	<30 mA		<100 mA	<0.5 A	PNP		
Discrete Inputs /Outputs	8	8	BL67-8XSG-PD	<30 mA		<100 mA	<0.5 A	PNP		
Discrete Inputs /Outputs	4	4	BL67-4DI4DO-PD	<30 mA		<100 mA	<0.5 A	PNP		



## Select Optional CANopen Interface / Serial Communication Modules

#### Power Distribution

Inputs: V<sub>1</sub> Outputs: V<sub>0</sub> Logic: V<sub>MB</sub>

#### Mechanical:

Operating Temperature: +32 to +131°F (0 to +55°C) Protection: NEMA 1,3,4,12,13 / IEC IP 67 Vibration: 5 g @ 10 – 500 Hz

#### Material:

- Connectors: Nickel-plated brass
- Housing: PC-VO (Lexan)

#### Diagnostics (Logical):

· Diagnostic information available through the fieldbus gateway

#### **Diagnostics (Physical):**

- · LED to indicate module bus communication status as well as I/O diagnostics
- LEDs for each I/O point to indicate on/off status

#### **Functional Description:**

- Connect up to 8 CANopen slaves to this module
- Map the slaves into any available fieldbus

Model Description	Model Number	Operating Current							
Model Description	model Number	from V <sub>MB</sub>	from V	from V Supply					
Inputs									
Discrete Inputs	BL67-4DI-P	<30 mA	<50 mA	<100 mA					
Outputs									
Discrete Outputs	BL67-1RS485/422	<140 mA	<50 mA						
Discrete Outputs	BL67-1RS232	<60 mA	<50 mA						
Discrete Outputs	BL67-1SSI	<50 mA	<50 mA						

# Select Optional CANopen Interface / Serial Communication Modules

#### Electrical:

Operating CurrentInputs: V1 Outputs: V0 Logic: VMB **Power Distribution:** Accepts 24 volts DC supply to provide V1 and V0 for downstream modules **Material:** Connectors: Nickel-plated brass Housing PC-VO (Lexan) **Diagnostics (Logical)** Diagnostic information available through the fieldbus gateway **Diagnostics (Physical)** LEDs to indicate status of DeviceNet and Module Bus communication LEDs for each I/O point to indicate on/off status

Model Description	Model Number	Operating Current				
Moder Description	Model Number	from V <sub>MB</sub>	for downstream I/O			
Power Feeding Module	BL67-PF-24 volts DC	<30 mA	<10 mA			





Shown with BL67-B-4M12 base

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## Step 6 Select Base Modules for BL67 I/O

**A4** 

	eurofast®				picofast®	M23	minifast®					
Connector Type	Number of Connectors	Number of Pins	Model Number	Description								
eurofast®	2	2 (ea)	BL67-B-2M12	When used with 4 input or 4 output modules, each connector has 2 I/O point								
eurofast®	2	2 (ea)	BL67-B-2M12-P	Each	Each connector has 2 $\ensuremath{\text{I/O}}$ points, paired so consecutive points are on the same connector.							
eurofast®	4	2 (ea)	BL67-B-2M12	Whe	n used with 8 input or 8 outp	out modules, each connecto	r has 2 I/O points.					
eurofast®	4	2 (ea)	BL67-B-2M12-P	Each	connector has 2 I/O points, p	paired so consecutive points	are on the same connector.					
eurofast®	1	5	BL67-B-1M12	Туріс	ally used with serial I/O mo	dules.						
eurofast®	1	8	BL67-B-1M12-8	Туріс	ally used with serial I/O mo	dules.						
picofast®	4		BL67-B-4M8	Туріс	ally used with 4-input or 4-o	output modules.						
picofast®	8		BL67-B-8M8	Туріс	ally used 8-input or 8-outpu	t modules with.						
M23	1	12	BL67-B-1M23	Туріс	ally used with 8-output or S	SI Modules.						
M23	1	12	BL67-B-1M23-VI	Base module that allows full 4 A available from V+ pins.								
M23	1	19	BL67-B-1M23-19	For u	use with 16-output module.							
minifast®	1	5	BL67-B-1RSM	For u	use with the power feeding n	nodule, five wire power sche	eme.					
	1	4	BL67-B-1RSM-4	For use with the power feeding module, four wire power scheme.								

Labels for labeling electronic modules BL67-Label/DIN-A4-50-PCS

Programming Cable -For connecting the BL20/BL67 system to the I/O Assistant software XN-PS2-CABLE

DIN A4 sheet size

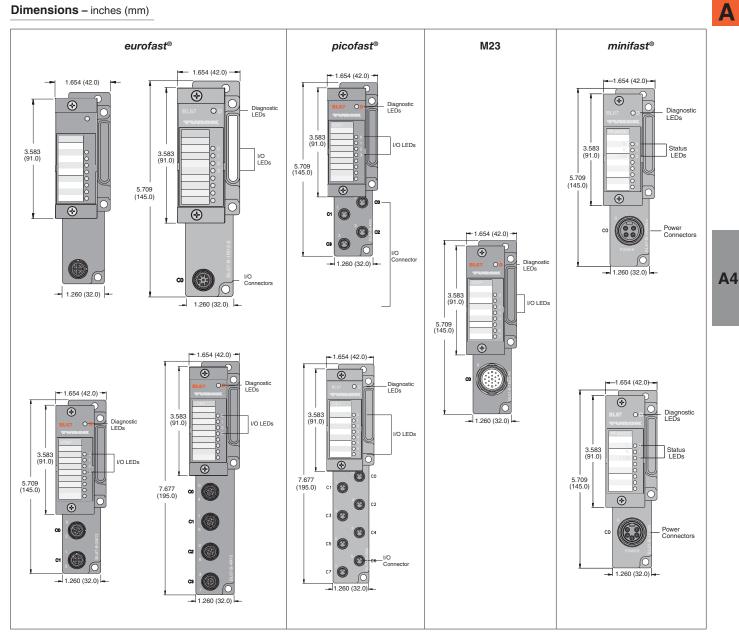




# **Base Module Dimensions and Pinouts**

# **TURCK Serial Bus System**

Dimensions – inches (mm)





#### RISK OF LOSS

Delivery of the equipment to a common carrier shall constitute delivery to the Purchaser and the risk of loss shall transfer at that time to Purchaser. Should delivery be delayed due to an act or omission on the part of the Purchaser, risk of loss shall transfer to the Purchaser upon notification by TURCK Inc. that the order is complete and ready for shipment.

#### WARRANTIES

TURCK INC. (hereinafter "TURCK") offers five (5) WARRANTIES to cover all products sold. They are as follows:

 The **12-MONTH WARRANTY** is available for the products listed - generally those not covered by LIFETIME, 5-YEAR, 24-MONTH or 18-MONTH warranty. No registration required.

2) The **18-MONTH WARRANTY** is available for the products listed - generally those not covered by LIFETIME or 5-YEAR WARRANTY.

No registration is required.

3) The **24-MONTH WARRANTY** is available for the products listed - generally those not covered by LIFETIME, 5-YEAR or 18-MONTH.

No registration is required.

4) The **5-YEAR WARRANTY** is available generally for the products listed. No registration is required.

5) A LIFETIME WARRANTY is available for the products listed. It becomes effective when the accompanying TURCK LIFETIME WARRANTY REGISTRATION is completed and returned to TURCK.

GENERAL TERMS AND CONDITIONS FOR ALL WARRANTIES

12-MONTH STANDARD WARRANTY

• 18-MONTH STANDARD WARRANTY

• 24-MONTH STANDARD WARRANTY

• 5-YEAR WARRANTY

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• LIFETIME WARRANTY

**TURCK** warrants the Products covered by the respective WARRANTY AGREEMENTS to be free from defects in material and workmanship under normal and proper usage for the respective time periods listed above from the date of shipment from **TURCK**. In addition, certain specific terms apply to the various WARRANTIES.

# THESE EXPRESS WARRANTIES ARE IN LIEU OF AND EXCLUDE ALL OTHER REPRESENTATIONS MADE - BOTH EXPRESSED AND IMPLIED.

THERE ARE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE FOR PRODUCTS COVERED BY THESE TERMS AND CONDITIONS.

TURCK warrants that the goods sold are as described, but no promise, description, affirmation of fact, sample model or representation, oral or written shall be part of an order, unless set forth in these terms and conditions, or are in writing and signed by an authorized representative of TURCK. These WARRANTIES do not apply to any Product which has been subject to misuse, negligence, or accident -or to any Product which has been modified or repaired, improperly installed, altered, or disassembled -except according to TURCK's written instructions.

These WARRANTIES are subject to the following conditions:

1) These WARRANTIES are limited to the electronic and mechanical performance only, as expressly detailed in the Product specifications and NOT to cosmetic performance.

2) These WARRANTIES shall not apply to any cables attached to, or integrated with the Product. However, the 18-MONTH WARRANTY shall apply to cables sold separately by TURCK.

 These WARRANTIES shall not apply to any Products which are stored, or utilized, in harsh environmental or electrical conditions outside TURCK's written specifications.

4) The WARRANTIES are applicable only to Products shipped from TURCK subsequent to January 1, 1988.

ADDITIONAL SPECIFIC TERMS FOR - (12-MONTH STANDARD WARRANTY) for Linear Displacement Transducers and RFID products.

(18-MONTH STANDARD WARRANTY) FOR ULTRASONIC SENSORS, CABLES AND ALL NON-SENSING PRODUCTS SOLD BY TURCK INC. INCLUDING MULTI-SAFE, MULTI-MODUL, MULTI-CART AND RELATED AMPLIFIER PRODUCTS, RELAYS AND TIMERS.

(24-MONTH STANDARD WARRANTY) FOR ENCODERS.

5-YEAR WARRANTY FOR INDUCTIVE AND CAPACITIVE PROXIMITY

SENSORS: The periods covered for the above WARRANTIES and Products shall be 12 MONTHS, 18-MONTHS, 24-MONTHS and 5-YEARS, respectively, from the date of shipment from TURCK.

LIFETIME WARRANTY (OPTIONAL - REGISTRATION REQUIRED) FOR INDUCTIVE, INDUCTIVE MAGNET OPERATED AND CAPACITIVE PROXIMITY SENSORS SOLD TO THE ORIGINAL PURCHASER FOR THE LIFETIME OF THE ORIGINAL APPLICATION.

# The following terms apply to the LIFETIME WARRANTY in addition to the General Terms:

1) This WARRANTY shall be effective only when the LIFETIME WARRANTY REGISTRATION has been completed, signed by the End User and an authorized TURCK Representative or Distributor and has been received by TURCK no later than six (6) months after installation in the End User's Plant, or two (2) years from the date product was shipped from TURCK, whichever is sooner.

2) This warranty is available only to TURCK's authorized Representatives, Distributors and to the Original User. (The term "Original User" means that person, firm, or corporation which first uses the Product on a continuous basis in connection with the operation of a production line, piece of machinery, equipment, or similar device.) In the event the ownership of the product is transferred to a person, firm or corporation other than the Original User, this WARRANTY shall terminate.

3) This WARRANTY is applicable only to the Original Application. In the event the machinery, equipment, or production line to which the Product is connected, or on which it is installed, is substituted, changed, moved or replaced, the WARRANTY shall terminate.

4) This WARRANTY shall be valid only if the Product was purchased by the Original User from TURCK, or from an authorized TURCK Distributor, or was an integral part of a piece of machinery and equipment obtained by the Original user from an Original Equipment Manufacturer, which itself, was purchased directly from TURCK or from an authorized Distributor.

#### PURCHASER'S REMEDIES

This Remedy shall apply to all WARRANTIES. If a TURCK Distributor desires to make a WARRANTY Claim, the Distributor shall, if requested by TURCK, ship the Product to TURCK's factory in Minneapolis, Minnesota, postage or freight prepaid. If the User desires to make a WARRANTY Claim, they shall notify the authorized TURCK Distributor from whom it was purchased or, if such Distributor is unknown, shall notify TURCK. TURCK shall, at its option, take any of the following two courses of action for any products which TURCK determines are defective in materials or workmanship.

1) Repair or replace the Product and ship the Product to the Original Purchaser or to the authorized TURCK Distributor, postage or freight prepaid; or

2) Repay to the Original Purchaser that price paid by the Original Purchaser; provided that if the claim is made under the LIFETIME WARRANTY, and such Product is not then being manufactured by TURCK, then the amount to be repaid by TURCK to the Original Purchaser shall be reduced according to the following schedule:

Number of Years Since Date of Purchase by Original Purchaser	Percent of Original Purchase Price To Be Paid by TURCK
10	50%
15	25%
20	10%
More than 20	5%

PURCHASER'S REMEDIES SHALL BE LIMITED EXCLUSIVELY TO THE RIGHT OF REPLACEMENT, REPAIR OR REPAYMENT AS PROVIDED AND DOES NOT INCLUDE ANY LABOR COST OR REPLACEMENT AT ORIGINAL PURCHASER'S SITE. TURCK SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF ANY WARRANTY, EXPRESSED OR IMPLIED, APPLICABLE TO THE PRODUCT, INCLUDING WITHOUT LIMITATION, ANY DAMAGES RESULTING FROM PROPERTY DAMAGE, PERSONAL INJURY OR BUSINESS INTERRUPTION.

#### CONSIDER SAFETY AND PROTECTION PRECAUTIONS

TURCK takes great care to design and build reliable and dependable products, however, some products can fail eventually. You must take precautions to design your equipment to prevent property damage and personal injury in the unlikely event of failure. As a matter of policy, TURCK does NOT recommend the installation of electronic controls as the sole device FOR THE PROTECTION OF PERSONNEL in connection with power driven presses, brakes, shears and similar equipment and, therefore, the customer should build in redundancy or dual control using approved safety devices for these applications.





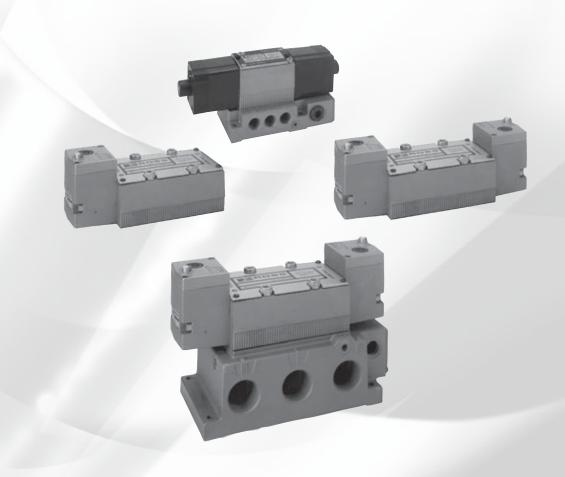






# **ROSS** CONTROLS®

# ANSI VALVES W70 & W74 SERIES

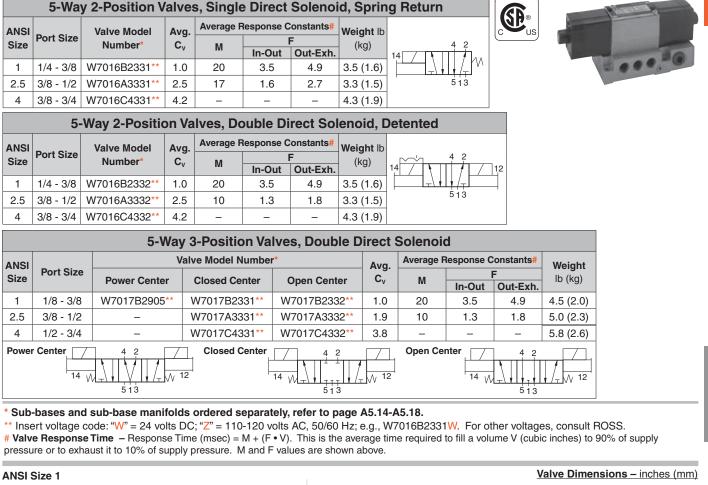


#### ANSI SERIES VALVES - KEY FEATURES

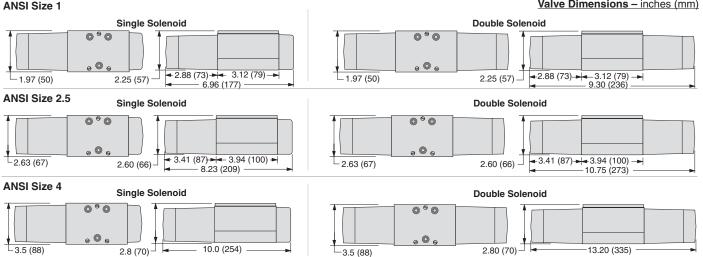
- ANSI Sizes 1, 2.5, 4, 10 and 20
- 5/2- and 5/3 way direct and pilot solenoid options
- Spool & Sleeve construction
- 24 volts DC or 110 volts AC solenoid control
- Available with 1/4 1½ ports
- Lube or non-lube service
- Manual overrides
- Interpose pressure regulators
- Single sub-base mounting
- Micro-thin air bearing between spool and sleeve assures quick valve response
- W70 Series Suitable for vacuum service with or without external pilot supply
- W74 Series Suitable for vacuum service (with external pilot supply)

		DESCR	RIPTI	ON		AV	AILA	BLE	POR	CRIPTION AVAILABLE PORT SIZES							FUNCTIONS								
VALVE TYPE	VALVE SERIES	ANSI Size	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	11⁄4	1½	3/2 Single	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	<b>Pressure Control</b>	Page		
ANSI	W70	1																	1.0				A5.3 - A5.9		
ANSI	W70	2.5																	2.5				A5.3 - A5.9		
ANSI	W70	4																	4.2				A5.3 - A5.9		
ANSI	W70	10																	10.0				A5.3 - A5.9		
ANSI	W70	20																	22.0				A5.3 - A5.9		
ANSI	W74	1																	1.0				A5.11 - A5.13		
ANSI	W74	2.5																	2.5				A5.11 - A5.13		
ANSI	W74	4																	4.2				A5.11 - A5.13		
ANSI	W74	10																	10.0				A5.11 - A5.13		
ANSI	W74	20																	22.0				A5.11 - A5.13		
Sub-Bases & Manifolds									A5.14 - A5.18																
Accesso	ries																						A5.19		





**Direct Solenoid Controlled Valves** 



#### Options: Indicator Light (in Base/Manifold), refer to page A5.17-A5.18. Accessories ordered separately, refer to page A5.19.

# STANDARD SPECIFICATIONS (for valves on this page): Construction: Spool and sleeve. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Solenoids: AC power; DC for ANSI size 1 models only. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): ANSI Size 1: 140 VA inrush, 30 VA holding on 50 or 60 Hz; 20 watts on DC. ANSI Size 3 and 4: 380 VA inrush, 79 VA holding. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air. Inlet Pressure: Vacuum to 150 psig (10 bar). Manual Override: Flush; rubber non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

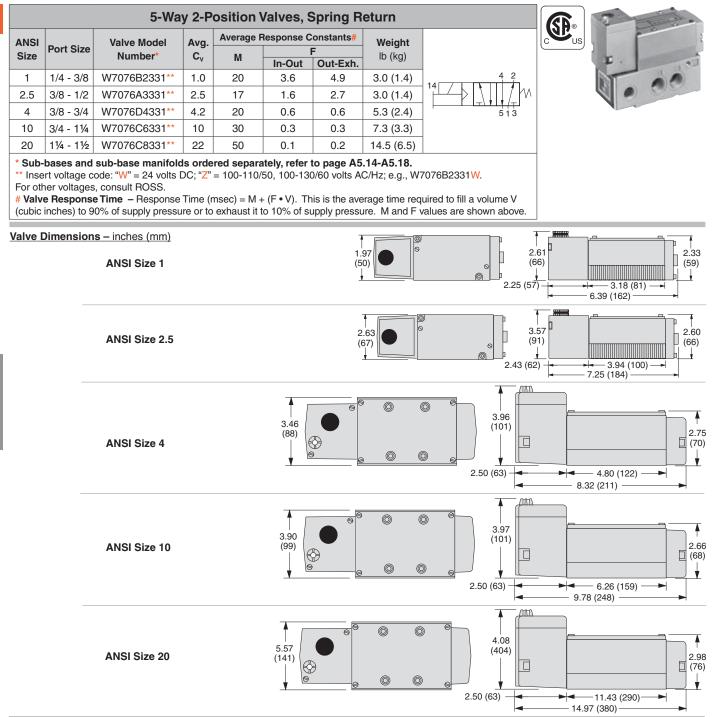
Online Version Rev. 11/14/16 W70 Series

Α

**A5** 

# **Single Solenoid Pilot Controlled Valves**

# ANSI W70 Series



Options: Indicator Light (in Base/Manifold), refer to page A5.17-A5.18. Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

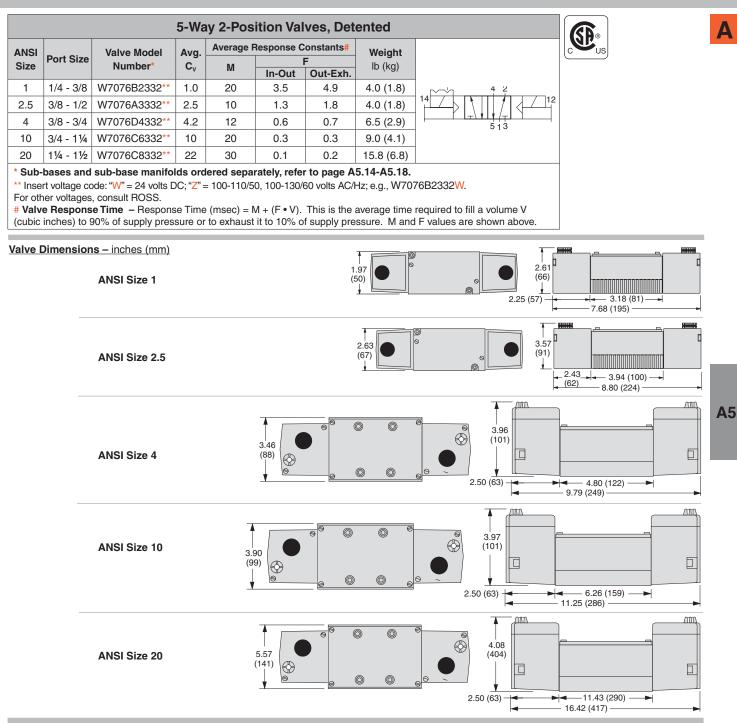
Construction: Spool and sleeve.	Media Temperature: 40° to 175°F (4° to 80°C).
Mounting Type: Base.	For other temperature ranges, consult ROSS.
Solenoid Pilot: Rated for continuous duty.	Flow Media: Filtered air.
Standard Voltages: 24 volts DC; 100-110/50, 100-130/60 volts AC/Hz.	Inlet Pressure: Vacuum to 150 psig (10 bar).
Power Consumption (each solenoid):	Pilot Pressure:
ANSI Size 1: 10 VA inrush, 24 VA holding on 50 or 60 Hz; 5 watts on DC.	ANSI Size 1 & 20: At least 30 psig (2 bar).
ANSI Size 2.5, 4, 10 & 20: 87 VA inrush, 55 VA holding on 50 or 60 Hz;	ANSI Size 2.5, 4 &10: At least 15 psig (1 bar).
14 watts on DC.	Indicator Light: Size 4, 10 & 20 models only.
Ambient Temperature: 40° to 120°F (4°C to 50°C).	Manual Override: Flush; rubber, non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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# **Double Solenoid Pilot Controlled Valves**



Options: Indicator Light (in Base/Manifold), refer to page A5.17-A5.18. Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Flow Media: Filtered air. Standard Voltages: 24 volts DC; 100-110/50, 100-130/60 volts AC/Hz. Power Consumption (each solenoid): **Pilot Pressure:** ANSI Size 1: 10 VA inrush, 24 VA holding on 50 or 60 Hz; 5 watts on DC. ANSI Size 2.5, 4, 10 & 20: 87 VA inrush, 55 VA holding on 50 or 60 Hz; 14 watts on DC.

Ambient Temperature: 40° to 120°F (4°C to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Inlet Pressure: Vacuum to 150 psig (10 bar). ANSI Size 1 & 20: At least 30 psig (2 bar). ANSI Size 2.5, 4 &10: At least 15 psig (1 bar). Indicator Light: Size 4, 10 & 20 models only. Manual Override: Flush; rubber, non-locking.



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

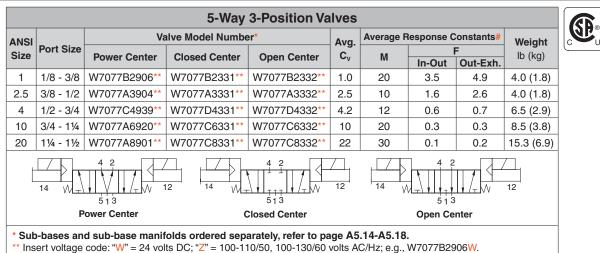
**Online Version** Rev. 11/14/16

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W70 Series

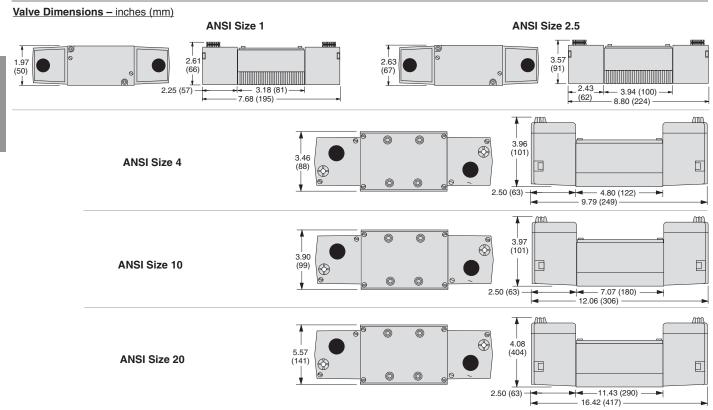
# **Double Solenoid Pilot Controlled Valves**

# ANSI W70 Series



For other voltages, consult ROSS.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



Options: Indicator Light (in Base/Manifold), refer to page A5.17-A5.18. Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

Media Temperature: 40° to 175°F (4° to 80°C).
For other temperature ranges, consult ROSS.
Flow Media: Filtered air.
Inlet Pressure: Vacuum to 150 psig (10 bar).
Pilot Pressure:
ANSI Size 1 & 20: At least 30 psig (2 bar).
ANSI Size 2.5, 4 & 10: At least 15 psig (1 bar).
Indicator Light: ANSI Size 4, 10 & 20 models only.
Manual Override: Flush; rubber, non-locking.

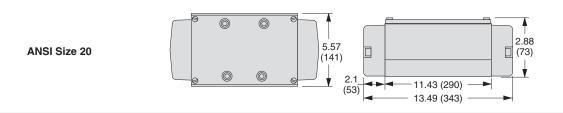
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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# **Single Pressure Controlled Valves**

#### 5-Way 2-Position Valves, Spring Return Average Response Constants# Weiaht ANSI Valve Model Avg. Port Size Size Number lb (kg) Cv М In-Out Out-Exh. 2 4 W7056B2331 4.9 2.5 (1.1) 1 1/4 - 3/8 1.0 20 3.6 1/12 W7056A3331 2.5 2.0 (0.9) 2.5 3/8 - 1/2 17 1.5 2.6 5134 3/8 - 3/4 W7056B4331 4.2 12 0.6 0.7 4.3 (1.9) 10 3/4 - 11/4 W7056A6331 10 20 0.3 0.3 6.3 (2.8) 20 11⁄4 - 11⁄2 W7056A8331 22 30 0.1 0.2 13.0 (5.9) \* Sub-bases and sub-base manifolds ordered separately, refer to page A5.14-A5.18. # Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above. Valve Dimensions - inches (mm) 1 97 (59) (50) **ANSI Size 1** 6 0.96 -3.18(81)(24) 5.10 (129) 2.63 ANSI Size 2.5 (67) 6 0.88 3.94 (100) (22) 5.7 (145) 0 0 3.46 ANSI Size 4 (88) $\bigcirc$ 0 1.00 4.80 (122) (25)6.80 (173) 0 0 3.90 ANSI Size 10 Γ (99) 0 0 1.00 Ŵ 6.26 (159) (25) 8.30 (211)



Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air.

Inlet Pressure: Vacuum to 150 psig (10 bar). **Pilot Pressure:** ANSI Size 1 & 20: At least 30 psig (2 bar). ANSI Size 2.5, 4 & 10: At least 15 psig (1 bar).



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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W70 Series

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2.64

(67)

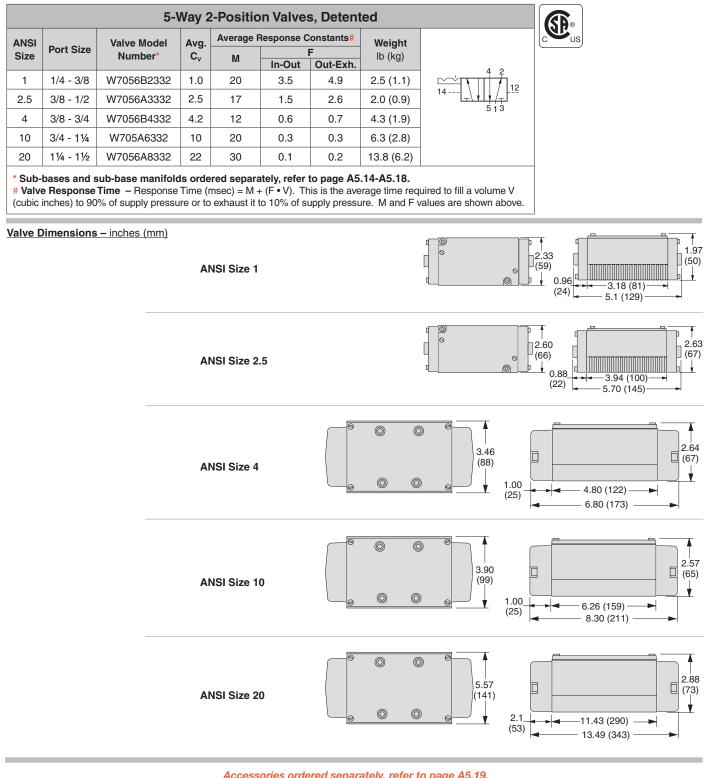
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2.57

(65)

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# **Double Pressure Controlled Valves**



Accessories ordered separately, refer to page A5.19.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Ambient/Media Temperature:: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air.

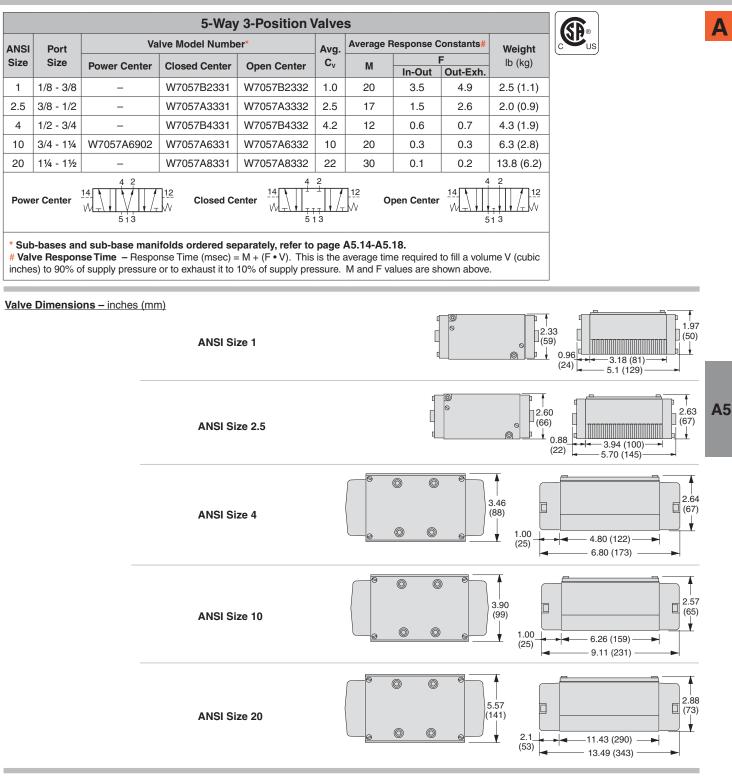
Inlet Pressure: Vacuum to 150 psig (10 bar). **Pilot Pressure:** ANSI Size 1 & 20: At least 30 psig (2 bar). ANSI Size 2.5, 4 & 10: At least 15 psig (1 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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## **Double Pressure Controlled Valves**



#### Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). For other temperature ranges, consult ROSS. Flow Media: Filtered air. Inlet Pressure: Vacuum to 150 psig (10 bar). Pilot Pressure: ANSI Size 1 & 20: At least 30 psig (2 bar). ANSI Size 2.5, 4 & 10: At least 15 psig (1 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

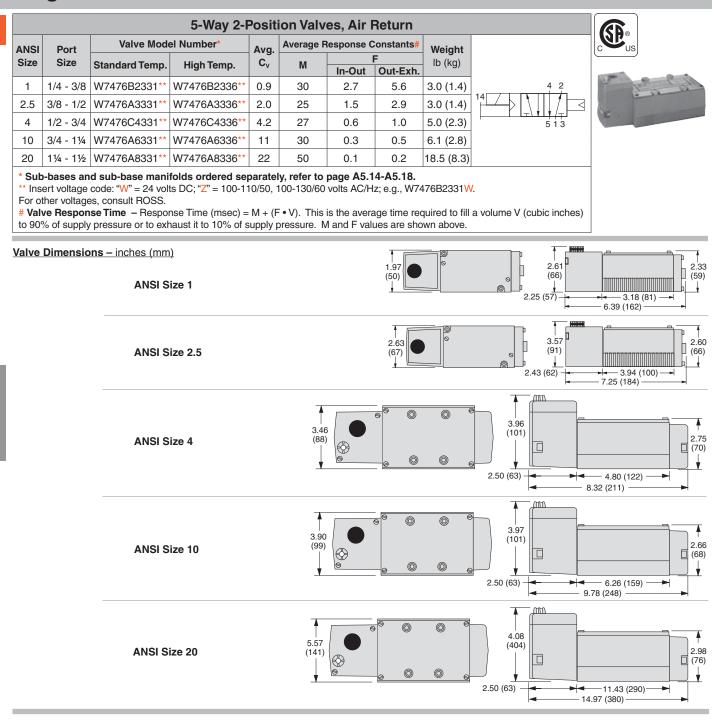
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W70 Series

## **Single Solenoid Pilot Controlled Valves**



Options: Indicator Light (in Base/Manifold), refer to page	A5.17-A5.18. Accessories ordered separately, refer to page A5.19.
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STANDARD SPECIFICATIONS (for valves on this page):						
Construction: Poppet. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110/50, 110-120/60 volts AC/Hz. Power Consumption (each solenoid): ANSI Size 1: 10 VA inrush, 24 VA holding on 50 or 60 Hz; 5 watts on DC. ANSI Size 2.5, 4, 10 & 20: 87 VA inrush, 55 VA holding on 50 or 60 Hz; 15 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C); extended to 175°F (80°C) for High Temperature models.	<ul> <li>MediaTemperature: 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for High Temperature models.</li> <li>Flow Media: Filtered air.</li> <li>Inlet Pressure: 30 to 150 psig (2 to 10 bar).</li> <li>Pilot Pressure: Must be equal to or greater than inlet pressure.</li> <li>Indicator Light: ANSI Size 4, 10 &amp; 20 models only: Included, one per solenoid.</li> <li>Manual Override: Flush; rubber, non-locking.</li> </ul>					

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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**A5** 



ANSI

W74 Series

## **Double Solenoid Pilot Controlled Valves**

		Valve Mode	l Number*		Av		esponse		
NSI Size	Port Size	o		Avg. C <sub>v</sub>		Consta	F	Weight Ib (kg)	
		Standard Temp.	High Temp.	- V	М	In-Out	Out-Exh.		4 2
1	1/4 - 3/8	W7476B2332**	W7476B2337**	0.9	30	2.7	5.6	3.0 (1.4)	
2.5	3/8 - 1/2	W7476A3332**	W7476A3337**	2.0	25	1.5	2.9	3.0 (1.4)	
4	1/2 - 3/4	W7476C4332**	W7476C4337**	4.2	27	0.6	1.0	5.0 (2.3)	
10	3/4 - 1¼	W7476A6332**	W7476A6337**	11	30	0.3	0.5	6.1 (2.8)	
20	1¼ - 1½	W7476A8332**	W7476A8337**	22	50	0.1	0.2	18.5 (8.3)	
# Valv	ve Respon s) to 90% c	f supply pressure o	r to exhaust it to 10						ed to fill a volume V (cubic e shown above.
<u>alve</u>	<u>Dimensio</u>	n <u>s – inches (mm)</u> ANSI Sizo					1.97 (50)	•	2.25 (57)
		ANSI Size	e 2.5				2.63 (67)		3.57 (91) + 2.43 + 3.94 (100) + + (62) + 8.80 (224) +
		ANSI Size	e 4		3.46 (88)	• •	e ©	© 6	2.50 (63) 9.79 (249)
		ANSI Size	e 10	3.90 (99)	0	0	0		
		ANSI Size	e 20	Ę (*	5.57 141)		6 0	© 6	

Options: Indicator Light (in Base/Manifold), refer to page A5.17-A5.18. Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet.	MediaTemperature: 40° to 175°F (4° to 80°C); extended to 220°F (105°C
Mounting Type: Base.	for High Temperature models.
Solenoid Pilot: Rated for continuous duty.	Flow Media: Filtered air.
Standard Voltages: 24 volts DC; 110/50, 110-120/60 volts AC/Hz.	Inlet Pressure: 30 to 150 psig (2 to 10 bar).
Power Consumption (each solenoid):	Pilot Pressure: Must be equal to or greater than inlet pressure.
ANSI Size 1: 10 VA inrush, 24 VA holding on 50 or 60 Hz; 5 watts on DC.	Indicator Light: ANSI Size 4, 10 & 20 models only: Included, one pe
ANSI Size 2.5, 4, 10 & 20: 87 VA inrush, 55 VA holding on 50 or 60 Hz;	solenoid.
15 watts on DC.	Manual Override: Flush; rubber, non-locking.
Ambient Temperature: 40° to 120°F (4° to 50°C); extended to 175°F	
(80°C) for High Temperature models.	

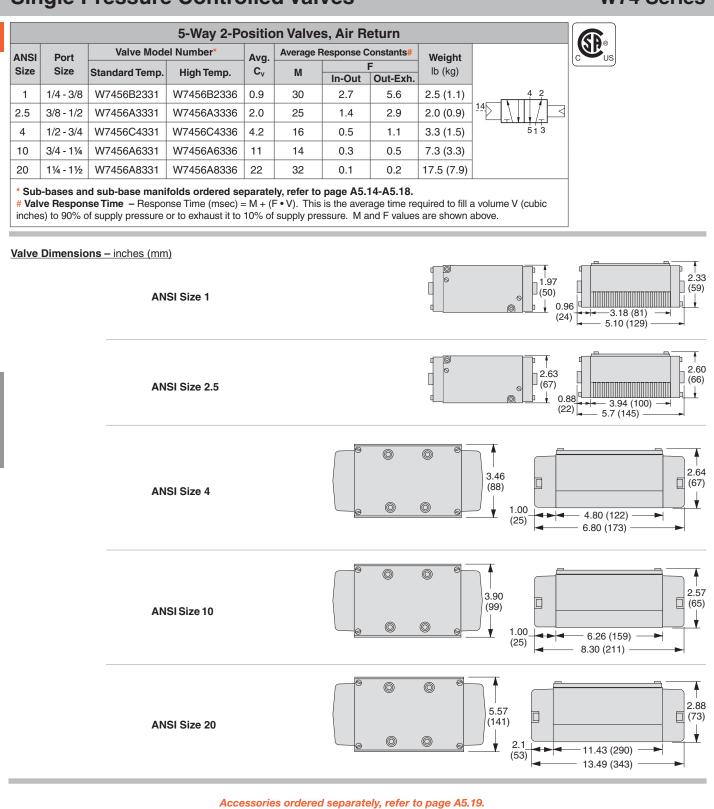
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ANSI W74 Series

## **Single Pressure Controlled Valves**



STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Ambient Temperature: 40° to 175°F (4° to 80°C). MediaTemperature: 40° to 175°F (4° to 80°C); extended to 220°F (105°C)

for High Temperature models. Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**A5** 

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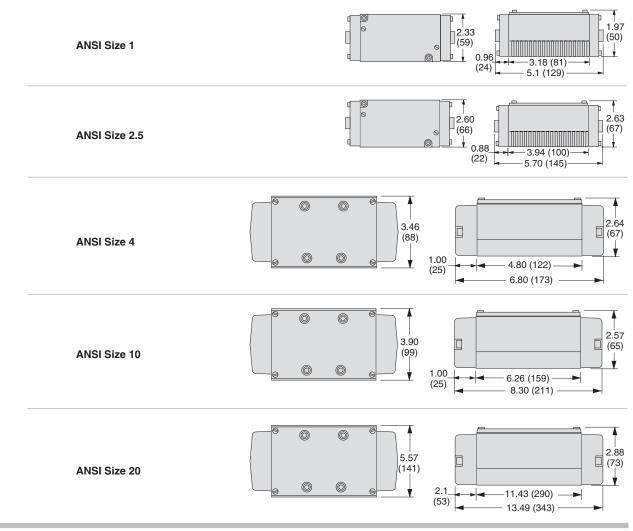
## **Double Pressure Controlled Valves**

	5-Way 2-Position Valves, Detented									
ANSI	ANSI Port Valve Model Number* Avg. Average Re		Response C	onstants#	Weight					
Size	Size	Standard Temp.	High Temp.	Cv	М	In-Out	F Out-Exh.	lb (kg)		
1	1/4 - 3/8	W7456B2332	W7456B2337	0.9	30	2.7	5.6	2.5 (1.1)	4 2	
2.5	3/8 - 1/2	W7456A3332	W7456A3337	2.0	25	1.4	2.9	2.0 (0.9)		
4	1/2 - 3/4	W7456C4332	W7456C4337	4.2	16	0.5	1.1	3.3 (1.5)	5 1 3	
10	3/4 - 1¼	W7456A6332	W7456A6337	11	14	0.3	0.5	7.3 (3.3)		
20	1¼ - 1½	W7456A8332	W7456A8337	22	32	0.1	0.2	17.5 (7.9)		

\* Sub-bases and sub-base manifolds ordered separately, refer to page A5.14-A5.18.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

#### Valve Dimensions - inches (mm)



#### Accessories ordered separately, refer to page A5.19.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Ambient Temperature: 40° to 175°F (4° to 80°C). Media Temperature: 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for High Temperature models. Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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**A5** 

W74 Series

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## Sub-Bases – Side Ported For Solenoid Pilot Controlled Valves



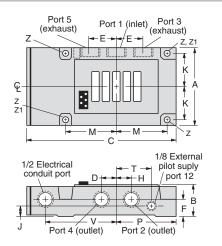


Sub-base for ANSI Size 4 valve illustrated

The sub-base numbers shown in the chart on the right specify pressure ports with NPT threads, and electrical openings with 1/2 NPT threads.

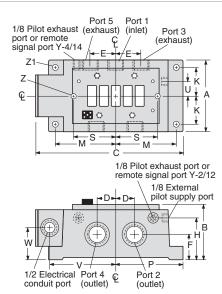
		Indic	Avg. C <sub>v</sub>		
ANSI Size	Outlet Port	None One Two			
1	1/4	500B91	525K91**	526K91**	0.9 to 1.0
I	3/8	501B91	527K91**	528K91**	0.9 to 1.0
0.5	3/8	474K91	482K91**	484K91**	2.0 to 2.5
2.5	1/2	475K91	483K91**	485K91**	2.0 to 2.5
	3/8	361B91	_	_	4.2
4	1/2	362B91	_	_	4.2
	3/4	363B91	_	_	4.2
	3/4	364B91	_	_	10 to 11
10	1	365B91	_	_	10 to 11
	1¼	366B91	_	_	10 to 11
20	1¼	367B91	_	_	22
20	1½	368B91	_	_	22

\*NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D502B91. \*\* Insert voltage code: "--W" = 24 volts DC; "-Z" = 110-120 volts AC, 50/60 Hz; e.g., 525K91--W. For other voltages, consult ROSS.





**A5** 



	Sub-Base Dimensions inches (mm)							
	ANSI 1	ANSI 2.5	ANSI 4	ANSI 10	ANSI 20			
Α	2.80 (71)	3.56 (90)	3.36 (85)	5.08 (129)	6.64 (169)			
В	1.44 (37)	1.61 (41)	2.64 (67)	3.78 (96)	3.70 (94)			
С	6.15 (156)	7.09 (180)	7.21 (183)	10.45 (266)	12.34 (313)			
D	0.51 (13)	0.63 (16)	0.75 (19)	1.38 (35)	1.38 (35)			
Е	0.88 (22)	1.25 (32)	1.50 (38)	2.76 (70)	2.76 (70)			
F	0.78 (20)	0.93 (23)	1.23 (31)	1.75 (44)	1.59 (40)			
Н	0.58 (15)	0.63 (16)	2.21 (56)	3.01 (76)	2.85 (72)			
J	0.38 (10)	0.50 (13)	-	-	-			
Κ	1.13 (29)	1.50 (38)	-	2.05 (52)	2.38 (60)			
М	1.88 (48)	2.31 (59)	-	4.33 (110)	5.35 (136)			
Ρ	2.43 (62)	2.97 (75)	2.86 (73)	4.76 (121)	5.86 (149)			
S	-	-	2.36 (60)	-	-			
Т	1.35 (34)	1.78 (45)	-	-	-			
U	-	-	0.83 (21)	1.97 (50)	1.54 (39)			
۷	2.75 (70)	3.29 (83)	3.07 (78)	4.65 (118)	5.60 (142)			
W	-	-	1.23 (31)	2.50 (64)	2.15 (55)			
Ζ	0.27 (7)	-	0.30 (7)	-	-			
Z1	-	0.28 (7)	-	0.34 (9)	0.37 (9)			

ANSI Size 4, 10 & 20



## Sub-Bases – Side Ported **For Pressure Controlled Valves**

## for ANSI Valves W70 & W74 Series

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**A5** 



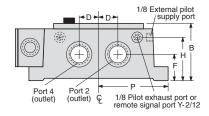
Sub-base for ANSI Size 4 valve illustrated

ANSI Size	Outlet Port	Model Number	Avg. C <sub>v</sub>
1	1/4	500B91	0.9 to 1.0
I	3/8	501B91	0.9 to 1.0
o -	3/8	474K91	2.0 to 2.5
2.5	1/2	475K91	2.0 to 2.5
	3/8	361B91	4.2
4	1/2	362B91	4.2
	3/4	363B91	4.2
	3/4	364B91	10 to 11
10	1	365B91	10 to 11
	1¼	366B91	10 to 11
00	1¼	367B91	22
20	1½	368B91	22

\*NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D502B91.

		Port 5 exhaust)		Port 3 (exhaust) Z,Z1 K K K Z
J	Port 4 (outlet)	G D + + Port 2 (outlet)	► T - ► H	1/8 Remote signal port 12

Port 5 Ę Port 1 Port 3 1/8 Pilot exhaust (exhaust) port or remote signal port Y-4/14 (inlet) (exhaust) H-F ′E-► Z1 Ð Ø Ø Ζ П ę **.** Ø Ð - S S M м



ANSI Size 4, 10 & 20

ANSI Size 1 & 2.5

ANSI 1	ANSI 2.5	ANSI 4	ANSI 10	ANSI 20
2.80 (71)	3.56 (90)	3.36 (85)	5.08 (129)	6.64 (169)
1.44 (37)	1.61 (41)	2.64 (67)	3.78 (96)	3.70 (94)
6.15 (156)	7.09 (180)	7.21 (183)	10.45 (266)	12.34 (313)
0.51 (13)	0.63 (16)	0.75 (19)	1.38 (35)	1.38 (35)
0.88 (22)	1.25 (32)	1.50 (38)	2.76 (70)	2.76 (70)
0.78 (20)	0.93 (23)	1.23 (31)	1.75 (44)	1.59 (40)
0.58 (15)	0.63 (16)	2.21 (56)	3.01 (76)	2.85 (72)
0.38 (10)	0.50 (13)	-	-	-
1.13 (29)	1.50 (38)	-	2.05 (52)	2.38 (60)
1.88 (48)	2.31 (59)	-	4.33 (110)	5.35 (136)
2.43 (62)	2.97 (75)	2.86 (73)	4.76 (121)	5.86 (149)
-	-	2.36 (60)	-	-
1.35 (34)	1.78 (45)	-	-	-
-	-	0.83 (21)	1.97 (50)	1.54 (39)
-	-	-	-	-
0.27 (7)	-	0.30 (7)	-	-
-	0.28 (7)	-	0.34 (9)	0.37 (9)
	2.80 (71) 1.44 (37) 6.15 (156) 0.51 (13) 0.88 (22) 0.78 (20) 0.58 (15) 0.38 (10) 1.13 (29) 1.88 (48) 2.43 (62) - 1.35 (34) - -	2.80 (71)       3.56 (90)         1.44 (37)       1.61 (41)         6.15 (156)       7.09 (180)         0.51 (13)       0.63 (16)         0.88 (22)       1.25 (32)         0.78 (20)       0.93 (23)         0.58 (15)       0.63 (16)         0.38 (10)       0.50 (13)         1.13 (29)       1.50 (38)         1.88 (48)       2.31 (59)         2.43 (62)       2.97 (75)         -       -         1.35 (34)       1.78 (45)         -       -         0.27 (7)       -	2.80 (71)         3.56 (90)         3.36 (85)           1.44 (37)         1.61 (41)         2.64 (67)           6.15 (156)         7.09 (180)         7.21 (183)           0.51 (13)         0.63 (16)         0.75 (19)           0.88 (22)         1.25 (32)         1.50 (38)           0.78 (20)         0.93 (23)         1.23 (31)           0.58 (15)         0.63 (16)         2.21 (56)           0.38 (10)         0.50 (13)         -           1.13 (29)         1.50 (38)         -           1.88 (48)         2.31 (59)         -           2.43 (62)         2.97 (75)         2.86 (73)           -         -         2.36 (60)           1.35 (34)         1.78 (45)         -           -         -         0.83 (21)           -         -         0.83 (21)           -         -         0.83 (21)	2.80 (71)         3.56 (90)         3.36 (85)         5.08 (129)           1.44 (37)         1.61 (41)         2.64 (67)         3.78 (96)           6.15 (156)         7.09 (180)         7.21 (183)         10.45 (266)           0.51 (13)         0.63 (16)         0.75 (19)         1.38 (35)           0.88 (22)         1.25 (32)         1.50 (38)         2.76 (70)           0.78 (20)         0.93 (23)         1.23 (31)         1.75 (44)           0.58 (15)         0.63 (16)         2.21 (56)         3.01 (76)           0.78 (20)         0.93 (23)         1.23 (31)         1.75 (44)           0.58 (15)         0.63 (16)         2.21 (56)         3.01 (76)           0.38 (10)         0.50 (13)         -         -           1.13 (29)         1.50 (38)         -         2.05 (52)           1.88 (48)         2.31 (59)         -         4.33 (110)           2.43 (62)         2.97 (75)         2.86 (73)         4.76 (121)           -         -         2.36 (60)         -           1.35 (34)         1.78 (45)         -         -           -         -         0.83 (21)         1.97 (50)           -         -         -         -

Sub-Base Dimensions inches (mm)



## Sub-Bases – Side & Bottom Ported For Solenoid Pilot or Pressure Controlled Valves

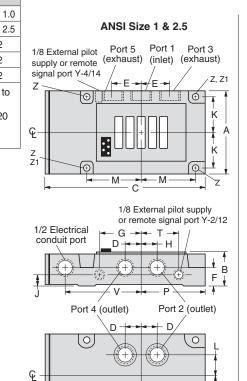
C<sub>v</sub>

## for ANSI Valves W70 & W74 Series

Α

#### Side & Bottom Ported Sub-Bases

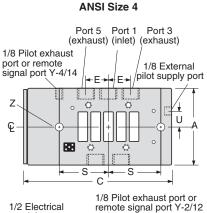
ANS	Outlet	Indica	Indicator Lights in Base*						
Size		None		One		Two	Avg. C		
0120	TOR	N	lod	el Numb	per				
1	1/4	499B91	52	9K91**	53	0K91**	0.9 to 1.0		
2.5	3/8	476K91	47	7K91**	48	6K91**	2.0 to 2.5		
	3/8	369B91		—		_	4.2		
4	1/2	370B91		_		_	4.2		
	3/4	371B91				_	4.2		
the m ** Ins volts /	*NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D502B91. ** Insert voltage code: "–W" = 24 volts DC; "–Z" = 110-120 volts AC, 50/60 Hz; e.g., 529K91–W. For other voltages, consult ROSS.								
Sub	-Base Di	mensions	inc	hes (mn	n)				
	ANSI 1	ANSI 2	2.5	ANSI	4				
Α	2.80 (71	) 3.56 (9	0)	3.36 (8	5)				
В	1.44 (37	) 1.61 (4	1)	2.64 (6	7)				
С	6.15 (156	5) 7.09 (18	80)	7.21 (18	33)				
D	0.51 (13	) 0.63 (1	6)	0.75 (1	9)				
Е	0.88 (22	) 1.25 (3	32)	1.50 (3	8)				
F	0.78 (20	) 0.93 (2	23)	1.23 (3	1)				
G	1.46 (37	) 2.41 (6	51)	_					
Н	0.58 (15	) 0.63 (1	6)	2.21 (5	6)				
J	0.38 (10	) 0.50 (1	3)						
К	1.13 (29	) 1.50 (3	8)						
L	0.63 (16	) 0.81 (2	21)	_					
М	1.88 (48	) 2.31 (5	i9)	_					

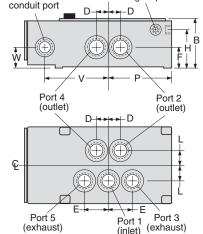


C

Port 5

(exhaust)





#### **Bottom Ported Sub-Bases**

2.97 (75)

\_

1.78 (45)

\_

3.29 (83)

0.28 (7)

ANSI Size	Outlet Port	Avg. C <sub>v</sub>				
	3/4	372B91	10 to 11			
10	1	373B91	10 to 11			
	1¼ 374B91		10 to 11			
20	1¼	375B91	22			
20	1½	22				
1½         376B91         22           *NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D502B91.         1000000000000000000000000000000000000						

2.86 (73)

2.36 (60)

\_

0.83 (21)

0.30 (7)

\_

	Dimensions inches (mm)									
	ANSI 10	ANSI 20		ANSI 10	ANSI 20					
Α	5.8 (129)	6.64 (169)	Κ	2.05 (52)	2.38 (60)					
В	3.78 (96)	3.70 (94)	L	1.22 (31)	1.22 (31)					
С	10.45 (266)	12.34 (313)	Μ	4.33 (110)	5.36 (136)					
D	1.38 (35)	1.38 (35)	Ν	0.88 (22)	1.00 (25)					
Е	2.76 (70)	2.76 (76)	Ρ	4.76 (121)	5.82 (148)					
F	1.03 (26)	1.54 (39)	R	4.65 (118)	5.60 (142)					
G	2.60 (66)	3.90 (99)	Т	2.50 (64)	2.15 (55)					
Н	3.01 (76)	2.85 (72)	Ζ	0.34 (8)	0.37 (9)					
J	3.25 (83)	2.85 (72)								

1/8 Pilot exhaust port or remote signal port Y-4/14 ¢ Z-Ð ø Ø Κ ł ç A Κ **RH** 0 ð ŧ М М Ċ 1/8 Pilot exhaust port or remote signal port Y-2/12 1/2 Electrical conduit port ۲ н Ν P R 1/8 External pilot supply port Port 4 (outlet) Port 2 (outlet) ⊭D≯4D> Ģ

Port 3 (exhaust) Port 3 (exhaust) Port 1 (inlet)

Т 0

Port 3

(exhaust)

Е

F

Port 1 (inlet)

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Ρ

S

Т

U

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Ζ

**Z1** 

2.43 (62)

\_

1.35 (34)

\_

2.75 (70)

0.27 (7)



## Manifolds For Solenoid Pilot Controlled Valves

## for ANSI Valves W70 & W74 Series



manifold station.

the electrical cavity.

ANSI Size 1 & 2.5

Typical Manifold Station

The numbers of the manifold stations shown in the chart on the right specify

pressure ports with NPT threads and electrical openings with 1¼ NPT threads.

All necessary hardware and seals for manifold assembly are included with each

Indicator Lights: As shown in the chart the smaller sizes of manifolds are

available with indicator lights. These lights are located in the end plate covering

Manifold Note: The port positions of the solenoid controlled and the pressure

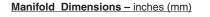
controlled manifolds are not the same. For this reason these stations cannot be mixed in the same installation. If both types of valves must be used in the same

installation, use only manifold stations for solenoid controlled valves.

Indicator Lights in Manifold\* ANSI Outlet None One Two Avg. C Port Size Model Number 1/4 502B91 531K91\* 532K91\*\* 0.9 to 1.0 1 503B91 533K91\* 534K91\* 0.9 to 1.0 3/8 3/8 472K91 478K91\*\* 480K91\*\* 2.0 to 2.5 2.5 1/2 473K91 479K91\*\* 481K91\*\* 2.0 to 2.5 4.2 3/8 377B91 4 1/2 378B91 4.2 3/4 379B91 4.2 \_\_\_\_ \_\_\_\_ 3/4 380B91 10 to 11 10 381B91 10 to 11 1 382B91 11/4 10 to 11

NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D502B91.

Insert voltage code: "-W" = 24 volts DC; "-Z" = 110-120 volts AC, 50/60 Hz; e.g., 531K91-W. For other voltages, consult ROSS.

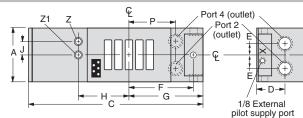


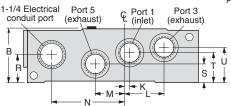
Lights are mounted in bases, on the valves, or on

solenoids, depending on the particular type of valve.

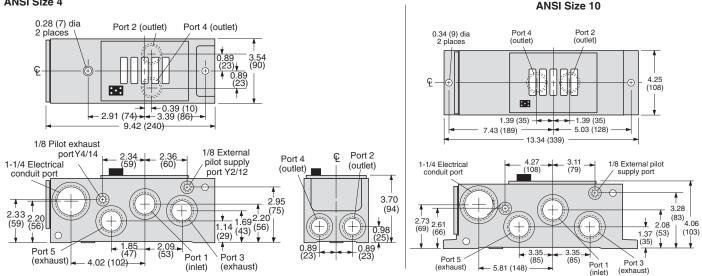
	ANSI 1	ANSI 2.5		ANSI 1	ANSI 2.5							
Α	2.26 (57)	2.80 (71)	L	1.62 (41)	1.81 (46)							
В	2.26 (57)	2.66 (68)	Μ	1.00 (25)	1.46 (37)							
С	7.89 (201)	8.50 (216)	Ν	2.88 (73)	3.46 (88)							
D	1.38 (35)	1.48 (38)	Ρ	2.16 (55)	2.21 (56)							
Е	0.56 (14)	0.70 (18)	R	1.17 (30)	1.36 (35)							
F	2.76 (70)	2.99 (76)	S	0.64 (16)	0.78 (20)							
G	3.14 (80)	3.43 (87)	Т	1.07 (27)	1.40 (36)							
н	1.80 (46)	2.24 (87)	U	1.57 (40)	1.76 (45)							
J	0.50 (13)	_	Ζ	0.28 (7)	_							
К	0.31 (8)	0.18 (6)	<b>Z1</b>	_	0.28 (7)							

Dimensions inches (mm)





#### ANSI Size 4



Valves and manifold stations can be assembled by ROSS to precise specifications. The assembly is then ready for integration into your system.

#### ASSEMBLED MANIFOLDS

For detailed information about such assemblies, consult your ROSS Distributor or call ROSS in the U.S.A. at 1-888-TEK-ROSS (835-7677) or 1-706-356-3708.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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Α

## Manifolds For Pressure Controlled Valves

## for ANSI Valves W70 & W74 Series



Typical Manifold Station

The numbers of the manifold stations shown in the chart on the right specify pressure ports with NPT threads. All necessary hardware and seals for manifold assembly are included with each manifold station.

Manifold Note: The port positions of the solenoid controlled and the pressure controlled manifolds are not the same. For this reason these stations cannot be mixed in the same installation. If both types of valves *must* be used in the same installation, *use only manifold stations for solenoid controlled valves*.

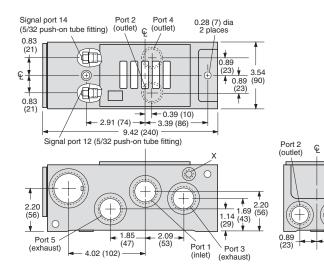
ANSI Size	Outlet Port	Model Number	Avg. $C_v$		
4	1/4	359B91	0.9 to 1.0		
I	3/8	360B91	0.9 to 1.0		
2.5	3/8	468B91	2.0 to 2.5		
2.5	1/2	469B91	2.0 to 2.5		
	3/8	383B91	4.2		
4	1/2	384B91	4.2		
	3/4	385B91	4.2		
	3/4	386B91	10 to 11		
10	1	387B91	10 to 11		
	1¼	388B91	10 to 11		

\*NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D502B91.

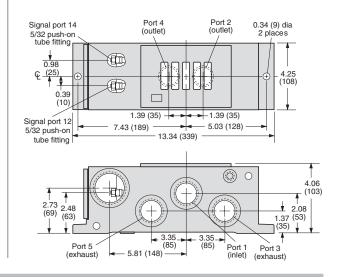
#### Manifold Dimensions - inches (mm)

							1/4 Signal port 14 ➡H ➡ /Z	Port 4
		Di	imensions	inche	es (mm)			E
		ANSI 1	ANSI 2.5		ANSI 1	ANSI 2.5		
	Α	2.26 (57)	2.80 (71)	L	1.47 (37)	1.80 (46)		
	В	2.26 (57)	2.66 (68)	Μ	1.36 (35)	1.46 (37)		
	С	6.25 (159)	6.86 (174)	Ν	0.56 (14)	0.70 (18)	1/4 Signal	G — Port 2
SI Size 1 & 2.5	D	1.32 (34)	1.48 (38)	Ρ	2.37 (60)	2.21 (56)	port 12	→ (outlet)
	Е	0.56 (14)	0.70 (18)	R	2.50 (64)	2.99 (76)	Port 5 (exhaust)	Port 1 (inlet) / Port 3 (exhaust)
	F	2.88 (73)	2.99 (76)	S	1.14 (29)	1.40 (36)		
	G	3.31 (84)	3.40 (86)	Т	1.14 (29)	1.76 (45)	B I I I I I I I I I I I I I I I I I I I	
	Н	0.56 (14)	0.74 (19)	U	1.26 (32)	1.76 (45)		
	J	0.88 (22)	1.26 (32)	Ζ	0.28 (7)	0.28 (7)		
	κ	0.00 (00)	0.18 (6)				- M	→

#### ANSI Size 4



#### ANSI Size 10



**ASSEMBLED MANIFOLDS** 

Valves and manifold stations can be assembled by ROSS to precise specifications. The assembly is then ready for integration into your system.

For detailed information about such assemblies, consult your ROSS Distributor or call ROSS in the U.S.A. at 1-888-TEK-ROSS (835-7677) or 1-706-356-3708.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Port 4

(outlet)

0.89

(23)

3.70 (94)

0.98

ANS



#### **Interposed Pressure Regulators**

Both single and double interposed regulators are available for valves with  $C_v$  ratings up to 4.2. A regulator is bolted to the valve's sub-base or manifold station, and the valve is then bolted to the regulator. This mounting method allows the valve to be removed and replaced without disturbing the regulator.

Single pressure regulators provide the same regulated pressure at both outlet ports. Double pressure regulators allow the pressure at each outlet port to be set independently.

A locking type knob is used to set the regulated pressure at any point in the range of:

5 to 100 psig (0.3 to 7 bar) for size 1 and 2 models;

5 to 125 psig (0.3 to 8.5 bar) for size = 4.2 models.

Maximum inlet pressure is 150 psig (10 bar). Pressure gauge(s) included.

ANSI	Interpos	sed Regulator – Mode	l Number				
Size	Oin al a	Dou	uble*				
	Single	Solenoid	Remote Air				
1	840C91	841C91	713C91				
2.5	626C91	627C91	714C91				
4	632C91	633C91	715C91				
* Double regulator only for W70 spool valves.							

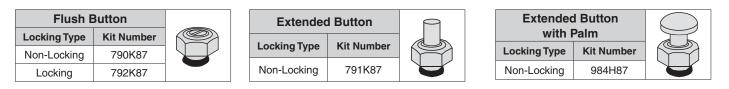
WARNING:

Double interposed regulators will reverse output ports - the 12 solenoid will pressurize the 4 port, the 14 solenoid will pressurize the 2 port - which may cause unexpected, potentially dangerous cylinder movement at valve pressurization.

#### **Manual Override Kits**

Flush flexible manual overrides are standard on solenoid pilot controlled valves with  $C_v$  ratings of 2.0 or larger. Both locking and non-locking metal override buttons are also available for these models.

Each of the override buttons in the kits at the right is made of metal and is spring-returned. The locking type button, however, can be kept in the actuated position by turning the slot in the top of the button with a screwdriver.



#### Silencers

Port	Thread	Mode	el Number	Avg.	Dimensions inches (mm)		Weight			
Size	Туре	NPT Threads	BSPT Threads	Cv	Α	В	lb (kg)			
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)			
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		-A-	
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)		· · · · ·	
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)		() · · · · · · · · · · · · · · · · · · ·	EN T
3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (92)	0.2 (0.1)		В	
3/4	Male	5500A5003	D5500A5003	11.5	2.0 (51)	5.3 (135)	0.6 (0.3)			
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)			
1¼	Male	5500A7013	D5500A7013	16.4	2.0 (51)	5.5 (140)	0.6 (0.3)			
Pressu	ure Rang	e: 0 to 150 psig	g (0 to 10.3 bar) max	kimum.	Flow Medi	a: Filtered ai	r.	·		

ROSS

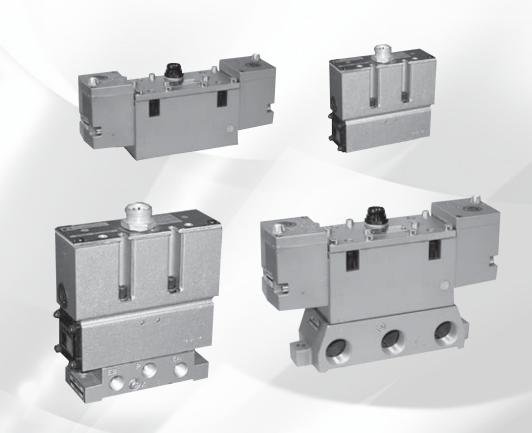
Online Version Rev. 11/14/16





# ROSS CONTROLS®

# SAE VALVES 80 & 84 SERIES



#### SAE 80 & 84 SERIES VALVES - KEY FEATURES

- Micro-thin air bearing between spool and sleeve assures quick valve response
- Designed for high cycle rates and long life
- No seals to wear out
- Easily field-convertible for use with an external pilot supply
- Suitable for vacuum service (with external pilot supply)

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		DESCI	RIPTI	ON		AVA	AILAI	BLE	POR	T SI	ZES			F	UNC	TION	IS						
VALVE TYPE	VALVE SERIES	SAE Size	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	3/2 Single	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	Pressure Control	Page
SAE	80 & 84	125																	1.8				A6.3 - A6.7
SAE	80 & 84	250																	5.7				A6.3 - A6.7
SAE	80 & 84	500																-	8.0				A6.3 - A6.7
Sub-Bases									A6.8														
Manifold	S																						A6.9
Accessories									A6.10														



## **Single Solenoid Pilot Controlled Valves**

			5-Way	2-Position Va	alves, Sprin	g Return					
			Valve Model	Number*				Δ	verage Res	nonse	
SAE Size	Chrysler Wired 5-pin	Chrysler Wired 5-pin	Ford Wired 5-pin	Chrysler Wired 5-pin	Hardwire	Ford Wired 5-pin micro	Avg. C <sub>v</sub>		Constan	-	Weight Ib (kg)
	micro-connector (120 volts / 60 Hz)	micro-connector (24 volts DC)	mini-connector (all voltages)	mini-connector (all voltages)		connector (24 volts DC)		М	In-Out	Out-Exh.	
125	8076C3311	8076C3321	8076C3331**	8076C3341**	8076C3351**	8076C3361	1.4	20	3.5	4.9	3.5 (1.6
250	8076C4311	8076C4321	8076C4331**	8076C4341**	8076C4341** 8076C4351** 8076C4361 4.0				1.4	2.6	6.5 (2.9
500	8076B6311	8076B6321	8076B6331**	8076B6341**	8076B6351**	8076B6361	8.2	22	0.5	0.8	8.3 (3.7
* Sub-bases and sub-base manifolds ordered separately, refer to page A6.8-9. ** Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g.,8076C3331W. For other voltages, consult ROSS. # Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.											
SAE S	Dimensions – ind Size 125	ches (mm)	5.10	SAE Size	250			5.60	SAE 12	5	T
00											
SAE Size 500 $3.00$ $(76)$ $($								Single	SAE 50 Soleno		
	Wiring Diagrams (all voltages)								Ford Wired 4-pin micro-connector (24 volts DC)		
		Chrysler Wired 5-pin mini-connector (all voltages) LIGHT SOL A Chrysler Wired 5-pin micro-connector (24 volts DC) LIGHT SOL Chrysler Wired 5-pin micro-connector (24 volts DC) Chrysler Wired 5-pin micro-connector (24 volts DC)						Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz)			

Options: Manual Override (for SAE 500 size only), refer to page A6.10. Accessories ordered separately, refer to page A6.10.

#### Pressure Controlled Spool & Sleeve Valves for SAE available, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool and sleeve. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): SAE Size 125, 250: 8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC. SAE Size 500: 87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC. Indicator Light: One for each solenoid. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Vacuum to 150 psig (10 bar). Manual Override: Flush; rubber, non-locking. SAE 80 Series

Α

**A6** 

**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

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## **Double Solenoid Pilot Controlled Valves**

			5-W	ay 2-Positio	on Valves, E	Detented					
SAE Size	Chrysler Wired 5-pin	Chrysler Wired 5-pin	Valve Model Ford Wired 5-pin	Chrysler Wired 5-pin	Hardwire	Ford Wired 5-pin micro	Avg. C <sub>v</sub>	Av	erage Res Constant	-	Weight Ib (kg)
	micro-connector (120 volts / 60 Hz)	(24 volts DC)	mini-connector (all voltages)	mini-connector (all voltages)		connector (24 volts DC)		М	In-Out	⊢ Out-Exh.	
125	8076C3312	8076C3322	8076C3332**	8076C3342**	8076C3352**	8076C3362	1.4	15	3.5	4.9	3.5 (1.6)
250	8076C4312	8076C4322	8076C4332**	8076C4342**	8076C4352**	8076C4362	4.0	17	1.5	2.6	7.0 (3.2)
500	8076B6312	8076B6322	8076B6332**	8076B6342**	8076B6352**	8076B6362	8.0	30	0.4	0.5	9.5 (4.3)
<ul> <li>* Sub-bases and sub-base manifolds ordered separately, refer to page A6.8-9.</li> <li>** Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g.,8076C3332W. For other voltages, consult ROSs.</li> <li># Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.</li> </ul>											
SAE Size 125 $SAE Size 250$ $Sat Size 500$ $SAE Size 500$ $SAE Size 500$ $SAE Size 500$ $Sat Size 500$											
			Fo	ord Wired 5-pin min	i-connector (all vo	Itages)	Fo	rd Wired 4	4-pin micro-o	connector (24	volts DC)
Wiring Diagrams for Available Options											
	SOL SHT SOL SUL A SOL SOL SOL SOL SOL SOL SOL SOL SOL SOL		-	LIGHT SOL. A COL		Dits DC)	Chrysle		pin micro-co	SOL SOL B	volts / 60 Hz)
_	Options: Manu	al Override (for	SAE 500 size o	only), refer to p	age A6.10. A	ccessories orde	red se	parate	ly, refer to	o page A6.	10.

#### Pressure Controlled Spool & Sleeve Valves for SAE available, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction:Spool and sleeve.Media Temperature:40° to 175°F (4° to 80°C).Mounting Type:Base.Flow Media:Filtered air.Solenoid Pilot:Rated for continuous duty.Inlet Pressure:Vacuum to 150 psig (10 bar).Standard Voltages:24 volts DC; 110-120 volts AC, 50/60 Hz.Pilot Pressure:When external supply is used, pressure must be equal<br/>to or greater than inlet pressure.Power Consumption (each solenoid):SAE Size 125, 250:8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC.Indicator Light:One for each solenoid.SAE Size 500:87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC.Manual Override:Flush; rubber, non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

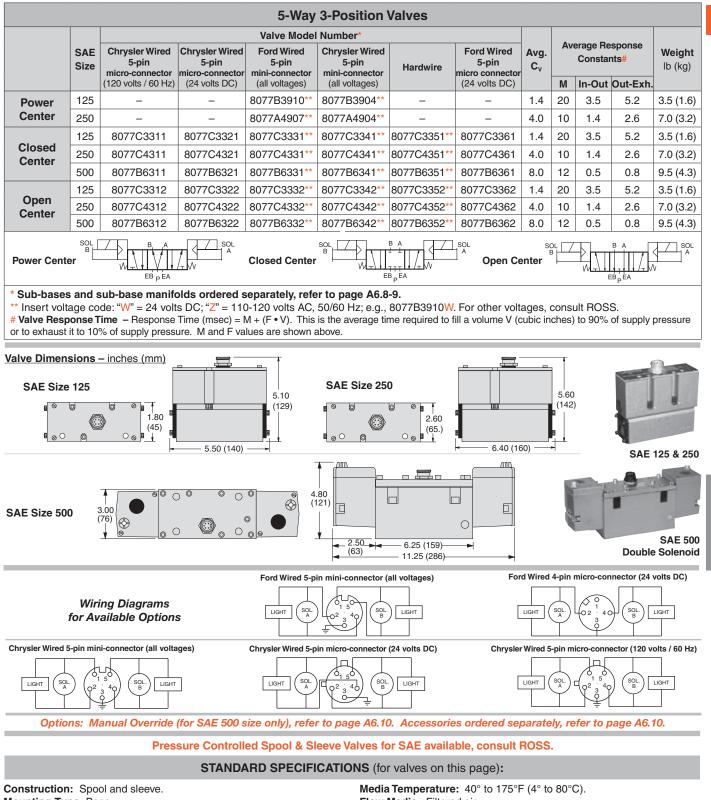
Α

**A6** 



SAE 80 Series

## **Double Solenoid Pilot Controlled Valves**



Mounting Type: Base.

Solenoid Pilot: Rated for continuous duty.

Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz.

Power Consumption (each solenoid):

SAE Size 125, 250: 8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC. SAE Size 500: 87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC. Ambient Temperature:  $40^{\circ}$  to  $120^{\circ}$ F ( $4^{\circ}$  to  $50^{\circ}$ C). Media Temperature: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air.
Inlet Pressure: Vacuum to 150 psig (10 bar).
Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure.
Indicator Light: One for each solenoid.
Manual Override: Flush; rubber, non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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80 Series

Δ

**A6** 

## **Single Solenoid Pilot Controlled Valves**

#### 5-Way 2-Position Valves, Air Return Valve Model Number **Average Response Chrysler Wired Chrysler Wired** Chrysler Wired Ford Wired 5-pin Constants# SAE Weight Ford Wired 5-pin Avg. 5-pin 5-pin 5-pin micro $C_v$ Size mini-connector Hardwire lb (kg) micro-connector mini-connector micro-connector connector Μ (all voltages) In-Out Out-Exh. (24 volts DC) (all voltages) (120 volts / 60 Hz) (24 volts DC) 125 8476C3311 8476C3321 8476C3331\*\* 8476C3341\*\* 8476C3351\* 8476C3361 1.8 47 1.6 3.0 2.8 (1.3) 250 8476C4311 8476C4321 8476C4331\*\* 8476C4341\*\* 8476C4351 8476C4361 5.5 60 0.6 0.8 5.2 (2.4) 500 8476B6311 8476B6321 8476B6331\*\* 8476B6341\*\* 8476B6351\* 8476B6361 7.9 30 0.4 0.5 7.7 (3.5) R A Sub-bases and sub-base manifolds ordered separately, refer to page A6.8-9. SOL Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g.,8476C3331W. For other voltages, consult ROSS. $\leq$ # Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic FBPFA inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above. Valve Dimensions - inches (mm) SAE Size 125 SAE Size 250 **SAE 125** 5.10 5.60 (129)(142) 1.80 2.60 (45) (65.) 00 5 50 (140) 6 40 (160) **SAE 250** 0 0 0 4.80 SAE Size 500 口 (121)3.00 (76)0 2.50 6.25 (159) SAE 500 (63) 9.80 (248) Single Solenoid Ford Wired 5-pin mini-connector (all voltages) Ford Wired 4-pin micro-connector (24 volts DC) Wiring Diagrams for Available Options LIGHT SOI LIGHT LIGH1 SOL B LIGHT Chrysler Wired 5-pin mini-connector (all voltages) Chrysler Wired 5-pin micro-connector (24 volts DC) Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz) SOL BOL LIGHT SOL LIGHT LIGHT LIGHT SOL SOL LIGHT LIGHT

Options: Manual Override (for SAE 500 size only), refer to page A6.10. Accessories ordered separately, refer to page A6.10.

#### Pressure Controlled Spool & Sleeve Valves for SAE available, consult ROSS.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: Each solenoid: SAE Size 125, 250: 8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC. SAE Size 500: 87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air.
Inlet Pressure: 30 to 150 psig (2 to 10 bar).
Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure.
Indicator Light: One for each solenoid.
Manual Override: Flush; rubber non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

#### A6.6

Α

**A6** 



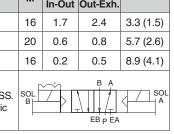
## SAE 84 Series

## **Double Solenoid Pilot Controlled Valves**

	5-Way 2-Position Valves, Detented										
	Valve Model Number*								erage Re	sponse	
SAE	Chrysler Wired					Ford Wired 5-pin	Avg.		Constants#		Weight
Size	5-pin micro-connector	5-pin micro-connector	5-pin mini-connector	5-pin mini-connector	Hardwire	micro connector	Cv	м		F	lb (kg)
	(120 volts / 60 Hz)		(all voltages)	(all voltages)		(24 volts DC)		IVI	In-Out	Out-Exh.	
125	8476C3312	8476C3322	8476C3332**	8476C3342**	8476C3352**	8476C3362	1.8	16	1.7	2.4	3.3 (1.5)
250	8476C4312	8476C4322	8476C4332**	8476C4342**	8476C4352**	8476C4362	5.7	20	0.6	0.8	5.7 (2.6)
500	8476B6312	8476B6322	8476B6332**	8476B6342**	8476B6352**	8476B6362	7.6	16	0.2	0.5	8.9 (4.1)
+ 0h											

Sub-bases and sub-base manifolds ordered separately, refer to page A6.8-9.

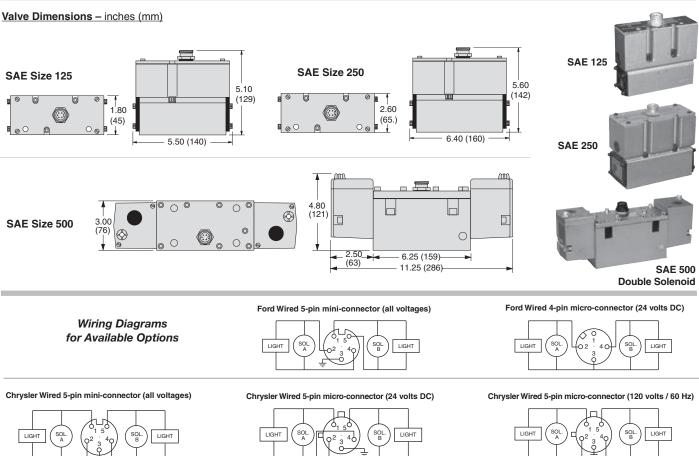
\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g.,8476C3332W. For other voltages, consult ROSS. # Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



SAF

Α

**84 Series** 



Options: Manual Override (for SAE 500 size only), refer to page A6.10. Accessories ordered separately, refer to page A6.10.

#### Pressure Controlled Spool & Sleeve Valves for SAE available, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: Each solenoid: SAE Size 125, 250: 8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC. SAE Size 500: 87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar). Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure. Indicator Light: One for each solenoid. Manual Override: Flush; rubber non-locking.



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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**A6** 

## Sub-Bases – Side Ported

SAE 125 Sub-Base

Α, Β

1/8

1/4

3/8

Port Size\*

P, EA, EB

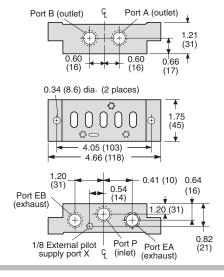
1/4

3/8

3/8

## for SAE Valves 80 & 84 Series

#### Dimensions - inches (mm)



## **SAE 250**

**SAE 125** 

Model Number

577K91

578K91

579K91

For SAE threads, consult ROSS.

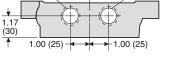
NPT port threads.

Α

SAE 250 Sub-Base									
Model Number	Port Size*								
Model Number	А, В	P, EA, EB							
539K91	1/4	3/8							
540K91	3/8	1/2							
541K91	1/2	1/2							
542K91	3/4	3/4							

\*NPT port threads. For SAE threads, consult ROSS.



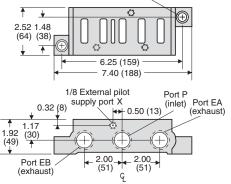


Ģ

Port B (outlet)

0.39 (10) dia. (2 places)

Port A (outlet)

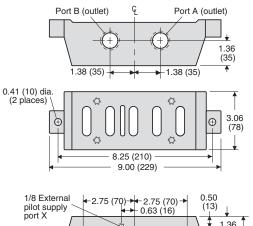


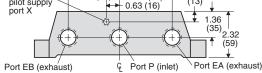
#### **SAE 500**

SAE 500 Sub-Base					
Model Number	Port Size*				
woder Number	A, B	P, EA, EB			
582K91	1/2	3/4			
728K91	3/4	3/4			
583K91	3/4	1			
584K91	1	1			
*NPT port threads. For SAE threads, consult ROSS.					



SAE 500 Double Solenoid







## for SAE Valves 80 & 84 Series

## Α

### **Manifold Stations**

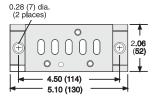
Each manifold station is supplied with all necessary seals and hardware for assembly. End plates are *not* required with these manifolds. Each station has all ports threaded to accept piping.

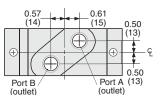
#### **SAE 125**

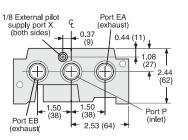
Dimensions - inches (mm)

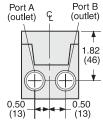
SAE 125 Manifold					
Model Number	Po	rt Size*			
Model Number	А, В	P, EA, EB			
580K91	1/4	3/8			
581K91	3/8	3/8			
*NPT port threads.					

For SAE threads, consult ROSS.



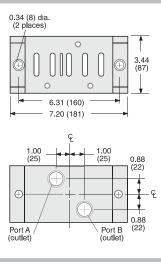


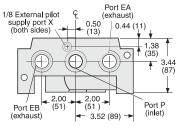


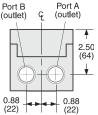


### **SAE 250**

SAE 250 Manifold					
Port Size*					
А, В	P, EA, EB				
3/8	1/2				
1/2	3/4				
3/4	3/4				
*NPT port threads. For SAE threads, consult ROSS.					
	Pc A, B 3/8 1/2 3/4				



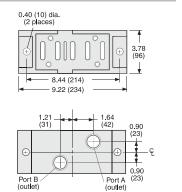


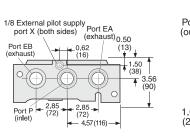


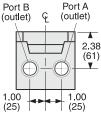
**A6** 

## **SAE 500**

SAE 500 Manifold						
Model Number	Port Size*					
woder Number	A, B	P, EA, EB				
585K91	1/2	3/4				
586K91	3/4	1				
587K91	1	1				
*NPT port threads. For SAE threads, consult ROSS.						

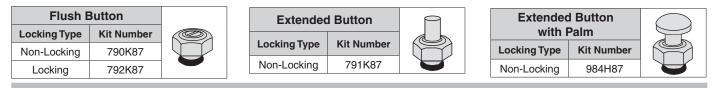






#### Manual Override Kits for SAE Size 500 Valves

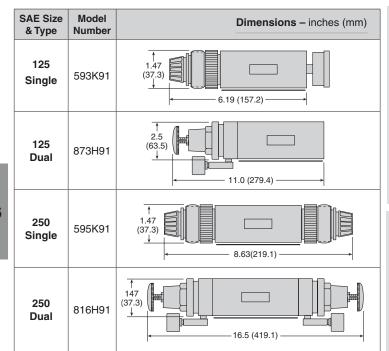
Flush flexible manual override buttons are standard on all SAE 500 solenoid pilot valves. Metal buttons as shown below can be installed in place of the standard flexible buttons. Both locking and non-locking metal buttons are available. Each button has spring-return action. The locking type button, however, can be kept in the actuated position by turning the slot in the top of the button with a screwdriver.



#### **Blanking Plates**

For manifold stations not occupied by a valve, blanking plates are available. These plates block the unused air passages.

#### **Interposed Regulators**



Single and dual interposed regulators are available for SAE sizes 125 and 250.

Part Number

820K77

821K77

822K77

A regulator is sandwiched between the valve and sub-base or manifold station and the valve is then bolted through the regulator to the sub-base or manifold station with the longer bolts provided. Single pressure regulators supply the same regulated pressure at both outlet ports.

Dual pressure regulators allow the pressure at each outlet port to be set independently.

Use dual pressure regulators with 80 Series valves only. When using dual pressure regulators, the valve must be externally piloted. For external pilot supply conversion, see below.

**Regulated pressure range:** 10 to 130 psig (1 to 9 bar); regulatorto-base gasket included.

#### EXTERNAL PILOT SUPPLY CONVERSION

SAE Size

125

250

500

ROSS SAE Solenoid pilot valves are designed to use an internal pilot supply. However, they are easily converted for use with an external pilot supply. To make this conversion, remove the pipe plug on the bottom of the valve. The plug is located between the center port and an adjacent port. Install this plug in the threaded port at the end of the center port. This blocks the internal pilot supply. Connect the external pilot supply line to port X in the base. Pressure in the external supply line must not be less than that specified in the valve's Standard Specifications.

#### Silencers

Port	Thread	Mode	el Number	Avg.	Dimensions inches (mm)		Weight		
Size	Туре	NPT Threads	<b>BSPT</b> Threads	Cv	Α	В	lb (kg)		
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		Fi
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)	+ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$	μ- Δ
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)		
3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (92)	0.2 (0.1)		(a) · ····
3/4	Male	5500A5003	D5500A5003	11.5	2.0 (51)	5.3 (135)	0.6 (0.3)		B
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)		٣
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.								





Α







# ROSS CONTROLS®

# MINIATURE VALVES W14 SERIES SOLENOID PILOT PACK VALVES SERIES



#### SOLENOID PILOT CONTROLLED PACK VALVES - KEY FEATURES

- Individual Valve Shut-off (automatic): increases uptime for continuous processing
- Sure-Shifting and Self-Cleaning: reliable performance in extreme conditions (dirt tolerant, high humidity, cold, heat, dust, debris returned from the field actuator, etc...)
- Easily Accessible Manual Override (Yellow): turn to actuate, no tools needed
- Positive Sealing and Self-Compensating for Wear: perpendicular poppet face seals
- Quick Electrical Disconnect w/Indicator Light: allows immediate troubleshooting of component/system issues in the field.
- Consistent Actuation over the Life of the Valve: strong shifting forces
- Explosion Proof & Intrinsically Safe options available, consult ROSS
- 8 & 16 Station Valve/Manifold: flying wire leads or central wiring option

CONTENT	Page
Solenoid Pilot Controlled Miniature Valves	A7.3
4-Way Solenoid Pilot Controlled Pack Valves	A7.4
3-Way Solenoid Pilot Controlled Pack Valves	A7.5



## **Solenoid Pilot Controlled Miniature Valves**

## W14 Series

Α

3-Way 2-Position Valves, Single Direct Solenoid, Spring Return					
Override Type	Valve Model Number*	Cv			
Locking	W1413A1408**	0.1			
Non-Locking	W1413A1409**	0.1	3/2 Normally Closed		



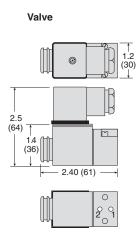
#### \* Sub-bases and sub-base manifold ordered separately.

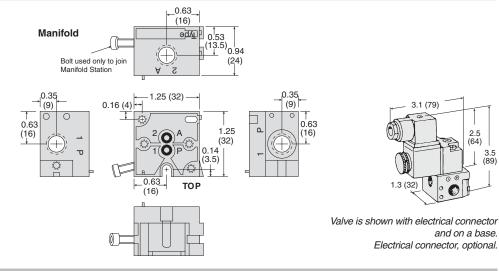
\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., W1413A1408W. For other voltages, consult ROSS.

Monifold	Model Numb	ber
Manifold	535K91	
	Port Threads	Мс

	Port Threads	Model Number		
Sub-Base	1/8 NPT	516B91		
	1/8 BSPP	D516B91		

Dimensions - inches (mm)





#### ACCESSORIES

	Electrical			Cord Diameter	Electrical Connector Model Number		
	Connector	Electrical Connector Type	Cord Length meters (feet)		Without	Lighted Connector*	
Electrical	Form				Light	24 Volts DC	120 Volts AC
Connectors	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	_	-	723K77	724K77-W	724K77-Z
	EN 175301-803 Form A	Connector Only	-	-	937K87	936K87-W	936K87-Z
	* Lights in connectors with a translucent housing can be used as indicator lights to show when solenoids are energized.						

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 8 VA inrush, 6 VA holding on 50 or 60 Hz; 6 watts on DC. Enclosure Rating: IP65, IEC 60529.

Electrical Connections: EN 175301-803 Form A connector.

Ambient Temperature: 5° to 120°F (-15° to 50°C). Media Temperature: 5° to 175°F (-15° to 80°C). For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice. Flow Media: Filtered air. Inlet Pressure: Vacuum to 150 psig (10 bar). Manual Override: Flush; metal, locking and non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**A7** 

3.5 (89)



**Online Version** Rev. 11/14/16

## 4-Way Solenoid Pilot Controlled Pack Valves

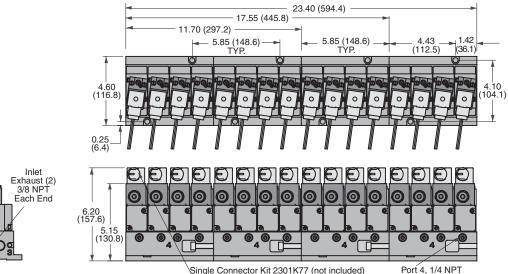
## **Pack Series**

5-Way 2-Position Valves, Single Solenoid Pilot Controlled						
Valve/Manifold Assembly	Model Number	Cv				
4 Station	3900A1052-1**	0.5				
8 Station	3900A1052-2**	0.5				
12 Statio 3900A1052-3** 0.5						
16 Station	3900A1052-4**	0.5	513			
20 Station and over consult ROSS 0.5						
<ul> <li>** Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz;</li> <li>e.g., 3900A1052-1W. For other voltages, consult ROSS.</li> </ul>						



#### Dimensions - inches (mm)

Α



Single Connector Kit 2301K77 (not included)

(Port 2 on the other side)

# PgO

#### **A**CCESSORIES & **O**PTIONS

Silencers						
Port	Thread	Mod	el Number			
Size	Туре	NPT Threads	BSPT Threads			
3/8	Male	5500A3013	D5500A3013			
1/2 Male 5500A4003 D5500A3003						
Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum.						
Flow Media: Filtered air.						

	Fitting Type	Port Threads	Model Number*
Fitting	Brass Swivel	1/4	270A27
	*1/4 tube.		

Electrical	Connector Type	Model Number*					
Connector	EN 175301-803 Form A	2301K77					
Connector	* Electrical Connector w/10' leads.						

For dual or spring return actuators. Field convertible to a 3/2 Valve.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Solenoids: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 3.9 VA holding on 50/60 Hz; 2.1 watts on DC. Enclosure Rating: IP65, IEC 60529.

Electrical Connections: EN 175301-803 Form A connector. Ambient Temperature: 39° to 122°F (4° to 50°F). Media Temperature: 39° to 175°F (4° to 80°C). Indicator Light: In connector. Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar).

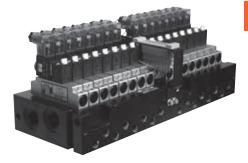


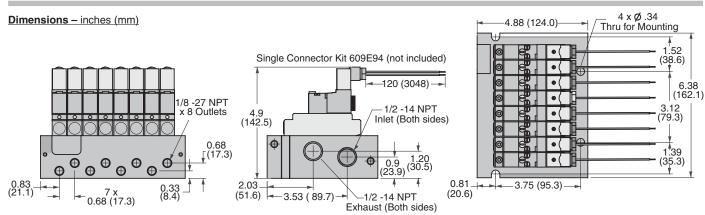
## **3-Way Solenoid Pilot Controlled Pack Valves**

## **Pack Series**

Δ

3-Way 2-Position Valves - Extended-Duty, Single Solenoid Pilot Controlled											
Value/Manifold Assembly	Model I	0									
Valve/Manifold Assembly	Flying Leads	Central Wiring	C <sub>v</sub>								
8 Station 3900A0713-1** 3900A1055-1**											
16 Station	3900A0713-2**	3900A1055-2**	0.5								
24 Station and over	consult ROSS	consult ROSS	0.5								
** Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3900A1052-1W. For other voltages, consult ROSS.											
$3/2 \text{ Normally Closed} \qquad \begin{array}{c} 2\\ 12\\ \hline \\ 3 \\ 1 \end{array} \qquad \begin{array}{c} 2\\ \hline \\ 3 \end{array} \qquad \begin{array}{c} 2\\ \hline \end{array} \qquad \begin{array}{c} 2\\ \end{array} \qquad \begin{array}{c} 2\\ \end{array} \qquad \begin{array}{c} 2\\ \end{array} \end{array} \qquad \begin{array}{c} 2\\ \end{array} \qquad \begin{array}{c} 2\\ \end{array} \qquad \begin{array}{c} 2\\ \end{array} \end{array} \qquad \begin{array}{c} 2\\ \end{array} \end{array} \qquad \begin{array}{c} 2\\ \end{array} \qquad \begin{array}{c} 2\\ \end{array} \end{array} $ \qquad \begin{array}{c} 2\\ \end{array} \end{array}  \qquad \begin{array}{c} 2\\ \end{array} \end{array} \qquad \begin{array}{c} 2\\ \end{array} \end{array}											





#### ACCESSORIES & OPTIONS

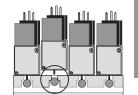
Sile	ncers						Port	Model Number*				
Olici						Fitting Type	Threads	Flying Leads	<b>Central Wiring</b>			
Port Size	Thread Type	Mod NPT Threads	el Number BSPT Threads		Fitting	Metal Swivel	1/8	322E27	322E27			
3/8	Male	5500A3013	D5500A3013			*1/4 tube.						
1/2	Male	5500A4003	D5500A3003					Model Number				
	•	1 0 (	to 10.3 bar) maximum.		ectrical	Connecto	or Type	Flying Leads	Central Wiring			
		red all.		C	onnector	EN 175301-8	03 Form C	609E94	consult ROSS			
		1.00				* Electrical C	onnector w	/10' leads.				
					onnector	EN 175301-8	03 Form C	609E94				

Individual Valve Shut-off (automatic): Individual valves can be removed without shutting off main air supply to the whole manifold or entire solenoid cabinet.

• Simply remove the valve and an internal check-ball automatically blocks inlet air to that station

4/2 Low-Power Solenoid Pilot Controlled Valves available, consult ROSS.

Inlet air is automatically restored to the station when the valve is returned



#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Base. Solenoids: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 0.03 VA holding on 50/60 Hz; 0.8 watts on DC. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form C connector. Ambient Temperature: 39° to 122°F (4° to 50°F). Media Temperature: 39° to 175°F (4° to 80°C). Indicator Light: In connector. Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar).

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

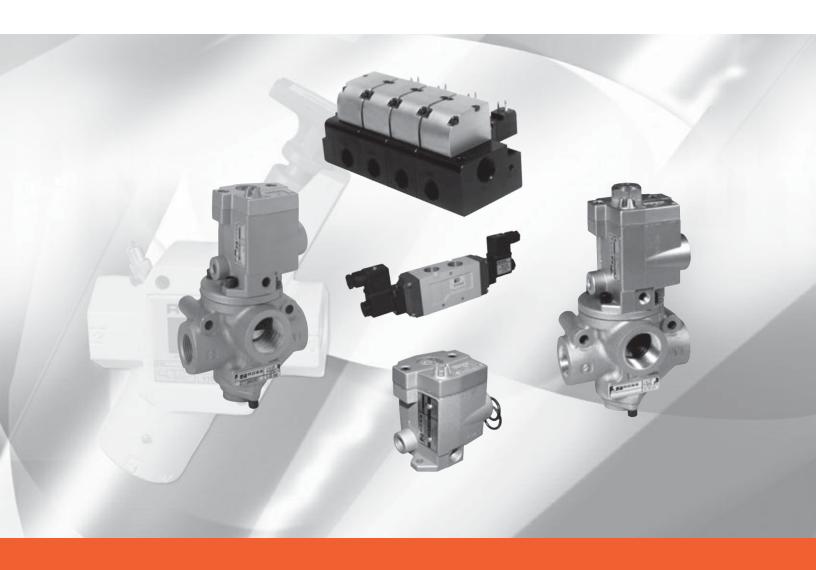
**A7** 





# ROSS CONTROLS®

# **INLINE MOUNTED VALVES AND MANIFOLDS**



										_														
								0		1	Dale	e Ser	ries						a la					
Poppet Va		Poppet Valves					Directional Control														compact Valves			
27 Serie					Ser		<u> </u>					eries				NA	MUF	R In	terfac	e 95	& 34	Sei		16 Series
	DESCR	RIPTION		AV	AILA	BLE	INL	ETE	POR	T SIZ	ZES			FU	INC	τιο	NS							
VALVE TYPE/SERIES	Spool & Sleeve	Poppet			3/8			1		1½	2	21/2	2/2	3/2	3/4	4/2	5/2	5/3	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	<b>Pressure Control</b>	Manifol	Page
DALE SERIES				, ,	 																			
СР																			100					B1.3 - B1.6
LF																			64.7 100					B1.7 - B1.8
CX																			64.7					B1.9 - B1.1
LX LT																			2.2					B1.19 - B1.2 B1.22 - B1.2
Accessories																			2.2					B1.22 - B1.2 B1.25
27 SERIES																						T		
27																			72					B2.3 - B2.9
27																			34					B2.10 - B2.1
27 Options & Acces 21 SERIES	ssorie	S																	72					B2.3 - B2.5 B2.12 - B2.2
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21																			40					B3.6 - B3.8
21 Vacuum																			71					B3.9 - B3.1 B3.12 - B3.1
21 Full Vacuum																			71					B3.11
Options & Acces			POL	05.0	ED	EC																		B3.14
INLINE DIRECTI 95	ONAL	CONT	HOL	90 5	<b>PERI</b>	23													2.6					B4.3, B4.7
95																			4.5					B4.4 - B4.5 B4.8 - B4.5
95 Manifold Base (	Intion	0 9 4 -		oric															3.4					B4.6, B4.1
Manifold Base, ONAMUR INTERF	-				S			_	_				_	_				_						B4.11 - B4.1
95																								B5.3
34																								B5.4
COMPACT 16 SE	RIES																							Dea Do
16															I				[					B6.3 - B6.4

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В



	Con	ents	Page
D	CP Series Solenoid pilot controlled LF Series Solenoid pilot controlled CX Series for Leak Tight Applications Solenoid pilot and pressure controlled	<ul> <li>S</li> <li>LX Series for Leak Tight Applications Solenoid pilot and pressure controlled</li> <li>LT Series for Leak Tight Applications Solenoid pilot and pressure controlled</li> </ul>	B1.1 – B1.25
			В
Ρ	oppet Valves 27 Series		
•	Solenoid control Direct solenoid control Pressure control		B2.1 – B2.23
P	oppet Valves 21 Series		
•	Solenoid control Pressure control	<ul> <li>Low Temperature</li> <li>High Temperature</li> <li>Vacuum</li> <li>Full Vacuum</li> </ul>	B3.1 – B3.14
1			
D	Virectional Spool Valves 95 Ser Solenoid Control Pressure Control Manifolds	es	B4.1 – B4.12
Ν	AMUR Interface 95 & 34 Series		B5.1 – B5.4
•	Solenoid pilot controlled		
1			
С	compact Valves 16 Series		B6.1 – B6.4
•	Solenoid pilot controlled		D0.1 - D0.4
С	autions and Warranty		
•	Compatible Lubricants Cautions and Warnings		Inside Cover
R	Online Version Rev. 11/14/16	v.rosscontrols.com	B0.3

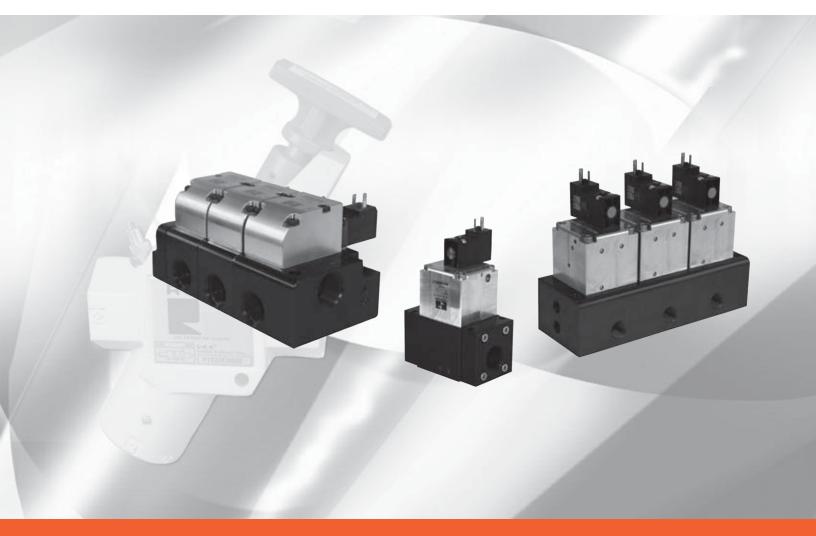


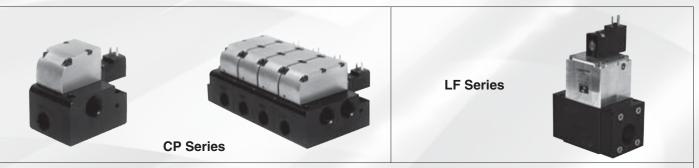


# ROSS CONTROLS®

# **DALE SERIES VALVES**

## Inline Poppet Valves & Manifolds Leak Tight Valves & Manifolds





Internally or externally piloted series for use in standard pressure applications with 30 psi (2 bar) minimum operating pressure.

Image: constraint of the second sec

		PRESSURE		/	AVAIL	ABLE	INLET	PORT	≅ ≳	MOUNTING					
VALVE TYPE/FUNCTION	SOLENOID		1/4	3/8	1/2	3/4	1	1¼	1½	2	21/2	MAXIMUM FLOW CV	INLINE	MANIFOLD	Page
CP SERIES															
2/2												108			B1.3 - B1.6
3/2												12.3			B1.3 - B1.6
LF SERIES															
2/2												62.7			B1.7 - B1.8
CX SERIES for	Leak Test Ap	oplications													
2/2												108			B1.9 - B1.10
3/2												12.3			B1.11
2/2												108			B1.12 - B1.13
3/2												12.3			B1.12 - B1.13
CX SERIES MA	NIFOLDS for	r Leak Test Ap	oplica	tions											
2/2												108			B1.14 - B1.15
3/2												12.3			B1.16
2/2												108			B1.17 - B1.18
3/2												12.3			B1.17 - B1.18
LX SERIES for	Leak Test Ap	plications													
2/2												62.7			B1.19 - B1.20
2/2												62.7			B1.21
LT SERIES															
3/4												2.2			B1.22 - B1.23
Accessories	Electrical C	onnectors, Sile	encers	6											B1.25

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В



## **Dale CP Series**

	2-Way 2-Position Valves, Spring Assisted Air Return								
Port Size		Model N Internal Pi	Pilot Port	Thread	Avg. C <sub>v</sub>	Weight			
1	2	Normally Closed	Normally Open	NPT BSPP		Avg. O <sub>v</sub>	lb (kg)		
1/2	3/8	CP14NB37101**	CP24NB37101**	10-32 UNF	M5	3.5	1.4 (0.6)		
1/2	1/2	CP14NB47101**	CP24NB47101**	10-32 UNF	M5	3.5	1.4 (0.6)		
1	3/4	CP16NB57101**	CP26NB57101**	1/8-27 NPT	G1/8	12.3	3.5 (1.6)		
1	1	CP16NB67101**	CP26NB67101**	1/8-27 NPT	G1/8	12.3	3.5 (1.6)		
1½	1¼	CP18NB77101**	CP28NB77101**	1/8-27 NPT	G1/8	44.9	10.0 (4.6)		
1½	1½	CP18NB87101**	CP28NB87101**	1/8-27 NPT	G1/8	44.9	10.0 (4.6)		
21⁄2	2	CP10NB97101**	CP20NB97101**	1/8-27 NPT	G1/8	108	19.5 (8.9)		
21⁄2	21⁄2	CP10NB07101**	CP20NB07101**	1/8-27 NPT G1/8		108	19.5 (8.9)		
		ds. For BSPP threads,			-	•			

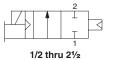


**B1** 

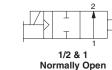
B

Port Sizes 3/4 thru 21/2

Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., CP14NB37101W.



Normally Closed



Normally Open

	3-Way 2-Position Valves, Spring Assisted Air Return								
Port	Size	Model N	Pilot Port	Thread		Weight			
1 011	0120	Internal Pil	ot Supply			Avg. C <sub>v</sub>	lb (kg)		
1, 3	2	Normally Closed	Normally Open	NPT	BSPP				
1/2	3/8	CP34NB37101**	CP44NB37101**	10-32 UNF	M5	3.5	1.8 (0.8)		
1/2	1/2	CP34NB47101**	CP44NB47101**	10-32 UNF	M5	3.5	1.8 (0.8)		
1	3/4	CP36NB57101**	CP46NB57101**	1/8-27 NPT	G1/8	12.3	5.3 (2.4)		
1	1	CP36NB67101**	CP46NB67101**	1/8-27 NPT	G1/8	12.3	5.3 (2.4)		
	* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., CP34DB37101W. ** Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., CP34NB37101W.								
		1/2 & 1	1/2			1			

Normally Open



**EXTERNAL PILOT SUPPLY** CONVERSION:

Normally Closed

The CP Series valves can be easily field converted to external pilot supply by simply removing existing pipe plug from port X-1, and installing air supply to the X-1 port.

<

11/2 & 21/2

#### Accessories ordered separately, refer to page B1.25.

Normally Open

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Electrical Connections: EN 175301-803 Form A or Form C connector. Ambient Temperature: 40° to 120°F (4° to 50°C). Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Media Temperature: 40° to 175°F (4° to 80°C). Standard Voltages/Power Consumption (each solenoid): Flow Media: Filtered air. For liquid applications, consult ROSS. 2/2 Valves Port Size 1/2 & 1 and 3/2 Valves Port Size 1/2: Inlet Pressure: 30 to 145 psig (2 to 10 bar). 24 volts DC: 1.2 watts on DC. Pilot Pressure: 30 to 145 psig (2 to 10 bar). Must be equal to or greater 110 volts AC, 50 Hz: 5.4 VA. than inlet pressure. 120 volts AC, 60 Hz: 5.0 VA. Manual Override: Non-Locking. 2/2 Valves Port Size 11/2 & 21/2 and 3/2 Valves Port Size 1: 2/2 valves: Port Size: 1/2 thru 21/2 (Normally Closed). 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. Port Size: 1/2 & 1 (Normally Open). 3/2 valves: Port Size: 1/2 & 1 (Normally Closed). 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC. Enclosure Rating: IP65, IEC 60529. Port Size: 1/2 (Normally Open).

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

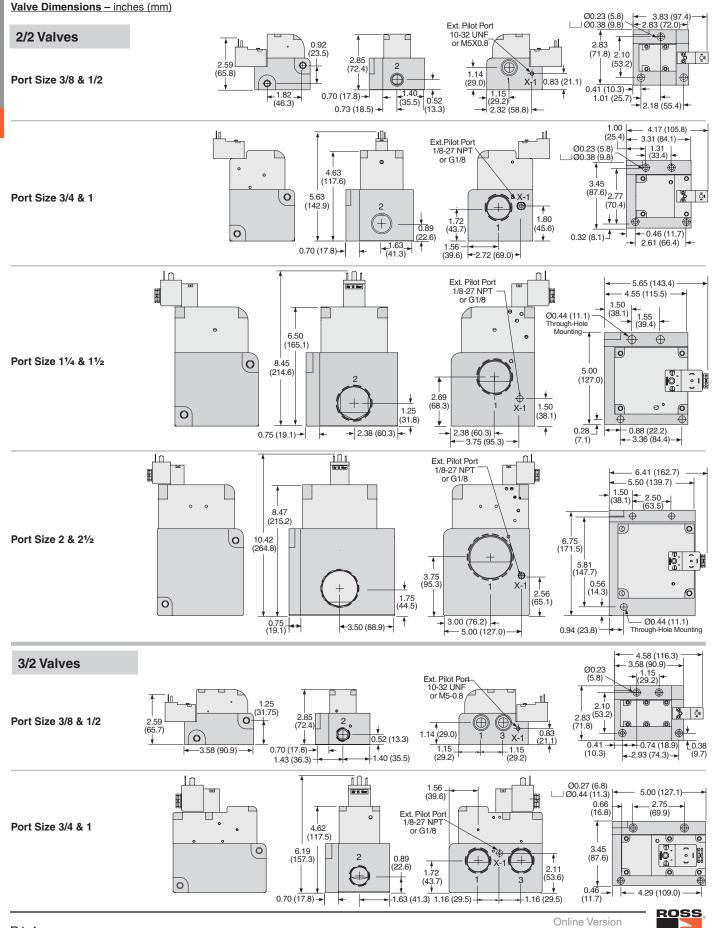
B1.3

**B1** 

B

## **Dale CP Series**

Rev. 11/14/16



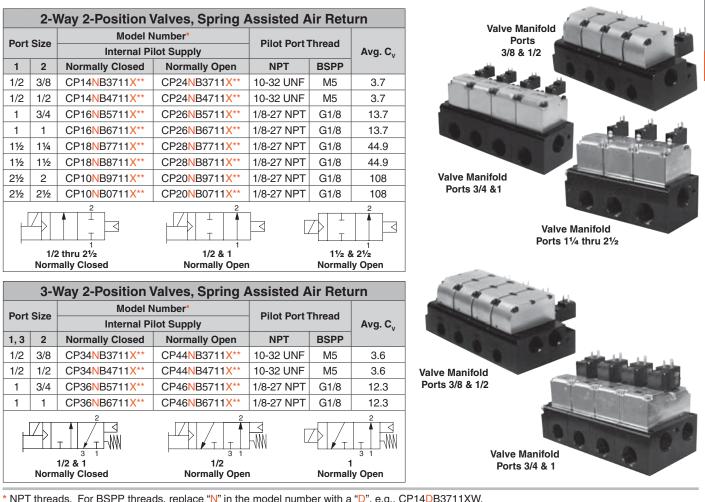
## Solenoid Pilot Controlled Valve Manifolds

## **Dale CP Series**

**B1** 

P

Manifolds can be ordered from two to ten stations. Complete valves-on-manifold assemblies can be ordered to fit your precise requirements. For preassembled manifold valves with the same model number, select the part number from the table below. For ordering the Dale CP Series manifold valves with different valve functions, please see page B1.24 for manifold configurator.



\* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., CP14DB3711XW.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., CP14NB3711XW.

X To indicate the number of stations desired (2-10), replace X in the model number with the specific number of stations,

e.g., CP14NB37114W, 4 = Number of Stations.

Contact ROSS for 1 station valve manifolds or refer to single CX Valve product page.

#### EXTERNAL PILOT SUPPLY **CONVERSION:**

The CP Series valves can be easily field converted to external pilot supply by simply removing existing pipe plug from port X-1, and installing air supply to the X-1 port.

#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

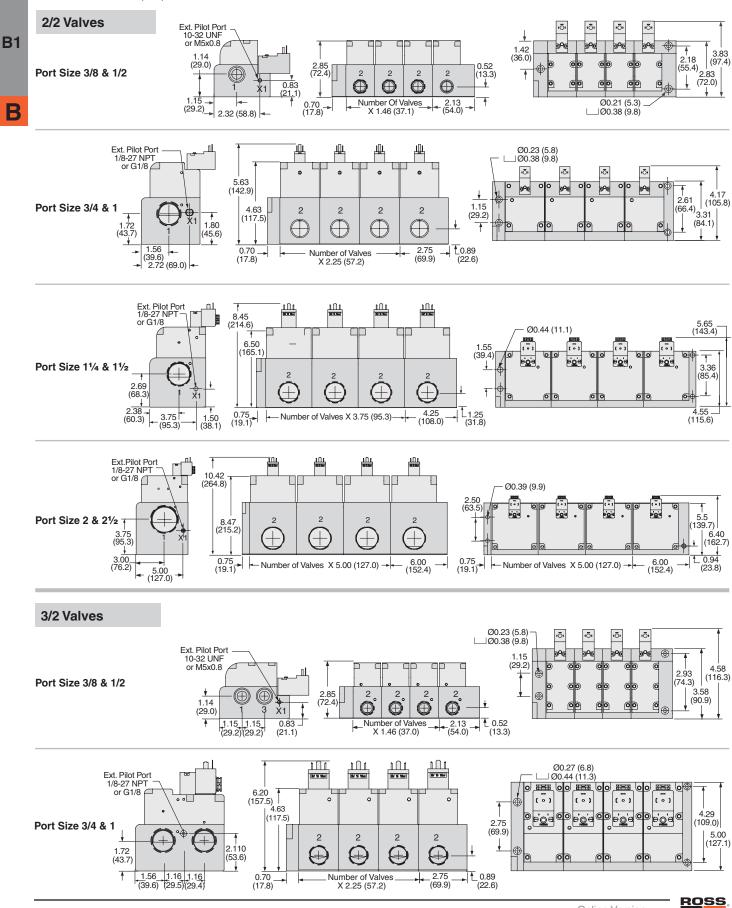
Construction: Poppet.	Electrical Connections: EN 175301-803 Form A or Form C connector.
Mounting Type: Inline.	Ambient Temperature: 40° to 120°F (4° to 50°C).
Solenoid Pilot: Rated for continuous duty.	Media Temperature: 40° to 175°F (4° to 80°C).
Standard Voltages/Power Consumption (each solenoid):	Flow Media: Filtered air. For liquid applications, consult ROSS.
2/2 Valves Port Size 1/2 & 1 and 3/2 Valves Port Size 1/2:	Inlet Pressure: 30 145 psig (2 to 10 bar).
24 volts DC: 1.2 watts on DC.	Pilot Pressure: 30 to 145 psig (2 to 10 bar). Must be equal to or greater
110 volts AC, 50 Hz: 5.4 VA.	than inlet pressure.
120 volts AC, 60 Hz: 5.0 VA.	Manual Override: Non-Locking.
2/2 Valves Port Size 11/2 & 21/2 and 3/2 Valves Port Size 1:	2/2 valves: Port Size: 1/2 thru 21/2 (Normally Closed).
24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz.	Port Size: 1/2 & 1 (Normally Open).
5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC	3/2 valves: Port Size: 1/2 & 1 (Normally Closed).
Enclosure Rating: IP65, IEC 60529.	Port Size: 1/2 (Normally Open).

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## **Solenoid Pilot Controlled Valve Manifolds**

Dimensions - inches (mm)



## **Dale LF Series**

**B1** 

		2-Way 2-Positio	on Valves, Spring A	Assisted A	ir Retu	rn		<u></u>
Port	Size	ze Model Number*		Ŭ		0	1°	
1	2	Normally Closed	Normally Open	NPT	BSPP	C <sub>v</sub>	lb (kg)	Ports 3/8 thru 1
3/8	3/8	LF13NB37101**	LF23NB37101**	1/8-27 NPT	G1/8	3.6	1.5 (0.7)	
1/2	1/2	LF14NB47101**	LF24NB47101**	1/8-27 NPT	G1/8	3.6	1.5 (0.7)	0
3/4	3/4	LF15NB57101**	LF25NB57101**	1/8-27 NPT	G1/8	12.2	3.5 (1.6)	
1	1	LF16NB67101**	LF26NB67101**	1/8-27 NPT	G1/8	12.2	3.5 (1.6)	0
1¼	1¼	LF17NB77101**	LF27NB77101**	1/8-27 NPT	G1/8	36.1	9.3 (4.2)	
1½	1½	LF18NB87101**	LF28NB87101**	1/8-27 NPT	G1/8	36.1	9.3 (4.2)	
2	2	LF19NB97101**	LF29NB97101**	1/8-27 NPT	G1/8	62.7	19.3 (8.8)	
21⁄2	21⁄2	LF10NB07101**	LF20NB07101**	1/8-27 NPT	G1/8	62.7	19.3 (8.8)	1. P.
	* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., LF13DB37101W. ** Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., LF13NB37101W.						Ports 11/4 thru 21/2	
		Normally Closed	3/8 thru 1 Normally Open		thru 2½ nally Ope			

The LF & LX Series provides superior performance over a diaphragm valve with a rugged poppet design, bidirectional flow and high cycle life.

with a rugged poppet design, binigh cycle life. Diaphragm Valve Performance Cost Ball Valve Effective Ball Valve

The LF & LX Series provides superior performance over a ball valve with solenoid actuation, shifting speed, cycle life, and most important, a cost effective alternative.

EXTERNAL PILOT SUPPLY CONVERSION:

The LF Series valves can be easily field converted to external pilot supply by simply removing existing pipe plug from port X-1, and installing air supply to the X-1 port.

#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Electrical Connections: EN 175301-803 Form A or Form C connector. Mounting Type: Inline. Ambient Temperature: 40° to 120°F (4° to 50°C). Solenoid Pilot: Rated for continuous duty. Media Temperature: 40° to 175°F (4° to 80°C). Standard Voltages/Power Consumption (each solenoid): Flow Media: Filtered air. For liquid applications, consult ROSS. Port Size 3/8 thru 1: 24 volts DC: 1.2 watts on DC. Inlet Pressure: 30 to 145 psig (2 to 10 bar). 110 volts AC, 50 Hz: 5.4 VA. Pilot Pressure: 30 to 145 psig (2 to 10 bar). Must be equal to or greater 120 volts AC, 60 Hz: 5.0 VA. than inlet pressure. Port Size 11/4 thru 21/2: Manual Override: Non-Locking. 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. Port Size: 3/8 thru 21/2 (Normally Closed). 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC. Port Size: 3/8 thru 1 (Normally Open). Enclosure Rating: IP65, IEC 60529.

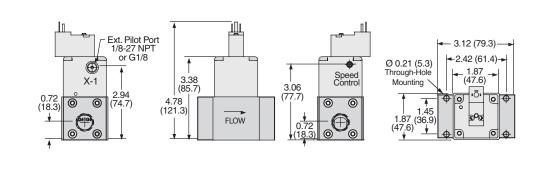
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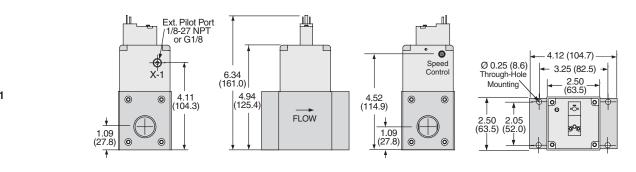
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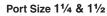
Valve Dimensions - inches (mm)

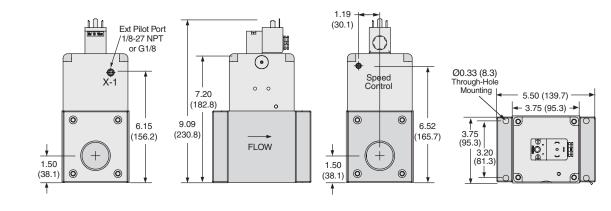
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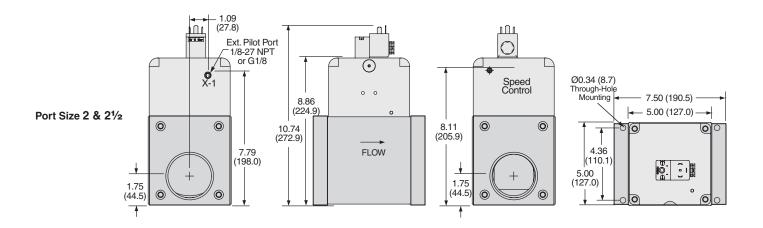




Port Size 3/4 & 1









## for Leak Tight Applications

	2-Way 2-Position Valves, Air Return								
Por	t Size	Model N	lumber*	Pilot Port 1	Throad				
PUL	Size	External P	ilot Supply	FIIOLFOIL	meau	Avg. C <sub>v</sub>	Weight Ib (kg)		
1	2	Normally Closed	Normally Open	NPT	BSPP	U <sub>v</sub>	10 (119)		
1/4	1/4	CX12NB27501**	CX22NB27501**	10-32 UNF	M5	0.9	1.3 (0.6)		
1/2	3/8	CX14NB37501**	CX24NB37501**	10-32 UNF	M5	3.5	1.4 (0.6)		
1/2	1/2	CX14NB47501**	CX24 <mark>N</mark> B47501**	10-32 UNF	M5	3.5	1.4 (0.6)		
1	3/4	CX16NB57501**	CX26NB57501**	1/8-27 NPT	G1/8	12.3	3.5 (1.6)		
1	1	CX16NB67501**	CX26NB67501**	1/8-27 NPT	G1/8	12.3	3.5 (1.6)		
1½	1¼	CX18NB77501**	CX28NB77501**	1/8-27 NPT	G1/8	44.9	10.0 (4.6)		
1½	1½	CX18NB87501**	CX28NB87501**	1/8-27 NPT	G1/8	44.9	10.0 (4.6)		
21⁄2	2	CX10NB97501**	CX20NB97501**	1/8-27 NPT	G1/8	108	19.5 (8.9)		
21⁄2	21⁄2	2 CX10NB07501** CX20NB07501** 1/8-27 NPT G1/8 108 11				19.5 (8.9)			
		ads. For BSPP threads tage code: "W" = 24 vo			-	0			

1/4 thru 1

Normally Open



**B1** 

B

Port Sizes 3/8 & 1/2



Port Sizes 1/4, 3/4 thru 21/2

#### Features & Benefits:

1/4 thru 21/2

Normally Closed

Compact Manifold Design – Eliminating piping High Flow – CP Series port sizes from 3/8" to 2-1/2" Consistent Shifting – Dual piston provides smooth, consistent shifting Bi-Directional Flow – Allows pressure or vacuum on any port at any time Reduced Downtime – Poppet cartridge rebuilds completed in minutes Life Test – Tested to 20 million cycles

#### Accessories ordered separately, refer to page B1.25.

11/2 & 21/2

Normally Open

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Ambient Temperature: 40° to 120°F (4° to 50°C). Mounting Type: Inline. Media Temperature: 40° to 175°F (4° to 80°C). Solenoid Pilot: Rated for continuous duty. Flow Media: Filtered air. For liquid applications, consult ROSS. Standard Voltages/Power Consumption (each solenoid): Inlet Pressure: Port Size 1/4 thru 1: Port Size 1/4: Vacuum to 250 psig (vacuum to 17.2 bar). 24 volts DC: 1.2 watts on DC. Port Size 1/2 thru 21/2: Vacuum to 145 psig (vacuum to 10 bar). 110 volts AC, 50 Hz: 5.4 VA. **Pilot Pressure:** 120 volts AC, 60 Hz: 5.0 VA. Port Size 1/4: 70 to 145 psig (5 to 10 bar). Port Size 11/4 thru 21/2: Port Size 1/2 thru 21/2: 30 to 145 psig (2 to 10 bar). Must be equal to 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. or greater than inlet pressure. 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC. Manual Override: Non-Locking. Enclosure Rating: IP65, IEC 60529. Port Size: 1/4 thru 21/2 (Normally Closed). Electrical Connections: EN 175301-803 Form A or Form C connector. Port Size: 1/4 thru 1 (Normally Open).

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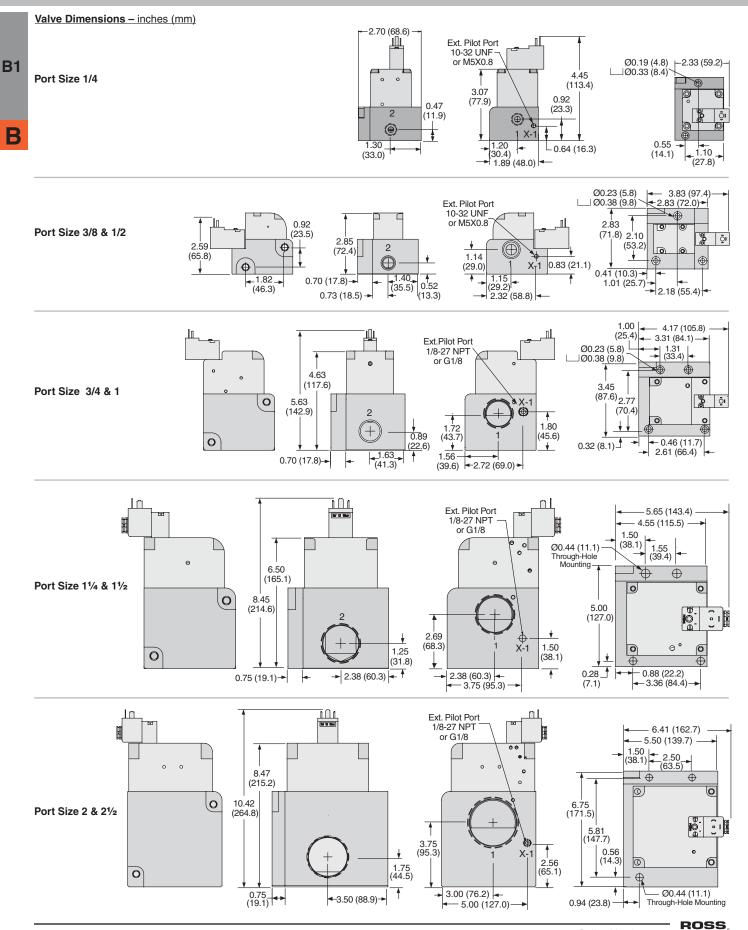
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## **Dale CX Series**

## Solenoid Pilot Controlled Valves for Leak Tight Applications

## **Dale CX Series**



## for Leak Tight Applications

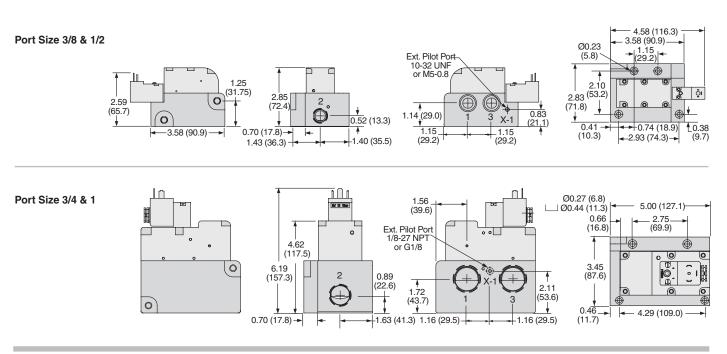
## **Dale CX Series**

**B1** 

B

Port Size		Model N	Model Number*		Thursd			
Por	i Size	External P	ilot Supply	Pilot Port	Inread	Avg. Weight		
1, 3	2	Normally Closed	Normally Open	NPT BSPP C <sub>v</sub>		υv	ib (kg)	Port Sizes
1/2	3/8	CX34NB37501**	CX44NB37501**	10-32 UNF	M5	3.5	1.8 (0.8)	3/8 & 1/2
1/2	1/2	CX34NB47501**	CX44NB47501**	10-32 UNF	M5	3.5	1.8 (0.8)	
1	3/4	CX36NB57501**	CX46NB57501**	1/8-27 NPT	G1/8	12.3	5.3 (2.4)	
1	1	CX36NB67501**	CX46NB67501**	1/8-27 NPT	G1/8	12.3	5.3 (2.4)	
			replace "N" in the mode ts DC; "Z" = 110 volts A			•		
						Port Size 3/4 & 1		
		1/2 & 1 Normally Closed	1/2 Normally Oper	•	1 Normally	Open		

Valve Dimensions - inches (mm)



Accessories ordered separately, refer to page B1.25.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages/Power Consumption (each solenoid): Port Size 1/2: 24 volts DC: 1.2 watts on DC. 110 volts AC, 50 Hz: 5.4 VA. 120 volts AC, 60 Hz: 5.0 VA.

Port Size 1:

24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC.

Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form A or Form C connector. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. For liquid applications, consult ROSS. Inlet Pressure: Vacuum to 145 psig (vacuum to 10 bar). Pilot Pressure: 50 to 145 psig (3.4 to 10 bar). Must be equal to or greater than inlet pressure. Manual Override: Non-Locking. Port Size: 1/2 & 1 (Normally Closed). Port Size: 1/2 (Normally Open).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

	2-Way 2-Position Valves, Air Return							
	ort ze	Model Number*	Pilot Por	Pilot Port Thread		Weight		
1	2		NPT	BSPP	Avg. C <sub>v</sub>	lb (kg)		
1/2	3/8	CX14NB35501	10-32 UNF	M5	3.5	1.4 (0.6)		
1/2	1/2	CX14NB45501	10-32 UNF	M5	3.5	1.4 (0.6)		
1	3/4	CX16NB55501	1/8-27 NPT	G1/8	12.3	3.5 (1.6)		
1	1	CX16NB65501	1/8-27 NPT	G1/8	12.3	3.5 (1.6)		
1½	1¼	CX18NB75501	1/8-27 NPT	G1/8	44.9	10.0 (4.6)		
1½	1½	CX18NB85501	1/8-27 NPT	G1/8	44.9	10.0 (4.6)		
21⁄2	2	CX10NB95501	1/8-27 NPT	G1/8	108	19.5 (8.9)		
21⁄2	21⁄2	CX10NB05501	1/8-27 NPT	G1/8	108	19.5 (8.9)		
* NP	T thre	ads. For BSPP threads, replace "N	" in the model	number with a	" <mark>D</mark> ", e.g., C	(34 <mark>D</mark> B35501.		
		Normally Closed						

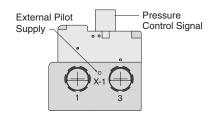
	3-Way 2-Position Valves, Spring Assisted Air Return								
Port Size Model Number*		Pilot Por	t Thread	Avg. C,	Weight				
1, 3	2		NPT	BSPP	<b>3</b> v	lb (kg)			
1/2	3/8	CX34 <mark>N</mark> B35501	10-32 UNF	M5	3.5	1.4 (0.6)			
1/2	1/2	CX34 <mark>N</mark> B45501	10-32 UNF	M5	3.5	1.4 (0.6)			
1	3/4	CX36NB55501	1/8-27 NPT	G1/8	12.3	3.5 (1.6)			
1	1	CX36NB65501	1/8-27 NPT	G1/8	12.3	3.5 (1.6)			
* NP	T thre	ads. For BSPP threads, replace "N	" in the model	number with a	"D", e.g., C	X34DB35501.			
	Normally Closed $-\frac{2}{3}$								



**Dale CX Series** 



**Note:** The Dale Series pressure controlled valves require both an external pilot supply and a control signal to operate the valve. When a pressure control signal is applied the valve shifts to the open position.



Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Inline. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. For liquid applications, consult ROSS. Inlet Pressure: Vacuum to 250 psig (17.2 bar).

#### Pilot Pressure:

2/2 valves: 30 to 250 psig (2 to 17.2 bar). Must be equal to or greater than inlet pressure.

*3/2 valves:* 50 to 250 psig (3.4 to 17.2 bar). Must be equal to or greater than inlet pressure.

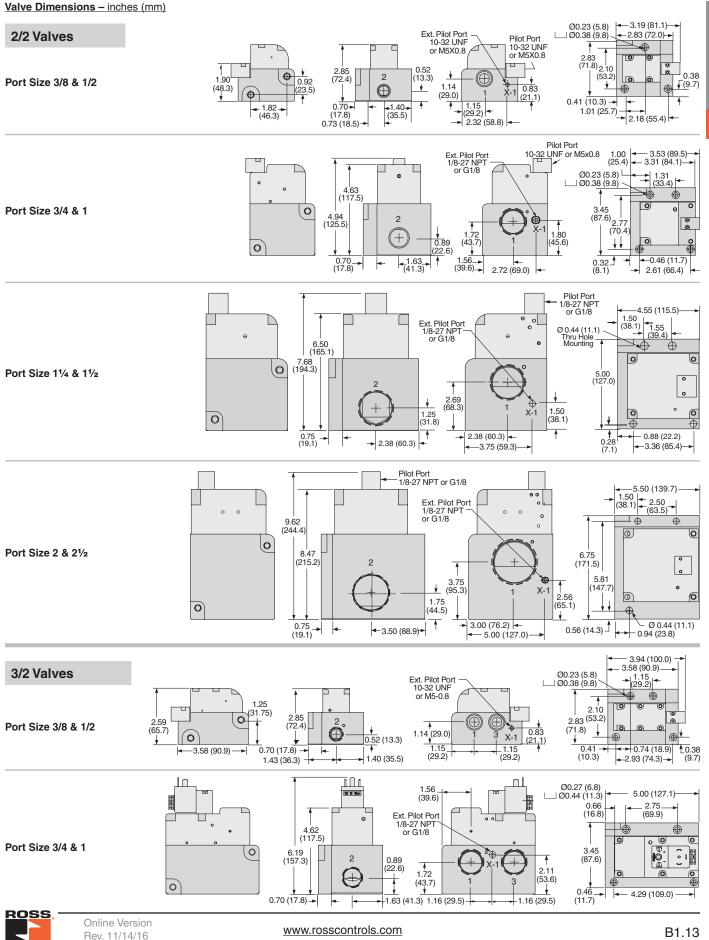


## **Pressure Controlled Valves** for Leak Tight Applications

## **Dale CX Series**

**B1** 

B



Manifolds can be ordered from two (2) to ten (10) stations. Complete valves-on-manifold assemblies can be ordered to fit your precise requirements.

For preassembled manifold valves with the same model number, select the part number from the table below. For ordering the Dale CX Series manifold valves with different valve functions, please see page B1.24 for manifold configurator.

		ng the Dale CX Serie onfigurator.	s manifold valves with	n different valv	e functio	ns, please	see page B1.24 for
		2-Way 2-	Position Valves, A	ir Return			
Port	Size		Number* Pilot Supply	Pilot Port	Thread	Avg. C <sub>v</sub>	Valve Manifold Ports 3/8 & 1/2
1	2	Normally Closed	Normally Open	NPT	BSPP		
1/4	1/4	CX12NB2751X**	CX22NB2751X**	10-32 UNF	M5	0.9	
1/2	3/8	CX14NB3751X**	CX24NB3751X**	10-32 UNF	M5	3.5	
1/2	1/2	CX14NB4751X**	CX24NB4751X**	10-32 UNF	M5	3.5	
1	3/4	CX16NB5751X**	CX26NB5751X**	1/8-27 NPT	G1/8	12.3	
1	1	CX16NB6751X**	CX26NB6751X**	1/8-27 NPT	G1/8	12.3	Valve Manifold
1½	1¼	CX18 <mark>N</mark> B7751 <mark>X</mark> **	CX28NB7751X**	1/8-27 NPT	G1/8	44.9	Ports 3/4 &1
1½	1½	CX18NB8751X**	CX28NB8751X**	1/8-27 NPT	G1/8	44.9	
21⁄2	2	CX10 <mark>N</mark> B9751 <mark>X</mark> **	CX20NB9751X**	1/8-27 NPT	G1/8	108	
21⁄2	21⁄2	CX10 <mark>N</mark> B0751 <mark>X</mark> **	CX20NB0751X**	1/8-27 NPT	G1/8	108	1
F							
		I thru 2½ nally Closed	1/4 thru 1 Normally Open	No	11/2 & 21/2 ormally Op	en	Valve Manifold Ports 1/4, 11/4 thru 21/2

\* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., CX12DB2751XW.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g.,CX12NB2751XW.

X To indicate the number of stations desired, replace X in the model number with the specific number of stations, e.g., CX12NB27514W,

4 = 4 Stations; CX12NB27510W, 0 = 10 Stations.

#### Features & Benefits:

Compact Manifold Design - Eliminating piping High Flow - CP Series port sizes from 3/8" to 2-1/2" Consistent Shifting - Dual piston provides smooth, consistent shifting Bi-Directional Flow - Allows pressure or vacuum on any port at any time Reduced Downtime - Poppet cartridge rebuilds completed in minutes Life Test - Tested to 20 million cycles

#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet.	Enclosure Rating: IP65, IEC 60529.
Mounting Type: Inline.	Electrical Connections: EN 175301-803 Form A or Form C connector.
Solenoid Pilot: Rated for continuous duty.	Flow Media: Filtered air. For liquid applications, consult ROSS.
Standard Voltages/Power Consumption (each solenoid):	Inlet Pressure:
Port Size 1/4 thru 1: 24 volts DC: 1.2 watts on DC.	Port Size 1/4: Vacuum to 250 psig (vacuum to 17.2 bar).
110 volts AC, 50 Hz: 5.4 VA.	Port Size 1/2 thru 21/2: Vacuum to 145 psig (vacuum to 10 bar).
120 volts AC, 60 Hz: 5.0 VA.	Pilot Pressure:
Port Size 1¼ thru 2½:	<i>Port Size 1/4:</i> 70 to 145 psig (5 to 10 bar).
24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz.	Port Size 1/2 thru 21/2: 30 to 145 psig (2 to 10 bar). Must be equal to
5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC.	or greater than inlet pressure.
Ambient Temperature: 40° to 120°F (4° to 50°C).	Manual Override: Non-Locking.
Media Temperature: 40° to 175°F (4° to 80°C).	Port Size: 1/4 thru 21/2 (Normally Closed).
•	Port Size: 1/4 thru 1 (Normally Open).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**B1** 

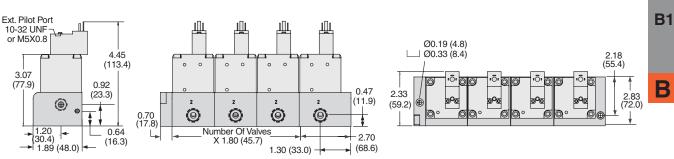


## Solenoid Pilot Controlled Valve Manifolds for Leak Tight Applications

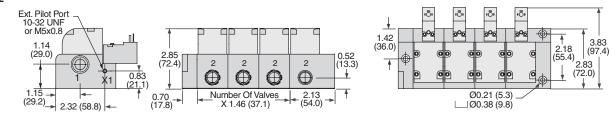
Dimensions - inches (mm)

#### Port Size 1/4

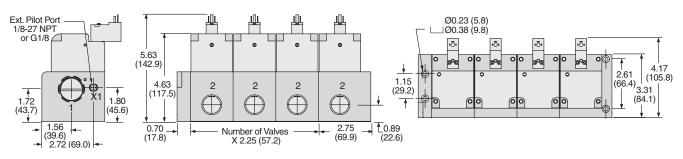




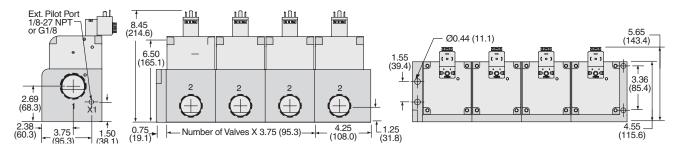
#### Port Size 3/8 & 1/2



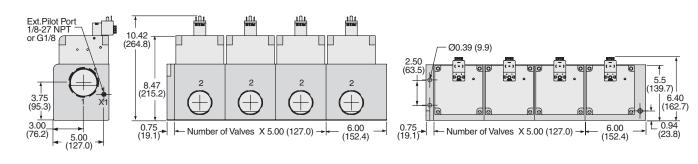
#### Port Size 3/4 & 1



#### Port Size 11/4 & 11/2



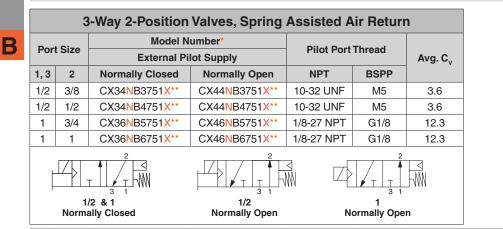


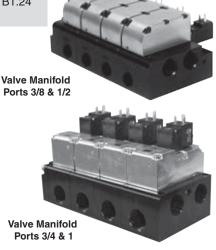




Manifolds can be ordered from two (2) to ten (10) stations. Complete valves-on-manifold assemblies can be ordered to fit your precise requirements.

For preassembled manifold valves with the same model number, select the part number from the table below. For ordering the Dale CX Series manifold valves with different valve functions, please see page B1.24 for manifold configurator.



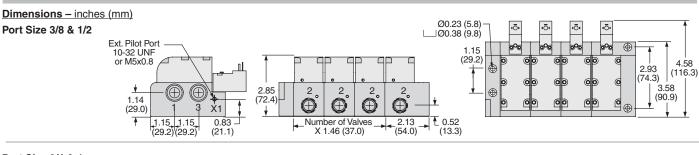


\* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., CX34DB3751\*\*.

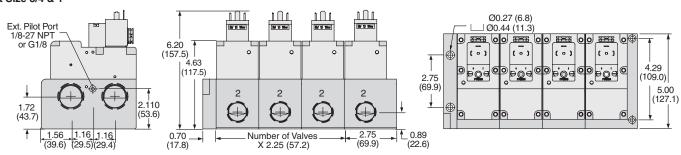
\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., CX34NB3751XW.

X To indicate the number of stations desired, replace X in the model number with the specific number of stations, e.g., CX34NB37514W,

4 = 4 Stations ; CX34NB37510W, 0 = 10 Stations.







#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Electrical Connections: EN 175301-803 Form A or Form C connector. Mounting Type: Inline. Ambient Temperature: 40° to 120°F (4° to 50°C). Solenoid Pilot: Rated for continuous duty. Media Temperature: 40° to 175°F (4° to 80°C). Standard Voltages/Power Consumption (each solenoid): Flow Media: Filtered air. For liquid applications, consult ROSS. Port Size 1/2: 24 volts DC: 1.2 watts on DC. Inlet Pressure: Vacuum to 145 psig (vacuum to 10 bar). 110 volts AC, 50 Hz: 5.4 VA. Pilot Pressure: 50 to 145 psig (3.4 to 10 bar). Must be equal to or greater 120 volts AC, 60 Hz: 5.0 VA. than inlet pressure. Port Size 1: 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. Manual Override: Non-Locking. 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC. Port Size: 1/2 & 1 (Normally Closed). Enclosure Rating: IP65, IEC 60529. Port Size: 1/2 (Normally Open).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**B1** 



## **Pressure Controlled Valve Manifolds**

## for Leak Tight Applications

## **Dale CX Series**

**B1** 

B

## Manifolds can be ordered from two (2) to ten (10) stations.

Complete valves-on-manifold assemblies can be ordered to fit your precise requirements. For preassembled manifold valves with the same model number, select the part number from the table below. For ordering the Dale CX Series manifold valves with different valve functions, please see page B1.24 for manifold configurator.

	2-Way 2-Position Valves, Air Return								
Por	t Size	Model Number*	* Pilot Port Thread		Aug. C				
1	2	Model Number"	NPT	BSPP	Avg. C <sub>v</sub>				
1/2	3/8	CX14NB3551X	10-32 UNF	M5	3.7				
1/2	1/2	CX14NB4551X	10-32 UNF	M5	3.7				
1	3/4	CX16NB5551X	1/8-27 NPT	G1/8	13.7				
1	1	CX16NB6551X	1/8-27 NPT	G1/8	13.7				
1½	1¼	CX18NB7551X	1/8-27 NPT	G1/8	44.9				
1½	1½	CX18NB8551X	1/8-27 NPT	G1/8	44.9				
21⁄2	2	CX10NB9551X	1/8-27 NPT	G1/8	108				
21⁄2	21⁄2	CX10NB0551X	1/8-27 NPT	G1/8	108				



Ports 3/8 & 1/2

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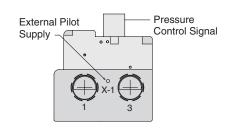
	3-Way 2-Position Valves, Spring Assisted Air Return								
Port Size			Pilot Port T	hread	A				
1, 3	2	Model Number*	NPT	IPT BSPP Avg. C		2			
1/2	3/8	CX34NB3551X	10-32 UNF	M5	3.6				
1/2	1/2	CX34 <mark>N</mark> B4551X	10-32 UNF	M5	3.6	$ \begin{array}{c c} \hline \\ \hline \\ 3 \end{array} $			
1	3/4	CX36NB5551X	1/8-27 NPT	G1/8	12.3	Normally Closed			
1	1	CX36NB6551X	1/8-27 NPT	G1/8	12.3				



\* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., CX14DB3551X.

X To indicate the number of stations desired, replace X in the model number with the specific number of stations, e.g., CX14NB35516, 6 = 6 Stations; CX14NB35510, 0 = 10 Stations.

Note: The Dale Series pressure controlled valves require both an external pilot supply and a control signal to operate the valve. When a pressure control signal is applied the valve shifts to the open position.



Note: For manifolds requiring different valves types, consult ROSS.

#### Accessories ordered separately, refer to page B1.25.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Inline. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. For liquid applications, consult ROSS. Inlet Pressure: Vacuum to 250 psig (vacuum to 17.2 bar).

#### **Pilot Pressure:**

2/2 valves: 30 to 250 psig (2 to 17.2 bar). Must be equal to or greater than inlet pressure. 3/2 valves: 50 to 250 psig (3.4 to 17.2 bar). Must be equal to or greater than inlet pressure.

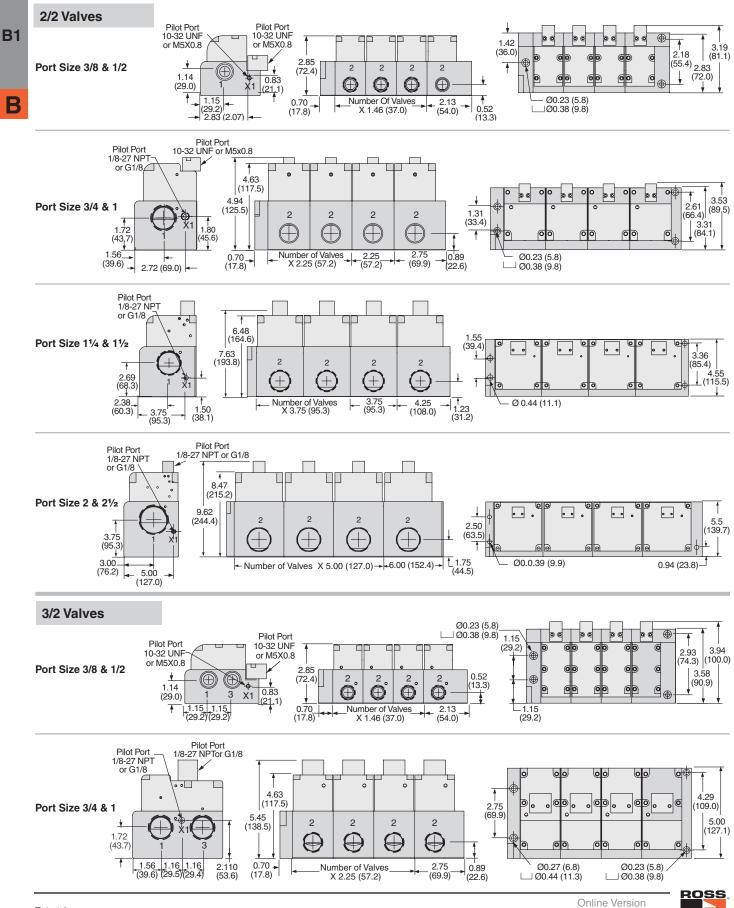


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## Pressure Controlled Valve Manifolds for Leak Tight Applications

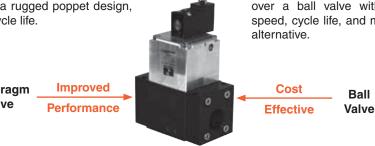
Dimensions - inches (mm)



## for Leak Tight Applications

		2-Wa	ay 2-Position Va	lves, Air Re	turn				Ц
Port	Size	Model N	lumber*	Pilot Port T	hread				
	0.20	External P	ilot Supply		mouu	Avg. C <sub>v</sub>	Weight lb (kg)		- 20 0
1	2	Normally Closed	Normally Open	NPT	BSPP		(		
3/8	3/8	LX13NB37501**	LX23NB37501**	10-32 UNF	M5	3.6	1.5 (0.7)	Ports 3/8 thru 1	
1/2	1/2	LX14NB47501**	LX24NB47501**	10-32 UNF	M5	3.6	1.5 (0.7)	Ports 5/6 thru 1	(d
3/4	3/4	LX15NB57501**	LX25NB57501**	1/8-27 NPT	G1/8	12.2	3.5 (1.6)		
1	1	LX16NB67501**	LX26NB67501**	1/8-27 NPT	G1/8	12.2	3.5 (1.6)		14
1¼	1¼	1/4 LX17NB77501** LX27NB77501**		1/8-27 NPT	G1/8	36.1	9.3 (4.2)		
1½	1½	LX18NB87501**	LX28NB87501**	1/8-27 NPT	G1/8	36.1	9.3 (4.2)		- teb
2	2	LX19NB97501**	LX29NB97501**	1/8-27 NPT	G1/8	62.7	19.3 (8.8)		
21⁄2	21⁄2	LX10NB07501**	LX20NB07501**	1/8-27 NPT	G1/8	62.7	19.3 (8.8)		
		ads. For BSPP thread bltage code: "W" = 24 v				0		Ports 1¼ thru 2½	
						2	3		
	I	Normally Closed	3/8 thru 1 Normally Op	en		& 2½ ally Open			

The LF & LX Series provides superior performance over a diaphragm valve with a rugged poppet design, bi-directional flow and high cycle life.



The LF & LX Series provides superior performance over a ball valve with solenoid actuation, shifting speed, cycle life, and most important, a cost effective

**Dale LX Series** 

**B1** 

Diaphragm Valve

**EXTERNAL PILOT SUPPLY CONVERSION:** 

The LX Series valves can be easily field converted to external pilot supply by simply removing existing pipe plug from port X-1, and installing air supply to the X-1 port.

#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet.	Enclosure Rating: IP65, IEC 60529.
Mounting Type: Inline.	Electrical Connections: EN 175301-803 Form A or Form C connector.
Solenoid Pilot: Rated for continuous duty.	Ambient Temperature: 40° to 120°F (4° to 50°C).
Standard Voltages/Power Consumption (each solenoid):	Media Temperature: 40° to 175°F (4° to 80°C).
Port Size 3/8 thru 1:	Flow Media: Filtered air. For liquid applications, consult ROSS.
24 volts DC: 1.2 watts on DC. 110 volts AC, 50 Hz: 5.4 VA. 120 volts AC, 60 Hz: 5.0 VA. <i>Port Size 1¼ thru 2½:</i> 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC.	<ul> <li>Inlet Pressure: Vacuum to 145 psig (vacuum to 10 bar).</li> <li>Pilot Pressure: 30 to 145 psig (2 to 10 bar). Must be equal to or greater than inlet pressure.</li> <li>Manual Override: Non-Locking.</li> <li>Port Size: 3/8 thru 2½ (Normally Closed).</li> <li>Port Size: 3/8 thru 1 (Normally Open).</li> </ul>

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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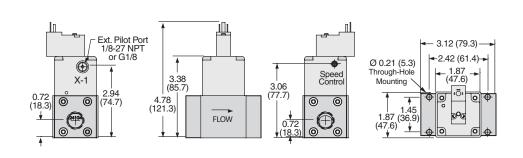
## Solenoid Pilot Controlled Valves for Leak Tight Applications

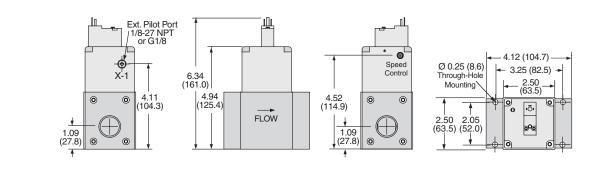
Valve Dimensions - inches (mm)

**B1** 

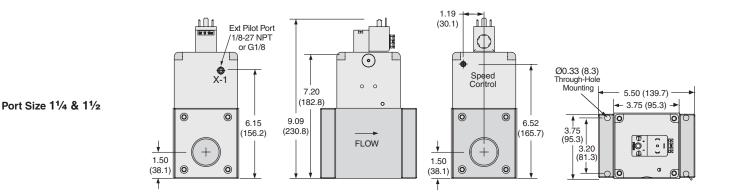
B

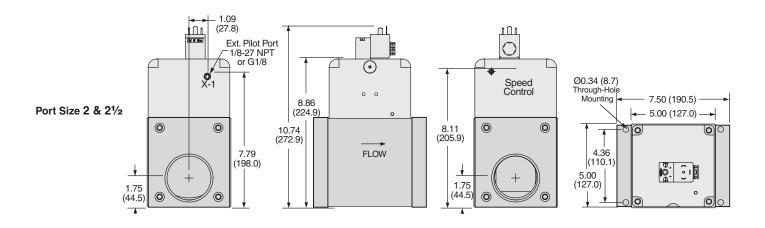
Port Size 3/8 & 1/2











ROSS

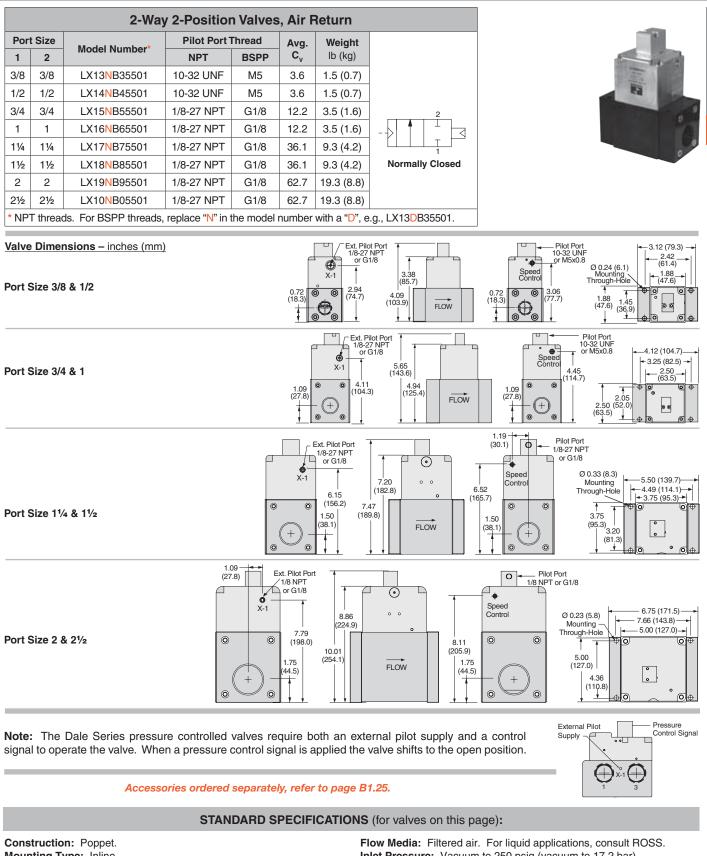


## Pressure Controlled Valves

for Leak Tight Applications

**B1** 

P



Mounting Type: Inline. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. For liquid applications, consult ROSS. Inlet Pressure: Vacuum to 250 psig (vacuum to 17.2 bar). Pilot Pressure: 30 to 250 psig (2 to 17.2 bar). Must be equal to or greater than inlet pressure.

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## **Solenoid Pilot Controlled Valve Manifold** for Leak Test Applications

## **Dale LT Series**

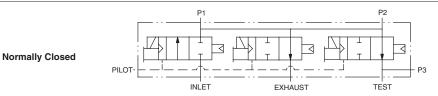
The LT Series valves can be field configured for flow, pressure decay, or differential pressure

TITIT	
V a a	

testing by selecting different combinations of the three sensor ports.

				3-Way 4-Position Val	lve, Multi So	lenoid Act	tuated		
Port Size				Medel Numbert	Pilot Port	Thread	Aug. 0	Weight	
	In	Exh.	Test	Model Number*	NPT	BSPP	Avg. C <sub>v</sub>	lb (kg)	
	1/4	1/4	1/4	LT32NB27500**	1/8-27 NPT	G1/8	2.2	2.9 (1.3)	

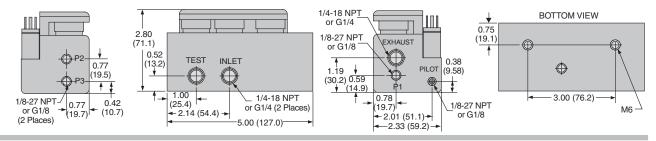
\* NPT threads. For BSPP threads, replace "N" in the model number with a "D", e.g., LT32DB27500W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., LT32NB27500W.



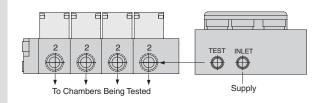
#### Dimensions - inches (mm)

**B1** 

B

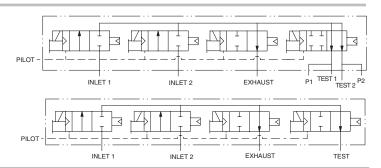


The CX and LT Series can be combined to simplify the most complex test circuits. The LT manifold with integrated sensor ports is the primary valve used for the fill, isolate and test functions. In this example the test port of the LT is connected to the CX manifold allowing four chambers to be tested one at a time. The flexibility of combining the LT and CX manifolds creates a compact package, reduces leak paths, and provides an all in one test solution.



## **ROSS/FLEX®** Looking for a different solution?

ROSS/FLEX® Customer defined application specific solutions that reduce cost, improve productivity and provide a perfect fit.



#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Inline. Pilot Solenoid: DC power. Rated for continuous duty. Standard Voltages/Power Consumption (each solenoid): 24 volts DC: 1.2 watts on DC. 110 volts AC, 50 Hz: 5.4 VA. 120 volts AC, 60 Hz: 5.0 VA.

Ambient/Media Temperature: 40° to 120°F (4° to 50°C). Flow Media: Filtered air. For liquid applications, consult ROSS. Pilot Port: 1/8 NPT, or G1/8 ports. Inlet Pressure: 2 to 145 psi (0.13 to 10 bar). Pilot Pressure: 50 to 145 psi (3.4 to 10 bar). Must be equal to or greater than inlet pressure.

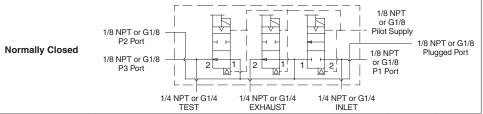


## Solenoid Pilot Controlled Valve Manifold for Leak Tight Applications

## **Dale LT Series**

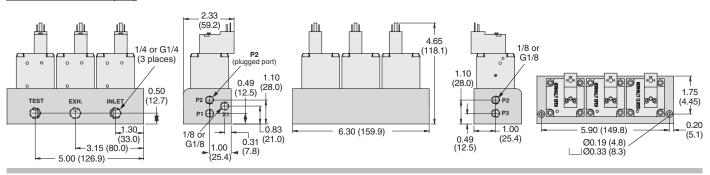
The LT Series valves can be field configured for flow, pressure decay, or differential pressure testing by selecting different combinations of the three sensor ports.

3-Way 4-Position Valve, Multi Solenoid Actuated														
P	Port Siz	ze	Medel Number	Sens	sor Po	orts	Pilot Port	Ave C	Weight					
In Exh. Test		Test	Model Number	P1	P2	<b>P</b> 3	Thread	Avg. C <sub>v</sub>	lb (kg)					
1/4	1/4	1/4	LT32NB27500**01	1/8	1/8	1/8	1/8 NPT	0.9	3.6 (1.7)					
1/4	1/4	1/4	LT32DB27500**01	1/8	1/8	1/8	G 1/8	0.9	3.6 (1.7)					
** Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC; e.g., LT32NB27500W01.														
	<b>In</b> 1/4 1/4	Exh.           1/4         1/4           1/4         1/4	In         Exh.         Test           1/4         1/4         1/4           1/4         1/4         1/4	Fort Size         Model Number           In         Exh.         Test           1/4         1/4         1/4         LT32NB27500**01           1/4         1/4         1/4         LT32DB27500**01	Nodel Number         Sens           In         Exh.         Test         Model Number         P1           1/4         1/4         1/4         LT32NB27500**01         1/8           1/4         1/4         1/4         LT32DB27500**01         1/8	Nodel Number         Sensor Point           In         Exh.         Test         Model Number         P1         P2           1/4         1/4         1/4         LT32NB27500**01         1/8         1/8           1/4         1/4         1/4         LT32DB27500**01         1/8         1/8	Senser           In         Exh.         Test         Model Number         P1         P2         P3           1/4         1/4         1/4         LT32NB27500**01         1/8         1/8         1/8           1/4         1/4         1/4         LT32DB27500**01         1/8         1/8         1/8	Visit         Model Number         Sensor Pilot Port Thread         Pilot Port Thread           1/4         1/4         1/4         LT32NB27500**01         1/8         1/8         1/8         1/8         NPT           1/4         1/4         1/4         LT32DB27500**01         1/8         1/8         1/8         G 1/8	Volt         Senser         Pilot Port         Avg. C <sub>v</sub> In         Exh.         Test         P1         P2         P3         Pilot Port         Avg. C <sub>v</sub> 1/4         1/4         1/4         LT32NB27500**01         1/8         1/8         1/8         NPT         0.9           1/4         1/4         1/4         LT32DB27500**01         1/8         1/8         1/8         G 1/8         0.9					





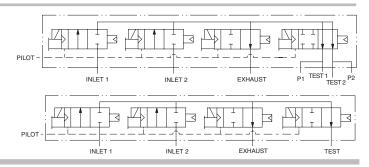
Dimensions - inches (mm)



The CX and LT Series can be combined to simplify the most complex test circuits. The LT manifold with integrated sensor ports is the primary valve used for the fill, isolate and test functions. In this example the test port of the LT is connected to the CX manifold allowing four chambers to be tested one at a time. The flexibility of combining the LT and CX manifolds creates a compact package, reduces leak paths, and provides an all in one test solution.

## **ROSS/FLEX®** Looking for a different solution?

ROSS/FLEX<sup>®</sup> Customer defined application specific solutions that reduce cost, improve productivity and provide a perfect fit.



#### Accessories ordered separately, refer to page B1.25.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Inline. Pilot Solenoid: DC power. Rated for continuous duty. Standard Voltages/Power Consumption (each solenoid): 24 volts DC: 1.2 watts on DC. 110 volts AC, 50 Hz: 5.4 VA. 120 volts AC, 60 Hz: 5.0 VA. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form C connector. Ambient/Media Temperature: 40° to 120°F (4° to 50°C). Flow Media: Filtered air. For liquid applications, consult ROSS. Pilot Port: 1/8 NPT, or G1/8 ports. Inlet Pressure: Vacuum to 250 psi (vacuum to 17.2 bar). Pilot Pressure: 70 to 145 psi (4.8 to 17.2 bar).

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This form can be used when your application requires either a CP or CX Series valve manifold with different valve functions to provide you with complete valve manifold assemblies to fit your precise requirements.

Manifolds can be ordered from two to ten stations. For other combinations, contact ROSS for more information.

Port Thread: /alve Series: /alve Type:	NPT     BSPP       CP     CX       2/2     3/2	<ul> <li>24 volts DC &amp;</li> <li>Different port 2 (i.e., valve 1 =</li> </ul>	enoid Pilot Valves 110 or 120 volts AC Solenoid Pilot Valves 2 sizes with same port 1 size 1/2" port 1 & 3/8" port 2; 1/2" port 1 & 1/2" port 2.
Valve Position Number	Valve Model Number*	Valve Position Number	Valve Model Number**
1		1	CX14NB37511W
2		2	CX14NB37511W
3		3	CX24NB37511W
4		4	CX24NB37511W
5		5	Blank
6		6	CX14NB47511W
7		7	CX24NB47511W
8		8	CX14NB35511
9		9	
10		10	
	CX Valve product pages for Valve Model Numbers. o indicate base with blocking plate.	**Example give	n for an eight station manifold.

Name:		Date:
Company Name:		
Address:		
City, State, Zip Code:		
Tel:	_e-mail:	

Fax completed form to 1-706-356-3600 or e-mail to custsvc@rosscontrols.com to obtain pre-assemble part number, price, and delivery.

E



**B1** 

B

## **Electrical Connectors**

			E	lectrical Conn	ectors Part Nun			
Valve Type	Port Size	Electrical Connector Form	Lighted Co	nnector Only	Lighted Conne			
Type	0.20		24 Volts DC	120 Volts AC	24 Volts DC	120 Volts AC		
2/2	1/4 - 1	EN 175301-803 Form C	2453K77-W	2453K77-Z	2476K77-W	2476K77-Z		
2/2	1½-2½	EN 175301-803 Form A	936K87-W	936K87-Z	720K77-W	720K77-Z	Mars P. C.	10 D 200
3/2	1/2	EN 175301-803 Form C	2453K77-W	2453K77-Z	2476K77-W	2476K77-Z		
3/2	1	EN 175301-803 Form A	936K87-W	936K87-Z	720K77-W	720K77-Z		

Elect	rical Co	nnectors for LF, LX \$	Series Soler	noid Pilot Co	ontrolled Valv	es.		
Mahaa	Dent		E	lectrical Conn	ectors Part Nun	nber		$C \rightarrow$
Valve Type	Port Size	Port Electrical Connector L		nnector Only	Lighted Conne	ctor Pre-wired*		
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.20		24 Volts DC	120 Volts AC	24 Volts DC	120 Volts AC	and the second	the form
2/2	3/8 - 1	EN 175301-803 Form C	2453K77-W	2453K77-Z	2476K77-W	2476K77-Z	and the second second	ALC: NO
2/2	11⁄4-21⁄2	EN 175301-803 Form A	936K87-W	936K87-Z	720K77-W	720K77-Z		
*Pre-w	ired conr	ectors include a 2 meter	(6½ ft.) cord.					

Electi	rical Co	onnectors for LT Seri	es Solenoid	Pilot Contro	olled Valves.			
Value	Dant	Electrical Oceano de la	E	lectrical Conn	ectors Part Nun			
Valve Type	Port Electrical Connector Size Form		Lighted Co	nnector Only	Lighted Conne	ctor Pre-wired*	and the second second	
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.20		24 Volts DC	120 Volts AC	24 Volts DC	120 Volts AC	Mars D. C.	A COLOR
1/4	3/8 - 1	EN 175301-803 Form C	2453K77-W	2453K77-Z	2476K77-W	1.1	and the second s	
*Pre-wi	ired conr	nectors include a 2 meter	(6½ ft.) cord.					-

## Silencers

Port	Thread	Mode	el Number	Avg.	Dimension	s inches (mm)	Weight		
Size	Туре	NPT Threads	<b>BSPT</b> Threads	Cv	Α	В	lb (kg)		
1/4	Male	ale 5500A2003 D5500A2003		2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		
3/8	Male 5500A3013 D5500A3013		2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		~ ~ ~	
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)	B	E
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)	P	
3/4	Male	5500A5003	D5500A5003	11.5	2.0 (51)	5.3 (135)	0.6 (0.3)		
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)		
Pressu	ure Rang	e: 0 to 150 psig	g (0 to 10.3 bar) max	kimum.	Flow Medi	a: Filtered ai	r.		

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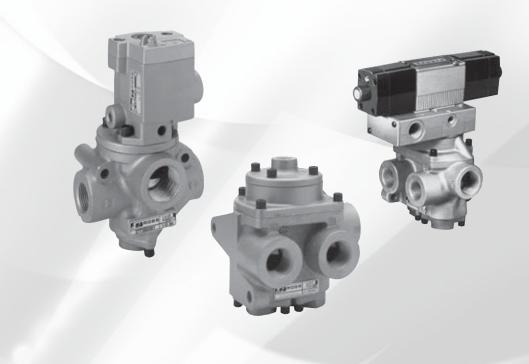
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# ROSS CONTROLS®

# POPPET VALVES 27 SERIES



## POPPET 27 SERIES VALVES - KEY FEATURES

- Low weight; compact size
- Valves available with special control functions:
  - Timed sequence actuation and/or deactuation
  - Momentary control of actuation/deactuation from one pressure source
  - Actuating force multiplier, for use with low signal pressures
- Available with choices of internal components for three different temperature ranges
- Can be mounted close to actuator, reducing length of pipe to be pressurized/exhausted on each cycle
- Easily field-convertible for use with an external pilot supply
- Long life expectancy
- Consistent response times over the life of the valve

Valve models for external pilot supply available, consult ROSS.

	DESCR	RIPTION		AVA	AILA	BLE	INL	ET F	POR	r siz	ES.	•			F	-UN	СТІ	ONS	5							
VALVE TYPE/SERIES	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	<b>2</b> ½	2/2	3/2	3/4	4/2	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	<b>Pressure Control</b>	Page
27																						72				B2.3 - B2.5
27																						34				B2.10 - B2.11
27																						72				B2.12 - B2.14
27 Series with P	ressur	e Boos	ster /	Ada	ptor												-									
																						32				B2.6
																						34				B2.15
27 Series with Air Index Adaptor																										
																						27				B2.7
																						32				B2.16
27 Series with Ti	imed S	equen	ce A	dap	tor							r											_	_		
																						34				B2.8, B2.17
27 Series with Ti	imed S	equen	ce &	Tim	ied S	Sequ	enc	e Ex	tens	ion /	Ada	ptor	S													
																						34				B2.9
07 Carles with T	ine e el tri	- /Out 0																				32				B2.18
27 Series with Ti	imea ir	VOUT S	equ	ence	e Ad	apto	or i															32				B2.19
27 Series with Ti	imod la		000	one	<u>، م</u>	Time	4 6	0000	nee	Evt		on f	\ day	ator								32				B2.19
21 Series with T	inieu-ir	woul S	equ	enco	εα		su 3	eque	ence		=1151		Audp	JUD	3							34				B2.20
27 Series Pressu	Ire Co	ntroller	d wit	th In	let P	Port	Cont	troll	ad Ti	med	-In (	Sear	lend		dan	tor						34				D2.20
21 001103 1 10330					lot P					lineu		Jequ			aap							34				B2.21
27 Series Pressu	ure Cor	ntrolled	with	n Inle	et Po	ort Co	ontro	olled	Tim	ed-In	Se	auer	nce à	& Tir	ned	Sec	auer	nce l	Exte	nsio	on A	÷.	rs	I		
																	1					32				B2.22
Options & Acces	ssories	s																				-				B2.23
															_											

#### Explosion-Proof solenoid pilot valves available, see explosion proof valves.



Port Size Bo			2-Way 2-Position Valves, Spring Return														
Size Bo	ody	Valve Mode	el Number*	c	v	Av	erage Res Constant		Weight								
1, 2 S	Size	Normally Closed	Normally Open	NC	NO	М	I NC	NO	lb (kg)								
1/4 3	3/8	2771B2001**	2772B2001**	2.3	2.3	10	0.91	0.91	2.5 (1.2)	2							
3/8 <b>3</b>	3/8	2771B3001**	2772B3001**	3.8	3.3	10	0.70	0.76	2.5 (1.2)								
1/2 3	3/8	2771B4011**	2772B4011**	4.0	3.5	10	0.64	0.72	2.5 (1.2)								
1/2 3	3/4	2771B4001**	2772B4001**	7.7	6.5	14	0.37	0.43	3.3 (1.5)	Normally Closed							
3/4 3	3/4	2771B5001**	2772B5001**	9.0	7.3	14	0.34	0.39	3.3 (1.5)	Normally Closed							
1 3	3/4	2771B6011**	2772B6011**	9.0	7.9	14	0.34	0.37	3.3 (1.5)								
1 1	1¼	2771B6001**	2772B6001**	24	21	26	0.17	0.17	7.0 (3.2)	2							
1¼ 1	1¼	2771B7001**	2772B7001**	29	20	26	0.15	0.19	7.0 (3.2)	10							
1½ 1	1¼	2771B8011**	2772B8011**	29	21	26	0.15	0.18	7.0 (3.2)								
1½	2	2771B8001**	2772B8001**	49	49	41	0.09	0.09	15.5 (6.9)	1 Normally Open							
2	2	2771B9001**	2772B9001**	57	57	41	0.07	0.07	15.5 (6.9)	Normally Open							
21⁄2	2	2771B9011**	2772B9011**	64	72	41	0.07	0.06	15.5 (6.9)								

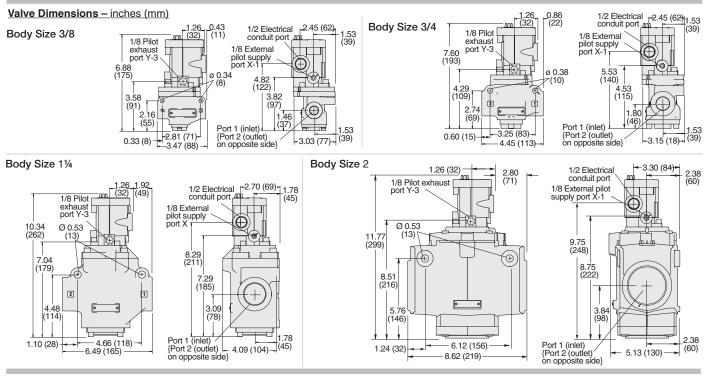
B

**27 Series** 

**B**2

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2771B2001W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2771B2001W. For other voltages, consult ROSS.
# Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



## Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Port Size 1/4 to 1½: 15 to 150 psig (1 to 10 bar).
Inlet Pressure: Port Size 1½ to 2½: 30 to 150 psig (2 to 10 bar).
Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure.
Manual Override: Flush; rubber, non-locking.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT>1.

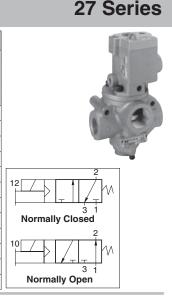
#### Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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#### 3-Way 2-Position Valves, Spring Return Average ResponseConstants# Port Size Valve Model Number C<sub>v</sub> Body Weight lb (kg) Size Μ 1, 2 3 Normally Closed **Normally Open** 1-2 2-3 1-2 2-3 1-2 2-3 1-2 2-3 2774B2001\*\* 2.5 0.90 1/4 1/2 3/8 2773B2001\*\* 3.1 2.3 2.7 0.80 0.99 0.88 2.5 (1.2) 10 3/8 1/23/8 2773B3001\*\* 2774B3001\* 3.6 5.3 2.8 3.2 10 0.70 0.50 0.90 0.77 2.5 (1.2) 1/2 1/23/8 2773B4011\*\* 2774B4011\*\* 3.3 5.3 2.8 3.2 10 0.75 0.50 0.90 0.76 2.5 (1.2) 1 3/4 2773B4001\*\* 9.2 6.3 8.0 11 0.43 0.27 0.46 0.60 1/22774B4001\* 6.3 3.3 (1.5) 3/4 1 3/4 2773B5001\*\* 2774B5001\* 7.7 11 6.9 7.4 11 0.36 0.26 0.45 0.60 3.3 (1.5) 1 1 3/4 2773B6011\* 2774B6011\* 8 12 6.8 7.5 11 0.34 0.25 0.40 0.59 3.3 (1.5) 17 24 28 1 1½ 11⁄4 2773B6001\*\* 2774B6001\*\* 23 34 0.17 0.14 0.20 0.17 7.0 (3.2) 32 19 24 28 7.0 (3.2) 11/4 11/2 11/4 2773B7001\*\* 2774B7001\*\* 30 0.15 0.15 0.19 0.17 28 0.15 7.0 (3.2) $1\frac{1}{2}$ 1½ 11/4 2773B8011\*\* 2774B8011\* 30 31 19 23 0.15 0.19 0.16 11⁄2 21⁄2 2 2773B8001\* 2774B8001\* 68 70 57 59 76 0.05 0.04 0.07 0.04 16.5 (7.4) 2 21⁄2 2 2773B9001\*\* 2774B9001 70 70 58 61 76 0.05 0.04 0.05 0.04 16.5 (7.4) 21⁄2 21⁄2 2 2773B9011\*\* 2774B9011\*\* 70 71 54 55 76 0.05 0.04 0.50 0.04 16.5 (7.4)

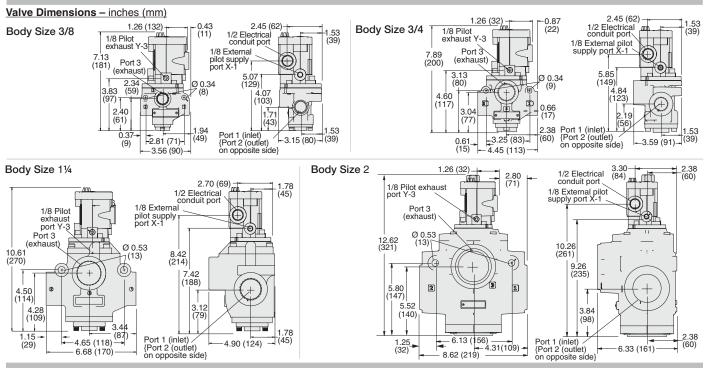


В

**B2** 

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2773B2001W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2773B2001W. For other voltages, consult ROSS. # Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23. Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Port Size 1/4 to 11/2: 15 to 150 psig (1 to 10 bar).

Inlet Pressure: Port Size 11/2 to 21/2: 30 to 150 psig (2 to 10 bar). Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure. Manual Override: Flush; rubber, non-locking.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.



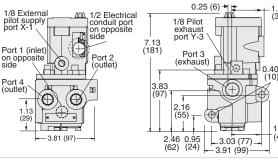
	4-Way 2-Position Valves, Spring Return														
Port	Size	Body	Valve Model	c	v	A۱	verage Res Constan		Weight						
1, 2, 4	3	Size	Number*	1-2, 1-4	4-3, 2-3	м		F	lb (kg)						
-,_, -	-			,			1-2, 1-4	4-3, 2-3							
1/4	1/2	3/8	2776B2001**	2.1	2.9	10	0.92	0.92	3.0 (1.4)						
3/8	1/2	3/8	2776B3001**	2.9	4.2	10	0.90	0.90	3.0 (1.4)						
1/2	1/2	3/8	8 2776B4011** 3.1 7.3		7.3	10	0.89	0.73	3.0 (1.4)	1' <del>7'    </del>   X     1   M					
1/2	1	3/4	2776B4001**	5.6	8.1	26	0.50 0.66		5.3 (2.4)	3 1					
3/4	1	3/4	2776B5001**	7.0	9.3	26	0.36	0.55	5.3 (2.4)						
1	1	3/4	2776B6011**	7.8	10	26	0.35	0.50	5.3 (2.4)	]					
1	1½	1¼	2776B6001**	19	26	79	0.17	0.22	11.3 (5.1)						
1¼	11⁄4 11⁄2 1		2776B7001**	21	27	79	0.16	0.18	11.3 (5.1)						
1½	1½	1¼	2776B8011**	22	27	79	0.15	0.15	11.3 (5.1)						

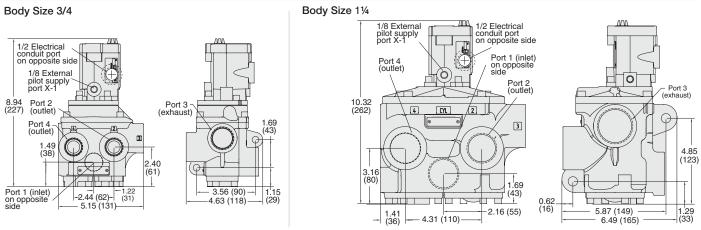
\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2776B2001W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2776B2001W. For other voltages, consult ROSS. # Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions - inches (mm)







Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23. Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Port Size 1/4 to 11/2: 15 to 150 psig (1 to 10 bar);

Inlet Pressure: Port Size 11/2 to 21/2: 30 to 150 psig (2 to 10 bar). Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure. Manual Override: Flush; rubber, non-locking.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**Online Version** Rev. 11/14/16

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B

**B2** 

1.26 (32)

1.75 (44)

## Solenoid Pilot Controlled Valves With Pressure Booster Adaptor

**Pressure Booster Adaptor:** Increases the actuating force on the valve piston. It should be used when the inlet and pilot pressures are below the minimums specified for the valve. It should also be used when an external pilot supply with a lower pressure than the inlet pressure is used. The valve's pilot pressure is applied to a piston in the pilot booster adaptor that has a larger area than the piston in the valve. The force on the piston in the adaptor is thereby larger than that which could be produced by the piston in the valve. This larger force is applied to the valve's piston directly so that there is then sufficient force to shift the valve properly.

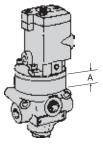
	3-Way 2-Position Valves, Spring Return													
Port S	Size	Body	Valve Model Number*	c	v	Dimension A	Weight							
1, 2	3	Size	varve moder Number	1-2	2-3	inches (mm)	lb (kg)							
1/4	1/2	3/8	2773B2009**	2.5	3.1	0.75 (19)	2.5 (1.2)							
3/8	1/2	3/8	2773B3009**	3.6	5.3	0.75 (19)	2.5 (1.2)							
1/2	1/2	3/8	2773B4019**	3.3	5.3	0.75 (19)	2.5 (1.2)							
1/2	1	3/4	2773B4009**	6.3	9.2	0.75 (19)	3.3 (1.5)							
3/4	1	3/4	2773B5009**	7.7	11	0.75 (19)	3.3 (1.5)							
1	1	3/4	2773B6019**	8	12	0.75 (19)	3.3 (1.5)							
1	1½	1¼	2773B6009**	23	34	1.25 (32)	7.0 (3.2)							
1¼	1½	1¼	2773B7009**	30	32	1.25 (32)	7.0 (3.2)							
1½	1½	1¼	2773B8019**	30	31	1.25 (32)	7.0 (3.2)							
	Normally Closed													



\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2773B2009W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2773B2009W. For other voltages, consult ROSS.

Detailed dimensions, see corresponding valves models pages.



Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23. Silencers ordered separately, refer to page B2.23.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Inlet Pressure: 15 to 150 psig (1 to 10 bar).Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure.Manual Override: Flush; rubber, non-locking.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**B2** 

B



## Solenoid Pilot Controlled Valves With Air Index Adaptor

## **27 Series**

В

**B2** 

Air Index Adaptor: Allows a valve controlled by a single solenoid pilot to function as an impulse controlled, mechanically detented valve. A momentary electrical signal to the solenoid actuates the valve and holds it in the actuated position. A second momentary signal from the same source returns the valve to its deactuated position.

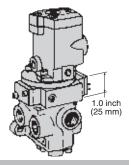


	4-Way 2-Position Valves, Spring Return													
Port	Size	Body	Valve Model Number*	C	Ç <sub>v</sub>	Weight								
1, 2, 4	3	Size	valve model number"	1-2, 1-4	4-3, 2-3	lb (kg)								
1/4	1/2	3/8	2776B2008**	2.1	2.9	3.0 (1.4)								
3/8	1/2	3/8	2776B3008**	2.9 4.2		3.0 (1.4)								
1/2	1/2	3/8	2776B4018**	3.1 7.3		3.0 (1.4)								
1/2	1	3/4	2776B4008**	5.6	8.1	5.3 (2.4)								
3/4	1	3/4	2776B5008**	7.0	9.3	5.3 (2.4)								
1	1	3/4	2776B6018**	7.8	10	5.3 (2.4)								
1	1½	1¼	2776B6008**	2776B6008** 19 26		11.3 (5.1)								
1¼	1½	1¼	2776B7008**	21	27	11.3 (5.1)								
1½	1½	1¼	2776B8018**	22	27	11.3 (5.1)								
	$1\frac{1}{2}$													

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2776B2008W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2776B2008W. For other voltages, consult ROSS.

Detailed dimensions, see corresponding valves models pages.



Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23. Silencers ordered separately, refer to page B2.23.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Inlet Pressure: 15 to 150 psig (1 to 10 bar).Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure.Manual Override: Flush; rubber, non-locking.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Online Version Rev. 11/14/16

## Solenoid Pilot Controlled Valves With Timed Sequence Adaptor

## 27 Series

	2-Way 2-Position Valves, Spring Return													
Port	Body		Valve Mod	el Number*		C	v	Woight						
Size	Body Size	Normally	y Closed	Normal	ly Open	NC	NO	Weight Ib (kg)						
1, 2	0120	Timed In	Timed Out	Timed In	Timed Out	NC	NO	ib (itg)						
1/4	3/8	2771B2004**	2771B2005**	2772B2004**	2772B2005**	2.3	2.3	3.5 (1.6)						
3/8	3/8	2771B3004**	2771B3005**	2772B3004**	2772B3005**	3.8	3.3	3.5 (1.6)						
1/2	3/8	2771B4014**	2771B4015**	2772B4014**	2772B4015**	4.0	3.5	3.5 (1.6)						
1/2	3/4	2771B4004**	2771B4005**	2772B4004**	2772B4005**	7.7	6.5	4.3 (2.0)						
3/4	3/4	2771B5004**	2771B5005**	2772B5004**	2772B5005**	9.0	7.3	4.3 (2.0)						
1	3/4	2771B6014**	2771B6015**	2772B6014**	2772B6015**	9.0	7.9	4.3 (2.0)						
1	1¼	2771B6004**	2771B6005**	2772B6004**	2772B6005**	24	21	9.0 (4.1)						
1¼	1¼	2771B7004**	2771B7005**	2772B7004**	2772B7005**	29	20	9.0 (4.1)						
1½	1¼	2771B8014**	2771B8015**	2772B8014**	2772B8015**	29	21	9.0 (4.1)						
-	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$													
Norr	nally Clo	12 7		Normall				2						
т	imed Ou													



**Timed Sequence Adaptor:** Allows the actuation and/or de-actuation of a valve to be delayed up to 30 seconds for 2/2 valves, and up to 3 seconds for 3/2 and 4/2 valves. The time delay function is controlled by a continuously adjustable tapered needle. Longer time delays can be obtained by using this adaptor in conjunction with the timed sequence extension adaptor, see next page.

#### **OPERATION**

Timed In Adaptor: Solenoid energized; after preset delay valve is actuated. Solenoid deenergized; valve immediately deactuated.

**Timed Out Adaptor:** Solenoid energized; valve immediately actuated. Solenoid de-energized; after preset delay valve is deactuated.

			3-1									
Dort	Size	Darks		Valve Mod	lel Number*			C	v		M/- 1	
Pon	Size	Body Size	Normally	/ Closed	Norma	lly Open	N	С	N	0	Weight Ib (kg)	
1, 2	3	0120	Timed In	Timed Out	Timed In	Timed Out	1-2	2-3	1-2	2-3	ib (kg)	
1/4	1/2	3/8	2773B2004**	2773B2005**	2774B2004**	2774B2005**	2.5	3.1	2.3	2.7	3.5 (1.6)	
3/8	1/2	3/8	2773B3004**	2773B3005**	2774B3004**	2774B3005**	3.6	5.3	2.8	3.2	3.5 (1.6)	
1/2	1/2	3/8	2773B4014**	2773B4015**	2774B4014**	2774B4015**	3.3	5.3	2.8	3.2	3.5 (1.6)	
1/2	1	3/4	2773B4004**	2773B4005**	2774B4004**	2774B4005**	6.3	9.2	6.3	8.0	4.3 (2.0)	Detailed dimensions,
3/4	3/4 1 3/4		2773B5004**	2773B5005**	2774B5004**	2774B5005**	7.7	11	6.9	7.4	4.3 (2.0)	see corresponding valves
1	1 1 3/4 2		2773B6014**	2773B6015**	2774B6014**	2774B6015**	8	12	6.8	7.5	4.3 (2.0)	models pages.
1	1½	1¼	2773B6004**	2773B6005**	2774B6004**	2774B6005**	23	34	17	24	9.0 (4.1)	
1¼	1½	1¼	2773B7004**	2773B7005**	2774B7004**	2774B7005**	30	32	19	24	9.0 (4.1)	11
1½	1½	1¼	2773B8014**	2773B8015**	2774B8014**	2774B8015**	30	31	19	23	9.0 (4.1)	
	Time Iormal Timed	lly Close	12 ed		Timed In Timed In Normally Open Timed Qut				[ 			1.28 inches (33 mm)
	Timed	Out				Timed Out	10		* [			

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2771B2004W.
\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2771B2004W. For other voltages, consult ROSS.

Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23. Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). 

 Pilot Pressure:
 When external supply is used, pressure must be equal to or greater than inlet pressure.

 Manual Override:
 Flush; rubber, non-locking.

 Time Delay Interval:
 2/2 Valves: Up to 30 seconds.

 3/2 Valves:
 Up to 3 seconds.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.



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2 28 inches

(58 mm)

## Solenoid Pilot Controlled Valves With Timed Sequence & Timed Sequence Extension Adaptors

Valve Model Number\*

Timed Sequence & Timed Sequence Extension Adaptors: Used in conjunction can increase the time delay interval up to 60 seconds. It also helps to obtain "snap" action of the valve. By keeping pilot air off the main valve piston until the pressure has built high enough to ensure prompt valve response, the timed sequence extension adaptor prevents the piston from creeping.

3-Way 2-Position Valves, Spring Return

C'

Dort	Size	Dedu			Valve N	odel Nun	nber*				C	v		Mainht
POIL	Size	Body Size		Normally	Closed		Norma	lly Open		N	0	N	0	Weight Ib (kg)
1, 2	3	Size	Т	imed In	Timed Ou	t Ti	ned In	Timed C	Dut	1-2	2-3	1-2	2-3	ib (kg)
1/4	1/2	3/8	277	'3B2006**	2773B200	/** 2774	B2006**	2774B20	07**	2.5	3.1	2.3	2.7	3.5 (1.6)
3/8	1/2	3/8	277	'3B3006**	2773B300	/** 2774	B3006**	2774B30	07**	3.6	5.3	2.8	3.2	3.5 (1.6)
1/2	1/2	3/8	277	'3B4016**	2773B401	/** 2774	B4016**	2774B40	17**	3.3	5.3	2.8	3.2	3.5 (1.6)
1/2	1	3/4	277	'3B4006**	2773B400	/** 2774	B4006**	2774B40	07**	6.3	9.2	6.3	8.0	4.3 (2.0)
3/4	1	3/4	277	'3B5006**	2773B500	/** 2774	B5006**	2774B50	07**	7.7	11	6.9	7.4	4.3 (2.0)
1	1	3/4	277	'3B6016**	2773B601	/** 2774	B6016**	2774B60	17**	8	12	6.8	7.5	4.3 (2.0)
1	1½	2 11/4 2773B6006** 2773B6007** 277		/** 2774	B6006**	2774B60	07**	23	34	17	24	9.0 (4.1)		
1¼	1½	1¼	277	'3B7006**	2773B700	/** 2774	B7006**	2774B70	07**	30	32	19	24	9.0 (4.1)
1½	1½	1¼	277	'3B8016**	2773B801	/** 2774	B8016**	2774B80	17**	30	31	19	23	9.0 (4.1)
	Norm	Timed I ally Clo	sed				N	Timed In Iormally Op	en					
		imed O		av 2-Pos					π			<u>م</u> الچ	3	1
P	ort Si	ze	Body		Model Num	· •		C <sub>v</sub>	We	eight				
1, 2	, 4		Size	Timed I	n Tim	ed Out	1-2, 1-4	1	-	(kg)				Dataila
1/4		1/2	3/8	2776B200	06** 2776	B2007**	2.1	2.9	3.0	(1.4)	1		0.00r	Detaile
3/8	8	1/2	3/8	2776B300	06** 2776	B3007**	2.9	4.2	3.0	(1.4)	1	se	e coi	respondir
1/2	2	1/2	3/8	2776B401	16** 2776	B4017**	3.1	7.3		(1.4)	1			
1/	2	4	2/4	07760400	0776	24007**	E C	0.1	E 2	(0, 1)	1			

	4-Way 2-Position Valves, Spring Return														
Port	Size	Body	Valve Mod	el Number*	C	v	Weight								
1, 2, 4	3	Size	Timed In	Timed Out	1-2, 1-4	4-3, 2-3	lb (kg)								
1/4	1/2	3/8	2776B2006**	2776B2007**	2.1	2.9	3.0 (1.4)								
3/8	1/2	3/8	2776B3006**	2776B3007**	2.9	4.2	3.0 (1.4)								
1/2	1/2	3/8	2776B4016**	2776B4017**	3.1	7.3	3.0 (1.4)								
1/2	1	3/4	2776B4006**	2776B4007**	5.6	8.1	5.3 (2.4)								
3/4	1	3/4	2776B5006**	2776B5007**	7.0	9.3	5.3 (2.4)								
1	1	3/4	2776B6016**	2776B6017**	7.8	10	5.3 (2.4)								
1	11⁄2	1¼	2776B6006**	2776B6007**	19	26	11.3 (5.1)								

11/2 2776B7006\* 2776B7007\*\* 21 27 11.3 (5.1) 11/4 11/4 2776B8016 2776B8017\*\* 27 11.3 (5.1) 11/2 11/4 22 11/2

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2773B2006W.

Timed Out

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2773B2006W. For other voltages, consult ROSS.

Options: Indicator Light Kit, Manual Override Kits; refer to page B2.23. Silencers ordered separately, refer to page B2.23.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar).

Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure. Manual Override: Flush; rubber, non-locking. Adjustable Time Delay: Up to 30 seconds.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Timed In

Online Version Rev. 11/14/16

27 Series





## **Direct Double Solenoid Controlled**

## 27 Series

			N O													
	Port	Sizo		Valve Mode	l Numbor*		C	v		1	Average	Response	Consta	ints#		
	FOIL	Size	Body	valve woue	inumber	N	С	N	0				F		Weight	
	1, 2	3	Size	Normally Closed	Normally Open	1-2	2-3	1-2 2-3		М	1-2	NC 2-3	1-2	NO 2-3	lb (kg)	
	1/4 1/2		3/8	2773B2003**	2774B2003**	2.5	3.1	2.3	2.7	30	0.90	0.80	0.99	0.88	3.5 (1.6)	
	3/8 1/2		3/8	2773B3003**	2774B3003**	3.6	5.3	2.8	3.2	30	0.70	0.50	0.90	0.77	3.5 (1.6)	3 1
	1/2 1/2		3/8	2773B4013**	2774B4013**	3.3	5.3	2.8	3.2	30	0.75	0.50	0.90	0.76	3.5 (1.6)	Normally Closed
	1/2	1	3/4	2773B4003**	2774B4003**	6.3	9.2	6.3	8.0	32	0.43	0.17	0.46	0.60	4.3 (1.9)	Y. 2
	3/4	1	3/4	2773B5003**	2774B5003**	7.7	11	6.9	7.4	32	0.36	0.26	0.45	0.60	4.3 (1.9)	
	1	1	3/4	2773B6013**	2774B6013**	8	12	6.8	7.5	32	0.34	0.25	0.40	0.59	4.3 (1.9)	
	1 1½ 1¼ 1½		1¼	2773B6003**	2774B6003**	23	34	17	24	52	0.17	0.14	0.20	0.17	8.0 (3.6)	
			1¼	2773B7003**	2774B7003**	30	32	19	24	52	0.15	0.15	0.19	0.17	8.0 (3.6)	
	1½	1½	1¼	2773B8013**	2774B8013**	30	31	19	23	52	0.15	0.15	0.19	0.16	8.0 (3.6)	3 1 Normally Open

B2

B

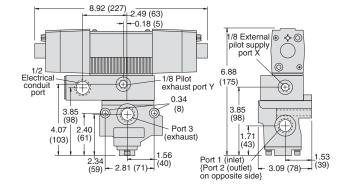
NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2773B2003W.

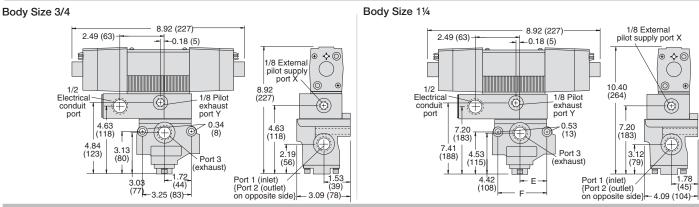
\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2773B2003W. For other voltages, consult ROSS.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

#### Valve Dimensions - inches (mm)







Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 190 VA inrush, 40 VA holding on 50 or 60 Hz; 20 watts on DC. Indicator Lights: In each solenoid housing. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar).

**Pilot Pressure:** If external supply is used, pressure must be equal to or greater than inlet pressure.

Manual Override: Flush; metal, non-locking.

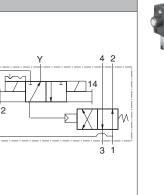
**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.



## **Direct Double Solenoid Controlled**

	4-Way 2-Position Valves, Detented														
Port S	ine			C	2v	Avera	ge Respor	nse Constants#							
Ports	nze	Body Size	Valve Model Number*	1-2,	4-3,	м		F	Weight						
1, 2, 4	3	Size	Number	1-4	2-3	IVI	1-2, 1-4	4-3, 2-3	lb (kg)						
1/4	1/4 1/2 3/8		2776B2003**	2.1	2.9	30	0.92 0.92		4.0 (1.8)	; <u> </u>					
3/8	3/8 1/2 3/8		2776B3003**	2.9	4.2	30	0.90 0.90		4.0 (1.8)	l II F					
1/2	1/2 3/8		2776B4013**	3.1	4.3	30	0.89	0.73	4.0 (1.8)						
1/2	1	3/4	2776B4003**	5.6	8.1	46	0.50	0.66	6.3 (2.8)	12					
3/4	1	3/4	2776B5003**	7.0	9.3	46	0.36	0.55	6.3 (2.8)						
1	1	3/4	2776B6013**	7.8	10	46	0.35	0.50	6.3 (2.8)						
1	1 11/2 11/4		2776B6003**	19	26	99	0.17	0.22	12.3 (5.5)						
1¼	1½	1¼	2776B7003**	21	27	99	0.16	0.18	12.3 (5.5)						
1½	1½	1¼	2776B8013**	22	27	99	0.15	0.15	12.3 (5.5)						



0000

27 Series

B2

Port 2 (outlet)

Port 4

(outlet)

Port 1 (inlet)

0.70 (18)

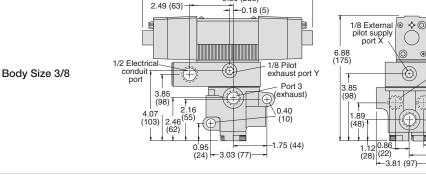
-1.56 (40)

B

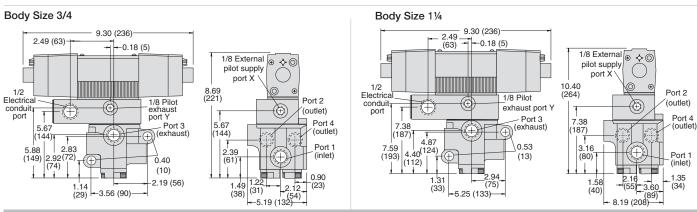
\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2776B2003W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2776B2003W. For other voltages, consult ROSS # Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions – inches (mm)



9.30 (236)



Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

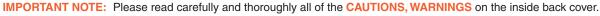
Construction: Poppet; Acetal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid)): 190 VA inrush, 40 VA holding on 50 or 60 Hz; 20 watts on DC. Indicator Lights: In each solenoid housing. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar).

**Pilot Pressure:** If external supply is used, pressure must be equal to or greater than inlet pressure.

Manual Override: Flush; metal, non-locking.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.



ROSS

## **Pressure Controlled Valves**

	2-Way 2-Position Valves, Spring Return													
Port Size	Body	Valve Mode	I Number*	C	2 <sub>v</sub>	Average	Response	Constants#	Weight					
1, 2	Size	Normally Closed	Normally Open	NC	NO	М	NC	F NO	lb (kg)					
1/4	3/8	2751A2001	2752A2001	2.3	2.3	10	0.91	0.91	1.3 (0.6)	2				
3/8	3/8	2751A3001	2752A3001	3.8	3.3	10	0.70	0.76	1.3 (0.6)	12 M				
1/2	3/8	2751A4011	2752A4011	4.0	3.5	10	0.64	0.72	1.3 (0.6)					
1/2	3/4	2751A4001	2752A4001	7.7	6.5	14	0.37	0.43	2.0 (0.9)	Normally Closed				
3/4	3/4	2751A5001	2752A5001	9.0	7.3	14	0.34	0.39	2.0 (0.9)					
1	3/4	2751A6011	2752A6011	9.0	7.9	14	0.34	0.37	2.0 (0.9)	2				
1	1¼	2751A6001	2752A6001	24	21	26	0.17	0.17	8.0 (3.6)					
1¼	1¼	2751A7001	2752A7001	29	20	26	0.15	0.19	8.0 (3.6)					
1½	1¼	2751A8011	2752A8011	29	21	26	0.15	0.18	8.0 (3.6)	1				
1½	2	2751A8001	2752A8001	49	49	41	0.09	0.09	14.3 (6.4)	Normally Open				
2	2	2751A9001	2752A9001	57	57	41	0.07	0.07	14.3 (6.4)					
21⁄2	2	2751A9011	2752A9011	64	72	41	0.07	0.06	14.3 (6.4)					

B

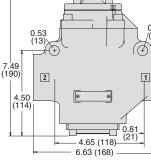
NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2751A2001.

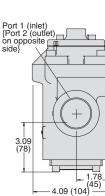
# Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to

90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

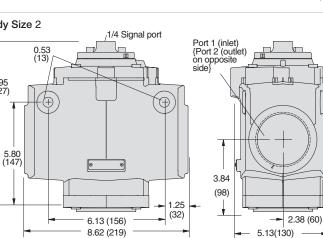
#### Valve Dimensions - inches (mm)

#### 1/4 Signal port Body Size 3/8 Port 1 (inlet) {Port 2 (outlet) on opposite Body Size 3/4 1/4 Signal port 0.34 Port 1 (inlet) {Port 2`(outlet) (8) side 0.34 0.34 4.42 (112) on opposite /(8) (8)side} 3.71 (94) 2.74 2.15 (55) 15 1.46 1.80 (46) 0.66 0.38 Η 3.25 (83) --2.81 (71) --39 (39)4.56 (116) 3.56 (90) 3.11 (79) 3.11 (79) Body Size 11/4 Body Size 2 ,1/4 Signal port Port 1 (inlet) {Port 2 (outlet) on opposite 0.53 (13) 1/4 Signal port C m Port 1 (inlet) {Port 2 (outlet) on opposite side} side} 8.95 (227)





(13)



#### Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Port Size 1/4 to 11/2: 15 to 150 psig (1 to 10 bar). Port Size 11/2 to 21/2: 30 to 150 psig (2 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥1.



## **Pressure Controlled Valves**

				3-\	Nay	2-Po	sitic	on Va	lves,	Spring	Return	า			
Port	Size		Valve Model	Number*		C	v			Average F	Response	Constants	\$#		
1 OIL	OILC	Body		Transer	N	C	N	0			I	=		Weight	
1, 2	3	Size	Normally Closed	Normally Open	1-2	2-3	1-2	2-3	М	1-2	C 2-3	N 1-2	0 2-3	lb (kg)	
1/4	1/2	3/8	2753A2001	2754A2001	2.5	3.1	2.3	2.7	10	0.90	0.80	0.99	0.88	1.3 (0.6)	2
3/8	1/2	3/8	2753A3001			5.3	2.8	3.2	10	0.70	0.50	0.90	0.77	1.3 (0.6)	12 
1/2	1/2	3/8	2753A4011			5.3	2.8	3.2	10	0.75	0.50	0.90	0.76	1.3 (0.6)	
1/2	1	3/4	2753A4001	2754A4001	6.3	9.2	6.3	8.0	12	0.43	0.17	0.46	0.60	2.0 (0.9)	Normally Closed
3/4	1	3/4	2753A5001	2754A5001	7.7	11	6.9	7.4	12	0.36	0.26	0.45	0.60	2.0 (0.9	
1	1	3/4	2753A6011	2754A6011	8	12	6.8	7.5	12	0.34	0.25	0.40	0.59	2.0 (0.9	2
1	1½	1¼	2753A6001	2754A6001	23	34	17	24	32	0.17	0.14	0.20	0.17	6.0 (2.7)	10 / V
1¼	1½	1¼	2753A7001	2754A7001	30	32	19	24	32	0.15	0.15	0.19	0.17	6.0 (2.7)	
1½	1½	1¼	2753A8011 2754A8011		30	31	19	23	32	0.15	0.15	0.19	0.16	6.0 (2.7)	Normally Open
1½	21⁄2	2	2753A8001	2754A8001	68	70	57	59	76	0.05	0.04	0.07	0.04	15.3 (6.9)	
2	21⁄2	2	2753A9001	2754A9001	70	70	58	61	76	0.05	0.04	0.05	0.04	15.3 (6.9)	
21⁄2	21⁄2	2	2753A9011	2754A9011	70	71	54	55	76	0.05	0.04	0.05	0.04	15.3 (6.9)	

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2753A2001.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

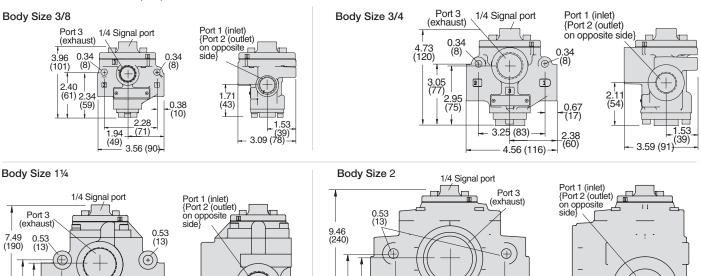
Valve Dimensions - inches (mm)

4.50

4.28 (109)

ROSS

2



**27 Series** 

**B2** 

B

B2.13

#### Silencers ordered separately, refer to page B2.23.

5.80

(147)

78

(45)

4.84 (123)

5.52

(140)

2

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Port Size 1/4 to 1½: 15 to 150 psig (1 to 10 bar). Port Size 1½ to 2½: 30 to 150 psig (2 to 10 bar).

0

0.82

- 3.44 (87

4.65 (118)

6.63 (168)

3.09 (78)

Pilot Pressure: Must be equal to or greater than inlet pressure.

3

4.31(109)

.

6

6.13 (156)

8.62 (219)

1

1 25

(32)

3.84

(98)

2.38 (60)-

6.33(161)

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Online Version Rev. 11/14/16

## **Pressure Controlled Valves**

## **27 Series**

	4-Way 2-Position Valves, Spring Return												
Port	Size	Body	Valve Model	Ave	erage Res Constant	•	Weight						
1, 2, 4	3	Size	Number*	1-2, 1-4	4-3, 2-3	М	1-2, 1-4	4-3, 2-3	lb (kg)				
1/4	1/2	3/8	2756A2001	2.1	2.9	10	0.92	0.92	1.8 (0.8)				
3/8	1/2	3/8	2756A3001	2.9	4.2	10	0.90	0.90	1.8 (0.8)				
1/2	1/2	3/8	2756A4011	3.1	4.3	10	0.89	0.73	1.8 (0.8)				
1/2	1	3/4	2756A4001	5.6	8.1	26	0.50	0.66	4.3 (1.9)				
3/4	1	3/4	2756A5001	7.0	9.3	26	0.36	0.55	4.3 (1.9)				
1	1	3/4	2756A6011	7.8	10	26	0.35	0.50	4.3 (1.9)				
1	1½	1¼	2756A6001	19	26	79	0.22	0.22	10.3 (4.6)				
1¼	1½	1¼	2756A7001	21	27	79	0.18	0.18	10.3 (4.6)				
1½	1½	1¼	2756A8011	22	27	79	0.15	0.15	10.3 (4.6)				

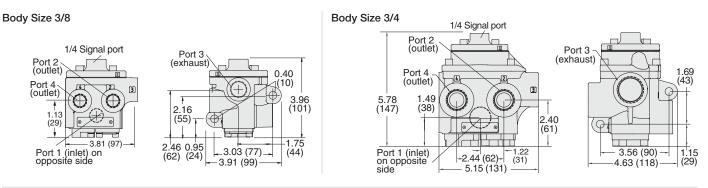


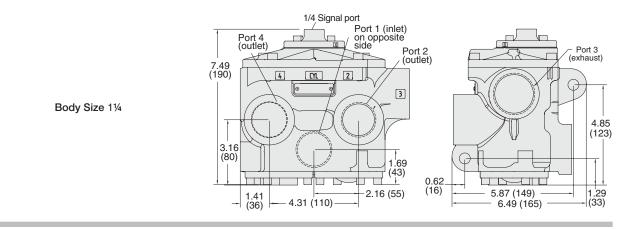
**B2** 

B

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2756A2001.
 # Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

#### Valve Dimensions - inches (mm)





#### Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: Port Size 1/4 to 1½: 15 to 150 psig (1 to 10 bar). Port Size 1½ to 2½: 30 to 150 psig (2 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

Pressure Booster Adaptor: Increases the actuating force on the valve piston. It should be used when the inlet pressure exceeds the available signal pressure, or when the signal pressure is less than 15 psig (1 bar).

The valve's signal pressure is applied to a piston in the pressure booster adaptor that has a larger area than the piston in the valve. The force on the piston in the adaptor is thereby larger than that which could be produced by the piston in the valve. This larger force is applied to the valve's piston directly so that there is then sufficient force to shift the valve properly.

	2-Way 2-Position Valves, Spring Return											
Port Size	Body	Valve Mode	el Number*	(	2 <sub>v</sub>	Dimension A	Weight					
1, 2	Size	Normally Closed	Normally Open	NC	NO	inches (mm)	lb (kg)					
1/4	3/8	2751A2007	2752A2007	2.3	2.3	0.75 (19)	2.3 (1.1)					
3/8												
1/2	3/8	2751A4017	2752A4017	4.0	3.5	0.75 (19)	2.3 (1.1)	1				
1/2	3/4	2751A4007	2752A4007	7.7	6.5	0.75 (19)	3.0 (1.4)	Normally Closed				
3/4	3/4	2751A5007	2752A5007	9.0	7.3	0.75 (19)	3.0 (1.4)	,2				
1	3/4	2751A6017	2752A6017	9.0	7.9	0.75 (19)	3.0 (1.4)	10 <b>•</b> • •				
1	1¼	2751A6007	2752A6007	24	21	1.25 (32)	9.0 (4.1)					
1¼	1¼	2751A7007	2752A7007	29	20	1.25 (32)	9.0 (4.1)	Normally Open				
11/2 11/4 2751A8017 2752A8017 29 21 1.25 (32) 9.0 (4.1)												
* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2751A2007.												



B

**B2** 

3-way PB Adaptor



4-way PB Adaptor

	3-Way 2-Position Valves, Spring Return												
Port	Size	Body	Valve Mod	el Number*	N	C		0	Dimension A	Weight			
1, 2	3	Size	Normally Closed	Normally Open	1-2	2-3	1-2	2-3	inches (mm)	lb (kg)			
1/4	1/2	3/8	2753A2007 2754A2007		2.5	3.1	2.3	2.7	0.75 (19)	2.3 (1.1)			
3/8	1/2	3/8	2753A3007	2754A3007	3.6	5.3	28	3.2	0.75 (19)	2.3 (1.1)	3' 1		
1/2	1/2	3/8	2753A4017 2754A4017		3.3	5.3	28	3.2	0.75 (19)	2.3 (1.1)	Normally Closed		
1/2	1	3/4	2753A4007 2754A4007		6.3	9.2	6.3	8.0	0.75 (19)	3.0 (1.4)	2		
3/4	1	3/4	2753A5007	2754A5007	7.7	11	6.9	7.4	0.75 (19)	3.0 (1.4)	10 / M		
1	1	3/4	2753A6017	2754A6017	8	12	6.8	7.5	0.75 (19)	3.0 (1.4)			
1	1½	1¼	2753A6007	2754A6007	23	34	17	24	1.25 (32)	9.0 (4.1)	Normally Open		
1¼	1½	1¼	2753A7007	2754A7007	30	32	19	24	1.25 (32)	9.0 (4.1)	Normany Open		
1½         1½         1¼         2753A8017         2754A8017         30         31         19         23         1.25 (32)         9.0 (4.1)													
* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2753A2007.													

			4-Way						
Port S	Size	Body	Valve Model		Cv	Dimension A	Weight		
1, 2, 4	3	Size	Number*	1-2, 1-4	4-3, 2-3	inches (mm)	lb (kg)		
1/4	1/2	3/8	2756A2007	2.1	2.9	0.75 (19)	2.8 (1.3)		Detailed dimensions,
3/8	1/2	3/8	2756A3007	2.9	4.2	0.75 (19)	2.8 (1.3)		see corresponding valves models
1/2	1/2	3/8	2756A4017	3.1	4.3	0.75 (19)	2.8 (1.3)		pages.
1/2	1	3/4	2756A4007	5.6	8.1	0.75 (19)	5.3 (2.4)		A 1997
3/4	1	3/4	2756A5007	7.0	9.3	0.75 (19)	5.3 (2.4)		
1	1	3/4	2756A6017	7.8	10	0.75 (19)	5.3 (2.4)	3 1	A
1	1½	1¼	2756A6007	19	26	1.25 (32)	11.3 (5.2)		
1¼	1½	1¼	2756A7007	21	27	1.25 (32)	11.3 (5.2)		( <u></u> ¶¶, (@), , , , , , , , , , , , , , , , , , ,
1½	1½	11⁄4	2756A8017	22	27	1.25 (32)	11.3 (5.2)		
* NPT p	oort th	reads. F	or BSPP three	ads add a	a " <mark>D</mark> " prefix	to the model n	umber e.g.,	D2756A2007.	See .

#### Silencers ordered separately, refer to page B2.23.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



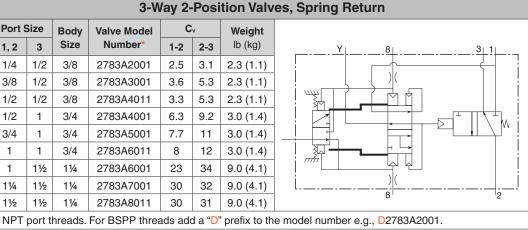
**Online Version** Rev. 11/14/16

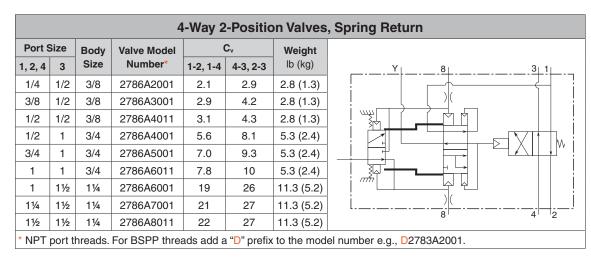
Air Index Adaptor: Allows a valve with a single signal source to function as an impulse controlled, mechanically detented valve.

A momentary pressure signal shifts and holds the valve. A second momentary pressure signal from the same source returns the valve to its original position.

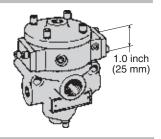


**B2** 





Detailed dimensions, see corresponding valves models pages.



Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.



#### Pressure Controlled Valves With Timed Sequence Adaptors

## 27 Series

**Timed Sequence Adaptor:** Allows the actuation and/or de-actuation of a valve to be delayed up to 30 seconds for 2/2 valves, and up to 3 seconds for 3/2 and 4/2 valves. The time delay function is controlled by a continuously adjustable tapered needle.

	2-Way 2-Position Valves, Spring Return										
Port Size			Valve Mode	l Number*							
FUIT SIZE	Body Size	Normally	y Closed	Normal	ly Open		v	Weight Ib (kg)			
1, 2	0120	Timed In	Timed Out	Timed In	Timed Out	NC	NO	15 (Ng)			
1/4	3/8	2751A2002	2751A2003	2752A2002	2752A2003	2.3	2.3	2.3 (1.1)			
3/8	3/8	2751A3002	2751A3003	2752A3002	2752A3003	3.8	3.3	2.3 (1.1)			
1/2	3/8	2751A4012	2751A4013	2752A4012	2752A4013	4.0	3.5	2.3 (1.1)			
1/2	3/4	2751A4002	2751A4003	2752A4002	2752A4003	7.7	6.5	3.0 (1.4)			
3/4	3/4	2751A5002	2751A5003	2752A5002	2752A5003	9.0	7.3	3.0 (1.4)			
1	3/4	2751A6012	2751A6013	2752A6012	2752A6013	9.0	7.9	3.0 (1.4)			
1	1¼	2751A6002	2751A6003	2752A6002	2752A6003	24	21	9.0 (4.1)			
1¼	1¼	2751A7002	2751A7003	2752A7002	2752A7003	29	20	9.0 (4.1)			
1½	1¼	2751A8012	2751A8013	2752A8012	2752A8013	29	21	9.0 (4.1)			
		Normally Close	d 2		Normally	y Open		)			
						°≠_[	<u> </u>	_w			
Т	imed In	Ti	med Out	Tir	ned In	Tim	ed Out				



Timed-Out Adaptor



**Dual Timed Adaptor** 

**B2** 

B

	Timed In Timed Out Timed In							ned Ou	t			
			3-V	Vay 2-Posit	ion Valves,	Spring Re	turn					
Port	Cine			Valve Mode	el Number*			C	₽ <sub>v</sub>			
Port	Size	Body Size	Normall	y Closed	Normal	ly Open	N	IC	N	0	Weight Ib (kg)	
1, 2	3	0120	Timed In	Timed Out	Timed In	Timed Out	1-2	2-3	1-2	2-3	ib (kg)	
1/4	1/2	3/8	2753A2002	2753A2003	2754A2002	2754A2003	2.5	3.1	2.3	2.7	2.3 (1.1)	Detailed dimensions, see
3/8	1/2	3/8	2753A3002	2753A3003	2754A3002	2754A3003	3.6	5.3	28	3.2	2.3 (1.1)	corresponding valves
1/2	1/2	3/8	2753A4012	2753A4013	2754A4012	2754A4013	3.3	5.3	28	3.2	2.3 (1.1)	models pages.
1/2	1	3/4	2753A4002	2753A4003	2754A4002	2754A4003	6.3	9.2	6.3	8.0	3.0 (1.4)	<b>6</b>
3/4	1	3/4	2753A5002	2753A5003	2754A5002	2754A5003	7.7	11	6.9	7.4	3.0 (1.4)	C TON TON
1	1	3/4	2753A6012	2753A6013	2754A6012	2754A6013	8	12	6.8	7.5	3.0 (1.4)	
1	1½	1¼	2753A6002	2753A6003	2754A6002	2754A6003	23	34	17	24	9.0 (4.1)	1.3 inch (33 mm)
1¼	1½	1¼	2753A7002	2753A7003	2754A7002	2754A7003	30	32	19	24	9.0 (4.1)	
1½	1½	1¼	2753A8012	2753A8013	2754A8012	2754A8013	30	31	19	23	9.0 (4.1)	
			Normally Close	d		No	rmally	Open		0		
					<u>10</u>	<u>≉</u>	W 10	*				
		Timed Ir	י ד	imed Out		Timed In		Tin	ed Out	t		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2751A2002.

OPERATION : Timed In Adaptor: Air signal applied; after preset time delay valve is actuated. Air signal removed; valve immediately deactuated. Timed Out Adaptor: Air signal applied; valve immediately actuated. Air signal removed; after preset delay valve is deactuated.

#### Silencers ordered separately, refer to page B2.23.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

Adjustable Time Delay: Up to 30 seconds.

Safety Integrity Level (SIL) – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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#### Pressure Controlled Valves With Timed Sequence & Timed Sequence Extension Adaptors

		2-Way	2-Position	/alves, Spri	ng Return				
Port Size	Dedu		Valve Mode	el Number*				Weight	
Port Size	Body Size	Normally	y Closed	Normal	ly Open	C <sub>v</sub>		Weight - Ib (kg)	
1, 2	3126	Timed In	Timed Out	Timed In	Timed Out	NC	NO	ib (kg)	
1/4	3/8	2781A2002	2781A2003	2782A2002	2782A2003	2.3	2.3	2.3 (1.1)	
3/8	3/8	2781A3002	2781A3003	2782A3002	2782A3003	3.8	3.3	2.3 (1.1)	
1/2	3/8	2781A4012	2781A4013	2782A4012	2782A4013	4.0	3.5	2.3 (1.1)	
1/2	3/4	2781A4002	2781A4003	2782A4002	2782A4003	7.7	6.5	3.0 (1.4)	
3/4	3/4	2781A5002	2781A5003	2782A5002	2782A5003	9.0	7.3	3.0 (1.4)	
1	3/4	2781A6012	2781A6013	2782A6012	2782A6013	9.0	7.9	3.0 (1.4)	
1	1¼	2781A6002	2781A6003	2782A6002	2782A6003	24	21	9.0 (4.1)	
1¼	1¼	2781A7002	2781A7003	2782A7002	2782A7003	29	20	9.0 (4.1)	
1½	1¼	2781A8012	2781A8013	2782A8012	2782A8013	29	21	9.0 (4.1)	
Timed	in (NC)	Time	d Out (NC)	Timed In	(NO)	Timed	Out (N	0) '	

3-Way 2-Position Valves, Spring Return

Timed In

2784A2002

2784A3002

2784A4012

2784A4002

2784A5002

2784A6012

**Normally Open** 

Timed Out

2784A2003 2.5

2784A3003 3.6

2784A4013 3.3

2784A4003 6.3

2784A5003

2784A6013

2784A6003

2784A7003

4-3, 2-3

2.9

4.2

4.3

8.1

9.3

10

26

27

27

Valve Model Number\*

**Normally Closed** 

**Timed Out** 

2783A2003

2783A3003

2783A4013

2783A4003

2783A5003

2783A6013

Valve Model Number

2786A6012 2786A6013

2786A8012 2786A8013

**Timed In** 

2786A2002

2786A3002

2786A4012

2786A4002

2786A5002

2786A6002

2786A7002

Timed In

2783A2002

2783A3002

2783A4012

2783A4002

2783A5002

2783A6012

2783A6002

2783A7002



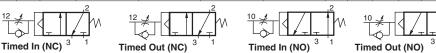


**Timed-Out Adaptor** 



Timed Sequence Adaptor: Allows the actuation and/or de-actuation of a valve to be delayed up to 30 seconds for 2/2 valves, and up to 3 seconds for 3/2 and 4/2 valves. The time delay function is controlled by a continuously adjustable tapered needle. Longer time delays can be obtained by using this adaptor in conjunction with the timed sequence extension adaptor.

**Timed Sequence Extension Adaptor:** Used in conjunction with the timed sequence adaptor to extend the delay interval up to 60 seconds. It also helps to obtain "snap" action of the valve by keeping pilot or signal air off the main valve piston until the pressure has built high enough to cause prompt valve response. Air line lubrication is required with this adaptor.



4-Way 2-Position Valves, Spring Return

1-2, 1-4

2.1

2.9

3.1

5.6

7.0

7.8

19

21

22

C.



**Timed Out** 

2786A2003

2786A3003

2786A4013

2786A4003

2786A5003

2786A6003

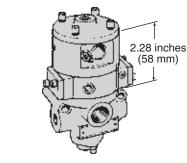
2786A7003

2783A6003 2784A6002

2783A7003 2784A7002

2783A8012 2783A8013 2784A8012 2784A8013

Detailed dimensions, see corresponding valves models pages.



NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2781B2002.

#### Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

C<sub>v</sub>

NC

1-2 2-3

3.1

5.3 28

5.3 28 3.2

9.2 6.3

31

7.7 11 6.9 7.4

8 12 6.8 7.5

23 34

30 32

30

Weight

lb (kg)

2.8 (1.3)

2.8 (1.3)

2.8 (1.3)

5.3 (2.4)

5.3 (2.4)

5.3 (2.4)

11.3 (5.2)

11.3 (5.2)

11.3 (5.2)

NO

1-2 2-3

2.3 2.7

17

19

19

24

24

Weight

lb (kg)

2.3 (1.1)

2.3 (1.1)

3.0 (1.4)

3.0 (1.4)

9.0 (4.1)

9.0 (4.1)

23 9.0 (4.1)

Timed In

Timed Out

3.2 2.3 (1.1)

8.0 3.0 (1.4)

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

#### Adjustable Time Delay: Up to 60 seconds.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Port Size

1, 2 3

1/41/2

3/8 1/2

1/2 1/2

1/2 1

3/4 1

> 1 1

1 11/2

11⁄4 11⁄2

11/2 11/2

Port Size

3

1/2

1/2

1/2

1

1

1

11/2

11/2

1½

1, 2, 4

1/4

3/8

1/2

1/2

3/4

1

1

11⁄4

11⁄2

Body

Size

3/8

3/8

3/8

3/4

3/4

3/4

11/4

11/4

11⁄4

Body

Size

3/8

3/8

3/8

3/4

3/4

3/4

11/4

11⁄4

11/4



**Timed Sequence Adaptor:** Allows the actuation and/or de-actuation of a valve to be delayed up to 30 seconds for 2/2 valves, and up to 3 seconds for 3/2 and 4/2 valves. The time delay function is controlled by a continuously adjustable tapered needle.

	2-Way 2-Position Valves, Spring Return										
Port Size	Body	Valve Mode	el Number*	0	2 <sub>v</sub>	Weight					
1, 2	Size	Normally Closed	Normally Open	NC	NO	lb (kg)					
1/4	3/8	2751B2008	2752B2008	2.3	2.3	2.3 (1.1)					
3/8	3/8	2751B3008	2752B3008	3.8	3.3	2.3 (1.1)					
1/2	3/8	2751B4018	2752B4018	4.0	3.5	2.3 (1.1)					
1/2	3/4	2751B4008	2752B4008	7.7	6.5	3.0 (1.4)					
3/4	3/4	2751B5008	2752B5008	9.0	7.3	3.0 (1.4)					
1	3/4	2751B6018	2752B6018	9.0	7.9	3.0 (1.4)					
1	1¼	2751B6008	2752B6008	24	21	9.0 (4.1)					
1¼	1¼	2751B7008	2752B7008	29	20	9.0 (4.1)					
1½	1½         1¼         2751B8018         2752B8018         29         21         9.0 (4.1)										
NPT port	threads.	For BSPP threads add	a "D" prefix to the model	numb	er e.g.	., <mark>D</mark> 2751B2008.					





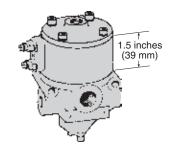
**B2** 

B

	3-Way 2-Position Valves, Spring Return												
Port	Size	Dedu	Valve Mod	el Number*		C	v		Weight				
1011	0120	Body Size	valve mou		N	С	NO		Weight Ib (kg)				
1, 2	3	Size	Normally Closed	ormally Closed Normally Open		2-3	1-2	2-3	ib (kg)				
1/4	1/2	3/8	2753B2008	2754B2008	2.5	3.1	2.3	2.7	2.3 (1.1)				
3/8	1/2	3/8	2753B3008	2754B3008	3.6	5.3	28	3.2	2.3 (1.1)				
1/2	1/2	3/8	2753B4018	2754B4018	3.3	5.3	28	3.2	2.3 (1.1)				
1/2	1	3/4	2753B4008	2754B4008	6.3	9.2	6.3	8.0	3.0 (1.4)				
3/4	1	3/4	2753B5008	2754B5008	7.7	11	6.9	7.4	3.0 (1.4)				
1	1	3/4	2753B6018	2754A6018	8	12	6.8	7.5	3.0 (1.4)				
1	1½	1¼	2753B6008	2754B6008	23	34	17	24	9.0 (4.1)				
1¼	1½	1¼	2753B7008	2754B7008	30	32	19	24	9.0 (4.1)				
1½	1½	1¼	2753B8018	2754B8018	30	31	19	23	9.0 (4.1)				
NPT	IPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2753B2008												
I	Normally Closed $12 \times 12 $												

Normally Open

Detailed dimensions, see corresponding valves models pages.



#### **OPERATION :**

Normally Closed

Timed In Adaptor: Air signal applied; after preset time delay valve is actuated. Air signal removed; valve immediately deactuated. Timed Out Adaptor: Air signal applied; valve immediately actuated. Air signal removed; after preset delay valve is deactuated.

M

#### Silencers ordered separately, refer to page B2.23.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Adjustable Time Delay: Up to 30 seconds.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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Timed-In/Out Sequence & Timed Sequence Extension Adaptors: Used in conjunction can increase the time delay interval up to 60 seconds. It also helps to obtain "snap" action of the valve. By keeping pilot air off the main valve piston until the pressure has built high enough to ensure prompt valve response, the timed sequence extension adaptor prevents the piston from creeping.





	2-Way 2-Position Valves, Spring Return											
Port Siz	e Body	Valve Mod	el Number*	C	v	Weight						
1, 2	Size	Normally Closed	Normally Open	NC	NO	lb (kg)						
1/4	3/8	2781B2005	2782B2005	2.3	2.3	2.3 (1.1)						
3/8	3/8	2781B3005	2782B3005	3.8	3.3	2.3 (1.1)						
1/2	3/8	2781B4015	2782B4015	4.0	3.5	2.3 (1.1)						
1/2	3/4	2781B4005	2782B4005	7.7	6.5	3.0 (1.4)	Normally Closed					
3/4	3/4	2781B5005	2782B5005	9.0	7.3	3.0 (1.4)	2_					
1	3/4	2781B6015	2782B6015	9.0	7.9	3.0 (1.4)						
1	1¼	2781B6005	2782B6005	24	21	9.0 (4.1)						
11⁄4	1¼	2781B7005	2782B7005	29	20	9.0 (4.1)	Normally Open					
1½	1¼	2781B8015	2782B8015	29	21	9.0 (4.1)						

#### 3-Way 2-Position Valves, Spring Return

Dort	Port Size		Value Mad	el Number*		C	v			
Port	Size	Body Size	valve mod		N	С	N	0	Weight Ib (kg)	
1, 2	3	5120	Normally Closed	Normally Open	1-2	2-3	1-2	2-3	ib (kg)	
1/4	1/2	3/8	2783B2005	2784B2005	2.5	3.1	2.3	2.7	2.3 (1.1)	12
3/8	1/2	3/8	2783B3005	2784B3005	3.6	5.3	28	3.2	2.3 (1.1)	ש
1/2	1/2	3/8	2783B4015	2784B4015	3.3	5.3	28	3.2	2.3 (1.1)	
1/2	1	3/4	2783B4005	2784B4005	6.3	9.2	6.3	8.0	3.0 (1.4)	
3/4	1	3/4	2783B5005	2784B5005	7.7	11	6.9	7.4	3.0 (1.4)	
1	1	3/4	2783B6015	2784B6015	8	12	6.8	7.5	3.0 (1.4)	10
1	1½	1¼	2783B6005	2784B6005	23	34	17	24	9.0 (4.1)	
1¼	1½	1¼	2783B7005	2784B7005	30	32	19	24	9.0 (4.1)	
1½	1½	1¼	2783B8015	2784B8015	30	31	19	23	9.0 (4.1)	

Weight

lb (kg)

2.8 (1.3)

2.8 (1.3)

2.8 (1.3)

5.3 (2.4)

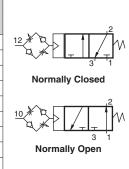
5.3 (2.4)

5.3 (2.4)

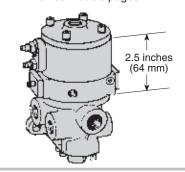
11.3 (5.2)

11.3 (5.2)

11.3 (5.2)



Detailed dimensions, see corresponding valves models pages.



\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2781B2005.

4-Way 2-Position Valves, Spring Return

C<sub>v</sub>

4-3, 2-3

2.9

4.2

4.3

8.1

9.3

10

26

27

27

1-2, 1-4

2.1

2.9

3.1

5.6

7.0

7.8

19

21

22

Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Adjustable Time Delay: Up to 60 seconds

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

B

**Port Size** 

3

1/2

1/2

1/2

1

1

1

11/2

11/2

11/2

1, 2, 4

1/4

3/8

1/2

1/2

3/4

1

1 1¼

11⁄2

Body

Size

3/8

3/8

3/8

3/4

3/4

3/4

11⁄4

11⁄4

11/4

Valve Model

Number

2786B2005

2786B3005

2786B4015

2786B4005

2786B5005

2786B6015

2786B6005

2786B7005



Inlet Port Controlled Timed-In Sequence Adaptor: Permits valve actuation and deactuation to be controlled by the pressure at the inlet port. When pressure is applied an internal passage conducts the pressure to the sequence adaptor. After the preset time delay, the valve is actuated. When pressure is removed from the inlet port the valve is deactuated.

SizeNormally ClosedNormally OpenNCNOIb (kg)3/8 $2751A2004$ $2752A2004$ $2.3$ $2.3$ $2.3$ $1.1$ 3/8 $2751A3004$ $2752A3004$ $3.8$ $3.3$ $2.3$ $1.1$ 3/8 $2751A4014$ $2752A4014$ $4.0$ $3.5$ $2.3$ $1.1$ $3/4$ $2751A4004$ $2752A4004$ $7.7$ $6.5$ $3.0$ $1.4$ $3/4$ $2751A6004$ $2752A6004$ $9.0$ $7.3$ $3.0$ $1.4$ $3/4$ $2751A6014$ $2752A6004$ $9.0$ $7.9$ $3.0$ $1.4$ $11/4$ $2751A6004$ $2752A6004$ $24$ $21$ $9.0$ $4.1$ $11/4$ $2751A7004$ $2752A7004$ $29$ $20$ $9.0$ $4.1$		turn	ig Re	Sprir	-Position Valves,	2-Way 2		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		Weight	v	0	el Number*	Valve Mod	Body	Port Size
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		lb (kg)	NO	NC	Normally Open	Normally Closed	Size	1, 2
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		2.3 (1.1)	2.3	2.3	2752A2004	2751A2004	3/8	1/4
3/4 $2751A4004$ $2752A4004$ $7.7$ $6.5$ $3.0$ (1.4) $3/4$ $2751A5004$ $2752A5004$ $9.0$ $7.3$ $3.0$ (1.4) $3/4$ $2751A6014$ $2752A6014$ $9.0$ $7.3$ $3.0$ (1.4) $3/4$ $2751A6014$ $2752A6014$ $9.0$ $7.9$ $3.0$ (1.4) $11/4$ $2751A6004$ $2752A6004$ $24$ $21$ $9.0$ (4.1) $11/4$ $2751A7004$ $2752A7004$ $29$ $20$ $9.0$ (4.1)		2.3 (1.1)	3.3	3.8	2752A3004	2751A3004	3/8	3/8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	····· <sup>*</sup> ······ 1	2.3 (1.1)	3.5	4.0	2752A4014	2751A4014	3/8	1/2
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Normally Closed	3.0 (1.4)	6.5	7.7	2752A4004	2751A4004	3/4	1/2
1¼         2751A6004         2752A6004         24         21         9.0 (4.1)           1¼         2751A7004         2752A7004         29         20         9.0 (4.1)	2	3.0 (1.4)	7.3	9.0	2752A5004	2751A5004	3/4	3/4
1¼         2751A6004         2752A6004         24         21         9.0 (4.1)           1¼         2751A7004         2752A7004         29         20         9.0 (4.1)		3.0 (1.4)	7.9	9.0	2752A6014	2751A6014	3/4	1
		9.0 (4.1)	21	24	2752A6004	2751A6004	11⁄4	1
	·	9.0 (4.1)	20	29	2752A7004	2751A7004	11⁄4	1¼
e 1¼ 2751A8014 2752A8014 29 21 9.0 (4.1) Normally Open	Normally Open	9.0 (4.1)	21	29	2752A8014	2751A8014	1¼	1½

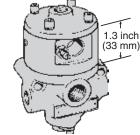
			3-W	ay 2-Position Val	ves, S	sprin	д ке	turn		
Port	Sizo	Dealer	Valva Mad	el Number*		C	v		M/-:	
PUIL	Size	Body Size	valve wou	er Nulliber	N	C	N	0	Weight Ib (kg)	
1, 2	3	0120	Normally Closed	Normally Open	1-2	2-3	1-2	2-3		
1/4	1/2	3/8	2753A2004	2754A2004	2.5	3.1	2.3	2.7	2.3 (1.1)	
3/8	1/2	3/8	2753A3004	2754A3004	3.6	5.3	28	3.2	2.3 (1.1)	
1/2	1/2	3/8	2753A4014	2754A4014	3.3	5.3	28	3.2	2.3 (1.1)	3 1 Normally Closed
1/2	1	3/4	2753A4004	2754A4004	6.3	9.2	6.3	8.0	3.0 (1.4)	normany closed
3/4	1	3/4	2753A5004	2754A5004	7.7	11	6.9	7.4	3.0 (1.4)	10 4 7
1	1	3/4	2753A6014	2754A6014	8	12	6.8	7.5	3.0 (1.4)	
1	1½	11⁄4	2753A6004	2754A6004	23	34	17	24	9.0 (4.1)	
1¼	1½	1¼	2753A7004	2754A7004	30	32	19	24	9.0 (4.1)	Normally Open
1½	1½	1¼	2753A8014	2754A8014	30	31	19	23	9.0 (4.1)	

2 Way O Desition Values Cari

			4-Way 2-Pos	sition Val	ves, Spi	ring Retur	'n
Port S	Size	Body	Valve Model	C	v	Weight	
1, 2, 4	3	Size	Number*	1-2, 1-4	4-3, 2-3	lb (kg)	
1/4	1/2	3/8	2756A2004	2.1	2.9	2.8 (1.3)	
3/8	1/2	3/8	2756A3004	2.9	4.2	2.8 (1.3)	
1/2	1/2	3/8	2756A4014	3.1	4.3	2.8 (1.3)	
1/2	1	3/4	2756A4004	5.6	8.1	5.3 (2.4)	14 🖌
3/4	1	3/4	2756A5004	7.0	9.3	5.3 (2.4)	Lo
1	1	3/4	2756A6014	7.8	10	5.3 (2.4)	·
1	1½	1¼	2756A6004	19	26	11.3 (5.2)	
1¼	1½	1¼	2756A7004	21	27	11.3 (5.2)	
1½	1½	1¼	2756A8014	22	27	11.3 (5.2)	

valves models pages.

Detailed dimensions, see corresponding



\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2751A2004.

Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Adjustable Time Delay: 2/2 Valves: Up to 30 seconds. 3/2, 4/2 Valves: Up to 3 seconds.

**Online Version** 

Rev. 11/14/16

Safety Integrity Level (SIL) – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq 1$ .

Valve models with EN connector available, consult ROSS.



#### **Pressure Controlled Valves** With Inlet Port Controlled Timed-In Sequence & Timed Sequence Extension Adaptors

Inlet Port Controlled Timed-In Sequence Adaptor: Permits valve actuation and deactuation to be controlled by the pressure at the inlet port. When pressure is applied an internal passage conducts the pressure to the sequence adaptor. After the preset time delay, the valve is actuated. When pressure is removed from the inlet port the valve is deactuated. Timed Sequence Extension Adaptor: Increases the maximum time delay interval to 60 seconds. It also helps to obtain "snap" action of the valve. By keeping pressure off the main valve piston until it is high enough to ensure prompt valve response, the timed sequence extension adaptor prevents the piston from creeping.

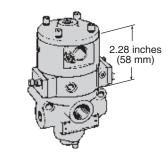


	n	etur	ng H	Spri	ives,	way 2-Position va	3-1			
	M/- :		v	C		el Number*	Value Med	Dealer	Ci=0	Port
	Weight	0	N	С	N		valve mod	Body Size	Size	Port
	lb (kg)	2-3	1-2	2-3	1-2	Normally Open	Normally Closed	Size	3	1, 2
	2.3 (1.1)	2.7	2.3	3.1	2.5	2784A2004	2783A2004	3/8	1/2	1/4
	2.3 (1.1)	3.2	28	5.3	3.6	2784A3004	2783A3004	3/8	1/2	3/8
3 ا Normally Closed	2.3 (1.1)	3.2	28	5.3	3.3	2784A4014	2783A4014	3/8	1/2	1/2
Normany crocou	3.0 (1.4)	8.0	6.3	9.2	6.3	2784A4004	2783A4004	3/4	1	1/2
	3.0 (1.4)	7.4	6.9	11	7.7	2784A5004	2783A5004	3/4	1	3/4
	3.0 (1.4)	7.5	6.8	12	8	2784A6014	2783A6014	3/4	1	1
	9.0 (4.1)	24	17	34	23	2784A6004	2783A6004	1¼	1½	1
Normally Open	9.0 (4.1)	24	19	32	30	2784A7004	2783A7004	1¼	1½	1¼
	9.0 (4.1)	23	19	31	30	2784A8014	2783A8014	1¼	1½	1½

#### 4-Way 2-Position Valves, Spring Return

			-				
Port S	ize	Body	Valve Model		Cv	Weight	
1, 2, 4	3	Size	Number*	1-2, 1-4	4-3, 2-3	lb (kg)	
1/4	1/2	3/8	2786A2004	2.1	2.9	2.8 (1.3)	
3/8	1/2	3/8	2786A3004	2.9	4.2	2.8 (1.3)	
1/2	1/2	3/8	2786A4014	3.1	4.3	2.8 (1.3)	4, ,2
1/2	1	3/4	2786A4004	5.6	8.1	5.3 (2.4)	
3/4	1	3/4	2786A5004	7.0	9.3	5.3 (2.4)	
1	1	3/4	2786A6014	7.8	10	5.3 (2.4)	3 1
1	1½	1¼	2786A6004	19	26	11.3 (5.2)	
1¼	1½	1¼	2786A7004	21	27	11.3 (5.2)	
1½	1½	1¼	2786A8014	22	27	11.3 (5.2)	

Detailed dimensions, see corresponding valves models pages.



27 Series

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2781A2004.

#### Silencers ordered separately, refer to page B2.23.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

#### Adjustable Time Delay: Up to 60 seconds.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.





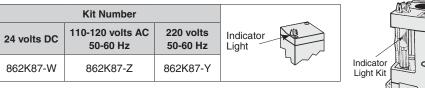
## **Accessories & Options**

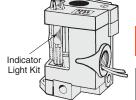
## for 27 Series

#### **Indicator Light Kit**

To visually verify valve operation indicator lights are available in kit form. The indicator light extends through the solenoid or pilot cover and is illuminated when the solenoid is energized. Such lights are standard on double solenoid valves.

Indicator light kit is available for single solenoid models.





**B2** 

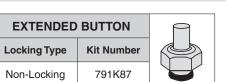
B

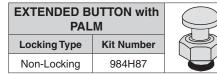
#### **Manual Override Kits**

Flush flexible manual overrides are standard on single solenoid models. Double solenoid models have flush metal-button overrides. Both types are non-locking.

Each of the buttons in the override kits below is made of metal and is spring-returned. The locking type button, however, can be kept in the actuated position by turning the slot in the top of the button with a screwdriver.

FLUSH E	BUTTON	
Locking Type	Kit Number	
Non-Locking	790K87	
Locking	792K87	





#### **Electrical Connector**

## Valves available with installed prewired connectors, consult ROSS.

#### System 8 Solenoid Pilot

Models available with preinstalled System 8 solenoid pilot, consult ROSS.

#### Silencers

					Port si	ize 1/4 thru	2	 Port size 2½	0 1000
Port Size	Thread Type		el Number	Avg.	inche	nsions s (mm)	Weight Ib (kg)		A
4/0		NPT Treads	BSPT Threads		A	B		Male Pipe Threads	
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)		B
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)		
1½	Female	5500A8001	D5500A8001	29.9	2.5 (64)	5.7 (144)	1.0 (0.5)		
21⁄2	Female	5500A9002	D5500A9002	103.7	4.0 (102)	5.7 (145)	2.9 (1.4)	Female Pipe Threa	
1	•	e: 0 to 150 psig Itered air.	g (0 to 10.3 bar) maxi	mum.				·	B







# ROSS CONTROLS®

## POPPET VALVES 21 SERIES HIGH TEMPERATURE AND LOW TEMPERATURE APPLICATIONS



#### POPPET 21 SERIES VALVES – KEY FEATURES

- Low weight; compact size
- Available with choices of internal components for three different temperature ranges
- Can be mounted close to actuator, reducing length of pipe to be pressurized/exhausted on each cycle
- Long life expectancy
- Consistent response times over the life of the valve
- Construction makes them readily adaptable to vacuum service
- · Easily field-convertible for use with an external pilot supply
- Models with external pilot supply available, consult ROSS

#### Type H (High Temperature) Service:

Fluorocarbon seals are used to ensure high temperature stability. *Ambient Temperature:* Up to 250°F (122°C) for solenoid models; up to 300°F (150°C) for pressure controlled models. *Media Temperature:* 0° to 300°F (-17° to 150°C).

#### Type O (Low Temperature) Service:

Buna-N seals are used to ensure good performance at low temperatures. *Ambient Temperature:* Down to -40°F (-40°C). *Media Temperature:* -40° to 175°F (-40° to 80°C).

#### **Vacuum Service Valves**

Vacuum service valves are ideal for lifting, holding, vacuum packaging and moving anything from large objects to tiny particles. They also provide an effective means for leak testing.

#### Explosion-Proof solenoid pilot valves available, see explosion proof valves.

	DESCR	RIPTION		AV	AILA	ABLE	E INL	.ET	POR	T SIZ	ZES				F	=UN	СТІ	ONS	5							
VALVE TYPE/SERIES	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	2½	2/2	3/2	3/4	4/2	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Direct Solenoid Control	Pressure Control	Page
21																						40				B3.3 - B3.5
21																						40				B3.6 - B3.8
21 Vacuum																						71				B3.9 - B3.10 B3.12 - B3.13
21 Full Vacuum																						71				B3.11
Options & Accessories E													B3.14													



#### Solenoid Pilot Controlled Valves For High and Low Temperature Applications

## **21 Series**

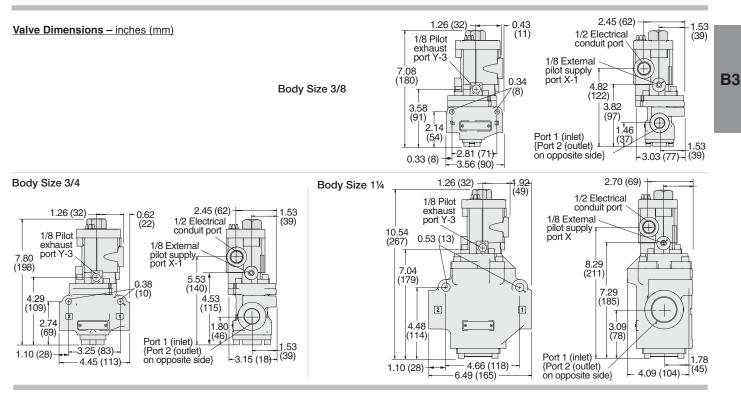
B

	Body     Size     High Temperature     Low Temperature     Cv     F     Ib (kg)       12     12     12     12     12     12     12														
Port	Body		Valve Mod	el Number*					•	•	Weight				
Size		High Tem	perature	Low Tem	perature	C	v	84		F		1			
1,2		<b>Normally Closed</b>	Normally Open	<b>Normally Closed</b>	Normally Open	NC	NO	IVI	NC	NO					
1/4	3/8	2171B2001**	2172B2001**	2171B2002**	2172B2002**	2.3	2.3	10	0.96	0.96	3.0 (1.4)				
3/8	3/8	2171B3001**	2172B3001**	2171B3002**	2172B3002**	3.8	3.3	10	0.90	0.93	3.0 (1.4)	Normally Closed			
1/2	3/8	2171B4011**	2172B4011**	2171B4012**	2172B4012**	4.0	3.5	10	0.82	0.88	3.0 (1.4)				
1/2	3/4	2171B4001**	2172B4001**	2171B4002**	2172B4002**	7.7	6.5	14	0.39	0.50	3.3 (1.5)	0			
3/4	3/4	2171B5001**	2172B5001**	2171B5002**	2172B5002**	9.0	7.3	14	0.32	0.37	3.3 (1.5)				
1	3/4	2171B6011**	2172B6011**	2171B6012**	2172B6012**	9.0	7.9	14	0.31	0.36	3.3 (1.5)				
1	1¼	2171B6001**	2172B6001**	2171B6002**	2172B6002**	24	21	26	0.19	0.20	7.5 (3.4)	1			
1¼	1¼	2171B7001**	2172B7001**	2171B7002**	2172B7002**	29	20	26	0.14	.18	7.5 (3.4)	Normally Open			
1½	1¼	2171B8011**	2172B8011**	2171B8012**	2172B8012**	29	21	26	0.13	0.17	7.5 (3.4)				
		ando For DOD th	reede edd e "D"	profix to the mode		04741	20001	1.1.1			·				

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2171B2001W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2171B2001W. For other voltages, consult ROSS.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



#### Options: Indicator Light Kit, Manual Override Kits; refer to page B3.14.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Poppet; Metal. For temperatures below 40°F (4°C) air must be free of water vapor to Mounting Type: Inline. prevent formation of ice. Solenoid Pilot: Rated for continuous duty. Flow Media: Filtered air. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Inlet Pressure: 30 to 150 psig (2 to 10 bar). Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; Pilot Pressure: When external supply is used, pressure must be equal 14 watts on DC. to or greater than inlet pressure. Ambient Temperature: High Temp: 0° to 250°F (-17° to 122°C). Manual Override: Non-locking metal button, standard. Low Temp: -40° to 120°F (-40° to 50°C). Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to Media Temperature: High Temp: 0° to 300°F (-17° to 150°C). IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, Low Temp: -40° to 175°F (-40° to 80°C). PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥1.

Valve models with EN connector available, consult ROSS.

**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS**, **WARNINGS** on the inside back cover.

Online Version Rev. 11/14/16

## **Solenoid Pilot Controlled Valves**

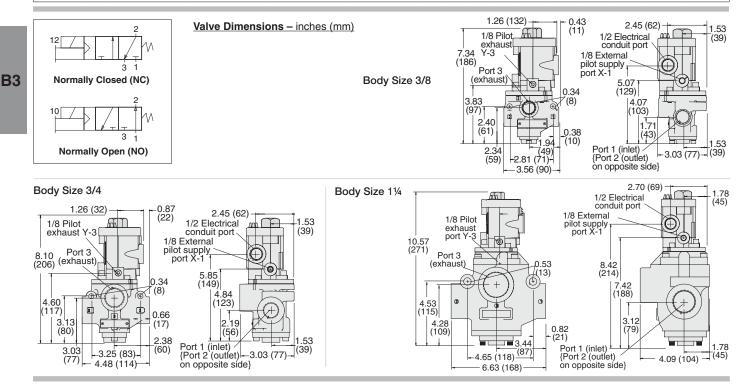
#### For High and Low Temperature Applications

				3	-Way 2-Posit	ion Valves, S	prir	ng R	etur	'n						
I	ort			Valve Mod	el Number*			C	, v		Ave	rage Re	esponse	Const	ants#	
	Size	Body	High Tem	perature	Low Tem	perature	N	IC	N	0				F		Weight
1, 3	2 3	Size	Normally Closed	Normally Open	Normally Closed	Normally Open	1-2	2-3	1-2	2-3	М		IC		10	lb (kg)
-,-					, , , , , , , , , , , , , , , , , , , ,							1-2	2-3	1-2	2-3	
1/4	1/2	3/8	2173B2001**	2174B2001**	2173B2002**	2174B2002**	2.4	3.4	2.0	2.1	10	1.76	2.08	1.60	2.30	3.0 (1.4)
3/8	1/2	3/8	2173B3001**	2174B3001**	2173B3002**	2174B3002**	3.0	5.8	2.3	2.4	10	0.95	1.07	1.03	1.60	3.0 (1.4)
1/2	1/2	3/8	2173B4011**	2174B4011**	2173B4012**	2174B4012**	3.0	5.2	2.9	2.8	10	0.94	0.98	11.00	2.00	3.0 (1.4)
1/2	1	3/4	2173B4001**	2174B4001**	2173B4002**	2174B4002**	6.6	12	6.5	7.0	11	0.58	0.64	0.50	0.70	3.3 (1.5)
3/4	1	3/4	2173B5001**	2174B5001**	2173B5002**	2174B5002**	7.8	13	7.5	7.5	11	0.38	0.41	0.43	0.67	3.3 (1.5)
1	1	3/4	2173B6011**	2174B6011**	2173B6012**	2174B6012**	7.5	12	7.7	7.6	11	0.24	0.36	0.42	0.60	3.3 (1.5)
1	11/2	11⁄4	2173B6001**	2174B6001**	2173B6002**	2174B6002**	24	40	15	17	28	0.16	0.18	0.17	0.20	7.5 (3.4)
11/	11/2	11⁄4	2173B7001**	2174B7001**	2173B7002**	2174B7002**	29	39	21	23	28	0.12	0.17	0.15	0.19	7.5 (3.4)
1½	11⁄2	11⁄4	2173B8011**	2174B8011**	2173B8012**	2174B8012**	30	38	22	23	28	0.12	0.16	0.13	0.18	7.5 (3.4)

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2173B2001W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2173B2001W. For other voltages, consult ROSS.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.



Options: Indicator Light Kit, Manual Override Kits; refer to page B3.14. Silencers ordered separately, refer to page B3.14.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: High Temp: 0° to 250°F (-17° to 122°C). Low Temp: -40° to 120°F (-40° to 50°C). Media Temperature: High Temp: 0° to 300°F (-17° to 150°C). Low Temp: -40° to 175°F (-40° to 80°C).

For temperatures below 40°F (4°C) air must be free of water vapor to

Flow Media: Filtered air.

Inlet Pressure: 30 to 150 psig (2 to 10 bar).

**Pilot Pressure:** When external supply is used, pressure must be equal to or greater than inlet pressure.

Manual Override: Non-locking metal button, standard.

Safety Integrity Level (SIL) – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

prevent formation of ice.



#### Solenoid Pilot Controlled Valves For High and Low Temperature Applications

#### 4-Way 2-Position Valves, Spring Return Port Size Valve Model Number C. Average Response Constants# Body Weight Size lb (kg) 1, 2, 4 3 **High Temperature** Low Temperature 1-2, 1-4 4-3, 2-3 Μ 1-2, 1-4 4-3, 2-3 2176B2002\*\* 1/4 1/2 3/8 2176B2001\*\* 2.1 2.2 30 1.70 2.28 3.0(1.4)3/8 1/2 3/8 2176B3001\*\* 2176B3002\*\* 2.5 3.1 30 1.13 1.33 3.0 (1.4) 1/2 3/8 2176B4011\*\* 2176B4012\*\* 2.9 3.8 1.00 1.22 3.0 (1.4) 1/230 0.76 1/21 3/42176B4001\*\* 2176B4002\*\* 5.7 6.5 46 0.50 5.8 (2.6) 3/41 3/42176B5001\*\* 2176B5002\* 7.1 8.7 46 0.36 0.55 5.8 (2.6) 1 3/4 2176B6011\*\* 2176B6012\*\* 7.7 10 46 0.36 0.50 5.8 (2.6) 1 11⁄2 11/4 2176B6001\*\* 2176B6002\*\* 18 23 99 0.22 12.0 (5.4) 0.19 1 2176B7001\*\* 2176B7002\*\* 11⁄4 11⁄2 11⁄4 20 28 99 0.19 0.22 12.0 (5.4) 11⁄2 11⁄2 11⁄4 2176B8011\*\* 2176B8012\*\* 21 29 99 0.16 0.22 12.0 (5.4)

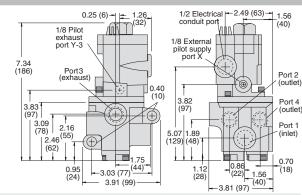
\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2176B2001W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2176B2001 W. For other voltages, consult ROSS.

**Value Response Time** – Response Time (msc) = M + ( $F \cdot V$ ). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions - inches (mm)

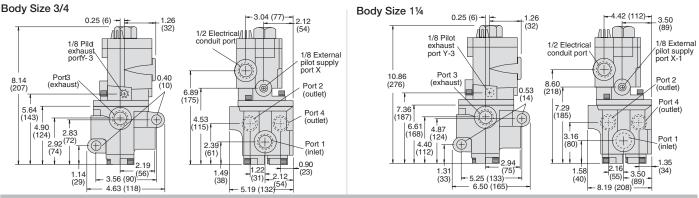
Body Size 3/8



21 Series

B

**B**3



Options: Indicator Light Kit, Manual Override Kits; refer to page B3.14. Silencers ordered separately, refer to page B3.14.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: High Temp: 0° to 250°F (-17° to 122°C). Low Temp: -40° to 120°F (-40° to 50°C). Media Temperature: High Temp: 0° to 300°F (-17° to 150°C). Low Temp: -40° to 175°F (-40° to 80°C). For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice. Flow Media: Filtered air.

Inlet Pressure: 30 to 150 psig (2 to 10 bar).

**Pilot Pressure:** When external supply is used, pressure must be equal to or greater than inlet pressure.

Manual Override: Non-locking metal button, standard.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

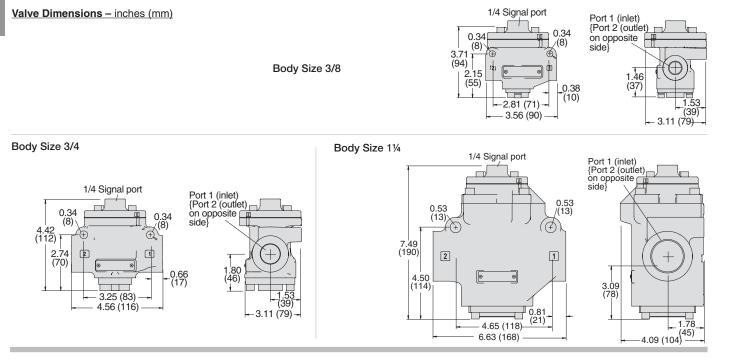
#### **Pressure Controlled Valves** For High and Low Temperature Applications

	2-Way 2-Position Valves, Spring Return														
Port	Body	High Tem		el Number* Low Tem	perature	Avg	ι. C <sub>v</sub>		age Res Constant	•	Weight				
Size	Size	Normally Closed	Normally Open	Normally Closed		NC	NO	М	NC	NO	lb (kg)				
1/4	3/8	2151B2001	2152B2001	2151B2002	2152B2002	2.3	2.3	10	0.91	0.91	1.8 (0.8)				
3/8	3/8	2151B3001	2152B3001	2151B3002	2152B3002	3.8	3.3	10	0.70	0.76	1.8 (0.8)				
1/2	3/8	2151B4011	2152B4011	2151B4012	2152B4012	4.0	3.5	10	0.64	0.72	1.8 (0.8)				
1/2	3/4	2151B4001	2152B4001	2151B4002	2152B4002	7.7	6.5	16	0.37	0.43	4.2 (2.0)				
3/4	3/4	2151B5001	2152B5001	2151B5002	2152B5002	9.0	7.3	16	0.34	0.39	4.2 (2.0)				
1	3/4	2151B6011	2152B6011	2151B6012	2152B6012	9.0	7.9	16	0.34	0.37	4.2 (2.0)				
1	1¼	2151B6001	2152B6001	2151B6002	2152B6002	24	21	27	0.17	0.17	11.0 (5.0)				
1¼	1¼	2151B7001	2152B7001	2151B7002	2152B7002	29	20	27	0.19	0.19	11.0 (5.0)				
1½	1¼	2151B8011	2152B8011	2151B8012	2152B8012	29	21	27	0.18	0.18	11.0 (5.0)				
	Normally Closed (NC) $\begin{array}{c} 12 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $														

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2151B2001.

# Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

B



#### Silencers ordered separately, refer to page B3.14.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Ambient/Media Temperatures: High Temperature:  $0^{\circ}$  to  $300^{\circ}$ F (-17° to 150°C). Low Temperature: -40° to 175°F (-40° to 80°C). For temperatures below  $40^{\circ}$ F ( $4^{\circ}$ C) air must be free of water vapor to prevent formation of ice. Flow Media: Filtered air. **Inlet Pressure:** 30 to 150 psig (2 to 10 bar). **Pilot Pressure:** Must be equal to or greater than inlet pressure.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.



#### **Pressure Controlled Valves** For High and Low Temperature Applications

					3-Way 2	-Position V	alve	es, S	pring	g Re	eturr	1				
Port	Sizo			Valve Mod	el Number*			C	₽ <sub>v</sub>			Averag	e Respons	e Constan	ts#	
Port	Size	Body	High Tem	nperature	Low Tem	perature	N	IC	N	0			1	F		Weight
1, 2	3	Size	Normally	Normally	Normally	Normally	1-2	2-3	1-2	2-3	М	1	IC	1	10	lb (kg)
., 2	Ŭ		Closed	Open	Closed	Open		20		20		1-2	2-3	1-2	2-3	
1/4	1/2	3/8	2153B2001	2154B2001	2153B2002	2154B2002	2.4	3.4	2.0	2.1	10	1.76	2.08	1.60	2.30	1.8 (0.8)
3/8	1/2	3/8	2153B3001	2154B3001	2153B3002	2154B3002	3.0	5.8	2.3	2.4	10	0.95	1.07	1.03	1.60	1.8 (0.8)
1/2	1/2	3/8	2153B4011	2154B4011	2153B4012	2154B4012	3.0	5.2	2.9	2.8	10	0.94	0.98	11.00	2.00	1.8 (0.8)
1/2	1	3/4	2153B4001	2154B4001	2153B4002	2154B4002	6.6	12	6.5	7.0	11	0.58	0.64	0.50	0.70	4.5 (2.1)
3/4	1	3/4	2153B5001	2154B5001	2153B5002	2154B5002	7.8	13	7.5	7.5	11	0.38	0.41	0.43	0.67	4.5(2.1)
1	1	3/4	2153B6011	2154B6011	2153B6012	2154B6012	7.5	12	7.7	7.6	11	0.24	0.36	0.42	0.60	4.5 (2.1)
1	1½	1¼	2153B6001	2154B6001	2153B6002	2154B6002	24	40	15	17	28	0.16	0.18	0.17	0.20	11.0 (5.0)
1¼	1½	1¼	2153B7001	2154B7001	2153B7002	2154B7002	29	39	21	23	28	0.12	0.17	0.15	0.19	11.0 (5.0)
1½	1½	1¼	2153B8011	2154B8011	2153B8012	2154B8012	30	38	22	23	28	0.12	0.16	0.13	0.18	11.0 (5.0)
	Normally Closed $\xrightarrow{12}{12}$ $\xrightarrow{12}{12}$ $\xrightarrow{12}{12}$ Normally Open $\xrightarrow{10}{12}$ $\xrightarrow{10}{12}$ $\xrightarrow{11}{12}$															

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2153B2001.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Port 1 (inlet) {Port 2 (outlet) Port 3 Valve Dimensions - inches (mm) 1/4 Signal port (exhaust) on opposite 3.96 (101) 0.34 0.34 side (8) (8)2.40 (61) 2.34 Body Size 3/8 1.71 (43) (59)0.38 (10) n-1.53 1 94 (71) 3.09 (78)-(49) 3.56 (90)-Body Size 3/4 Body Size 11/4 1/4 Signal port Port 1 (inlet) {Port 2 (outlet) on opposite Port 3 Port 3 (exhaust) 1/4 Signal port Port 1 (inlet) (exhaust side} {Port 2 (outlet) 0.53 (13) 7.49 0.53 on opposite side} (190) 0 (13) 4.73 (120) (8) 0.34  $( \neq )$ (8) P 3.05 (77) 4.50 (114) 2 2 0 ) 2.95 2.11 3.09 (78) (75) 0.67 4.28 (109) 0.82 ł - 3.25 (83) 2.38 (39) 4.56 (116) - (60) 3.59 (91) 3.44 (87 1.78 (45) 4.65 (118) 4.84 (123) 6.63 (168)

#### Silencers ordered separately, refer to page B3.14.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Ambient/Media Temperatures: High Temperature: 0° to 300°F (-17° to 150°C). Low Temperature: -40° to 175°F (-40° to 80°C). For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice. Flow Media: Filtered air. **Inlet Pressure:** 30 to 150 psig (2 to 10 bar). **Pilot Pressure:** Must be equal to or greater than inlet pressure.

Safety Integrity Level (SIL) – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq 1$ .

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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**21 Series** 

B

#### **Pressure Controlled Valves** For High and Low Temperature Applications

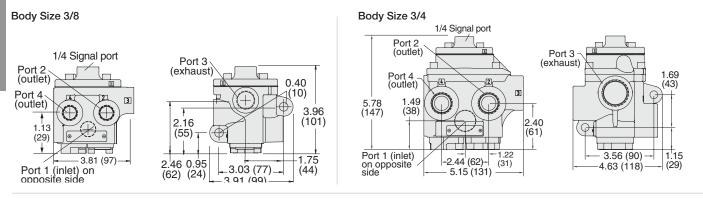
## 21 Series

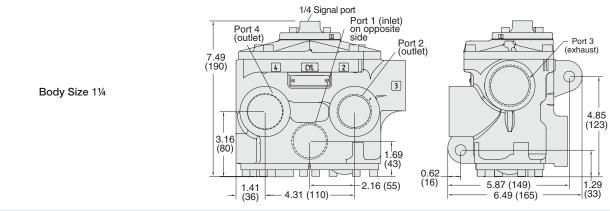
	4-Way 2-Position Valves, Spring Return													
Port S	Port Size		Valve Mode	Cv		Average Response Constants#			Weight					
1 0 4	3	Body Size	High Tomporature		1014	42.00	м	F		lb (kg)				
1, 2, 4	3		High Temperature	Low Temperature	1-2, 1-4	4-3, 2-3	IVI	1-2, 1-4	4-3, 2-3					
1/4	1/2	3/8	2156B2001	2156B2002	2.1	2.9	30	1.70	2.28	3.0 (1.4)				
3/8	1/2	3/8	2156B3001	2156B3002	2.9	4.2	30	1.13	1.33	3.0 (1.4)	4 2			
1/2	1/2	3/8	2156B4011	2156B4012	3.1	4.3	30	1.00	1.22	3.0 (1.4)				
1/2	1	3/4	2156B4001	2156B4002	5.6	8.1	46	0.50	0.76	5.8 (2.6)				
3/4	1	3/4	2156B5001	2156B5002	7.0	9.3	46	0.36	0.55	5.8 (2.6)	0 1			
1	1	3/4	2156B6011	2156B6012	7.8	10	46	0.36	0.50	5.8 (2.6)				
1	1½	1¼	2156B6001	2156B6002	19	26	99	0.19	0.22	12.0 (5.4)				
1¼	1½	1¼	2156B7001	2156B7002	21	27	99	0.19	0.18	12.0 (5.4)				
1½	1½	1¼	2156B8011	2156B8012	22	27	99	0.16	0.15	12.0 (5.4)				

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g.,D2156B2001.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

#### Valve Dimensions - inches (mm)





#### Silencers ordered separately, refer to page B3.14.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Ambient/Media Temperatures: High Temperatures: 0° to 300°F (-17° to 150°C). Low Temperatures: -40° to 175°F (-40° to 80°C). For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice. Flow Media: Filtered air.

**Inlet Pressure:** 30 to 150 psig (2 to 10 bar). **Pilot Pressure:** Must be equal to or greater than inlet pressure.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

B



## **Solenoid Pilot Controlled Valves**

#### **For Vacuum Applications**

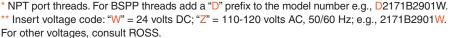
	2-Way 2-Position Valves, Spring Return												
Port Size	Body Size	Valve Model Number*	Function	C <sub>v</sub>	Average Response Constants#		Weight lb (kg)						
Size	Size	Number			М	F	ib (kg)						
1/4	3/8	2171B2901**	NC	2.1	10	0.96	3.0 (1.4)	2 (WORK)					
3/8	3/8	2171B3906**	NC	2.6	10	0.90	3.0 (1.4)						
1/2	3/8	2171A4917**	NC	2.6	10	0.82	3.0 (1.4)	EPS*' 1 (PUMP)					
3/4	3/4	2171B5905**	NC	7.8	14	0.39	3.3 (1.5)	Normally Closed (NC)					
1	3/4	2171B6904**	NC	8.3	14	0.32	3.3 (1.5)	,,,					
1	1¼	2171B6916**	NC	20	14	0.31	3.3 (1.5)						
1¼	1¼	2171B7901**	NC	30	26	0.19	7.5 (3.4)	2 (WORK)					
1¼	1¼	2171B8906**	NC	31	26	0.14	7.5 (3.4)	│┎┶े┤ <sup>┿</sup> ╷┆┝┉					
1½	1¼	2172B8900**	NO	21	26	0.17	7.5 (3.4)	EPS* 1 (PUMP)					
1½	2	2171B8900**	NC	57	##	##	15.5 (6.9)	Normally Open (NO)					
21⁄2	2	2171B9901**	NC	64	##	##	15.5 (6.9)						

B

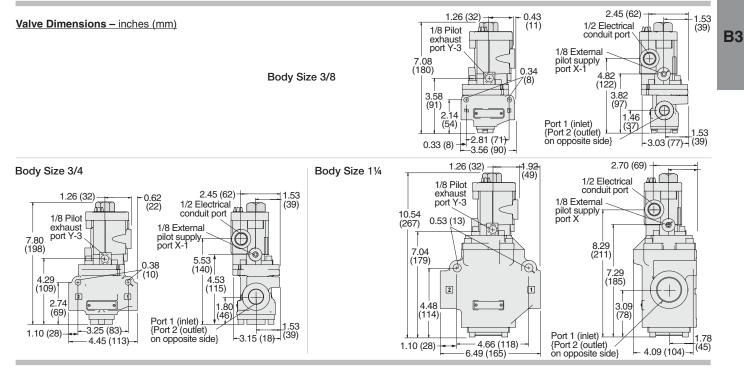
21 Series

#### Piping 2/2 Normally Closed or Normally Open Valves

Pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2). *Note:* 2/2 vacuum valves provide only on/off control and do not have an exhaust function.



**# Valve Response Time** – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above. ## Consult ROSS.



#### Options: Indicator Light Kit, Manual Override Kits; refer to page B3.14.

STANDARD SPECIFICATIONS (for valves on this page):

#### Construction: Poppet; Metal.

Mounting Type: Inline.

Solenoid Pilot: Rated for continuous duty.

Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 Watts on DC.

**Ambient Temperature:** -40° to 120° F (-40° to 50° C), for low temperature valves. High temperature valves also available. **Media Temperature:** -40° to 175° F (-40° to 80° C). Flow Media: Vacuum and/or filtered-compressed air.

Pressure: Vacuum to 150 psig (vacuum to 10 bar).

\*External Pilot Pressure: Equal or higher than inlet pressure, but not less than 30 psig.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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## **Solenoid Pilot Controlled Valves For Vacuum Applications**

			3-Way 2-Position	n Val	ves	, Sprin	g R	eturn		
Port	Size	Body		C	2v	-	Av	erage Ro Consta	esponse ints#	Weight
1, 2	3	Size	Valve Model Number*	1-2	2-3	Function	м		F	lb (kg)
1, 2	3			1-2	2-0		IVI	In-Out	Out-Exh.	
1/4	1/2	3/8	2173B2900**	2.4	3.4	NC	10	1.76	2.08	3.0 (1.4)
3/8	1/2	3/8	2173B3900**	3.0	5.8	NC	10	0.95	1.07	3.0 (1.4)
3/8	1/2	3/8	2174B3900**	3.0	5.8	NC	10	0.95	1.07	3.0 (1.4)
3/8	1/2	3/8	2173B3908**	3.0	5.8	NO	10	0.95	1.07	3.0 (1.4)
1/2	1/2	3/8	2173B4901**	3.0	5.2	NC	10	0.94	0.98	3.0 (1.4)
1/2	1	3/4	2173B4902**	6.6	12	NC	11	0.58	0.64	3.3 (1.5)
1/2	1	3/4	2174A4912**	6.5	7.0	NC	11	0.58	0.64	3.3 (1.5)
3/4	1	3/4	2173B5900**	7.8	13	NC	11	0.38	0.41	3.3 (1.5)
3/4	1	3/4	2174B5903**	7.5	7.5	NC	11	0.38	0.41	3.3 (1.5)
1	1	3/4	2173B6901**	7.5	12	NC	11	0.24	0.36	3.3 (1.5)
1	1½	1¼	2173B6902**	24	40	NC	28	0.16	0.18	7.5 (3.4)
1	1½	1¼	2174A6914**	15	17	NO	28	0.16	0.18	7.5 (3.4)
11⁄4	11/2	1¼	2173B7901**	29	39	NC	28	0.12	0.17	7.5 (3.4)
11/4	1½	11⁄4	2173B7917**	29	39	NO	28	0.12	0.17	7.5 (3.4)
1½	1½	1¼	2173B8900**	30	38	NC	28	0.12	0.16	7.5 (3.4)
1½	21⁄2	2	2173A8915**	68	70	NC	##	##	##	16.5 (7.4)
2	21⁄2	2	2173A9905**	70	70	NC	##	##	##	16.5 (7.4)
21⁄2	21⁄2	2	2173A9906**	70	71	NC	##	##	##	16.5 (7.4)
* NPT	nort t	nreads	For BSPP threads add a	"D" n	refix t	o the mo	del n	umber e	n D2173	B2900W

NPT port threads. For BSPP threads add a "D" prefix to the model number, e.g., D2173B2900W. \* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2173B2900W. For other voltages, consult ROSS.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

(11)

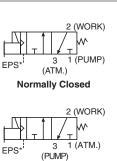
1.26 (132)

1/8 Pilot

#### ## Consult ROSS.

Body Size 3/8

Valve Dimensions - inches (mm)



Normally Open

1.26 (32)

AM

1/8 Pilot

exhaust

Body Size 3/4

1.53

(39)

#### Piping 3/2 Normally Closed (NC) Valves

In this valve configuration, pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2), and the normal air pressure exhaust port becomes the atmosphere port (port 3).

21 Series

#### Piping 3/2 Normally Open (NO) Valves

To obtain a 3/2 normally open ROSS vacuum valve, simply pipe the 3/2 normally closed body slightly differently. Connect the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).

(22)

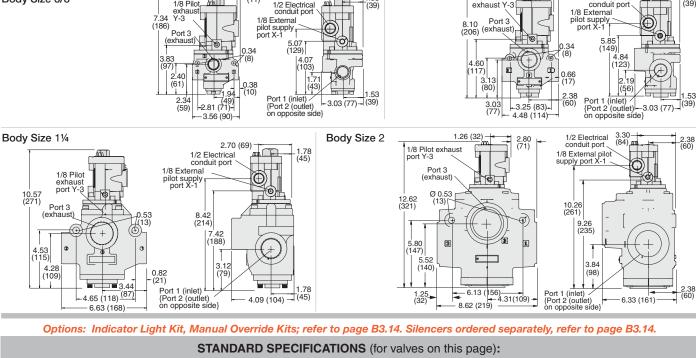
2.45 (62)

P

-1.53 (39)

1/2 Electrical

conduit port



2.45 (62)

Construction: Poppet; Metal. Mounting Type: Inline.

Solenoid Pilot: Rated for continuous duty.

Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz.

Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

Ambient Temperature: -40° to 120° F (-40° to 50° C), for low temperature valves. High temperature valves also available.

Media Temperature: -40° to 175° F (-40° to 80° C).

Flow Media: Vacuum and/or filtered-compressed air. Pressure: Vacuum to 150 psig (vacuum to 10 bar). \*External Pilot Pressure: Equal or higher than inlet pressure, but not less than 30 psig.

Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

#### Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



#### Solenoid Pilot Controlled Valves For Full Vacuum Applications

#### 3-Way 2-Position Valves, Spring Return Port Size C<sub>v</sub> Average Response Constants# Body Valve Model Weight Function Size Number lb (kg) 1, 2 3 1-2 2-3 M In-Out Out-Exh. 1/21/2 3/8 2174B4900\*\* 2.8 2.8 NC 11 0.58 0.64 3.0 (1.4) 1/2 3/8 2173B4914\*\* 1/23.0 5.2 NO 11 0.50 0.70 3.0 (1.4) 11/4 11/2 11/4 2174B7903\* 23 23 NC 28 0.12 0.17 7.5 (3.4) 11⁄4 11⁄2 11⁄4 2173B7904\*\* 39 39 NO 28 0.15 0.19 7.5 (3.4) Normally Closed Normally Open

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2173B4914W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2173B4914W. For other voltages, consult ROSS.
# Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

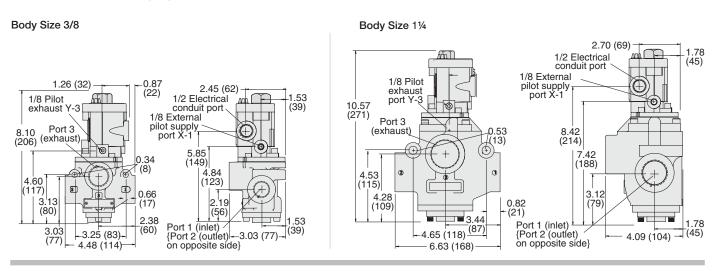
#### Full Vacuum – 3-Way Normally Closed (NC) Valves

This valve functions as a *normally open* valve. Pipe the unit into the system by connecting the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).

#### Full Vacuum – 3-Way Normally Open (NO) Valves

This valve functions as a normally closed valve. Pipe the unit into the system by connecting the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).

#### Valve Dimensions - inches (mm)



#### Options: Indicator Light Kit, Manual Override Kits; refer to page B3.14. Silencers ordered separately, refer to page B3.14.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Solenoids: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 Watts on DC. Ambient Temperature: -40° to 120° F (-40° to 50° C), for low temperature

valves. High temperature: -40° to 125° F (-40° to 30° C), for how temperature valves also available. **Media Temperature:** -40° to 175° F (-40° to 80° C).

Flow Media: Vacuum and/or filtered-compressed air.

Pressure: Vacuum to 150 psig (vacuum to 10 bar).

\*External Pilot Pressure: Equal or higher than inlet pressure, but not less than 30 psig.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

Valve models with EN connector available, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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## Pressure Controlled Valves

**For Vacuum Applications** 

		2-V	Vay 2-Pos	sition	Valves	, Spring R	eturn	
Port Size	Body Size	Valve Model Number*	Function	C <sub>v</sub>		Average Response Constants#		2 (WORK)
1, 2	Size	Number			M F		- lb (kg)	
1/4	3/8	2151A2901	NC	2.1	10	0.96	1.8 (0.8)	1 (PUMP)
1/2	3/8	2151A4910	NC	3.0	10	0.90	1.8 (0.8)	Normally Closed (NC)
1/2	3/4	2151B4904	NC	6.9	10	0.82	4.5 (2.0)	Normany Closed (NC)
3/4	3/4	2151A5913	NC	7.8	14	0.39	4.5 (2.0)	2 (WORK)
3/4	3/4	2152A5901	NO	7.0	14	0.37	4.5 (2.0)	
1	3/4	2151B6900	NC	8.3	14	0.19	4.5 (2.0)	
1¼	1¼	2151A7909	NC	30	26	0.14	11.0 (5.0)	1 (PUMP)
1½	1¼	2151B8900	NC	31	26	0.13	11.0 (5.0)	Normally Open (NO)
1½	1¼	2152B7900	NO	23	26	0.17	11.0 (5.0)	
		2152B7900 . For BSPP thre	_	-	-	-		.2901.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

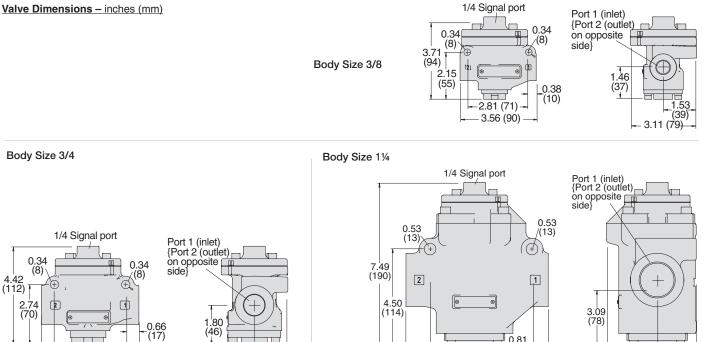
#### Piping 2/2 Normally Closed (NC) Valves

Pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2).

Note: 2/2 vacuum valves provide only on/off control and do not have an exhaust function.

**B**3

B



# STANDARD SPECIFICATIONS (for valves on this page):

(39)

Construction: Poppet; Metal.

3.25 (83)

4.56 (116)

Mounting Type: Inline.

Media Temperature: -40° to 175° F (-40° to 80° C).

Flow Media: Vacuum and/or filtered-compressed air.

Pressure: Vacuum to 150 psig (vacuum to 10 bar).

**Signal Pressure:** Equal or higher than inlet pressure, but not less than 30 psig (2 bar).

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

0.81

4.65 (118)

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



1.78

4.09 (104)

## **Pressure Controlled Valves**

**For Vacuum Applications** 

	3-Way 2-Position Valves, Spring Return													
Port S	Size	Body	Valve Model		C	Cv	Average	Response	Response Constants# F					
1, 2	3	Size	Number*	Function	1-2	2-3	м				2 (WORK)			
	1/0	0/0	045050000	NO	<u> </u>	0.4	4.0	In-Out	Out-Exh.	1.0 (0.0)				
1/4	1/2	3/8	2153B2900	NO	2.4	3.4	10	1.60	2.30	1.8 (0.8)				
3/8	1/2	3/8	2153A3913	NC	2.4	3.4	10	0.95	1.07	1.8 (0.8)	(ATM.) 3 1 (PUMP)			
1/2	1/2	3/8	2153B4903	NC	3.0	5.2	10	0.94	0.98	1.8 (0.8)	Normally Closed (NC)			
3/4	1	3/4	2153B5903	NC	7.8	13	11	0.38	0.41	4.5 (2.0)				
1	1	3/4	2153A6906	NC	7.4	12	11	0.24	0.36	4.5 (2.0)	2 (WORK)			
1	1½	1½	2153C6905	NO	24	40	28	0.17	0.20	11.0 (5.0)				
1¼	1½	1½	2153A7906	NO	29	39	28	0.15	0.19	11.0 (5.0)	(PUMP) 3 1 (ATM.)			
1½	1½	1½	2153B8900	NC	30	38	28	0.12	0.16	11.0 (5.0)	Normally Open (NO)			
2	21⁄2	2	2153A9903	NC	70	71	##	##	##	15.3 (6.9)				
21⁄2	21⁄2	2	2153A9902	NC	70	71	##	##	##	15.3 (6.9)				

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2153B2900.

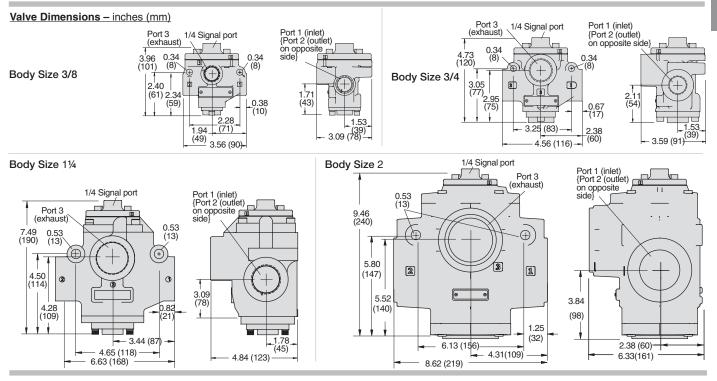
# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

## Consult ROSS.

#### Piping 3/2 Normally Closed (NC) Valves

In this valve configuration, pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2), and the normal air pressure exhaust port becomes the atmosphere port (port 3). **Piping 3/2 Normally Open (NO) Valves** 

To obtain a 3/2 normally open ROSS vacuum valve, simply pipe the 3/2 normally closed body slightly differently. Connect the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).



#### Silencers ordered separately, refer to page B3.14.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Media Temperature: -40° to 175° F (-40° to 80° C). Flow Media: Vacuum and/or filtered-compressed air.

Pressure: Vacuum to 150 psig (vacuum to 10 bar).

**Signal Pressure:** Equal or higher than inlet pressure, but not less than 30 psig (2 bar).

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

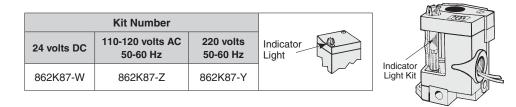


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#### **Indicator Light Kit**

To visually verify valve operation indicator lights are available in kit form. The indicator light extends through the solenoid or pilot cover and is illuminated when the solenoid is energized. Such lights are standard on double solenoid valves.

Indicator light kit is available for single solenoid models (type O only).



#### **Manual Override Kits**

Flush flexible manual overrides are standard on single solenoid models. Double solenoid models have flush metal-button overrides. Both types are non-locking.

Each of the buttons in the override kits below is made of metal and is spring-returned. The locking type button, however, can be kept in the actuated position by turning the slot in the top of the button with a screwdriver.

	FLUSH B				EXTENDED	BUTTON	9	EXTENDED B PAL		
	Locking Type	Kit Number		[	Locking Type	Kit Number	an			
>	Non-Locking	790K87			Locking Type	Kit Nulliber		Locking Type	Kit Number	
	Locking	792K87			Non-Locking	791K87		Non-Locking	984H87	
	_		I]							

#### **Electrical Connector**

## Valves available with installed prewired connectors, please consult ROSS.

#### System 8 Pilot

Models available with preinstalled System 8 solenoid pilot, consult ROSS.

#### Silencers

		Port size 1/4 thru 2						Port size 2½	1000	
Port	Thread	Mod	el Number	Avg.	-	n <b>sions</b> s (mm)	Weight			
Size	Туре	NPT Treads	BSPT Threads	Cv	Α	В	lb (kg)			A
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)		Male Pipe Threads	
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)		·	B
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)			
1½	Female	5500A8001	D5500A8001	29.9	2.5 (64)	5.7 (144)	1.0 (0.5)			
21⁄2	Female	5500A9002	D5500A9002	103.7	4.0 (102)	5.7 (145)	2.9 (1.4)		Female Pipe Threads	
	ure Rang Iedia: Fi	e: 0 to 150 psig tered air.		B						

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.





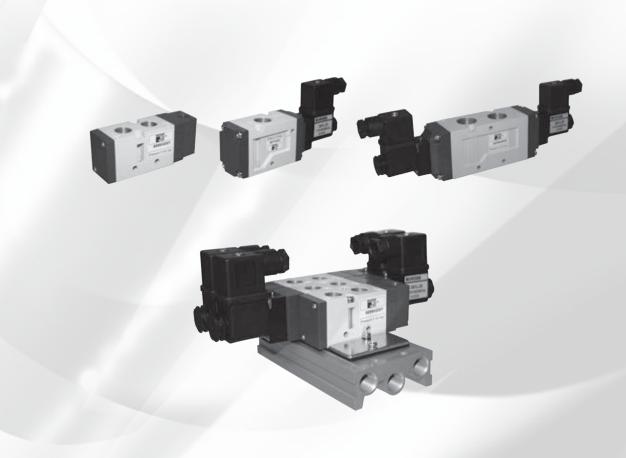






## **ROSS** CONTROLS®

## INLINE DIRECTIONAL CONTROL VALVES 95 Series



#### INLINE DIRECTIONAL VALVES AND MANIFOLDS- KEY FEATURES

- 24 volts DC and 110 volts AC options for solenoid control
- Available with 1/8, 1/4, 3/8, and 1/2 port options
- Flexible mounting inline or manifold
- Resilient seal spool construction
- Compact size
- High flow capacity
- Lube or non-lube service
- Manual overrides
- Pressure ports located in valve body

TOTO	1		6 HI.						
Solenoid Controlled		Pressure Controlled				Manif	old Options		
	AV	AILABLE	PORT SIZ	ES	MAX. FLOW	MOU	NTING		
VALVE TYPE	1/8	1/4	3/8	1/2	Cv	INLINE	MANIFOLD	Page	
SOLENOID PILOT CONTROLLED	•						,		
3/2 NC/NO Spring return					2.6			B4.3	
5/2 Spring Return					4.5			B4.4	
5/2 Detented					4.5			B4.5	
5/3 Spring Center					2.2			B4.6	
PRESSURE CONTROLLED									
3/2 NC/NO Spring return					2.6			B4.7	
5/2 Spring Return					4.5			B4.8	
5/2 Detented					4.5			B4.9	
5/3 Spring Center					3.4			B4.10	
MANIFOLD BLOCKS, OPTIONS, & ACCE	SSORIES								
Manifold Blocks (3/2 Valves)								B4.11	
Manifold Blocks (5/2 & 5/3 Valves)								B4.12	
Manifold Blanking Plates								B4.11 - B4.12	
Pilot Coils & Connectors								B4.11 - B4.12	
Silencers								B4.11 - B4.12	

**B4** 

B





9573K2001\*\*

# in .

95 Series

B

**B4** 

3/8 3/8 9573K3001\*\* 9574K3001\*\* 2.6 1.15 (0.52) \* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D9573K1001W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 9573K1001W.

9574K2001\*\*

Normally Open

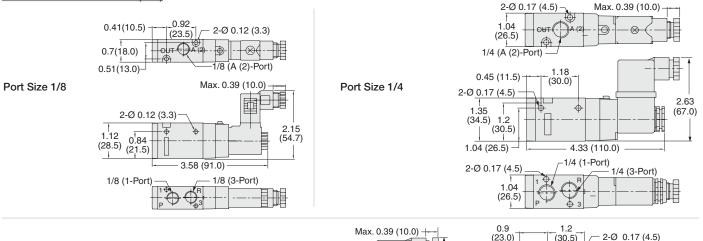


Valve Dimensions - inches (mm)

1/4

Normally Closed

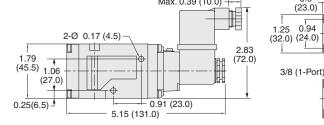
1/4



1.3

0.70 (0.32)

12



**FLOW CHARTS** 1750 4000 1500 3500 3000 2500 1250 2000 1600 (I/min) 2000 (iii 1200 (iii) 800 750 1500 ð 500 250 ð 1000 Port 3/8 450 Port 1/8 Port 1/4 500 ð r 5 a a 10 3 4 5 6 10 4 Pre Pressure (bar) ure (bar sure (bar)

#### Solenoid and Connector included. Manifolds and Accessories ordered separately, refer to page B4.11. For other options, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Solenoid Pilot: AC or DC power, rated for continuous duty. Standard Voltages: 24 volts DC; 110 volts AC, 50/60 Hz. Power Consumption: 3.5 VA holding on 50/60 Hz; 2.5 watts on DC. Enclosure Rating: IP65, IEC 60529.

#### **Electrical Connections:**

Port Size 1/8: MICRO-MINI EN 175301-803 connector. Port Size 1/4 & 3/8: EN 175301-803 Industrial Form B connector. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 22.5 to 150 psig (1.5 to 10 bar). Manual Override: Pushbutton, non-locking.

(30.5)

h

3/8 (A (2)-Port)

3/8 (3-Port)

#### Valves available with installed prewired connectors, please consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

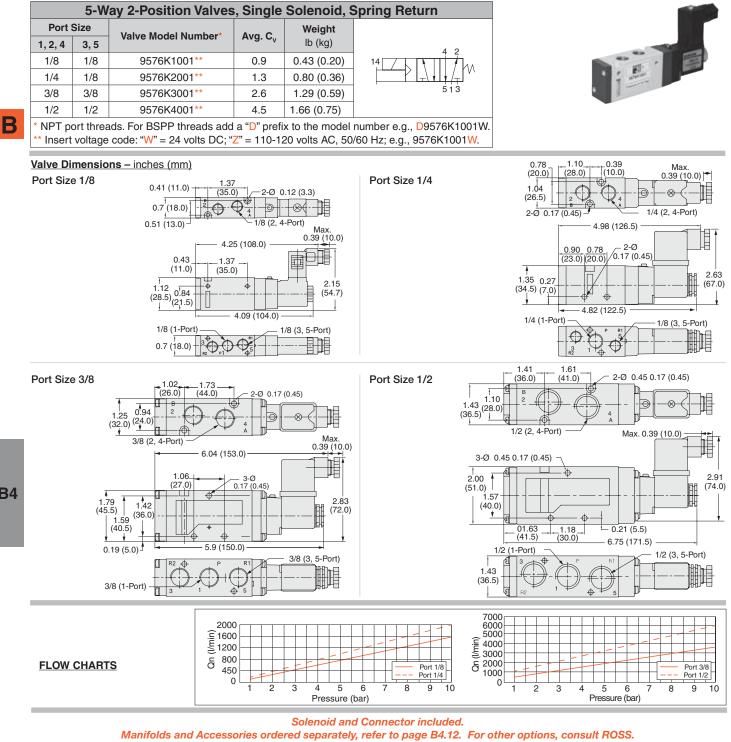
ROSS

Port Size 3/8

**Online Version** Rev. 11/14/16

## Single Solenoid Pilot Controlled Valves

## 95 Series



#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool.

Mounting Type: Inline or manifold mounted. Solenoid Pilot: AC or DC power, rated for continuous duty. Standard Voltages: 24 volts DC; 110 volts AC, 50/60 Hz. Power Consumption: 3.5 VA holding on 50/60 Hz; 2.5 watts on DC. Enclosure Rating: IP65, IEC 60529.

#### **Electrical Connections:**

Port Size 1/8: MICRO-MINI EN 175301-803 connector. Port Size 1/4, 3/8 & 1/2: EN 175301-803 Industrial Form B connector. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 22.5 to 150 psig (1.5 to 10 bar). Manual Override: Pushbutton, non-locking.

Valves available with installed prewired connectors, please consult ROSS.

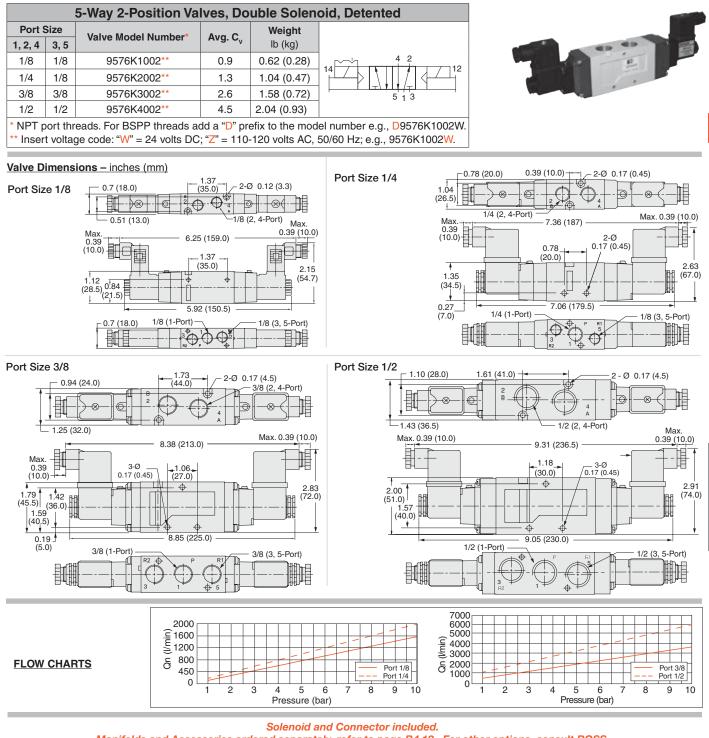


## **Double Solenoid Pilot Controlled Valves**

## **95 Series**

B

**B4** 



Manifolds and Accessories ordered separately, refer to page B4.12. For other options, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Solenoid Pilot: AC or DC power, rated for continuous duty. Standard Voltages: 24 volts DC; 110 volts AC, 50/60 Hz. Power Consumption: 3.5 VA holding on 50/60 Hz; 2.5 watts on DC. Enclosure Rating: IP65, IEC 60529.

#### **Electrical Connections:**

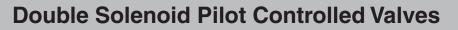
Port Size 1/8: MICRO-MINI EN 175301-803 connector. Port Size 1/4, 3/8 & 1/2: EN 175301-803 Industrial Form B connector. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 22.5 to 150 psig (1.5 to 10 bar). Manual Override: Pushbutton, non-locking.

Valves available with installed prewired connectors, please consult ROSS.

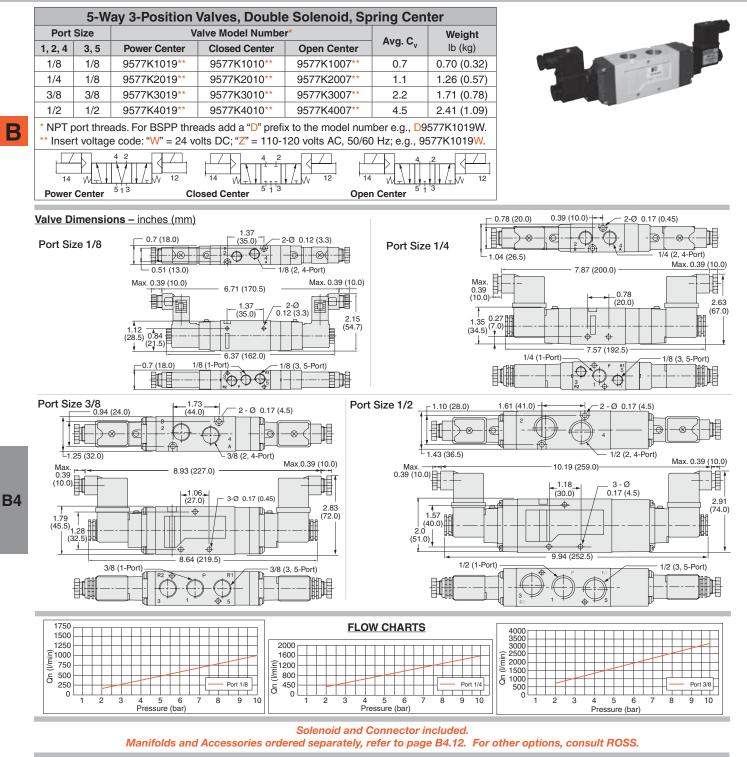
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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**Online Version** Rev. 11/14/16



#### 95 Series



#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Solenoid Pilot: AC or DC power, rated for continuous duty. Standard Voltages: 24 volts DC; 110 volts AC, 50/60 Hz. Power Consumption: 3.5 VA holding on 50/60 Hz; 2.5 watts on DC. Enclosure Rating: IP65, IEC 60529.

#### **Electrical Connections:**

Port Size 1/8: MICRO-MINI EN 175301-803 connector. Port Size 1/4, 3/8 & 1/2: EN 175301-803 Industrial Form B connector. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar). Manual Override: Pushbutton, non-locking.

Valves available with installed prewired connectors, please consult ROSS.



## **Single Pressure Controlled Valves**

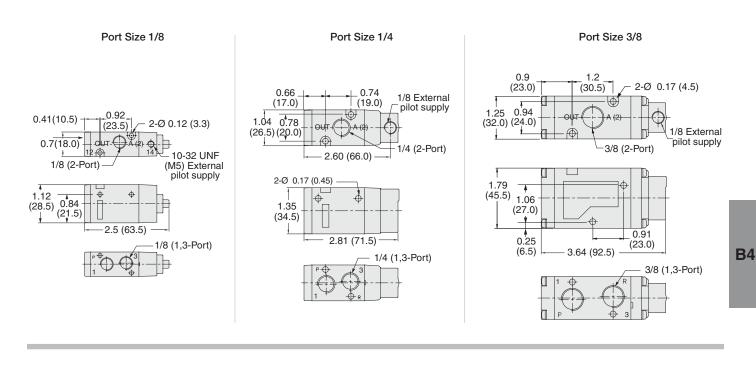
#### 3-Way 2-Position Valves, Single Pilot, Spring Return Port Size Valve Model Number Signal Port Weight Avg. C<sub>v</sub> lb (kg) Thread 1,2 3 **Normally Closed** Normally Open 10-32 UNF 1/8 1/8 9553K1000 9554K1000 0.9 0.26 (0.12) 1/4 9553K2000 9554K2000 1/4 1/8 1.3 0.51 (0.23) 3/8 3/8 1/8 9553K3000 9554K3000 2.6 0.86 (0.39) \* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D9553K1000. 12 10 Normally Closed Normally Open 1 -111/



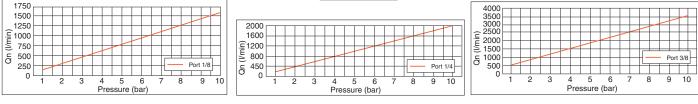
**95 Series** 

B

Valve Dimensions - inches (mm)



#### **FLOW CHARTS**



Manifolds and Accessories ordered separately, refer to page B4.11. For other options, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 22.5 to 150 psig (1.5 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Manual Override: Pushbutton, non-locking.

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

B4.7

## **Single Pilot Pressure Controlled Valves**

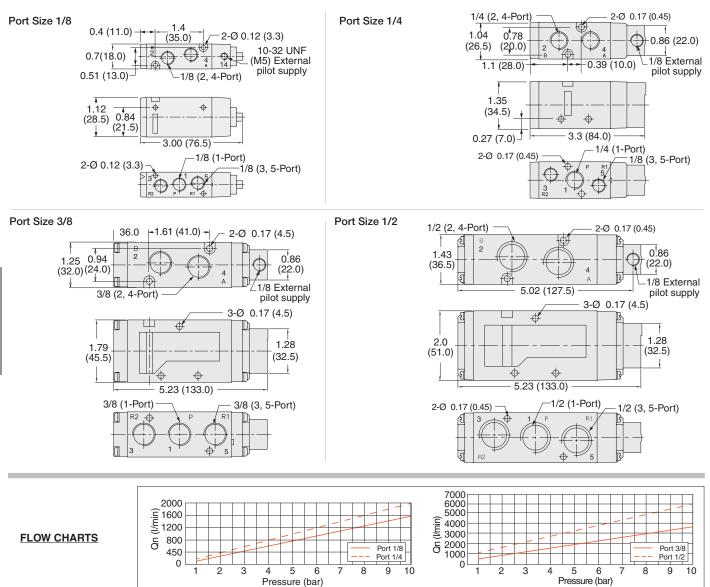
## 95 Series

	5-Way 2-Position Valves, Single Pilot, Spring Return												
Port Size		Signal Port	Valve Model Number*	Avg. C <sub>v</sub>	Weight								
1, 2, 4	3, 5	Thread	valve model Number	Avg. O <sub>v</sub>	lb (kg)	4 2							
1/8	1/8	1/8	9556K1001	0.9	0.26 (0.12)	14 M12							
1/4	4 1/8 1/8		9556K2001	1.3	0.48 (0.22)	L <u>∓\∳I</u> ♥/∓J`							
3/8	3/8	1/8	9556K3001	2.6	1.02 (0.46)	513							
1/2	1/2	1/8	9556K4001	4.5	1.39 (0.63)								
* NPT p	ort threa	ads. For BSPP	threads add a " <mark>D</mark> " prefix to th	ne model nu	mber e.g., <mark>D</mark> 9556	K1001.							



#### B

#### Valve Dimensions - inches (mm)



#### Manifolds and Accessories ordered separately, refer to page B4.12. For other options, consult ROSS.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. **Inlet Pressure:** 22.5 to 150 psig (1.5 to 10 bar). **Pilot Pressure:** Must be equal to or greater than inlet pressure. **Manual Override:** Pushbutton, non-locking.

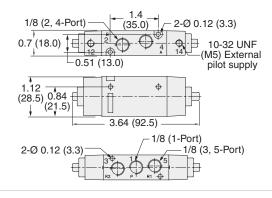


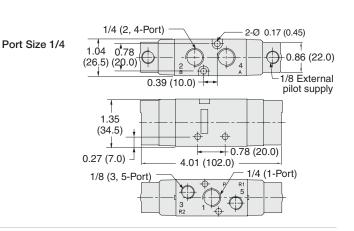
## **Double Pressure Controlled Valves**

#### 5-Way 2-Position Valves, Double Pilot, Detented Port Size Signal Port Weight Valve Model Number Avg. C<sub>v</sub> Thread lb (kg) 1, 2, 4 3, 5 1/8 1/8 9556K1002 0.32 (0.15) 1/8 0.9 1/4 1/8 1/8 9556K2002 1.3 0.59 (0.27) 1/8 3/8 3/8 9556K3002 2.6 1.07 (0.49) 1/21/21/8 9556K4002 4.5 1.55 (0.70) NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D9556K1002.

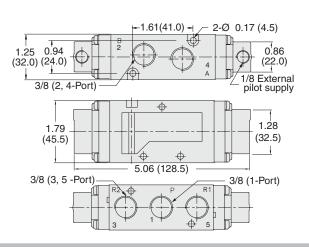
#### Valve Dimensions - inches (mm)

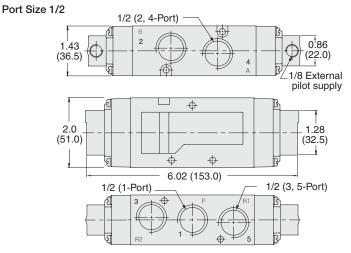
Port Size 1/8

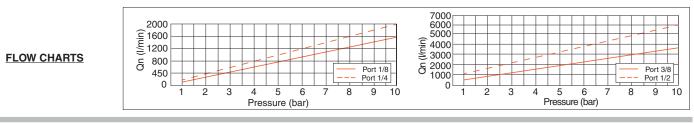




Port Size 3/8







#### Manifolds and Accessories ordered separately, refer to page B4.12. For other options, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air.

ROSS

Inlet Pressure: 22.5 to 150 psig (1.5 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Manual Override: Pushbutton, non-locking.

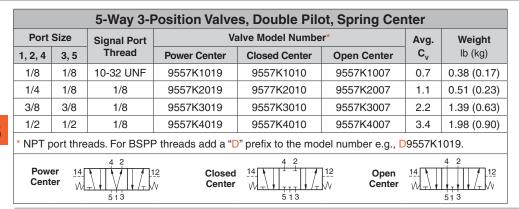
95 Series

**B4** 

B



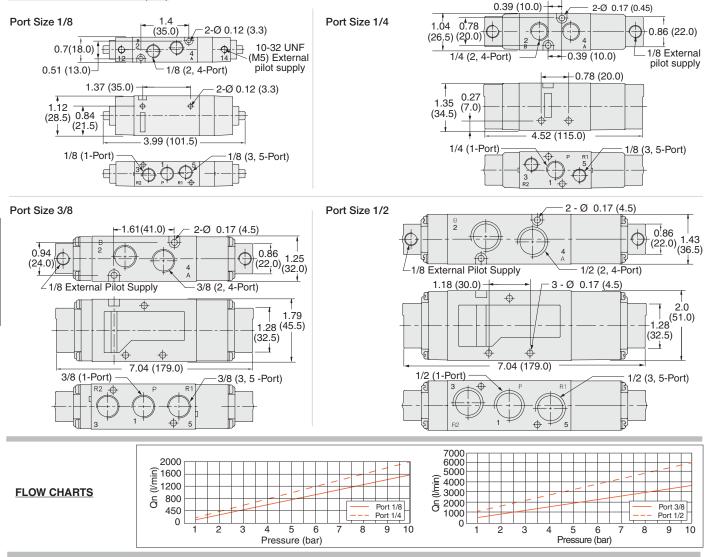
### 95 Series





B

#### Valve Dimensions - inches (mm)



Manifolds and Accessories ordered separately, refer to page B4.12. For other options, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline or manifold mounted. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 30 to 150 psi (2 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Manual Override: Pushbutton, non-locking.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

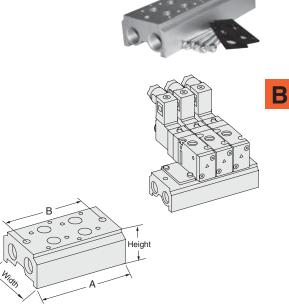
B4.10



## **Manifold Base** For 3/2- Spring Return or Detented Valves

Port	Size	Manifold Base Part Number*								
1, 3	2	2 Valves Unit	4 Valves Unit	6 Valves Unit	8 Valves Unit	10 Valves Unit				
1/8	1/8	1472H91	1474H91	1476H91	1478H91	1480H91				
1/4 1/4 1492H91 1494H91 1496H91 1498H91 1500H91										
* NPT	* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1472H91.									

	_		Nun	nbers of Valv	es Unit				
Port Size	Base Dimensions	2	4	6	8	10			
0120	Dimensions	Dimensions – inches (mm)							
	Height	0.98 (25)	0.98 (25)	0.98 (25)	0.98 (25)	0.98 (25)			
1/8	Length (A)	2.32 (59)	3.82 (97)	5.31 (135)	6.81 (173)	8.31 (211)			
1/0	Length (B)	1.85 (47)	3.35 (85)	4.84 (123)	6.34 (161)	7.83 (199)			
	Width	1.65 (42)	1.65 (42)	1.65 (42)	1.65 (42)	1.65 (42)			
	Height	1.06 (27)	1.06 (27)	1.06 (27)	1.06 (27)	1.06 (27)			
1/4	Length (A)	3.03 (77)	5.16 (131)	7.28 (185)	9.41 (239)	11.53 (293)			
1/4	Length (B)	2.60 (66)	4.72 (120)	6.85 (174)	8.98 (228)	11.10 (282)			
	Width	1.97 (50)	1.97 (50)	1.97 (50)	1.97 (50)	1.97 (50)			



	Port Size	Kit Number
MANIFOLD BLANKING KITS	1/8	1813H77
DLANKING KITS	1/4	1814H77

Manifold blanking kits incude: blanking plate, manifold gasket and mounting bolts.



### Accessories & Options

	Connector	Port Size	Model N	lumber*	
	Form	Fort Size	24 Volts DC	110 Volts AC	S. Frank Concerne
Electrical	EN 175301-803 MICRO-MINI	1/8	1766L77	1780L77	Frank (
Connectors	EN 175301-803 Industrial Form B connector	1/4, 3/8, 1/2	1767L77	1781L77	ARA
	*3-Pin Electrical Connectors w	ith LED & Surg	e Suppressor		

### Silencers

Port	Thread	Mode	el Number	Avg.	Dimension	<b>s</b> inches (mm)	Weight			
Size	Туре	NPT Threads	BSPT Threads	Cv	Α	В	lb (kg)		-A-	1
1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	2.2 (55)	0.1 (0.1)	-  , ' ,  >	() · · · · · · · · · · · · · · · · · · ·	is
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		В	C C
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		٢	_
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum.					a: Filtered air				



Online Version Rev. 11/14/16

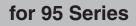
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

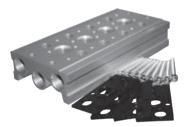
## **Manifold Base** For 5/2 & 5/3- Spring Return or Detented Valves

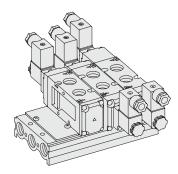
Port	Size		Id Base Part Nu	umber*				
1, 2, 4	3, 5	2 Valves Unit	4 Valves Unit	6 Valves Unit	8 Valves Unit	10 Valves Unit		
1/8	1/8	1392H91	1394H91	1396H91	1398H91	1390H91		
1/4	1/4	1412H91	1414H91	1416H91	1418H91	1420H91		
3/8	3/8	1432H91	1434H91	1436H91	1438H91	1440H91		
1/2	1/2	1652H91	1654H91	1656H91	1658H91	1650H91		
* NPT p	* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1392H91.							

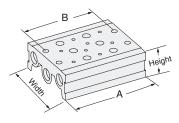
-		

_	_		Nu	mbers of Valve	s Unit	
Port Size	Base Dimensions	2	4	6	8	10
0120			Dime	ensions – inche	es (mm)	
	Height	1.02 (26)	1.02 (26)	1.02 (26)	1.02 (26)	1.02 (26)
1/8	Length (A)	2.32 (59)	3.81 (97)	5.31 (135)	6.81 (173)	8.31 (211)
1/0	Length (B)	1.85 (47)	3.35 (85)	4.84 (123)	6.34 (161)	7.83 (199)
	Width	4.33 (110)	4.33 (110)	4.33 (110)	4.33 (110)	4.33 (110)
	Height	1.06 (27)	1.06 (27)	1.06 (27)	1.06 (27)	1.06 (27)
1/4	Length (A)	3.29 (83.5)	5.45 (138.5)	7.62 (193.5)	9.78 (248.5)	11.95 (303.5)
1/4	Length (B)	2.81 (71.5)	4.98 (126.5)	7.15 (181.5)	9.31 (236.5)	7.94 (201.5)
	Width	2.68 (68)	2.68 (68)	2.68 (68)	2.68 (68)	2.68 (68)
	Height	1.18 (30)	1.18 (30)	1.18 (30)	1.18 (30)	1.18 (30)
3/8	Length (A)	3.66 (93)	6.26 (159)	8.86 (225)	11.46(291)	14.05 (357)
3/0	Length (B)	3.15 (80)	5.75 (146)	8.35 (212)	10.94 (278)	13.54 (344)
	Width	3.43 (87)	3.43 (87)	3.43 (87)	3.43 (87)	3.43 (87)
	Height	1.32 (33.5)	1.32 (33.5)	1.32 (33.5)	1.32 (33.5)	1.32 (33.5)
1/2	Length (A)	4.05 (103)	7.01 (178)	9.96 (253)	12.91 (328)	15.87 (403)
	Length (B)	3.46 (88)	6.42 (163)	9.37 (238)	12.32 (313)	15.27 (388)
	Width	3.86 (98)	3.86 (98)	3.86 (98)	3.86 (98)	3.86 (98)









MANIFOL	D
BLANKING	KITS

#### Part Number Port Size 1/8 1806H77 1/4 1807H77 3/8 1808H77

1809H77

1/2

Manifold blanking kits incude blanking plate, manifold gasket and mounting bolts.



Manifold Gasket

**Blanking Plate** 

### **ACCESSORIES & OPTIONS**

	Connector	Port Size	Model N		
	Form	Port Size	24 Volts DC	110 Volts AC	the second
Electrical	EN 175301-803 Form A MICRO-MINI	1/8	1766L77	1780L77	States 1
Connectors	EN 175301-803 Industrial Form B connector	1/4, 3/8, 1/2	1767L77	1781L77	E
	*3-Pin Electrical Connectors with LED	& Surge Sup	pressor		

### Silencers

Port	Thread	Mode	el Number	Avg.	Dimension	<b>s</b> inches (mm)	Weight			
Size	Туре	NPT Threads	<b>BSPT</b> Threads	Cv	Α	В	lb (kg)		-A-	
1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	2.2 (55)	0.1 (0.1)		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~ * * *
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		B	H
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)		$\forall$	
1/2	Male	5500A4003	D5500A4003	2.7	1.3 (32)	3.6 (92)	0.2 (0.1)			
Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.										

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

B4.12











## **ROSS** CONTROLS®

## NAMUR INTERFACE VALVES 95 & 34 Series





#### NAMUR INTERFACE 95 SERIES VALVES - KEY FEATURES

- Compact inline ported valve consisting 5/2-way with either solenoid pilot control
- 24 volts DC and 110 volts AC options for solenoid control
- Available port sizes 1/4"
- Resilient spool & sleeve construction
- High flow capacity
- Pressure ports located in valve body
- Manual override included
- Lube or non-lube service
- Fast response times

#### NAMUR INTERFACE 34 SERIES VALVES - KEY FEATURES

- "Duck-bill" protected exhaust port(s):
  - Limits wash down fluids from entering the valve
  - Minimizes the collection point for contamination
- Corrosion resistant epoxy powder coat
- Solenoid Pilot Low wattage, fast shifting, repeatable, long life
- Patented Ball-poppet internals Near zero internal leakage for the life of the valve, self cleaning valve seats, sure shifting
- Faster and more precise operation than a spool valve
- 3/2 Normally Closed

VALVE TYPE/SERIES		PORT SIZES	MAX. FLOW	Page			
	CONNECTION	1/4	Cv	Tage			
95 SERIES							
SOLENOID PILOT CONT	ROLLED with NAMUR INTERFACE						
5/2			1.3	B5.3			
34 SERIES							
SOLENOID PILOT CONTROLLED with NAMUR INTERFACE							
3/2, 52	3/2, 52 M12, or EN 175301-803 Form A		0.25	B5.4			

B

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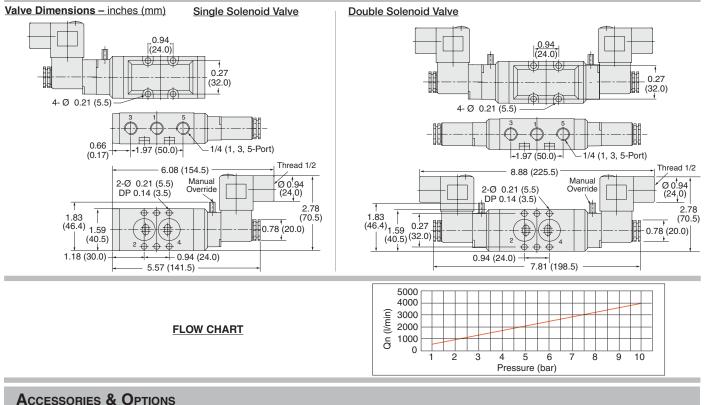
## **Solenoid Pilot Controlled Valves NAMUR** Interface

### 95 Series

5-'	Way 2-Position Valv	ves, Si	ngle Solenc	oid, Spring Return							
Port Size	Valve Model Number*	Avg.	Weight								
1, 3, 5		C <sub>v</sub>	lb (kg)								
1/4	9576K2901**	1.3	0.80 (0.36)	513							
	5-Way 2-Position Valves, Double Solenoid, Detented										
Port Size	Valve Model Number*	Avg.	Weight	4 2							
1, 3, 5	valve wodel Number*	Cv	lb (kg)								



\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D9576K2901W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 9576K2901W.



#### **Electrical Connectors** Silencers Model Number\* Connector Port Port Size Model Number Threads Form Size 24 Volts DC 110 Volts AC 1/4 Male - NPT 5500A2003 EN 175301-803 Form B 1/41767L77 1781L77 1/4Male - BSPT D5500A2003 \*3-Pin Electrical Connectors with LED & Surge Suppressor

For	other	options,	consult	ROSS.
-----	-------	----------	---------	-------

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Inline. Solenoid Pilot: AC or DC power, rated for continuous duty. Standard Voltages: 24 volts DC; 110 volts AC, 50/60 Hz. Power Consumption: 5.5 VA holding on 50/60 Hz; 2.5 watts on DC. Enclosure Rating: IP65, IEC 60529.

Electrical Connections: Industrial Form B EN 175301-803 connector. Ambient/Media Temperature: 41° to 140°F (5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 22.5 to 150 psig (1.5 to 10 bar). Manual Override: Pushbutton, non-locking.

Valves available with installed prewired connectors, please consult ROSS.



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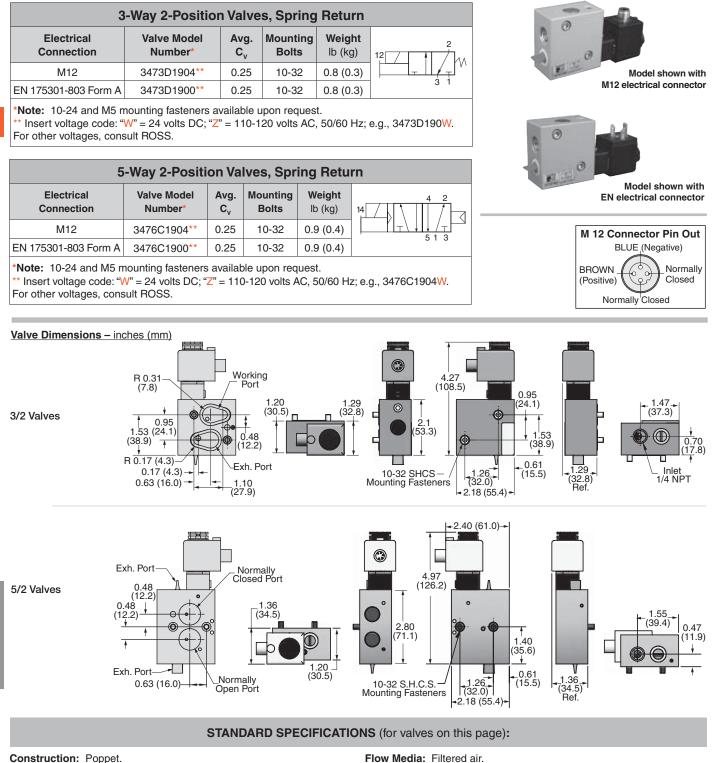
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**B**5

## Solenoid Pilot Controlled Valves **NAMUR** Interface

## 34 Series



Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 24 volts DC, 0.7 watt; 110-120 volts AC, 50/60 Hz. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form A connector, or M12. Ambient/Media Temperatures: 4° to 122°F (-10° to 50°C). For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.

Flow Media: Filtered air.

Inlet Pressure: 29 to 116 psig (2 to 8 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

Port Threads: NPT. Standard: NEMA 4X (enclosure constructed for indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; and also provides protection in highly corrosive environments.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**B5** 

B











# ROSS CONTROLS®

## **COMPACT VALVES 16 SERIES**





## Solenoid Pilot Controlled Compact Valves

	3-Way 2-Position Valves, Spring Return												
Port Size	Valve	Model	Number*	Cv		Average Respo	nse Constants#	Weight					
1, 2, 3	Normally Closed	(NC)	Normally Open (NO)	NC	NO	М	F	lb (kg)					
1/8	1613B1020**	r	1614B1020**	0.3	0.3	5	2.90	1.4 (0.6)					
1/4	1613B2020**	r	1614B2020**	0.3	0.3	5	2.90	1.4 (0.6)					
Normally	Normally Closed $\begin{array}{c} 12 \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $												
	4-Way 2-Position Valves, Spring Return												
Port Size	Valve Model	(	C <sub>v</sub> Average Resp	onse (	onstant	ts# Weight		4 2					

## **16 Series**

B

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1613B1020W.

Μ

5

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 1613B1020W. For other voltages, consult ROSS.

F

2.90

# Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

lb (kg)

2.4 (1.1)

Valve Dimensions - inches (mm)

Number

1616C2020\*\*

1-2

0.3

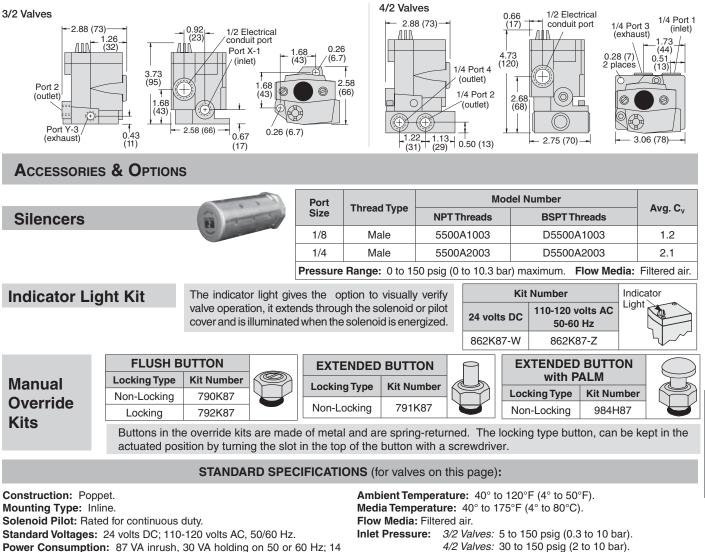
2-4

0.3

3/2 Valves

1, 2, 3, 4

1/4



watts on DC.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Manual Override: Flush; rubber, non-locking.

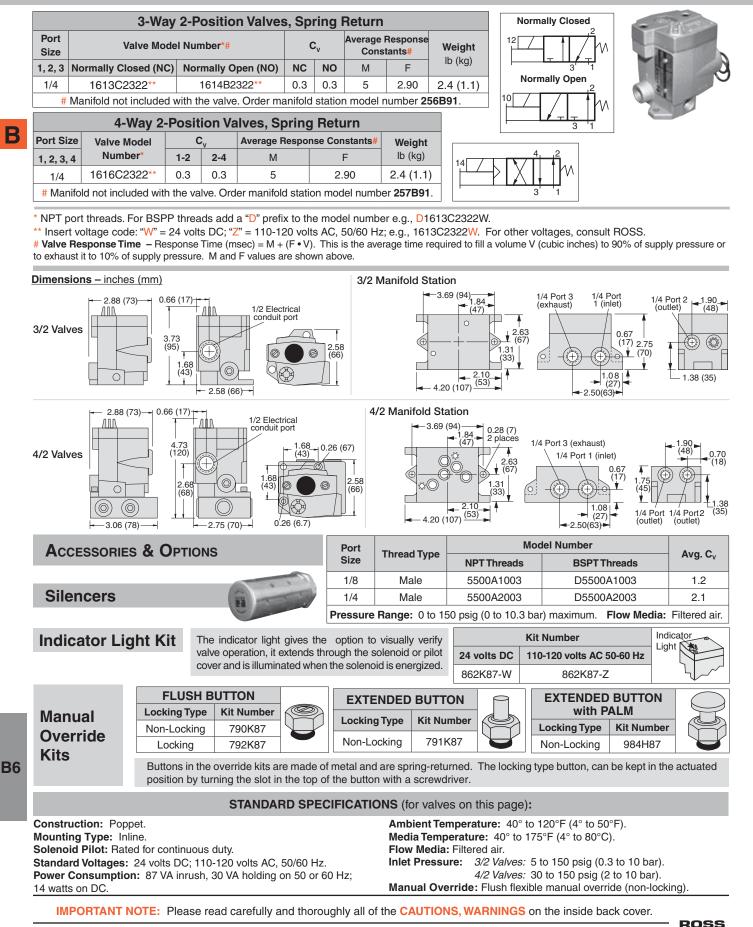
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**B6** 

## Solenoid Pilot Controlled Compact Valves and Manifolds

**16 Series** 











# ROSS CONTROLS®

## MANUAL AND MECHANICAL VALVES





C1



## **Manual Valves** Flush & Mushroom Pushbutton

**Green Button** 

1223B1MBG

1223B2MBG

idon						
	3-Way 2-Positio	n Valves, Flush	Pushb	utton, Spri	ng Return	
Dout Cine	Valve Model Number*			Weight	0	
Port Size	Green Button	Red Button	$ C_v$ $(kg)$		21	
1/8	1223B1FPG	1223B1FPR	0.6	0.28 (0.13)		1 14
1/4	1223B2FPG	1223B2FPR	0.9	0.34 (0.15)	1.5	4
Port Sizo	Valve Mod	el Number*		Weight	0	

lb (kg)

0.29 (0.13)

0.35 (0.16)

C<sub>v</sub>

0.6

0.9



**12 Series** 

C

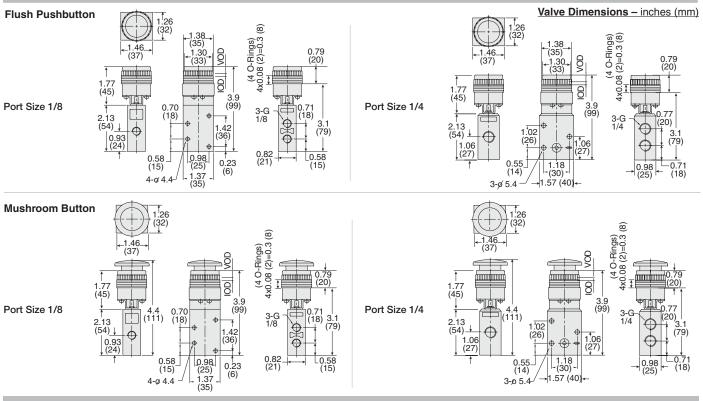
**C1** 

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1223B1FPG

**Red Button** 

1223B1MBR

1223B2MBR



#### Accessories

Port Size

1/8

1/4

	Port Thread		Model Number		Avg.	Dimensions inches (mm)		Weight	
Silencers	Size	Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)	
	1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	2.0 (51)	0.1 (0.1)	
	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)	( B
	Press	ure Ran	<b>ge:</b> 0 to 150 p	iltered air.					

Normally Closed or Normally Open simply by piping the inlet supply accordingly.

STANDARD SPECIFICATIONS (for valves on this page): Construction: Spool & Sleeve. Mounting Type: Inline. Ambient/Media Temperature: 40° to 175°F (4° to 80 °C). Flow Media: Filtered air. Inlet Pressure: 5 to 150 psig (0.3 to 10 bar). Valve Body: Die-cast aluminum. Button Materials: Stainless steel, polyoxymethylene.

Spool Material: Aluminum. Seals Material: Nitrile rubber. Spring Material: Stainless Steel. Switch Parts: Glass filled Nylon.

Valid Operation Distance: 0.22 inches (5.5 mm). Invalid Operation Distance: 0.04 inches (1.0 mm). Pressure for Valid/Invalid Operation: 7.7 lb (3.5 Kg).

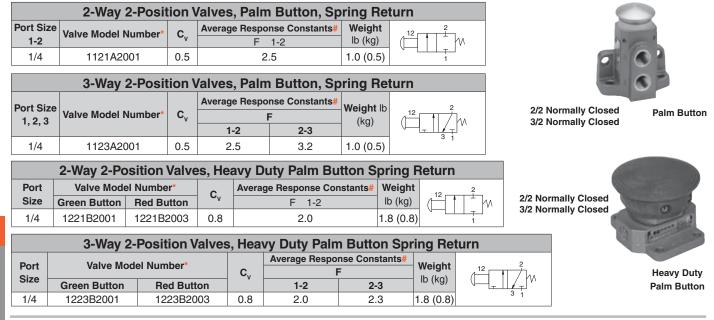
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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## Manual Valves Palm Button & Heavy Duty Palm Button

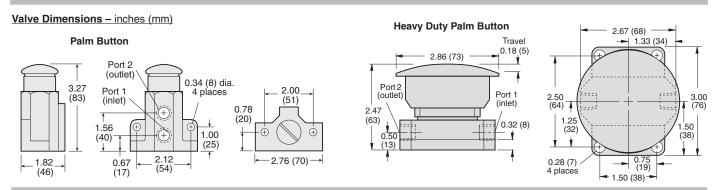
## 11 & 12 Series



#### C1

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1121A2001.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.



#### **A**CCESSORIES & **O**PTIONS

Silencers	Port	Thread	Model	Number	Avg.	Dimension	<b>s</b> inches (mm)	Weight	
for 3-way	Size	Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)	
Valves	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)	B
	Press	ure Ran	<b>ge:</b> 0 to 150	psig (0 to 10.3 b	oar) ma	ximum. <b>Fl</b>	ow Media: F	iltered air.	

RING GUARD	Part Number	+4.75 (121) → Ţ 2.50
Heavy Duty Palm Button	278B30	

Helps to protect against accidental valve actuation.

#### STANDARD SPECIFICATIONS (for valves on this page):

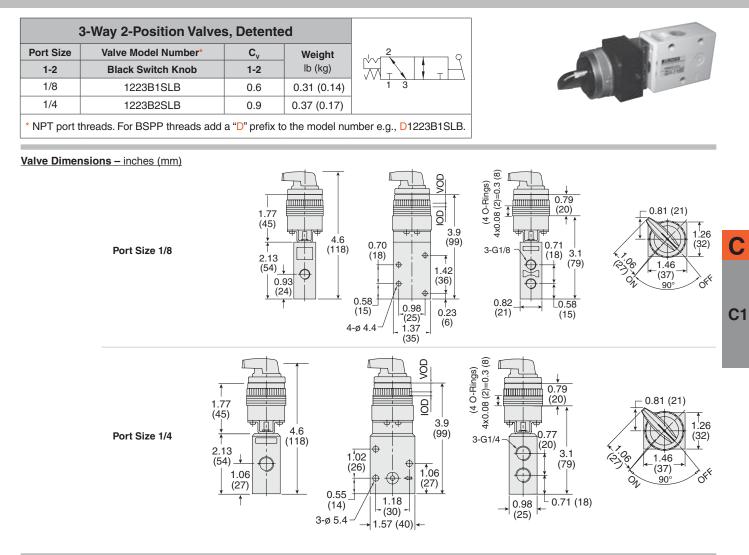
Construction: Poppet. Mounting Type: Side and bottom mounting flanges. Ambient/Media Temperature: 40° to 175°F (4° to 80 °C). Flow Media: Filtered air. Inlet Pressure: 5 to 150 psig (0.3 to 10 bar). Valve Body: Die-cast aluminum. Button Materials: Pushbutton: Aluminum. Heavy Duty Palm Button: High-strength plastic.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## Manual Valves Selector Switch

## **12 Series**



Normally Closed or Normally Open simply by piping the inlet supply accordingly.

#### ACCESSORIES

Silencers	Port Thread Size Type	Model Number		Avg.	Dimensions inches (mm)		Weight			
		Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)		
	1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	2.0 (51)	0.1 (0.1)		
	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		B B
	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.									

STANDARD SPECIFI	ICATIONS (for valves on this page):
Construction: Spool & Sleeve.	Spool Material: Aluminum.
Mounting Type: Inline.	Seals Material: Nitrile rubber.
Ambient/Media Temperature: 40° to 175°F (4° to 80 °C).	Spring Material: Stainless Steel.
Flow Media: Filtered air.	Switch Parts: Glass filled Nylon.
Inlet Pressure: 5 to 150 psig (0.3 to 10 bar). Valve Body: Die-cast aluminum. Button Materials: Stainless steel, polyoxymethylene.	Valid Operation Distance: 0.22 inches (5.5 mm). Invalid Operation Distance: 0.04 inches (1.0 mm). Pressure for Valid/Invalid Operation: 7.7 lb (3.5 Kg).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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## Manual Valves Toggle Lever

## **11 Series**

	2-Way 2-Position Valves, Spring Return											
Port Size	Valve Model Number*	C <sub>v</sub>	Average Response Constants# F 1-2	Weight Ib (kg)	12 × 12							
1/4	1121A2002	0.5	2.5	1.0 (0.5)								
	* NPT part threads. For RCPP threads add a "P" profix to the model number of a P1101A0000											

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1121A2002.

	3-Way	2-Pos	sition Valves	, Spring Ret	urn					
Port Size	Valve Model Number*	C <sub>v</sub>	Average Respo	nse Constants# =	Weight	2				
		v	1-2	2-3	lb (kg)					
1/4	1123A2002	0.5	2.5	3.2	1.0 (0.5)	3 1				
* NPT po	* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1123A2002.									

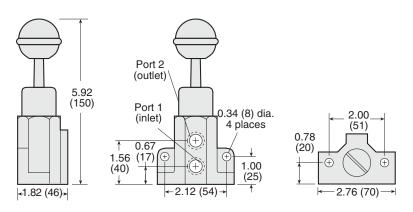


С

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.

**C1** 

Valve Dimensions - inches (mm)



#### Accessories

Silencers	Port		Model Number		Avg.	Dimensions inches (mm)		Weight	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
for 3-way	Size	Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)	
Valves	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)	
	Press	ure Ran	ge: 0 to 150 p						

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Side and bottom mounting flanges. Ambient/Media Temperature: 40° to 175°F (4° to 80 °C). Flow Media: Filtered air. Inlet Pressure: 5 to 150 psig (0.3 to 10 bar) . Valve Body: Die-cast aluminum. Lever Knob Material: Glass filled Nylon.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## **Manual Valves** Lever

		3-Way 2	-Pos	ition Valves	, Detented o	or Spring	g Return		
Port Size	Operators	Valve Model Number*	C <sub>v</sub>	Average Respo	nse Constants# F	Weight	12 2 12 2 10	2 12 2 4 7 .	192
Size		Number		1-2	2-3	lb (kg)			Charles and
1/4	Detented	3623A2003	1.2	1.66	1.43	1.3 (0.6)	3 1	3 1	
1/4	Spring Return	3623A2004	1.2	1.66	1.43	1.3 (0.6)	Detented	Spring Return	

		4-Way 2	2-Pos	sition Valves	s, Detented	or Sprir	ng Return	
Port Size	Operators	Valve Model Number*	C,	Average Response Constants# F		Weight	4 2 14 2 12	4 2 14 2 14
5120		Number		1-2, 1-4	4-3, 2-3	lb (kg)		
1/4	Detented	3626A2003	1.2	1.66	1.43	2.5 (1.1)	3 1	
1/4	Spring Return	3626A2004	1.2	1.66	1.43	2.5 (1.1)	Detented	Spring Return

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D3623A2003.

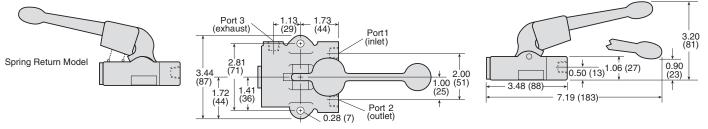
# Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.

Valve Dimensions - inches (mm)

3/2 Valve

2.44 (62 Port 3 (exhaust Port4 (outlet) 3.8 (97 1.56 (40) 0.72 Port 1 (inlet) ← 2.25 (57)→ 4.50 (114) → 2.44 (62) 4.88 (124) 7.87 (200)-

4/2 Valve



#### ACCESSORIES

Silencers	Port	Thread	Model	Avg.	Dimensions inches (mm)		Weight		
for 3-way	Size	Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)	
Valves	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)	B B B
	Press	ure Ran	ge: 0 to 150	osig (0 to 10.3 b	ar) ma	ximum. <b>Fl</b>	ow Media: F	iltered air.	

For models with vertical handle, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Side and bottom mounting flanges. Ambient/Media Temperature: 40° to 175°F (4° to 80 °C).

Flow Media: Filtered air. Inlet Pressure: 5 to 150 psig (0.3 to 10 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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С

**C1** 

**36 Series** 

Port 2

(outlet)

.85

3.65 (93)

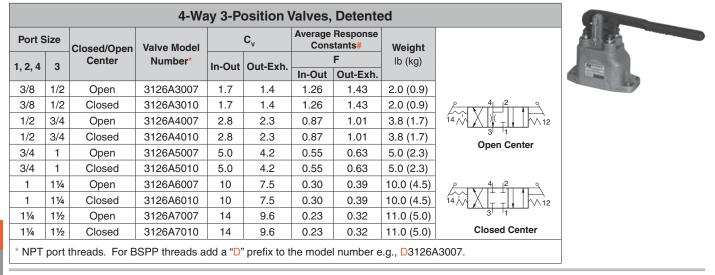
0.17 (4) 2 places

(47)

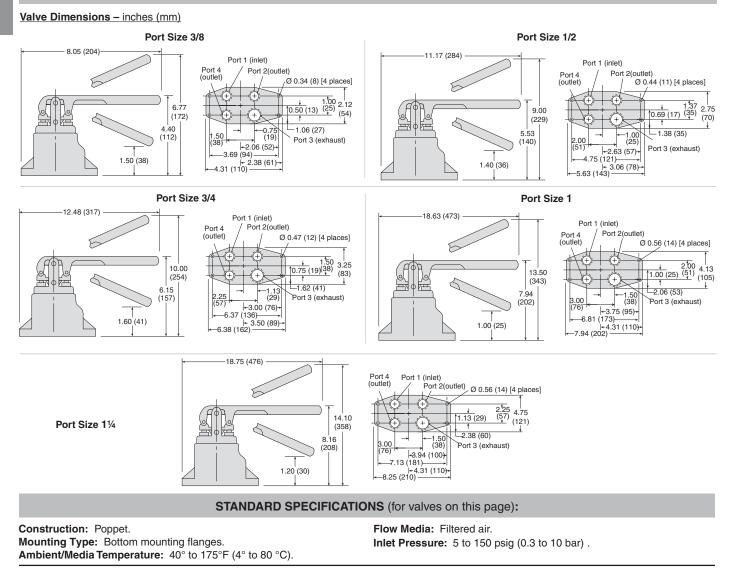
(31)

÷

## Manual Valves Heavy Duty Hand Lever - Horizontal



# Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

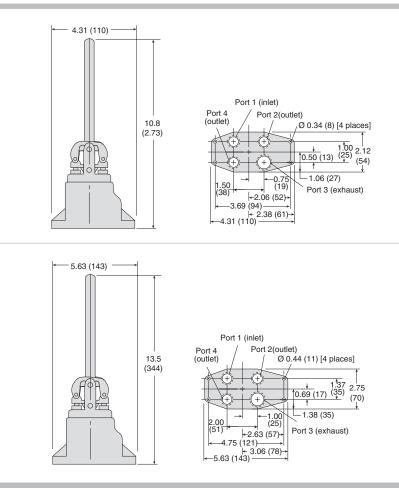


## Manual Valves Heavy Duty Hand Lever - Vertical

Port S	Size	Closed/Open	Valve Model	0	₽ <sub>v</sub>	-	Response tants#	Weight	
1, 2, 4	3	Center	Number*	In-Out	Out-Exh.		F	lb (kg)	
., _, .	Ŭ			in out	out Exili	In-Out	Out-Exh.		_
3/8	1/2	Open	3126A3009	1.7	1.4	1.26	1.43	2.4 (1.1)	
3/8	1/2	Open	3126A3012#	1.7	1.4	1.26	1.43	2.4 (1.1)	
3/8	1/2	Closed	3126A3013	1.7	1.4	1.26	1.43	2.4 (1.1)	
3/8	1/2	Closed	3126A3014#	1.7	1.4	1.26	1.43	2.4 (1.1)	Open Center
1/2	3/4	Open	3126A4009	2.8	2.3	0.87	1.01	4.8 (2.2)	
1/2	3/4	Open	3126A4012#	2.8	2.3	0.87	1.01	4.8 (2.2)	
1/2	3/4	Closed	3126A4013	2.8	2.3	0.87	1.01	4.8 (2.2)	
1/2	3/4	Closed	3126A4014#	2.8	2.3	0.87	1.01	4.8 (2.2)	3' '1
# Non	dete	nted models.						·	Closed Center

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.

Valve Dimensions - inches (mm)



#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Bottom mounting flanges. Ambient/Media Temperature: 40° to 175°F (4° to 80 °C). Flow Media: Filtered air. Inlet Pressure: 5 to 150 psig (0.3 to 10 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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**31 Series** 

С

**C1** 

## Manual Valves Pedal & Treadle

	3	-Way 2	-Position Val	ves, Treadle	, De	etente	ed	
	Valve Model		Average Resp	oonse Constants	#			2
Port Size		Number* C <sub>v</sub> F			Weig	ht lb (kg)	12/12/10	
	Number		1-2	2-3				│ ╭ <sub>∽</sub> ┥ <sub>┰</sub> │ / <sub>୵</sub> ⊢→
1/4	3643A2001	1.2	1.66	1.43		1.3	3 (0.6)	3 1
	4-Wa	y 2-Po	sition Valves	, Treadle, De	eten	ted		
	Valve Model		Average Respon	nse Constants#	W	eight		4 2
Port Size	Number*	ber* C <sub>v</sub> F				(kg)	14	12
	Number		1-2, 1-4	4-3, 2-3		(119)		
1/4	3646A2001	1.2	1.66	1.43	2.8	3 (1.3		3 1
	3-V	Vay 2-P	osition Valve	es, Pedal, Sp	orin	g Ret	urn	
	Valve Model		Average Resp	oonse Constants	#	Weight lb (kg) 12 ≻		2
Port Size	Number*	C <sub>v</sub>		F				
	Number		1-2	2-3				│ /─ <u> </u> <sub>┲</sub> │ / <sub>┲</sub> / <sup>∨</sup>
1/4	3643A2002	1.2	1.66	1.43		1.3	3 (0.6)	3 1
					_			
	4-Way	2-Posi	tion Valves, I	Pedal, Sprin	g R	eturn		
	Valve Model		Average Respon	nse Constants#	W	eight		4 2
Port Size	Number*	Cv	F	•		(kg)	14	
	Number		1-2, 1-4	4-3, 2-3		(1.9)		
1//	264642002	10	1.66	1 / 2	200	112		31





\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D3643A2001.

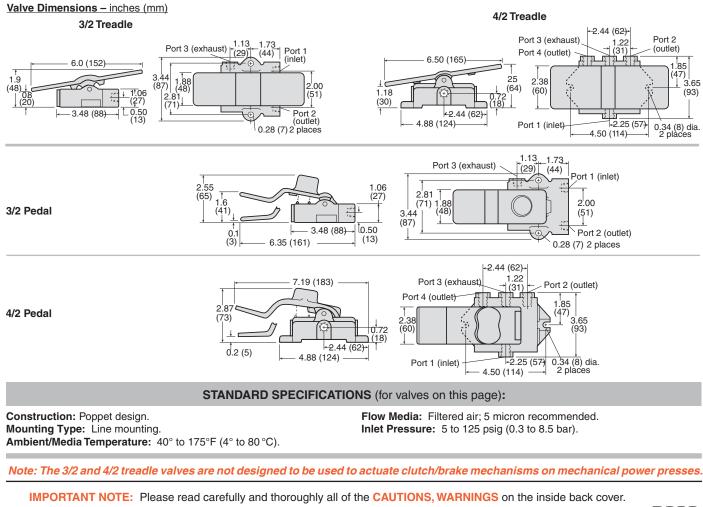
1.66

1.2

# Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.

2.8 (1.3

1.43



1/4

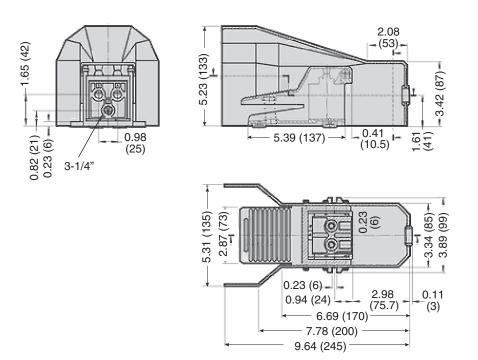
3646A2002



## Manual Valves Foot Pedal with Guard

	Size         Operators           /4         Non-locking foot pedal		osition Valves, Pedal							
Port Size	Operators	Valve M	odel Number*	Cv	Weight Ib (kg)					
1/4	Non-locking foot pedal	RM4	F210-08G	0.5	2.1 (0.9)					
1/4	Locking foot pedal	RM4F	=210-08LG	0.5	2.1 (0.9)					
			<u>/~</u> [							
5/2	Spring Return without Lo	ck	5/2 Dete	ented w	ith Lock					
* NPT port t	threads.									

Valve Dimensions - inches (mm)



Convertible to a 3-Way function.

Note: Designed to meet OSHA 1910.217 Mechanical power presses, with protective guard to prevent accidental actuation.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Line mounting. Ambient/Media Temperature: 23° to 140°F (-5° to 60°C). Flow Media: Filtered air. Inlet Pressure: 0 to 120 psig (0 to 8.2 bar).

ROSS

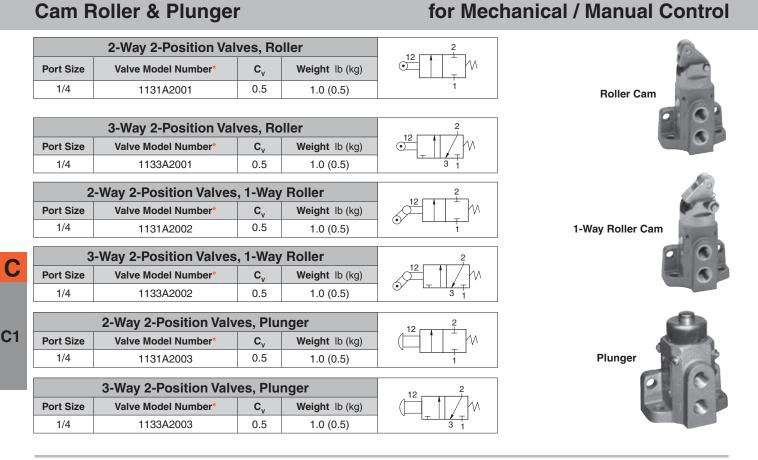
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

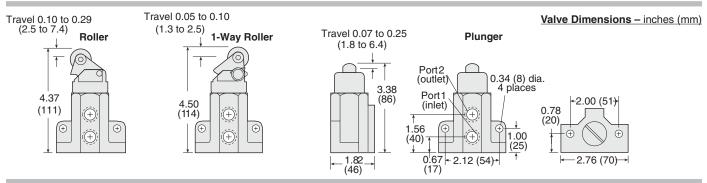
С

**C1** 



\* NPT port threads. For BSPP threads add a "D" prefix to the model number, e.g., D1131A2001.

# Valve Response Time – Response Time (msec) =  $M + (F \cdot V)$ . This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. F values are given in the chart above. M values for manually operated valves depend on the speed of actuation, and may be taken as zero for most practical applications.



#### Accessories

Silencers	Port	Thread	Model Number		Avg.	Dimensions inches (mm)		Weight		
for 3-way	Size	Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)		
Valves	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)		B B
	Press	ure Ran	ge: 0 to 150	psig (0 to 10.3 b	oar) ma	ximum. <b>Fl</b>	ow Media: F	iltered air.		

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Side and bottom mounting flanges. Ambient/Media Temperature: 40° to 175°F (4° to 80 °C).

**Mechanical Cam Valves** 

Flow Media: Filtered air. Inlet Pressure: 5 to 150 psig (0.3 to 10 bar) .

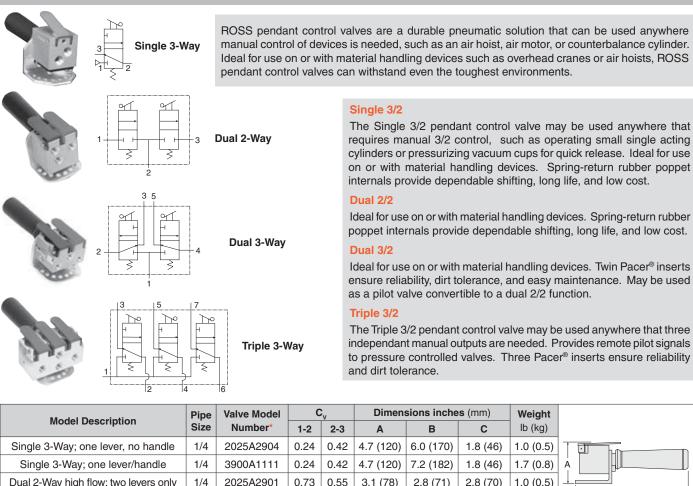
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**11 Series** 

## **Manual Valves Pendant Control**

## Manual Control



1/4

1/4

1/8

1/8

1/4

1/4

2025A2901

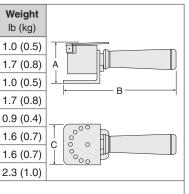
3900A0378

2025A1900

3900A0379

2025A2902

3900A0407



#### **Application Data**

0.55

0.55

0.42

0.42

0.42

0.42

0.73

0.24

0.24

0.24

0.24

3.1 (78)

3.1 (78)

2.1 (54)

2.9 (73)

2.8 (71)

2.8 (71)

2.8 (71)

7.2 (182)

2.8 (71)

7.2 (182)

2.8 (71)

7.2 (182)

2.8 (70)

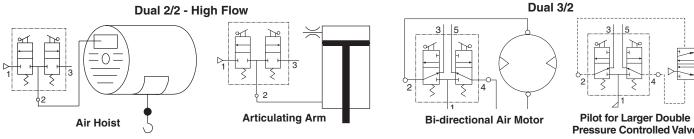
2.8 (70)

2.5 (64)

2.8 (70)

3.8 (97)

3.8 (97)



#### To convert a Dual 3/2 into a Dual 2/2:

Plug ports 3 and 5. Connect supply line to port 2. Port 1 becomes the outlet and port 4 becomes the exhaust port.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Line mounting. Ambient Temperature: 40° to 120°F (4° to 50°C).

Dual 2-Way high flow; two levers only

Dual 2-Way high flow; two levers/handle

Dual 3-Way; two levers only

Dual 3-Way; two levers/handle

Triple 3-Way; three levers only

Triple 3-Way; three levers/handle

NPT port threads.

Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 0 to 150 psig (0 to 10 bar).

С

**C1** 

Pressure Controlled Valve

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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# ROSS CONTROLS®

## VALVES FOR AIR FLOW CONTROL



		e a		Flov	w Contr	ol Valve	25					ROSS	
Check Valves													
Check Valves													
	Shuttle V	/alves							C	Quick E	xhaust	Valves	
VALVE TYPE	VALVE SERIES	4/0				ABLE					01/	MAX. FLOW Cv	Page
Flow Control		1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	<b>2</b> ½		
Low Profile	19											2.3	D1.3
High Capacity	19											50	D1.4
Low Profile High Capacity	19											22	D1.4
Right Angle	11											2.8	D1.5
Check								1			1		
Low Profile	19											0.5	D1.6
Mid Range	19											3.9	D1.6
High Capacity	19											50	D1.6
Shuttle													
Standard	19											0.8	D1.7
High Flow	19											3.0	D1.7
Quick Exhaust													

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D

**D1** 



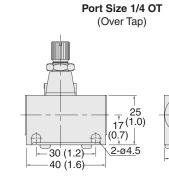
## Flow Control Valves, Low Profile

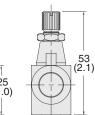
### Low Profile Flow Control Valves with Slot Adjustment

Port Size	Valve Model Number*	Avg. CV (Fully Open)	Weight Ib (kg)	2 - 4							
1/8	1968F1004	0.5	0.1 (0.1)								
1/4 OT	1968F2004	0.5	0.1 (0.1)								
* NPT por	* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1968F1004.										

Valve Dimensions - inches (mm)

Port Size 1/8





(0.8)

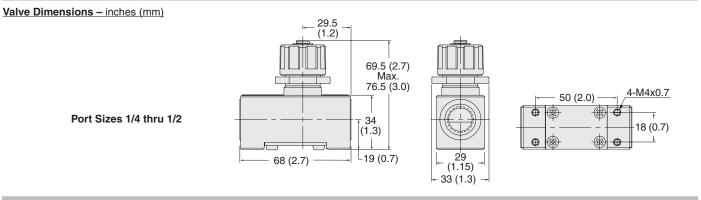
D1

D



Port Size	Valve Model Number*	Avg. CV (Fully Open)	Weight Ib (kg)	
1/4	1968F2007	2.3	0.4 (0.2)	2 + 1
3/8	1968F3007	2.3	0.4 (0.2)	
1/2	1968F4007	2.3	0.4 (0.2)	

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1968F2007.



51

(2.0)

#### **Operation:**

To increase flow: Turn adjustment screw out. To decrease flow: Turn adjustment screw in. **Flow Adjustment:** From 0 to Maximum Flow.

#### Numbers of Slot/Knob Turns:

Port sizes 1/8 and 1/4 OT (Over Tap): 8. Port sizes 1/4, 3/8 and 1/2: 10.

#### STANDARD SPECIFICATIONS (for valves on this page):

Ambient/Media Temperature:  $41^{\circ}$  to  $140^{\circ}$ F ( $5^{\circ}$  to  $60^{\circ}$ C). Flow Media: Filtered air.

#### Pressure Range:

Supply Pressure: 217 psi (14.9 bar). Maximum Operating Pressure: 150 psi (10.3 bar).



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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## 19 Series



## **Flow Control Valves, High Capacity**

## **19 Series**

	I Valv	<b>co</b> , m	gii oupuon	<b>y</b>			
	Port Size	Body Size	Valve Model Number*	Avg. C <sub>v</sub> (Fully Open)	Weight Ib (kg)		
	1/4	3/8	1968B2007	2.3	0.5 (0.2)		
	3/8	3/8	1968B3007	2.6	0.5 (0.2)		
	1/2	3/8	1968B4017	2.6	0.5 (0.2)		
	1/2	3/4	1968B4007	7.5	0.8 (0.4)		Particip Brid
ligh Capacity	3/4	3/4	1968B5007	8.3	0.8 (0.4)		
Control Valves	1	3/4	1968B6017	8.3	0.8 (0.4)		
ontroi vaives	1	1¼	1968B6007	17	2.2 (1.0)		
	1¼	1¼	1968B7007	22	2.2 (1.0)		
	1½	1¼	1968B8017	22	2.2 (1.0)		
	1½	2	1968B8007	50	4.3 (1.9)		
	2	2	1968B9007	50	4.3 (1.9)		
	21⁄2	2	1968B9017	50	4.3 (1.9)		
			1	1	. , ,		
	Port Size	Body Size	Valve Model Number*	Avg. C <sub>v</sub> (Fully Open)	Weight lb (kg)		
ow Profile	1/2	3/4	1968E4007	7.5	0.8 (0.4)	$2 - \frac{1}{2}$	A T
igh Capacity	3/4	3/4	1968E5007	8.3	0.8 (0.4)		0055
ontrol Valves	1	11/4	1968E6007	17	2.1 (1.0)		
	11/4	1¼	1968E7007	22	2.1 (1.0)		
<u>e Dimensions – inche</u>		acity Cont	rol Valves		Low Prof	file High Ca	apacity Control Valves
Body Size 3/8	ngn oape	iony com				-	
-			Body Siz	e 3/4	Adjusting		dy Size 3/4
Port 2 trolled flow) (132) - 2.81 (71)			Port 2 (controlled flow) 5.60 (145 4.60 (117)		3.06 (78)	- 3.75 (70)	1.06 (27) +1.56 (40) -
Body Size 11/	4		Body Size	2			Body Size 1¼
Port 2 rrolled flow) 7.07 Pr (180)	ort 1	C Port (controlle			4.38		Jjusting Knob

Operation: To increase flow: Turn adjustment screw out. To decrease flow: Turn adjustment screw in.

Numbers of Slot/Knob Turns: Port sizes 1/4 and 3/8: 14. Port sizes 1/2, 3/4: 12. Port sizes 1, 1¼: 24. Port sizes 1½, 2½: 24.

STANDARD SPECIFICATIONS (for valves on this page):

4.00

(102)

2.46

(63)

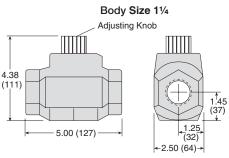
3.96 (101

Construction: Poppet. Mounting Type: Line mounting. Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

Flow Adjustment: From 0 to Maximum Flow.

Flow Media: Filtered air. Pressure Range: 5 to 150 psig (0.3 to 10 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**D1** 



## **Right Angle Flow Control Valves with Slot Adjustment**

Port Size	Valve Mode	el Number*	Avg.C <sub>v</sub>	Weight	
	Threaded Inlet	Tube Fitting	(Fully Open)	lb (kg)	
1/8	1968A1008	1968A1108#	0.3	0.06 (0.03)	2
1/4	1968A2008	1968A2108	0.6	0.12 (0.05)	
3/8	1968A3008	1968A3108	1.9	0.20 (0.09)	IO
1/2	1968A4008		2.8	0.34 (0.15)	

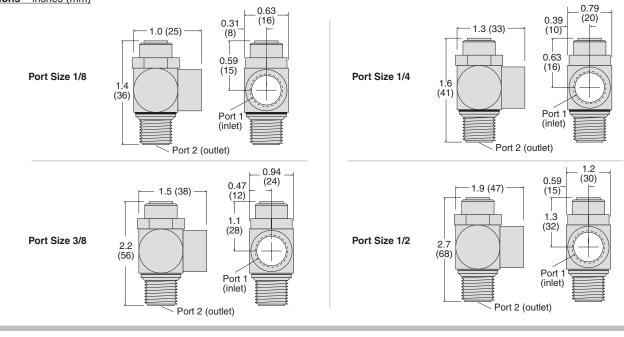
NPT threads. For BSPP threads add a "D" prefix to the model number, e.g., D1968A1008. # These models have 1/8 threaded outlet, but with 1/4 inlet tube fittings.

## **Right Angle Flow Control Valves with Knob Adjustment**

Dout Cine	Valve Mode	l Number*	Avg.C <sub>v</sub>	Weight	
Port Size	Threaded Inlet	Tube Fitting	(Fully Open)	lb (kg)	
1/8	1968A1018	1968A1118#	0.3	0.08 (0.04)	
1/4	1968A2018	1968A2118	0.6	0.14 (0.06)	
3/8	1968A3018	1968A3118	1.9	0.20 (0.09)	
1/2	1968A4018		2.8	0.34 (0.15)	

\* NPT threads. For BSPP threads add a "D" prefix to the model number, e.g., D1968A1018. # These models have 1/8 threaded outlet, but with 1/4 inlet tube fittings.





#### **Operation:**

To increase flow: Turn adjustment screw out.

To decrease flow: Turn adjustment screw in.

Flow Adjustment: From 0 to Maximum Flow.

## Numbers of Slot/Knob Turns: Port sizes 1/4 and 3/8: 14.

Port sizes 1/2, 3/4: 12. Port sizes 1, 11/4: 24.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Line mounting. Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

**Online Version** 

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Flow Media: Filtered air.

Pressure Range: 5 to 150 psig (0.3 to 10 bar).

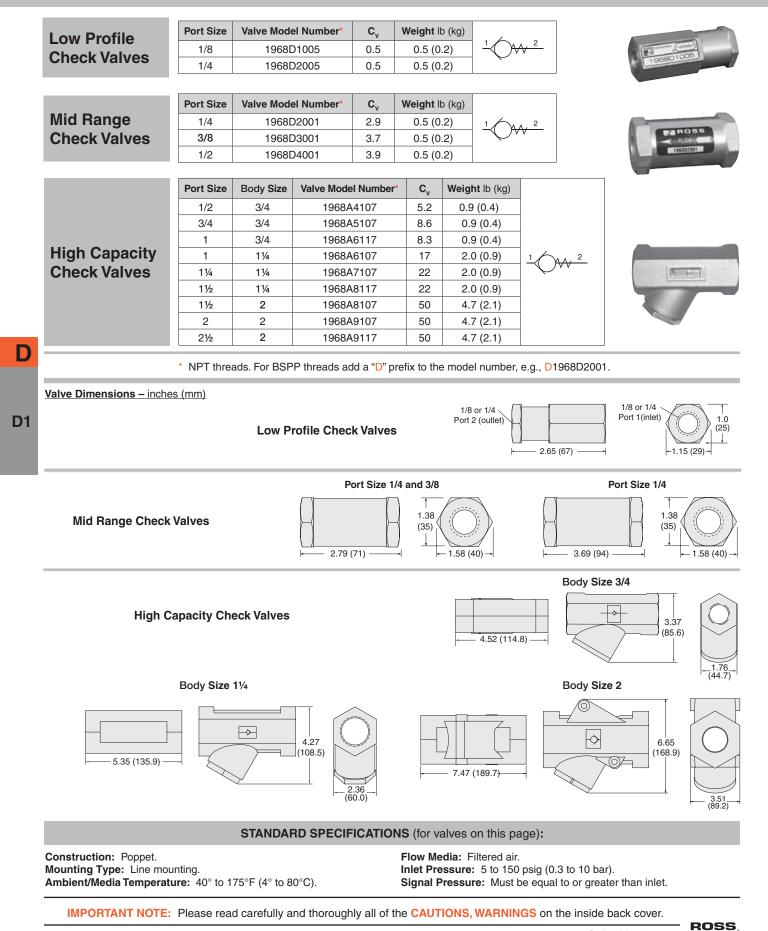




D

## **Check Valves**

## **19 Series**



Online Version Rev. 11/14/16

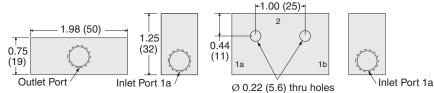
## 19 & 18 Series

## **Standard Shuttle Valves**

Port Size	Valve Model Number*	Avg. C <sub>v</sub> 1-2	Weight Ib (kg)	2
1/8	1968E1006	0.8	0.15 (0.07)	1A 1B
1/4	1968E2006	0.8	0.15 (0.07)	

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1968E1006.

Valve Dimensions - inches (mm)

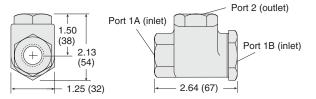


## **High Flow Shuttle Valves**

Port Size	Valve Model Number*	Avg. C <sub>v</sub> 1-2	Weight Ib (kg)	2
1/4	1968D2003	2.0	0.8 (0.4)	
3/8	1968D3003	3.0	0.8 (0.4)	
				~

\* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D1968E2003.

Valve Dimensions - inches (mm)



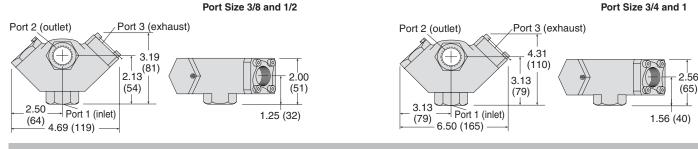
D1

D

## **Quick Exhaust Valves**

Port Size		Valve Model	Av	Avg. C <sub>v</sub>		0
1-2	3	Number*	1-2	2-3	lb (kg)	
3/8	1/2	1868A3005	2.9	3.4	1.0 (0.5)	
1/2	1/2	1868A4005	2.9	3.4	1.0 (0.5)	
3/4	1	1868A5005	7.2	10	2.5 (1.1)	3 1
1	1	1868A6005	7.2	10	2.5 (1.1)	
* NPT	port th	reads. For BSPP thre	ads add a	ı " <mark>D</mark> " prefix	to the model	number e.g., D1868A3005.

Valve Dimensions - inches (mm)



## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: Line mounting. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Pressure Range: 5 to 150 psig (0.3 to 10 bar).







# ROSS CONTROLS®

# FILTERS, PRESSURE REGULATORS, LUBRICATORS SILENCERS RECLASSIFIERS





Е



C	Contents	Page
Filters <ul> <li>Particulate</li> <li>Coalescing</li> <li>Adsorbing</li> </ul>	<ul> <li>Clean Air Package</li> <li>Silencers/Reclassifier</li> <li>Drip Leg Drain</li> </ul>	E1.1 - E1.30
<ul> <li>Regulators</li> <li>Piston and Diaphragm</li> <li>Precision</li> <li>Remote</li> </ul>	<ul> <li>High Relief</li> <li>High Pressure</li> <li>Relief Valves</li> </ul>	E2.1 - E2.27
Integrated Filter/Regulators <ul> <li>Modular or Inline mounting</li> <li>5 micron filter element</li> <li>Piston or Diaphragm type</li> </ul>	<ul> <li>Self-relieving or Non-relieving</li> <li>Includes pressure gauge</li> </ul>	E3.1 - E3.9
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Combination Units <ul> <li>Filters and Regulators</li> <li>Filters and Lubricators</li> </ul>	<ul> <li>Integrated Filter/Regulator and Lubricators</li> <li>Filter, Regulator and Lubricators</li> </ul>	E5.1 - E5.31
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# ROSS CONTROLS®

## **FILTERS**



## www.rosscontrols.com



FILTER TYPE/SERIES	1/8	1/4	3/8	1/2	3/4	1	11/4	1½	2	INLINE	MODULAR	MAX FLOW (scfm)	POLYCARBONATE E	METAL BOWL	AUTOMATIC DRAIN	MANUAL DRAIN	0.01 µm	0.3 µm	5 µm	20 µm	40 µm	ACTIVATED CARBC	Page
FILTERS																							
BANTAM												30											E1.3
MINIATURE												23											E1.4
MID-SIZE												75											E1.5
MD3™												92											E1.6
FULL-SIZE												155											E1.7
MD4™												205											E1.8
HIGH-CAPACITY												1000											E1.9 E1.11
COALESCING FILTERS																							
BANTAM												11											E1.12
MINIATURE												10											E1.13
MID-SIZE												100											E1.14
MD3™												125											E1.15
FULL-SIZE												100											E1.16
MD4™												158											E1.17
HIGH-CAPACITY												840											E1.18- E1.22
OIL VAPOR REMO	OVAL	. (AD	SOR	BIN	G) FI	LTE	RS																
MD3™												125											E1.23
MD4™												165											E1.24
CLEAN AIR PACK	KAGE	S																					
MD3™												125											E1.25 - E1.26
MD4™												158											E1.27 -E1.28
INLINE SILENCE	RS/I	RECI	LASS	SIFIE	RS		_																
																							E1.29
DRIP LEG DRAIN	S		1	1									1										
																							E1.30

## FILTERS - KEY FEATURES

AVAILABLE PORT SIZES

- Filters 5- and 40-micron filtration levels
- Coalescing Filters 0.3- and 0.01-micron filtration levels
- Oil Vapor Removal (Adsorbing) Filters removes oil and hydrocarbon vapors

MOUNTING FLOW

• Filter Drains – manual, automatic, internal float, and automatic external drains

OPTIONS

BOWL

FILTRATION

N

- Modular and inline mounting options
- Metal and High Strength polycarbonate bowl options
- Several Differential Gauge options available

F

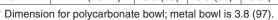
## **BANTAM Series**

		Model N	lumbers								
Port Size	Automatic D	Prain	Manual Dra	ain							
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl							
With THREADED PORTS *											
1/8	5B01B0100	5B01B0200	5B01B0300	5B01B0400							
1/4*	5B02B0100	5B02B0200	5B02B0300	5B02B0400							
With Quick-Connect TUBE FITTINGS											
1/4	5B03B0100	5B03B0200	5B03B0300	5B03B0400							
3/8	5B04B0100	5B04B0200	5B04B0300	5B04B0400							
4mm	5B05B0100	5B05B0200	5B05B0300	5B05B0400							
6mm	5B06B0100	5B06B0200	5B06B0300	5B06B0400							
8mm	5B07B0100	5B07B0200	5B07B0300	5B07B0400							
10mm	5B08B0100	5B08B0200	5B08B0300	5B08B0400							

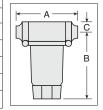


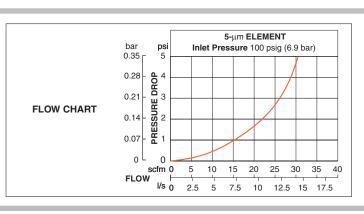


Dimensions inches (mm) Weight Bowl Port Size Capacity lb (kg) Α B\*\* С Depth No Port 2-oz (60-ml) 1.7 (43) 3.9 (99) 0.5 (13) 1.8 (45) 0.27 (0.12) 1/8, 1/4 2-oz (60-ml) 3.0 (76) 3.9 (99) 0.5 (13) 1.8 (45) 0.49 (0.22) Models below have quick-connect tube fittings. 1/4 2-oz (60-ml) 3.4 (86) 3.9 (99) 0.5 (13) 1.8 (45) 0.47 (0.21) 3/8 2-oz (60-ml) 3.9 (99) 3.9 (99) 0.5 (13) 1.8 (45) 0.47 (0.21) 3.4 (86) 4 mm 2-oz (60-ml) 0.47 (0.21) 3.9 (99) 0.5 (13) 1.8 (45) 6 mm 2-oz (60-ml) 3.4 (86) 3.9 (99) 0.5 (13) 1.8 (45) 0.47 (0.21) 8 mm 2-oz (60-ml) 3.4 (86) 3.9 (99) 0.5 (13) 1.8 (45) 0.47 (0.21) 0.47 (0.21) 10 mm 2-oz (60-ml) 3.9 (99) 3.9 (99) 0.5 (13) 1.8 (45)



REPLACEMENT FILTER ELEMENTS								
Element Rating Element Material Part Number								
5-µm	Polyethylene	933K77						





#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Fiber.

#### Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 150°F (4° to 66°C). Fluid Media: Compressed air.

## Inlet Pressure - Automatic drain model:

*Polycarbonate bowl:* Up to 150 psig (up to 10 bar). *Metal bowl:* Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 5-micron rated polyethylene.
Body: Acetal.
Bowl: Polycarbonate or aluminum.
Seals: Nitrile.

**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



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Port Size

1/8

1/4

## **MINIATURE Series**

Depth	Weight Ib (kg)		ISO Symbols Filter		$\rightarrow$
.6 (41)	0.33 (0.15)		A	Y utomatic Drain	Y Manual Drain
6 (11)	0.35 (0.16)	) l			

Port	Pour Turno	Bowl	1	Dimensions	inches (mm	)	Weight
Size	Bowl Type	Capacity	А	В	С	Depth	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (60-ml)	1.6 (41)	3.9 (99)	0.4 (9.5)	1.6 (41)	0.33 (0.15)
1/0, 1/4	Aluminum	2-oz (60-ml)	1.6 (41)	4.3 (109)	0.4 (9.5)	1.6 (41)	0.35 (0.16)

Port Sizes: 1/8 & 1/4 - Flow to 23 scfm

Metal Bowl

5022B1010

5022B2010

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5021B1010.

**Automatic Drain** 

**Polycarbonate Bowl** 

5021B1010

5021B2010

Model Numbers\*

Manual Drain

Metal Bowl

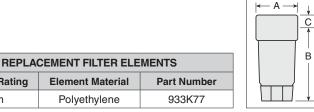
5012B1010

5012B2010

**Polycarbonate Bowl** 

5011B1010

5011B2010

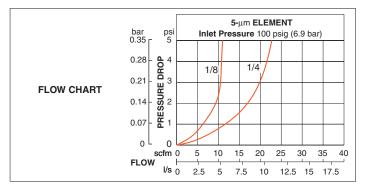


Ε

**Element Rating** 

5-µm

**E1** 



## Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

## Construction: Fiber.

Ambient/Media Temperature: *Polycarbonate bowl:* 40° to 125°F (4° to 52°C). *Metal bowl:* 40° to 150°F (4° to 66°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 5-micron rated polyethylene.
Body: Aluminum.
Bowl: Polycarbonate or aluminum.
Seals: Nitrile.





Port Size

1/4

3/8

1/2

## **MID-SIZE Series**





Davit Cine	Powl Turne	Bowl	D	n)	Weight		
Port Size	Bowl Type	Capacity	А	В	С	Depth	lb (kg)
1/4, 3/8,	Polycarbonate	4-oz (120-ml)	2.7 (67)	4.8 (122)	0.6 (16)	2.4 (60)	1.13 (0.51)
1/2	Zinc	4-oz (120-ml)	2.7 (67)	4.9 (123)	0.6 (16)	2.4 (60)	1.50 (0.68)

Port Sizes: 1/4, 3/8 & 1/2 - Flow to 75 scfm

Metal Bowl

5022B2007

5022B3027

5022B4007

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5021B2007.

**Automatic Drain** 

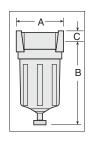
**Polycarbonate Bowl** 

5021B2007

5021B3027

5021B4007

Model Numbers\*



psi 5

3 R

bar 0.35

0.28

0.21

0.14 1SS<sup>2</sup>

0.07

FLOW CHART

Manual Drain

Metal Bowl

5012B2007

5012B3026

5012B4007

**Polycarbonate Bowl** 

5011B2007

5011B3026

5011B4007

REPLACEMENT FILTER ELEMENTS						
Element Rating	Element Material	Part Number				
5-µm	Polyethylene	936K77				

**H** 1 0 0 scfm 0 20 30 50 60 70 80 10 40 FLOW l/s 0 20 25 30 35 10 15 5 **Options: Internal Float Drain, consult ROSS.** 

Accessories ordered separately, refer to page E6.3-4, E6.7.

## STANDARD SPECIFICATIONS (for products on this page):

## Construction: Fiber.

## Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 79°C). Fluid Media: Compressed air.

## Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

5-µm ELEMENT

Inlet Pressure 100 psig (6.9 bar) 1/4

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Filter Element: 5-micron rated polyethylene. Body: Zinc. Bowl: Polycarbonate bowl with zinc shatterguard, or zinc bowl. Seals: Nitrile.

1/2

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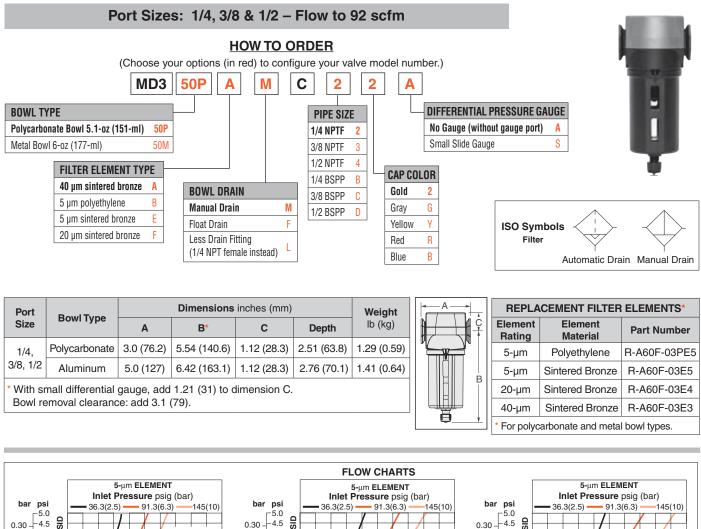
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

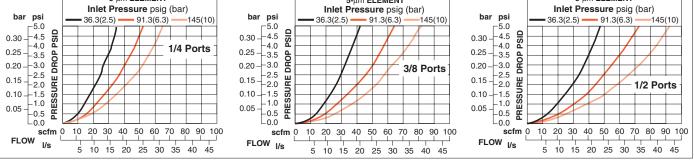
E1.5

E1

E

## **MD3<sup>™</sup> Series**





Options: Differential Pressure Gauge, for additional information refer to page E6.6. Options: External Bowl Drains, refer to page E6.7. Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Sintered or fiber.

Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C).

Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### Inlet Pressure - Automatic drain model:

Polycarbonate bowl: 30 to 150 psig (2 to 10 bar). Metal bowl: 30 to 200 psig (2 to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 250 psig (0 to 17 bar). Filter Element: 5-micron polyethylene, or 5-, 20-, 40-µm sintered bronze. Body: Die-cast zinc. Bowl: Polycarbonate bowl with nylon shatterguard, or aluminum bowl with clear nylon sight glass. Seals: Nitrile



Port Size

1/4

3/8

1/2

3/4

## **FULL-SIZE Series**

# E



Port Size		Bowl	Bowl	D	imensions	inches (mn	n)	Weight
Port Size	Туре	Capacity	А	В	С	Depth	lb (kg)	
	1/4, 3/8,	Polycarbonate	8-oz (240-ml)	3.5 (89)	5.8 (146)	0.6 (16)	3.5 (89)	1.93 (0.88)
	1/2, 3/4	Zinc	8-oz (240-ml)	3.5 (89)	6.4 (163)	0.6 (16)	3.5 (89)	2.90 (1.32)

Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 155 scfm

Metal Bowl

5022B2005

5022B3005

5022B4005

5022B5015

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5021B2008.

Model Numbers\*

Manual Drain

Metal Bowl

5012B2006

5012B3006

5012B4006

5012B5016

**Polycarbonate Bowl** 

5011B2008

5011B3008

5011B4008

5011B5018

1/2, 0/4	Zinc	8-oz (240-ml)	3.5 (89)	6.4 (163)	0.6 (16)	3.5 (89)
					A	
						ŢŢ

**Automatic Drain** 

**Polycarbonate Bowl** 

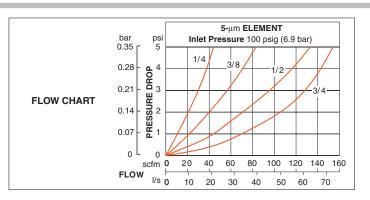
5021B2008

5021B3008

5021B4008

5021B5018

REPLACEMENT FILTER ELEMENTS					
Element Rating	Element Material	Part Number			
5-µm	Polyethylene	939K77			



b

Options: Automatic External Drain, refer to page E6.7. Internal Float Drain, consult ROSS. Accessories ordered separately, refer to page E6.3-4.

## STANDARD SPECIFICATIONS (for products on this page):

## Construction: Fiber.

Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C).
Fluid Media: Compressed air.
Inlet Pressure - Automatic drain model: Polycarbonate bowl: Up to 150 psig (up to 10 bar).

Polycarbonate bowl: Up to 150 psig (up to 10 bar) Metal bowl: Up to 200 psig (up to 14 bar).

## Inlet Pressure - Manual drain model:

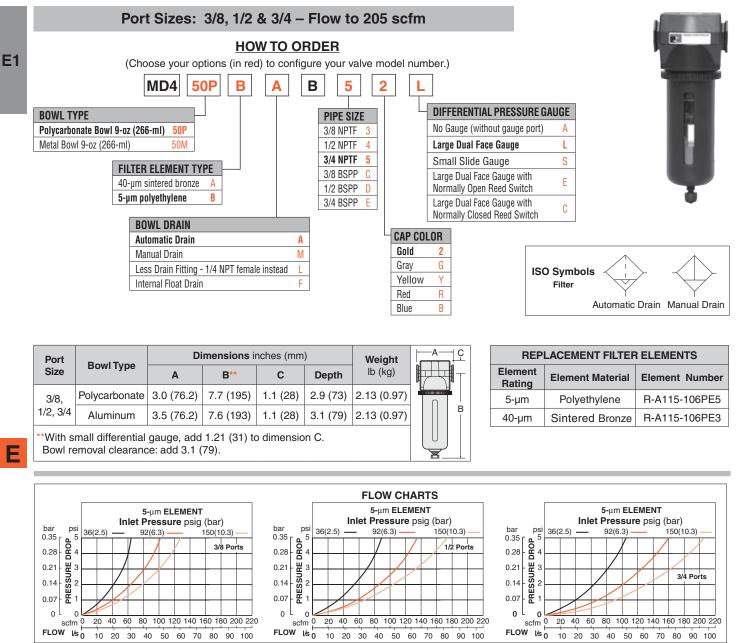
Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 5-micron rated polyethylene.
Body: Zinc.
Bowl: Polycarbonate bowl with steel shatterguard, or zinc bowl with clear nylon sight glass.
Bowl Ring: Aluminum.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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## MD4<sup>™</sup> Series



Options: Differential Pressure Gauge, for additional information refer to page E6.6. Options: External Bowl Drains, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

## Construction: Sintered or fiber.

Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

## Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Filter Element: 5-micron rated polyethylene, or 40-micron rated sintered bronze Body: Die-cast zinc. Bowl: Polycarbonate bowl with steel shatterguard, or aluminum bowl with clear nylon sight glass. Bowl Ring: Nylon. Seals: Nitrile

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E1.8



## **HIGH-CAPACITY** Series



	Model Numbers						
Port Size	Automatic E	Drain	Manual Dra				
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl			
3/4	5021B5008	5022B5005	5011B5008	5012B5006			
1	5021B6008	5022B6005	5011B6008	5012B6006			
* NPT port t	NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5021B5008.						

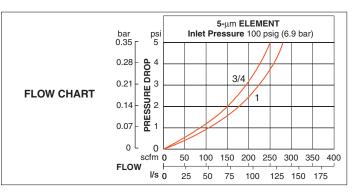
Port Sizes: 3/4 & 1 - Flow to 275 scfm

Model Numbere\*

Port	Bowl	Bowl Bowl Type Capacity		Dimensions inches (mm)			
Size	Туре			В	С	Depth	lb (kg)
3/4	Polycarbonate	16-oz (480-ml)	4.5 (114)	8.0 (203)	0.8 (21)	4.2 (106)	2.44 (1.11
1	Aluminum	16-oz (480-ml)	4.5 (114)	8.3 (210)	0.8 (21)	4.2 (106)	3.25 (1.48)



REPLACEMENT FILTER ELEMENTS						
Element Rating	Element Material	Part Number				
5-µm	Polyethylene	1010K77				



Ç

В

Options: Automatic External Drain, refer to page E6.7. Internal float drain , consult ROSS. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Fiber.

Ambient/Media Temperature:

#### Polycarbonate bowl: 40° to 125°F (4° to 52°C).

Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: Up to 150 psig (up to 10 bar).

Metal bowl: Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 5-micron rated polyethylene.
Body: Aluminum.
Bowl: Polycarbonate bowl with steel shatterguard, or aluminum bowl with clear nylon sight glass.
Bowl Ring: Aluminum.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Online Version Rev. 11/14/16

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E1.9

## **HIGH-CAPACITY Series**

## Port Sizes: 11/4 & 11/2 - Flow to 660 scfm

		Model Numbers*				
Port Size	Filter Element Rating	Element Rating Automatic Drain				
		Metal Bowl	Metal Bowl			
11/4	5-µm	5022B7019	5012B7019			
1 /4	40-µm	5X00B7051	5X00B7052			
41/	5-µm	5022B8019	5012B8019			
1½	40-µm	5X00B8037	5X00B8051			

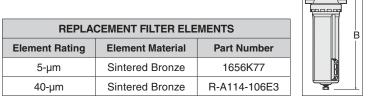
\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5022B7019.

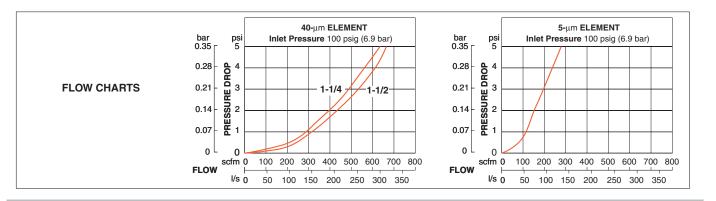
Port		Bowl	Dimensions inches (mm)				Weight
Size	Туре	Capacity	А	В	C	Depth	lb (kg)
<b>1</b> ¼	Aluminum	35-oz (1000-ml)	5.5 (140)	10.7 (271)	1.4(36)	4.2 (106)	1.93 (0.88)
<b>1</b> ½	Aluminum	35-oz (1000-ml)	5.5 (140)	10.7 (271)	1.4(36)	4.2 (106)	1.93 (0.88)





E1





## Options: External Automatic Drain, refer to page E6.7. Internal float drain, consult ROSS. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Sintered. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure:

Automatic drain model: Up to 200 psig (up to 14 bar). Manual drain model: 0 to 200 psig (0 to 14 bar). Filter Element: 40-micron rated or 5-micron rated sintered bronze. Body: Aluminum. Bowl: Aluminum bowl with clear nylon sight glass. Bowl Ring: Aluminum. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

## **HIGH-CAPACITY** Series

**E1** 

## Port Sizes: 11/4, 11/2 & 2 - Flow to 1000 scfm

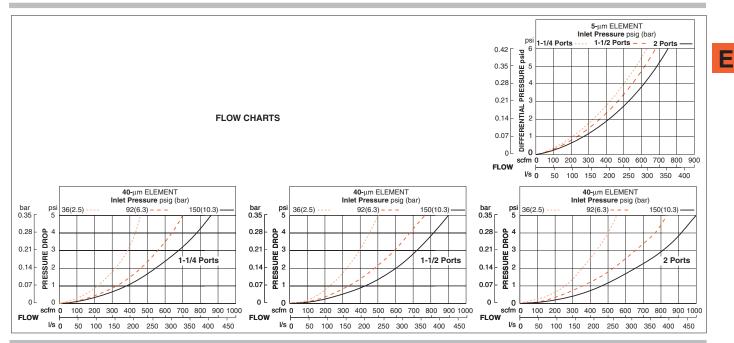
Port Size	Filter Floment Dating	Model Numbers*				
Port Size	Filter Element Rating	Internal Float Drain	Manual Drain			
<b>1</b> ¼	5-µm	5022B7018	5012B7018			
<b>1</b> ¼	40-µm	5X00B7025	5X00B7054			
<b>1</b> ½	5-µm	5022B8018	5012B8018			
<b>1</b> ½	40-µm	5X00B8018	5X00B8019			
2	5-µm	5022B9018	5012B9018			
2	40-µm	5X00B9004	5X00B9003			

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5022B7018.

Port Size	Bowl	Bowl	Bowl Dimensions inches (mm)		Bowl Dimensions inches (mi		Dimensions inches (mm	n)	Weight
Port Size	Туре	Capacity	Α	В	С	Depth	lb (kg)		
1¼, 1½, 2	Aluminum	123-oz (3700-ml)	8.1 (204)	12.0 (305)	2.4 (60.3)	8.0 (203.2)	14.3 (6.59)		



REPLACEMENT FILTER ELEMENTS						
Element Rating	Element Material	Part Number				
5-µm	Sintered Bronze	942K77				
40-µm	Sintered Bronze	944K77				



## Options: External Automatic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

**Construction:** Sintered or fiber. **Ambient/Media Temperature:** 40° to 175°F (4° to 80°C). **Fluid Media:** Compressed air. **Inlet Pressure:** Internal float drain model: 30 to 200 psin (2.1 to 14, ba

Internal float drain model: 30 to 200 psig (2.1 to 14 bar). Manual drain model: 0 to 200 psig (0 to 14 bar). Filter Element: 40-micron rated or 5-micron rated sintered bronze. Body: Aluminum. Bowl: Aluminum. Seals: Nitrile.

**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



Online Version Rev. 11/14/16

## **BANTAM Series**

## Port Sizes: 1/8 & 1/4 – Flow to 11 scfm

Port Size	Automatic D	Drain	Manual Dr	ain		
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl		
With THRE	ADED PORTS *					
1/8	5B01B0700	5B01B0800	5B01B0500	5B01B0600		
1/4	5B02B0700	5B02B0800	5B02B0500	5B02B0600		
With Quick	ck-Connect TUBE FITTINGS					
1/4	5B03B0700	5B03B0800	5B03B0500	5B03B0600		
3/8	5B04B0700	5B04B0800	5B04B0500	5B04B0600		
4mm	5B05B0700	5B05B0800	5B05B0500	5B05B0600		
6mm	6mm 5B06B0700		5B06B0500	5B06B0600		
8mm	5B07B0700	5B07B0800	5B07B0500	5B07B0600		
10mm	5B08B0700	5B08B0800	5B08B0500	5B08B0600		
* NPT port t	breads For BSPP thread	s add a "C" prefix	to the model number e.a.	C5B01B0700		



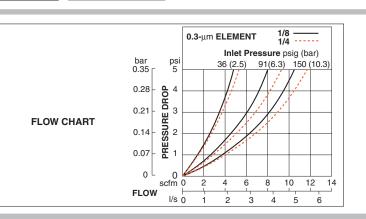
Automatic Drain Manual Drain

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5B01B0700. Models include 0.3-micron rated filter element.

Port Size	Bowl Dimensions inches (mm)				ı)	Weight	
FUIT SIZE	Capacity	Α	B**	С	Depth	lb (kg)	
No Ports	2-oz (60-ml)	1.7 (43)	3.9 (99)	0.5 (13)	1.8 (45)	0.27 (0.12)	
1/8, 1/4	2-oz (60-ml)	3.0 (76)	3.9 (99)	0.5 (13)	1.8 (45)	0.49 (0.22)	
Models b	elow have qu	ick-connec	t tube fitti	ngs.			
1/4	2-oz (60-ml)	3.4 (86)	3.9 (99)	0.5 (13)	1.8 (45)	0.47 (0.21)	
3/8	2-oz (60-ml)	3.9 (99)	3.9 (99)	0.5 (13)	1.8 (45)	0.47 (0.21)	
4 mm	2-oz (60-ml)	3.4 (86)	3.9 (99)	0.5 (13)	1.8 (45)	0.47 (0.21)	
6 mm	2-oz (60-ml)	3.4 (86)	3.9 (99)	0.5 (13)	1.8 (45)	0.47 (0.21)	
8 mm	2-oz (60-ml)	3.4 (86)	3.9 (99)	0.5 (13)	1.8 (45)	0.47 (0.21)	
10 mm	2-oz (60-ml)	3.9 (99)	3.9 (99)	0.5 (13)	1.8 (45)	0.47 (0.21)	
** Dimension for polycarbonate bowl; aluminum bowl is 3.8 (97).							

← A	→ ↓
$( \square$	Ţ Ţ
	B

REPLACEMENT FILTER ELEMENTSElement RatingElement MaterialPart Number0.3-µmBorosilicate-glass-fiber945K770.01-µmBorosilicate-glass-fiberR-A-10F-16E8



Accessories ordered separately, refer to page E6.3-4.

#### **STANDARD SPECIFICATIONS** (for products on this page):

Construction: Fiber. Inlet Pressure - Manual drain model: Ambient/Media Temperature: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 0 to 200 psig (0 to 14 bar). Metal bowl: 40° to 150°F (4° to 66°C). Filter Element: 0.3-micron rated, or 0.01-micron rated borosilicate-glass-Fluid Media: Compressed air. fiber element. Inlet Pressure - Automatic drain model: Body: Acetal. Bowl: Polycarbonate or aluminum. Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar). Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## **MINIATURE Series**

## Port Sizes: 1/8 & 1/4 - Flow to 10 scfm

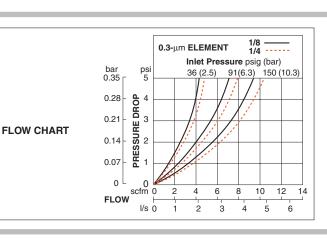
	Model Numbers*							
Port Size	Automatic D	rain	Manual Drain					
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl				
1/8	5031B1128	5032B1118	5031B1028	5032B1028				
1/4	5031B2128	5032B2128	5031B2028	5032B2028				
1/4	505162120	505202120	505102020	505202020				

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5031B1128. Models include 0.3-micron rated filter element.

Dort Cino	Bourd Turne	Bowl	I	Dimensions	inches (mm	ו)	Weight
Port Size	Bowl Type	Capacity	А	В	С	Depth	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (60-ml)	1.6 (41)	3.6 (92)	0.4 (9.5)	1.6 (41)	0.33 (0.15)
1/8, 1/4	Aluminum	2-oz (60-ml)	1.6 (41)	4.3 (109)	0.4 (9.5)	1.6 (41)	0.35 (0.16)



REPLACEMENT FILTER ELEMENTS						
Element Rating	Element Material	Part Number				
0.3-µm	Borosilicate-glass-fiber	945K77				
0.01-µm	Borosilicate-glass-fiber	R-A-10F-16E8				



Α

С

В

#### Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Fiber.

#### Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C).
 Metal bowl: 40° to 150°F (4° to 66°C)
 Fluid Media: Compressed air.
 Inlet Pressure - Automatic drain model:
 Polycarbonate bowl: Up to 150 psig (up to 10 basility)

Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar)
Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber coalescing element.
Body: Aluminum.
Bowl: Polycarbonate or aluminum.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## Port Sizes: 1/4, 3/8 & 1/2 – Flow to 85 scfm

			Model Numbers*					
	Port Size	Filter Element Rating	Auto	omatic Drain	Manual Drain			
		inding	Metal Bowl	Extended Metal Bowl	Metal Bowl	Extended Metal Bowl		
	1/4	0.3-µm	5032B2138	5032B2148	5032B2038	5032B2048		
	1/4	0.01-µm	5032B2239	5032B2249	5032B2238	5032B2248		
	3/8	0.3-µm	5032B3138	5032B3148	5032B3038	5032B3048		
	3/8	0.01-µm	5032B3239	5032B3249	5032B3238	5032B3248		
	1/0	0.3-µm	5032B4138	5032B4148	5032B4038	5032B4048		
	1/2	0.01-µm	5032B4239	5032B4249	5032B4238	5032B4248		

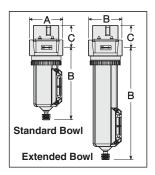


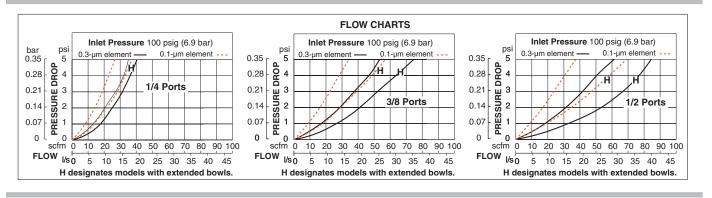
\*NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5032B2138. Models include 0.3-micron rated filter element.

Port Size	Bowl Bowl		Dimensions inches (mm)				Weight
Port Size	Туре	Capacity	Α	В	С	Depth	lb (kg)
1/4, 3/8, 1/2	Standard	6-oz (180-ml)	2.7 (67)	6.5 (165)	1.8 (45)	2.4 (60)	1.75 (0.80)
1/4, 3/8, 1/2	Extended	10-oz (300-ml)	2.7 (67)	9.5 (241)	1.8 (45)	2.4 (60)	2.00 (0.91)

ISO Symbols Coalescing Filter Automatic Drain Manual Drain

REPLACEMENT FILTER ELEMENTS								
Element Rating	Bowl Type	Element Material	Part Number					
0.3-µm	Standard	Borosilicate-glass-fiber	R-A60F-29					
0.3-µm	Extended	Borosilicate-glass-fiber	R-A60F-32					
0.01-µm	Standard	Borosilicate-glass-fiber	R-A60F-29E8					
0.01-µm	Extended	Borosilicate-glass-fiber	R-A60F-32E8					





#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

## Construction: Fiber.

Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure:

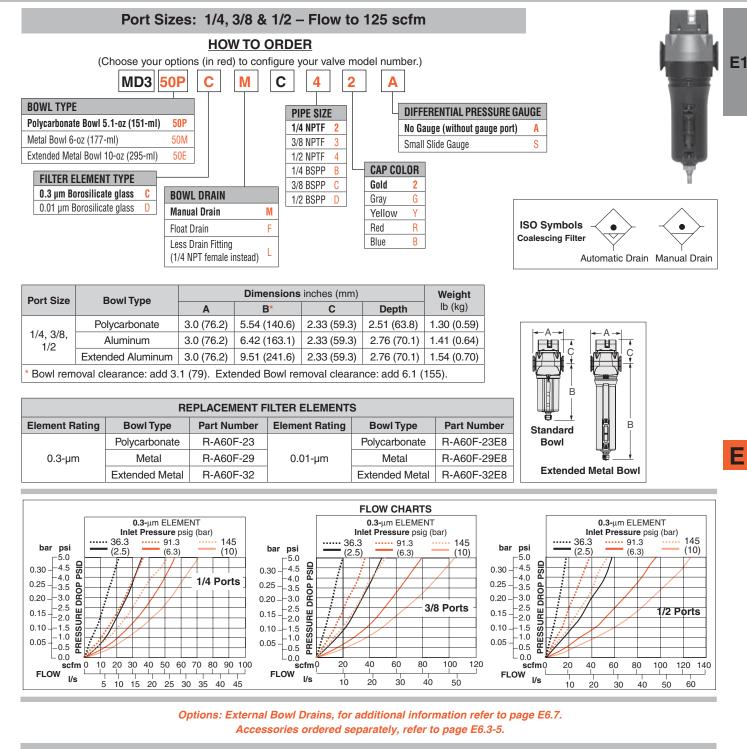
Automatic drain model: Up to 150 psig (up to 10 bar). Manual drain model: 0 to 150 psig (0 to 10 bar). Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber coalescing element.
Body: Zinc.
Bowl: Aluminum bowl with clear nylon sight glass, or extended aluminum bowl with clear nylon sight glass.
Bowl Ring: Nylon.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E1

ROSS

## MD3<sup>™</sup> Series



#### STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Fiber.

Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

### Inlet Pressure - Automatic drain model:

Polycarbonate bowl: 30 to 150 psig (2 to 10 bar). Metal bowl: 30 to 200 psig (2 to 14 bar). Inlet Pressure - Manual drain model: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 250 psig (0 to 17 bar).
Filter Element: 0.3-micron rated or 0.01-micron rated borosilicateglass-fiber coalescing element.
Body: Die-cast zinc.
Seals: Nitrile.
Bowl: Polycarbonate bowl with nylon shatterguard, or aluminum bowl with clear nylon sight glass.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Online Version Rev. 11/14/16

0.01-µm

#### Port Sizes: 1/4, 3/8 & 1/2 – Flow to 100 scfm Model Numbers Filter **Automatic Drain** Manual Drain Port Size **Bowl Type** Element Polycarbonate Polycarbonate Rating Metal Bowl Metal Bowl Bowl Bowl 0.3-µm 5031B2108 5032B2118 5031B2008 5032B2018 Standard 1/4 0.01-µm 5031B2209 5032B2219 5031B2208 5032B2218 0.3-µm 5031B3108 5032B3118 5031B3008 5032B3018 3/8 Standard 0.01-µm 5031B3208 5031B3209 5032B3219 5032B3218 0.3-µm 5031B4108 5032B4118 5031B4008 5032B4018 Standard 0.01-µm 5031B4209 5032B4219 5031B4208 5032B4218 1/2 0.3-µm 5031B4128 5032B4128 5031B4028 5032B4028 Extended







Port Size	Bowl	Devel Consoitu	D	imensions i	nches (mn	n)	Weight	
	Port Size	Туре	Bowl Capacity	Α	В	С	Depth	lb (kg)
	1/4, 3/8, 1/2	Standard	8-oz (240-ml)	3.5 (89)	5.8 (146)	1.8 (45)	3.5 (89)	2.13 (0.95)

3.5 (89)

5031B4229

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5031B2108.

5032B4229

10.3 (260)

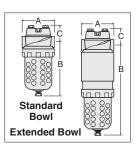
1.8 (45)

5031B4228

3.5 (89)

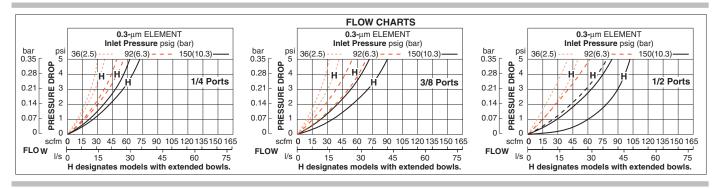
5032B4228

3.25 (1.54)



REPLACEMENT FILTER ELEMENTS								
Element Rating Bowl Type Element Material Part Number								
0.3-µm	Standard	Borosilicate-glass-fiber	947K77					
0.3-µm	Extended	Borosilicate-glass-fiber	R-A103-160L					
0.01-µm	Standard	Borosilicate-glass-fiber	948K77					
0.01-µm	Extended	Borosilicate-glass-fiber	R-A103-160LE8					

20-oz (600-ml)



Small slide differential Pressure Gauge included.

Options: Differential Pressure Gauges: Large Dual Face, Large Dual Face with Reed Switch (NO-NC), refer to page E6.6. Accessories ordered separately, refer to page E6.3-4.

## STANDARD SPECIFICATIONS (for products on this page):

## Construction: Fiber.

Ambient/Media Temperature: *Polycarbonate bowl:* 40° to 125°F (4° to 52°C). *Metal bowl:* 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

### Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber coalescing element.
Body: Zinc.
Bowl: Polycarbonate bowl with steel shatterguard, or zinc bowl with clear nylon sight glass.
Bowl Ring: Aluminum.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

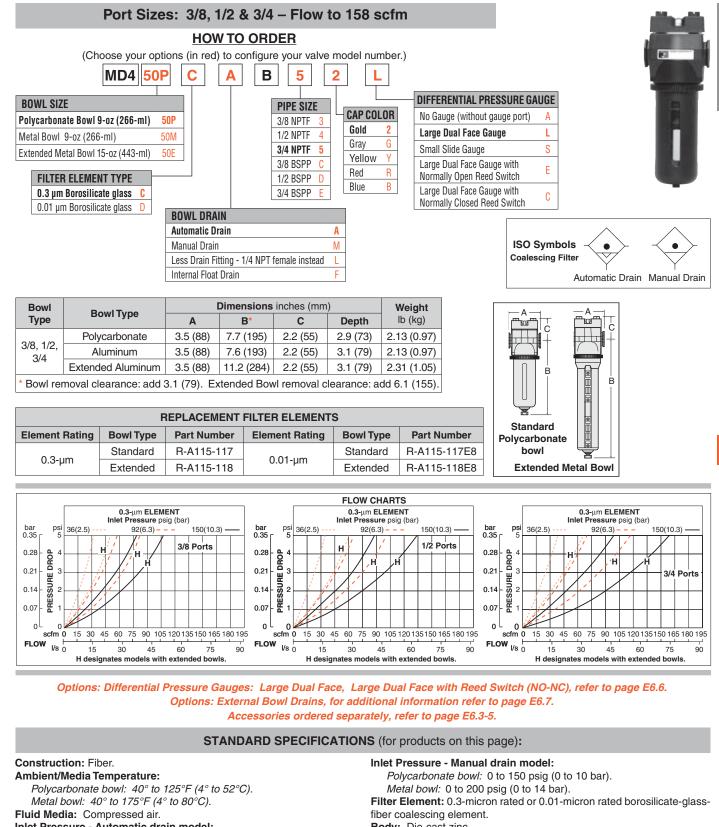
1/4. 3/8. 1/2

Extended



## MD4<sup>™</sup> Series

E1



Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

Body: Die-cast zinc. Bowl: Polycarbonate bowl with steel shatterguard, or aluminum bowl with clear nylon sight glass. Bowl Ring: Nylon. Seals: Nitrile.



Online Version Rev. 11/14/16

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## **HIGH-CAPACITY** Series

## Port Sizes: 3/4 & 1 – Flow to 220 scfm

		Model Numbers*							
	Port Size	Automatic I	Drain	Manual Drain					
		Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl				
	3/4	5X00B5099	5X00B5076	5031B5008	5032B5018				
	1	5X00B6027	5X00B6054	5031C6008	5032B6117				
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B									

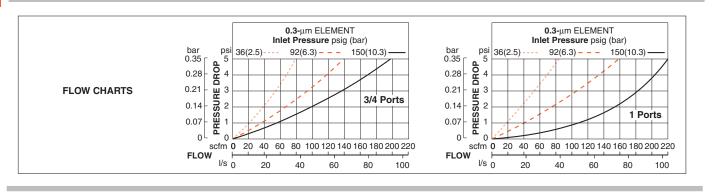
Models include 0.3-micron rated filter element.

Port	Bowl Type	Bowl Capacity	[	Dimensions	inches (mm	ו)	Weight
Size	Downype	Dom Capacity	Α	B*	С	Depth	lb (kg)
3/4, 1	Polycarbonate	16-oz (480-ml)	4.5 (114)	8.0 (203)	3.1 (78)	4.5 (114)	2.38 (1.09)
3/4, 1	Aluminum	16-oz (480-ml)	4.5 (114)	8.3 (210)	3.1 (78)	4.5 (114)	3.20 (1.46)



REPLACEMENT FILTER ELEMENTS						
Element Rating	Element Material	Part Number				
0.3-µm	Borosilicate-glass-fiber	949K77				
0.01-µm	Borosilicate-glass-fiber	R-A109-106E8				

E1



Large dual face differential Pressure Gauge included. Options: Differential Pressure Gauges: Small Slide, Large Dual Face with Reed Switch (NO-NC), refer to page E6.6. Accessories ordered separately, refer to page E6.3-4.

## STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Fiber.

Ambient/Media Temperature: *Polycarbonate bowl:* 40° to 125°F (4° to 52°C). *Metal bowl:* 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

### Inlet Pressure - Automatic drain model:

*Polycarbonate bowl:* Up to 150 psig (up to 10 bar). *Metal bowl:* Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber coalescing element.
Body: Aluminum.
Bowl: Polycarbonate bowl with steel shatterguard, or aluminum bowl with clear nylon sight glass.
Bowl Ring: Aluminum.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

## **HIGH-CAPACITY** Series

## Port Sizes: 3/4 & 1 – Flow to 295 scfm

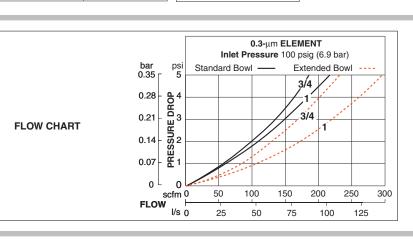
Port Size	Model Numbers*							
	Auto	omatic Drain	Manual Drain					
	Metal Bowl	Extended Metal Bowl	Metal Bowl	Extended Metal Bowl				
3/4	5X00B5086	5X00B5087	5032B5019	5032B5029				
1	5X00B6064	5X00B6065	5032B6019	5032C6028				

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B5086. Models include 0.3-micron rated filter element.

Port	Bowl	Bowl Capacity	ſ	Dimensions i	nches (mm	)	Weight
Size	Туре	e Bow oupdatily	Α	В	С	Depth	lb (kg)
3/4, 1	Standard	35-oz (1050-ml)	4.5 (114)	10.1 (257)	3.3 (83)	4.2 (106)	3.50 (1.59)
3/4, 1	Extended	62-oz (1860-ml)	4.5 (114)	15.7 (399)	3.3 (83)	4.2 (106)	4.25 (1.91)



	REPLACEMENT FILTER ELEMENTS								
	Element Rating	Bowl Type	Element Material	Part Number					
	0.0.11m	Standard	Borosilicate-glass-fiber	R-A114-112					
	0.3-µm	Extended	Borosilicate-glass-fiber	R-A114-113	¥				
	0.01-µm	Standard	Borosilicate-glass-fiber	R-A114-112E8	Standard Bowl				
		Extended	Borosilicate-glass-fiber	R-A114-113E8	E				



B

Extended Bowl

#### Large dual face differential Pressure Gauge included.

Options: Differential Pressure Gauges: Small Slide, Large Dual Face with Reed Switch (NO-NC), refer to page E6.6. Accessories ordered separately, refer to page E6.3-4.

## STANDARD SPECIFICATIONS (for products on this page):

Construction: Fiber.

Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure:

Automatic drain model: Up to 200 psig (up to 14 bar). Manual drain model: 0 to 200 psig (0 to 14 bar). Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber coalescing element.
Body: Aluminum.
Bowl: Aluminum bowl, or extended aluminum bowl.
Bowl Ring: Aluminum.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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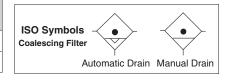
## **HIGH-CAPACITY** Series

## Port Sizes: 11/4 & 11/2 - Flow to 450 scfm

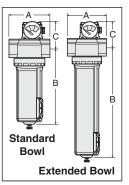
	Model Numbers*							
Port Size	Auto	matic Drain	Manual Drain					
	Metal Bowl	Extended Metal Bowl	Metal Bowl	Extended Metal Bowl				
1¼	5X00B7034	5X00B7036	5032B7019	5032B7029				
1½	5X00B8035	5X00B8036	5032B8019	5032B8029				

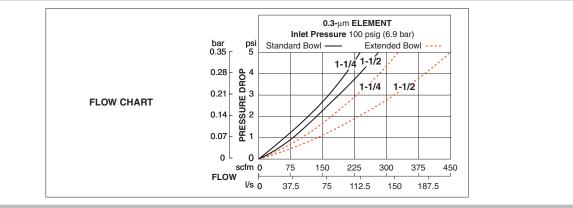
\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B7034. Models include 0.3-micron rated filter element.

Port	Bowl Type Bowl Capacity		[	Weight			
Size	вомпуре	Bowl Capacity	Α	В	С	Depth	lb (kg)
11/4. 11/2	Standard	35-oz (1050-ml)	5.5 (140)	10.6 (270)	3.7 (94)	4.2 (106)	4.31 (1.94)
1 /4, 1 /2	Extended	62-oz (1860-ml)	5.5 (140)	16.2 (412)	3.7 (94)	4.2 (106)	5.00 (2.27)



REPLACEMENT FILTER ELEMENTS								
Element Rating	Bowl Type	Element Material	Part Number					
0.0	Standard	Borosilicate-glass-fiber	R-A114-112					
0.3-µm	Extended	Borosilicate-glass-fiber	R-A114-113					
0.01	Standard	Borosilicate-glass-fiber	R-A114-112E8					
0.01-µm	Extended	Borosilicate-glass-fiber	R-A114-113E8					





Large dual face differential Pressure Gauge included.

Options: Differential Pressure Gauges: Small Slide, Large Dual Face with Reed Switch (NO-NC), refer to page E6.6. Bowl Drain - Internal Float Drain (on polycarbonate bowl only), consult ROSS. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Fiber. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure:

Automatic drain model: Up to 200 psig (up to 14 bar). Manual drain model: 0 to 200 psig (0 to 14 bar). Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glassfiber coalescing element. Body: Aluminum. Bowl: Aluminum bowl, or extended aluminum bowl. Bowl Ring: Aluminum. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## **HIGH-CAPACITY** Series

**E1** 

## Port Sizes: 11/4 & 11/2 - Flow to 465 scfm

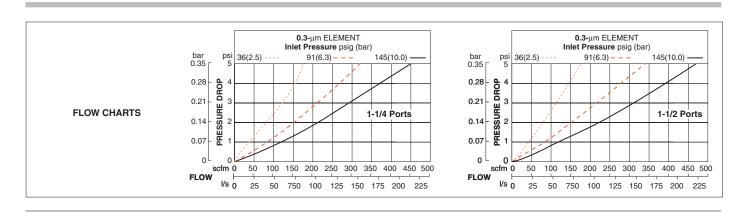
_		Model Numbersl*				
Port Size	Internal Float Drain	Ma	Manual Drain			
	Metal Bowl	Metal Bowl	Extended Metal Bowl			
<b>1</b> ¼	5X00B7019	5032B7018	5032B7028			
1½	5X00B8008	5032B8018	5032B8028			
* NPT port threads For BSPP threads add a "C" prefix to the model number e.g. C5X00B7019						

NPT port threads. For BSPP threads add a "C" prefix to the model num Models include 0.3-micron rated filter element.

Port	Bowl	Bowl Capacity		Dimensions	inches (mm)		Weight		100
Size Type	Bown Capacity	А	В	С	Depth	lb (kg)		ISC Coa	
<b>1</b> ¼, <b>1</b> ½	Standard	123-oz (3700-ml)	8.1 (204.7)	12.0 (305.1)	4.6 (117.4)	8.0 (203.2)	17.0 (7.8)		
<b>1</b> ¼, <b>1</b> ½	Extended	233-oz (7000-ml)	8.1 (204.7)	18.3 (465.1)	4.6 (117.4)	8.0 (203.2)	26.0 (11.8)		



Element Rating	Bowl Type	Element Material	Part Number	B	B
0.3-µm	Standard	Borosilicate-glass-fiber	952K77		
0.3-µm	Extended	Borosilicate-glass-fiber	953K77	Standard	
0.01.um	Standard	Borosilicate-glass-fiber	R-A106-24E8	Bowl	
0.01-µm	Extended	Borosilicate-glass-fiber	R-A106-24LE8	Exte	nded Bowl



⊢ A —

Large dual face differential Pressure Gauge included. Options: Differential Pressure Gauges: Small Slide, Large Dual Face with Reed Switch (NO-NC), refer to page E6.6. Accessories ordered separately, refer to page E6.3-4.

## STANDARD SPECIFICATIONS (for products on this page):

Construction: Fiber. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. **Inlet Pressure:** Internal float drain model: 30 to 200 psig (2 to 14 bar). Manual drain model: 0 to 200 psig (0 to 14 bar).

Filter Element: 0.3-micron rated borosilicate-glass-fiber coalescing element; optional 0.01-micron rated element. Body: Aluminum. Bowl: Aluminum bowl, or extended aluminum bowl. V-Band: Stainless steel. Seals: Nitrile.

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## **HIGH-CAPACITY** Series

## Port Sizes: 2 - Flow to 840 scfm

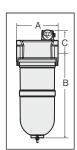
	Model Numbers*				
Port Size	Internal Float Drain	Manual Drain			
	Metal Bowl	Metal Bowl			
2	5X00B9009	5032B9018			
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B9009.					

Models include 0.3-micron rated filter element.



Port	Bowl	Bowl Capacity		Dimensions	inches (mm)		Weight	ISO Symbols -	$\wedge$
Size	Туре		Α	В	С	Depth	lb (kg)		
2	Aluminum	233-oz (7000-ml)	8.1 (204.7)	18.3 (465.1)	4.6 (117.4)	8.0 (203.2)	26.0 (11.8)	Automatic Drain	Y Manual Drain

REPLACEMENT FILTER ELEMENTS							
Element Rating Element Material Part Number							
0.3-µm	Borosilicate-glass-fiber	953K77					
0.01-µm Borosilicate-glass-fiber R-A106-24LE8							



0.3-µm ELEMENT Inlet Pressure psig (bar) bar 0.35 psi 5 36(2.5) 92(6.3) -150(10.3) -DROP 0.28 D 3 3 0.21 FLOW CHART າຊ2 0.14 0.07 뚭 1 ئیا ن scfm 0 FLOW 0 0 100 200 300 400 500 600 700 800 900 1000 l/s 0 50 100 150 200 250 300 350 400 450

## Large dual face differential Pressure Gauge included.

Options: Differential Pressure Gauges: Small Slide, Large Dual Face with Reed Switch (NO-NC), refer to page E6.6. Accessories ordered separately, refer to page E6.3-4.

## STANDARD SPECIFICATIONS (for products on this page):

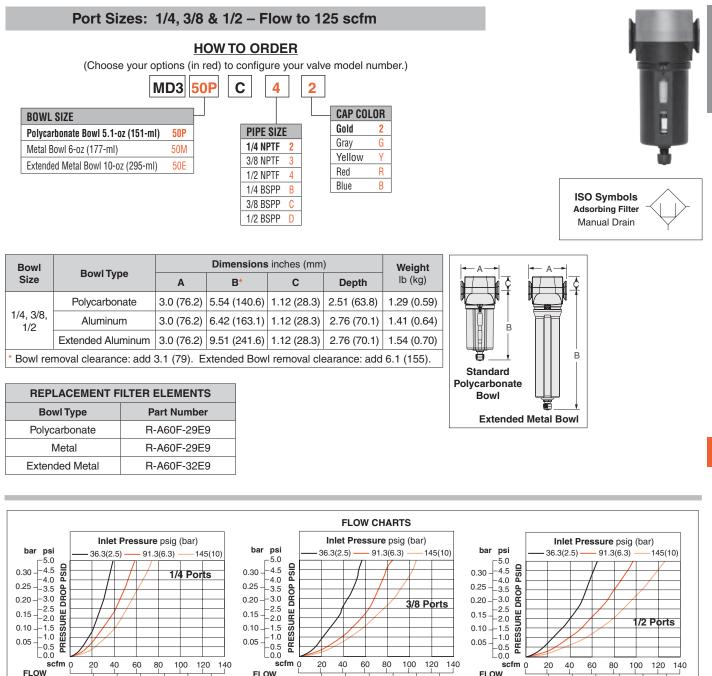
Construction: Fiber. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: Internal float drain model: 30 to 200 psig (2 to 14 bar). Manual drain model: 0 to 200 psig (0 to 14 bar). Filter Element: 0.3-micron rated borosilicate-glass-fiber coalescing element; optional 0.01-micron rated element. Body: Aluminum. Bowl: Aluminum. V-Band: Stainless steel. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## Modular Oil Vapor Removal (Adsorbing) Filters

## MD3<sup>™</sup> Series



#### Accessories ordered separately, refer to page E6.3-5.

20 40 60 80 100

10 20 30 40 50 60

## STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Fiber.

FLOW

I/s

#### Ambient/Media Temperature:

20 40 60 80 100

10 20 30 40 50 60

With polycarbonate bowl: 40° to 125°F (4° to 52°C). With metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### Inlet Pressure:

With polycarbonate bowl: 0 to 150 psig (0 to 10 bar). With metal bowl: 0 to 250 psig (0 to 17 bar).

120 140

FLOW

I/s

Filter Element: Activated carbon with urethane seals. Bowl Drain: Manual drain. Body: Die-cast zinc.

scfm 0

l/s

FLOW

20 40 60 80 100

10 20 30 40 50 60

120 140

Bowl: Polycarbonate with nylon shatterguard, aluminum bowl with clear nylon sight glass, or extended aluminum bowl with clear nylon sight glass. Seals: Nitrile.

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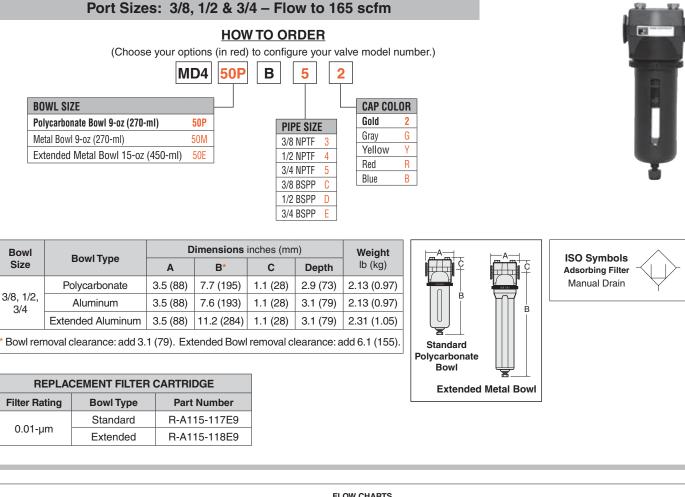
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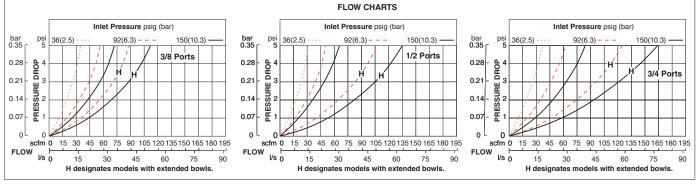
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

120 140

## Modular Oil Vapor Removal (Adsorbing) Filters

## Series MD4<sup>™</sup>





#### Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Fiber.

#### Ambient/Media Temperature:

With polycarbonate bowl: 40° to 125°F (4° to 52°C). With metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### Fiuld Media: Compressed

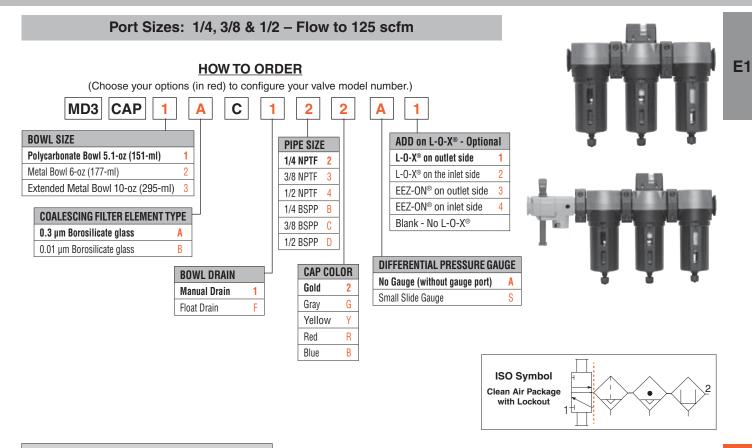
Inlet Pressure:

With polycarbonate bowl: 0 to 150 psig (0 to 10 bar). With metal bowl: 0 to 200 psig (0 to 14 bar). Bowl Drain: Manual.
Filter Cartridge: Activated carbon with urethane seals.
Body: Zinc.
Bowl: Polycarbonate bowl with steel shatterguard, aluminum bowl, or extended aluminum bowl.
Bowl Ring: Nylon.
Seals: Nitrile.



## **MD3<sup>™</sup> Series**

## Modular Clean Air Package



REPLACEMENT COALESCING ELEMENTS						
Element Rating	Part Number					
	Polycarbonate	R-A60F-23				
0.3-µm	Metal	R-A60F-29				
	Extended Metal	R-A60F-32				
	Polycarbonate	R-A60F-23E8				
0.01-µm	Metal	R-A60F-29E8				
	Extended Metal	R-A60F-32E8				

REPLACEMENT ADSORBING ELEMENTS				
Bowl Type	Part Number			
Polycarbonate	R-A60F-29E9			
Metal	R-A60F-29E9			

R-A60F-29

REPLACEMENT FILTER ELEMENTS				
Element Rating	Element Material	Part Number		
5-µm	Polyethylene	R-A60F-03PE5		

#### Accessories ordered separately, refer to page E6.3-5.

Extended Metal

## STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter, Coalescing Filter - Fiber. Ambient/Media Temperature: With polycarbonate bowl: 40° to 125°F (4° to 52°C). With metal bowl: 40° to 175°F (4° to 80°C). With metal bowl & float drain: 40° to 175°F (4° to 80°C). Inlet Pressure - Automatic drain model: With polycarbonate bowl: 30 to 150 psig (2 to 10 bar). With metal bowl: 30 to 200 psig (2 to 14 bar). Inlet Pressure - Manual drain model: With polycarbonate bowl: 0 to 150 psig (0 to 10 bar). With metal bowl: 0 to 250 psig (0 to 17 bar).

Filter Element: 5-µm-rated polyethylene.

Coalescing Filter Element: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber.
Adsorbing Filter Element: Activated carbon with urethane seals.
Bowl Drain: *Filter and Coalescing Filter:* Internal float drain or manual drain.
Adsorber Filter: Manual drain only.
Body: Die-cast zinc.
Bowl: Polycarbonate bowl with nylon shatterguard; aluminum bowl with clear nylon sight glass; extended aluminum bowl with clear nylon sight glass; extended aluminum bowl with clear nylon sight glass.
Nitrile.

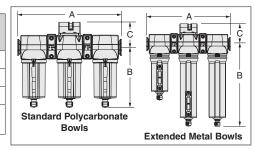
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## Modular Clean Air Package

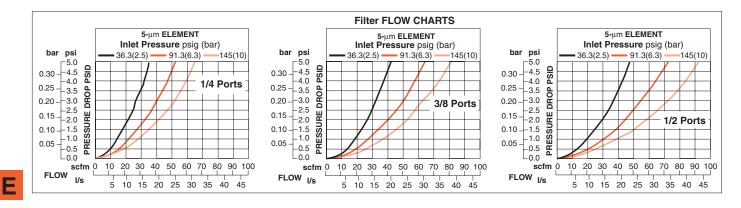
**E1** 

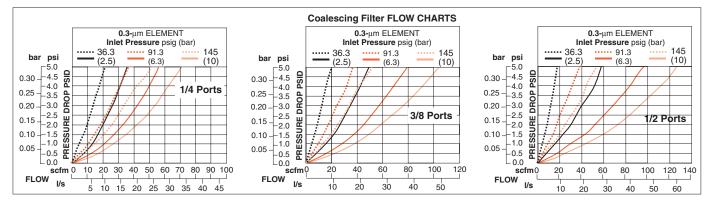
## MD3<sup>™</sup> Series

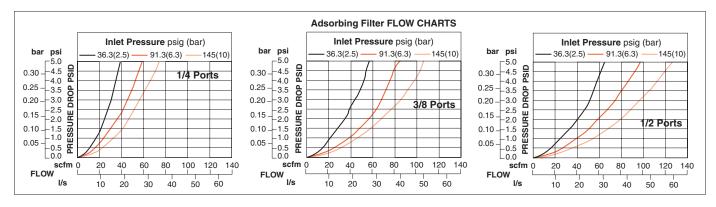
Bowl	Bowl Type		Weight				
Size	Bowriype	<b>A*</b>	B*	С	Depth	lb (kg)	
	Polycarbonate	9.58 (243.3)	5.54 (140.6)	2.38 (59.3)	2.51 (63.8)	4.3 (2.0)	
1/4, 3/8, 1/2	Aluminum	9.58 (243.3)	6.42 (163.1)	2.38 (59.3)	2.76 (70.1)	4.6 (2.1)	
1/2	Extended Aluminum	9.58 (243.3)	9.51 (241.6)	2.38 (59.3)	2.76 (70.1)	4.9 (2.2)	
* Lockout: With the lockout valve, add 2.3 (58) to dimension A. Bowl removal clearance: add 3.1 (79). Extended Bowl removal clearance: add 6.1 (155).							



## **AIR FLOW and CONSTRUCTION DATA**









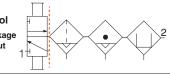
## Modular Clean Air Package

#### Port Sizes: 3/8, 1/2 & 3/4 HOW TO ORDER (Choose your options (in red) to configure your valve model number.) MD4 CAP 1 Δ В 5 2 ADD on L-O-X® - Optional **BOWL SIZE** PIPE SIZE L-O-X® on outlet side Three Polycarbonate Bowls 9-oz (266-ml) 1 3/8 NPTF 3 L-O-X<sup>®</sup> on the inlet side 2 1/2 NPTF 4 Three Metal Bowls 9-oz (266-ml) 2 EEZ-ON® on outlet side 3 5 3/4 NPTF One Metal Bowl 9 oz (266-ml) and Two 3 С 3/8 BSPP EEZ-ON® on inlet side Metal Bowls 15-oz (443-ml) Δ D 1/2 BSPP Blank - No L-O-X® **COALESCING FILTER ELEMENT TYPE** Е 3/4 BSPP **DIFFERENTIAL PRESSURE GAUGE** 0.3 µm Borosilicate glass А 0.01 µm Borosilicate glass В No Gauge (without gauge port) A **CAP COLOR** Large Dual Face Gauge L Gold 2 **BOWL DRAIN** S Small Slide Gauge Gray G Manual 1 Large Dual Face Gauge with Yellow γ F Internal Automatic Normally Open Reed Switch R 2 Red (not available on adsorber) Large Dual Face Gauge with Blue В С Internal Float drain F Normally Open Reed Switch



Series MD4<sup>™</sup>

ISO Symbol Clean Air Package with Lockout



	REPLACEMENT FILTER ELEMENTS						
Filter Type Element Rating		Bowl Type	Element Material	Part Number			
Filter	5-µm	Standard	Polyethylene	R-A115-106PE5			
Coalescing	0.3-µm	Standard	Borosilicate-glass-fiber	R-A115-117			
Coalescing	0.3-µm	Extended	Borosilicate-glass-fiber	R-A115-118			
Coalescing	0.01-µm	Standard	Borosilicate-glass-fiber	R-A115-117E8			
Coalescing	0.01-µm	Extended	Borosilicate-glass-fiber	R-A115-118E8			
Adsorbing	Standard Cartridge	Standard	Activated Carbon	R-A115-117E9			
Adsorbing	Extended Standard Cartridge	Extended	Activated Carbon	R-A115-118E9			
			·				

#### Accessories ordered separately, refer to page E6.3-5.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter, Coalescing Filter - Fiber. With polycarbonate bowl: 40° to 125°F (4° to 52°C). With metal bowl: 40° to 175°F (4° to 80°C).
Fluid Media: Compressed air.
Inlet Pressure - Automatic drain model: With polycarbonate bowl: 15 to 150 psig (1 to 10 bar).

*With metal bowl:* 15 to 200 psig (1 to 14 bar). **Inlet Pressure - Internal float drain model:** 

With polycarbonate bowl: 30 to 150 psig (2 to 10 bar). With metal bowl: 30 to 200 psig (2 to 14 bar).

#### Inlet Pressure - Manual drain model:

*With polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *With metal bowl:* 0 to 200 psig (0 to 14 bar).

**Filter Drains:** Internal automatic drains for general purpose and coalescing filters; manual drain for adsorbing filter.

Optional internal float drain on polycarbonate bowl only, consult ROSS. Filter Elements:

General Purpose: 5-micron rated polyethylene.

 $\label{eq:coalescing:0.3-micron} Coalescing: 0.3-micron rated or 0.01-micron rated borosilicate-glass-fiber; element.$ 

Adsorbing: Activated carbon with urethane seals.

**Bowls:** Polycarbonate bowls with steel shatterguards; aluminum bowl with clear nylon sight glasses on general purpose and coalescing units, or extended aluminum bowls for coalescing and adsorbing filters. **Seals:** Nitrile.

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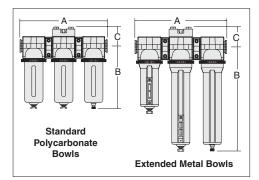
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

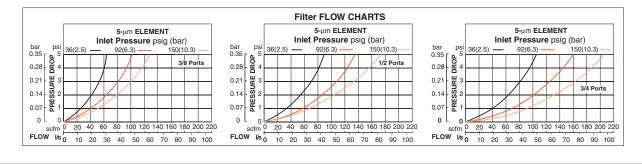
## Modular Clean Air Package

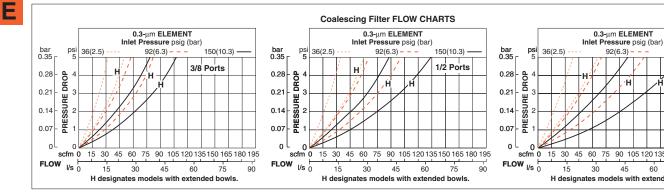
## Series MD4<sup>™</sup>

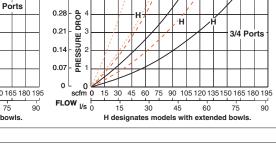
Port Size	Bowl Type	Dimensions inches (mm)				Weight	
FUIT SIZE	воштуре	<b>A*</b>	B*	С	Depth	lb (kg)	
3/8, 1/2, 3/4	Polycarbonate	10.9 (276)	7.7 (195)	2.2 (55)	2.9 (73)	6.63 (3.01)	
	Aluminum	3.5 (88)	7.7 (195)	2.2 (55)	2.9 (73)	6.63 (3.01)	
0/-	Extended Aluminum	3.5 (88)	11.2 (284)	2.2 (55)	2.9 (73)	7.00 (3.18)	
** <b>Lockout:</b> With the lockout valve, add 2.3 (58) to dimension A. Bowl removal clearance: add 3.1 (79). Extended Bowl removal clearance: add 6.1 (155).							

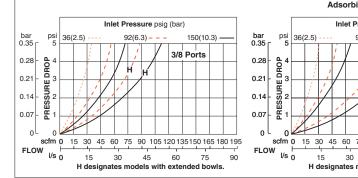


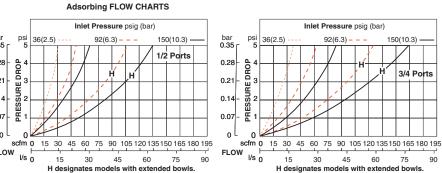
## **AIR FLOW and CONSTRUCTION DATA**













75

90

150(10.3)

150(10.3)

60

**Online Version** 

Rev. 11/14/16

3/4 Ports

### **Inline Silencers/Reclassifiers**

	Port Sizes: 1/2, 3/4 8	۶I
Port Size	Bowl Type	Model Numbers*
1/2	Polycarbonate	5055B4009
3/4	Polycarbonate	5055B5009
1	Polycarbonate	5055B6009
* NPT port threads	. For BSPP threads add a "C" prefix to the	model number e.g., C5055B4009.

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Port	C	Dimensions	inches (mm	ו)	Weight	
Size	Α	В	С	Depth	lb (kg)	B
1/2	3.5 (89)	5.5 (140)	0.7 (18)	3.5 (89)	1.3 (0.59)	
3/4	4.2 (107)	8.4 (213)	2.7 (69)	4.2 107)	2.8(1.27)	1/2 Model
1	4.2 (107)	8.4 (213)	2.7 (69)	4.2 (107)	2.8 (1.27)	3/4 & 1 Model

	REPLACEMENT FILTER ELEMENTS							
Port Size	Element Rating	Element Material	Part Number					
1/2	20-µm	Sintered Bronze	940K77					
3/4, 1	100-µm	Sintered Bronze	981K77					

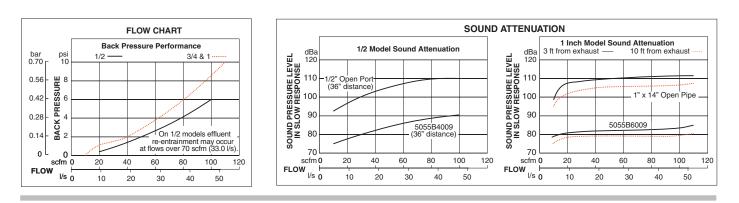


Constant-flow tests - conducted in a 14' x 22' room with a 14' ceiling. Sound pressure levels - recorded using a B & K precision impulse sound meter (model 22045), a 1-inch microphone (DB0375), a flexible extension rod (UA0196), and a random incidence corrector (UA0055). Test system was mounted on the 14-foot wall with exhaust port 4 feet from the 14-foot wall.

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B

H



#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Sintered. Ambient/Media Temperature: 40° to 125°F (4° to 51°C).

Fluid Media: Compressed air.

Inlet Pressure: 5 to 150 psig (0.3 to 10 bar). Filter Element: Sintered bronze. Bowl: Polycarbonate.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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**E1** 

1/2 Model

3/4 & 1 Model

Ε

## **Inline Drip Leg**

### **Drains**

				M	odel Numbe	rs*				
Port	with Dra	vith Drain-Cock with Ball Valve								
Size				Bowl	Capacity our	ice (ml)			Port sizes	
	<b>35</b> (1035)	<b>62</b> (1833)	<b>35</b> (103	35)	<b>62</b> (1833)	<b>120</b> (3548)	<b>230</b> (6801)	<b>340</b> (10055)	3/4 thru11/2	-
3/4	RC012-01	RC012-01-6	2 RC012-0	1-BV RC	012-01-62-B	v _	_	_		
1	RC013-01	RC013-01-6	2 RC013-0	1-BV RC	013-01-62-B	v _	_	_		
<b>1</b> ¼	RC014-01	RC014-01-6	2 RC014-0	1-BV RC	014-01-62-B	v _	_	_		
<b>1</b> ½	RC015-01	RC015-01-6	2 RC015-0	1-BV RC	015-01-62-B	v _	_	_		
2		_		R	C016-01-120	RC016-01-120	RC016-01-225	RC016-01		
NPT	port threads E	or RCDD thro		"	سيبعد الملم معر ما					10000
				SUMX to t	ne model nur	nber e.g., RC012-0	/ID.		Port size 2	T
									Port size 2	Ŧ
Port	Bowl Capacity ounce (ml)		Dimensions	inches (mn	n)	weight ⊨			ISO Symbols	
Port Size	Bowl Capacity ounce (ml)			inches (mn	n) Depth	Weight b (kg)				
Port Size	Bowl Capacity	A	Dimensions B*	inches (mn	n) Depth 4.2 (106)	Weight b (kg)		- <b>A</b>	ISO Symbols Filter	
Port Size 3/4	Bowl Capacity ounce (ml) 35 (1035)	<b>A</b> 4.5 (114)	Dimensions B* 10.6 (269)	inches (mn <b>C</b> 0.81 (21)	<ul> <li>Depth</li> <li>4.2 (106)</li> </ul>	Weight Ib (kg) 4.25 (1.93)			ISO Symbols Filter	
Port Size 3/4	Bowl Capacity ounce (ml) 35 (1035) 62 (1833)	<b>A</b> 4.5 (114) 4.5 (114)	Dimensions <b>B*</b> 10.6 (269) 16.2 (412)	inches (mn <b>C</b> 0.81 (21) 0.81 (21)	n) Depth 4.2 (106) 4.2 (106)	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)			ISO Symbols Filter	
Port Size 3/4 1	Bowl Capacity ounce (ml) 35 (1035) 62 (1833) 35 (1035)	A           4.5 (114)           4.5 (114)           5.5 (140)	Dimensions B* 10.6 (269) 16.2 (412) 10.6 (269)	inches (mn C 0.81 (21) 0.81 (21) 1.4 (36)	<ul> <li>Depth</li> <li>4.2 (106)</li> <li>4.2 (106)</li> <li>4.2 (106)</li> </ul>	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)           4.25 (1.93)			ISO Symbols Filter	
Port Size 3/4	Bowl Capacity ounce (ml) 35 (1035) 62 (1833) 35 (1035) 62 (1833)	A           4.5 (114)           4.5 (114)           5.5 (140)           5.5 (140)	Dimensions B* 10.6 (269) 16.2 (412) 10.6 (269) 16.2 (412)	inches (mn C 0.81 (21) 0.81 (21) 1.4 (36) 1.4 (36)	<ul> <li>Depth</li> <li>4.2 (106)</li> <li>4.2 (106)</li> <li>4.2 (106)</li> <li>4.2 (106)</li> </ul>	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)           4.25 (1.93)           5.00 (2.25)           4.50 (2.04)           5.81 (2.37)	-A - 1 B B D D T S T S C B C C C C C C C C C C C C C C C C C		ISO Symbols Filter	
Port Size 3/4 1 1¼	Bowl Capacity ounce (ml) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 35 (1035)	A           4.5 (114)           4.5 (114)           5.5 (140)           5.5 (140)           5.5 (140)	Dimensions B* 10.6 (269) 16.2 (412) 10.6 (269) 16.2 (412) 11.2 (285)	inches (mn <b>C</b> 0.81 (21) 0.81 (21) 1.4 (36) 1.4 (36) 1.4 (36)	Depth           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)           4.25 (1.93)           5.00 (2.25)           4.50 (2.04)           5.81 (2.37)			ISO Symbols Filter	
Port Size 3/4 1	Bowl Capacity ounce (ml) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 35 (1035) 62 (1833)	A           4.5 (114)           4.5 (114)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)	Dimensions B* 10.6 (269) 16.2 (412) 10.6 (269) 16.2 (412) 11.2 (285) 16.7 (424)	inches (mn C 0.81 (21) 0.81 (21) 1.4 (36) 1.4 (36) 1.4 (36) 1.4 (36)	Depth           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)           4.25 (1.93)           5.00 (2.25)           4.50 (2.04)           5.81 (2.37)           4.50 (2.04)           5.81 (2.37)	-A - 1 B B Dort sizes		ISO Symbols Filter	
Port Size 3/4 1 1¼	Bowl Capacity ounce (ml) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 120 (3548)	A           4.5 (114)           4.5 (114)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.1 (140)           5.5 (140)	Dimensions B* 10.6 (269) 16.2 (412) 10.6 (269) 16.2 (412) 11.2 (285) 16.7 (424) 11.2 (285) 16.7 (424) 15.5 (394)	inches (mn C 0.81 (21) 0.81 (21) 1.4 (36) 1.4 (36) 1.4 (36) 1.4 (36)	Depth           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)           4.25 (1.93)           5.00 (2.25)           4.50 (2.04)           5.81 (2.37)           4.50 (2.04)	-A - 1 B B Dort sizes		ISO Symbols Filter	
Port Size 3/4 1 1¼	Bowl Capacity ounce (ml) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 35 (1035) 62 (1833) 35 (1035) 62 (1833)	A           4.5 (114)           4.5 (114)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)           5.5 (140)	Dimensions B* 10.6 (269) 16.2 (412) 10.6 (269) 16.2 (412) 11.2 (285) 16.7 (424) 11.2 (285) 16.7 (424)	inches (mn C 0.81 (21) 1.4 (36) 1.4 (36) 1.4 (36) 1.4 (36) 1.4 (36) 1.4 (36)	Depth           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)           4.2 (106)	Weight Ib (kg)           4.25 (1.93)           5.00 (2.25)           4.25 (1.93)           5.00 (2.25)           4.50 (2.04)           5.81 (2.37)           4.50 (2.04)           5.81 (2.37)	ort sizes 4 thru1½		ISO Symbols Filter	

The ROSS Drip Leg Drain replaces conventional welded drip legs through improvements in both performance and serviceability resulting in increased machine productivity.

The ROSS Drip Leg Drain has a baffling device that increases the contamination removal efficiency by requiring the air to make more direction changes than a standard drip leg drain. This efficiency gain puts less contamination at the point of filtration, allowing the filter to function longer before maintenance is necessary.

#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Ambient/Media Temperature: 40° to 175° F (4° to 79°C). Fluid Media: Compressed air. Inlet Pressure: 15 to 200 psig (1 to 14 bar). Filter Drain: Drain-cock or Ball valve.

Add 3.5 inches (89 mm) to Dimension "B" and 0.29 lb (0.13 kg) to weight for units with Ball valves (BV option).

Heads: Aluminum. Bowl Rings: Aluminum. Seals: Nitrite.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.





**E1** 







# ROSS CONTROLS®

## **PRESSURE REGULATORS**



#### **PRESSURE REGULATORS – KEY FEATURES**

- Two design options available: • Piston design for highest air flow
  - Diaphragm design for high sensitivity and quick response
- Modular or Inline Mounting options
- Pressure Gauge included
- Removable Adjusting Knob for tamper resistance
- Self-relieving or non-relieving options •
- Reverse Flow option available on some regulator models
- T-Handle option available on some regulator models

			AVA		BLE	POR	T SI	ZES			MOU	NTING	FLOW	CONSTR	RUCTION		OF	ντιο	NS		
REGULATOR TYPE/SERIES	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	3	INLINE	MODULAR	MAX FLOW (scfm)	PISTON	DIAPHRAM	SELF RELIEVING	NON RELIEVING	REVERSE FLOW	T-HANDLE	LOCKING KNOB	Page
REGULATORS																					
RIGHT ANGLE													55								E2.3
BANTAM													23								E2.4
MINIATURE													40								E2.5
MID-SIZE													100								E2.6
MD3™													120								E2.7
FULL-SIZE													155								E2.8
MD4™													220								E2.9
HIGH-CAPACITY													800								E2.10
HIGH-PRESSURE	REG	ULA	TOR	S																	
HIGH-PRESSURE													70								E2.11
PRECISION REGU	LATO	ORS																			
MINIATURE													4								E2.12
FULL-SIZE													155								E2.13
MD4™													170								E2.14
HIGH-CAPACITY													800								E2.15
REMOTE PILOT RE	EGUI	ATC	RS																		
FULL-SIZE													155								E2.16 - E2.18
MD4™													190								E2.19
HIGH-CAPACITY													4000								E2.20 - E2.22
RELIEF VALVES	RELIEF VALVES																				
MINIATURE													40								E2.23
HIGH-FLOW													450								E2.24
PROPORTIONAL V	ALV	ES																			
RER Series													1000								E2.25
RB-RER Series													4000								E2.26

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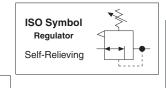


#### Port Sizes: 1/8, 1/4, 3/8 & 1/2 - Flow to 55 scfm

	Models with Threaded Banjo								
Port	Size	Model	-	n <b>sions</b> s (mm)	Tightening Torque				
Port 1 (female threads)	Port 2 (male threads)	Number	А	В	<b>Max.</b> Ft-lb (Nm)				
1/8	1/8	5214A1010	0.7 (17)	2.9 (74)	7.38 (10)				
1/4	1/4	5214A2010	0.7 (17)	3.2 (81)	8.85 (12)				
3/8	3/8	5214A3010	0.9 (22)	3.5 (88)	14.75 (20)				
1/2	1/2	5214A4010	1.1 (27)	3.5 (89)	22.13 (30)				
G1/8	G1/8	D5214A1010	0.7 (17)	2.9 (74)	11.06 (15)				
G1/4	G1/4	D5214A2010	0.7 (17)	3.2 (81)	14.75 (20)				
G3/8	G3/8	D5214A3010	0.9 (22)	3.5 (88)	22.13 (20)				
G1/2	G1/2	D5214A4010	1.1 (27)	3.5 (89)	22.50 (30)				



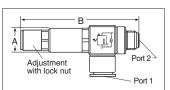
**RIGHT-ANGLE Series** 



E2

F

	Models	with Push-to-	Connect	Fitting		
Port	Size	Valve Model		n <b>sions</b> s (mm)	Tightening Torque Max.	
Port 1 <sup>#</sup> (tube size)	Port 2** (thread size)	Number	А	В	Ft-lb (Nm)	
5/32"	1/8	5214A1115	0.7 (17)	2.9 (73)	11.06 (15)	
1/4"	1/8	5214A1120	0.7 (17)	2.9 (73)	11.06 (15)	
1/4"	1/4	5214A2120	0.7 (17)	3.2 (81)	14.75 (20)	
3/8"	1/4	5214A2130	0.7 (17)	3.2 (81)	14.75 (20)	
3/8"	3/8	5214A3130	0.9 (22)	3.5 (88)	22.13 (30)	
4 mm	G1/8	D5214A1140	0.5 (13)	2.9 (73)	7.38 (10)	
6 mm	G1/8	D5214A1160	0.5 (13)	2.9 (73)	7.38 (10)	
8 mm	G1/8	D5214A1180	0.5 (13)	2.9 (73)	7.38 (10)	
6 mm	G1/4	D5214A2160	0.7 (17)	3.2 (81)	8.85 (12)	
8 mm	G1/4	D5214A2180	0.7 (17)	3.2 (81)	8.85 (12)	
10 mm	G1/4	D5214A2110	0.7 (17)	3.2 (81)	8.85 (12)	
8 mm	G3/8	D5214A3180	0.9 (22)	3.5 (88)	14.75 (20)	
10 mm	G3/8	D5214A3110	0.9 (22)	3.5 (88)	14.75 (20)	
# Port 1 tubing	g size in inche	s (") or millimete	rs (mm). **	Port 2 threa	ads are male.	



В

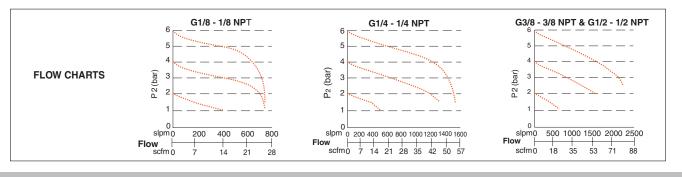
Adjustment with lock nut

Å

T

Port 2

Port 1



#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Self-relieving. Ambient/Media Temperature:  $15^{\circ}$  to  $160^{\circ}$ F (- $10^{\circ}$  to  $70^{\circ}$ C). Flow Media: Filtered air. Inlet Pressure: 15 to 240 psig (1 to 17 bar). Regulated Pressure Range: 15 to 120 psig (1 to 8 bar).

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Online Version Rev. 11/14/16

### **Modular Regulators**

### **BANTAM Series**

	Port Sizes: 1/8, 1/4 & 3/8 – Flow to 23 scfm								
			Model N	lumbers					
Port		Piston			Diaphragm				
Size			Regulated Pres	ssure psig (bar)					
	<b>0-50</b> (0-3.4)	<b>0-100</b> (0-6.9)	<b>0-125</b> (0-8.6)	<b>0-50</b> (0-3.4)	<b>0-100</b> (0-6.9)	<b>0-125</b> (0-8.6)			
With T	HREADED POI	RTS*			`				
1/8	5B01C0030	5B01C0010	5B01C0050	5B01C0040	5B01C0020	5B01C0060			
1/4	5B02C0030	5B02C0010	5B02C0050	5B02C0040	5B02C0020	5B02C0060			
With G	uick Connect	TUBE FITTING	S						
1/4	5B03C0030	5B03C0010	5B03C0050	5B03C0040	5B03C0020	5B03C0060			
3/8	5B04C0030	5B04C0010	5B04C0050	5B04C0040	5B04C0020	5B04C0060			
4mm	5B05C0030	5B05C0010	5B05C0050	5B05C0040	5B05C0020	5B05C0060			

5B06C0050

5B07C0050

5B08C0050

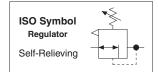
NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5B01C0030.

5B06C0040

5B07C0040

5B08C0040





1/8, 1/4	
Models bel	0
1/4	
3/8	
4 mm	

6mm

8mm

10mm

5B06C0030

5B07C0030

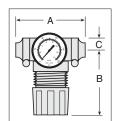
5B08C0030

Port Size	[	Dimensions	)	Weight			
Port Size	Α	В	С	Depth*	lb (kg)		
No Port	1.7 (43)	2.6 (67)	0.5 (13)	1.8 (45)	0.21 (0.09)		
1/8, 1/4	3.0 (76)	2.6 (67)	0.5 (13)	1.8 (45)	0.43 (0.19)		
Models bei	Models below have quick-connect tube fittings.						
1/4	3.4 (86)	2.6 (67)	0.5 (13)	1.8 (45)	0.21 (0.09)		
3/8	3.9 (99)	2.6 (67)	0.5 (13)	1.8 (45)	0.21 (0.09)		
4 mm	3.4 (86)	2.6 (67)	0.5 (13)	1.8 (45)	0.41 (0.18)		
6 mm	3.4 (86)	2.6 (67)	0.5 (13)	1.8 (45)	0.41 (0.18)		
8 mm	3.1 (79)	2.6 (67)	0.5 (13)	1.8 (45)	0.41 (0.18)		
10 mm	3.9 (99)	2.6 (67)	0.5 (13)	1.8 (45)	0.41 (0.18)		
* Less gau	ge.						

5B06C0010

5B07C0010

5B08C0010



5B06C0020

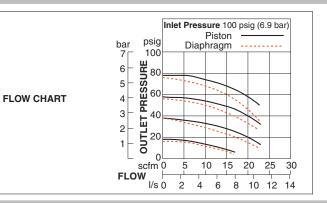
5B07C0020

5B08C0020

5B06C0060

5B07C0060

5B08C0060



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Piston or diaphragm. Self-relieving, for non-relieving option consult ROSS. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 150 psig (10 bar) maximum. Outlet Pressure: Adjustable up to 100 psig (7 bar).

Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 gauge ports front and rear. Panel Mounting: 1-3/16 inch (30 mm) hole required. Body: Acetal. Dome and Knob: Acetal. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

F



### **Inline Regulators**

0-50 (0-3.4)

5212C1004

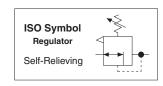
5212C2004

Port Size

1/8

1/4





Port Size	C	1)	Weight*			
	А	В	С	Depth*	lb (kg)	
1/8, 1/4	1.6 (41)	2.7 (68)	0.4 (10)	1.6 (41)	0.24 (0.11)	
* Less gaug	e.			*		

Piston

0-100 (0-6.9)

5211C1004

5211C2004

Port Sizes: 1/8 & 1/4 - Flow to 40 scfm

0-125 (0-8.6)

5213C1004

5213C2004

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5212C1004.

Model Numbers\*

Regulated Pressure psig (bar)

**0-50** (0-3.4)

5212C1005

5212C2005

Diaphragm

0-100 (0-6.9)

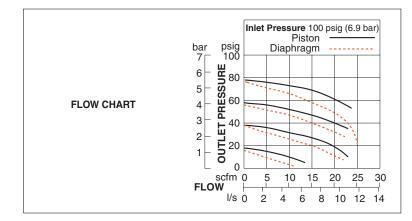
5211C1005

5211C2005

B

0-125 (0-8.6)

5213C1005 5213C2005



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Piston or diaphragm. Self-relieving, for non-relieving option consult ROSS. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear.
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Body: Aluminum.
Dome and Knob: Acetal.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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Online Version Rev. 11/14/16

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#### Port Sizes: 1/4, 3/8 & 1/2 - Flow to 100 scfm

	Model Numbers*					
Port Size	Pressure Range psig (bar)					
	<b>0-50</b> (0-3.4 )	<b>0-100</b> (0-6.9)	<b>0-150</b> (0-10.3)			
1/4	5212B2015	5211B2015	5213B2015			
3/8	5212B3015	5211B3015	5213B3015			
1/2 5212B4015 5211B4015 5213B4015						
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5212B2015.						

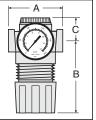
**E2** 

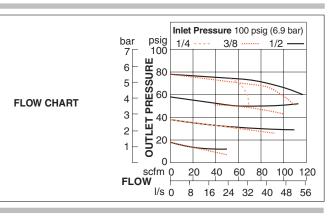
REGULATORS with REVERSE FLOW					
	Regulated	Model Numbers*			
Port Size	Pressure Range	Pressure Adjustment			
psig (bar)		Knob	T-Handle		
1/4	0-100 (0-6.9)	5X00B2035	5X00B2039		
3/8 0-100 (0-6.9) 5X00B3024 5X00B3021					
1/2 0-100 (0-6.9) 5X00B4023 5X00B4041					
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B2035.					

ISO Symbol Regulator Self-Relieving

Port Size		Dimensions	inches (mm)		Weight*
10110120	Α	В	С	Depth*	lb (kg)
1/4, 3/8, 1/2	2.7 (68)	3.3 (83)	1.3 (33)	2.1 (52)	1.0 (0.46)
*Less gauge.					

**Reverse-Flow Regulators** provide regulated in-to-out pressure control, plus quick exhausting from out-to-in. Used for downstream pressure regulation of weld guns and other applications requiring quick exhausting through the regulator.





#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

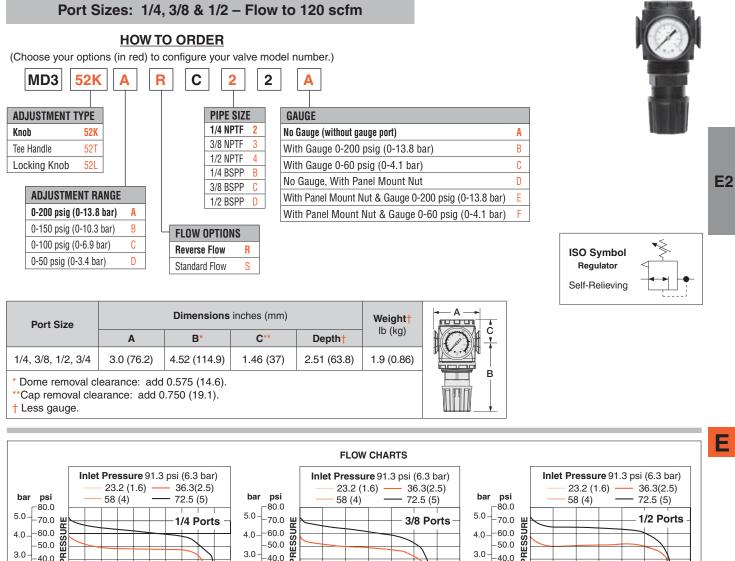
#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Piston. Self-relieving, for non-relieving option consult ROSS. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 250 psig (17 bar) maximum. Outlet Pressure: Adjustable up to 150 psig (10 bar). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.

Panel Mounting: 1-9/16 inch (40 mm) hole required. Body: Zinc. Cap: Nylon. Dome: Acetal. Knob: Acetal. Seals: Nitrile.



### MD3<sup>™</sup> Series



PRF -40.0 -40.0 -40.0 2.0-30.0 2.0-30.0 -30.0 2.0 \_20.0 Ę 20.0 **HO** -20.0 **Ĕ** 1.0 1.0 -10.0 **ठ** -10.0 **õ** 0.0 0.0 0.0 scfm 0 FLOW 50 60 70 80 90 100 100 scfm 0 10 20 30 40 scfm 0 20 40 60 80 120 140 20 40 60 80 100 FLOW I/s FLOW I/s 10 15 20 25 30 35 40 45 5 10 20 30 40 50 60 10 20 30 40 50

Accessories ordered separately, refer to page E6.3-5.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm.

Self-relieving, for non-relieving option consult ROSS. Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

Fluid Media: Compressed Air.

Inlet Pressure: 300 psig (21 bar) maximum.

Outlet Pressure: Adjustable up to 200 psig (14 bar); optional adjusting springs.

Optional Pressure Adjustment Locking Key: Removable. Pressure Gauge: 0-200 psig (0-14 bar) or 0-60 psig (0-4 bar); 1/4-NPT gauge ports front and rear.

Panel Mounting: 2-1/16 inch (52 mm) hole required. Self-relieving: Non-relieving optional. Body: Zinc. Dome: Nylon. Knob: Acetal. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.

1.0-

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

120 140

60

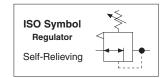
### **FULL-SIZE Series**

#### Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 155 scfm

		Model Numbers*				
Port Size	ort Size Pressure Range psig (bar)					
	<b>0-50</b> (0-3.4)	<b>0-125</b> (0-8.6)	<b>0-175</b> (0-12.1)			
1/4	5212B2017	5211B2017	5213B2017			
3/8	5212B3017	5211B3017	5213B3017			
1/2	5212B4017	5211B4017	5213B4017			
3/4	5212B5027	5211B5027	5213B5027			

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5212B2017.



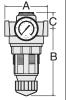


REGULATORS with REVERSE FLOW				
	Model Numbers*			
Port Size	Pressure Adjustment 0-125 (0-8.6)			
	Knob	T-Handle		
1/4	5X00B2010	-		
3/8	5X00B3004	5X00B3012		
1/2 5X00B4004 5X00B4047				
3/4 5X00B5034 5X00B5044				
NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B2010.				

Ε

**E2** 

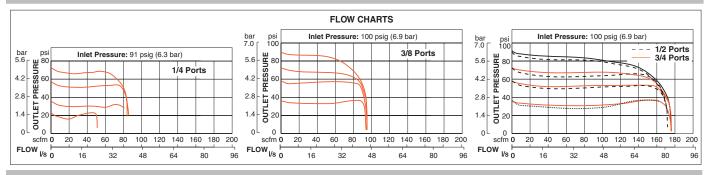
Port Size	Di	Weight <sup>+</sup>				
1 011 0120	Α	B**	C***	Depth <mark>†</mark>	lb (kg)	Γ
1/4, 3/8, 1/2, 3/4	3.5 (89)	5.8 (146)	1.3 (33)	2.8 (71)	2.06 (0.92)	٦ 



\*\* Dome removal clearance: add 0.63 (16).

\*\*\* Cap removal clearance: add 0.5 (13).

+ Less gauge.



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

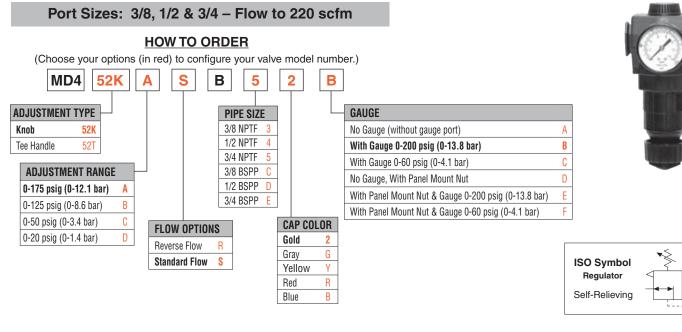
Construction: Diaphragm.

Self-relieving, for non-relieving option consult ROSS. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable up to 175 psig (12 bar). Pressure Adjustment Locking Key: Removable. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.

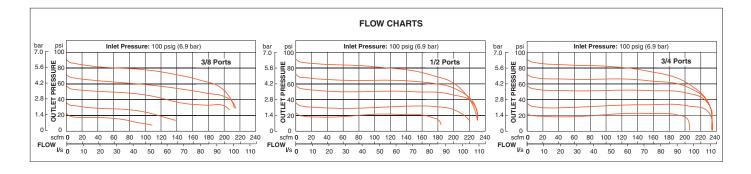
Panel Mounting: 2-1/16 inch (52 mm) hole required. Body: Zinc. Dome: Nylon; aluminum with optional 0 to 175 psig (0 to 12 bar) spring. Knob: Acetal. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.



### **MD4<sup>™</sup> Series**



Port	Dimensions inches (mm)			sions inches (mm) Weight †		
Size	А	B*	C**	Depth †	lb (kg)	
3/8, 1/2, 3/4	3.5 (87)	5.6 (142)	1.6 (40)	2.9 (73)	2.56 (1.16)	
**Cap remova	al clearance:	l clearance: add 0.625 (16). clearance: add 0.50 (13). reflect less gauge.				



#### Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm.

Self-relieving, for non-relieving option consult ROSS. **Ambient/Media Temperature:** 40° to 175°F (4° to 80°C). **Fluid Media:** Compressed air. **Inlet Pressure:** 300 psig (21 bar) maximum.

**Outlet Pressure:** Adjustable up to 175 psig (12 bar); optional adjusting springs.

Pressure Adjustment Locking Key: Removable.

Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.
Panel Mounting: 2-1/16 inch (52 mm) hole required.
Body: Zinc.
Dome: Nylon; aluminum with optional 0 to 175 psig (0 to 12 bar) spring.
Knob: Acetal.
Seals: Nitrile.
Valve: Brass.
Valve Cap: Nylon.



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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

### **HIGH-CAPACITY** Series

#### Port Sizes: 3/4, 1, 11/4 & 11/2 - Flow to 800 scfm

	Model Numbers*				
Port Size	Pressure Range psig (bar)				
	<b>0-50</b> (0-3.4 )	<b>0-100</b> (0-6.9)			
3/4	5212D5017	5211D5017			
1	5212D6017	5211D6017			
1¼	5212C7017	5211C7017			
1½ 5212C8017 5211C8017					
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5212D5017.					

**E2** 

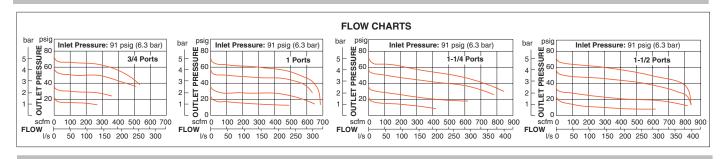
REGULATORS with REVERSE FLOW:					
Model Numbers*					
Port Size	Pressure Range psig (bar)	Pressure Adjustment			
	1.0 3 (0.07)	Knob	T-Handle		
3/4	0-100 (0-6.9)	5X00B5049	5X00B5050		
1	0-100 (0-6.9)	5X00D6003	5X00B6038		
1¼	0-100 (0-6.9)	5X00C7003	5X00B7016		
1½ 0-100 (0-6.9) 5X00C8001 5X00B8024					
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B5049.					

ISO Symbol Regulator Self-Relieving

Port Size		Dimensions inches (mm)				
FULL SIZE	Α	B**	C***	Depth †	lb (kg)	
3/4, 1	4.4 (111)	6.1 (154)	2.4 (62)	2.8 (71)	2.19 (0.99)	
1¼, 1½	4.9 (124)	6.4 (162)	2.1 (54)	2.8 (71)	2.50 (1.14)	
** Dome removal clearance: add 0.63 (16).						

\*\*\* Cap removal clearance: add 0.65 (16.5).

† Dimensions reflect less gauge.



Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Piston.

Self-relieving. **Ambient/Media Temperature:** 40° to 175°F (4° to 80°C). **Fluid Media:** Compressed air. **Inlet Pressure:** 300 psig (21 bar) maximum. **Outlet Pressure:** Adjustable up to 100 psig (7 bar). **Pressure Adjustment Locking Key:** Removable. **Pressure Gauge:** 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.

Panel Mounting: 2-1/16 inch (52 mm) hole required.
Body: Aluminum.
Dome: Nylon; aluminum with optional 0 to 150 psig (0 to 10 bar) spring.
Knob: Acetal
Seals: Nitrile.
Valve: Brass.
Valve Cap: Nylon.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

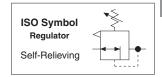
ROSS

### **Inline High-Pressure Regulators**

### Port Sizes: 1/8, 1/4 & 3/8 - Flow to 70 scfm

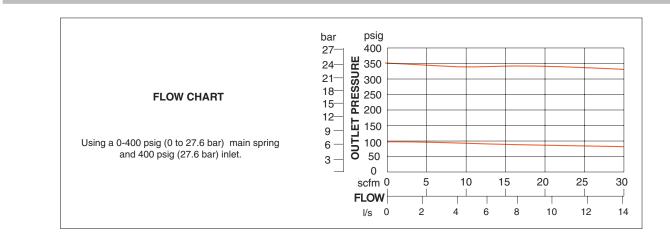
	Model Numbers*				
Port Size	Piston Type				
	Relieving	Non-relieving			
1/8	5215B1004 5X00B1025				
1/4	5215B2004 5X00B2076				
3/8	5215B3004 5X00B3052				
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5215B1004.					





Ε

		Dimensions in	Weight**			
Port Size	А	В	B C Depth**		lb (kg)	
1/8, 1/4	1.9 (47)	7.3 (186) max	0.4 (10)	1.9 (47)	1.15 (0.53)	
3/8	2.1 (54)	7.4 (188) max	0.5 (13)	2.1 (54)	1.30 (0.59)	c
** Less ga	uge.					



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Piston. Self-relieving, Non-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 400 psig (28 bar) maximum. Outlet Pressure: Adjustable up to 390 psig (27 bar).

Pressure Gauge: 0 to 600 psig (0 to 40 bar). Body and Dome: Aluminum. Knob: Nylon. Seals: Fluororelastomer. Max Flow Rate: 70 scfm (33.0 l/s) @400 psi (28 bar).

**HIGH-PRESSURE** Series

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

### **MINIATURE Series**

#### Port Sizes: 1/8 & 1/4 - Flow to 4 scfm

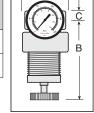
Port Size	Regulated Pressure Range# psig (bar)	Model Numbers*
1/8	0-50 (0-3.4)	5212C1006
1/4	0-50 (0-3.4)	5212C2006

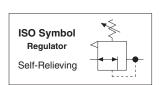
# For 0-10 psig (0-0.7 bar), 0-20 psig (0-1.4 bar), and 0-60 psig (0-4.1 bar) ranges, consult ROSS.

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5212C1006.

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-		2	r	
		-		

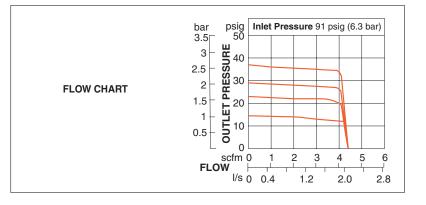
Port Size		Weight**				
Port Size	А	вС		Depth**	lb (kg)	
1/8, 1/4	1.8 (44)	3.4 (86)	0.4 (10)	1.8 (44)	0.38 (0.16)	
**Less gauge.						





**Precision Regulators** have a small valve seat and a large diaphragm area, a combination that allows greater precision, sensitivity, adjustment resolution, and less variation in regulated pressure.

Ε



#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear.
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Body: Aluminum.
Dome and Knob: Acetal.
Seals: Nitrile.

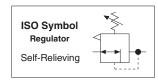


### **Modular Precision Regulators**

#### Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 155 scfm Internally Piloted Regulator Model Numbers\* Port Size Pressure Range psig (bar) 15-200 (1-13.8) 15-250 (1-17.2) 5213C2018 5214C2018 1/4 3/8 5213C3018 5214C3018 1/25213C4018 5214C4018 3/4 5213C5018 5214C5018 NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5213C2018.



**E2** 



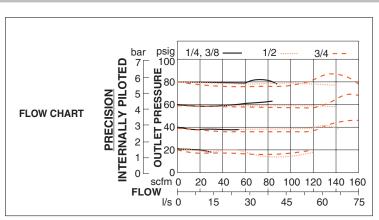
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В

Port Size		Weight†			
1 011 0120	Α	B**	C***	Depth†	lb (kg)
1/4, 3/8, 1/2, 3/4	3.5 (89)	4.2 (106)	1.3 (33)	2.8 (71)	2.06 (0.92)
** Dome removal clearance: add 0.63 (16). *** Cap removal clearance: add 0.5 (13).					

Less gauge.

Precision internal Pilot Regulators provide improved torque control for pneumatic tools; diaphragm type. Pressure settings held within 3 psig (0.2 bar).



Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable 15 to 250 psig (1 to 17 bar). Pressure Adjustment Locking Key: Removable. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.

Panel Mounting: 2-1/16 inch (52 mm) hole required. Body: Zinc. Dome: Nylon; aluminum with optional 0 to 175 psig (0 to 12 bar) spring. Knob: Acetal. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.

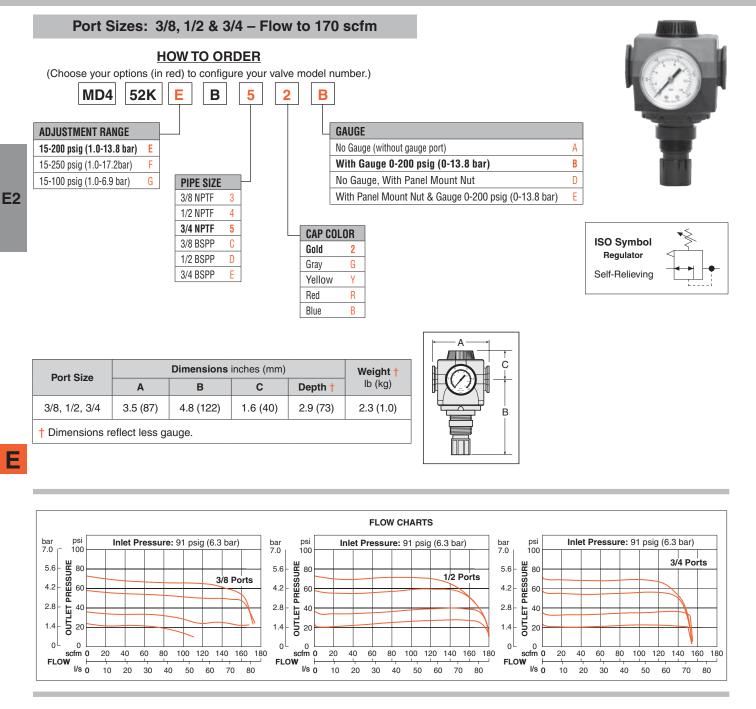
**FULL-SIZE Series** 

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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### MD4<sup>™</sup> Series



#### Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 250 psig (17 bar) maximum. Outlet Pressure: Adjustable 15 to 250 psig (1 to 17 bar). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Panel Mounting: 2-1/16 (52 mm) hole required.
Body and Dome: Zinc.
Bonnet and Knob: Acetal.
Seals: Nitrile.
Valve: Brass.
Precision Regulators: Provide improved torque control for pneumatic tools; diaphragm type. Pressure settings held within 3 psig (0.2 bar).



### **Inline Precision Regulators**

### **HIGH-CAPACITY Series**

#### Port Sizes: 3/4, 1, 1<sup>1</sup>/<sub>4</sub>, 1<sup>1</sup>/<sub>2</sub> – Flow to 800 scfm

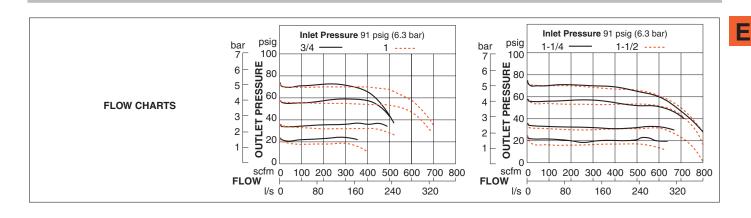
	Model Numbers*					
Port Size	Pressure Range psig (bar)					
	<b>15-200</b> (1-13.8)	<b>15-250</b> (1-17.2)				
3/4	5213D5017	5214D5017				
1	5213D6017	5214D6017				
1¼	5213D7017	5214D7017				
1½	5213D8017	5214D8017				
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5214D5017.						



**E2** 

ISO Symbol Regulator Self-Relieving

Port		Dimensions	inches (mm)	Weight †		
Size	А	В	С	Depth †	lb (kg)	
3/4, 1	4.4 (111)	4.6 (112)	2.4 (62)	2.8 (71)	2.0 (0.91)	
1¼, 1½	4.9 (124)	4.9 (125)	2.1 (54)	2.8 (71)	2.38 (1.08)	
† Dimension	is reflect less	gauge.				



#### **Precision Regulators:**

Provide improved torque control for pneumatic tools. Pressure settings held within 3 psig (0.2 bar).

#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable 15 to 250 psig (1 to 17 bar). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Panel Mounting: 1-3/16 (30 mm) hole required. Body: Aluminum. Bonnet and Knob: Acetal. Dome: Zinc. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.

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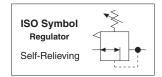
#### Port Sizes: 1/4, 3/8, 1/2, 3/4 - Flow to 155 scfm

	Model Numbers* Pressure Range psig (bar)				
Port Size					
	<b>0-200</b> (0-13.8)				
1/4	5211C2007				
3/8	5211C3007				
1/2	5211C4007				
3/4	5211C5007				
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5211C2007.					

**E2** 

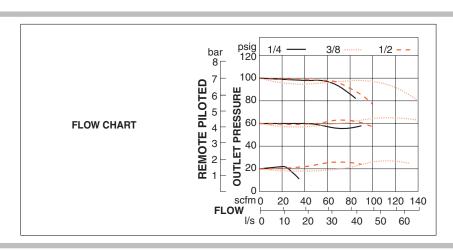
		5 131
		S. D. W.
	100	1
	- 10	1 14
		-

**FULL-SIZE Series** 



Port Size		Dimensions	ו)	Weight+		
1 011 0120	А	B**	C***	Depth <sup>†</sup>	lb (kg)	
1/4, 3/8, 1/2, 3/4	3.5 (89)	2.4 (62)	1.3 (33)	2.8 (71)	2.06 (0.92)	Г
** Dome removal of *** Cap removal c † Less gauge.		B				

Remote Pilot Regulators use any small regulator to provide remote adjustment and to ensure accurate pressure control.



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

 Construction: Diaphragm. Self-relieving.
 Image: Self-relieving.

 Ambient/Media Temperature: 40° to 175°F (4° to 80°C).
 Image: Self-relieving.

 Fluid Media: Compressed air.
 Image: Self-relieving.

 Inlet Pressure: 300 psig (21 bar) maximum.
 Self-relieving.

 Outlet Pressure: Adjustable 0 to 125 psig (0 to 14 bar).
 Self-relieving.

 Pressure Adjustment Locking Key: Removable.
 Self-relieving.

 Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.
 Self-relieving.

Panel Mounting: 2-1/16 inch (52 mm) hole required. Body: Zinc. Dome: Zinc. Knob: Acetal. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.



### **Modular Remote High-Relief Pilot Regulators**

Model Numbers\*

5X00B2037

5X00B3025

5X00B4040

5X00B5035

Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 150 scfm

Port Size

1/4

3/8

1/2

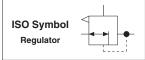
3/4

e.g., C5X00B2037.

### **FULL-SIZE Series**

**E2** 

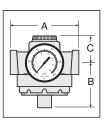
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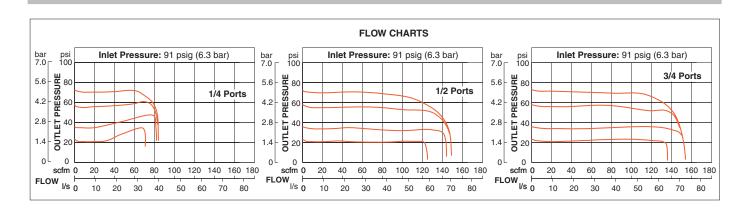


ISO Symbol Regulator	
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Dant Cine		Weight †					
Port Size	А	В	с	Depth †	lb (kg)		
1/4, 3/8, 1/2, 3/4	3.5 (87)	2.4 (62)	1.3 (33)	2.8 (71)	2.06 (0.92)		
Dimensions reflect less gauge.							

\* NPT port threads. For BSPP threads add a "C" prefix to the model number





#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable 0 to 200 psig (0 to 14 bar). Pilot Ports: 1/4 NPTF.

Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Body and Dome: Zinc. Seals: Nitrile; Fluororelastomer seals optional, consult ROSS. Valve: Brass. Valve Cap: Nylon.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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### Inline Premium High-Relief Remote Pilot Regulators

#### Port Sizes: 1/4, 3/8 & 1/2 - Flow to 150 scfm

Port Size	Model Numbers*
1/4	5216A2007
3/8	5216A3007
1/2	5216A4007

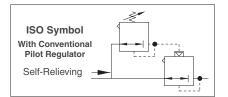
\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5216A2007.

**E2** 

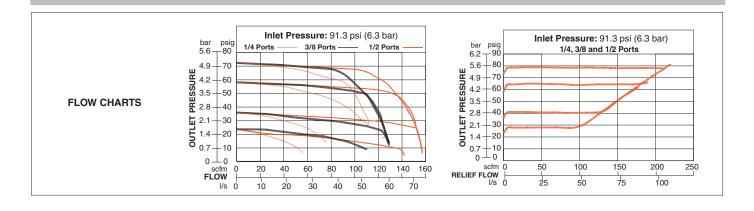
Port Size		Weight+			
FUIT SIZE	А	A B** C***		Depth†	lb (kg)
1/4, 3/8, 1/2	4.18 (106)	1.54 (39.1)	3.52 (89.3)	4.18 (106)	4.84 (2.2)
<ul> <li>** Dome removal clearance: add 0.63 (16).</li> <li>*** Cap removal clearance: add 0.5 (13).</li> <li>† Less gauge.</li> </ul>					

**FULL-SIZE Series** 





Ε



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

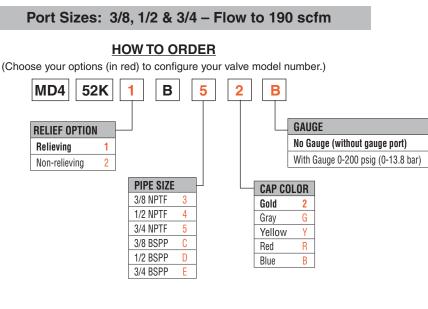
Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 0° to 158°F (-18° to 70°C). Fluid Media: Compressed air. Inlet Pressure: 400 psig (28 bar) maximum. Outlet Pressure: Adjustable up to 250 psig (17 bar). Pressure Gauge: 0 to 200 psig (0 to 14 bar) standard, 1/4-NPTF (1/4 BSPP) gauge ports front and rear; 0 to 600 psig (0 to 40 bar) optional. Body and Dome: Zinc. Valve: Brass. Valve Cap: Glass filled Nylon. Seals: Nitrile

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

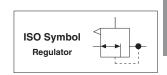
ROSS

## **Modular Remote Pilot Regulators**

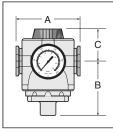
### **MD4<sup>™</sup> Series**





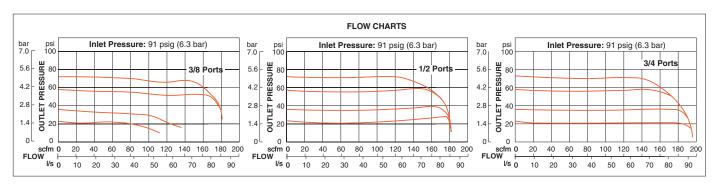


Port Size		Weight <mark>†</mark>			
Port Size	А	В	С	Depth †	lb (kg)
1/4, 3/8, 1/2, 3/4	3.5 (87)	2.4 (62)	1.6 (41)	2.9 (73)	2.2 (1.0)
† Dimensions reflect less gauge.					



A

В



#### Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable 0 to 250 psig (0 to 17 bar). Pilot Ports: 1/4 NPTF.

Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.
Body and Dome: Zinc.
Seals: Nitrile.
Valve: Brass.
Valve Cap: Nylon.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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F

### **HIGH-CAPACITY** Series

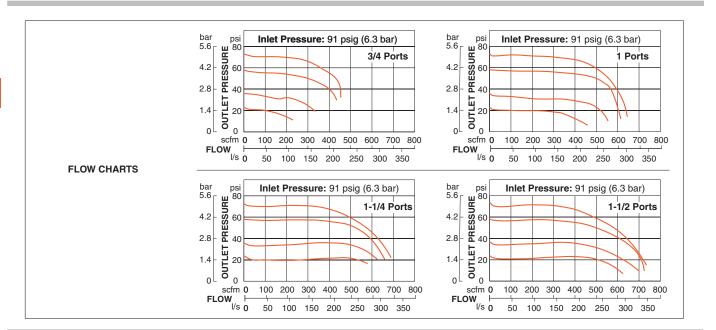
#### Port Sizes: 3/4, 1, 1<sup>1</sup>/<sub>4</sub> & 1<sup>1</sup>/<sub>2</sub> – Flow to 700 scfm

Port Size	Model Numbers*
3/4	5X00B5046
1	5X00B6039
1¼	5X00B7021
1½	5X00B8049
1½	5X00B8049

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00B5046.

#### **E2**

	Port Size	[	Dimensions i	nches (mm)		Weight†	A	
	FUIT SIZE	Α	B**	C***	Depth†	lb (kg)		ISO S
1	3/4, 1	4.4 (111)	2.9 (74)	2.4 (62)	2.8 (71)	1.88 (0.85)		Regula
	1¼, 1½	4.9 (124)	3.2 (81)	2.1 (54)	2.8 (71)	2.25 (1.02)	<b>o</b>   <b>(</b> /)) †	
	** Dome rem *** Cap remo † Less gauge	oval clearanc					B	



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: 0 to 200 psig (0 to 14 bar). Pilot Ports: 1/4 NPTF. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Body: Aluminum. Dome: Zinc. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.

### Inline Premium High-Relief Remote Pilot Regulators

#### Port Sizes: 3/4, 1 & 11/4 - Flow to 400 scfm

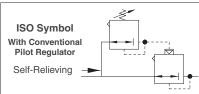
Port Size	Model Numbers*		
3/4	5216A5007		
1	5216A6007		
1¼	5216A7007		
* NPT port threads. For BSPP threads add a "C" prefix to the model			

number e.g., C5216A5007.

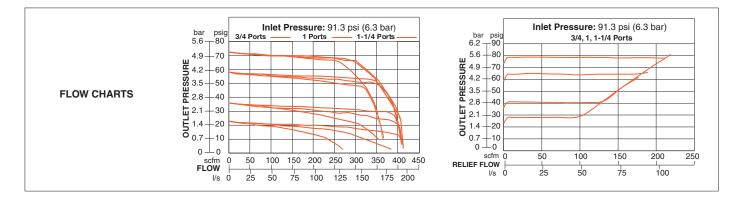
Port Size		Weight†			
A B**		C***	Depth†	lb (kg)	
3/4, 1, 1¼	4.18 (117)	1.87 (47.5)	3.99 (101.3)	4.18 (106)	6.44 (3.0)
** Dome removal clearance: add 0.63 (16). *** Cap removal clearance: add 0.5 (13). † Less gauge.					
			B C C		

## HIGH-CAPACITY Series





**E2** 



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 0° to 158°F (-18° to 70°C). Fluid Media: Compressed air. Inlet Pressure: 400 psig (28 bar) maximum. Outlet Pressure: Adjustable up to 250 psig (17 bar).

Pressure Gauge: 0 to 200 psig (0 to 14 bar) standard, 1/4-NPTF (1/4 BSPP) gauge ports front and rear; 0 to 600 psig (0 to 40 bar) optional. Body and Dome: Zinc. Valve: Brass. Valve Cap: Glass filled Nylon. Seals: Nitrile

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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### **HIGH-CAPACITY** Series

#### Port Sizes: 11/2, 2 & 3 - Flow to 4000 scfm

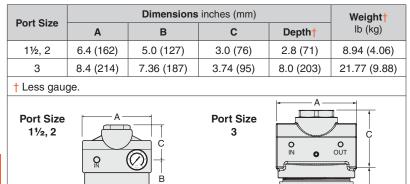
Flow to 850 scfm			
Port Size	Model Numbers*		
1½	5211B8027		
2	5211B9007		

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5211B8027.

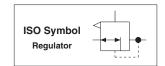
0
2
_

#### Flow to 4000 scfm

1100 10 4000 30111				
Port Size	Seals	Model Numbers*		
3	Nitrile	5211B9008		
3	Fluororelastomer	5X00B9021		
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5211B9008.				







FLOW CHARTS	psig Inlet Pressure: 91 psig (6.3 bar)
-------------	---

#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Piston. Self-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: 0 to 200 psig (0 to 14 bar). NOTE: Outlet pressure depends on the selection of the pilot regulator. Pilot Ports: 1/4 NPTF. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Body and Dome: Aluminum. Seals: Nitrile. Valve: Brass on ½" & 2" ports; Aluminum on 3" ports. Valve Cap: Aluminum.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

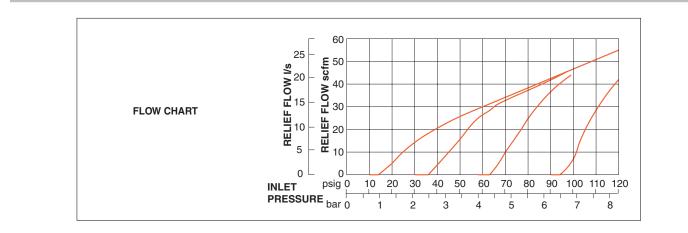
### **Inline Relief Valves**

### **MINIATURE Series**

Port Sizes: 1/8 & 1/4 – Flow to 40 scfm					
Model Numbers*					
Port Size	Port Size Pressure Range psig (bar)				
	<b>1-15</b> (0.07-1.0)	<b>1-30</b> (0.07-2.1)	<b>1-50</b> (0.07-3.4)	<b>1-140</b> (0.07-9.6)	
1/8	5210B1002	5210B1003	5210B1004	5210B1001	
1/4	5210B2002	5210B2003	5210B2004	5210B2001	
* NPT port th	reads. For BSPP threa	ads add a "C" prefix to	the model number e.g	., <mark>C</mark> 5210B1002.	

ISO Symbol Relief Valve	<b>*</b>
Self-Relieving	

Port Size	C	Weight†				
1 011 0120	А	В	С	Depth†	lb (kg)	l (()) − f
1/8, 1/4	1.6 (41)	2.7 (68)	0.4 (10)	1.6 (41)	0.24 (0.11)	B
†Less gaug	je.					



**Relief Valves** have maximum relief flows of 10 to 20 scfm (4.7 to 9.4 l/s). For models with increased sensitivity at lower pressure, consult ROSS.

#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 125°F (4° to 52°C). Fluid Media: Compressed air. Inlet Pressure: 300 psig (21 bar) maximum. Outlet Pressure: Adjustable 1 to 140 psig (0.07 to 9.6 bar). Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear.
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Body: Aluminum.
Dome and Knob: Acetal.
Seals: Nitrile.

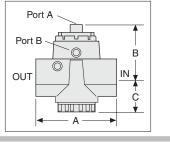
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

### **HIGH-FLOW Series**

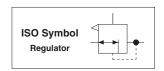
#### Port Sizes: 1 - Flow to 450 scfm

Port Size	Model Numbers*					
1	5X00D6012					
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5X00D6012.						

<b>D</b> 101	[	Dimensions	inches (mm	)	Weight
Port Size	А	В	С	Depth	lb (kg)
1	4.4 (111)	4.8 (122)	2.5 (62)	2.9 (72)	1.8 (0.8)





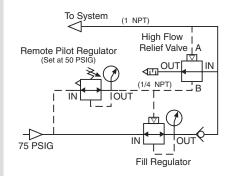


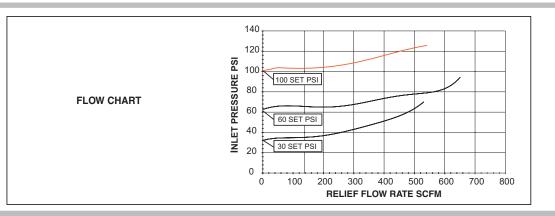
On the right is a typical circuit using the High Flow Relief Valve. The circuit utilizes a remotely piloted "fill" regulator (port size 1 NPT) and a small, remotely mounted, pilot regulator with 1/4 NPT ports.

The required system pressure is set by adjusting the knob on the pilot regulator until the desired system pressure is shown on the pilot regulator's gauge. An example system pressure of 50 PSIG was selected in the circuit.

Outlet pressure from the pilot regulator is sent to the fill regulator's signal port and the Port 2 of the High Flow Relief Valve. The Port 1 of the High Flow Relief Valve is connected to the system, as shown, to monitor system pressure.

If the system pressure exceeds the pilot regulator setting (set-point), the High Flow Relief Valve will begin to exhaust air after an approximate 2 psig (0.1 bar) rise above the set-point. Should the system pressure drop below the set-point, the fill valve will open to supply air downstream and maintain the system at the set-point.





Accessories ordered separately, refer to page E6.3-4.

#### **STANDARD SPECIFICATIONS** (for products on this page):

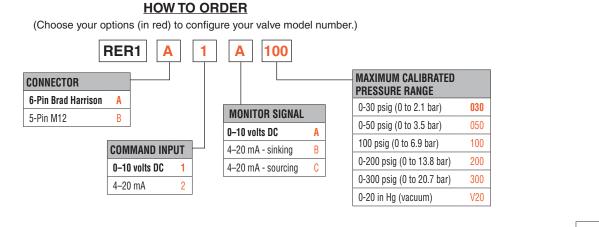
Construction: Diaphragm. Self-relieving. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure: 200 psig (14 bar) maximum. Outlet Pressure: 0 to 200 psig (0 to 14 bar). Pilot Ports: 1/4 NPTF. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Body: Aluminum. Dome: Zinc. Seals: Nitrile. Valve: Brass. Valve Cap: Nylon.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



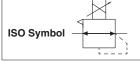
## **Electro-Pneumatic Proportional Valves**

### **RER1 Series**



Accessories ordered separately, see below.





### ACCESSORIES

#### Cables

For 6-Pin Brad Harrison Connector.

Cable Length	Part Number*					
6 feet (1.8 meters)	RER-CBL-6					
12 feet (3.7 meters)	RER-CBL-12					
25 feet (7.5 meters)	RER-CBL-25					
*For cables for 5-Pin M12 connector, consult ROSS.						



#### STANDARD SPECIFICATIONS (for products on this page):

Supply Voltage/Current: 15 - 24 volts DC/250 mA (required). Analog Monitor Signal:

Voltage: 0 – 10 volts DC@20 mA maximum.

Body and Dome: Zinc. Housing: Aluminum; powder coated. Manifold: Brass. Seals: Fluorocarbon. Transducer: Silicon, aluminum. Valves: Nickel-plated brass. Accuracy:  $< \pm .25\%$  F.S. Linearity/Hysteresis:  $< \pm .2\%$  F.S. BFSL. Repeatability:  $< \pm .2\%$  F.S. Note: High-pressure Proportional valve  $\geq 175$  psi (12 bar) - inlet and exhaust ports reversed from picture shown.

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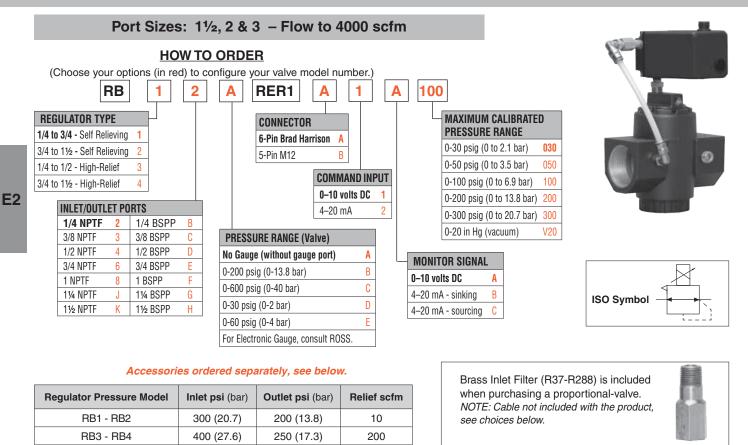
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## **E-P Proportional Valves with Volume Booster**

### **RB** Series

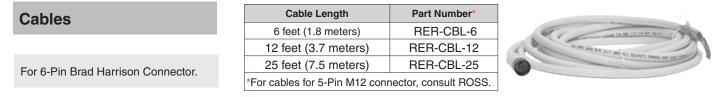


#### ACCESSORIES

### Mounting Bracket Kit

Kit Number





#### STANDARD SPECIFICATIONS (for products on this page):

Supply Voltage/Current: 15 – 24 volts DC/250 mA (required). Analog Monitor Signal:

Voltage: 0 - 10 volts DC@20 mA maximum.

Current: 4 - 20 mA sinking (sourcing optional).

Command Signal Impedance: Voltage:  $4.7 \text{ k}_{\Omega}$ , Current:  $100_{\Omega}$ . Command Signal Voltage/Current: 0 - 10 volts DC/4 - 20 mA. Electrical Connector: 6-pin Brad Harrison or 5-pin M12. Ambient/Media Temperature:  $32^{\circ}$  to  $158^{\circ}$ F ( $0^{\circ}$  to  $70^{\circ}$ C). Fluid Media: Compressed Air. Input Pressure: 29.9 in Hg to 300 psig (760 mm Hg to 21 bar). Output Pressure: 0 to 200 psi (0 to 14 bar). Body and Dome: Zinc. Housing: Aluminum; powder coated. Manifold: Brass. Seals: Fluorocarbon. Transducer: Silicon, aluminum. Valves: Nickel-plated brass. Accuracy: < ± 2.5% F.S. Linearity/Hysteresis: < ± 2.0% F.S. BFSL. Repeatability: < ± 0.6% F.S.





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# ROSS CONTROLS®

# INTEGRATED FILTER/REGULATORS



#### **INTEGRATED FILTER/REGULATORS – KEY FEATURES**

- Filter and Pressure Regulator combined into a single module to provide the compactness needed where space is limited
- All sizes have essentially the same operating characteristics as their corresponding individual filters and regulators
- All Filter/Regulator include internal automatic filter drain or manual drain options
- Pressure gauge included
- Regulator function is self relieving, and includes front and rear gauge ports
- 5-, 20-, 40-micron filter elements available (see table below)
- Metal or high strength polycarbonate bowl
- Modular or inline mounting
- MD3<sup>™</sup> and MD4<sup>™</sup> series can be modularly connected to a L-O-X<sup>®</sup> lockout valve
- Stainless steel Filter/Regulator and L-O-X<sup>®</sup> lockout valve combination available

	AVAILABLE PORT SIZES			FLOW	FILT	TRAT	ION			DRA ONS		REGUI TY	LATOR PE	ΟΡΤΙ	ONS			
INTEGRATED FILTER/REGULATOR TYPE/SERIES	1/8	1/4	3/8	1/2	3/4	MAX FLOW (scfm)	5 µ	20 µ	40 µ	POLYCARBONATE BOWL	METAL BOWL	AUTOMATIC DRAIN	MANUAL DRAIN	PISTON	DIAPHRAM	SELF RELIEVING	NON RELIEVING	Page
DANTAM						0.4												<b>F</b> 0.0
BANTAM						24												E3.3
MINIATURE						24												E3.4
MID-SIZE						105												E3.5
MD3™						110												E3.6
FULL-SIZE						180												E3.7
MD4™						230												E3.8
STAINLESS STEEL with L	- <b>O-X</b> ®	LOC	COUT	VALV	Έ													
																		E3.9

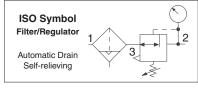


### **Modular Integrated Filter/Regulators**

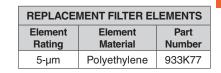
### **BANTAM Series**

		Model Nur	nbers					
Port Size	Automatic D	rain	Manual Dra	ain				
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl				
With THREADED PORTS (Piston Type): *								
1/8	5D01C0110	5D01C0210	5D01C0310	5D01C0410				
1/4	5D02C0110	5D02C0210	5D02C0310	5D02C0410				
With Quick-Connect TUBE FITTINGS (Piston Type):								
1/4	5D03C0110	5D03C0210	5D03C0310	5D03C0410				
3/8	5D04C0110	5D04C0210	5D04C0310	5D04C041				
4mm	5D05C0110	5D05C0210	5D05C0310	5D05C041				
6mm	5D06C0110	5D06C0210	5D06C0310	5D06C041				
8mm	5D07C0110	5D07C0210	5D07C0310	5D07C041				
10mm	5D08C0110	5D08C0210	5D08C0310 5D08C0410					
With Quick-	Connect TUBE FITTINGS	Chiaphragm Typ	ne):					
1/4	5D03C0120	5D03C0220	5D03C0320	5D03C041				
3/8	5D04C0120	5D04C0220	5D04C0320	5D04C042				
4mm	5D05C0120	5D05C0220	5D05C0320	5D05C042				
6mm	5D06C0120	5D06C0220	5D06C0320	5D06C042				
8mm	5D07C0120	5D07C0220	5D07C0320	5D07C042				
10mm	5D08C0120	5D08C0220	5D08C0320	5D08C042				





Port Size	Bowl	Di	mensions	Weight †						
Port Size	Capacity	А	B** C Depth		Depth †	lb (kg)				
No Port	2-oz (60-ml)	1.7 (43)	3.6 (92)	2.6 (67)	1.8 (45)	0.31 (0.15)				
1/8, 1/4	2-oz (60-ml)	3.0 (76)	3.6 (92)	2.6 (67)	1.8 (45)	0.53 (0.24)				
Models below	Models below have quick-connect tube fittings.									
1/4, 4, 6 mm	2-oz (60-ml)	3.4 (86)	3.6 (92)	2.6 (67)	1.8 (45)	0.51 (0.23)				
3/8, 10 mm	2-oz (60-ml)	3.9 (99)	3.6 (92)	2.6 (67)	1.8 (45)	0.51 (0.23)				
8 mm	2-oz (60-ml)	3.1 (79)	3.6 (92)	2.6 (67)	1.8 (45)	0.51 (0.23)				
** Dimension f	** Dimension for polycarbonate filter bowl; metal bowl is 3.8 (97). + Less gauge.									



bar 7.0 psi 100 Inlet Pressure: 91 psig (6.3 bar) Inlet Pressure: 91 psig (6.3 bar) psi 100 bar 7.0 [ PISTON DIAPHRAGM - 60 - 60 - 40 URE 5.6 80 5.6 ET PRESSI 4.2 60 4.2 FLOW CHARTS 2.8 40 2.8 **110** 20 10 20 1.4 1.4 0 0 scfm ol 0 scfm 10 20 25 FLOW FLOW l/s ₀ l/s 0 10 12 10 12 6 8 6 8

Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

**Construction:** Filter – fiber; Regulator – Piston.

Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 150°F (4° to 66°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model:

*Polycarbonate bowl:* Up to 150 psig (up to 10 bar). *Metal bowl:* Up to 200 psig (up to 14 bar).

Inlet Pressure - Manual drain model:

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Outlet Pressure: Adjustable up to 100 psig (7 bar).
Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear.
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Filter Element: 5-micron rated polyethylene.
Body, Dome and Knob: Acetal.
Bowl: Polycarbonate or aluminum bowl.
Seals: Nitrile.

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## **Inline Integrated Filter/Regulators**

Regulator

Туре

Piston

Diaphragm

Piston

Diaphragm

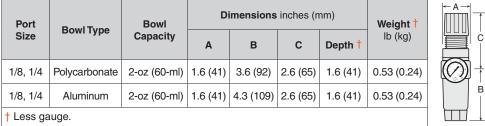
Port Size

1/8

1/4

### **MINIATURE** Series

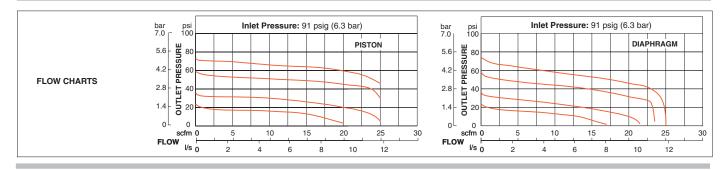
#### Port Sizes: 1/8 & 1/4 - Flow to 24 scfm Model Numbers' Automatic Drain **Manual Drain** Polycarbonate Bowl Metal Bowl **Polycarbonate Bowl** Metal Bowl 5322C1031 5322C1001 5321C1032 5321C1002 5321C1042 5322C1041 5321C1022 5322C1021 5321C2032 5322C2031 5321C2002 5322C2001 5321C2042 5322C2041 5321C2022 5322C2021 NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5321C1032.



**E**3

F

REPLACEMENT FILTER ELEMENTS							
Element Rating Element Material Part Number							
5-µm Polyethylene 933ł							



Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - fiber; Regulator - Piston. Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 150°F (4° to 66°C).

### Fluid Media: Compressed air.

Inlet Pressure - Automatic drain model: Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

#### Inlet Pressure - Manual drain model:

E3.4

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear. Panel Mounting: 1-3/16 inch (30 mm) hole required. Filter Drain: Internal automatic drain; optional manual drain. Filter Element: 5-micron rated polyethylene. Body: Aluminum. Bowl: Polycarbonate or aluminum. Dome and Knob: Acetal. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**ISO Symbol** Filter/Regulator Automatic Drain Self-relieving

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# Modular Integrated Filter/Regulators

# **MID-SIZE Series**

## Port Sizes: 1/4, 3/8 & 1/2 - Flow to 105 scfm

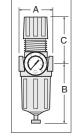
	Model Numbers*								
Port Size	Automatic I	Drain	Manual Drain						
	Polycarbonate bowl	Metal Bowl	Polycarbonate bowl	Metal Bowl					
1/4	5321B2052	5322B2051	5321B2062	5322B2061					
3/8	5321B3052	5322B3051	5321B3062	5322B3061					
1/2	5321B4052	5322B4051	5321B4062	5322B4061					
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g. C5321B2052									

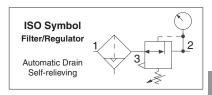
NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5321B2052.

Port Size	Bowl Bowl		[	Weight †			
Port Size	Туре	Capacity	Α	B**	C***	Depth †	lb (kg)
1/4, 3/8, 1/2	Polycarbonate	4-oz (120-ml)	2.7 (67)	4.6 (116)	3.3 (83)	2.4 (60)	1.44 (0.65)
1/4, 3/8, 1/2	Zinc	4-oz (120-ml)	2.7 (67)	4.9 (123)	3.3 (83)	2.4 (60)	1.50 (0.68)

\* Bowl removal clearance: add 3.1 (79). \*\*\* Dome removal clearance: add 0.63 (16). † Less gauge.

REPLACEMENT FILTER ELEMENTS							
Element Rating	Element Material	Part Number					
5-µm	Polyethylene	936K77					







**E3** 

F

1/2 Ports

FLOW CHARTS Inlet Pressure: 91 psig (6.3 bar) Inlet Pressure: 91 psig (6.3 bar) Inlet Pressure: 91 psig (6.3 bar) bar 7.0 psi 100 bar 7.0 psi 100 bar 7.0 г psi 100 1/4 Ports 80 60 40 3/8 Ports 80 60 40 20 **H** 80 5.6 5.6 5.6 00 0011ET PRESSUI 4.2 4.2 4.2 2.8 2.8 2.8 16 20 1.4 1.4 1.4 0 0 0 0 ol 0 scfm 0 scfm 0 scfm 0 10 20 30 40 50 60 70 80 90 100 110 10 20 30 40 50 60 70 80 90 100 110 10 20 30 40 50 60 70 80 90 100 110 FLOW FLOW FLOW l/s 0 l/s 0 l/s 0 5 10 15 20 25 30 35 40 45 50 5 10 15 20 25 30 35 40 45 50 5 10 15 20 25 30 35 40 45 50

> Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - fiber; Regulator - Piston. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal Bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### Inlet Pressure - Automatic drain model:

## Polycarbonate bowl: Up to 150 psig (up to 10 bar).

Metal bowl: Up to 200 psig (up to 14 bar).

### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

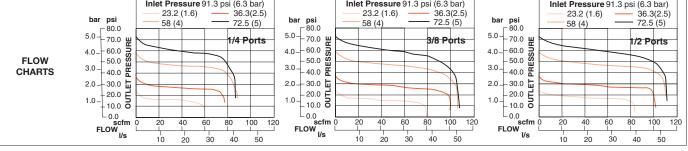
Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Filter Drain: Internal automatic drain or manual drain. Panel Mounting: 1-9/16 inch (40 mm) hole required. Filter Element: 5-micron rated polyethylene. Body: Zinc. Bowl: Polycarbonate with zinc shatterguard, or zinc bowl. Dome and Knob: Acetal. Seals: Nitrile.

**Online Version** Rev. 11/14/16

www.rosscontrols.com

# **Modular Integrated Filter/Regulators**

#### Port Sizes: 1/4, 3/8 & 1/2 – Flow to 110 scfm HOW TO ORDER (Choose your options (in red) to configure your valve model number.) MD3 **53P** В Μ С 2 Δ Α 1 ADD on L-O-X® - Optional **BOWL SIZE PIPE SIZE** L-O-X® on outlet side 1 Polycarbonate Bowl 5.1-oz (151-ml) 53P 1/4 NPTF 2 L-O-X<sup>®</sup> on the inlet side (must also choose Reverse Flow) 2 Metal Bowl 6-oz (177-ml) 53M 3/8 NPTF 3 EEZ-ON® on outlet side 3 1/2 NPTF 4 EEZ-ON® on inlet side (must also choose Reverse Flow) 4 **FILTER ELEMENT TYPE** 1/4 BSPP В Blank - No L-O-X® 40 µm sintered bronze А 3/8 BSPP C В 5 µm polyethylene 1/2 BSPP D GAUGE Е 5 µm sintered bronze No Gauge (without gauge port) A F 20 µm sintered bronze **ADJUSTMENT RANGE** With Gauge 0-200 psig (0-13.8 bar) В 0-200 psig (0-13.8 bar) A With Gauge 0-60 psig (0-4.1 bar) С **BOWL DRAIN** 0-150 psig (0-10 bar) В No Gauge, With Panel Mount Nut D Manual Drain М С E 0-100 psig (0-6.9 bar) With Panel Mount Nut & Gauge 0-200 psig (0-13.8 bar) Float Drain F D With Panel Mount Nut & Gauge 0-60 psig (0-4.1 bar) Less Drain Fitting 0-50 psig (0-3.4 bar) F (1/4 NPT female instead) Reverse Flow 0-200 psig (0-13.8 bar) F **ISO Symbol** Reverse Flow 0-150 psig (0-10.3 bar) G Filter/Regulator Reverse Flow 0-100 psig (0-6.9 bar) Н with Lockout Reverse Flow 0-50 psig (0-3.4 bar) J Automatic Drain Self-relieving Δ Dimensions inches (mm) Weight **REPLACEMENT FILTER ELEMENTS**\* **Bowl Type** lb (kg) Ċ С Α в Depth Part Number **Element Rating Element Material** Polycarbonate 3.0 (76.2) 5.54 (140.6) 4.68 (119) 2.51 (63.8) 1.98 (0.90) R-A60F-03PE5 Polyethylene 5-µm 2.76 (70.1) 2.17 (0.99) 3.0 (76.2) 6.42 (163.1) 4.68 (119) Metal R-A60F-03E5 Sintered Bronze 5-µm Lockout: With the lockout valve, add 2.3 (58) to dimension A. R-A60F-03E4 20-µm Sintered Bronze B Bowl (standard) removal clearance: add 3.1 (79) 40-µm Sintered Bronze R-A60F-03E3 Bowl (extended) removal clearance: add 6.1 (155) Dimensions above reflect less gauge. For polycarbonate and metal bowl types. ဓ Inlet Pressure 91.3 psi (6.3 bar) Inlet Pressure 91.3 psi (6.3 bar) Inlet Pressure 91.3 psi (6.3 bar) 23.2 (1.6) 36.3(2.5) 23.2 (1.6) 36.3(2.5) 23.2 (1.6) 36.3(2.5) bar psi bar psi bar psi 58 (4) 72.5 (5) 58 (4) 72.5 (5) 58 (4) 72.5 (5) 5.0-70.0 **H** 80.0 -70.0 ឌ 5.0-5.0-1/4 Ports 3/8 Ports /2 Ports 4.0-4.0-



Options: External Bowl Drains, refer to page E6.7. Accessories ordered separately, refer to page E6.3-5.

## STANDARD SPECIFICATIONS (for products on this page):

Construction: Regulator-diaphragm.	Outlet Pressure: Adjustable up to 200 psig (14 bar).
Ambient/Media Temperature:	Pressure Adjustment Locking Key: Removable.
Polycarbonate bowl: 40° to 125°F (4° to 52°C).	Pressure Gauge: 0 to 200 psig (0 to 14 bar) or 0 to 60 psig (0 to 4 bar);
<i>Metal Bowl:</i> 40° to 175°F (4° to 80°C).	1/4-NPT gauge ports front and rear.
Fluid Media: Compressed air.	Panel Mounting: 2-1/16 inch (52 mm) hole required.
Inlet Pressure - Automatic drain model:	Body: Zinc.
Polycarbonate bowl: 30 to 150 psig (2 to 10 bar).	Dome: Nylon.
Metal bowl: 30 to 200 psig (2 to 14 bar).	Bowl: Polycarbonate with nylon shatterguard, or aluminum bowl with clear
Inlet Pressure - Manual drain model:	nylon sight glass.
Polycarbonate bowl: 0 to 150 psig (0 to 10 bar).	Seals: Nitrile.
Metal bowl: 0 to 250 psig (0 to 17 bar).	Valve: Brass.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E3.6

**E3** 

Ε



MD3<sup>™</sup> Series

# **FULL-SIZE Series**

# **Modular Integrated Filter/Regulators**

**Automatic Drain** 

Bowl

Capacity

8-oz (240-ml)

8-oz (240-ml)

Polycarbonate bowl

5321B2072

5321B3072

5321B4072

5321B5072

Bowl

Туре

Polycarbonate

Zinc

Port Size

1/4 3/8

1/2

3/4

Port Size

1/4, 3/8,

1/2, 3/4

1/4, 3/8,

1/2, 3/4

Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 180 scfm

Metal Bowl

5322B2071

5322B3071

5322B4071

5322B5071

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5321B2072.

Α

3.5 (89)

3.5 (89)

Model Numbers

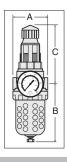


**E3** 

F

## ISO Symbol Filter/Regulator Automatic Drain Self-relieving

\*\* Bowl removal clearance: add 3.1 (79). \*\*\* Dome removal clearance: add 0.63 (16). † Less gauge.



Manual Drain

Metal Bowl

5322B2011

5322B3011

5322B4011

5322B5011

Weight †

lb (kg)

2.50 (1.15)

2.55 (1.17)

Polycarbonate bowl

5321B2012

5321B3012

5321B4012

5321B5012

C\*\*\*

5.8 (146)

5.8 (146)

Depth †

3.5 (89)

3.5 (89)

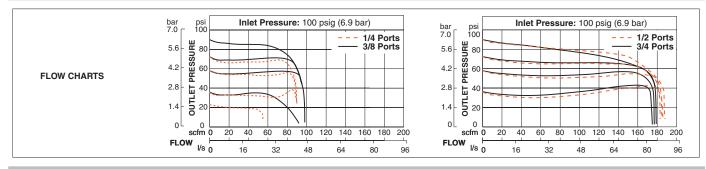
Dimensions inches (mm)

B\*\*

5.8 (146)

6.4 (163)

REPLACEMENT FILTER ELEMENTS						
Element Rating Element Material Part Number						
5-µm	Polyethylene	939K77				



Pressure Gauge included. Options: External Automatic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Filter – fiber; Regulator – Piston. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal Bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: Up to 150 psig (up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar). Inlet Pressure - Manual drain model: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar).

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar) Metal bowl: 0 to 200 psig (0 to 14 bar).

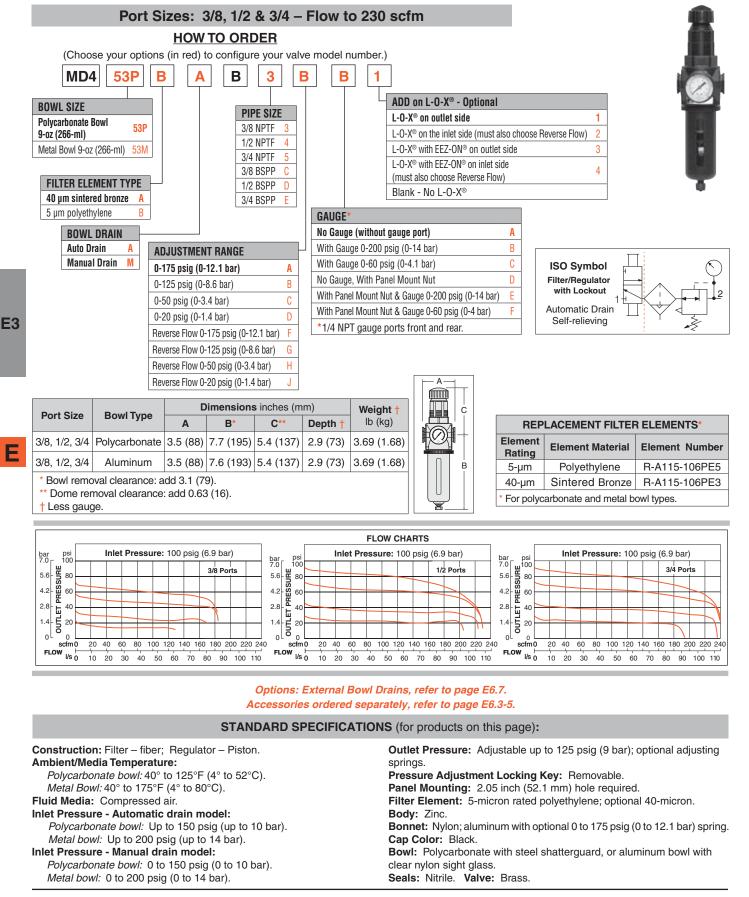
Outlet Pressure: Adjustable up to 125 psig (9 bar).

#### Pressure Adjustment Locking Key: Removable. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Panel Mounting: 2-1/16 inch (52 mm) hole required. Filter Element: 5-micron rated polyethylene. Body: Zinc. Dome: Nylon. Knob: Acetal. Bowl: Polycarbonate with steel shatterguard, or zinc bowl with clear nylon sight glass. Seals: Nitrile.



# **Modular Integrated Filter/Regulators**

## MD4<sup>™</sup> Series





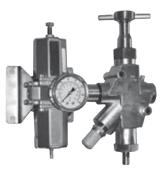
# Stainless Steel Integrated Filter/Regulators with Lockout L-O-X<sup>®</sup> Valves

## Series 15

## Port Sizes: 1/4, 1/2, 3/4 & 1 - Flow to 17 scfm

Port	Size	Model Number*	Cv			
1-2	3	Model Number	1-2	2-3		
1/4	1/4	RC010-13	2.14	2.08	]	
1/2	1/2	RC011-13	4.4	6.24		
3/4	1	RC012-13	5.0	17.0		
1	1	RC013-13	8.0	17.0	L	

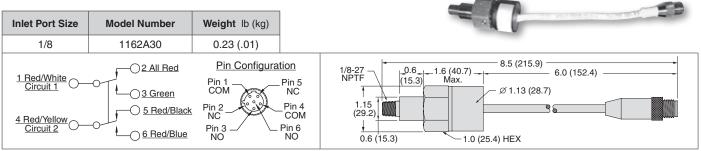
Lockout/Filter/Regulator	Ţ
ISO Symbol	
Lockout, Manual Drain, Self-reliev	ring



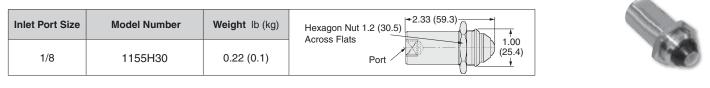
Port	Size	Avg. C <sub>v</sub>		Dimensions (inches/mm)			
1-2	3	1-2	2-3	Length	Width	Depth	
1/4	1/4	2.14	2.08	8.9 (226.1)	7.65 (194.4)	5.86 (149)	
1/2	1/2	4.4	6.24	10.24 (260)	8.98 (228)	5.94 (151)	
3/4	1	5.0	17.0	15.75 (400)	12.24 (311)	6.49 (165)	
1	1	8.0	17.0	15.75 (400)	12.24 (311)	6.49 (165)	

ACCESSORIES

## **Stainless Steel Pressure Switch**



## **Stainless Steel Visual Indicator**



\* NPT threads. For BSPP threads, consult ROSS.

### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet, 316 Stainless Steel. Mounting Type: In-Line. Ambient/Media Temperature: 30° to 175°F (-1° to 80°C). *Note: For lower temperature ratings, consult ROSS.* Flow Media: Filtered air. Inlet Pressure: 0 to 300 psig (0 to 21 bar). Secondary Pressure: 7 to 174 psig (0.5 to 12 bar). Seals: Fluorocarbon (Viton). Lock Hole Diameter: Port sizes 1/4 thru 2: 0.34 inch (8.64 mm). Length of Hole: Port size 1/4: 0.44 in (11.17 mm). Port size 1/2: 0.47 in (11.93 mm)

ROSS

Online Version Rev. 11/14/16

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E3

Ε





# ROSS CONTROLS®

# LUBRICATORS



### LUBRICATORS - KEY FEATURES

- Sight-feed and wick-feed design options
- Sight-feed Lubricators are easy to adjust, and an indicator on the sight dome measures the amount of oil dispensed
- The adjusting knob can be removed to make the lubricator "tamper-resistant"
- All working parts are in an easily replaceable cartridge
- Modular and inline mounting options
- Metal and High Strength polycarbonate bowl options
- External tamper resistant adjustment
- Quick-fill cap option for full size, MD3<sup>™</sup>, and MD4<sup>™</sup> series
- Extended bowls available for MD3<sup>™</sup> and MD4<sup>™</sup> series

		AVAILABLE PORT SIZES						FLOW	DES	IGN	-	WL PE		
LUBRICATOR TYPE/SERIES	1/8	1/4	3/8	1/2	3/4	1	11⁄4	1½	MAX FLOW (scfm)	SIGHT FEED	WICK FEED	POLYCARBONATE	METAL	Page
BANTAM									27					E4.3
MINIATURE									25					E4.4
MID-SIZE									110					E4.5
MD3™									150					E4.6
FULL-SIZE									140					E4.7
MD4™									205					E4.8
HIGH-CAPACITY									500					E4.9



## **BANTAM Series**

### Port Sizes: 1/8 & 1/4, and Tube Fittings – Flow to 27 scfm

Model Numbers								
Threaded Po	orts*	Tube Fittings						
Polycarbonate bowl	Metal Bowl	Polycarbonate bowl	Metal Bowl					
Т			1					
5B01B0005	5B01B0006	_	-					
5B02B0005	5B02B0006	5B03B0005	5B03B0006					
_	-	5B04B0005	5B04B0006					
_	-	5B05B0005	5B05B0006					
_	-	5B06B0005	5B06B0006					
_	-	5B07B0005	5B07B0006					
_	-	5B08B0005	5B08B0006					
LL CAP								
5B01B0007	5B01B0008	-	-					
5B02B0007	5B02B0008	5B03B0007	5B03B0008					
_	-	5B04B0007	5B04B0008					
_	-	5B05B0007	5B05B0008					
_	-	5B06B0007	5B06B0008					
_	-	5B07B0007	5B07B0008					
_	-	5B08B0007	5B08B0008					
	Polycarbonate bowl	Threaded Ports*           Polycarbonate bowl         Metal Bowl           T         5B01B0005         5B01B0006           5B02B0005         5B02B0006         -           -         -         -           -         <	Threaded Poiss*         Tube Fittin           Polycarbonate bowl         Metal Bowl         Polycarbonate bowl           T         Polycarbonate bowl         Metal Bowl         Polycarbonate bowl           T         SB01B0005         5B01B0006         -           5B02B0005         5B02B0006         5B03B0005           -         -         SB04B0005           -         -         SB05B0005           -         -         SB07B0005           -         -         SB07B0005           -         -         SB07B0005           -         -         SB07B0005           -         -         SB07B0007           SB01B0007         SB02B0008         -           -         SB04B0007         -           -         SB05B0007         -           -         SB06B0007         -           -         SB06B0007					

Dimensions inches (mm)

С

0.9 (22)

0.9 (22)

0.9 (22)

0.9 (22)

0.9 (22)

0.9 (22)

0.9 (22)

0.9 (22)

Depth

1.8 (45)

1.8 (45)

1.8 (45)

1.8 (45)

1.8 (45)

1.8 (45)

1.8 (45)

1.8 (45)

B\*\*

3.6 (91)

3.6 (91)

3.6 (91)

3.6 (91)

3.6 (91)

3.6 (91)

3.6 (91)

3.6 (91)

Α

1.7 (43)

3.0 (76)

3.4 (86)

3.9 (99)

3.4 (86)

3.4 (86)

3.4 (86)

3.9 (99)

Dimension for polycarbonate bowl; metal bowl is 3.8 (97).

Models below have quick-connect tube fittings.





FLOW CHART

нс

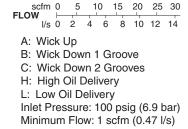
LC

Ε

**E4** 

psi bar 0.35 5 HA нв JRE DROP 0.28 4 Weight /LA lb (kg) 3 0.21 0.17 (0.08) 0.14 SSU 2 ÍВ 0.37 (0.17) PRE 0.07 0 0 scfm 0 5 10 15 0.37 (0.17) FLOW С 2 6 l/s 0 4 0.37 (0.17) 0.37 (0.17)

R



#### Accessories ordered separately, refer to page E6.3-4.

0.37 (0.17)

0.37 (0.17)

0.37 (0.17)

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Wick-Feed. Ambient/Media Temperature:

Bowl

Capacity

2-oz (60-ml)

Port Size

No Port

1/8, 1/4

1/4

3/8

4 mm

6 mm

8 mm

10 mm

#### Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 150°F (4° to 66°C). Fluid Media: Compressed air.

## **Inlet Pressure:**

Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 200 psig (14 bar) maximum. Oil Adjustment: External, no shutoff. Body: Acetal. Bowl: Polycarbonate or aluminum. Seals: Nitrile.

**Online Version** Rev. 11/14/16

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## **MINIATURE** Series



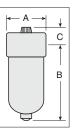
ISO Symbol Lubricator	${\checkmark}$
--------------------------	----------------

## Port Sizes: 1/8 & 1/4 - Flow to 25 scfm

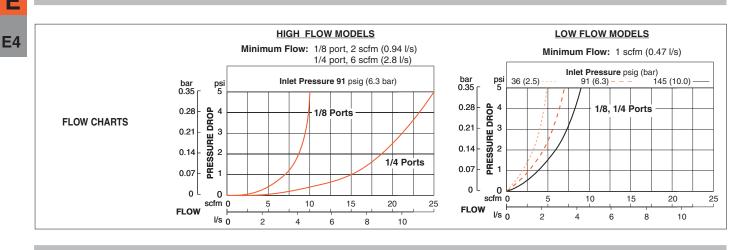
		Model Numbers*							
Port Size	Fill Type	Polycarbo	onate bowl	Metal Bowl					
		High Flow	Low Flow	High Flow	Low Flow				
1/8	Fill Port	5111B1010	5111B1012	5112B1010	5112B1012				
1/4	Fill Port	5111B2010	5111B2012	5112B2010	5112B2012				
1/8	Quick-Fill Cap	5111B1110	5111B1112	5112B1110	5112B1112				
1/4	Quick-Fill Cap	5111B2110	5111B2112	5112B2110	5112B2112				
* NPT next threads For PCPD threads add a "C" profix to the model number of a CE111P1010									

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5111B1010.

Port Size	Bowl Type	Bowl	Di	Weight			
Port Size	вомпуре	Capacity	Α	В	С	Depth	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (60-ml)	1.6 (41)	3.6 (92)	0.7 (17)	1.6 (41)	0.21 (0.10)
1/8, 1/4	Aluminum	2-oz (60-ml)	1.6 (41)	3.8 (97)	0.7 (17)	1.6 (41)	0.21 (0.10)



Ε



#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

## Construction: Wick-Feed. Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 150°F (4° to 66°C). Fluid Media: Compressed air.

### **Inlet Pressure:**

Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 200 psig (14 bar) maximum. Oil Adjustment: Internal, tamper-proof. Body: Aluminum. Bowl: Polycarbonate or aluminum. Seals: Nitrile.



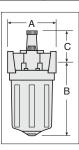
# **Modular Lubricators**

## Port Sizes: 1/4, 3/8 & 1/2 - Flow to 110 scfm

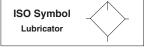
		Model Num	ıbers*
Port Size	Fill Type	Sight-Fe	eed
		Polycarbonate Bowl	Metal Bowl
1/4	Fill Port	5111B2007	5112B2007
3/8	Fill Port	5111B3007	5112B3007
1/2	Fill Port	5111B4007	5112B4007
1/4	Quick-Fill Cap	5111B2107	5112B2107
3/8	Quick-Fill Cap	5111B3107	5112B3107
1/2	Quick-Fill Cap	5111B4107	5112B4107

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5111B2007.

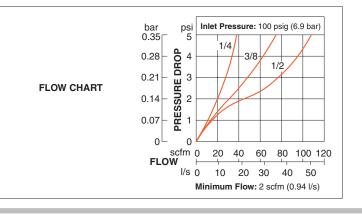
Port Size	Bourd Turne	Bowl	[	Weight			
Port Size	Bowl Type	Capacity	А	В	С	Depth	lb (kg)
1/4, 3/8, 1/2	Polycarbonate	4-oz (120-ml)	2.7 (68)	4.1 (103)	1.8 (46)	2.4 (60)	1.06 (0.48)
1/4, 3/8, 1/2	Zinc	4-oz (120-ml)	2.7 (68)	4.1 (103)	1.8 (46)	2.4 (60)	1.50 (0.68)







**E4** 



#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Sight-Feed. Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C).

#### Inlet Pressure:

Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 200 psig (14 bar) maximum. Fluid Media: Compressed air.
Oil Adjustment: External, tamper-resistant.
Body: Zinc.
Bowl: Polycarbonate bowl with zinc shatterguard, or zinc bowl.
Sight Dome: Nylon.
Seals: Nitrile.

ROSS

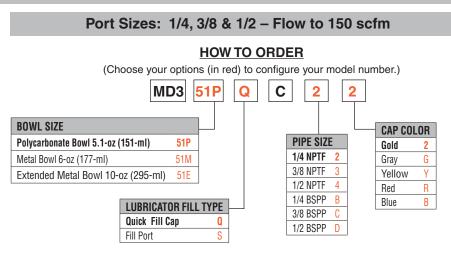
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E4.5

## **MID-SIZE Series**

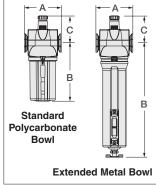


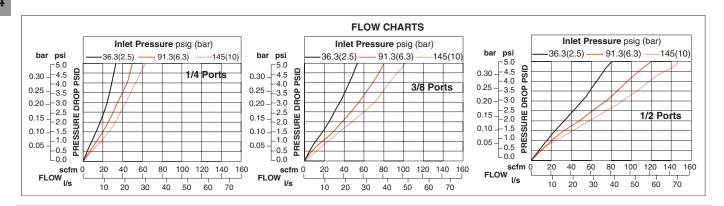


ISO Symbol Lubricator

Bowl Type		Dimensions	inches (mm)		Weight					
Downype	А	B**	С	Depth	lb (kg)					
Polycarbonate	3.0 (76.2)	4.72 (119.9)	2.21 (56.1)	2.51 (63.8)	1.30 (0.59)					
Aluminum	3.0 (76.2)	6.02 (152.9)	2.21 (56.1)	2.76 (70.1)	1.42 (0.64)					
Extended Aluminum	3.0 (76.2)	9.37 (238)	2.21 (56.1)	2.76 (70.1)	1.54 (0.70)					
** Bowl removal clearance: add 3.1 (79).										

Extended Bowl removal clearance: add 6.1 (155).





#### Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Sight-Feed.

Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### **Inlet Pressure:**

Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 250 psig (17 bar) maximum. Oil Adjustment: External; tamper resistant. Body: Zinc. Bowl: Polycarbonate with nylon shatterguard, or aluminum bowl with clear nylon sight glass. Sight-Feed Dome: Nylon. Seals: Nitrile.



## **FULL-SIZE Series**

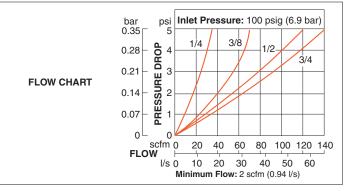
Model Numbers*													
Port Size Fill Type Sight-Feed Wick-Feed													
		Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl								
1/4	Fill Port	5111B2008	5112B2008	5111B2014	5112B2014								
3/8	Fill Port	5111B3008	5112B3008	5111B3014	5112B3014								
1/2	Fill Port	5111B4008	5112B4008	5111B4014	5112B4014								
3/4	Fill Port	5111B5008	5112B5008	5111B5014	5112B5014								
1/4	Quick-Fill Cap	5111B2108	5112B2108	5111B2114	5112B2114								
3/8	Quick-Fill Cap	5111B3108	5112B3108	5111B3114	5112B3114								
1/2	Quick-Fill Cap	5111B4108	5112B4108	5111B4114	5112B4114								
3/4 Quick-Fill Cap 5111B5108 5112B5108 5111B5114 5112B5114													

Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 140 scfm





Port Size	Baud Tuna	Bowl	D	imensions	inches (mr	m)	Weight	
Port Size	Bowl Type	Capacity	Α	B**	С	Depth	lb (kg)	A
With Sight-Feed								
1/4, 3/8, 1/2, 3/4	Polycarbonate	8-oz (240-ml)	3.5 (88)	5.2 (132)	1.3 (32)	3.5 (89)	2.06 (0.94)	╎┌╨╾╨┒╢╶┊
1/4, 3/8, 1/2, 3/4	Zinc	8-oz (240-ml)	3.5 (88)	5.3 (135)	1.3 (32)	3.5 (89)	2.90 (1.32)	
With Wick-Feed								
1/4, 3/8, 1/2, 3/4	Polycarbonate	8-oz (240-ml)	3.5 (88)	5.2 (132)	0.7 (17)	3.5 (89)	2.25 (1.02)	
1/4, 3/8, 1/2, 3/4	Zinc	8-oz (240-ml)	3.5 (88)	5.3 (135)	0.7 (17)	3.5 (89)	2.85 (1.30)	00 00
** Bowl removal cl	earance: add 3.1	(79).						



#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

## Construction: Sight-Feed.

Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). *Metal bowl:* 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. **Inlet Pressure:** 

Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 200 psig (14 bar) maximum.

Oil Adjustment: External, tamper-resistant. Adjusting Knob: Acetal. Body: Zinc. Bowl: Polycarbonate with steel shatterguard, or zinc bowl with sight glass. Bowl Ring: Aluminum. Seals: Nitrile. Sight Dome: Nylon. External, tamper-proof.

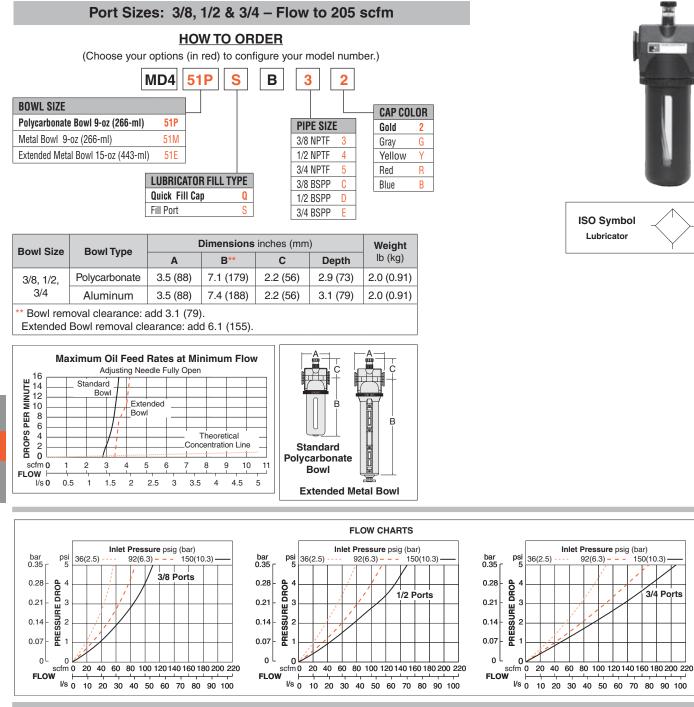
**E4** 

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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## **MD4<sup>™</sup> Series**



#### Accessories ordered separately, refer to page E6.3-4.

### STANDARD SPECIFICATIONS (for products on this page):

Construction: Sight-Feed. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

## Inlet Pressure:

Polycarbonate bowl: 150 psig (10 bar). Metal bowl: 200 psig (14 bar). Oil Adjustment: External; tamper resistant. Body: Zinc. Bowl: Polycarbonate with steel shatterguard, aluminum bowl with clear nylon sight glass, or extended aluminum bowl with two clear nylon sight glass. Bowl Ring: Nylon. Sight-Feed Dome: Nylon. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E4

F



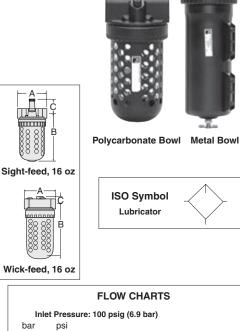
# **HIGH-CAPACITY** Series

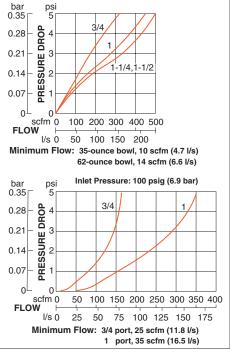
FU	JIL SIZES.	3/4, 1, 17	4 0 172 -		JU SCIIII								
			Model Numbers*										
Port	Bowl Size		Metal Bowl										
Size	oz (ml)	FILL-	PORT	QUICK-FILL CAP									
		Sight-Feed	Wick-Feed	Sight-Feed	Wick-Feed								
	16 (473.2)	5112B5009	_	5112B5109	_								
3/4	35 (1035.1)	5112B5019	_	5112B5119	_								
	62 (1833.6)	5112B5029	_	5112B5129	_								
	16 (473.2)	5112B6009	5112B6011	5112B6109	5112B6111								
1	35 (1035.1)	5112B6019	_	5112B6119	_								

Port Sizes: 3/1 1 11/2 & 11/2 - Flow to 500 sofm

62 (1833.6)       5112B5029       —       5112B5129       —         16 (473.2)       5112B6009       5112B6011       5112B6109       5112B6119         35 (1035.1)       5112B6029       —       5112B6129       —         62 (1833.6)       5112B7009       —       5112B7109       —         11/4       16 (473.2)       5112B7019       —       5112B7119       —         11/4       25 (1035.1)       5112B7029       —       5112B7129       —         11/2       16 (473.2)       5112B8009       —       5112B8109       —         11/2       25 (1035.1)       5112B8019       —       5112B8109       —         11/2       35 (1035.1)       5112B8019       —       5112B8109       —         11/2       35 (1035.1)       5112B8029       —       5112B8129       —         11/2       16 (473.2)       5111B8009       —       51112B109       —         3/4       16 (473.2)       5111B6009       5111B6109       5111B6111       5111B6111         11/2       16 (473.2)       5111B7009       —       5111B7109       —       _         11/2       16 (473.2)       5111B8009       —       5111B8109							
1       35 (1035.1)       5112B6019       —       5112B6119       —         62 (1833.6)       5112B6029       —       5112B6129       —         11/4       16 (473.2)       5112B7009       —       5112B7109       —         11/4       35 (1035.1)       5112B7019       —       5112B7129       —         11/4       35 (1035.1)       5112B7029       —       5112B7129       —         11/4       16 (473.2)       5112B8009       —       5112B8109       —         11/2       16 (473.2)       5112B8019       —       5112B8129       —         11/2       35 (1035.1)       5112B8029       —       5112B8129       —         3/4       16 (473.2)       5111B5009       —       5111B5109       —         1       16 (473.2)       5111B6009       5111B6111       5111B6111       5111B6111         1/4       16 (473.2)       5111B7009       —       5111B7109       —         1       16 (473.2)       5111B8009       —       5111B7109       —         1       16 (473.2)       5111B8009       —       5111B8109       —         1/4       16 (473.2)       5111B8009       —       5111		62 (1833.6)	5112B5029	—	5112B5129	—	
62 (1833.6)       5112B6029       —       5112B6129       —         14       16 (473.2)       5112B7009       —       5112B7109       —         114       35 (1035.1)       5112B7019       —       5112B7119       —         62 (1833.6)       5112B7029       —       5112B7129       —         62 (1833.6)       5112B7029       —       5112B8109       —         11/2       16 (473.2)       5112B8009       —       5112B8109       —         11/2       35 (1035.1)       5112B8019       —       5112B8119       —         62 (1833.6)       5112B8029       —       5112B8129       —       Sight-feed, 35 oz         Port       Bowl Size       oz (ml)       Polycarbo-ste Bowl       —       5111B5109       —         3/4       16 (473.2)       5111B5009       —       5111B6111       5111B6111       11         11/2       16 (473.2)       5111B709       —       5111B7109       —       —         11/2       16 (473.2)       5111B8009       —       5111B7109       —       _         11/2       16 (473.2)       5111B8009       —       5111B8109       —       _         11/2		16 (473.2)	5112B6009	5112B6011	5112B6109	5112B6111	
16 (473.2)       5112B7009       —       5112B7109       —         11/4       16 (473.2)       5112B7019       —       5112B7119       —         62 (1833.6)       5112B7029       —       5112B7129       —         11/2       16 (473.2)       5112B8009       —       5112B8109       —         11/2       35 (1035.1)       5112B8019       —       5112B8109       —         11/2       35 (1035.1)       5112B8029       —       5112B8119       —         62 (1833.6)       5112B8029       —       5112B8129       —         62 (1833.6)       5112B8009       —       5111B8129       —         7       8owl Size oz (ml)       Polycarbonate Bowl       —       5111B5109       —         3/4       16 (473.2)       5111B6009       5111B6111       5111B6111       11         11/4       16 (473.2)       5111B7009       —       5111B7109       —         11/2       16 (473.2)       5111B8009       —       5111B8109       —         11/2       16 (473.2)       5111B8009       —       5111B8109       —         11/2       16 (473.2)       5111B8009       —       5111B8109       —	1	35 (1035.1)	5112B6019	—	5112B6119	_	
11/4       35 (1035.1)       5112B7019       —       5112B7119       —         62 (1833.6)       5112B7029       —       5112B7129       —         11/2       16 (473.2)       5112B8009       —       5112B8109       —         11/2       35 (1035.1)       5112B8019       —       5112B8109       —         11/2       35 (1035.1)       5112B8019       —       5112B8129       —         62 (1833.6)       5112B8029       —       5112B8129       —         Port       Bowl Size       Polycarbonate Bowl        Sight-feed, 35 oz         3/4       16 (473.2)       5111B5009       —       5111B5109       —         1       16 (473.2)       5111B6009       5111B6011       5111B6111          1/4       16 (473.2)       5111B7009       —       5111B7109       —         1/4       16 (473.2)       5111B8009       —       5111B8109       —         1/4       16 (473.2)       5111B8009       —       5111B8109       —         1/4       16 (473.2)       5111B8009       —       5111B8109       —         1/4       16 (473.2)       5111B8009       —       5111B8109 <t< td=""><td></td><td>62 (1833.6)</td><td>5112B6029</td><td>—</td><td>5112B6129</td><td>_</td><td></td></t<>		62 (1833.6)	5112B6029	—	5112B6129	_	
Image: height of the system         Image: height of the system <t< td=""><td></td><td>16 (473.2)</td><td>5112B7009</td><td>—</td><td>5112B7109</td><td>_</td><td>ПВ</td></t<>		16 (473.2)	5112B7009	—	5112B7109	_	ПВ
Information         Information <thinformation< th=""> <thinformation< th=""></thinformation<></thinformation<>	1¼	35 (1035.1)	5112B7019	—	5112B7119	_	
1½       35 (1035.1)       5112B8019       —       5112B8119       —         62 (1833.6)       5112B8029       —       5112B8129       —         Port       Bowl Size       Polycarbonate Bowl       —         3/4       16 (473.2)       5111B5009       —       5111B5109       —         1       16 (473.2)       5111B6009       5111B6011       5111B6111         1½       16 (473.2)       5111B7009       —       5111B7109       —         1½       16 (473.2)       5111B8009       —       5111B8109       —         *       NPT port threads. For BSPP threads add a "C" prefix to the model       Extended Metal		62 (1833.6)	5112B7029	—	5112B7129	_	
1½       35 (1035.1)       5112B8019       —       5112B8119       —         62 (1833.6)       5112B8029       —       5112B8129       —         Port Size       Bowl Size oz (ml)       Polycarbonate Bowl       —         3/4       16 (473.2)       5111B5009       —       5111B5109       —         1       16 (473.2)       5111B6009       5111B6011       5111B6110       5111B6111         1½       16 (473.2)       5111B7009       —       5111B7109       —         1½       16 (473.2)       5111B8009       —       5111B8109       —         1½       16 (473.2)       5111B8009       State and		16 (473.2)	5112B8009	—	5112B8109	_	Sight-feed. 35 oz
Port Size         Bowl Size oz (ml)         Polycarbonate Bowl           3/4         16 (473.2)         5111B5009         —         5111B5109         —           1         16 (473.2)         5111B6009         5111B6011         5111B6109         5111B6111           1½         16 (473.2)         5111B7009         —         5111B7109         —           1½         16 (473.2)         5111B8009         —         5111B8109         —           * NPT port threads. For BSPP threads add a "C" prefix to the model         Extended Metal	1½	35 (1035.1)	5112B8019	—	5112B8119	_	
Size         oz (ml)         Polycarbonate Bowl           3/4         16 (473.2)         5111B5009         —         5111B5109         —           1         16 (473.2)         5111B6009         5111B6119         5111B6111           1½         16 (473.2)         5111B7009         —         5111B7109         —           1½         16 (473.2)         5111B8009         —         5111B8109         —           * NPT port threads. For BSPP threads add a "C" prefix to the model         Extended Metal		62 (1833.6)	5112B8029	—	5112B8129	_	Č
1         16 (473.2)         5111B6009         5111B6011         5111B6109         5111B6111           1¼         16 (473.2)         5111B7009         —         5111B7109         —           1½         16 (473.2)         5111B8009         —         5111B8109         —           1½         16 (473.2)         5111B8009         —         5111B8109         —           * NPT port threads. For BSPP threads add a "C" prefix to the model         Extended Metal				Polycarbo	nate Bowl		
1¼       16 (473.2)       5111B7009       —       5111B7109       —         1½       16 (473.2)       5111B8009       —       5111B8109       —         * NPT port threads. For BSPP threads add a "C" prefix to the model       Extended Metal	3/4	16 (473.2)	5111B5009	_	5111B5109	_	
1½       16 (473.2)       5111B8009       —       5111B8109       —         * NPT port threads. For BSPP threads add a "C" prefix to the model       Extended Metal	1	16 (473.2)	5111B6009	5111B6011	5111B6109	5111B6111	
* NPT port threads. For BSPP threads add a "C" prefix to the model	1¼	16 (473.2)	5111B7009	_	5111B7109	_	
The point include in the model and a prenix to the model	1½	16 (473.2)	5111B8009	—	5111B8109	—	
				reads add a "(	prefix to the	model	

Port Size	)	Weight									
Port Size	Bowl Type	Α	B**	С	Depth	lb (kg)					
With Sight-Feed	, 16 oz (473.2 n	nl)									
3/4, 1, 1¼, 1½	Polycarbonate	4.3 (108)	8.2 (208)	1.4 (37)	4.2 (106)	2.63 (1.21)					
3/4, 1, 1¼, 1½	Aluminum	4.3 (108)	7.3 (185)	1.4 (37)	4.2 (106)	2.85 (1.30)					
With Wick-Feed,	16 oz (473.2 m	nl)									
1/4, 3/8, 1/2, 3/4	Polycarbonate	7.7 (195)	0.8 (21)	4.3 (108)	2.88 (1.31)						
1/4, 3/8, 1/2, 3/4	Aluminum	4.5 (114)	8.2 (208)	0.8 (21)	4.3 (108)	3.00 (1.36)					
With Sight-Feed	, 35 oz (1035.1	ml)									
3/4, 1	Aluminum	4.3 (108)	10.2 (259)	2.0 (51)	4.2 (106)	2.56 (1.16)					
1¼, 1½	Aluminum	4.3 (108)	10.6 (268)	1.6 (41)	4.2 (106)	2.53 (1.16)					
Extended Bowls	Extended Bowls, 35oz (1035ml)										
3/4, 1 Aluminum 4.3 (108) 15.8 (400) 2.0 (51) 4.2 (106) 3.38 (1.64)											
1¼, 1½	Aluminum	4.3 (108)	16.1 (410)	1.6 (41)	4.2 (106)	3.38 (1.64)					
** Bowl removal of	learance: add 3	3.1 (79).									





Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Sight-Feed, or Wick-Feed. Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C).

Fluid Media: Compressed air.

Inlet Pressure: Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 200 psig (14 bar) maximum.

Oil Adjustment: External, tamper-resistant or internal. Body: Aluminum. Bowl: Polycarbonate with steel shatterguard; aluminum bowl with sight glass, or extended aluminum bowl with sight glass. Bowl Ring: Aluminum. Sight Dome: Nylon. Seals: Nitrile.

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**Online Version** Rev. 11/14/16

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# ROSS CONTROLS®

# FILTER, REGULATOR, AND LUBRICATOR COMBINATIONS



### FRLs Combinations – KEY FEATURES

- Combinations include Filter and Regulator, Filter and Lubricator, Integrated Filter / Regulator combined into a single module plus a Lubricator, and Filter, Regulator and Lubricator
- All sizes have essentially the same operating characteristics as their corresponding individual Filters, Regulators, and Lubricators
- All filters include either a manual or internal automatic filter drain and a pressure gauge
- Regulators are either self relieving or non-relieving and have gauge ports front and rear
- 5-, 20-, and 40-micron filter element options available
- Additional available options are the same as those for the corresponding individual filters
- Modular or inline mounting

		AV	AILA	BLE	POR	T SI	ZES		FLOW	FILT	RAT	ION		ΟΡΤΙ	ONS	;	REGUI TY		ΟΡΤ	IONS	LUBRIC TY		OPT.	
COMBINATION TYPE/SERIES	1/8	1/4	3/8	1/2	3/4	1	11⁄4	1½	MAX FLOW (scfm)	5 µm	20 µm	40 µm	POLYCARBONATE BOWL	METAL BOWL	AUTOMATIC DRAIN	MANUAL DRAIN	PISTON	DIAPHRAGM	SELF RELIEVING	NON RELIEVING	WICK FEED	SIGHT FEED	госкоит	Page
FILTER AND RE	GUL	ΑΤΟ	R																					
MINIATURE									19															E5.3
MID-SIZE									100															E5.4
FULL-SIZE									138															E5.5
HIGH CAPACITY									270															E5.6
FILTER AND LUI	BRIC	ATOF	1																					
MINIATURE									19															E5.7
MID-SIZE									100															E5.8
FULL-SIZE									138															E5.9
HIGH CAPACITY									270															E5.10
INTEGRATED FI	LTER	/REG	ULA	TOR	PLU	S L	UBRI	САТС	DR															
BANTAM									23															E5.11 - E5.12
MINIATURE									24															E5.13 - E5.14
MID-SIZE									100															E5.15
MD3™									110															E5.16 - E5.17
FULL-SIZE									140															E5.18
MD4™									205															E5.19 - E5.20
FILTER REGULA	TOR	PLU	S LU	BRIC	ATO	R																		
BANTAM									22															E5.21 - E5.22
MINIATURE									19															E5.23
MID-SIZE									100															E5.24
MD3™									110															E5.25 - E5.26
FULL-SIZE									138															E5.27
MD4™									205															E5.28 - E5.28
HIGH CAPACITY									495															E5.30 - E5.31

**E**5



# Inline Filter and Regulator Combinations

Port Sizes: 1/8 & 1/4 - Flow to 19 scfm

Metal Bowl

5322C1024

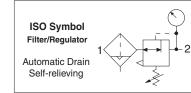
5322C2024

Model Numbers\*

Model Numbers\*

## **MINIATURE** Series

# Metal Bowl 5322C1025 5322C2025 NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5321C1027.



Port Size	Automatic Di	rain	Manual Dra	in
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	
1/8	5321C1037	5322C1034	5321C1036	

**Automatic Drain** 

FILTER and PISTON type REGULATOR

**Polycarbonate Bowl** 

5321C1027

5321C2027

FILTER and DIAPHRAGM type REGULATOR

5321C2037

Port Size

1/8

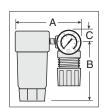
1/4

1/4

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5321C1037.

5322C2034

Port	David Turna	Bowl	Di	Weight †			
Size	Bowl Type	Capacity	Α	В	С	Depth †	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (60-ml)	4.4 (111)	3.6 (90)	0.7 (17)	1.6 (41)	0.77 (0.34)
1/8, 1/4	Aluminum	2-oz (60-ml)	4.4 (111)	4.3 (109)	0.7 (17)	1.6 (41)	0.79 (0.36)
† Less g	auge.						

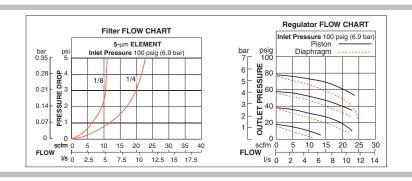


Metal Bowl

5322C1035

5322C2035

REPLAC	REPLACEMENT FILTER ELEMENTS					
Element Rating Element Material Part Number						
5-µm	Polyethylene	933K77				



Manual Drain

**Polycarbonate Bowl** 

5321C1026

5321C2026

5321C2036

### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - Fiber; Regulator - Piston.

#### Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C).

Metal bowls: 40° to 175°F (4° to 80°C).

#### Fluid Media: Compressed air.

Inlet Pressure - Automatic drain model:

Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar).

## Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear Oil Adjustment: Internal; tamper-resistant. Panel Mounting: 1-3/16 inch (30 mm) hole required. Filter Element: 5-micron rated polyethylene. Heads: Aluminum. Bowls: Polycarbonate bowls, or aluminum bowls. Regulator Dome and Knob: Acetal. Seals: Nitrile.

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# **Modular Filter and Regulator Combinations**

## **MID-SIZE Series**

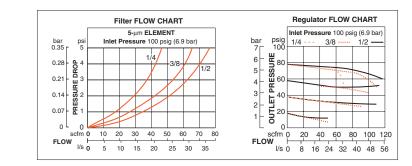
## Port Sizes: 1/4, 3/8 & 1/2 – Flow to 100 scfm

	Model Numbers*					
Port Size	Size Automatic Drain		Manual Dra	in		
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl		
1/4	5M11B2110	5M11B2210	5M11B2310	5M11B2410		
3/8	5M11B3110	5M11B3210	5M11B3310	5M11B3410		
1/2	5M11B4110	5M11B4210	5M11B4310	5M11B4410		
* NDT port t	broada Ear PSPD throada	add a "C" profix t	a the model number of a			

\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5M11B2110.

Dant Olar	Bowl True Bowl		Di	Weight †			
Port Size	Bowl Type	Capacity	Α	В	С	Depth †	lb (kg)
1/4, 3/8, 1/2	Polycarbonate	4-oz (120-ml)	5.4 (137)	6.2 (157)	1.3 (33)	2.8 (71)	2.20 (1.00)
1/4, 3/8, 1/2	Zinc	4-oz (120-ml)	5.4 (137)	6.3 (160)	1.3 (33)	2.8 (71)	2.57 (1.17)
† Less gauge.							

REPLA	CEMENT FILTER ELE	MENTS	
Element Rating	Element Material	Part Number	
5-µm	Polyethylene	936K77	



#### Pressure Gauge included. Includes 2 female port blocks. Accessories ordered separately, refer to page E6.3-4.

Δ

В

STANDARD SPECIFICATIONS (for products on this page):

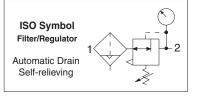
Construction: Filter – Fiber; Regulator – Piston. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowls: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model:

#### Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). Inlet Pressure - Manual drain model:

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Outlet Pressure: Adjustable up to 100 psig (7 bar). Filter Element: 5-micron rated polyethylene. Heads: Zinc. Oil Adjustment: External; tamper-resistant. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Panel Mounting: 1-9/16 inch (40 mm) hole required. Regulator Dome and Knob: Acetal. Optional metal regulator dome. Bowls: Polycarbonate bowls with zinc shatterguards, or zinc bowls. Sight Dome: Clear nylon. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.







# **Modular Filter and Regulator Combinations**

## **FULL-SIZE Series**

## Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 138 scfm

With THREADED PORTS							
	Model Numbers* Automatic Drain Manual Drain						
Port Size							
	Polycarbonate Bowl Metal Bowl Polycarbonate Bowl Metal Bo						
1/4	5F11B2120	5F11B2220	5F11B2320	5F11B2420			
3/8	5F11B3120	5F11B3220	5F11B3320	5F11B3420			
1/2	5F11B4120	5F11B4220	5F11B4320	5F11B4420			
3/4	5F11B5120	5F11B5220	5F11B5320	5F11B5420			

#### With PIPE NIPPLES

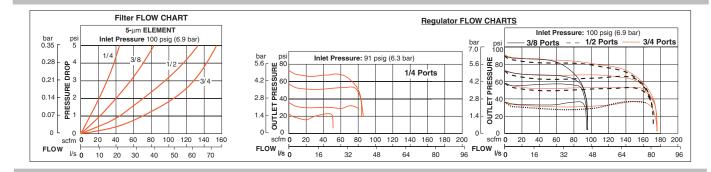
Fittings	Model Numbers*					
for	Automatic D	rain	Manual Drain			
Tubing	Polycarbonate Bowl	Polycarbonate Bowl Metal Bowl		Metal Bowl		
1/4	5F00B2120	5F00B2220	5F00B2320	5F00B2420		
3/8	5F00B3120	5F00B3220	5F00B3320	5F00B3420		
1/2	5F00B4120	5F00B4220	5F00B4320	5F00B4420		
3/4	5F00B5120	5F00B5220	5F00B5320	5F00B5420		

\*NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5F11B2120, C5F00B2120.

Port Size Bowl Type		Bowl Type Bowl		Dimensions inches (mm)			
FUIT SIZE	Bowitype	Capacity	Α	В	С	Depth †	lb (kg)
1/4, 3/8, 1/2, 3/4	Polycarbonate	8-oz (240-ml)	7.0 (178)	5.8 (147)	1.3 (33)	2.8 (71)	4.09 (1.86)
1/4, 3/8, 1/2, 3/4	Zinc	8-oz (240-ml)	7.0 (178)	6.4 (163)	1.3 (33)	2.8 (71)	5.06 (2.30)
† Less gauge.							

|--|

REPLACEMENT FILTER ELEMENTS						
Element Rating Element Material Part Number						
5-µm	Polyethylene	939K77				

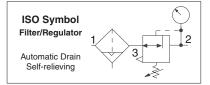


Pressure Gauge included. Units with Threaded Ports Include 2 female port blocks. Options: External Automatic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber; Regulator – Piston. Ambient/Media Temperature:	Filter Element: 5-micron rated polyethylene. Heads: Zinc.
Polycarbonate bowl: 40° to 125°F (4° to 52°C).	Oil Adjustment: External; tamper-resistant.
<i>Metal bowl:</i> 40° to 175°F (4° to 80°C).	Pressure Adjustment Locking Key: Removable.
Fluid Media: Compressed air.	Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front
Inlet Pressure - Automatic drain model:	and rear.
Polycarbonate bowl: 15 to 150 psig (1 to 10 bar).	Bowls: Polycarbonate bowl with steel shatterguard, or zinc bowl with
Metal bowl: 15 to 200 psig (1 to 14 bar).	clear nylon sight glass.
Inlet Pressure - Manual drain model:	Bowl Rings: Aluminum.
Polycarbonate bowl: 0 to 150 psig (0 to 10 bar).	Regulator: Nylon dome; acetal Knob.
Metal bowl: 0 to 200 psig (0 to 14 bar).	Sight Dome: Clear nylon.
Outlet Pressure: Adjustable up to 125 psig (9 bar).	Seals: Nitrile.





**E5** 

Ε

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# **Inline Filter and Regulator Combinations**

## **HIGH-CAPACITY** Series

## Port Sizes: 3/4 & 1 – Flow to 270 scfm

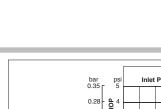
	Model Numbers*					
Port Size	Automatic D	rain	Manual Drain			
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl		
3/4	5H00C5110	5H00C5210	5H00C5310	5H00C5410		
1 5H00C6110 5H00C6210 5H00C6310 5H00C6410						
* NPT port t	hreads For BSPP threads	add a "C" prefix t	o the model number e.a.	C5H00C5110		

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5H00C5110.

Port Size	Bowl Type Bowl		Bowl Type Bowl Dimensions inches (mm)					Weight †
Port Size	воштуре	Capacity	Α	В	С	Depth †	lb (kg)	
3/4, 1	Polycarbonate	16-oz (480-ml)	9.1 (231)	8.0 (203)	2.4 (62)	4.3 (108)	4.53 (2.05)	
3/4, 1	Zinc	16-oz (480-ml)	9.1 (231)	8.3 (210)	2.1 (54)	4.3 (108)	5.95 (2.70)	
† Less gau	† Less gauge.							

REPLACEMENT FILTER ELEMENTS					
Element Rating	Element Material	Part Number			
5-µm	Polyethylene	1010K77			





Filter

FLOW CHART

Б

ssul 0.14

PRE 0.07 0 0 scfm 0 50

0.21

FLOW

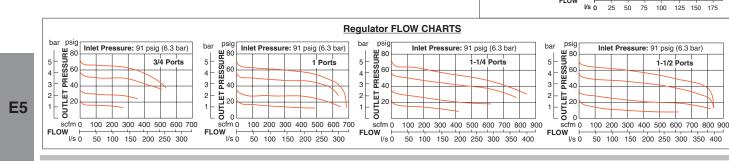
**ISO Symbol** Filter/Regulator Automatic Drain Self-relieving

> 5-µm ELEMENT ressure 100 psig (6.9 bar)

> > 3/4

100 150 200 250 300 350 400





#### Pressure Gauge included. Options: External Automatic Drain, Electronic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - Fiber; Regulator - Piston. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

#### Filter Element: 5-micron rated polyethylene. Heads: Aluminum. Oil Adjustment: External; tamper-resistant. Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Adjustment Locking Key: Removable. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Bowls: Polycarbonate bowl with steel shatterguard, or zinc bowl with clear nylon sight glass. Bowl Rings: Aluminum. Seals: Nitrile.



# **Inline Filter and Lubricator Combinations**

# **MINIATURE** Series

2

**ISO Symbol** Filter-Lubricator

Automatic Drain Self-relieving

Port Sizes: 1/8 & 1/4 – Flow to 19 scfm							
		Model N	umbers*				
Fill	Automatic I	Drain	Manual Dr	ain			
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl			
	5311C1012	5312C1012	5311C1011	5312C1011			
	5311C2012	5312C2012	5311C2011	5312C2011			
Cap	5311C1112	5312C1112	5311C1111	5312C1111			
Cap	5311C2112	5312C2112	5311C2111	5312C2111			

## \* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5311C1012.

Port Size Bowl Type Bowl			Bowl Dimensions inches (mm)				
Bowl Type	Capacity	А	В	С	Depth †	lb (kg)	
Polycarbonate	2-oz (60-ml)	3.4 (86)	3.6 (90)	0.7 (17)	1.6 (41)	0.59 (0.27)	
Metal	2-oz (60-ml)	3.4 (86)	4.3 (109)	0.7 (17)	1.6 (41)	0.59 (0.27)	
	Polycarbonate	Polycarbonate 2-oz (60-ml)	Capacity         A           Polycarbonate         2-oz (60-ml)         3.4 (86)	Capacity         A         B           Polycarbonate         2-oz (60-ml)         3.4 (86)         3.6 (90)	Capacity         A         B         C           Polycarbonate         2-oz (60-ml)         3.4 (86)         3.6 (90)         0.7 (17)	Capacity         A         B         C         Depth †           Polycarbonate         2-oz (60-ml)         3.4 (86)         3.6 (90)         0.7 (17)         1.6 (41)	

† Less gauge.

Port Size

1/8 1/4

1/8 1/4 Lubricator Fill

Туре

Fill Port

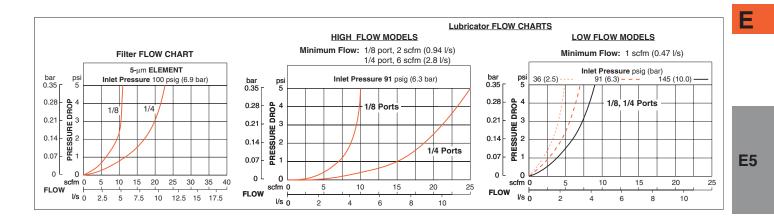
Fill Port

Quick-Fill Cap

Quick-Fill Cap

А ¥ C В

REPLA	REPLACEMENT FILTER ELEMENTS					
Element Rating	Element Material	Part Number				
5-µm	Polyethylene	933K77				



#### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, Lubricator – Wick-Feed or Quick-Fill Cap. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar).	<ul> <li>Inlet Pressure - Manual drain model: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).</li> <li>Oil Adjustment: Internal; tamper-resistant.</li> <li>Filter Drain: Internal automatic drain; optional manual drain.</li> <li>Filter Element: 5-micron rated polyethylene.</li> <li>Heads: Aluminum.</li> <li>Bowls: Polycarbonate or aluminum.</li> <li>Seals: Nitrile.</li> </ul>
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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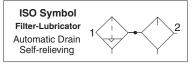
# **Modular Filter and Lubricator Combinations**

## **MID-SIZE Series**

## Port Sizes: 1/4, 3/8 & 1/2 - Flow to 100 scfm

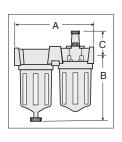
	Model Numbers*							
Port Size	Automatic D	rain	Manual Drain					
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl				
1/4	5M11B2101	5M11B2202	5M11B2301	5M11B2402				
3/8	5M11B3101	5M11B3202	5M11B3301	5M11B3402				
1/2	5M11B4101	5M11B4202	5M11B4301	5M11B4402				
* NPT port	* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5M11B2101.							

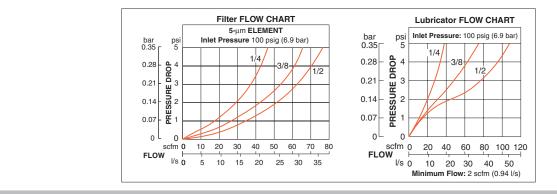




Dout Cine	Bowl Turne Bowl		Dimensions inches (mm)				Weight †
Port Size	Bowl Type	Capacity	Α	В	С	Depth †	lb (kg)
1/4, 3/8, 1/2	Polycarbonate	4-oz (120-ml)	5.6 (137)	4.8 (122)	1.8 (46)	2.8 (71)	2.29 (1.04)
1/4, 3/8, 1/2	Metal	4-oz (120-ml)	5.6 (137)	4.9 (123)	1.8 (46)	2.8 (71)	3.10 (1.41)
+ Less gauge	).						

REPLACEMENT FILTER ELEMENTS					
Element Rating Element Material Part Number					
5-µm	Polyethylene	936K77			





Pressure Gauge included. Includes 2 female port blocks. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, Lubricator – Sight-Feed. Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### Inlet Pressure - Automatic drain model:

*Polycarbonate bowl:* 15 to 150 psig (1 to 10 bar). *Metal bowl:* 15 to 200 psig (1 to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).
Filter Element: 5-micron rated polyethylene.
Heads: Zinc.
Oil Adjustment: External; tamper-resistant.
Bowls: Polycarbonate bowls with zinc shatterguards, or zinc bowls.
Sight Dome: Clear nylon.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## **FULL-SIZE Series**

### Port Sizes: 1/4, 3/8, 1/2 & 3/4 - Flow to 138 scfm

#### With THREADED PORTS

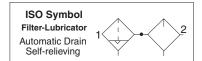
	Model Numbers*							
Port Size	Automatic D	rain	Manual Drain					
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl				
1/4	5F11B2101	5F11B2202	5F11B2301	5F11B2402				
3/8	5F11B3101	5F11B3202	5F11B3301	5F11B3402				
1/2	5F11B4101	5F11B4202	5F11B4301	5F11B4402				
3/4	5F11B5101	5F11B5202	5F11B5301	5F11B5402				
* NPT port t	* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5F11B2101							

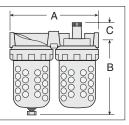
#### With PIPE NIPPLES

Fittings	Model Numbers							
for	Automatic D	rain	Manual Drain					
Tubing	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl				
1/4	5F00B2101	5F00B2202	5F00B2301	5F00B2402				
3/8	5F00B3101	5F00B3202	5F00B3301	5F00B3402				
1/2	5F00B4101	5F00B4202	5F00B4301	5F00B4402				
3/4	5F00B5101	5F00B5202	5F00B5301	5F00B5402				

David Cine David Turne		Bowl	Dimensions inches (mm)				Weight †
Port Size	Bowl Type	Capacity		В	С	Depth †	lb (kg)
1/4, 3/8, 1/2, 3/4	Polycarbonate	8-oz (240-ml)	7.1 (180)	5.8 (147)	1.3 (33)	2.8 (71)	4.09 (1.86)
1/4, 3/8, 1/2, 3/4	Zinc	8-oz (240-ml)	7.1 (180)	6.4 (163)	1.3 (33)	2.8 (71)	5.9 (2.68)
† Less gauge.		-					-







**E5** 

REPLA		IVIENIS		
Element Rating	Element Material	Part Number		
5-μm	Polyethylene	939K77	Filter FLOW CHART           5-µm ELEMENT           0.35         5           0.28         4           0.21         -           0.21         -           0.35         -           0.14         -           0.21         -           0.21         -           0.21         -           0.21         -           0.21         -           0.21         -           0.21         -           0.21         -           0.21         -           0.22         -           0.14         -           0.22         -           0.07         -           0.14         -           0.22         -           0.23         -	Lubricator FLOW CHART           bar         psi         Inlet Pressure: 100 psig (6.9 bar)           0.35         5         1/4         3/8           0.28         6         4         1/2         3/4           0.21         9         3         3/4         3/4           0.14         75         2         1         1
			0 0 0 20 40 60 80 100 120 140 16	0 scfm 0 20 40 60 80 100 120 140

Pressure Gauge included. Units with Threaded Ports Include 2 female port blocks. Options: Electronic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

FLOW //s 0 10 20 30 40 50 60 70

### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, Lubricator – Sight-Feed. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). Inlet Pressure - Manual drain model: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

*Metal bowl:* 0 to 200 psig (0 to 14 bar). **Outlet Pressure:** Adjustable up to 125 psig (9 bar). Filter Element: 5-micron rated polyethylene.
Heads: Zinc.
Oil Adjustment: External; tamper-resistant.
Pressure Adjustment Locking Key: Removable.
Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.
Bowls: Polycarbonate bowl with steel shatterguard, or zinc bowl with clear nylon sight glass.
Bowl Rings: Aluminum.
Regulator: Nylon dome; acetal knob.
Sight Dome: Clear nylon.
Seals: Nitrile.

FLOW

I/s 0 10 20 30 40 50 60 Minimum Flow: 2 scfm (0.94 I/s)

ROSS

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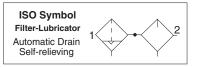
## **HIGH-CAPACITY** Series

## Port Sizes: 3/4 & 1 – Flow to 270 scfm

		Model N	umbers*		
Port Size	Automatic D	rain	Manual Drain		
	Polycarbonate Bowl Metal Bowl		Polycarbonate Bowl	Metal Bowl	
3/4	5H00B5101	5H00B5202	5H00B5301	5H00B5402	
1 5H00B6101 5H00B6202 5H00B6301 5H00B6402					
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5H00B5101.					

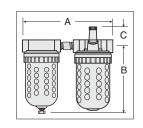
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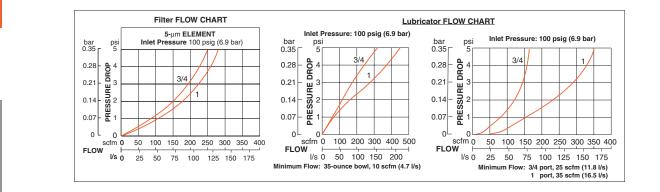


Dimensions inches (mm) Bowl Weight † Port Size **Bowl Type** Capacity lb (kg) Depth † Α В С 3/4, 1 Polycarbonate 16-oz (480-ml) 9.2 (234) 8.0 (204) 1.4 (37) 4.3 (108) 5.27 (2.39) 16-oz (480-ml) 3/4, 1 Aluminum 9.2 (234) 8.3 (210) 1.4 (37) 4.3 (108) 6.3 (2.86)

Less gauge.



REPLACEMENT FILTER ELEMENTS					
Element Rating Element Material Part Number					
5-µm	Polyethylene	1010K77			



Pressure Gauge included. Options: Automatic External Drain, Electronic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

#### Construction: Filter - Fiber, Lubricator - Wick-Feed.

#### Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C).

Metal bowl: 40° to 175°F (4° to 80°C).

#### Fluid Media: Compressed air.

#### Inlet Pressure - Automatic drain model:

Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar).

#### Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Filter Element: 5-micron rated polyethylene. Heads: Aluminum. Oil Adjustment: External; tamper-resistant. Bowls: Polycarbonate bowls with steel shatterguard, or aluminum bowls with sight glass. Bowl Rings: Aluminum. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

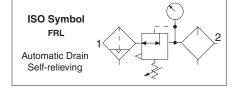


## **BANTAM Series**

### Port Sizes: 1/8 & 1/4 and Tube Fittings - Flow to 23 scfm

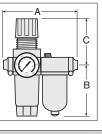
Combination with PISTON Type REGULATOR					
Model Numbers#					
Port Size	Automatic E	Drain	Manual Dr	ain	
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl	
With THRE	EADED PORTS*				
1/8	5D01C0115	5D01C0216	5D01C0315	5D01C0416	
1/4	5D02C0115	5D02C0216	5D02C0315	5D02C0416	
With Quic	k Connect TUBE FITT	NGS			
1/4	5D03C0115	5D03C0216	5D03C0315	5D03C0416	
3/8	5D04C0115	5D04C0216	5D04C0315	5D04C0416	
4mm	5D05C0115	5D05C0216	5D05C0315	5D05C0416	
6mm	5D06C0115	5D06C0216	5D06C0315	5D06C0416	
8mm	5D07C0115	5D07C0216	5D07C0315	5D07C0416	
10mm	5D08C0115	5D08C0216	5D08C0315	5D08C0416	
* NPT port f	threads. For BSPP thread	ls add a " <mark>C</mark> " prefix	to the model number e.g	J., <mark>C</mark> 5D01C0115.	



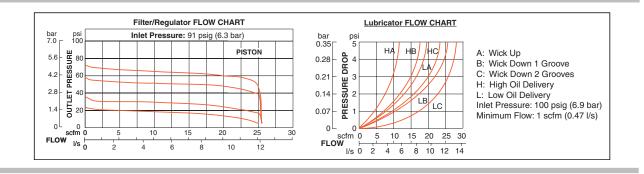


\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5D01C0115 #Change the ninth digit to "7" for quick fill lubricator cap e.g., 5D01C0117

Port	Bowl	Dimensions inches (mm)				Weight †
Size Ca	Capacity	А	B**	С	Depth †	lb (kg)
1/8, 1/4	2-oz (60-ml)	4.6 (117)	3.6 (92)	2.6 (67)	1.8 (45)	0.57 (0.32)
Models b	elow have qu	ick-connec	t tube fitti	ngs.		
1/4	2-oz (60-ml)	5.0 (127)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
3/8	2-oz (60-ml)	5.6 (142)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
4, 6 mm	2-oz (60-ml)	5.1 (130)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
8 mm	2-oz (60-ml)	4.7 (120)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
10 mm	2-oz (60-ml)	5.6 (142)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
** Dimension for polycarbonate filter bowl; metal bowl is 3.8 (97). † Less gauge.						



REPLACEMENT FILTER ELEMENTS				
Element Rating Element Material Part Number				
5-µm	Polyethylene	933K77		



Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, Regulator - Piston; Lubricator - Wick-Feed. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model:

Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar).

#### Inlet Pressure - Manual drain model:

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Pressure Gauge: 0 to 160 psig (11 bar); 1/8 NPT gauge ports front and rear.
Filter Element: 5-micron rated polyethylene.
Oil Adjustment: External, no shutoff.
Outlet Pressure: Adjustable up to 100 psig (7 bar).
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Filter/Regulator & Lubricator Bodies: Acetal.
Bowls: Polycarbonate bowls or aluminum bowls.
Regulator Dome and Knob: Acetal.
Seals: Nitrile.

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

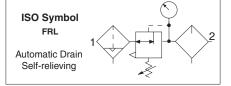
Ε

# **BANTAM Series**

### Port Sizes: 1/8 & 1/4 and Tube Fittings – Flow to 23 scfm

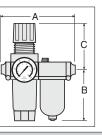
Port		Model Nu	umbers#	
Size	Automatic D	rain	Manual Dr	ain
0.20	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl
With TH	READED PORTS*			
1/8	5D01C0125	5D01C0226	5D01C0325	5D01C0426
1/4	5D02C0125	5D02C0226	5D02C0325	5D02C0426
With Qu	ick Connect TUBE FITTI	NGS		
1/4	5D03C0125	5D03C0226	5D03C0325	5D03C0426
3/8	5D04C0125	5D04C0226	5D04C0325	5D04C0426
4mm	5D05C0125	5D05C0226	5D05C0325	5D05C0426
6mm	5D06C0125	5D06C0226	5D06C0325	5D06C0426
8mm	5D07C0125	5D07C0226	5D07C0325	5D07C0426
10mm	5D08C0125	5D08C0226	5D08C0325	5D08C0426



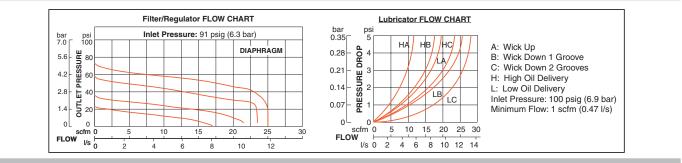


\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5D01C0115. #Change the ninth digit to "7" for quick fill lubricator cap e.g., 5D01C0127.

Port	Bowl	Di	Weight <sup>†</sup>			
Size	Capacity	Α	B**	С	Depth †	lb (kg)
1/8, 1/4	2-oz (60-ml)	4.6 (117)	3.6 (92)	2.6 (67)	1.8 (45)	0.57 (0.32)
Models b	elow have quic	k-connect	tube fittin	gs.		
1/4	2-oz (60-ml)	5.0 (127)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
3/8	2-oz (60-ml)	5.6 (142)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
4, 6 mm	2-oz (60-ml)	5.1 (130)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
8 mm	2-oz (60-ml)	4.7 (120)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
10 mm	2-oz (60-ml)	5.6 (142)	3.6 (92)	2.6 (67)	1.8 (45)	0.55 (0.31)
	** Dimension for polycarbonate filter bowl; metal bowl is 3.8 (97). † Less gauge.					



REPLACEMENT FILTER ELEMENTS				
Element Rating Element Material Part Number				
5-µm	Polyethylene	933K77		





### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - Fiber, Lubricator - Diaphragm.

#### Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C).

Metal bowl: 40° to 175°F (4° to 80°C).

#### Fluid Media: Compressed air.

Inlet Pressure - Automatic drain model:

Polycarbonate bowl: 15 to 150 psig (1 to 10 bar).

# *Metal bowl:* 15 to 200 psig (1 to 14 bar). **Inlet Pressure - Manual drain model:**

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Pressure Gauge: 0 to 160 psig (11 bar); 1/8 NPT gauge ports front and rear.
Filter Element: 5-micron rated polyethylene.
Oil Adjustment: External, no shutoff.
Outlet Pressure: Adjustable up to 100 psig (7 bar).
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Filter/Regulator & Lubricator Bodies: Acetal.
Bowls: Polycarbonate bowls or aluminum bowls.
Regulator Dome and Knob: Acetal.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Model Numbers

Manual Drain

Metal Bowl

5352C1005

5352C2005

5352C1105

5352C2105

**Polycarbonate Bowl** 

5351C1005

5351C2005

5351C1105

5351C2105

Port Sizes: 1/8 & 1/4 - Flow to 24 scfm

Metal Bowl

5352C1006

5352C2006

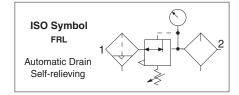
5352C1106

5352C2106

<sup>r</sup> NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5351C1006.

# **MINIATURE Series**

100



Port	DevelTerre	Bowl Dimensions inches (mm)				Weight †	
Size	Bowl Type	Capacity	Α	В	С	Depth †	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (59.1-ml)	3.7 (94)	3.9 (99)	2.6 (67)	1.6 (41)	0.66 (0.30)
1/8, 1/4	Aluminum	2-oz (59.1-ml)	4.0 (101)	4.3 (109)	2.6 (67)	1.6 (41)	0.66 (0.30)
† Less gauge.							

REPLACEMENT FILTER ELEMENTS				
Element Rating Element Material Part Number				
5-µm Polyethylene 933K77				

Combination with PISTON Type REGULATOR

Polycarbonate Bowl

5351C1006

5351C2006

5351C1106

5351C2106

With QUICK-FILL Cap Lubricator

Automatic Drain

Port Size

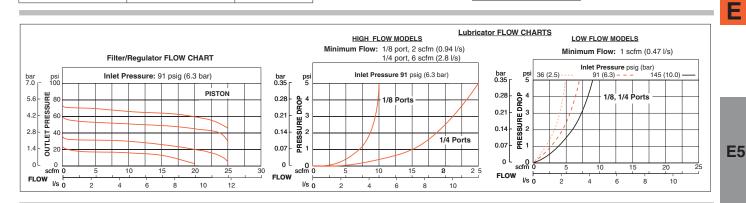
1/8

1/4

1/8

1/4

Fill Port Lubricator



## Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, Regulator - Piston; Lubricator - Wick-Feed. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). Inlet Pressure - Manual drain model: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 160 psig (11 bar); 1/8 NPT gauge ports front and rear. Oil Adjustment: Internal; tamper-resistant. Panel Mounting: 1-3/16 inch (30 mm) hole required. Filter Drain: Internal automatic drain; optional manual drain. Filter Element: 5-micron rated polyethylene. Bodies: Aluminum for filter/regulator and lubricator. Bowls: Polycarbonate bowls or aluminum bowls. Regulator Dome and Knob: Acetal. Seals: Nitrile.

Α

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В

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



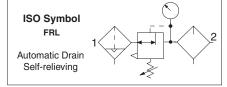
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Port Sizos: 1/2 & 1/4 Elow to 2/ cofm

# **MINIATURE Series**

Combination with DIAPHRAGM Type REGULATOR						
	Model Numbers*					
Port Size	Automatic	Drain	Manual Drain			
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl		
Fill Port Lubricator						
1/8	5341C1006	5342C1006	5341C1005	5342C1005		
1/4	5341C2006	5342C2006	5341C2005	5342C2005		
With QUICK-FILL Cap Lubricator						
1/8	5341C1106	5342C1106	5341C1105	5342C1105		
1/4	5341C2106	5342C2106	5341C2105	5342C2105		
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5351C1006.						





A

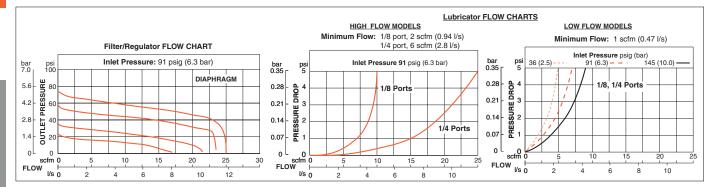
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В

Port	David Turna	Bowl	Dimensions inches (mm)				Weight †
Size	Bowl Type	Capacity		В	С	Depth †	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (59.1-ml)	3.7 (94)	3.6 (92)	2.6 (67)	1.6 (41)	0.66 (0.30)
1/8, 1/4	Aluminum	2-oz (59.1-ml)	4.0 (101)	4.3 (109)	2.6 (67)	1.6 (41)	0.66 (0.30)

t Less	gauge.
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REPLACEMENT FILTER ELEMENTS					
Element Rating Element Material Part Number					
5-µm	Polyethylene	933K77			



### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

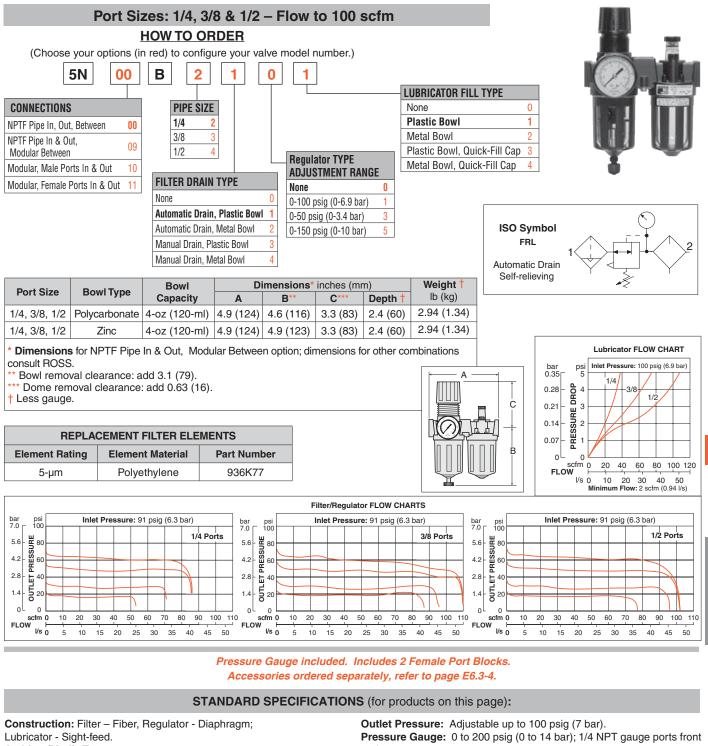
### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, Lubricator – Diaphragm; Lubricator - Week-Feed Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). Inlet Pressure - Manual drain model:

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Gauge: 0 to 160 psig (11 bar); 1/8 NPT gauge ports front and rear. Oil Adjustment: Internal; tamper-resistant. Panel Mounting: 1-3/16 inch (30 mm) hole required. Filter Drain: Internal automatic drain; optional manual drain. Filter Element: 5-micron rated polyethylene. Bodies: Aluminum for filter/regulator and lubricator. Bowls: Polycarbonate bowls or aluminum bowls. Regulator Dome and Knob: Acetal. Seals: Nitrile.



# **MID-SIZE Series**



Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

#### **Inlet Pressure:**

#### For automatic drain model:

Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). For manual drain model:

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports fror and rear.
Oil Adjustment: External; tamper-resistant.
Panel Mounting: 1-9/16 inch (40 mm) hole required.
Filter Element: 5-micron rated polyethylene.
Bodies: Zinc for filter/regulator and lubricator.
Bowls: Polycarbonate bowls with zinc shatterguard, or zinc bowls.
Regulator Dome and Knob: Acetal.
Seals: Nitrile.
Sight Dome: Clear nylon.

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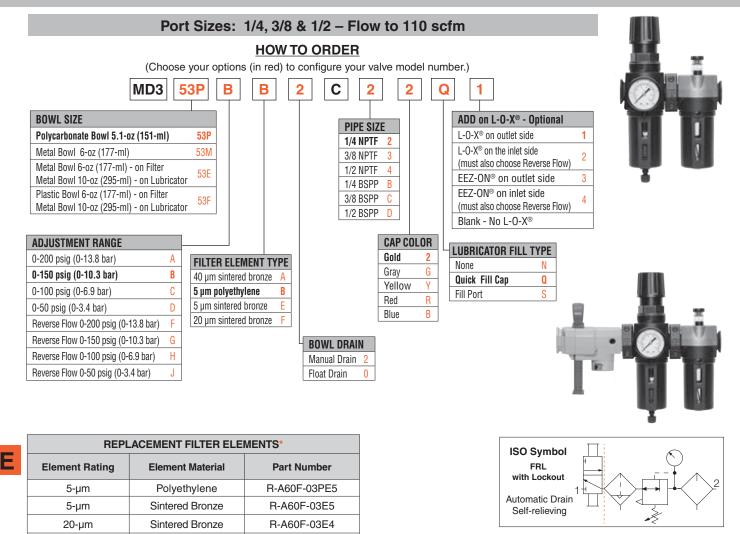
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E

**MD3<sup>™</sup> Series** 



**E**5

40-µm

For polycarbonate and metal bowl types.

Sintered Bronze

#### Accessories ordered separately, refer to page E6.3-5.

R-A60F-03E3

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - Fiber, or Sintered Bronze, Regulator -Optional Pressure Adjustment Locking Key: Removable. Diaphragm; Lubricator - Sight-feed. Pressure Gauge: 0-200 psig (0-13.8 bar) ); 1/4 NPT gauge ports front Ambient/Media Temperature: and rear. Panel Mounting: 2-1/16 inch (52 mm) hole required. Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Oil Adjustment: External; tamper resistant. Fluid Media: Compressed air. Filter Element: 5-micron rated polyethylene; 5-, 20- or 40-micron rated Filter Inlet Pressure: sintered bronze. Polycarbonate bowl & Manual drain: 0 to 150 psig (0 to 10 bar). Body: Zinc. Dome: Nylon. Polycarbonate bowl & Float drain: 30 to 150 psig (2 to 10 bar). Bowl: Polycarbonate bowl with nylon shatterguard, or aluminum bowl Filter Inlet Pressure: Metal bowl & Manual drain: 0-250 psig (0 to 17 bar). with clear nylon sight glass. Lubricator bowl only: extended aluminum bowl Metal bowl & Float drain: 30-200 psig (2 to 14 bar). with clear nylon sight glass. Lubricator Inlet Pressure: Seals: Nitrile. Valve: Brass. Polycarbonate bowl: 150 psig (10 bar) maximum. Metal bowl: 250 psig (17 bar) maximum. Sight-Feed Dome: Nylon. Outlet Pressure: Adjustable up to 200 psig (14 bar); optional adjusting springs.



## **MD3<sup>™</sup> Series**

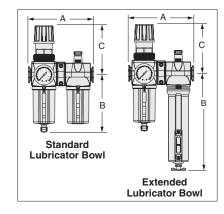
Bourd Turne		Weight †				
Bowl Type	А	B*	С	Depth †	lb (kg)	
Polycarbonate	6.46 (164.1)	5.54 (140.6)	4.68 (119)	2.90 (73.7)	4.7 (2.1)	
Metal	6.46 (164.1)	6.42 (163.1)	4.68 (119)	2.90 (73.7)	5.1 (2.3)	
Extended Metal	6.46 (164.1)	9.37 (238)	4.68 (119)	2.90 (73.7)	5.3 (2.4)	

Lockout: With the lockout valve, add 2.3 (58) to dimension A.

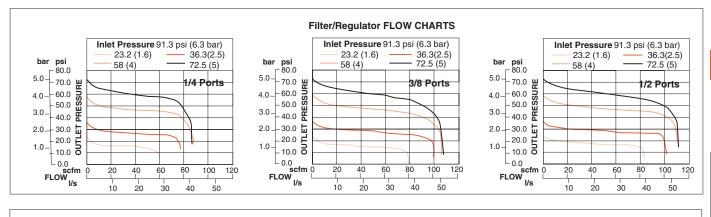
\* Bowl (standard) removal clearance: add 3.1 (79)

\* Bowl (extended) removal clearance: add 6.1 (155)

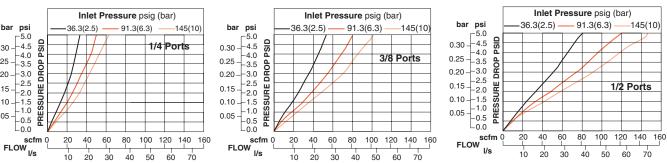
Less gauge.



## **AIR FLOW and CONSTRUCTION DATA**







ROSS

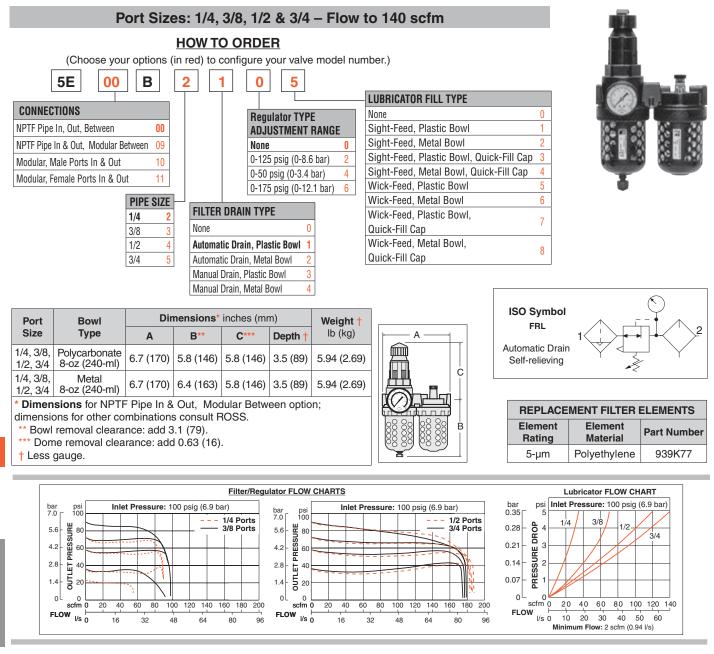
0.30

0.25 –

0.20 -

0.15 -0.10 0.05 -

# FULL-SIZE Series



Pressure Gauge included. Units with Threaded Ports Include 2 female port blocks. Options: External Automatic Drain, refer to page E6.7. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

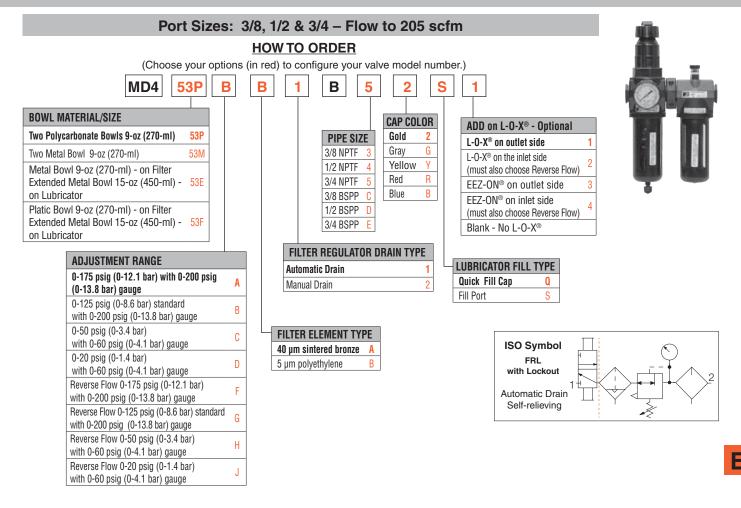
Construction: Filter - Fiber, Regulator - Diaphragm; Outlet Pressure: Adjustable up to 125 psig (9 bar). Lubricator - Sight-Feed, or Wick-Feed. Filter Element: 5-micron rated polyethylene. Ambient/Media Temperature: Pressure Adjustment Locking Key: Removable. Polycarbonate bowl: 40° to 125°F (4° to 52°C). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front Metal bowl: 40° to 175°F (4° to 80°C). and rear. Fluid Media: Compressed air. Oil Adjustment: External; tamper-resistant. Inlet Pressure - Automatic drain model: Bodies: Zinc for filter/regulator and lubricator. Polycarbonate bowl: Up to 150 psig (up to 10 bar). Bowls: Polycarbonate bowls with steel shatterguards, or zinc bowls with Metal bowl: Up to 200 psig (up to 14 bar). clear nylon sight glasses. Inlet Pressure - Manual drain model: Bowl Rings: Nylon. Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Regulator: Nylon dome; acetal knob. Sight Dome: Clear nylon. Seals: Nitrile. Metal bowl: 0 to 200 psig (0 to 14 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

F



**MD4<sup>™</sup> Series** 



<b>REPLACEMENT FILTER ELEMENTS*</b>					
Element Rating Element Material Part Number					
5-µm	R-A115-106PE5				
40-µm Sintered Bronze R-A115-106PE					
* For Polycarbonate and metal bowl types.					

Options: External Bowl Drains, refer to page E6.7. Accessories ordered separately, refer to page E6.3-5.

**STANDARD SPECIFICATIONS** (for products on this page):

Construction: Filter - Fiber or Sintered Bronze, Filter Element: 5-micron rated polyethylene; optional 40-micron element. Regulator - Diaphragm; Lubricator - Sight-Feed. Heads: Zinc. Ambient/Media Temperature: Pressure Adjustment Locking Key: Removable. Polycarbonate bowl: 40° to 125°F (4° to 52°C). Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front Metal bowl: 40° to 175°F (4° to 80°C). and rear. Fluid Media: Compressed air. Oil Adjustment: External: tamper-resistant. Inlet Pressure - Automatic drain model: Bowls: Aluminum bowl with clear nylon sight glass, polycarbonate bowl Polycarbonate bowl: Up to 150 psig up to 10 bar). with steel shatterguard, or extended aluminum lubricator bowl with clear Metal bowl: Up to 200 psig (up to 14 bar). nylon sight glass. Inlet Pressure - Manual drain model: Regulator Valve: Brass. Sight Dome: Clear nylon. Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Seals: Nitrile. Outlet Pressure: Adjustable up to 125 psig (9 bar).

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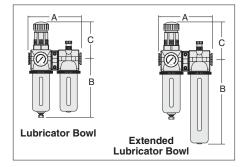
Port Size	Bowd Type		Weight †			
Port Size	Bowl Type	А	B*	С	Depth †	lb (kg)
	Polycarbonate	7.3 (186)	7.7 (195)	5.4 (137)	2.9 (73)	5.81 (2.64)
3/8, 1/2, 3/4	Metal	7.3 (186)	7.6 (193)	5.4 (137)	2.9 (73)	5.81 (2.64)
	Extended Metal	7.2 (183)	10.6 (269)	4.68 (119)	5.4 (137)	6.00 (2.73)

Lockout: With the lockout valve, add 2.3 (58) to dimension A.

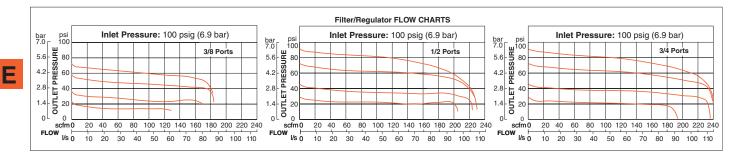
\* Bowl (standard) removal clearance: add 4.2 (107).

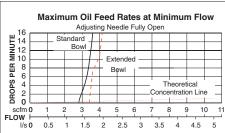
\* Bowl (extended) removal clearance: add 6.1 (155)

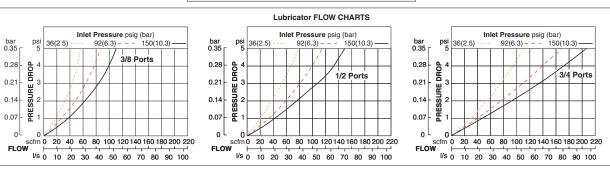
† Less gauge.



## **AIR FLOW and CONSTRUCTION DATA**









**Online Version** 

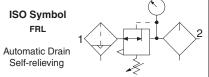
Rev. 11/14/16

## **BANTAM Series**

## Port Sizes: 1/8 & 1/4 - Flow to 22 scfm

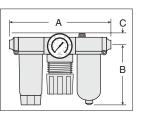
Port		Model Numbers*#				
Size	Automatic D	rain	Manual Drain			
0120	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl		
With TH	READED PORTS	· · · · · ·		·		
1/8	5B01C0115	5B01C0216	5B01C0315	5B01C0416		
1/4	5B02C0115	5B02C0216	5B02C0315	5B02C0416		
With Qu	ick Connect TUBE FITTI	NGS				
1/4	5B03C0115	5B03C0216	5B03C0315	5B03C0416		
3/8	5B04C0115	5B04C0216	5B04C0315	5B04C0416		
4mm	5B05C0115	5B05C0216	5B05C0315	5B05C0416		
6mm	5B06C0115	5B06C0216	5B06C0315	5B06C0416		
8mm	5B07C0115	5B07C0216	5B07C0315	5B07C0416		
10mm	5B08C0115	5B08C0216	5B08C0315	5B08C0416		



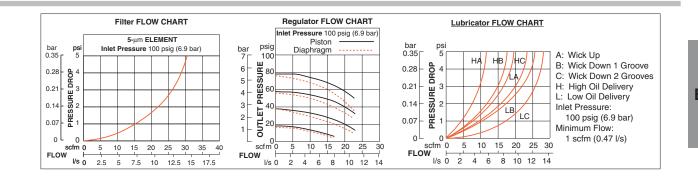


NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5B01C0115. #Change the ninth digit to "7" for quick fill lubricator cap e.g., 5B01C0117.

Port Size	Dimensions inches (mm)				Weight †
Port Size	Α	B**	С	Depth †	lb (kg)
1/8, 1/4	6.3 (160	3.6 (92)	1.7 (43)	3.6 (92)	0.53 (0.24)
Models bel	ow have qu	ıick-conne	ct tube fit	tings.	
1/4	6.7 (170)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
3/8	7.2 (183)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
4, 6 mm	6.7 (170)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
8 mm	6.4 (163)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
10 mm	7.2 (183)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
** Dimension for polycarbonate filter bowl; metal bowl is 3.8 (97). † Less gauge.					



REPLACEMENT FILTER ELEMENTS				
Element Rating Element Material Part Number				
5-µm	Polyethylene	933K77		



#### Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - Fiber; Regulator - Piston; Lubricator - Wick-Feed.

#### Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C).

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## Fluid Media: Compressed air.

Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

## Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Filter Element: 5-micron rated polyethylene. Oil Adjustment: External, no shutoff. Outlet Pressure: Adjustable up to 100 psig (7 bar). Panel Mounting: 1-3/16 inch (30 mm) hole required. Bodies: Acetal. Bowls: 2-oz (60-ml) polycarbonate bowls or aluminum bowls. Regulator Dome and Knob: Acetal. Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

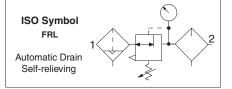
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F

## **BANTAM Series**

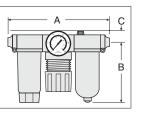
Combination with DIAPHRAGM Type Regulator - Fill Port Lubricator				
Port		Model N	umbers#	
Size	Automatic Dr	ain	Manual Dra	in
0.20	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl
With TH	READED PORTS*			
1/8	5B01C0125	5B01C0226	5B01C0325	5B01C0426
1/4	5B02C0125	5B02C0226	5B02C0325	5B02C0426
With Qui	ick Connect TUBE FITTIN	IGS		
1/4	5B03C0125	5B03C0226	5B03C0325	5B03C0426
3/8	5B04C0125	5B04C0226	5B04C0325	5B04C0426
4mm	5B05C0125	5B05C0226	5B05C0325	5B05C0426
6mm	5B06C0125	5B06C0226	5B06C0325	5B06C0426
8mm	5B07C0125	5B07C0226	5B07C0325	5B07C0426
10mm	5B08C0125	5B08C0226	5B08C0325	5B08C0426



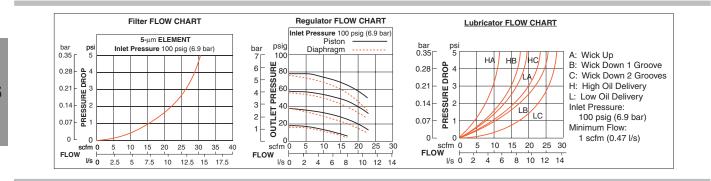


\* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5B01C0115. #Change the ninth digit to "7" for quick fill lubricator cap e.g., 5B01C0127.

Port Size	D	Weight †			
Port Size	Α	B**	С	Depth †	lb (kg)
1/8, 1/4	6.3 (160	3.6 (92)	1.7 (43)	3.6 (92)	0.53 (0.24)
Models bel	ow have qu	ıick-conne	ect tube fit	tings.	
1/4	6.7 (170)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
3/8	7.2 (183)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
4, 6 mm	6.7 (170)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
8 mm	6.4 (163)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
10 mm	7.2 (183)	3.6 (92)	1.7 (43)	3.6 (92)	0.50 (0.23)
** Dimension for polycarbonate filter bowl; metal bowl is 3.8 (97). † Less gauge.					



	REPLACEMENT FILTER ELEMENTS				
E	Element Rating Element Material Part Number				
	5-µm	Polyethylene	933K77		



#### Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

**Construction:** Filter – Fiber; Regulator – Diaphragm; Lubricator - Wick-Feed.

#### Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

### Inlet Pressure - Automatic drain model:

Polycarbonate bowl: Up to 150 psig up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar).

# Inlet Pressure - Manual drain model: Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar). Filter Element: 5-micron rated polyethylene. Oil Adjustment: External, no shutoff. Outlet Pressure: Adjustable up to 100 psig (7 bar). Panel Mounting: 1-3/16 inch (30 mm) hole required. Bodies: Acetal. Bowls: 2 oz (60 ml) polycarbonate bowls or aluminum bowls. Regulator Dome and Knob: Acetal. Seals: Nitrile.



# Inline Filter, Regulator and Lubricator Combinations

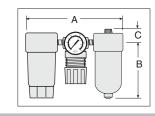
## **MINIATURE Series**

### **Port Sizes: 1/8 & 1/4 – Flow to 19 scfm**

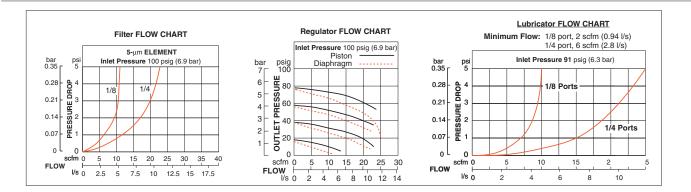
	Model Numbers*				
Port Size	Automatic Drain		Manual Drain		
0120	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl	
FILL Po	rt Lubricator	<u>`</u>			
1/8	5331C1006	5332C1006	5331C1005	5332C1005	
1/4	5331C2006	5332C2006	5331C2005	5332C2005	
With QU	With QUICK-FILL CAP				
1/8	5331C1106	5332C1106	5331C1105	5332C1105	
1/4	5331C2106	5332C2106	5331C2105	5332C2105	
* NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5331C1006.					

Deut Oler	Bowl Dimensions inches (mm)			Weight †			
Port Size	Bowl Type	Capacity	Α	В	С	Depth †	lb (kg)
1/8, 1/4	Polycarbonate	2-oz (60-ml)	5.5 (140)	3.6 (90)	0.7 (17)	1.6 (41)	0.76 (0.34)
1/8, 1/4	Aluminum	2-oz (60-ml)	5.5 (140)	4.3 (109)	0.7 (17)	1.6 (41)	0.76 (0.34)
1 1 2 2 2 2 1 +							

+ Less gauge.



REPLACEMENT FILTER ELEMENTS				
Element Rating Element Material Part Number				
5-µm	Polyethylene	933K77		



### Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber; Regulator – Piston; Lubricator - Wick-Feed. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: Up to 150 psig up to 10 bar). Metal bowl: Up to 200 psig (up to 14 bar). Inlet Pressure - Manual drain model:

*Polycarbonate bowl:* 0 to 150 psig (0 to 10 bar). *Metal bowl:* 0 to 200 psig (0 to 14 bar). Outlet Pressure: Adjustable up to 100 psig (7 bar).
Pressure Gauge: 0 to 160 psig (0 to 11 bar); 1/8 NPT gauge ports front and rear.
Oil Adjustment: Internal; tamper-resistant.
Panel Mounting: 1-3/16 inch (30 mm) hole required.
Filter Element: 5-micron rated polyethylene.
Heads: Aluminum.
Bowls: Polycarbonate or aluminum.
Regulator Dome and Knob: Acetal.
Seals: Nitrile.

ISO Symbol FRL Automatic Drain Self-relieving

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

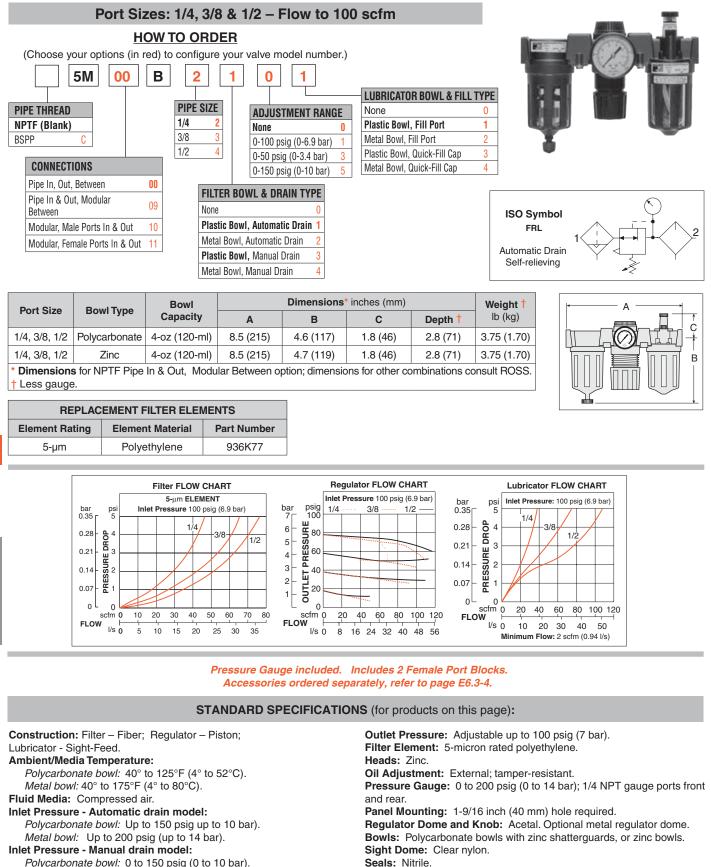


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Ε

## **MID-SIZE Series**



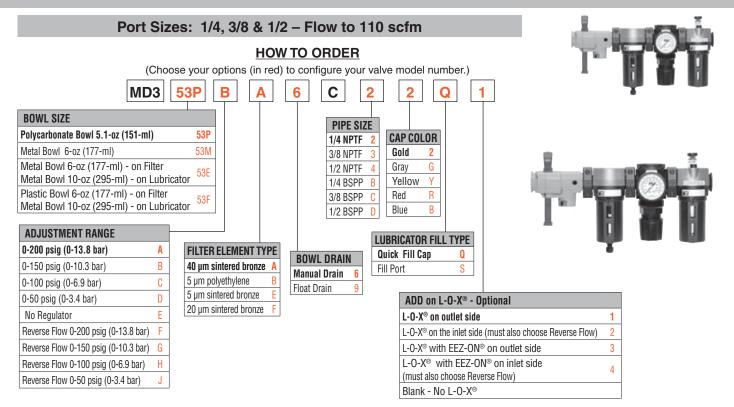
Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**E**5

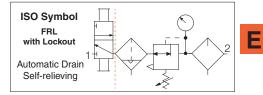


## MD3<sup>™</sup> Series



REPLACEMENT FILTER ELEMENTS*					
Element Rating Element Material Part Number					
5-µm	Polyethylene	R-A60F-03PE5			
5-µm	Sintered Bronze	R-A60F-03E5			
20-µm Sintered Bronze R-A60F-03E4					
40-µm Sintered Bronze R-A60F-03E3					
* For polycarbonate and	metal howl types				

For polycarbonate and metal bowl types.



Options: Drains: For additional information, refer to page E6.7. Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter - Fiber, or Sintered Bronze; Panel Mounting: 2-1/16 inch (52 mm) hole required. Regulator - Diaphragm; Lubricator - Sight-Feed. Self-relieving: Non-relieving optional. Ambient/Media Temperature: Oil Adjustment: External; tamper resistant. Polycarbonate bowl: 40° to 125°F (4° to 52°C). Filter Element: 5-µm-rated polyethylene; 5-µm, 20-µm or 40-µm-rated With metal bowl: 40° to 175°F (4° to 80°C). sintered bronze. Differential Pressure Gauge: Optional. Body: Zinc. Fluid Media: Compressed air. Dome: Nylon. **Filter Inlet Pressure:** Regulator Dome: Nylon. Polycarbonate bowl & Manual drain: 0 to 150 psig (0 to 10 bar). Knob: Acetal. Polycarbonate bowl & Float drain: 30 to 150 psig (2 to 10 bar). Bowl: Polycarbonate with nylon shatterguard, or aluminum bowl with Metal bowl & Manual drain: 0 to 250 psig (0 to 17 bar). clear nylon sight glass. Lubricator bowl only: extended aluminum bowl Metal bowl & Float drain: 30 to 200 psig (2 to 14 bar). with clear nylon sight glass. Outlet Pressure: Adjustable up to 200 psig (13 bar); optional adjusting Seals: Nitrile. Valve: Brass. springs Optional Pressure Adjustment Locking Key: Removable. Valve Cap: Nylon. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4-NPT gauge ports front Sight-Feed Dome: Nylon and rear.

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

E5.25

## **MD3<sup>™</sup> Series**

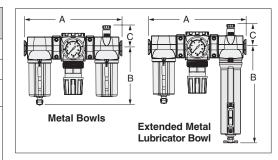
Port Size	Bowl Type		Weight			
Port Size	вомпуре	А	B*	С	Depth	lb (kg)
	Polycarbonate	9.72 (247.4)	5.54 (140.6)	2.21 (56.2)	2.90 (73.7)	6.1 (2.8)
1/2,	Aluminum	9.72 (247.4)	6.42 (163.1)	2.21 (56.2)	2.90 (73.7)	6.4 (2.9)
3/8, 1/2	Extended Aluminuml	9.72 (247.4)	9.37 (238)	2.21 (56.2)	2.90 (73.7)	6.6 (3.0)
Lookouti	With the lockou	t volvo odd 0	2 (E9) to dim	oncion A		

**Lockout:** With the lockout valve, add 2.3 (58) to dimension A.

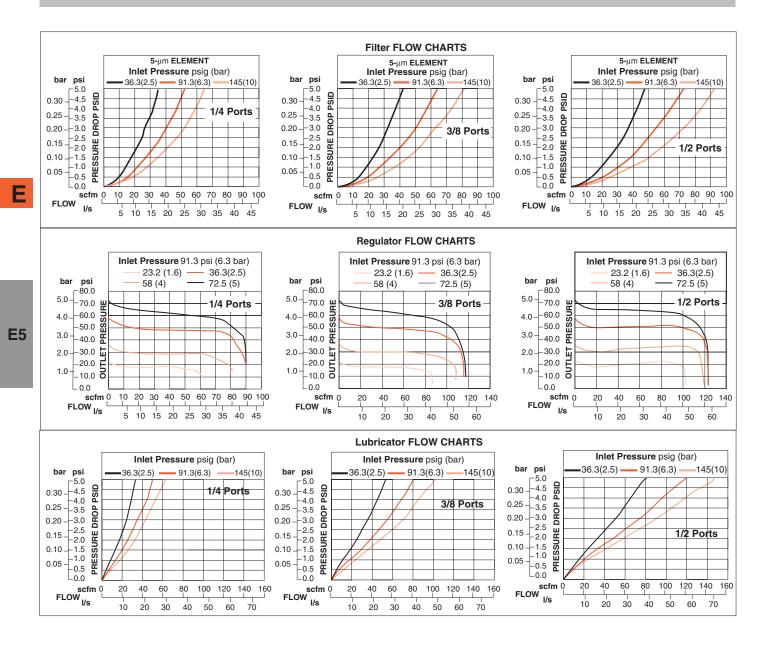
\* Bowl (standard) removal clearance: add 3.1 (79)

\* Bowl (extended) removal clearance: add 6.1 (155)

Dimensions above reflect less gauge.

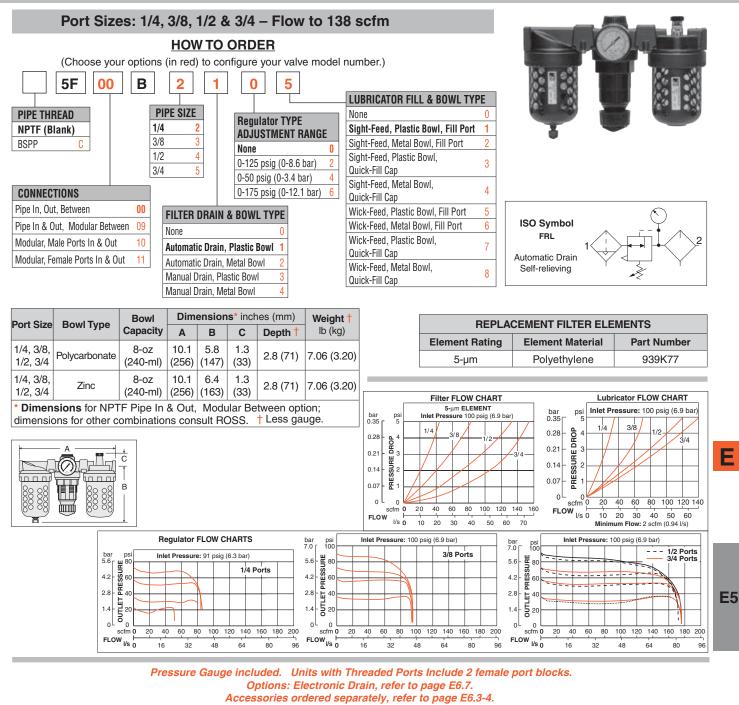


### **AIR FLOW and CONSTRUCTION DATA**





# **FULL-SIZE Series**



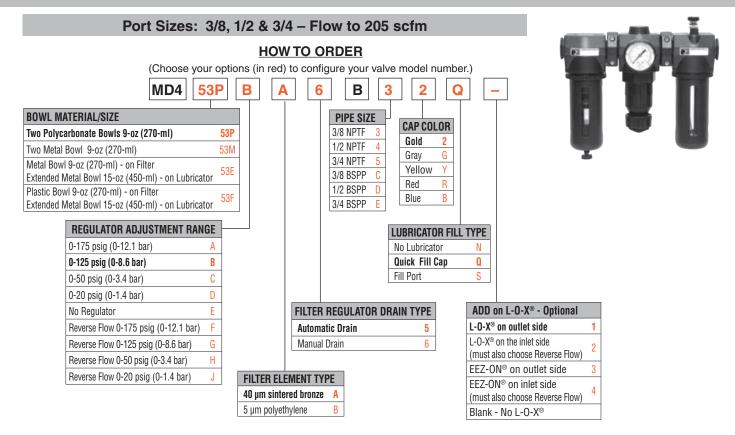
STANDARD SPECIFICATIONS (for products on this page): Construction: Filter - Fiber; Regulator - Piston; Outlet Pressure: Adjustable up to 125 psig (9 bar). Lubricator - Sight-Feed. Filter Element: 5-micron rated polyethylene. Ambient/Media Temperature: Heads: Zinc. Polycarbonate bowl: 40° to 125°F (4° to 52°C). Oil Adjustment: External: tamper-resistant. Metal bowl: 40° to 175°F (4° to 80°C). Pressure Adjustment Locking Key: Removable. Fluid Media: Compressed air. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front Inlet Pressure - Automatic drain model: and rear. Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Bowls: Zinc bowl with clear nylon sight glass, or polycarbonate bowl with Metal bowl: 15 to 200 psig (1 to 14 bar). steel shatterguard. Inlet Pressure - Manual drain model: Bowl Rings: Aluminum. Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Regulator: Nylon dome; acetal knob. Metal bowl: 0 to 200 psig (0 to 14 bar). Sight Dome: Clear nylon. Seals: Nitrile.

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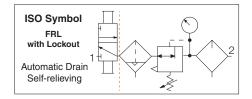
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## MD4<sup>™</sup> Series



<b>REPLACEMENT FILTER ELEMENTS*</b>				
Element Rating Element Material Part Number				
5-µm	Sintered Bronze	R-A115-106PE5		
40-µm Sintered Bronze R-A115-106PE				
* For polycarbonate and metal bowl types.				



#### Options: External Bowl Drains, refer to page E6.7. Accessories ordered separately, refer to page E6.3-5.

#### STANDARD SPECIFICATIONS (for products on this page):

Construction: Filter – Fiber, or Sintered Bronze; Regulator – Piston; Lubricator - Sight-Feed. Ambient/Media Temperature:

Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air.

Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar).

Metal bowl: 15 to 200 psig (1 to 10 bar). Inlet Pressure - Manual drain model:

Polycarbonate bowl: 0 to 150 psig (0 to 10 bar).

Metal bowl: 0 to 200 psig (0 to 14 bar).

Outlet Pressure: Adjustable up to 125 psig (9 bar).

Filter Element: 5-micron rated polyethylene or 40-micron element.
Heads: Zinc.
Oil Adjustment: External; tamper-resistant.
Pressure Adjustment Locking Key: Removable.
Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear.
Bowls: Aluminum bowl with clear nylon sight glass, polycarbonate bowl with steel shatterguard; extended aluminum lubricator bowl with two clear nylon sight glasses.
Bowl Rings: Nylon.
Sight Dome: Clear nylon.
Seals: Nitrile.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**E5** 

F



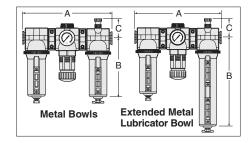
Port Size	Pour Turne	[	Weight †			
Port Size	Bowl Type	А	B*	С	Depth <mark>†</mark>	lb (kg)
3/8, 1/2, 3/4	Polycarbonate	10.9 (276)	7.7 (195)	2.2 (56)	2.9 (73)	6.94 (3.15)
3/8, 1/2, 3/4	Aluminum	10.9 (276)	7.6 (193)	2.2 (56)	3.1 (79)	6.94 (3.15)
3/8, 1/2, 3/4	Extended Metal	10.9 (276)	10.6 (269)	2.2 (56)	3.1 (79)	7.13 (3.24)

Lockout: With the lockout valve, add 2.3 (58) to dimension A.

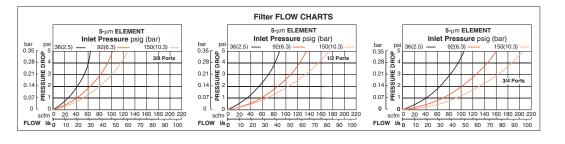
\* Bowl (standard) removal clearance: add 4.2 (107).

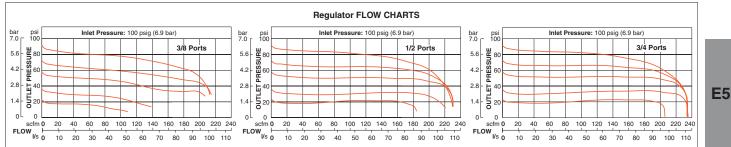
\* Bowl (extended) removal clearance: add 6.1 (155)

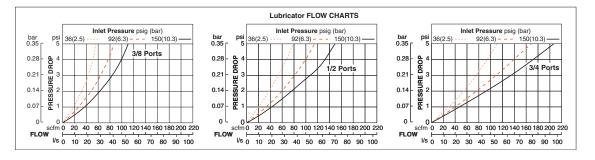
+ Less gauge.



### **AIR FLOW and CONSTRUCTION DATA**







ROSS

## Inline Filter, Regulator and Lubricator Combinations

# **HIGH-CAPACITY** Series

**ISO Symbol** FRL Automatic Drain Self-relieving

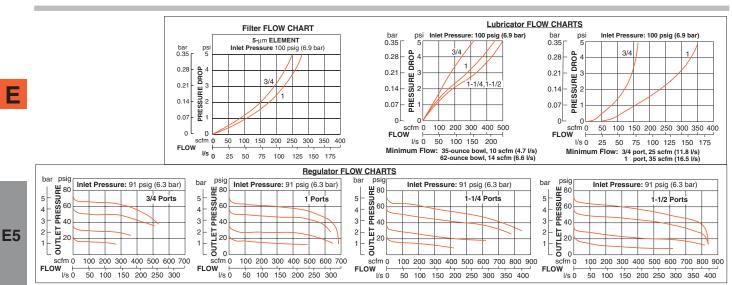
## Port Sizes: 3/4 & 1 – Flow to 270 scfm

Devit	Model Numbers*					
Port Size	Automatic D	rain	Manual Dra	ain		
	Polycarbonate Bowl	Metal Bowl	Polycarbonate Bowl	Metal Bowl		
3/4	5H00C5111	5H00C5212	5H00C5311	5H00C5412		
1	5H00C6111	5H00C6212	5H00C6311	5H00C6412		
* NIDT						

NPT port threads. For BSPP threads add a "C" prefix to the model number e.g., C5H00C5110.

Port Size	e Bowl Type Bowl Capacity		Din	Weight †			
PUIT SIZE	воштуре	Bowl Capacity	Α	В	С	Depth †	lb (kg)
3/4, 1	Polycarbonate	16-oz (480-ml)	15.8 (401)	8.0 (204)	1.2 (31)	4.3 (108)	8.00 (3.64)
3/4, 1	Aluminum	16-oz (480-ml)	15.8 (401)	8.3 (210)	1.2 (31)	4.3 (108)	8.9 (4.03)
† Less gau	t Less gauge.						

REPLA	CEMENT FILTER ELE	A	
Element Rating	Element Material	Part Number	
5-µm	Polyethylene	1010K77	



Pressure Gauge included. Accessories ordered separately, refer to page E6.3-4.

#### STANDARD SPECIFICATIONS (for products on this page):

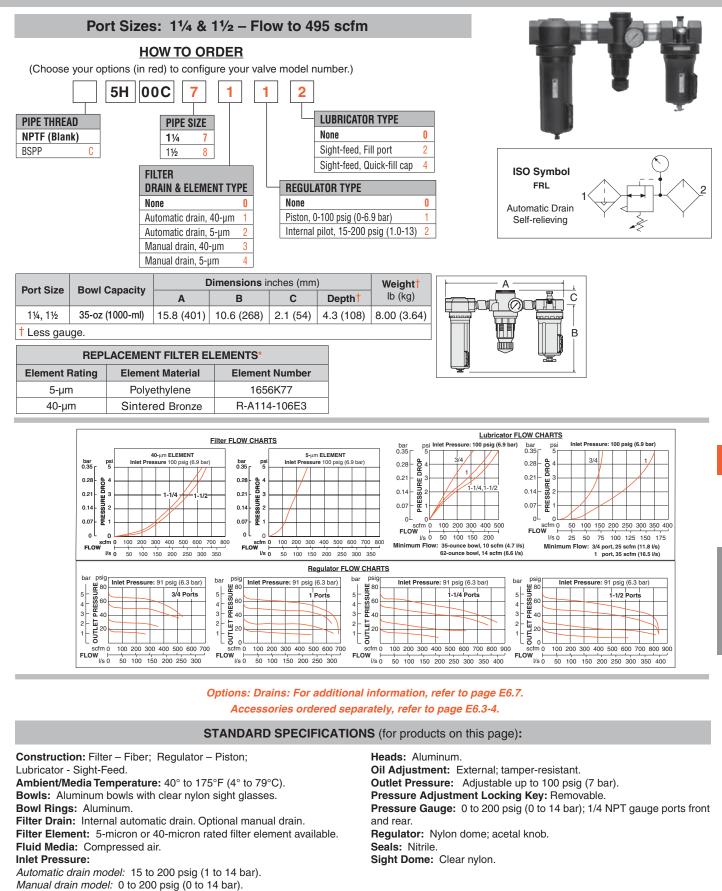
Construction: Filter - Fiber; Regulator - Piston; Lubricator - Wick-Feed. Heads: Aluminum. Ambient/Media Temperature: Polycarbonate bowl: 40° to 125°F (4° to 52°C). Metal bowl: 40° to 175°F (4° to 80°C). Fluid Media: Compressed air. Inlet Pressure - Automatic drain model: Polycarbonate bowl: 15 to 150 psig (1 to 10 bar). Metal bowl: 15 to 200 psig (1 to 14 bar). steel shatterguard. Inlet Pressure - Manual drain model: Seals: Nitrile. Polycarbonate bowl: 0 to 150 psig (0 to 10 bar). Metal bowl: 0 to 200 psig (0 to 14 bar).

Filter Element: 5-micron rated polyethylene. Oil Adjustment: External; tamper-resistant. Outlet Pressure: Adjustable up to 100 psig (7 bar). Pressure Adjustment Locking Key: Removable. Pressure Gauge: 0 to 200 psig (0 to 14 bar); 1/4 NPT gauge ports front and rear. Bowls: Aluminum bowls with sight glass, or polycarbonate bowls with Bowl Rings: Aluminum.



# Inline Filter, Regulator and Lubricator Combinations

# **HIGH-CAPACITY Series**



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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.





# **ROSS** CONTROLS®

# FILTER, REGULATOR, AND LUBRICATOR Accessories



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CONTENT	Page
Mounting Accessories	E6.3
Modular Assembly Components	E6.4
Clamp, Brackets, End Ports & Port Blocks	E6.5
Pressure Gauges	E6.6
External Drains, Silencers	E6.7

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### **Mounting Screws for BANTAM Models**

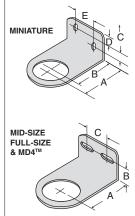
Usage Models	Kit Number
BANTAM	859K77

BANTAM models mounts with long screws that extend through end plates.

## Mounting Brackets for Regulators and Integrated Filter/Regulators

Regulators and integrated filter/regulators can be mounted to a surface with a bracket that attaches to the regulator. Brackets and mounting panel nuts can be ordered separately or in a kit which includes both bracket and mounting panel nut.

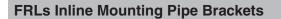
Usage Part Number		Dimensions inches (mm)							
Models	Kit	Bracket	Panel Nut	Α	В	С	D	E	Panel Mounting Hole Diameter
MINIATURE	873K77	872K77	874K77	1.375 (35)	1.125 (29)	0.31 (8)	0.31 (8)	0.69 (17)	1.19 (30)
MID-SIZE	876K77	875K77	877K77	2.38 (60)	1.00 (25)	1.50 (38)	_	_	1.56 (40)
MD3™	R-A127-11	_	R-127-11	2.38 (60)	1.00 (25)	1.50 (38)	-	-	1.56 (40)
FULL-SIZE, MD4™	879K77	878K77	880K77	2.38 (60)	1.00 (25)	1.50 (38)	-	-	2.06 (52)



## Modular Mounting Brackets for Filters, Regulators, Lubricators, FRL's, or Clean Air Packages

Two L-shaped metal brackets as shown at the right can be used for wall mounting of modular FRLs or Clean Air Packages. A single bracket can be used to mount individual filters or lubricators. Kits include two brackets and four screws for attaching the brackets to the modules.

Lloago Modolo	Usage Models Kit Number		Dimensions inches (mm)			
Usage models	Kit Nulliber	Α	В	С	D	
MID-SIZE & FULL-SIZE	915K77	3.0 (76)	0.88 (22)	1.00 (25)	1.20 (31)	



Two pipe brackets can be used for wall mounting of FRLs assemblies that use pipe nipples to join the components. The bracket kits listed below include two sets of brackets.

Nipple Size	Kit Number Dimensions inches			(mm)
Nipple 0120	Nit Humber	Α	В	С
1/4	887K77	2.72 (28)	0.50 (13)	1.00 (25)
3/8	888K77	2.72 (28)	0.50 (13)	1.00 (25)
1/2	889K77	2.72 (28)	0.50 (13)	1.00 (25)
3/4	890K77	3.69 (94)	1.13 (29)	1.25 (32)
1	891K77	3.69 (94)	1.13 (29)	1.25 (32)

## Bracket Assembly Kit for HIGH-RELIEF Pilot Operated Regulator

High-Relief Pilot Operated Regulator with 1/4- thru 1<sup>1</sup>/<sub>4</sub> inch ports can be mounted to a vertical surface using a bracket assembly kit.



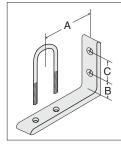
Kit Number

R-A37-381

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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## MID-SIZE and FULL-SIZE Units

The modular designs of the MID-SIZE and FULL-SIZE series offer maximum flexibility in customizing FRLs assemblies. As shown at the right, connector kits are required to interconnect units. Various port kits (shown below) can be used to connect the assemblies to the inlet and outlet piping. Note that all FRLs components have threaded ports so that conventional pipe fittings may be used where desired.

### Female Port Block

Used to connect to piping at inlet or outlet.

Doub Cine	Part N		
Port Size	NPT Threads	BSPP Threads	
1/4	897K77	D897K77	
3/8	898K77	D898K77	
1/2	899K77	D899K77	
3/4	900K77	D900K77	

### Male Port Block

Used to connect modular to non-modular units.

Port Size	Part N	umber
Port Size	NPT Threads	BSPP Threads
1/4	893K77	D893K77
3/8	894K77	D894K77
1/2	895K77	D895K77
3/4	896K77	D896K77

## **BANTAM Units**

BANTAM modular units use end plates secured with screws to hold the pipe or tubing ports (see below), and also to serve as mounting brackets. Short screws are used to secure the end plates when a single BANTAM unit is used. If two or more units are combined, long screws extend through an end plate and thread into the next unit.

Screw kits required are as follows:

Single Unit: Two short screw kits.

Two-Unit Combination: One each short screw kit and long screw kit. Three-Unit Combination: Two long screw kits.

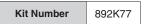
#### **E6**

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Pipe Ports					
Kit Description	Part Number				
END PLATE (1)	857K77				
Short Screw (2)	858K77				
Long Screw (2)	859K77				
Small O-Ring (for inlet or mating ports)	860K77				
Large O-Ring (for outlet or mating ports)	861K77				

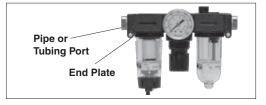
## Connector Kit

Used to connect units to one another as well as to any of the ports shown on this page.









Pipe Ports										
Port Size	Part Number									
1/8 NPT	862K77									
1/4 NPT	863K77									
1/8 BSPP	D864K77									
1/4 BSPP	D865K77									

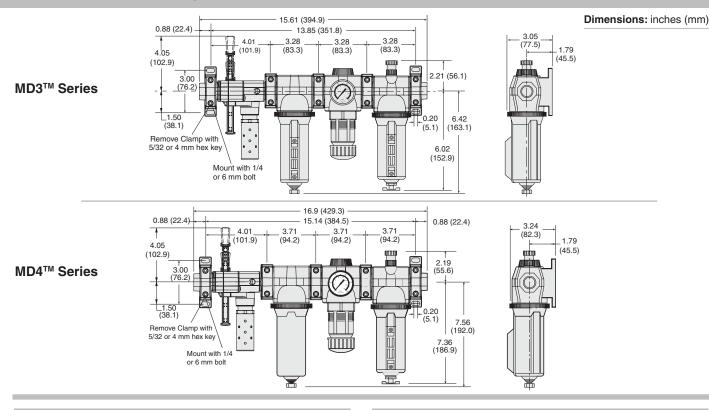
Tube Ports									
Port Size	Part Number								
1/4	866K77								
3/8	867K77								
4 mm	868K77	am ))))							
6 mm	869K77								
8 mm	870K77								
10 mm	871K77								





## Modular Assemblies Accessories: Clamp, Brackets, End Ports & Port Blocks

## **MD** Series



## **Clamp for Module Connections**

Specially designed clamps provide a guick and easy assembly or disassembly of MD modules. Two allen-head bolts quickly tighten or loosen the clamp using a 5/32 or 4mm hex key. The clamp contains a plate carrying two O-rings to provide positive sealing between modules.

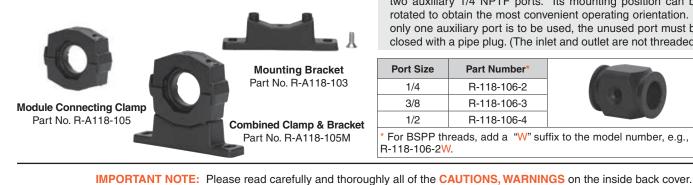
Order clamp by part number R-A118-105.

Combined clamp and bracket (below) can be ordered by part number R-A118-105M.

## Mounting Brackets

Two brackets are normally used to mount an FRL to a vertical surface. The mounting bracket attaches to the module connecting clamp (see above) with a single screw. Each bracket then employs two bolts (1/4" or 6mm) to connect the assembly to the mounting surface.

Order bracket and screw by part number R-A118-103. Combined bracket and clamp (above) can be ordered by part number R-A118-105M.



## Male and Female End Ports

Either male or female end ports can be attached to threaded inlet and outlet lines. This allows all modules of an FRL assembly to be removed easily and guickly without having to unthread the end modules. The end ports are attached to the modules with clamps (see at left). End ports can be included in an assembled FRL or ordered separately by the following part numbers:

Port Size	Male Part Number*		Port Size	Female Part Number*	52
1/4	R-118-109-2F		1/4	R-118-100-2	A THE A
3/8	R-118-109-3F		3/8	R-118-100-3	
1/2	R-118-109-4F	D.L.	1/2	R-118-100-4	V
3/4	R-118-109-6F		3/4	R-118-100-6	

For BSPP threads, add a "W" suffix to the model number, e.g., R-118-109-2FW.

## **Extra Port Blocks**

An extra port block can be placed between modules to provide two auxiliary 1/4 NPTF ports. Its mounting position can be rotated to obtain the most convenient operating orientation. If only one auxiliary port is to be used, the unused port must be closed with a pipe plug. (The inlet and outlet are not threaded.)

Port Size	Part Number*	
1/4	R-118-106-2	
3/8	R-118-106-3	
1/2	R-118-106-4	
* For BSPP th R-118-106-2		fix to the model number, e.g.,

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## **Pressure Gauges**

Port Size	Model Number*	Case Diameter inches (mm)	
1/8	5400A1002	0-160 (0-11)	1.5 (38)
1/4	5400A2010	0-60 (0-4)	2.0 (51)
1/4	5400A2011	0-200 (0-14)	2.0 (51)
1/4	5400A2012	0-300 (0-20)	2.0 (51)
1/4	5400A2014**	0-160 (0-11)	2.5 (64)
1/4	5400A2015***	0-160 (0-11)	2.0 (51)

Center back mounting; male pipe threads.

\*\* 5400A2014 - Stainless steel case liquid filled.

\*\*\* 5400A2015 - Green shade between 40-70 psi (2.7-4.8 bar).

## **Differential Pressure Gauges**



Small Slide Gauge With Reed Switch Wi	e Dual Face Gauge ith Reed Switch Normally Closed)			
DIFFERENTIAL R-A60F-28 R-K103-151 R-106-35 R-106-35E	R-106-35C			
PRESSURE GAUGE TYPE/SERIES				
FILTERS				
BANTAM – – – –	-			
MINIATURE – – – – – –	_			
MID-SIZE – – – – –	-			
MD3™ – – – –	-			
FULL-SIZE – – – – –	-			
MD4™ –				
HIGH-CAPACITY – – – –	-			
COALESCING FILTERS				
BANTAM – – – –	-			
MINIATURE – – – – –	-			
MID-SIZE – – –	-			
FULL-SIZE –				
MD3™	_			
MD4™ –				
HIGH-CAPACITY –				
OIL VAPOR REMOVAL (ADSORBING) FILTERS				
MD3 <sup>TM</sup> – – – – –	-			
MD4 <sup>TM</sup> – – – – –	-			
CLEAN AIR PACKAGES				
MD3™ – – –	-			
MD4™ –				

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



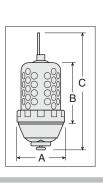
## **FRL's Series**

## **External Automatic Drains**

Dino Sizo	Model Number*									
Pipe Size	Polycarbonate Bowl**	Metal Bowl								
1/8	5057B1001	5058B1001								
1/4*	5057B2001	5058B2001								
*Use 1/4 size with FULL-SIZE, HIGH-CAPACITY, MD3 <sup>™</sup> & MD4 <sup>™</sup> filters. Use kit 1076K77 to convert standard bowl to accept auto drain unit. **Available for FULL-SIZE filters only. Polycarbonate bowl includes metal bowl guard.										

 
 Dimensions inches (mm)
 Weight lb (kg)

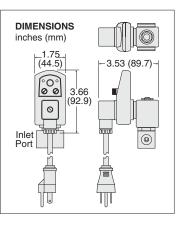
 1/8, 1/4
 3.5 (89)
 4.2 (107)
 8.3 (211)
 2.6 (1.2)





## **Electronically Controlled Drain**

Pipe Size	Voltage	Model Number**					
1/4	110-120 volts AC, 50/60 Hz	R-DED-115V-2					
3/8	110-120 volts AC, 50/60 Hz	R-DED-115V-3					
1/2	110-120 volts AC, 50/60 Hz	R-DED-115V-4					
1/4	24 volts DC	R-DED-24V-2					
3/8	24 volts DC	R-DED-24V-3					
1/2 24 volts DC R-DED-24V-4							
** NPT port threads. For BSPP threads, add a "W" suffix to the model number, e.g., R-DED-115V-2W.							





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## **STANDARD SPECIFICATIONS** (for electronically controlled drain):

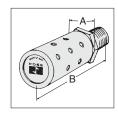
Drain Time: Adjustable 0.5 to 10 seconds. Drain Interval: Adjustable 0.5 to 45 minutes. Current Consumption: 4 ma maximum. Ambient Temperature: 35° to 130°F (2° to 54°C). Media Temperature: 35° to 190°F (2° to 88°C).

#### Electrical Connection: DIN 43650A, ISO 440/6952. Valve Type: 2/2 direct acting, normally closed. Valve Body: Forged brass; 3/16-inch (4.8 mm) orifice. Maximum Pressure: 230 psig (15.8 bar).

## Silencers



Port Size	Thread	Mode	Number*	Avg.	Dimension	<b>s</b> inches (mm)	Weight
Port Size	Туре	NPT Threads	BSPT Threads	Cv	А	В	lb (kg)
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)
3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (92)	0.2 (0.1)
3/4	Male	5500A5003	D5500A5003	11.5	2.0 (51)	5.3 (135)	0.6 (0.3)



Flow Media: Filtered air; 5 micron recommended.

Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum.



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# Replacements Filter Elements

# **FRL's Series**

Category	Series	Element Rating	Bowl Type	Element Material	Part Number	
	Bantam	5-µm		Polyethylene	933K77	
	Miniature	5-µm		Polyethylene	933K77	
	MID-SIZE	5-µm		Polyethylene	936K77	
		5-µm		Polyethylene	R-A60F-03PE5	
		5-µm		Sintered Bronze	R-A60F-03E5	
	MD3™	20-µm		Sintered Bronze	R-A60F-03E4	
		40-µm		Sintered Bronze	R-A60F-03E3	
Filters	FULL-SIZE	5-µm		Polyethylene	939K77	
		5-µm		Polyethylene	R-A115-106PE5	
	MD4™	40-µm		Sintered Bronze	R-A115-106PE3	
	HIGH-CAPACITY Flow to 275 scfm	5-µm		Polyethylene	1010K77	
	HIGH-CAPACITY Flow to 660 scfm	5-µm		Sintered Bronze	1656K77	
		40-µm		Sintered Bronze	R-A114-106E3	
	HIGH-CAPACITY Flow to 1000 scfm	5-µm		Sintered Bronze	942K77	
		40-µm		Sintered Bronze	944K77	
		0.3-µm		Borosilicate-glass-fiber	945K77	
	Bantam, Miniature					
		0.01-µm	<u> </u>	Borosilicate-glass-fiber	R-A-10F-16E8	
		0.3-µm	Standard	Borosilicate-glass-fiber	R-A60F-29	
	MID-SIZE	0.3-µm	Extended	Borosilicate-glass-fiber	R-A60F-32	
		0.01-µm	Standard	Borosilicate-glass-fiber	R-A60F-29E8	
		0.01-µm	Extended	Borosilicate-glass-fiber	R-A60F-32E8	
			Polycarbonate	Borosilicate-glass-fiber	R-A60F-23	
		0.3-µm	Metal	Borosilicate-glass-fiber	R-A60F-29	
	MD3™		Extended Metal	Borosilicate-glass-fiber	R-A60F-32	
			Polycarbonate	Borosilicate-glass-fiber	R-A60F-23E8	
		0.01-µm	Metal	Borosilicate-glass-fiber	R-A60F-29E8	
			Extended Metal	Borosilicate-glass-fiber	R-A60F-32E8	
		0.3-µm	Standard	Borosilicate-glass-fiber	947K77	
	FULL-SIZE	0.3-µm	Extended	Borosilicate-glass-fiber	R-A103-160L	
	FULL-SIZE	0.01-µm	Standard	Borosilicate-glass-fiber	948K77	
Coalescing		0.01-µm	Extended	Borosilicate-glass-fiber	R-A103-160LE8	
Filters		0.0	Standard	Borosilicate-glass-fiber	R-A115-117	
	MDAIM	0.3-µm	Extended	Borosilicate-glass-fiber	R-A115-118	
	MD4™	0.01	Standard	Borosilicate-glass-fiber	R-A115-117E8	
		0.01-µm	Extended	Borosilicate-glass-fiber	R-A115-118E8	
		0.3-µm	Standard	Borosilicate-glass-fiber	949K77	
	HIGH-CAPACITY Flow to 220 scfm	0.01-µm	Standard	Borosilicate-glass-fiber	R-A109-106E8	
			Standard	Borosilicate-glass-fiber	R-A114-112	
	HIGH-CAPACITY	0.3-µm	Extended	Borosilicate-glass-fiber	R-A114-113	
	Flow to 295 & 450 scfm		Standard	Borosilicate-glass-fiber	R-A114-112E8	
		0.01-µm	Extended	Borosilicate-glass-fiber	R-A114-113E8	
			Standard	Borosilicate-glass-fiber	952K77	
	HIGH-CAPACITY	0.3-µm	Extended	Borosilicate-glass-fiber	953K77	
	Flow to 465 scfm		Standard	Borosilicate-glass-fiber	R-A106-24E8	
		0.01-µm	Extended	Borosilicate-glass-fiber	R-A106-24LE8	
	HIGH-CAPACITY	0.3-µm	Extended	Borosilicate-glass-fiber	953K77	
	Flow to 840 scfm	0.01-µm	Extended	Borosilicate-glass-fiber	R-A106-24E8	
		- i e i pitti	Polycarbonate	Borosilicate-glass-fiber	R-A60F-29E9	
	MDOTM		-	3		
Oil Vapor	MD3™		Metal	Borosilicate-glass-fiber	R-A60F-29E9	
Removal Filters			Extended Metal	Borosilicate-glass-fiber	R-A60F-32E9	
Fillers	MD4™	0.01-µm	Standard	Borosilicate-glass-fiber	R-A115-117E9	
		ο.οτ-μπ	Extended	Borosilicate-glass-fiber	R-A115-118E9	
Silencers	Port Size 1/2	20-µm		Sintered Bronze	940K77	
Reclassifiers	Port Size 3/4, 1	100-µm		Sintered Bronze	981K77	



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## **Compatible Lubricants**

Although air line lubrication is not required for most ROSS valves, other mechanisms in the system may need such lubrication. When a lubricator is used, it should be supplied only with oils which are compatible with the materials used in the valves for seals and poppets. Generally speaking, these are petroleum base oils with oxidation inhibitors, and aniline point between 180°F (82°C) and 220°F (104°C) and an ISO 32, or lighter, viscosity. Oils with phosphate type additives, such as zinc dithiophosphate, must be avoided because they can harm polyurethane valve components. The best oils to use in pneumatic systems are those specifically compounded for air line lubricator service.

## **Cautions on the Use of Polycarbonate Bowls**

**Use Only with Compressed Air.** Filters and lubricators with polycarbonate bowls are specifically designed for compressed air service, and their use with any other fluid (liquid or gas) is a misapplication. The use with or injection of certain hazardous fluids in the system (e.g., alcohol or liquefied petroleum gas) could be harmful to the polycarbonate bowl or result in a combustible condition or hazardous leakage. Before using with a fluid other than air, or for nonindustrial applications, or for life support systems, consult ROSS.

**Use Metal Bowl Guard When Supplied.** A metal bowl guard is supplied with all but the smallest bowls, and must always be used to minimize danger from fragmentation in the event of failure of a polycarbonate bowl.

**Avoid Harmful Substances.** Some compressor oils, chemical cleaners, solvents, paints, and fumes will attack polycarbonate bowls and can cause bowl failure. Do not use with or near these materials. When a bowl becomes dirty, replace the bowl or wipe it with a clean dry cloth. Immediately replace any polycarbonate bowl which is crazed, cracked, or deteriorated.

## Substances HARMFUL to Polycarbonate Bowls

Acetaldehyde Acetic acid Acetone Acrylonitrile Ammonia Ammonium fluoride Ammonium hydroxide Ammonium sulfide Anaerobic adhesives & sealants Antifreeze Benzene Benzoic acid Benzvl alcohol Brake fluids Bromobenzene Butyric acid Carbolic acid

Carbon disulfide Carbon tetrachloride Caustic potash solution Caustic soda solution Chlorobenzene Chloroform Cresol Cyclohexanol Cyclohexanone Cyclohexene Dimethyl formamide Dioxane Ethane tetrachloride Ethyl acetate Ethyl ether Ethylamine Ethylene chlorohydrin

Ethylene dichloride Ethylene glycol Formic acid Freon (refrigerant & propellant) Gasoline (high aromatic) Hydrazine Hydrochloric acid Lacquer thinner Methyl alcohol Methylene chloride Methylene salicylate Milk of lime (CaOH) Nitric acid Nitrobenzene Nitrocellulose lacquer Phenol Phosphorous hydroxyl chloride

Phosphorous trichloride Propionic acid Pyridine Sodium hydroxide Sodium sulfide Styrene Sulfuric acid Sulfural chloride Tetrahydronaphthalene Thiophene Toluene Turpentine Xylene Perchlorethylene

## Trade Names of Substances HARMFUL to Polycarbonate Bowls

• Atlas Perma-Guard • Buna N • Cellulube #150 & #220 • Crylex #5 cement • Eastman 910 • Garlock 98403 (polyurethane)

- Haskel 568-023 Hilgard Company's hil phene Houghton & Co. oil 1120, 1130, 1055 Houtosafe 1000 Kano Kroil
- Keystone penetrating oil #2 Loctite 271, 290, 601 Loctite Teflon sealant Marvel Mystery Oil Minn. Rubber 366Y
- National Compound N11 Nylock VC-3 Parco 1306 Neoprene Permabond 910 Petron PD287 Prestone Pydraul AC
- Sears Regular Motor Oil Sinclair oil "Lily White" Stauffer Chemical FYRQUEL 150 Stillman SR 269-75 (polyurethane)
   Stillman SR 513-70 (poppropo) Tappargas Tolar Toppage and red 495 500 pils Titon Vibra• tito Toppage



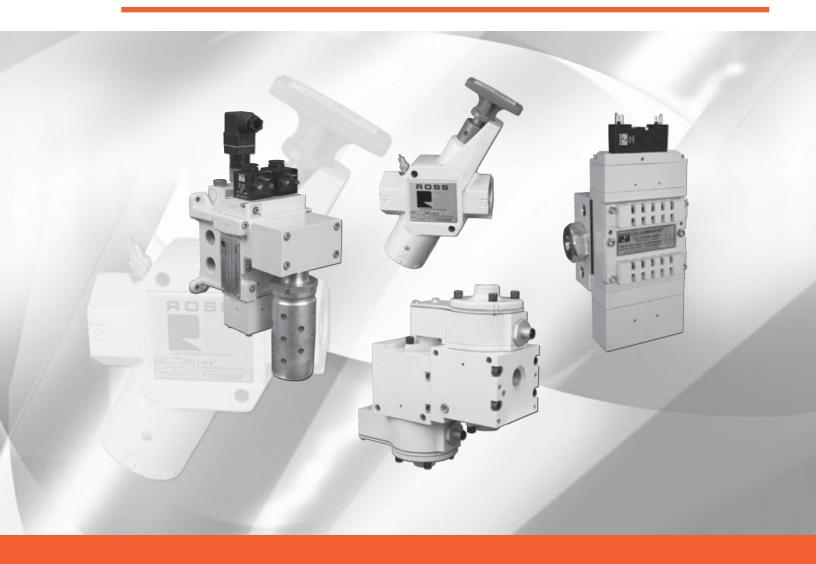






# ROSS CONTROLS®

# **ROSS SAFETY-RELATED PRODUCTS**







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# **ROSS** CONTROLS®

# LOCKOUT & EXHAUST L-O-X® VALVES AND SOFT START EEZ-ON® VALVES 15 AND 27 SERIES



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#### MANUAL LOCKOUT & EXHAUST L-O-X® VALVES - KEY FEATURES

- Fluorocarbon slipper seals for easy shifting, even after long periods of inactivity
- Easily identified by yellow body with red handle
- Integrated sensing port for pressure verification
- Lockable only in the OFF position
- Has a full size exhaust port (equal to or larger than supply)
- Simple push/pull of the large handle provides positive direct manual operation

### MANUAL LOCKOUT L-O-X® VALVES WITH SOFT START EEZ-ON® - KEY FEATURES

- Easily identified by blue handle
- Gradual re-application of pneumatic pressure prevents rapid equipment movement at startup
- Lockable only in the OFF position
- Has a full size exhaust port (equal to or larger than supply)
- Positive action (2 positions only)
- Simple push/pull of the large blue handle provides positive direct manual operation
- Integrated sensing port for pressure verification

				AV	AILA	BLE	POR	T SIZ	ES			FUNC	TIONS				
VALVE TYPE	VALVE SERIES	1/4	3/8	1/2	3/4	1	1¼	1½	2	<b>2</b> ½	3	2/2	3/2	Max Flow (Cv)	Solenoid Control	Pressure Control	Page
Manual Lockout & Exhaust	L-O-X® Va	alves	;									1	11				
Slim Line	15													2.67			F1.3
Modular	15													5.6			F1.4
Classic	15													19.25			F1.5
High Capacity	L-O-X®													40.38			F1.6
Stainless Steel	15													39			F1.7
Stainless Steel with Integrated Filter/Regulator	RCO													9			F1.8 - F1.10
Piloted Valves with Manual	Lockout I	L-0-)	K® Co	ntrol													
														70			F1.11 - F1.12
														70			F1.13
														140			F1.14
														140			F1.15
Soft Start EEZ-ON® Valves			_														-
Right Angle	19													1.8			F1.16
	27													30			F1.17 - F1.18
	27													29			F1.19
	27																F1.20
Manual Lockout L-O-X <sup>®</sup> Val	ves with S	Soft S	Start	EEZ-	ON®	Oper	ation										
Modular	15													5.6			F1.21
Classic	15													16.2			F1.22
Piloted Valves with Manual	Lockout I	L-0-)	K® & 9	Soft S	Start	EEZ	-ON®	Ореі	atio	n		_					
Manual Pilot Controlled	27													30			F1.23 - F1.24
Solenoid Pilot Controlled	27													30			F1.25

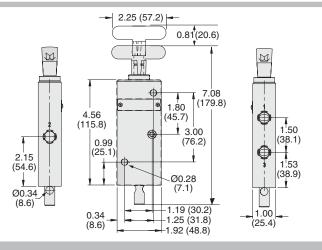


ROSS

# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves **Slim Line**

3-Way 2-Position Valve									
Port Size		Valve Model Number*	C	v	Weight Ib (kg)	2			
1, 2	3	valve model number	1-2	2-3	Weight lb (kg)				
1/4	3/8	Y1523D2002	1.84	1.79	0.9 (0.4)	<u>│└┯<u> </u><sub>┲</sub> <u> </u>   <sub>/ ┲</sub>                                    </u>			
3/8	3/8	Y1523D3012	2.67	2.64	0.9 (0.4)	3 1			
* NPT p	* NPT port threads. For BSPP threads, insert a "D" after "Y" to the model number, e.g., YD1523D2002,								

#### Valve Dimensions - inches (mm)



## **ACCESSORIES & OPTIONS**

Silencers								
Port Size	Thread Type	Model Number	Avg. C <sub>v</sub>					
3/8	Male - NPT	5500A3013	2.7					
3/8	Male - BSPT	D5500A3013	2.7					
Pressure Range: 0 to 150 psig (0 to 10.3 bar)								

maximum. Flow Media: Filtered air.

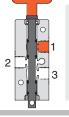


Pressure Switche			
Connection Type	Model Number*	Port Threads	
EN 175301-803 Form A	586A86	1/8 NPT	
M12	1153A30	1/8 NPT	
*Pressure switch closes on fal	ling pressure of 5	psig (0.34 bar).	
Pop-Up Indicator	Model Number** 988A30		- Mile
	** 1/8 NPT pc	ort threads.	
Multiple Lock-ou	t Device	Model Number	356A30

## **VALVE OPERATION**

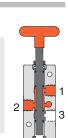
#### Valved Closed

When the red handle is pushed inward, the flow of supply air is blocked and downstream air is exhausted via the exhaust port. While servicing or maintaining machinery, the L-O-X® valve should be padlocked in this position to prevent the handle from being pulled outward inadvertently where potential for human injury exists.



### Valve Open

When the red handle is pulled outward supply air flows freely from inlet to outlet and flow to exhaust is blocked. A detent keeps the handle in the open position.



6.00

If a system requires gradual buildup of downstream pressure, see manual L-O-X<sup>®</sup> valves with EEZ-ON<sup>®</sup> operation.

### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Inlet Pressure: 0 to 145 psig (0 to 10 bar). Lock Hole Diameter: 0.27 inch (7.0 mm). Length of Hole: 0.43 inch (10.9 mm).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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**F1** 

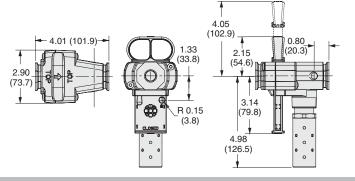
# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves **Modular**

## **15 Series**

3-Way 2-Position Valve,									
Port Size		Volvo Model Numbert	C <sub>v</sub>		Weight				
1, 2	3	Valve Model Number*	1-2	2-3	lb (kg)				
1/4	3/4	Y1523A2003	3.7	7.8	1.7 (0.8)				
3/8	3/4	Y1523A3003	5.1	8.3	1.7 (0.8)				
1/2	3/4	Y1523A4003	5.5	8.6	1.8 (0.8)	3 1			
3/4	3/4	Y1523A5013	5.6	8.1	1.8 (0.8)				
* NPT po	* NPT port threads. For BSPP threads, insert a "D" after "Y" to the model number, e.g., YD1523A2003.								



Valve Dimensions - inches (mm)



## **ACCESSORIES & OPTIONS**

Silencers							
Port Size	Thread Type	Model Number	Avg. $C_{v}$				
3/4	Male - NPT	5500A5003	11.5				
3/4	Male - BSPT	D5500A5003	11.5				
<b>Pressure Range:</b> 0 to 150 psig (0 to 10.3 bar)							

maximum. Flow Media: Filtered air.



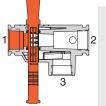
Pressure Switch			
Connection Type Model Number* Port Threads			
EN 175301-803 Form A	586A86	1/8 NPT	10
M12	1153A30	1/8 NPT	
*Pressure switch closes on fa	lling pressure of 5	psig (0.34 bar).	
Pop-Up Indicator	Model Numbe	er** 988A30	- Mile
	** 1/8 NPT pc	ort threads.	
Multiple Lock-ou	t Device	Model Number	356A30

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## VALVE OPERATION

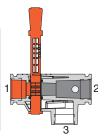
#### Valved Closed

When the red handle is pushed inward, the flow of supply air is blocked and downstream air is exhausted via the exhaust port. While servicing or maintaining machinery, the L-O-X® valve should be padlocked in this position to prevent the handle from being pulled outward inadvertently where potential for human injury exists.



#### Valve Open

When the red handle is pulled outward supply air flows freely from inlet to outlet and flow to exhaust is blocked. A detent keeps the handle in the open position.



If a system requires gradual buildup of downstream pressure, see manual L-O-X<sup>®</sup> valves with EEZ-ON<sup>®</sup> operation.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Modular, In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Inlet Pressure: 0 to 200 psig (0 to 14 bar). Lock Hole Diameter: 0.27 inch (7.0 mm). Length of Hole: 0.43 inch (10.9 mm).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES



# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves Classic

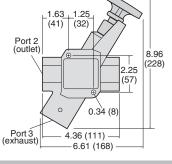
## **15 Series**

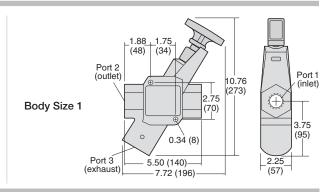
				3-Way 2-Pos	ition Va	lve		
Port Size		Size	Pody Size	Valve Model Number*	C	v	Weight	
	1, 2	3	Body Size	valve model number	1-2	2-3	lb (kg)	
	3/8	3/4	1/2	Y1523C3002	4.74	3.57	1.5 (0.7)	
	1/2	3/4	1/2	Y1523C4002	7.10	4.00	1.5 (0.7)	2
	3/4	3/4	1/2	Y1523C5012	8.26	4.10	1.5 (0.7	
	3/4	1¼	1	Y1523C5002	13.12	8.98	2.5 (1.1)	
	1	1¼	1	Y1523C6002	16.56	9.52	2.5 (1.1)	
	1¼	1¼	1	Y1523C7012	19.25	9.74	2.5 (1.1)	
	*NPT p	oort thr	eads. For BS	PP threads, insert a "D" a	fter "Y" to	the mod	el number,	e.g., YD1523D3002.

F1

#### Valve Dimensions - inches (mm)

Body Size 1/2





## **ACCESSORIES & OPTIONS**

Silencers							
Port Size	Thread Type	nread Type Model Number*					
3/4	Male - NPT	5500A5003	11.5				
3/4	Male - BSPT	D5500A5003	11.5				
1¼	Male - NPT	5500A7013	16.4				
1¼	Male - BSPT	D5500A7013	16.4				
Pressure Range: 0 to 150 psig (0 to 10.3 bar)							
maximum. Flow Media: Filtered air.							

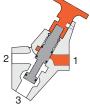


Pressure Switche		EN Coni Normally		
Connection Type Model Number		Port Threads	A REAL	Closed
EN 175301-803 Form A	586A86	1/8 NPT	0	
M12	1153A30	1/8 NPT		M12 Con Pin 4
*Pressure switch closes on fal	ling pressure of 5	psig (0.34 bar).		Normally Open Pin 1 Common
Pop-Up Indicator	Model Number** 988A30		AL.	Common
	** 1/8 NPT port threads.			
Multiple Lock-ou	t Device	Model Number	356A30	

## VALVE OPERATION

#### Valved Closed

With a short push of the red handle inward, the flow of supply air is blocked and downstream air is exhausted via the exhaust port at the bottom of the valve. The L-O-X<sup>®</sup> valve should be padlocked in this position to prevent the handle from being pulled outward inadvertently where potential for human injury exists or while servicing machinery.



Port 1 (inlet)

3 00

(76)

2.00

(51)

### Valve Open

When the red handle is pulled out, supply air flows freely from inlet to outlet and flow to exhaust is blocked. A detent keeps the handle in the open position. The handle is not designed to be locked in this position, thereby providing for ready shut-off when necessary.

If a system requires gradual buildup of downstream pressure, see manual L-O-X<sup>®</sup> valves with EEZ-ON<sup>®</sup> operation.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 0 to 300 psig (0 to 20.7 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

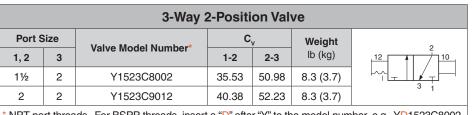


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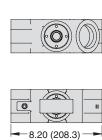
# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves **High Capacity**

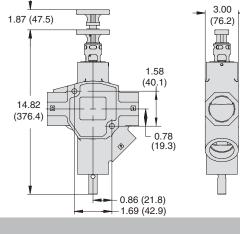
## **15 Series**



NPT port threads. For BSPP threads, insert a "D" after "Y" to the model number, e.g., YD1523C8002.

#### Valve Dimensions - inches (mm)





**Pressure Switches** 

Valves can be padlocked in two locations, at the handle or at the end of the spool.

## **ACCESSORIES & OPTIONS**

Silencers							
Port Size	Thread Type	Model Number	Avg. C <sub>v</sub>				
2	Female - NPT	5500B9001	34.2				
2	Female - BSPT	D5500B9001	34.2				
Pressure Range: 0 to 150 psig (0 to 10.3 bar)							

maximum. Flow Media: Filtered air.



#### **Connection Type** Model Number\* **Port Threads** Ground EN 175301-803 Form A 586A86 1/8 NPT M12 Connector Pinout 1153A30 1/8 NPT M12 Pin 4 Normally Pin 3 \*Pressure switch closes on falling pressure of 5 psig (0.34 bar). Not Used Open - Pin 2 Pin 1 rmally Closed Commo 988A30 Model Number\* **Pop-Up Indicator** \*\* 1/8 NPT port threads. **Multiple Lock-out Device** Model Number 356A30



EN Connector Pinout

Normally Open Normally

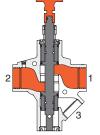
## **VALVE OPERATION**

#### Valved Closed

With a short push of the red handle inward, the flow of supply air is blocked and downstream air is exhausted via the exhaust port while servicing or maintaining machinery. Padlock the L-O-X® valve in this position to prevent the handle from being pulled outward inadvertently to avoid potential for human injury while servicing machinery.

#### Valve Open

When the red handle is pulled out, supply air flows freely from inlet to outlet and flow to exhaust is blocked. A detent keeps the handle in the open position. The handle is not designed to be locked in this position, thereby providing for ready shut-off when necessary.



If a system requires gradual buildup of downstream pressure, see manual L-O-X<sup>®</sup> valves with EEZ-ON<sup>®</sup> operation.

### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Inlet Pressure: 0 to 300 psig (0 to 20.7 bar). Lock Hole Diameter: 0.27 inch (7.0 mm). Length of Hole: 0.43 inch (10.9 mm).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES

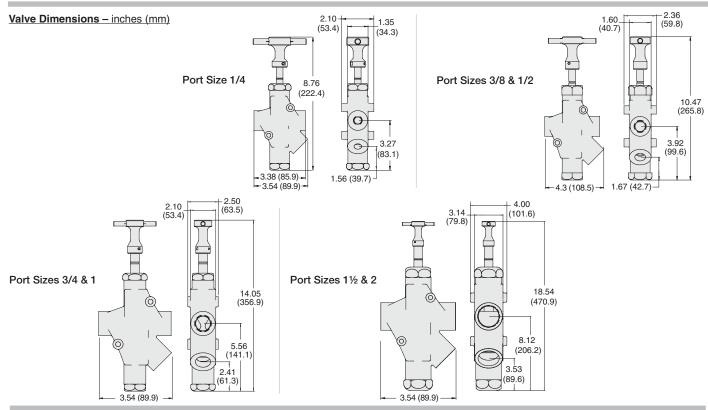


# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves Stainless Steel

## **15 Series**

	3-Way 2-Position Valve									
Port Size		Valve Model Number*	C <sub>v</sub>		Weight					
1, 2	3	Valve Model Number 1-2 2-3 lb (kg)								
1/4	1/4	1523B2004	2.14	2.08	3.75 (1.70)					
3/8	1/2	1523B3004	5.79	6.24	6.0 (2.72)	2				
1/2	1/2	1523B4004	5.79	6.24	6.0 (2.72)					
3/4	1	1523B5004	14.30	17.00	13.0 (5.89					
1	1	1523B6004	14.30	17.00	13.0 (5.89)					
1½	2	1523B8004	39.00	45.00	35.0 (15.87)					
2	2	1523B9004	39.00	45.00	35.0 (15.87)					
* NPT p	ort thre	ads. For BSPP threads, a	dd a " <mark>D</mark> " p	orefix to t	he model numb	er, e.g., D1523B2004.				





## **VALVE OPERATION**

### Valve Closed

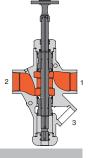
Flow Media: Filtered air.

With a push of the handle inward, the flow of supply air is blocked and downstream air is exhausted via the exhaust port while servicing or maintaining machinery. Padlock the L-O-X<sup>®</sup> valve in this position to prevent the handle from being pulled outward inadvertently to avoid potential for human injury while servicing machinery.



### Valve Open

When the handle is pulled out, supply air flows freely from inlet to outlet and flow to exhaust is blocked. A detent keeps the handle in the open position. The handle is not designed to be locked in this position, thereby providing for ready shut-off when necessary.



STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool, 316 Stainless Steel. Mounting Type: In-Line. Ambient/Media Temperature: 30° to 175°F (-1° to 80°C). Note: For lower temperature ratings, consult ROSS. 
 Inlet Pressure:
 0 to 300 psig (0 to 20.7 bar).

 Lock Hole Diameter:
 Port sizes 1/4 thru 2:
 0.34 inch (8.64 mm).

 Length of Hole:
 Port size 1/4:
 0.44 in (11.17 mm).

 Port size 1/2:
 0.47 in (11.93 mm)

 Port size 1 and 2:
 0.55 inch (13.97 mm).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

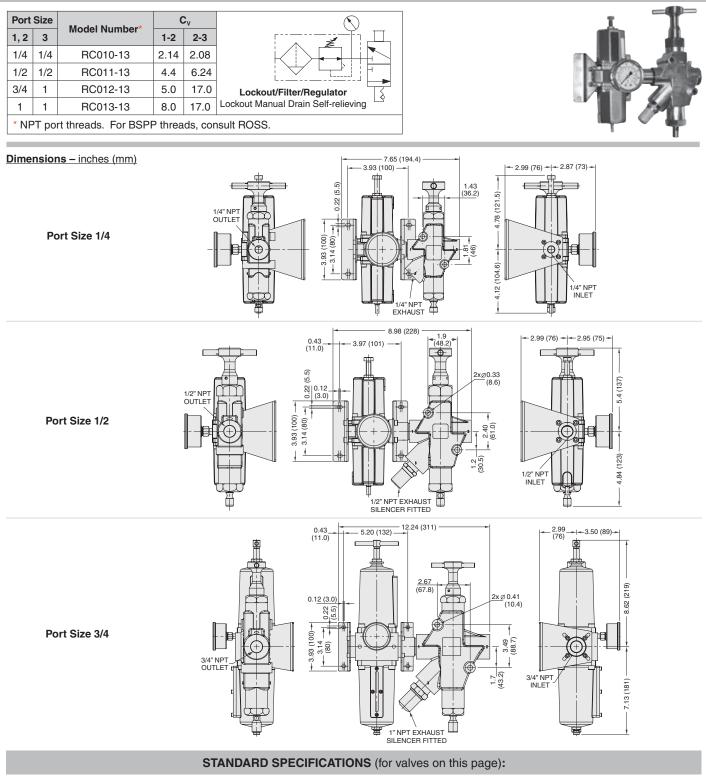
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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# Stainless Steel Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulator

## Air Entry Combination Pneumatic Energy Isolation (LOTO)



Construction: Spool, 316 Stainless Steel. Mounting Type: In-Line. Ambient/Media Temperature: 30° to 175°F (-1° to 80°C). *Note: For lower temperature ratings, consult ROSS.* Flow Media: Filtered air. Inlet Pressure: 0 to 300 psig (0 to 20.7 bar). Secondary Pressure: 7 to 174 psig (0.5 to 12 bar). Seals: Fluorocarbon (Viton). Lock Hole Diameter: Port sizes 1/4 thru 2: 0.34 inch (8.64 mm). Length of Hole: Port size 1/4: 0.44 in (11.17 mm). Port size 1/2: 0.47 in (11.93 mm) Port size 1 and 2: 0.55 inch (13.97 mm).

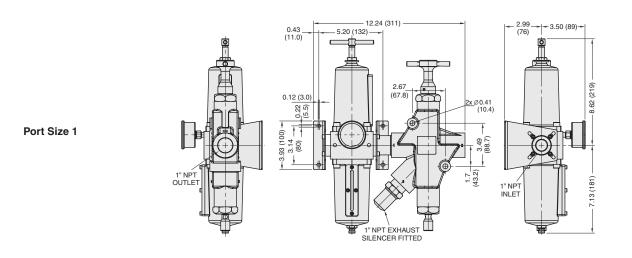
#### NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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# Stainless Steel Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulator



## **Stainless Steel Cabinet for Wash-Down Applications**

- Stainless steel control cabinet includes filter/regulator and Category 4 DM<sup>2®</sup> Series valve for Air Entry Control
- Stainless steel construction, designed for wash-down areas ٠
- · Control cabinet is built with slanted top to avoid pooling
- Control Reliable Energy Isolation















**F1** 

## **APPLICATIONS:**

 Chemical Processing • Forestry • Mining • Pharmaceutical • Pulp and Paper • Oil and Gas • Off-shore Industries

## Will build to your specifications!

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.



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### **Stainless Steel Silencers**

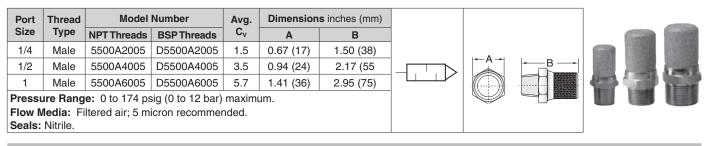
- Port sizes 1/4 thru 1 NPT have all stainless steel construction
  - Port sizes 2 NPT and all BSPT have standard construction consisting of nickel plated cold rolled steel
  - Supplied with a standard pipe thread fitting for attaching directly to the exhaust ports of air-operated equipment

Port	Thread	Model I	Number	Avg. C <sub>v</sub>	Dimension	<b>s</b> inches (mm)	Weight		
Size	Туре	NPT Threads	BSPT Threads	/.rg. 0 <sub>v</sub>	Α	В	lb (kg)		
1/4	Male	5500B2004	D5500B2004	1.44	0.56 (14.2)	1.75 (44.5)	0.05 (0.23)		
1/2	Male	5500B4004	D5500B4004	3.01	0.87 (22.1)	2.75 (69.7)	0.25 ( 0.11)		
1	Male	5500B6004	D5500B6004	10.41	1.31 (33.3)	3.87 (98.3)	0.45 (0.20)		
2	Male	5500B9004	D5500B9004	28.11	2.37 (60.2)	5.50 (139.7)	1.5 (0.68)		
Pressu	Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum.								

Flow Media: Filtered air; 5 micron recommended.

## Silencers for Stainless Steel L-O-X® Air Entry Combinations

316 Stainless Steel sintered element silencers used to protect ports open to the atmosphere.

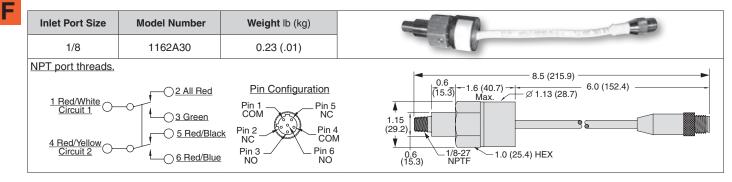


## **Stainless Steel Pressure Switch**

- 316 Stainless Steel Body
- Nitrile Seals

Nitrile Seals

- DPDT (Double-Pole Double-Throw Switch
- Factory preset 5 psi (falling)



### **Stainless Steel Visual Indicator**

- 316 Stainless Steel Body, internals and Springs
- Visual Indicator piston, Acetal
- · Visual Indicator assembly, Acetal with acrylic lens

Inlet Port Size	Model Number	Dimensions inches (mm)		Weight		
Iniet Port Size	woder Number	Α	В	lb (kg)		
1/8	1155H30	2.33 (59.3)	1.00 (25.4)	0.22 (0.1)	Port	10.00
NPT port threads.					Hexagon Nut 1.2 (30.5) Across Flats	0





# Piloted Valves with Manual Lockout L-O-X<sup>®</sup> Control

	3-Way 2-Position Valve, Solenoid Pilot Controlled											
Port S	Port Size Bod		Valve Model Number*	C <sub>v</sub>		Weight						
1, 2	3	Body Size	valve model number	1-2	2-3	lb (kg)						
1/4	1/2	3/8	Y2773A2072**	2.5	3.1	3.5 (1.6)						
3/8	1/2	3/8	Y2773A3072**	3.6	5.3	3.5 (1.6)						
1/2	1/2	3/8	Y2773A4082**	3.3	5.3	3.5 (1.6)	1 Y3 Y3 3					
1/2	1	3/4	Y2773A4072**	6.3	9.2	4.3 (1.9)	Д Д III					
3/4	1	3/4	Y2773A5072**	7.7	11	4.3 (1.9)						
1	1	3/4	Y2773A6082**	8.0	12	4.3 (1.9)						
1	1½	1¼	Y2773A6072**	23	34	8.0 (3.6)						
1¼	1½	1¼	Y2773A7072**	30	32	8.0 (3.6)	2					
1½	1½	1¼	Y2773A8082**	30	31	8.0 (3.6)						
1½	21⁄2	2	Y2773A8072**	68	70	17.5 (7.9)						
2	21⁄2	2	Y2773A9072**	70	70	17.5 (7.9)						
2½	21⁄2	2	Y2773A9082**	70	71	17.5 (7.9)						



**F1** 

\* NPT port threads. For BSPP threads, insert a "D" after "Y" to the model number, e.g., YD2773A2072W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., Y2773A2072W. For other voltages, consult ROSS.

# ACCESSORIES & OPTIONS

Silencers									
Port	Thread	Mode	Avg.						
Size	Туре	NPT Threads	BSPT Threads	Cv					
1/2	Male	5500A4003	D5500A4003	4.7					
1	Male	5500A6003	D5500A6003	14.6					
1½	Female	5500A8001	D5500A8001	29.9					
21⁄2	Female	5500A9002	D5500A9002	103.7					
-	-	0 1 1 5 0 1	(0) (0)						

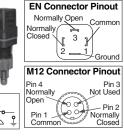
**Pressure Range:** 0 to 150 psig (0 to 10.3 bar) maximum. **Flow Media:** Filtered air.



Indicator Light Kit							
Kit	Indicator						
24 volts DC	110-120 volts AC 50-60 Hz	Light					
862K87-W	862K87-Z						

# **Pressure Switches**

Connection Type	Model Number*	Port Threads					
EN 175301-803 Form A	586A86	1/8 NPT					
M12	1153A30	1/8 NPT					
*Pressure switch closes on falling pressure of 5 psig (0.34 bar).							



-

Pop-Up Indicator	Model Number** 988/		988A	30	1	
	** 1/8 N	PT port thre	eads.			1
						Ω
Multiple Lock-out De	evice	Model Nu	mber	356	5A30	

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet.

Mounting Type: In-Line.

Solenoids: AC or DC power. Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz.

Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

Ambient Temperature:  $40^{\circ}$  to  $120^{\circ}F$  ( $4^{\circ}$  to  $50^{\circ}C$ ). Media Temperature:  $40^{\circ}$  to  $175^{\circ}F$  ( $4^{\circ}$  to  $80^{\circ}C$ ). Flow Media: Filtered air. Inlet Pressure: Port sizes 1/4 to 1½: 15 to 150 psig (1 to 10 bar).Port sizes 1½ to 2½: 30 to 150 psig (2 to 10 bar).Pilot Pressure: Must be equal to or greater than inlet pressure.

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

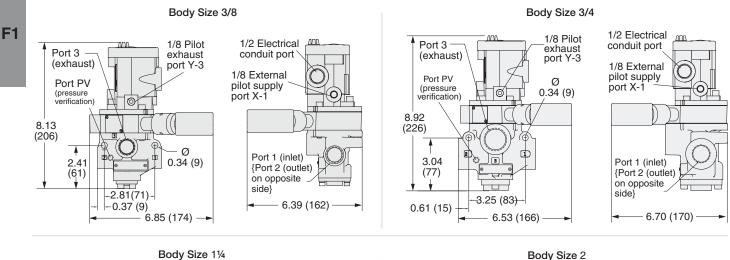
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Online Version Rev. 11/14/16

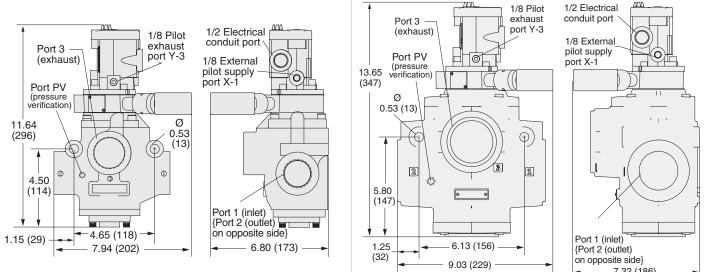
# **Piloted Valves with Manual Lockout L-O-X® Control**

# 27 Series

Valve Dimensions - inches (mm)



#### Body Size 11/4

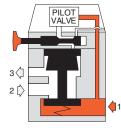


# F

# VALVE OPERATION

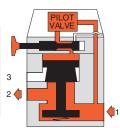
#### **Pilot De-energized**

With the solenoid pilot de-energized (regardless of the position of the L-O-X® handle) the inlet poppet remains closed. The outlet port is connected to the exhaust port so that pressure in the downstream lines is vented to atmosphere.



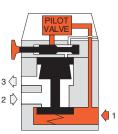
#### **Pilot Energized**

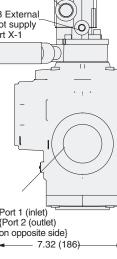
With the solenoid pilot energized and the L-O-X<sup>®</sup> control in the open position, air can flow from inlet to outlet port. The exhaust port is closed.



#### L-O-X<sup>®</sup> Valve Closed

With the handle pushed inward, the L-O-X® control is closed, and air to the valve piston is cut off. This allows the inlet poppet to be closed by its spring and the pressure of the inlet air. The outlet is connected to exhaust so downstream pressure is vented.







# Piloted Valves with Manual Lockout L-O-X<sup>®</sup> Control

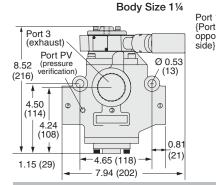
**27 Series** 

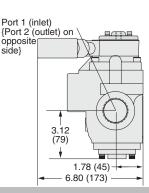
	3-Way 2-Position Valve, Internal Pressure Controlled										
Port S	Size	Body	Valve Model Number*		C <sub>v</sub> Weight						
1, 2	3	Size	valve model Number	1-2 2-3		lb (kg)					
1	1½	1¼	Y2783A6006	23	34	7.0 (3.2)					
1¼	1½	1¼	Y2783A7006	30	32	7.0 (3.2)					
1½	1½	1¼	Y2783A8016	30	31	7.0 (3.2)					
1½	21⁄2	2	Y2783A8006	68	70	15.3 (6.9					
2	21⁄2	2	Y2783A9006	70	70	15.3 (6.9	3 1				
21⁄2	21⁄2	2	Y2783A9016	70	71	15.3 (6.9)					
* NPT	* NPT port threads. For BSPP threads, insert a "D" after "Y" to the model number, e.g., YD2783A6006										

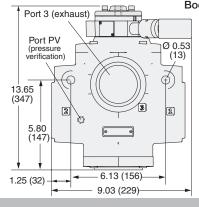


F1

### Valve Dimensions - inches (mm)







Model Number\*

586A86

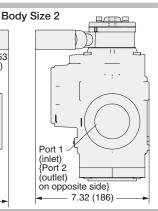
1153A30

1/8 NPT port threads.

\*Pressure switch closes on falling pressure of 5 psig (0.34 bar).

Model Number\*

Multiple Lock-out Device



**EN Connector Pinout** 

3

M12 Connector Pinout

Pin 3

Not Used

Normally Closed

- Pin 2

Normally Open

2

Pin 4

Normally Open

Pin 1

356A30

#### **ACCESSORIES & OPTIONS**

#### Silencers

Port Thread			Model Number					
	Size	Туре	NPT Threads	BSPT Threads	C <sub>v</sub>			
	1½	Female	5500A8001	D5500A8001	29.9			
	21⁄2	Female	5500A9002	D5500A9002	103.7			

Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.



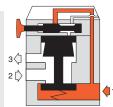
# **VALVE OPERATION**

**Valve Closed** With a short push of the red handle inward the flow of supply air is blocked and downstream air is exhausted via the exhaust port. Air pressure on the inlet and exhaust poppets produces a large closing force. The L-O-X<sup>®</sup> valve should be padlocked in this position to prevent the handle from being pulled outward inadvertently when potential for human injury exists or servicing machinery.

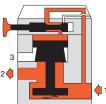
Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

Inlet Pressure: Basic Size 11/4: 15 to 150 psig (1 to 10 bar).

Basic Size 2: 30 to 150 psig (2 to 10 bar).



**Valve Open** With the red handle pulled out, pilot air flows to the top of the actuating piston, causing it to open the inlet poppet. Supply air then flows freely from inlet to outlet, and the exhaust port is blocked. A detent keeps the L-O-X<sup>®</sup> handle in the open position. The handle is designed not to be locked in the open position, thereby allowing for quick shut-off when necessary.



STANDARD SPECIFICATIONS (for valves on this page):

**Pressure Switches** 

**Connection Type** 

EN 175301-803 Form A

M12

Pop-Up Indicator

Pilot Pressure: Must be equal to or greater than inlet pressure.

**Port Threads** 

1/8 NPT

1/8 NPT

Model Number

988A30

**Safety Integrity Level (SIL)** – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT  $\geq$ 1.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Construction: Poppet.

Mounting Type: In-Line.

Flow Media: Filtered air.

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# **L-O-X® Series**

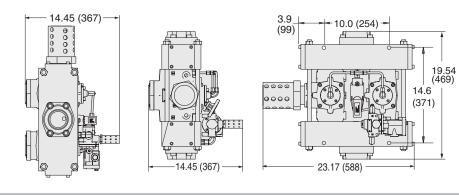
# 3 Inch L-O-X<sup>®</sup> Valve for Lockout

3-Way 2-Position Valve, Solenoid Pilot Controlled

· · · · · · · · · · · · · · · · · · ·								
Port Size		Valve Model	C	v	Weight			
1, 2	3	Number	1-2	2-3	lb (kg)			
3	21⁄2	Y3900A0896**	140	71	115 (53.0)			
** Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., Y3900A0896W. For other voltages, consult ROSS.								
50/00	112, 0.	g., 10000A0000	ci vonag	03, 001	isuit 110000.		C	



#### Valve Dimensions - inches (mm)



## **OPTIONS**

Multiple Lock-out Device

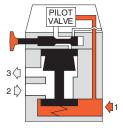
Model Number 356A30



# **VALVE OPERATION**

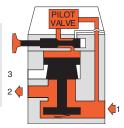
#### Pilot De-energized

With the solenoid pilot de-energized (regardless of the position of the L-O-X<sup>®</sup> handle) the inlet poppet remains closed. The outlet port is connected to the exhaust port so that pressure in the downstream lines is vented to atmosphere.



#### **Pilot Energized**

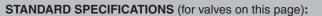
With the solenoid pilot energized and the L-O-X<sup> $\odot$ </sup> control in the open position, air can flow from inlet to outlet port. The exhaust port is closed.



#### L-O-X<sup>®</sup> Valve Closed

With the handle pushed inward, the L-O-X<sup> $\otimes$ </sup> control is closed, and air to the valve piston is cut off. This allows the inlet poppet to be closed by its spring and the pressure of the inlet air. The outlet is connected to exhaust so downstream pressure is vented.

# 



Construction: Spool. Mounting Type: In-Line. Solenoids: AC or DC power. Rated for continuous duty. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40 to 120°F (4 to 50°C).
Media Temperature: 40 to 175°F (4 to 80°C).
Flow Media: Filtered air; 5 micron filter recommended.
Inlet Pressure: 30 to 150 psig (2 to 10 bar).
Pilot Pressure: Must be equal to or greater than inlet pressure.
Port Threads: NPT.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**F1** 

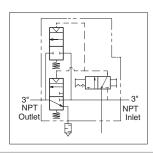


# **L-O-X® Series**

**F1** 

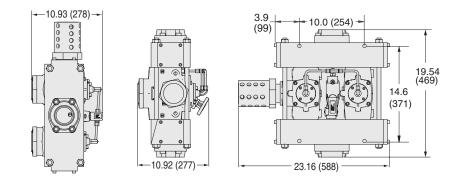
# 3 Inch L-O-X<sup>®</sup> Valve for Lockout

3-Way 2-Position Valve, Pressure Controlled								
Port Size		Valve Model	С	v	Weight			
1, 2	3	Number	1-2	2-3	lb (kg)			
3	21⁄2	Y3900A0829	140	71	110 (49.9)			





#### Valve Dimensions - inches (mm)



# **OPTIONS**

#### Multiple Lock-out Device Model Number

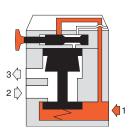


356A30

# Г

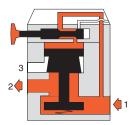
## Valve Closed

With a short push of the red handle inward the flow of supply air is blocked and downstream air is exhausted via the exhaust port. Air pressure on the inlet and exhaust poppets produces a large closing force. The L-O-X<sup>®</sup> valve should be padlocked in this position to prevent the handle from being pulled outward inadvertently when potential for human injury exists or servicing machinery.



#### Valve Open

With the red handle pulled out, pilot air flows to the top of the actuating piston, causing it to open the inlet poppet. Supply air then flows freely from inlet to outlet, and the exhaust port is blocked. A detent keeps the L-O-X<sup>®</sup> handle in the open position. The handle is designed not to be locked in the open position, thereby allowing for quick shut-off when necessary.



STANDARD SPECIFICATIONS (for valves on this page):

VALVE OPERATION

Construction: Spool. Mounting Type: In-Line. Ambient/Media Temperature: 40 to 175° F (4 to 80°C). Flow Media: Filtered air; 5 micron filter recommended. Inlet Pressure: 30 to 150 psig (2 to 10 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Port Threads: NPT.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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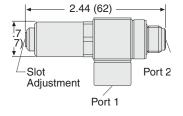
# **Right-Angle Soft Start EEZ-ON® Valves**

# **19 Series**

	2				
Port Size		Valve Model		Weight	
Port 1 (female threads)	Port 2 (male threads)	Number	Avg. C <sub>v</sub>	lb (kg)	1 Drimony Drossyure at Dart 1
1/4	1/4	1969B2010	1.2	0.38 (0.15)	Primary Pressure at Port 1
3/8	3/8	1969B3010	1.7	0.38 (0.15)	
G1/4	G1/4	D1969B2010	1.2	0.38 (0.15)	
G3/8	G3/8	D1969B3010	1.7	0.38 (0.15)	Primary Pressure at Port 2



Valve Dimensions - inches (mm)



F

**F1** 

- Gradual re-application of pneumatic pressure prevents rapid equipment movement at startup
- · Right angle style mounts directly in cylinder ports
- Available with threaded ports
- Point of use Soft Start

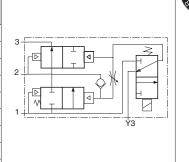
#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: Port Mounted. Ambient/Media Temperature: 15° to 160°F (-10° to 70°C). Flow Media: Filtered air. Operating Pressure: 45 to 150 psig (3 to 10.3 bar).



# Soft Start EEZ-ON® Valves

3-Way 2-Position Valve, Solenoid Pi										
Port	Size	Body	Valve Model	C <sub>v</sub>		Weight				
1, 2	3	Size	Number*	1-2	2-3	lb (kg)				
1/4	1/2	3/8	2773B2037**	2.5	3.1	4.5 (2.0)	3-			
3/8	1/2	3/8	2773B3037**	3.6	5.3	4.5 (2.0)				
1/2	1/2	3/8	2773B4047**	3.3	5.3	4.5 (2.0)	2			
1/2	1	3/4	2773B4037**	10.0	13.0	5.0 (2.3)				
3/4	1	3/4	2773B5037**	12.0	15.0	5.0 (2.3)				
1	1	3/4	2773B6047**	12.0	16.0	5.0 (2.3)	1+1			
1	11⁄2	1¼	2773A6037**	23.0	34.0	8.8 (4.0)				
1¼	11⁄2	1¼	2773A7037**	30.0	32.0	8.8 (4.0)				
1½	1½	1¼	2773A8047**	30.0	31.0	8.8 (4.0)				



Controlled

# 27 Series

F1

1/4 thru 1 Exhaust Port Size	
1 thru 1½ Exhaust Port Size	

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D2773B2037. \*\*Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 2773B2037W. For other voltages, consult ROSS.

# **ACCESSORIES & OPTIONS**

# Silencers



# Indicator Light Kit

ŧ	Kit	Indicator					
•	24 volts DC	110-120 volts AC 50-60 Hz	Light				
	862K87-W	862K87-Z					

Port	Thread	Model	Avg.						
Size	Туре	NPT Threads	BSPT Threads	Cv					
1/2	Male	5500A4003	D5500A4003	4.7					
1	Male	5500A6003	D5500A6003	14.6					
1½	Female	5500A8001	D5500A8001	29.9					
Pressure Range: 0 to 150 psig (0 to 10.3 bar)									
maxim	um. Flo	w Media: Filter	red air.						

# **Manual Overrides**

FLUSH E			EXTENDED	BUTTON	EXTENDED B PAL		
Locking Type	Kit Number		Locking Type Kit Number		Locking Type	Kit Number	
Locking	792K87		Non-Locking	791K87	Non-Locking	984H87	

**NOTE:** The 3/2 EEZ-ON<sup>®</sup> value is also available with a L-O-X<sup>®</sup> adapter so that both L-O-X<sup>®</sup> and EEZ-ON<sup>®</sup> functions are consolidated in a single value.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Solenoid Pilot: AC or DC power. Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature:  $40^{\circ}$  to  $120^{\circ}F$  ( $4^{\circ}$  to  $50^{\circ}C$ ). Media Temperature:  $40^{\circ}$  to  $175^{\circ}F$  ( $4^{\circ}$  to  $80^{\circ}C$ ). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10.3 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

<sup>°</sup> Online Version Rev. 11/14/16

# Soft Start EEZ-ON® Valves

1.26

(49)

3.56 (90)

-4.19 (106)

0.43

(11)

1/2 Electrical conduit port

1/8 External

Port 1 (inlet)

{Port 2 (outlet)

on opposite side}

pilot supply

2.45 (62) 1.53

53

(39)

3.03 (77)

Body Size 1<sup>1</sup>/<sub>4</sub>

# 27 Series Valve Technical Data & Operation

Pilot exhaust Port 3

(exhaust)

2

9.53 (242) 0.34

3.04

(77)

(8)

2.95

(75)

Body Size 3/4

1.26

(32)

3.25 (8<del>3)</del>

4.45 (113)<sup>(60)</sup>

4.62 (117)

2.38

-0.87 (22)

2 11

(54)

Port 1 (inlet) {Port 2

(outlet) on opposite side}

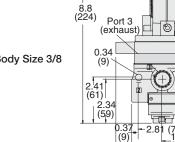
-3.59 (91)<sup>(39)</sup>

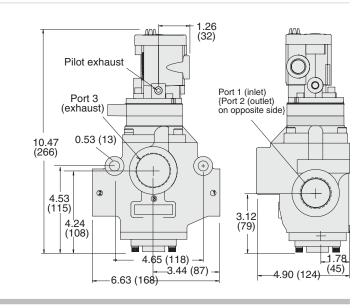
#### Valve Dimensions - inches (mm)



**F1** 

Body Size 3/8





F

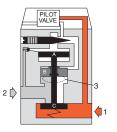
# **VALVE OPERATION**

#### **Pilot Not Energized**

Pilot air is blocked by the pilot. Any downstream pressure forces piston B (which slides on the valve stem) upward. This opens the exhaust port and vents the downstream line.

#### **Pilot Energized**

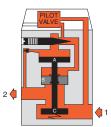
Pilot air forces piston B downward to close the exhaust port. Pilot air also flows past the adjusting needle, opens the ball check and begins slowly to pressurize the outlet line. At the same time, pressure is building up on piston A.



2

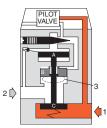
#### **Full Pressure**

When the pressure on piston A reaches approximately 50 percent of inlet pressure, it is forced downward and opens inlet poppet C. Full inlet pressure now flows freely to the outlet port.



#### **Pilot De-energized**

Air above pistons A and B is exhausted through the exhaust port of the pilot valve. Air above poppet C forces sliding piston B upward so that the main exhaust port is opened and the pressurized air is exhausted.



**Online Version** 

Rev. 11/14/16



# Soft Start EEZ-ON® Valves

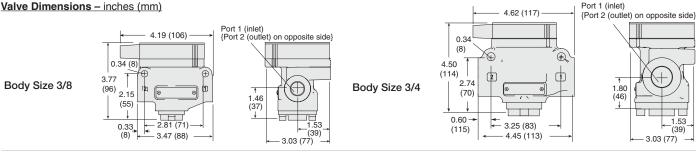
#### 2-Way 2-Position Valves, Pressure Controlled Port Size Weight Valve Model Number Body Size C<sub>v</sub> 1, 2 lb (kg) 1/43/8 2781A2007 2.3 1.5 (0.7) 3/8 3/8 2781A3007 3.8 1.5 (0.7) 1/2 3/8 2781A4017 4.0 1.5 (0.7) 1/2 3/4 2781A4007 13.0 2.3 (1.0) 3/4 3/4 2781A5007 15.0 2.3 (1.0) 1 3/4 2781A6017 16.0 2.3 (1.0) 6.0 (2.7) 1 11/4 2781A6007 24.0 11⁄4 11⁄4 2781A7007 29.0 6.0 (2.7) 1½ 11⁄4 2781A8017 29.0 6.0 (2.7) \* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D2781A2007.

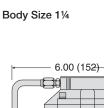


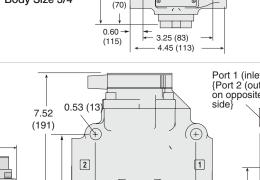
27 Series

**F1** 

#### Valve Dimensions - inches (mm)



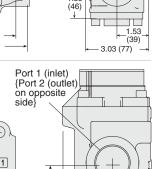




4.48

(114)

1.10 (28)



3.09

(78)

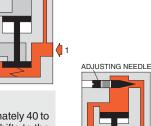
# **VALVE OPERATION**

#### Air Pressure to Inlet

When air pressure is first applied to the inlet, air flow to the piston is restricted by the adjustable needle in the delay orifice. Downstream air pressure gradually builds up at a rate determined by the setting of the adjustable needle.

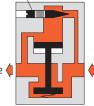
#### Valve Opens to Full Flow

When downstream air pressure reaches approximately 40 to 60 percent of inlet pressure, the valve element shifts to the full open position and there is full air flow to the downstream components. This condition continues as long as inlet air pressure is present.



ADJUSTING NEEDLE

2

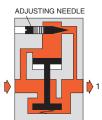


#### **Inlet Pressure Removed**

4.66 (118)

6.49 (165)

When inlet pressure is removed, the exhausting downstream air pressure keeps the inlet poppet open until the downstream pressure drops by approximately 90 percent. The 2 remaining pressure is exhausted via the delay orifice.



1.78

(45)

4.09 (104)

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10.3 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



**Online Version** Rev. 11/14/16

# Soft Start EEZ-ON<sup>®</sup> Valves

#### 3-Way 2-Position Valve, Pressure Controlled Port Size С Weight Body Size Valve Model Number\* 1/4 thru 1 1.2 3 1-2 2-3 lb (kg) Exhaust Port Size 1/4 1/2 3/8 2783C2037 2.5 3.1 4.5 (2.0) 3/8 1/2 3/8 2783C3037 3.6 5.3 4.5 (2.0) 1/2 1/2 3/8 2783C4047 3.3 4.5 (2.0) 5.3 1/2 1 3/4 2783C4037 10.0 13.0 5.0 (2.3) 3/4 1 3/4 2783C5037 12.0 15.0 5.0 (2.3) 1 3/4 12.0 2783C6047 16.0 5.0 (2.3) 1 $1\frac{1}{2}$ 11/4 2783C6037 23.0 34.0 8.8 (4.0) 1 11/4 11/2 11/4 2783B7037 30.0 32.0 8.8 (4.0 11⁄2 11/2 11⁄4 2783B8047 30.0 31.0 8.8 (4.0) 1 thru 11/2 Exhaust Port Size NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D2783C2037. Valve Dimensions - inches (mm) Body Size 3/8 Body Size 1<sup>1</sup>/<sub>4</sub> 1/4 Signal port Port 1 (inlet) 1/4 Signal port {Port 2 (outlet) Port 3 on opposite ίπ. (exhaust side} Port 1 (inlet) (Port 2 (outlet) Port 3 on opposite side] 5.59 (142) (exhaust) 0.34 (9)10.47 (266) 0.53 (13) 2 41 (61) 2.34 (+) 6.00 (152) 1.71(59) (43) 2 0 n-4.53 (115) 0.37 ·2.\$1 (71) 1.53 (9)1.94 (39) 3.<sup>1</sup>2 (79) 3.56 (90)<sup>(49)</sup> 3.09 (78) 4.24 (108) 4.19 (106) Body Size 3/4 1/4 Signal port 4.65 (118) Port 1 (inlet) {Port 2 (outlet) (45) 3.44 (87) 4.90 (124) Port 3 on opposite 6.63 (168) (exhaust side} **ACCESSORIES & OPTIONS** 0.34 6.36 (162) (8) (A) Model Number Port Thread Avg. Silencers **BSPT** Threads Size Type **NPT Threads** Cv 3.04 2 T (77)1/2 Male 5500A4003 D5500A4003 4.7 2 11 (54) D5500A6003 (75) 1 Male 5500A6003 14.6 11⁄2 Female 5500A8001 D5500A8001 29.9 (83)2.38 1 53 (39)Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. 4.45 (113<mark>)60)</mark> 3.59 (91) Flow Media: Filtered air. 4.62 (117)

# VALVE OPERATION

#### **Air Pressure to Inlet**

When air pressure is first applied to the inlet, air flow to the piston is restricted by the adjustable needle in the delay orifice. Downstream air pressure gradually builds up at a 2 ( rate determined by the setting of the adjustable needle.

#### Valve Opens to Full Flow

When downstream air pressure reaches approximately 40 to 60 percent of inlet pressure, the valve element shifts to the full open position and there is full air flow to the downstream components. This condition continues as long as inlet air pressure is present.

ADJUSTING NEEDLE

#### **Inlet Pressure Removed**

When inlet pressure is removed, the exhaust-

ing downstream air pressure keeps the inlet poppet open until the downstream pressure drops by approximately 90 percent. The remaining pressure is exhausted via 2 the delay orifice.



27 Series

STANDARD SPECIFICATIONS (for valves on this page):

2

Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10.3 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ADJUSTING NEEDLE

**F1** 

F1.20



# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves with Soft Start EEZ-ON<sup>®</sup>

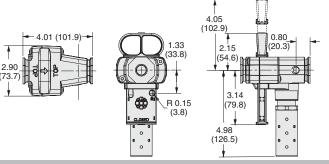
# **15 Series**

P	
	110
Pr.	00

**F1** 

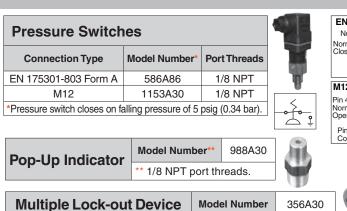
3-Way 2-Position Valve, Modular Port Size C Weight Valve Model Number\* 1,2 3 1-2 2-3 lb (kg) Y1523A2103 1.7 (0.8) 1/4 3/4 3.7 7.8 3/8 3/4 Y1523A3103 5.1 8.3 1.7 (0.8) 1/2 3/4 Y1523A4103 5.5 8.6 1.8 (0.8) 3/4 Y1523A5113 1.8 (0.8) 3/4 5.6 8.1 NPT port threads. For BSPP threads, insert a "D" after "Y" to the model number, e.g., YD1523A2103.

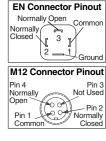
Valve Dimensions - inches (mm)



# ACCESSORIES & OPTIONS

Sile	Silencers											
Port Size	Thread Type	Model Number	Avg. $C_{\nu}$									
3/4	Male - NPT	5500A5003 11.5										
3/4	Male - BSPT	D5500A5003 11.										
Press maxin	sure Range: 0 to num. Flow Mec	o 150 psig (0 to 1 <b>lia:</b> Filtered air.	0.3 bar)									

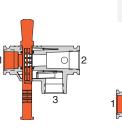




# **VALVE OPERATION**

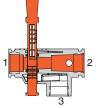
#### Valved Closed

With a short push of the blue handle inward, the flow of supply is blocked and downstream air is exhausted via the exhaust port at the bottom of the valve. It is required by OSHA that the L-O-X<sup>®</sup> valves with EEZ-ON<sup>®</sup> operation be padlocked in this position to prevent the handle from being pulled outward inadvertently when potential for human injury exists or servicing machinery.



#### **EEZ-ON®** Function

The blue handle will only shift part way due to a mechanical stop button allowing only partial flow from inlet to downstream causing the pressure to increase at a slower rate.



#### Valve Open

Pressing the mechanical stop button allows the blue handle to be shifted completely open allowing full flow from inlet to downstream.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Spool. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 0 to 200 psig (0 to 14 bar). Lock Hole Diameter: 0.27 inch (7.0 mm). Length of Hole: 0.43 inch (10.9 mm).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

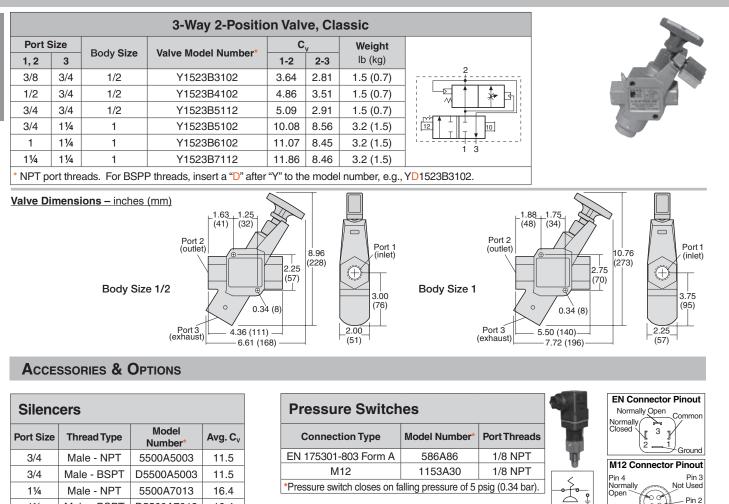
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Online Version Rev. 11/14/16

# Manual Lockout & Exhaust L-O-X<sup>®</sup> Valves with Soft Start EEZ-ON<sup>®</sup>

# **15 Series**



Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.

Male - BSPT

**F1** 

# VALVE OPERATION

D5500A7013

16.4

#### Valved Closed

11/4

With a short push of the blue handle inward, the flow of supply is blocked and downstream air is exhausted via the exhaust port at the bottom of the valve. It is required by OSHA that the L-O-X<sup>®</sup> valves with EEZ-ON<sup>®</sup> operation be padlocked in this position to prevent the handle from being pulled outward inadvertently when potential for human injury exists or servicing machinery.

# **EEZ-ON®** Function

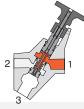
Model Number\*

\*\* 1/8 NPT port threads.

With the blue handle pulled out, the adjustable needle valve (accessed through top of handle) setting determines the rate of pressure buildup.

988A30

Model Number

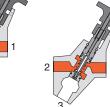


Normally

Closed

Pin 1

Common



**Multiple Lock-out Device** 

**Pop-Up Indicator** 

# Valve Open

After the blue handle is pulled out and pressure downstream has gradually increased, the valve automatically changes to a fully open state, allowing full flow from inlet to downstream. Full flow is achieved at approximately 50% of inlet pressure.

356A30

**STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Spool. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 0 to 150 psig (0 to 10 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES



# Manual Lockout L-O-X<sup>®</sup> Valves with Soft Start EEZ-ON<sup>®</sup> 3/2 Valves – Pressure Controlled

27 Series

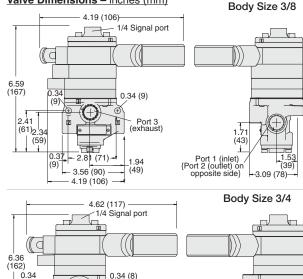
	3-Way 2-Position Valve, Manual Lockout Controlled											
Port	Size	Body Size	Valve Model Number*	C	v	Weight						
1, 2	3	Body Size	valve model Number	1-2	2-3	lb (kg)						
1/4	1/2	3/8	Y2783B2055	2.5	3.1	4.3 (2.0)						
3/8	1/2	3/8	Y2783B3055	3.6	5.3	4.3 (2.0)						
1/2	1/2	3/8	Y2783B4065	3.3	5.3	4.3 (2.0)						
1/2	1	3/4 Y2783B4055		10.0	13.0 4.8 (2.2)							
3/4	1	3/4	Y2783B5055	12.0	15.0	4.8 (2.2)						
1	1	3/4	Y2783B6065	12.0	16.0	4.8 (2.2)						
1	1½	1¼	Y2783A6055	23.0	34.0	7.9 (3.6)	] 1 +!					
1½	1½	1¼	Y2783A7055	30.0	32.0	7.9 (3.6)	]					
1½	1½	1¼	Y2783A8065	30.0	31.0	7.9 (3.6)						
* NPT p	port thr	eads. For BS	PP threads, insert a "D" af	ter "Y"	to the r	nodel numbe	r, e.g., YD2783B2055.					

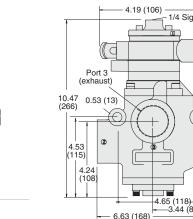
Body Size 1<sup>1</sup>/<sub>4</sub>

4.90 (124) -

F1

# Valve Dimensions - inches (mm)





# **A**CCESSORIES & **O**PTIONS

Silencers

Port	Thread	Model	Model Number*							
Size	Туре	NPT Threads	BSPT Threads	Cv						
1/2	Male	5500A4003	D5500A4003	4.7						
1	Male	5500A6003	D5500A6003	14.6						
1½	Female	5500A8001	D5500A8001	29.9						
Pressure Range: 0 to 150 psig (0 to 10.3 bar)										
maxir	num. <b>Fl</b>	ow Media: Filt	ered air.							

Port 1 (inlet) {Port 2 (outlet) on

opposite side}

3.12 (79)

**Multiple Lock-out Device** 356A30 Model Number

1/4 Signal port

0.53 (13)

 $(\oplus)$ 

-3.44 (87)-

0



F

(45)

# VALVE OPERATION

#### L-O-X<sup>®</sup> Valve (Handle) Open

3 25 (83

- 4.45 (113)

(8)

3.04

(77)

(75)

Pilot air forces piston B downward to

Ŧ

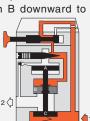
Port 3

(exhaust)

2.38

(60)

close the exhaust port. Pilot air flows past the adjusting needle, opens the ball check and begins slowly to pressurize the outlet line. At the same time, pressure is building up 20 on piston A.



## **Full Pressure**

2.1

(54)

Port 1 (inlet) {Port 2 (outlet) on opposite side}

With a short push of the red handle inward the flow of supply air is blocked and downstream air is exhausted via the exhaust port. Air pressure on the inlet and exhaust poppets produces a large closing force. The L-O-X® valve should be padlocked in this position to prevent the handle from being pulled outward inadvertently when potential for human

1.53

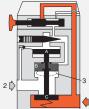
3.59 (91) (39)



injury exists or servicing machinery. STANDARD SPECIFICATIONS (for valves on this page):

#### L-O-X<sup>®</sup> Valve (Handle) Closed Pilot air forces piston B

downward to close the exhaust port. Pilot air flows past the adjusting needle, opens the ball check and begins slowly to pressurize the outlet line. At the same time, 21 pressure is building up on piston A.



Construction: Poppet. Mounting Type: In-Line.

Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

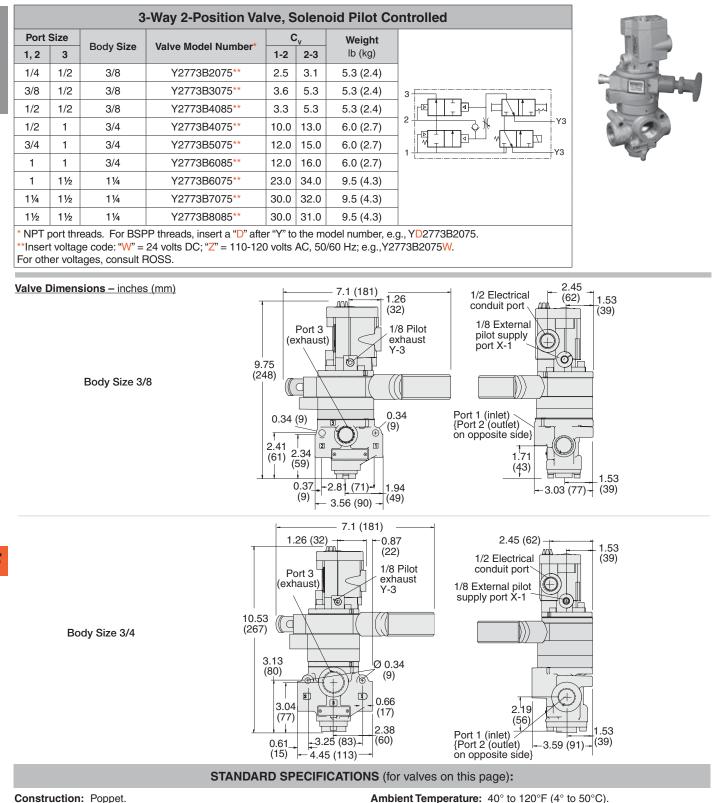
**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



Online Version Rev. 11/14/16

# Manual Lockout L-O-X<sup>®</sup> Valves with Soft Start EEZ-ON<sup>®</sup> 3/2 Valves – Solenoid Controlled

**27 Series** 



Mounting Type: In-Line.

Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar).

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**F1** 

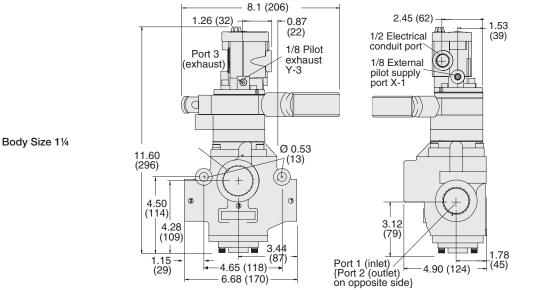


# Manual Lockout L-O-X<sup>®</sup> Valves with Soft Start EEZ-ON<sup>®</sup> 3/2 Valves – Solenoid Controlled

**27 Series** 

**F1** 

Valve Dimensions - inches (mm)



# **ACCESSORIES & OPTIONS**

Silencers											
Port	Thread	Mode	I Number*	Avg.							
Size	Туре	NPT Threads	BSPT Threads	Cv							
1/2	Male	5500A4003	D5500A4003	4.7							
1	Male	5500A6003	D5500A6003	14.6							
1½	Female	5500A8001	D5500A8001	29.9							
Press	ure Rang	e: 0 to 150 psi	g (0 to 10.3 bar) ma	ximum.							
Flow Media: Filtered air.											
			(i) ·	50							

Indicator Light Kit         24 volts DC         110-120 volts AC 50-60 Hz         Light           862K87-W         862K87-Z         Light         Light	Kit	Indicator			
862K87-W 862K87-Z	24 volts DC		Light		
$\mathbf{v}$	862K87-W	862K87-Z			

Multiple Lock-out Device	Model Number	356A30	
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# VALVE OPERATION

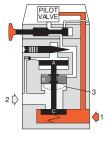
2

# L-O-X<sup>®</sup> Handle Open and Pilot Not Energized

Pilot air is blocked by the pilot. Any downstream pressure forces piston B (which slides on the valve stem) upward. This opens the exhaust port and vents the downstream line.

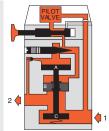
#### L-O-X<sup>®</sup> Handle Open and Pilot Energized

Pilot air forces piston B downward to close the exhaust port. Pilot air also flows past the adjusting needle, opens the ball check and begins slowly to pressurize the outlet line. At the same time, pressure is building up on piston A.



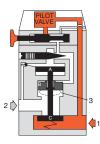
#### Full Pressure

When the pressure on piston A reaches approximately 50 percent of inlet pressure, it is forced downward and opens inlet poppet C. Full inlet pressure now flows freely to the outlet port.



#### L-O-X<sup>®</sup> Handle Closed

At any time the L-O-X<sup>®</sup> handle can be pushed inward, thereby closing off the flow of pilot air. Pilot air above pistons A and B is then vented to atmosphere. Piston A moves upward and closes inlet poppet C. Sliding piston B also moves upward to open the exhaust port and vents the downstream line.



Online Version Rev. 11/14/16

www.rosscontrols.com



F



# ROSS CONTROLS®

# SENSING VALVES SV27 SERIES



### SENSING VALVES – KEY FEATURES

- Senses internal position & state
- Electrical feedback via DPST switch (Double-Pole Single-Throw)
- Directly operated safety-rated force-guided positive-break status switch (DPST)
- Poppet construction for near zero leakage & dirt tolerance
- A diagnostic coverage (DC) of 90% can be obtained by monitoring the safety switch status
- Explosion proof solenoid pilot available, for more information consult ROSS

**F2** 

	DESCR	RIPTION		AVA	AILA	BLE	INL	ET F	POR	T SIZ	'ES				I	FUN	СТІ	ONS	\$						
VALVE TYPE/SERIES	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	<b>2</b> ½	2/2	3/2	3/4	4/2	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	Pressure Controlled	Page
SV27 Series																						29			F2.3 - F2.6
SV27 Series																						71			F2.4 - F2.7
SV27 Series with Lockout Valve																						32			F2.8 - F2.9
Air Entry Packages	5				-						-														F2.10



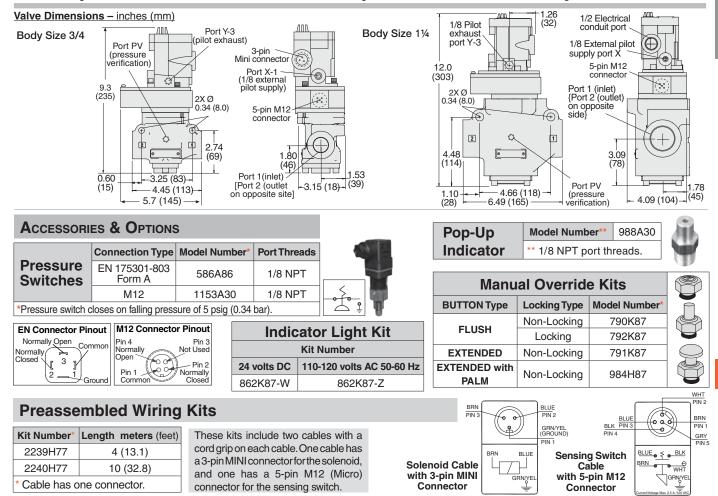
# Sensing Valves, Air Dump/Release

**F2** 

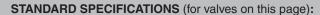
F

	2-Way 2-Position Valves, Solenoid Pilot Controlled												
Port Size 1, 2	Body Size	Valve Model Number*	С <sub>v</sub> 1-2	Weight Ib (kg)									
1/2	3/4	SV27NC105407PSAA**	7.7	4.6 (2.1)	PV 2								
3/4	3/4	SV27NC105507PSAA**	9.0	4.6 (2.1)									
1	3/4	SV27NC105607PSAA**	9.0	4.6 (2.1)									
1	1¼	SV27NC107607PSAA**	24	8.1 (3.7)									
1¼	1¼	SV27NC107707PSAA**	29	8.1 (3.7)	1								
1½	1¼	SV27NC107807PSAA**	29	8.1 (3.7)									

\* NPT port threads. For BSPP threads, replace "N" in the model number with a "D", e.g., SV27DC105407PSAA1A. \*\* Insert voltage code: "1A"=110-120 volts, 50/60 Hz; "1D"= 24 volts DC; .e.g., SV27NC105407PSAA1A. For other voltages, consult ROSS.



Integrated Double-Pole For valves basic size 3/4 & 1-1/4, the DPST switch is actuated Contact conditions during 13-14 (NC) Single-Throw Switch (DPST) 21-22 (NO) whenever the valve is not in the normal home position. switch travel (0 to 6 mm). Switch States



Construction: Poppet. Mounting Type: In-Line. Switch Current/Voltage Min.: 50 mA/24 volts DC. Solenoid Pilot: AC or DC power. Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. in excess of 15 million cycles. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 Functional Safety Data: watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar). Pilot Pressure: Must be equal to or greater than inlet pressure.

Switch Current/Voltage Max.: 2.5 A/120 volts AC.

NOTE: Electrical life of switch varies with conditions and voltage; rated

Category 2 PL d; B10d: Valve - 20,000,000, Switch - 2,000,000; PFHd: 2.35x10<sup>7</sup>; MTTFd: 98.15 (nop: 7360); DC (obtained by monitoring safety switch status): 90%; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Online Version Rev. 11/14/16

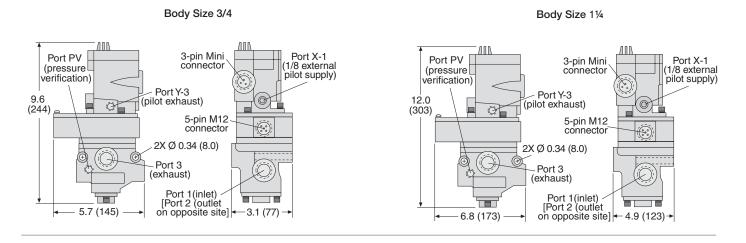
# Sensing Valves, Air Dump/Release

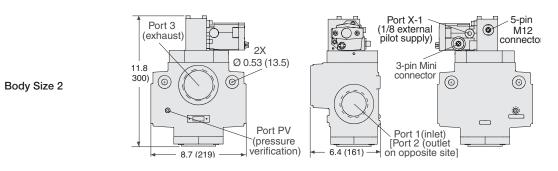
# SV27 Series

		;	3-Way 2-Position Valve	, Sol	enoi	d Pilot Co	ontrolled	CONTROP
Por	Port Size Body Valve Model				,	Weight		Te 2 s
1, 2	3	Size	Number*	1-2		LEGO		
1/2	1	3/4	SV27NC305407PSAA**	6.3	9.2	4.5 (2.0)		
3/4	1	3/4	SV27NC305507PSAA**	7.7	11	4.5 (2.0)	PV 2	
1	1	3/4	SV27NC305607PSAA**	8.0	12	4.5 (2.0)	· · · · ·	
1	1½	1¼	SV27NC307607PSAA**	23	34	7.8 (3.5)		
11⁄4	1½	1¼	SV27NC307707PSAA**	30	32	7.8 (3.5)		·
1½	1½	1¼	SV27NC307807PSAA**	30	31	7.8 (3.5)	3 1	200
1½	21⁄2	2	SV27NC309807PSAA**	68	70	18.1 (8.2)		
2	21⁄2	2	SV27NC309907PSAA**	70	70	18.1 (8.2)		
21⁄2	21⁄2	2	SV27NC309957PSAA**	70	71	18.1 (8.2)		

\* NPT port threads. For BSPP threads, replace "N" in the model number with a "D", e.g., SV27DC305407PSAA1A. \*\* Insert voltage code: "1A"=110-120 volts, 50/60 Hz; "1D"= 24 volts DC; .e.g., SV27NC305407PSAA1A. For other voltages, consult ROSS.

Valve Dimensions - inches (mm)





#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet.

Mounting Type: In-Line. Solenoid Pilot: AC or DC power. Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air.

Pilot Pressure: Must be equal to or greater than inlet pressure.

Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar).

Switch Current/Voltage Max.: 2.5 A/120 volts AC. Switch Current/Voltage Min.: 50 mA/24 volts DC. NOTE: Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles.

#### **Functional Safety Data:**

Category 2 PL d; B10d: Valve - 20,000,000, Switch - 2,000,000; PFHd: 2.35x10<sup>-7</sup>; MTTFd: 98.15 (n<sub>op</sub>: 7360); DC (obtained by monitoring safety switch status): 99%, ; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.



# **Sensing Valves SV27 Series**

# Silencers

Port	Thread	Mod	el Number*	Avg.				
Size	Туре	NPT Threads	BSPT Threads	Cv				
1	Male	5500A6003	D5500A6003	14.6				
1½	Female	5500A8001	D5500A8001	29.9				
21⁄2	Female	5500A9002	D5500A9002	103.7				
Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum.								
Flow Media: Filtered air.								

Port size 1 thru 11/2

Port size 21/2

# **Pressure Switches**

Connection Type	Model Number*	Port Threads		M12 Connector Pinout	
EN 175301-803 Form A	586A86	1/8 NPT	Normally	INORMAIIY NOT USED	
M12	1153A30	1/8 NPT	Closed 3	Open Pin 2	0 0
*Pressure switch closes on	falling pressure of 5	5 psig (0.34 bar).	Cound Cound	Pin 1 Normally Common Closed	

# **Pop-Up Indicator**

Model Number**	988A30	1
** 1/8 NPT port thre	eads.	

# **Indicator Light Kit**

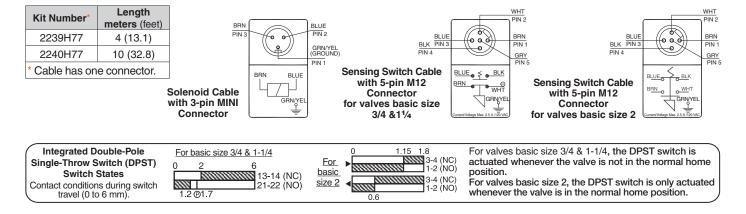
Kit	Indicator	
24 volts DC	110-120 volts AC 50-60 Hz	Light
862K87-W	862K87-Z	

## Manual Overrides

FLUSH BUTTON		EXTENDED	BUTTON	9	EXTENDED BUT		
Locking Type	Kit Number	Locking Type Kit Number			Locking Type	Kit Number	J.
Non-Locking	790K87				Non-Locking	984H87	
Locking	792K87	Non-Locking	791K87				

# **Preassembled Wiring Kits**

These kits include two cables with a cord grip on each cable. One cable has a 3-pin MINI connector for the solenoid, and one has a 5-pin M12 (Micro) connector for the sensing switch.

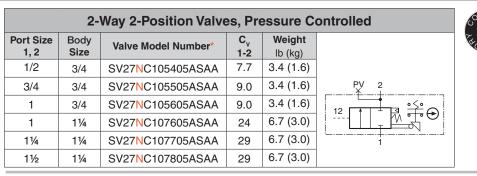




# Sensing Valves, Air Dump/Release

Port PV

6.1 (155)



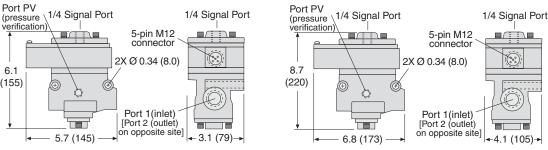
**F2** 

NPT port threads. For BSPP threads, replace "N" in the model number with a "D", e.g., SV27ND105405ASAA.

#### Valve Dimensions - inches (mm)







Not intended as a pressure trapping device; Please see Pilot Operated Check Sensing Valves, pages F4.13-F4.16.

# ACCESSORIES & OPTIONS

Dressure	Connection Type	Model Number*	Port Threads	14
Pressure Switches	EN 175301-803 Form A	586A86	1/8 NPT	
	M12	1153A30	1/8 NPT	
*Pressure switch of	closes on falling press	sure of 5 psig (	0.34 bar).	

	EN Connector F Normally Open	Pinout Common
+	Normally Closed	Ground
W.	M12 Connector	Pinout
		Pin 3 Jot Used
	Open Pin 1 Common	- Pin 2 Normally Closed

Pop-Up	Model Number**	988A3
Indicator	** 1/8 NPT port th	reads.



WHT **Preassembled Wiring Kits** PIN 2 BLK PIN 3 PIN 4 BRN 6 6 PIN 1 Kit Number Length meters (feet) GRY PIN 5 These kits include one cable with a cord grip. Cable has BLUE S 2241H77 4 (13.1) BLK a 5-pin M12 (Micro) connector for the sensing switch. WHT 2242H77 10 (32.8) Sensing Switch Cable with 5-pin M12 Cable has one connector. Connector Integrated Double-Pole For valves basic size 3/4 & 1-1/4, the DPST switch is actuated Contact conditions during 13-14 (NC) Single-Throw Switch (DPST) switch travel (0 to 6 mm) -22 (NO) whenever the valve is not in the normal home position. Switch States STANDARD SPECIFICATIONS (for valves on this page): Construction: Poppet. NOTE: Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles. Mounting Type: In-Line. Ambient Temperature: 40° to 120°F (4° to 50°C). Functional Safety Data: Category 2 PL d; B10d: Valve - 20,000,000, Switch Media Temperature: 40° to 175°F (4° to 80°C). - 2,000,000; PFHd: 2.35x10<sup>-7</sup>; MTTFd: 98.15 (n<sub>op</sub>: 7360); DC (obtained by Flow Media: Filtered air. monitoring safety switch status): 90%; ROSS recommends testing the switch Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar). function and sealing for load holding valves every 8 hours. Pilot Pressure: Must be equal to or greater than inlet pressure. Vibration/Impact Resistance: Calculated to BS EN 60068-2-27. Switch Current/Voltage Max.: 2.5 A/120 volts AC.

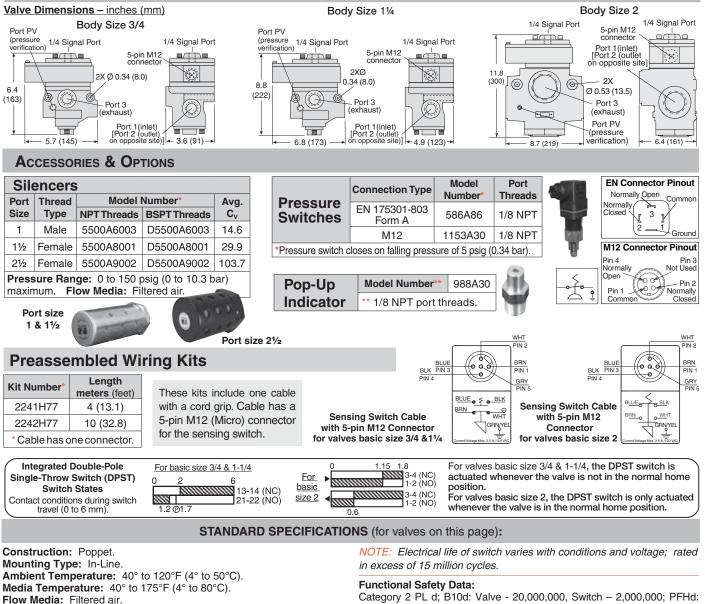
Switch Current/Voltage Min.: 50 mA/24 volts DC.



# Sensing Valves, Air Dump/Release

	3-Way 2-Position Valve, Pressure Controlled												
Port	Size	Body	Valve Model Number*	0	v	Weight							
1, 2	3	Size	valve model Nulliber	1-2	2-3	lb (kg)							
1/2	1	3/4	SV27NC305405ASAA	6.3	9.2	3.3 (1.5)							
3/4	1	3/4	SV27NC305505ASAA	7.7	11	3.3 (1.5)							
1	1	3/4	SV27NC305605ASAA	8.0	12	3.3 (1.5)	PV 2						
1	1½	1¼	SV27NC307605ASAA	23	34	6.4 (2.9)							
1¼	1½	1¼	SV27NC307705ASAA	30	32	6.4 (2.9)							
1½	11⁄2	1¼	SV27NC307805ASAA	30	31	6.4 (2.9)							
1½	21⁄2	2	SV27NC309805ASAA	68	70	17.2 (7.8)	3 1						
2	21⁄2	2	SV27NC309905ASAA	70	70	17.2 (7.8)							
21⁄2	21⁄2	2	SV27NC309955ASAA	70	71	17.2 (7.8)							

NPT port threads. For BSPP threads, replace "N" in the model number with a "D", e.g., SV27DC305405ASAA.



Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure. Switch Current/Voltage Max.: 2.5 A/120 volts AC. Switch Current/Voltage Min.: 50 mA/24 volts DC.

Category 2 PL d; B10d: Valve - 20,000,000, Switch - 2,000,000; PFHd:

2.35x10<sup>-7</sup>; MTTFd: 98.15 (n<sub>op</sub>: 7360); DC (obtained by monitoring safety switch status): 99% ; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

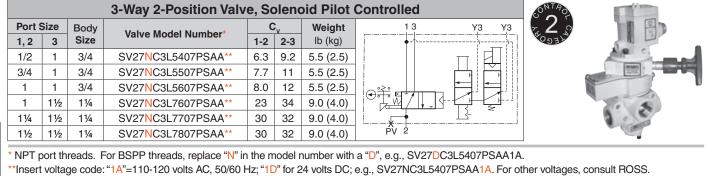
Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.

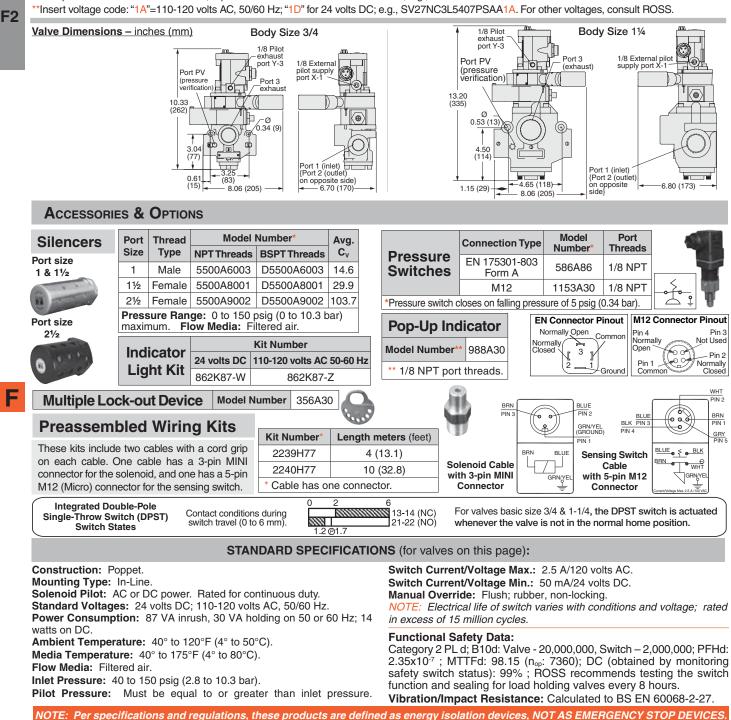
Online Version Rev. 11/14/16

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# Sensing Valves with Manual Lockout L-O-X<sup>®</sup> Control

# SV27 Series



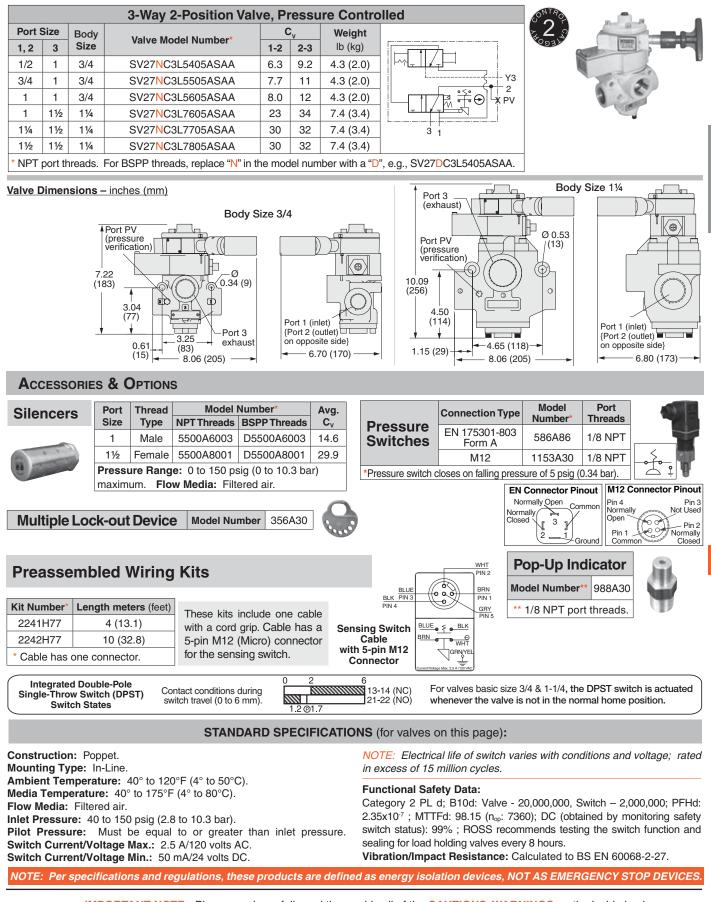




# Sensing Valves with Manual Lockout L-O-X<sup>®</sup> Control

SV27 Series

**F2** 



## SV27 Sensing Valves, Manual Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulator

Pre-engineered panel-mounted design with air entry via filter and regulator "FR", or filter, regulator, and lubricator "FRL".

Includes 3/2 Normally Closed Sensing Valve which senses poppet position and state.

Electrical feedback via DPST switch (Double-Pole Single-Throw).

Applications include Air Dump and Trapped-Pressure Release.

Mounting plate included.

Air Entry		Port	Size	Model	Air Entry	C	¢√	Dim	ensions inches (	(mm)
Combination	า	1, 2	3	Number*	Туре	1-2	2-3	Length	Width	Depth
Cat-2 with SV27		1/2	1	RC208-09**	FR	6.3	9.2	14.80 (374.9)	11.00 (279.0)	6.60 (167.7)
Cat-2 with SV27		1/2	1	RC208L-09**	FRL	6.3	9.2	14.80 (374.9)	11.00 (279.0)	6.60 (167.7)

\* NPT pressure port threads.

\*\* Specify voltage when ordering. Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., RC208-09W. M12 connectors available, consult ROSS.

Standard Air Entry Packages supplied with metal bowl and manual drain. For automatic drain insert an "A" before the dash (-) in the model number, e.g., RC208A-09.

#### Custom designs available, consult ROSS.

Explosion proof solenoid pilot available, for more information consult ROSS.

#### SV27 Sensing Valves, Manual Lockout L-O-X® Valves with Filter and Regulator

Pre-engineered panel-mounted design with air entry via filter and regulator "FR", or filter, regulator, and lubricator "FRL" Includes 3/2 Normally Closed Sensing Valve. Applications include Air Dump and Trapped-Pressure Release.

Mounting plate included.

Air Entry	Port Size		Model	Air Entry	Cv		Dimensions inches (mm)		
Combination	1, 2	3	Number*	Туре	1-2	2-3	Length	Width	Depth
Cat-2 with SV27	1/2	1/2	RC208-06**	FR	6.3	9.2	23.0 (585)	12.8 (326)	6.7 (171)
Cat-2 with SV27	1/2	1/2	RC208L-06**	FRL	7.7	11	23.0 (585)	12.8 (326)	6.7 (171)
Cat-2 with SV27	3/4	3/4	RC212-06**	FR	8.0	12	28.0 (712)	17.0 (432)	9.5 (242)
Cat-2 with SV27	3/4	3/4	RC212L-06**	FR	6.3	9.2	23.0 (585)	12.8 (326)	6.7 (171)
Cat-2 with SV27	1	1	RC216-06**	FRL	7.7	11	23.0 (585)	12.8 (326)	6.7 (171)
Cat-2 with SV27	1	1	RC216L-06**	FRL	8.0	12	31.8 (808)	17.0 (432)	9.5 (242)

\* NPT pressure port threads.

\*\* Specify voltage when ordering. Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., RC208-06W. M12 connectors available, consult ROSS.

Standard Air Entry Packages supplied with metal bowl and manual drain. For automatic drain insert an "A" before the dash (-) in the model number, e.g., RC208A-06.

#### Custom designs available, consult ROSS.

Explosion proof solenoid pilot available, for more information consult ROSS.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES









F



# **ROSS** CONTROLS®

# DOUBLE VALVES FOR CONTROL RELIABLE ENERGY ISOLATION DM<sup>1</sup> and DM<sup>2®</sup> Series



## CONTROL RELIABLE DOUBLE VALVES DM SERIES - KEY FEATURES

- Rapid response time to minimize stopping time
- Status Indicator switch for valve condition (ready to run) feedback
- Highly contaminant tolerant poppet construction
- Explosion proof solenoid pilot available, for more information consult ROSS

This valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2<sup>®</sup> series D valves for mechanical power press applications.



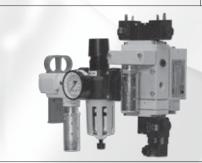
Control Reliable Double Valves with Dynamic Monitoring



Control Reliable Double Valves With Dynamic Monitoring & Memory



Control Reliable Modular Double Valves with Integrated Soft Start



Air Entry Packages Control Reliable Energy Isolation Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulator



F.

**F**3

			AVAIL	ABLE	PORT	SIZE	s			MAX. FI	LOW C	,			RE	SET	
	Category									Port	Size			nted art	ited art	atic	Page
TYPE/SERIES	Cat	1/4	3/8	1/2	3/4	1	1½	1/4	3/8	1/2	3/4	1	1½	Integrated Soft Start	Automatic	Solenoid	
DM <sup>1</sup> E	4							2.4	2.4								F3.3 - F3.4
DM <sup>1</sup> C	4							2.6	2.6	10	13	13					F3.5 - F3.7
DM <sup>1</sup> Series E &	C Prea	sseml	oled W	/iring	Kits												F3.8
DM <sup>2®</sup> E	4							2.4	2.4								F3.9 - F3.10
DM <sup>2®</sup> Series C P	reasse	mbled	d Wirin	ng Kits	\$												F3.11
DM <sup>2®</sup> C	4									10	13	20	64				F3.12 - F3.14
DM <sup>2®</sup> Series C P	reasse	mbled	d Wirir	ng Kits	\$												F3.15
M DM <sup>2®</sup>	4										8.4						F3.16 - F3.18
Air Entry Packa	ges		·				·										F3.19 - F3.20



# DM<sup>1</sup> Series E Air Dump / Release

ISO 13849-1:2006

**F**3

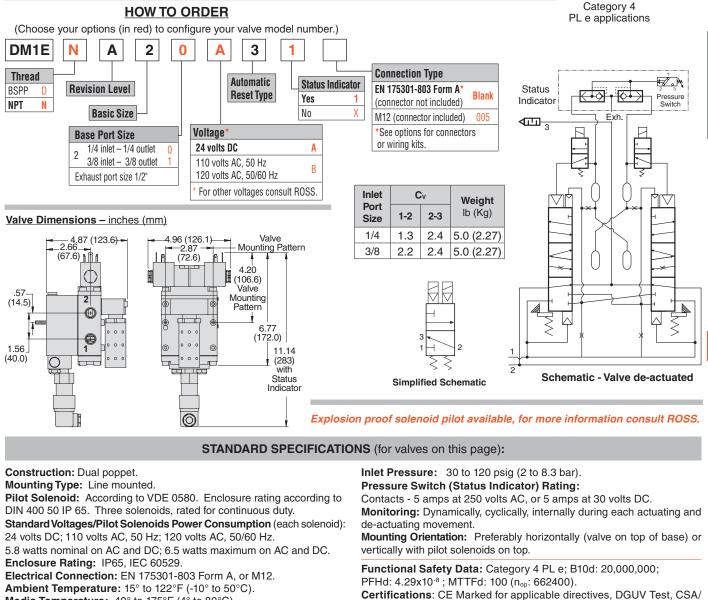
F

Dynamic Monitoring: Monitoring and air flow control functions are integrated into two identical valve elements for CAT 4 applications. The valve exhausts downstream air if asynchronous movement of valve elements occurs during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply. If the abnormality clears itself, the valve will return to the ready-to-run state; there is no memory of the abnormal behavior, as in the ROSS DM<sup>2®</sup> Series E and DM<sup>2®</sup> Series C products that require an intentional reset following lockout.

Basic 3/2 Normally Closed Valve Function: Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance - operates with or without inline lubrication. Ready-to-run: If an abnormality clears itself upon the removal of electricity to both solenoids, it will be ready-torun again. It does not remember the abnormality and stay in a locked-out state until intentionally reset. Therefore, cumulative abnormalities may go undetected.

Status Indicator: Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the "ready-to-run" condition or has experienced abnormal function. This indicator only reports status, it is not part of a lockout function. Silencers: All models include high flow, clog resistant silencers.

Mounting: Inline mounted with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included).



Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered, lubricated or unlubricated air (mineral oils according to DIN 51519, viscosity classes 32-46).

UL, TSSA for appropriately tested valves.

Vibration/Impact Resistance: Tested to BS EN 60068-2-27.

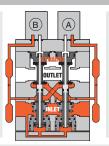
This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2<sup>®</sup> series D for mechanical power press applications.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



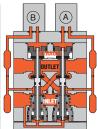
**Online Version** Rev. 11/14/16

#### Valve de-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages from the inlet chamber is restricted by orifices that allow air pressure to bypass the lower inlet poppets. Flow is sufficient to quickly pressurize the pilot supply/timing chambers on both sides A and B. The upper inlet poppets prevent air flow from the crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the de-actuated position. (Internal air passages shown out of the valve body for clarity.)



# DM<sup>1</sup> Series E **Valve Operation & Options**

Valve actuated: Energizing the pilot solenoids simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated position, where inlet air flow to outlet is open and both exhaust poppets are closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the main solenoids causes the valve elements to return to the ready-to-run (de-actuated) position.



Asynchronous Operation: If the valve elements

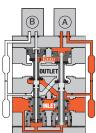
operate in a sufficiently asynchronous manner on ACTUATION, the valve will shift into a position where one crossover and its related timing chambers will be exhausted, and the other crossover and its related timing chambers will be pressurized.

In the illustration, side B is in the de-actuated position, but has no pilot air available to actuate with and has full pressure on its upper and lower inlet poppets and return piston to hold it in place.

Inlet air flow on side B into its crossover is restricted and flows through the open upper inlet poppet on side A, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. Once the main solenoids are de-energized, actuating pressure is removed from the top of the main pistons and then the lower inlet poppet return spring along with inlet air pressure acting on the side A return piston will push side A back into the de-actuated position. Inlet air pressurizes the crossovers and volume chambers. Pressure in the crossovers helps hold the upper inlet poppets on seat. The valve will then be in the ready-to-run position. On the next attempt to actuate normally, if side B is still unable to actuate synchronously with side A, the same sequence of events described above will occur again.

WARNING: If asynchronous operation occurs while DE-ACTUATING, the pilot supply/timing chambers on one side will still be exhausted as described above. However, this could be a temporary situation because the cause of the asynchronous operation may be able to correct itself allowing the stuck or slow acting side of the valve to eventually move back into the de-actuated position. Once the slow or stuck side has de-actuated, the pilot supply/timing chambers that were exhausted will then repressurize. If an external monitoring system is only checking the status indicator periodically this fault signal could be missed. The machine's safety system must be designed to ensure that this does not cause a hazardous situation.

Status Indicator: The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve operation is sufficiently asynchronous or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.



Valve in restricted outlet to exhaust state



Status indicato in normal ready-to-run position

# **O**PTIONS

**F**3

F

Electrical Electrical			O and Law atta	0	Electrical Connector Model Number			
	Connector	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted C	Connector	
Connectors	Form				Light	24 Volts DC	120 Volts AC	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z	
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
	EN 175301-803 Form A	Connector Only	—	-	937K87	936K87-W	936K87-Z	

CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

F

### Downstream Pressure Monitoring

Pressur	5			
Connection Type	Model Number	Port Threads		1
EN 175301-803 Form A	586A86	1/8 NPT		
M12	1153A30	1/8 NPT		I
*Pressure switch clos psig (0.34 bar).	es on falling pr	essure of 5		C

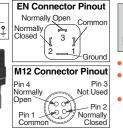
Kit Number

**NPT Threads** 

2323H77

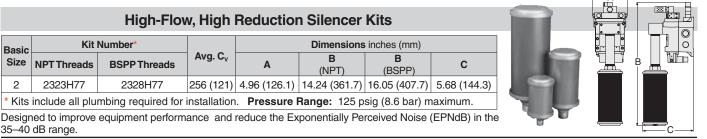
**BSPP** Threads

2328H77



Redundant	Model Number	Port Threads
Downstream Feedback Switch	RC26-13	3/8 NPT
May be installed do	wnstream on all	double valves

Provides a redundant means to verify the release of downstream pressure to next obstruction Factory preset, 5 psi (0.3 bar) - falling



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Online Version

Rev. 11/14/16

Basic

Size

2

35-40 dB range.

# DM<sup>1</sup> Series C Air Dump / Release

(Basic Size 2

DGUV, CE

Certifications

pending)

ISO 13849-1:2006

Category 4 PL e applications

Dynamic Monitoring: Monitoring and air flow control functions are integrated into two identical valve elements for CAT 4 applications. The valve exhausts downstream air if asynchronous movement of valve elements occurs during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply. If the abnormality clears itself, the valve will return to the ready-to-run state; there is no memory of the abnormal behavior, as in the ROSS DM<sup>2®</sup> Series E and DM<sup>2®</sup> Series C products that require an intentional reset following lockout.

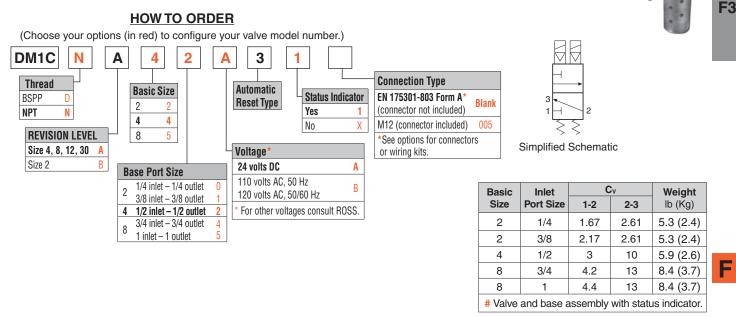
Basic 3/2 Normally Closed Valve Function: Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance operates with or without inline lubrication.

Ready-to-run: If an abnormality clears itself upon the removal of electricity to both solenoids, it will be ready-to-run again. It does not remember the abnormality and stay in a locked-out state until intentionally reset. Therefore, cumulative abnormalities may go undetected.

Status Indicator: Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the "readyto-run" condition or has experienced abnormal function. MUST be integrated into machine controls in order to prevent run signal until fault is cleared in valve. This indicator only reports status, it is not part of a lockout function.

Silencers: All models include high flow, clog resistant silencers.

Mounting: Base mounted - with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included). Captive valve-to-base mounting screws.



Explosion proof solenoid pilot available for basic size 4 valves, for more information consult ROSS.

### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet. Ambient Temperature: 15° to 122°F (-10° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Mounting Type: Base mounted. Pilot Solenoids: According to VDE 0580. Enclosure rating according to Flow Media: Filtered, lubricated or unlubricated (mineral oils according DIN 400 50 IP 65. Three solenoids, rated for continuous duty. to DIN 51519, viscosity classes 32-46). Standard Voltages/Pilot Solenoids Power Consumption Inlet Pressure: Basic Size 2: 45 to 150 psig (3.1 to 10.3 bar). Basic Size 4, 8, 12, 30: 30 to 120 psig (2.1 to 8.3 bar). (each solenoid): Basic Size 2 & 4: Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. volts AC, or 5 amps at 30 volts DC. 5.8 watts nominal on AC and DC; 6.5 watts maximum on AC and DC. Monitoring: Dynamically, cyclically, internally during each actuating and Basic Size 8: de-actuating movement. Mounting Orientation: Preferably horizontally (valve on top of base) or 15 watts on DC; 36 VA inrush and 24.6 VA holding on AC. Enclosure Rating: IP65, IEC 60529. vertically with pilot solenoids on top. Electrical Connection: EN 175301-803 Form A, or M12. Product data for Sistema Library users, pending. This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses,

see DM2<sup>®</sup> series D for mechanical power press applications.

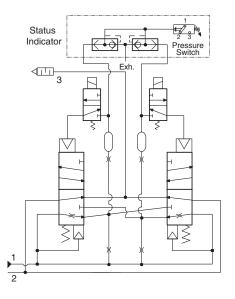
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Schematic - Valve de-actuated

View X

(Base mounting hole pattern)

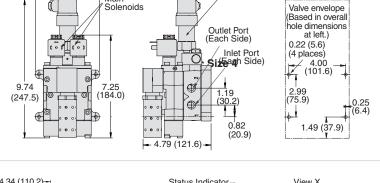


**F3** 

F

# Valve Dimensions - inches (mm)

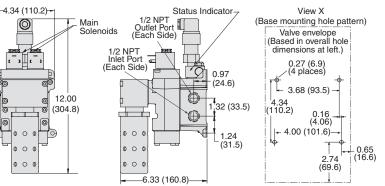
Basic Size 2

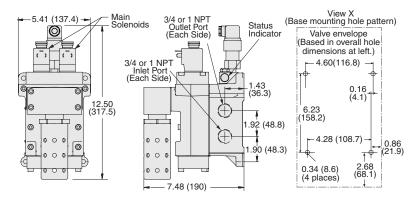


Status Indicator -

-4.50 (114.3)<del>-</del>

Main





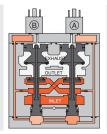
Basic Size 4

Basic Size 8

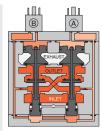


# DM<sup>1</sup> Series C Valve Operation & Options

Valve de-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages from the inlet chamber is restricted by orifices that allow air pressure to bypass the lower inlet poppets. Flow is sufficient to quickly pressurize the pilot supply/timing chambers on both sides A and B. The upper inlet poppets prevent air flow from the crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the de-actuated position. (Internal air passages shown out of the valve body for clarity.)



Valve actuated: Energizing the pilot solenoids simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated position, where inlet air flow to outlet is open and both exhaust poppets are closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the main solenoids causes the valve elements to return to the ready-to-run (de-actuated) position.

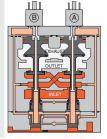


Asynchronous Operation: If the valve elements operate in a sufficiently asynchronous manner on ACTUATION, the valve will shift into a position where one crossover and its related timing chambers will be exhausted, and the other crossover and its related timing chambers will be pressurized.

In the illustration, side B is in the de-actuated position, but has no pilot air available to actuate with and has full pressure on its upper and lower inlet poppets and return piston to hold it in place.

Inlet air flow on side B into its crossover is restricted and flows through the open upper inlet poppet on side A, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. Once the main solenoids are de-energized, actuating pressure is removed from the top of the main pistons and then the lower inlet poppet return spring along with inlet air pressure acting on the side A return piston will push side A back into the de-actuated position. Inlet air pressurizes the crossovers and volume chambers. Pressure in the crossovers helps hold the upper inlet poppets on seat. The valve will then be in the ready-to-run position. On the next attempt to actuate normally, if side B is still unable to actuate synchronously with side A, the same sequence of events described above will occur again.

WARNING: If asynchronous operation occurs while DE-ACTUATING, the pilot supply/timing chambers on one side will still be exhausted as described above. However, this could be a temporary situation because the cause of the asynchronous operation may be able to correct itself allowing the stuck or slow acting side of the valve to eventually move back into the de-actuated position. Once the slow or stuck side has de-actuated, the pilot supply/timing chambers that were exhausted will then repressurize. If an external monitoring system is only checking the status indicator periodically this fault signal could be missed. The machine's safety system must be designed to ensure that this does not cause a hazardous situation.



### Status Indicator:

The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve operation is sufficiently asynchronous or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.



**F**3

Status indicator in normal ready-to-run position

### **O**PTIONS

Electrical	Electrical				Electrical Connector Model Number			
	Connector	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted Connector		
Connectors	Form			Diameter	Light	24 Volts DC	120 Volts AC	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
1-	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
	EN 175301-803 Form A	Connector Only	_	-	937K87	936K87-W	936K87-Z	

CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

### **Downstream Pressure Monitoring**

	Pressure	e Switche	s	EN Cor Normal	y Open Common	Redunda		I Number	Port Thread	s
Conn	ection Type	Model Number	Port Threads	Normally Closed		Downstrea Feedback St		26-13	3/8 NPT	
	75301-803 Form A	586A86	1/8 NPT	M12 Co	<sup>2</sup> <u> </u>		alled downstr			
	M12	1153A30	1/8 NPT	Pin 4	Pin 3		edundant mean pressure to r			e or
	ure switch close .34 bar).	es on railing pr		High-Flow	Pin 2 Normally Closed	Factory pre	set, 5 psi (0.3 <b>cer Kits</b>	bar) - fal	ling	
Basic	Kit N	umber*	Flow	,		s inches (mm)				
Size	NPT threads	BSPP thread	ls scfm	Α	B (NPT)	B (BSPP)	С			╵┤ <u></u>
2, 4	2324H77	2329H77	800 (378	) 4.34 (110.2)	19.06 (484.1)	21.40 (543.6)	7.27 (184.7)		3	
8	2325H77	2330H77	800 (378	) 5.41 (137.4)	21.18 (538.0)	23.52 (597.4)	8.41 (213.6)			

\* Kits include all plumbing required for installation. **Pressure Range:** 125 psig (8.6 bar) maximum.

Designed to improve equipment performance and reduce the Exponentially Perceived Noise (EPNdB) in the 35–40 dB range.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Online Version Rev. 11/14/16

# DM<sup>1</sup> Series E & C Preassembled Wiring Kits

Solenoid Cables

with EN connector

These kits include 2 cables with either EN or M12 connectors for the solenoids. All cables include cord grips.

Kit Number	Solenoid Connector Type	Length meters (feet)
2243H77	EN 175301-803 Form A	5 (16.4)
2244H77	EN 175301-803 Form A	10 (32.8)
2245H77	M12	5 (16.4)
2246H77	M12	10 (32.8)

#### Status Indicator kit ordered separately.

Status	Kit Number	Length meters (feet)
Status Indicator Kits	2247H77	5 (16.4)
Indicator Kits	2248H77	10 (32.8)

Status Indicator kits include one cable with EN connector and a cord grip.

et)	GRY 1 BR	4 BF 2 0 1 3 BLK	11.9		B	- NOT USED GRY PIN 2 GROUND BLUE RN/YEL	
	olenoid Cables h M12 Connect			GRY PFIN 2 SRMYYEL SROUND		atus Indicato with EN com	GRN/YEL GROUND BRN BLK

## F3

# Wiring Kits with J-Box

Kit Number*	Connector Types	Length meters (feet)				
2249H77	M12 - DIN	1 (3.3)				
2250H77	M12 - M12	1 (3.3)				
*24 volts DC only.						



Status Indicator Cable

with EN connector

10 Pin Port 1 Port 2 Pin # Port 3 Port 4 Pin # Pin # Pin # Pin # (V+) 1 ○ <sub>-0</sub> 3 <u>3</u> <u>\_3</u> <u>\_3</u> (V-) 2 ↔ -0 2 3 0 4 0 -04 5 O o 4 6 0 02 -04 70 80 o 2 90 02 10 0 4 8 30 5 04 20 01 7 (1) 30 5 04 30 5 04 30 5 04 20 01 20 01 720 01 69102 (4) <sup>(3)</sup> 5 J-Box Wiring

A J-Box is a junction box with a 10-pin MINI connector for connecting to the user's control system and (4) 5-pin M12 ports for connecting to the 3 solenoids and the status indicator on the DM<sup>2®</sup> Series valve. The J-Box kits include the J-Box as described above and (4) 1-meter cables for connecting to the valve. These cables have a connector on each end. The status indicator cable and the (3) solenoid cables have an M12 connector on one end and a EN connector on the other end (M12-DIN).

+ 1.85 (46.9) •

Standard valves come with DIN type solenoid connections, but could be bought with M12 type connections as well. Therefore we also offer a kit that provides solenoid cables with an M12 connector on each end (M12-M12).

F

# 10 PIN MINI Cable

Kit Number	Length meters (feet)
2253H77	3.66 (12)
2254H77	6.1 (20)
2255H77	9.1 (30)
2256H77	15.2 (50)

1.125 - 16UN2A - 3.9 (100)

(10)

04

2.90 (73.6)

These cables have a 10-pin MINI connector for connecting the J-Box kits above to the user's control system. Kits include one cable with connector and cord grip. Cable conductors are 18-gauge wire.

# PIN # PIN # 1 +24 volts DC 6 2 Common volts DC 7 3 8 4 Solenoid A 9



 Wire Colors:
 Wire Colors:

 Orange
 Orange w/Black

 Blue
 Red

 White w/Black
 Green/Yellow

 Red w/Black
 Black

 Green w/Black
 White



# **Outlet Port Pressure Monitoring Wiring Kit**

Kit Number	Length meters (feet)
2251H77	1 (3.3)

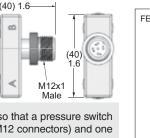
Some customers prefer to monitor downstream pressure in addition to using the DM<sup>2®</sup> or DM<sup>1</sup> Series valve. A convenient way to do this is to install a pressure switch in the extra outlet port that is provided on the valve. The Outlet Port Pressure Monitoring kit can be

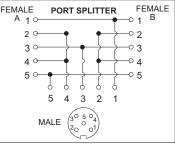
used with one of the J-Box kits above to split one of the M12 ports on the J-Box so that a pressure switch can be wired in as well. These kits consist of one port splitter (a Tee with three M12 connectors) and one M12-DIN cable (1 meter).

5

Solenoid B

Ø0.6





#### Pressure switch available separately, see valve options.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

M12x1 0

Female



**HOW TO ORDER** 

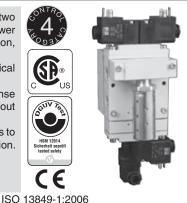
Dynamic Monitoring with Memory: Memory, monitoring, and air flow control functions are integrated into two identical valve elements for CAT 4 applications, except control of the clutch/brake mechanism on mechanical power press. Valves lock-out if asynchronous movement of valve elements occurs during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply.

An Action is Required for Reset - cannot be reset by removing and re-applying supply pressure or electrical power. Reset can only be accomplished by the integrated electrical (solenoid) reset.

Basic 3/2 Normally Closed Valve Function: Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance - operates with or without inline lubrication.

Status Indicator: Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the lockout or ready-to-run condition. Silencers: All models include high flow, clog resistant silencers.

Mounting: Inline mounted with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included).



ŧ2.,

Pressure

Switch

Þ

. Exh.

**Optional Reset** 

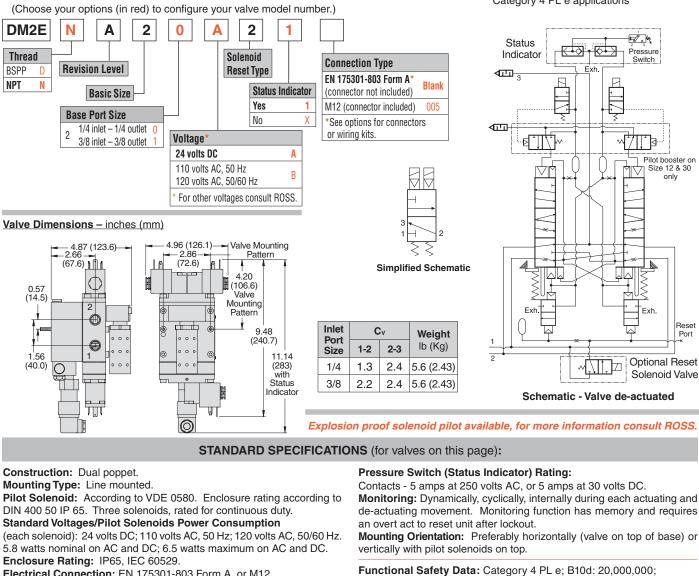
Solenoid Valve

Pilot booster on

Size 12 & 30

only

Category 4 PL e applications



PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). Certifications: CE Marked for applicable directives, DGUV Test, CSA/ UL, TSSA for appropriately tested valves. Vibration/Impact Resistance: Tested to BS EN 60068-2-27.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses. see DM2<sup>®</sup> series D for mechanical power press applications.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**Online Version** Rev. 11/14/16

www.rosscontrols.com

**F**3

Reset

Port

Schematic - Valve de-actuated

Explosion proof solenoid pilot available, for more information consult ROSS.

## Construction: Dual poppet.

Mounting Type: Line mounted.

DIN 400 50 IP 65. Three solenoids, rated for continuous duty. Standard Voltages/Pilot Solenoids Power Consumption

(each solenoid): 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. 5.8 watts nominal on AC and DC; 6.5 watts maximum on AC and DC. Enclosure Rating: IP65, IEC 60529.

Electrical Connection: EN 175301-803 Form A, or M12.

Ambient Temperature: 15° to 122°F (-10° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered, lubricated or unlubricated air (mineral oils according to DIN 51519, viscosity classes 32-46).

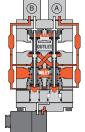
Inlet Pressure: 30 to 120 psig (2 to 8.3 bar).



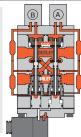
## **Control Reliable Double Valves** With Dynamic Monitoring & Memory

DM<sup>2®</sup> Series E Valve Operation & Options

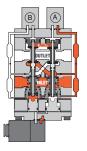
Valve de-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages from the inlet chamber is restricted by orifices that allow air pressure to bypass the lower inlet poppets. Flow is sufficient to quickly pressurize the pilot supply/timing chambers on both sides A and B. The upper inlet poppets prevent air flow from the crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the de-actuated position. (Air passages shown out of position for clarity.)



flow from the crossover Air pressure acting on s securely hold the valve on. (Air passages shown Operation: Whenever the valve ele valve will shift into a locked-out pos d, and the other crossover and its re Valve actuated: Energizing the pilot solenoids simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated position, where inlet air flow to outlet is open and both exhaust poppets are closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the main solenoids causes the valve elements to return to the ready-to-run (de-actuated) position.



o П n



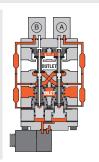
**F**3

Asynchronous Operation: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will shift into a locked-out position. In the locked-out position, one crossover and its related timing chambers will be exhausted, and the other crossover and its related timing chambers will be pressurized. The valve element (side A) that is partially actuated has pilot air available to actuate it, but there is no air pressure on the return piston to de-actuate that valve element. Air pressure in the crossover acts on the differential of side A stem diameters creating a latching force.

Side B is in the de-actuated position, but has no pilot air available to actuate with and has full pressure on its upper and lower inlet poppets and return piston to hold it in place. Inlet air flow on side B into its crossover is restricted and flows through the open upper inlet poppet on side A, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. Also, the return springs can only return the valve elements to the intermediate (locked-out) position. Therefore, the valve will remain in the locked-out position even if the inlet air supply is removed and re-applied. A reset signal must be applied intentionally in order to reset the valve.

**Resetting the valve:** Reset is accomplished by momentarily energizing the reset solenoid. Actuation of the reset solenoid provides inlet air pressure to the reset pistons which physically push the main valve elements to their de-actuated position. Inlet air pressurizes the crossovers and volume chambers, thereby applying air to the return pistons which then hold the upper inlet poppets on seat. De-actuation of the reset solenoid removes pressure from the lower side of the reset pistons, thus allowing them to return to their de-actuated position.

**Reset anti-tie-down feature:** Attempting to energize the valve's main solenoids while the reset solenoid is energized will cause side B to shift (overcoming the pressure on the small reset piston), but side A will not move due to the pressure on the larger reset piston on that side. This will cause the valve to go into and remain in the locked-out position until a reset signal is applied while the main solenoids are de-energized.



Status Indicator: The status indicator pressure switch will actuate when the main valve is operating normally, and will de-

of the main valve.

valve is operating normally, and will deactuate when the main valve is in the lockedout position or when inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status

### **O**PTIONS

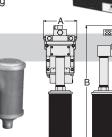
Electrical	Electrical	Electrical			Electrical Connector Model Number			
	Connector	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted C	connector	
Connectors	Form			Diamotor	Light	24 Volts DC	120 Volts AC	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
	EN 175301-803 Form A	Connector Only	_	-	937K87	936K87-W	936K87-Z	

CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

#### **Downstream Pressure Monitoring**

Pressur	e Switche	es	5	EN Connector Pinout	Redundant	Model Number	Port Threads	
Connection Type	Model Number	Port Threads		Normally Closed	Downstream Feedback Switch	RC26-13	3/8 NPT	
EN 175301-803 Form A	586A86	1/8 NPT		M12 Connector Pinout	<ul> <li>May be installed d</li> </ul>			
M12 *Pressure switch clos psig (0.34 bar).	1153A30 ies on falling pi	1/8 NPT ressure of 5		Pin 4 Pin 3 Normally Not Used Open Pin 2	downstream pressure to next obstruction			
	High	h-Flow,	High Re	Pin 1 Common Silencer	Kits			

Basic	Kit N	umber*	Avg. C <sub>v</sub>		Dimensions		
Size	NPT threads	BSPT threads	Avg. C <sub>v</sub>	А	B (NPT)	B (BSPT)	С
2	2323H77	2328H77	256 (121)	4.96 (126.1)	14.24 (361.7)	16.05 (407.7)	5.68 (144.3)
* Kits	* Kits include all plumbing required for installation. <b>Pressure Range:</b> 125 psig (8.6 bar) maximum.						



Designed to improve equipment performance and reduce the Exponentially Perceived Noise (EPNdB) in the 35-40 dB range.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



C.

## **Control Reliable Double Valves** with Dynamic Monitoring & Memory

## **Preassembled Wiring Kits**

These kits include 1 cable for the status indicator, and 3 cables with connector plus a cord grip for each.

	Kit Number*		Length	
Connector	Lighted (	Connector	Solenoid Connector Type	meters
without Light	24 Volts DC	120 Volts AC	1,100	(feet)
2283H77	2532H77-W	2532H77-Z	EN 175301-803 Form A	5 (16.4)
2284H77	2533H77-W	2533H77-Z	EN 175301-803 Form A	10 (32.8)
2288H77**	—	_	M12	5 (16.4)
2289H77**	_	_	M12	10 (32.8)
* Each cable h	has one conne	etor **Coil inc	udes light	

Each cable has one connector. \*Coil includes light

## Wiring Kits with J-Box

Kit Number*	Connector Types	Length meters (feet)		
2249H77	M12 - DIN	1 (3.3)		
2250H77	M12 - M12	1 (3.3)		
*24 volts DC only.				

A J-Box is a junction box with a 10-pin MINI connector for connecting to the user's control system and (4) 5-pin M12 ports for connecting to the 3 solenoids and the status indicator on the DM2® Series valve. The J-Box kits include the J-Box as described above and (4) 1-meter cables for connecting to the valve. These cables have a connector on each end. The status indicator cable and the (3) solenoid cables have an M12 connector on one end and a EN connector on the other end (M12-DIN).

6900

Standard valves come with DIN type solenoid connections, but could be bought with M12 type connections as well. Therefore we also offer a kit that provides solenoid cables with an M12 connector on each end (M12-M12).

### **10 PIN MINI Cable**

Kit Number	Length meters (feet)
2253H77	3.66 (12)
2254H77	6.1 (20)
2255H77	9.1 (30)
2256H77	15.2 (50)

# These cables have a 10-pin MINI connector for connecting the J-Box kits above to the user's control system.

Kits include one cable with connector and cord grip. Cable conductors are 18-gauge wire.

PIN # +24 volts DC 2 Common volts DC 3 8 4 Solenoid A 5 Solenoid B

-Ø0.6

(10)

M12x1

Female

1.41 (35.9)

1.125 - 16UN2A

PIN #

3.9 (100)

Remote Reset

40) 1

- 9 Remote Valve Fault Light 10 Remote System OK Light

(40)

M12x1

Male

Orange Blue Red White w/Black Red w/Black Black Green w/Black White

FEMALE

A 1 0

2 0

30

4 0

5 O

5

MALE

4

Wire Colors:

Wire Colors: Orange w/Black Green/Yellow

781 69102 5 (4) 3

PORT SPLITTER

3 2

Outlet Port Pressure Monitoring Wiring Kit

Kit Number	Length meters (feet)	
2251H77	1 (3.3)	

Some customers prefer to monitor downstream pressure in addition to using the DM<sup>2®</sup> or DM<sup>1</sup> Series valve. A convenient way to do this is to install a pressure switch in the extra outlet port that is provided on the valve. The Outlet Port Pressure Monitoring kit can be

used with one of the J-Box kits above to split one of the M12 ports on the J-Box so that a pressure switch can be wired in as well. These kits consist of one port splitter (a Tee with three M12 connectors) and one M12-DIN cable (1 meter).

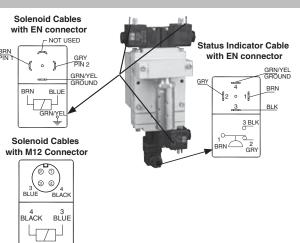
Pressure switch available separately, see valve options.

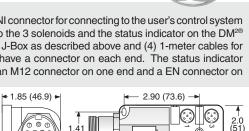
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

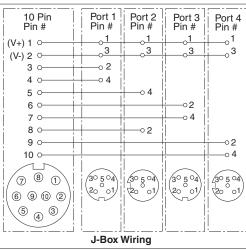


Online Version Rev. 11/14/16

## DM<sup>2®</sup> Series E **Preassembled Wiring Kits**







FEMALE

В 1

2

~ <u>3</u>

-04

- 5

1

#### Basic Size 2, 4, 8, 12 and 30

**Dynamic Monitoring With Complete Memory:** Memory, monitoring, and air flow control functions are simply integrated into two identical valve elements. Valves lock-out due to asynchronous movement of valve elements during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply. **An Action is Required for Reset** – cannot be reset by removing and re-applying supply pressure. Reset can only be accomplished by the optional integrated electrical (solenoid) reset.

**Basic 3/2 Normally Closed Valve Function:** Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance – operates with or without inline lubrication.

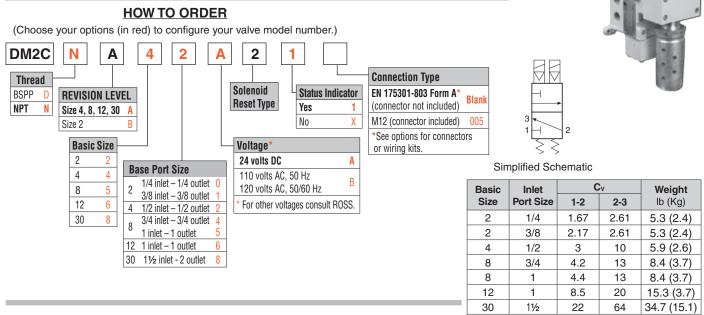
Status Indicator: Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the lockout or ready-to-run condition.

Silencers: All models include high flow, clog resistant silencers.

**Mounting:** Base mounted – with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included). Captive valve-to-base mounting screws.

#### Basic Size 12 and 30

Intermediate Pilots: Increases pilot air flow for fast valve response, making it possible to use the same size solenoids as valve sizes 2, 4 & 8, thereby reducing electrical power requirements for these larger valves.



F

**F**3

Explosion proof solenoid pilot available, for more information consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet.

Mounting Type: Base mounted.

**Pilot Solenoids:** According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Three solenoids, rated for continuous duty.

Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): Basic Size 2, 4, 12 & 30:

Primary and reset solenoids:

24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz.

5.8 watts nominal on AC and DC; 6.5 watts maximum on AC and DC. *Basic Size 8:* 

*Primary solenoids:* 15 watts on DC; 36 VA inrush and 24.6 VA holding on AC. *Reset solenoid:* 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC. **Enclosure Rating:** IP65, IEC 60529.

Electrical Connection: EN 175301-803 Form A, or M12.

Ambient Temperature: 15° to 122°F (-10° to 50°C).

Media Temperature:  $40^{\circ}$  to  $175^{\circ}F$  ( $4^{\circ}$  to  $80^{\circ}C$ ).

Flow Media: Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46).

# Valve and base assembly with status indicator.

Inlet Pressure: Basic Size 2: 45 to 150 psig (3.1 to 10.3 bar).

*Basic Size 4, 8, 12, 30:* 30 to 120 psig (2.1 to 8.3 bar). **Pressure Switch (Status Indicator) Rating:** Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC.

**Monitoring:** Dynamically, cyclically, internally during each actuating and de-actuating movement. Monitoring function has memory and requires an overt act to reset unit after lockout.

**Mounting Orientation:** Preferably horizontally (valve on top of base) or vertically with pilot solenoids on top.

**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400).

**Certifications**: CE Marked for applicable directives, DGUV Test, CSA/UL, TSSA for appropriately tested valves.

Vibration/Impact Resistance: Tested to BS EN 60068-2-27.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2<sup>®</sup> series D for mechanical power press applications.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## DM<sup>2®</sup> Series C Air Dump / Release

(Basic Size 2

DGUV CF

Certifications

pendina)

ISO 13849-1:2006

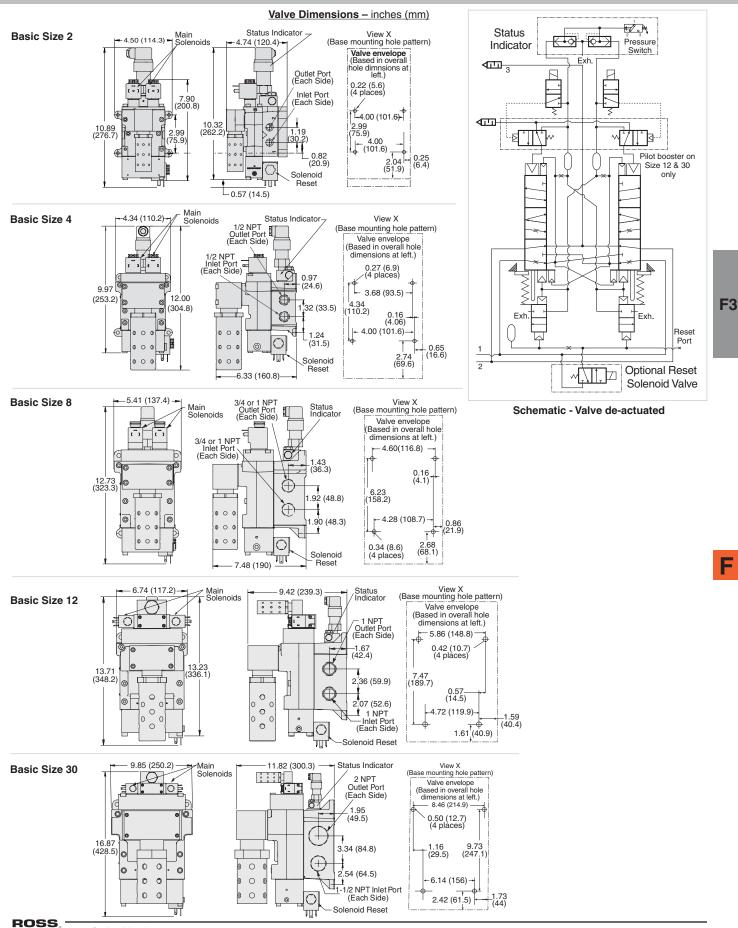
Category 4 PL e

applications



# Control Reliable Double Valves with Dynamic Monitoring & Memory

## DM<sup>2®</sup> Series C Valve Technical Data



## Control Reliable Double Valves with Dynamic Monitoring & Memory

DM<sup>2®</sup> Series C Valve Operation

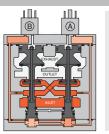
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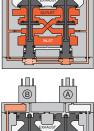
1

A

Valve de-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages is restricted by the size of the passage between the stem and the valve body opening. Flow is sufficient to quickly pressurize pilot supply/timing chambers A and B. The inlet poppets prevent air flow from crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the closed position. (Air passages shown out of position and reset adapter omitted for clarity.)

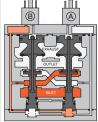


Valve actuated: Energizing the pilot valves simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated (open) position, where inlet air flow to crossover passages is fully open, inlet poppets are fully open and exhaust poppets are fully closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the pilots quickly causes the valve elements to return to the ready-to-run position.



Valve locked-out: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized.

The valve element (side B) that is partially actuated has pilot air available to fully actuate it, but no air pressure on the return piston to fully de-actuate the valve element. Air pressure in the crossover acts on the differential of side B stem diameters creating a latching force. Side A is in a fully closed position, and has no pilot air available to actuate, but has full pressure on the inlet poppet and return piston to hold the element in the fully closed position. Inlet air flow on side A into its crossover is restricted, and flows through the open inlet poppet on side B, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully closed position.



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**F**3

Resetting the valve: The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied. A remote reset signal must be applied to reset the valve. Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the main valve elements to their closed position. Inlet air fully pressurizes the crossovers and holds the inlet poppets on seat. Actuation of the reset piston opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset (Reset adapter added to illustration.). De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize. Reset pressure can be applied by a remote 3/2 normally

closed valve, or from an optional 3/2 normally closed solenoid, or a manual push

Flow

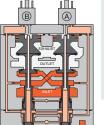
scfm

800 (378)

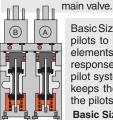
800 (378)

2080 (982)

7200 (3398)



Status Indicator: The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve is in the locked-out position or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the



Status indicator in normal ready-to-run position.

Basic Size 12 and 30 valves require relatively large pilots to actuate and de-actuate the main valve elements. In order to achieve extremely quick valve response for such large pilots, a 2-stage solenoid pilot system is incorporated into the design. This keeps the required electrical current to operate the pilots to a minimum.

Basic Size 12 & 30 pilots

Electrical	Electrical				Electrical Connector Model Number			
Electrical	Connector	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted C	connector	
Connectors	Form			Diameter	Light	24 Volts DC	120 Volts AC	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
	EN 175301-803 Form A	Connector Only	-	-	937K87	936K87-W	936K87-Z	
CAUTIONS: Do not	t use electrical connectors	with surge suppressors, as this ma	v increase valv	e response	e time when	de-actuating the	e solenoids.	

#### **Downstream Pressure Monitoring**

button mounted on the reset adapter.

Accessories & Options

Pressure Switches			
Connection Type	Model Number	Port Threads	ľ
EN 175301-803 Form A	586A86	1/8 NPT	
M12 1153A30 1/8 NPT			
*Pressure switch closes on falling pressure of 5 psig (0.34 bar).			

2329H77

2330H77

2331H77

2332H77

Kit Number\*

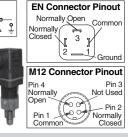
NPT threads BSPT threads

2324H77

2325H77

2326H77

2327H77



High-Flow, High Reduction Silencer Kits

B (NPT)

19.06 (484.1)

21.18 (538.0)

25.85 (656.6)

Dimensions inches (mm)

9.85 (250.2) 41.55 (1055.4) 41.55 (1055.4) 13.47 (342.1)

B (BSPT)

21.40 (543.6)

23.52 (597.4)

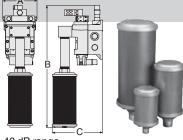
28.20 (716.3) 10.66 (270.8)

С

7.27 (184.7)

8.41 (213.6)

Redundant	Model Number	Port Threads	
Downstream Feedback Switch	RC26-13	3/8 NPT	
<ul> <li>May be installed dow</li> <li>Provides a redundan of downstream press</li> <li>Factory preset, 5 psi</li> </ul>	t means to verify th sure to next obstruc	ne release	
	H → A → H		



Kits include all plumbing required for installation. Pressure Range: 125 psig (8.6 bar) maximum. Designed to improve equipment performance and reduce the Exponentially Perceived Noise (EPNdB) in the 35-40 dB range.

Α

4.34 (110.2)

5.41 (137.4)

6.74 (117.2)

Online Version Rev. 11/14/16

#### closed valve, or from an optional 3/2 normally closed solenoid mounted on the reset adapter. De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize. Reset air pressure can be applied by a remote 3/2 normally

Port

Size

4

8

12

30

## Control Reliable Double Valves with Dynamic Monitoring & Memory

## Preassembled Wiring Kits

These kits include 1 cable for the status indicator, and 3 cables with connector plus a cord grip for each.

	Kit Number*		Length	
Connector	Lighted Connector		Solenoid Connector Type	meters
without Light	24 Volts DC	120 Volts AC	туре	(feet)
2283H77	2532H77-W	2532H77-Z	EN 175301-803 Form A	5 (16.4)
2284H77	2533H77-W	2533H77-Z	EN 175301-803 Form A	10 (32.8)
2288H77**	_	_	M12	5 (16.4)
2289H77**	-	_	M12	10 (32.8)
* Each cable h	as one conne	etor **Coil incl	udes light	

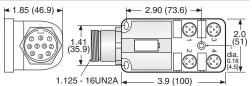
Each cable has one connector. Coll includes light

## Wiring Kits with J-Box

Kit Number*	Connector Types	Length meters (feet)		
2249H77	M12 - DIN	1 (3.3)		
2250H77 M12 - M12		1 (3.3)		
*24 volts DC only.				

A J-Box is a junction box with a 10-pin MINI connector for connecting to the user's control system and (4) 5-pin M12 ports for connecting to the 3 solenoids and the status indicator on the DM2® Series valve. The J-Box kits include the J-Box as described above and (4) 1-meter cables for connecting to the valve. These cables have a connector on each end. The status indicator cable and the (3) solenoid cables have an M12 connector on one end and a EN connector on the other end (M12-DIN).

Standard valves come with DIN type solenoid connections, but could be bought with M12 type connections as well. Therefore we also offer a kit that provides solenoid cables with an M12 connector on each end (M12-M12).



### **10 PIN MINI Cable**

Kit Number	Length meters (feet)
2253H77	3.66 (12)
2254H77	6.1 (20)
2255H77	9.1 (30)
2256H77	15.2 (50)

#### These cables have a 10-pin MINI connector for connecting the J-Box kits above to the user's control system. Kits include one cable with connector and cord grip. Cable conductors are 18-gauge wire.

ΡI	N #	PI	N #
1	+24 volts DC	6	-
2	Common volts DC	7	Re
3	-	8	-
4	Solenoid A	9	Re
5	Solenoid B	10	R

-Ø0.6

(10)

0.4

M12x1 Ò

Female



(40) 1.6

M12x1

Male

Orange Blue White w/Black Red w/Black emote System OK Light Green w/Black

10 Pin

Pin #

3 0-4 0-

5 0

6 0-

7 0-

8 0-

90

10 0-

7

5

8 1

a <sup>3</sup>

6 9 10 2

(V+) 1 아

(V-) 2 O-

Wire Colors: Wire Colors Orange w/Black Red Green/Yellow Black White



## **Outlet Port Pressure Monitoring Wiring Kit**

Kit Number	Length meters (feet)	
2251H77	1 (3.3)	

Some customers prefer to monitor downstream pressure in addition to using the DM<sup>2®</sup> or DM<sup>1</sup> Series valve. A convenient way to do this is to install a pressure switch in the extra outlet port that is provided on the valve. The Outlet Port Pressure Monitoring kit can be

used with one of the J-Box kits above to split one of the M12 ports on the J-Box so that a pressure switch can be wired in as well. These kits consist of one port splitter (a Tee with three M12 connectors) and one M12-DIN cable (1 meter).

FEMALE FEMALE PORT SPI ITTER A 10 В 01 2 G 0 2 3 30 4 04 5 -○ 5 Ч ç Ч 5 4 3 2 1 MALE

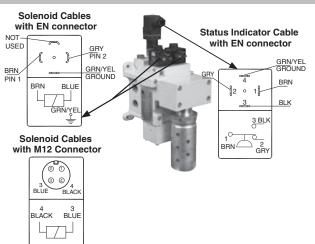
Pressure switch available separately, see valve options.



Online Version Rev. 11/14/16

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

# DM<sup>2®</sup> Series C **Preassembled Wiring Kits**



Port 1

Pin #

<u>.</u>3

-0 2

-04

30 5 04

20 01 20

Port 2

\_\_\_3

-04

-0 2

(3° 5

J-Box Wiring

01

Pin #

Port 3

<u>3</u>

02

-04

30 5 04

20 01

Pin #

Port 4

3

02

-04

(3° 5 ° 4

20 01

Pin # .<sub>0</sub>1

# Control Reliable Modular Double Valves with Integrated Soft Start

## M DM<sup>2®</sup> Series C Air Dump / Release

#### **Double Valves with Dynamic Monitoring & Memory**

**Dynamic Monitoring With Memory:** Memory, monitoring, and air flow control functions are integrated into two identical valve elements. Valves lock-out if asynchronous movement of valve elements occurs during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply.

An Action is Required for Reset: Cannot be reset by removing and re-applying supply pressure. Reset can be accomplished by the integrated electrical (solenoid) reset or by the manual reset button.

**Basic 3/2 Normally Closed Valve Function:** Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance – operates with or without inline lubrication.

**LED Indication:** Light-emitting diode (LED) indicators of main solenoid operation, reset solenoid operation, and status indicator condition.

**Status Indicator:** Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the lockout or ready-to-run condition.

Transducer (optional): For monitoring of downstream pressure in the system.

Silencers: All models include high flow, clog resistant silencers.

	Inlet         Outlet           3/4         3/4         8	Transducer	Valve Model Number*	С	v	Weight		
	Inlet	Outlet	Dasic Size	Transducer	valve model number	1 to 2	2 to 3	lb (Kg)
	3/4	3/4	8	With	MDM2CNA55A23	3.7	8.5	16.3 (7.4)
5	3/4	3/4	8	Without	MDM2CNA55A21	3.7	8.5	16.1 (7.3)

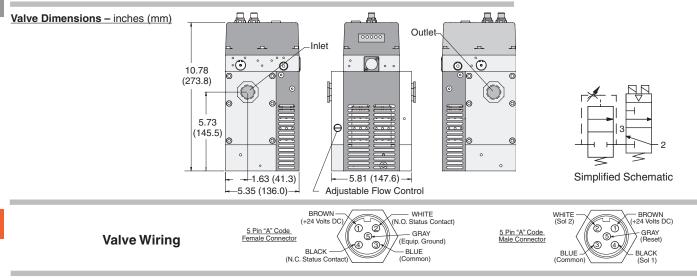
\* NPT port threads. For BSPP threads , replace "N" in the model number with a "D", e.g., MDM2CDA55A23.





ISO 13849-1:2006 Category 4 PL e applications

U.S. Patent No. 6840258, 6840259 (Worldwide Patents Pending)



#### Mounting brackets are required to install valve in the system, see M DM<sup>20</sup> Series C accessories for ordering information page F3.18.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Dual Poppet. Mounting Type: Base mounted. Pilot Solenoids: According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Three solenoids, rated for continuous duty. Standard Voltages: 24 volts DC. Pilot Solenoids Power Consumption (each solenoid): Primary and reset solenoids: 1.2 watts on DC. Enclosure Rating: IP65, IEC 60529. Solenoid & Status Indicator Connection: M12, 5-pin Male Receptacle, A-Coded. Ambient Temperature: 15° to 122°F (-10° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46); 5-micron recommended. **Inlet Pressure:** 30 to 150 psig (2 to 10 bar). Under certain circumstances, such as maximum restriction of the adjustable flow control or a very large downstream system volume, the minimum inlet pressure may need to be set up to 60 psig (4 bar) to prevent nuisance valve faults.

**Pressure Switch (Status Indicator) Rating:** 5 amps at 30 volts DC. **Monitoring:** Dynamically, cyclically, internally during each actuating and de-actuating movement. Monitoring function has memory and requires an overt act to reset unit after lockout.

Mounting Orientation: Vertically with pilot solenoids on top.

**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). **Certifications:** CE Marked for applicable directives, CSA/UL. **Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2<sup>®</sup> series D for mechanical power press applications.

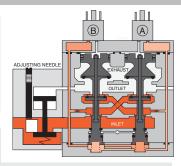
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

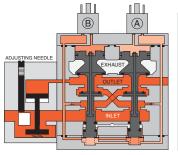


# Control Reliable Modular Double Valves with Integrated Soft Start

## M DM<sup>2®</sup> Series C Valve Operation

Valve de-actuated (ready-to-run): The flow of inlet air pressure to the inlet chamber of the main valve internals is restricted by a fixed orifice and an adjustable flow control as well as an air piloted 2-way normally closed poppet valve. The flow of inlet air pressure into the crossover passages is restricted by the size of the passage between the stem and the valve body opening. Flow is sufficient to quickly pressurize pilot supply/timing chambers A and B. The inlet poppets prevent air flow from crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the closed position. (Reset adapter omitted for clarity.)





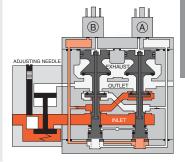
**Valve actuated:** Energizing the pilot valves simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated (open) position, where inlet air flow to crossover passages is

fully open, inlet poppets are fully open and exhaust poppets are fully closed. The outlet is then pressurized at a rate allowed by the fixed orifice and the adjusted flow control. Once the air pressure in the outlet chamber reaches approximately 60% of inlet pressure, the air piloted 2-way normally closed poppet valve opens fully and the pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. The adjustable flow control will control the time it takes for the outlet air pressure to reach approximately 60% of inlet pressure. Green "SOL. 1" and SOL. 2" LEDs will be displayed when the main solenoids are energized.

De-energizing the pilots quickly causes the valve elements to return to the ready-to-run position.

Valve locked-out: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized. The valve element (side B) that is partially actuated has pilot air available to fully actuate it, but no air pressure on the return piston to fully de-actuate the valve element.

Air pressure in the crossover acts on the differential of side B stem diameters creating a latching force. Side A is in a fully closed position, and has no pilot air available to actuate, but has full pressure on the inlet poppet and return piston to hold the element in the fully closed position. Inlet air flow on side A into its crossover is restricted, and flows through the open inlet poppet on side B, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully closed position.



**Resetting the valve:** The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied.

A remote reset signal must be applied to reset the valve. A momentary, remote electrical signal must be applied to the reset solenoid to apply pressure to the reset pistons in the valve. Actuation of the reset piston physically pushes the main valve elements to their closed position.

Inlet air fully pressurizes the crossovers and holds the inlet poppets on seat. Actuation of the reset piston opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset (Reset adapter added to illustration.). De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize. Reset air pressure is applied by a 3/2 normally closed solenoid, or a manual push button mounted on the reset adapter in the top valve cover. A green "RESET SOL." LED will be displayed when the reset solenoid is energized.

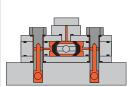
#### The reset procedure is as follows:

- Remove the electrical signals to the main coils
- Ensure there is air supplied to the valve
- Energize the reset solenoid for a minimum of 200 ms

 Allow a 200 ms delay after de-energizing the reset solenoid and re-energizing the main solenoids

#### **Status Indicator:**

The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve is in the locked-out position or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve. If the valve is in a ready-to-run condition, a green "STATUS" LED will be displayed. If the valve is faulted or there is no air pressure at the inlet, a red "STATUS" LED will be displayed.

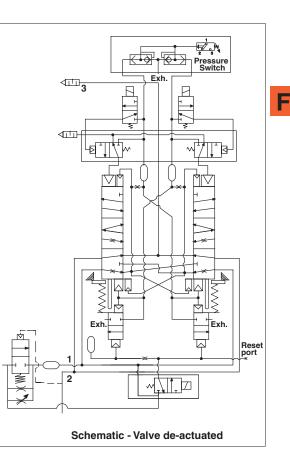


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(A)

B

Status indicator in normal ready-to-run position



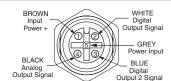
# Control Reliable Modular Double Valves with Integrated Soft Start

## Digital Pressure Transducer

## Model Number

2447H77

Wiring K



- Precision digital pressure transducer with 5 pin female connection
- Two PNP digital outputs which may be set individually, 4-20 mA analog output
- Three operation modes: Easy, Window and Hysteresis
- · Selectable response times to eliminate output chattering
- Powered by 12-24 vots DC
- 6 pressure unit conversions
- Lockable keypad
- Fast zero reset

(its	Kit Number	Length
	2431H77	Wiring Kit - 5 meters (16.4 feet). Includes two cords, and the cord grips.
	2432H77	Wiring Kit with Transducer - 5 meters (16.4 feet). Includes three cords, and the cord grips.

## **Mounting Accessories**

At least two mounting brackets should be used.

This can consist of two clamp mounting brackets or one clamp mounting bracket and one mounting bracket Kit Number 2433H77.

## Clamp for Module Connections

Specially designed clamps provide a quick and easy assembly or disassembly of MD3<sup>™</sup> modules. Two allen-head bolts quickly tighten or loosen the clamp using a 5/32 or 4mm hex key. The clamp contains a plate carrying two O-rings to provide positive sealing between modules.

Order clamp by part number R-A118-105.

Combined clamp and bracket (below) can be ordered by part number **R-A118-105M**.

## **Mounting Brackets**

Two brackets are normally used to mount an FRL to a vertical surface. The mounting bracket attaches to the module connecting clamp (see above) with a single screw. Each bracket then employs two bolts (1/4" or 6mm) to connect the assembly to the mounting surface.

Order bracket and screw by part number **R-A118-103**. Combined bracket and clamp (above) can be ordered by part number **R-A118-105M**.



## Male and Female End Ports

Either male or female end ports can be attached to threaded inlet and outlet lines. This allows all modules of an FRL assembly to be removed easily and quickly without having to unthread the end modules. The end ports are attached to the modules with clamps (see at left). End ports can be included in an assembled FRL or ordered separately by the following part numbers:

Port Size	Male Part Number*		Port Size	Female Part Number*	S. 1
1/4	R-118-109-2F		1/4	R-118-100-2	A COLOR
3/8	R-118-109-3F		3/8	R-118-100-3	
1/2	R-118-109-4F	Diaments of	1/2	R-118-100-4	-v
3/4	R-118-109-6F		3/4	R-118-100-6	-

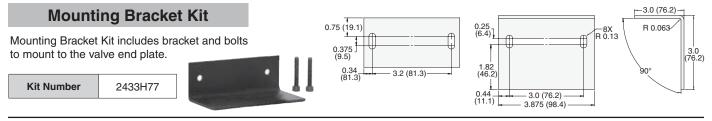
\* For BSPP threads, add a "W" suffix to the model number, e.g., R-118-109-2FW.

## **Extra Port Blocks**

An extra port block can be placed between modules to provide two auxiliary 1/4 NPTF ports. Its mounting position can be rotated to obtain the most convenient operating orientation. If only one auxiliary port is to be used, the unused port must be closed with a pipe plug. (The inlet and outlet are not threaded.)

Port Size	Part Number*	
1/4	R-118-106-2	
3/8	R-118-106-3	
1/2	R-118-106-4	
* For BSPP th	ureads add a "₩" su	ffix to the model number

e.g., R-118-106-2W.



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

F



**RC Series** 

#### DM<sup>1</sup> Series E Double Valves, Manual Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulator

Pre-engineered panel-mounted design with air entry via a filter and regulator "FR", or filter, regulator and lubricator "FRL".

Includes DM<sup>1</sup> Series E Double Valve with Monitoring:

a) Self-contained dynamic monitoring system requires no further valve monitoring controls,

b) Ready-to-run: If an abnormality clears itself upon the removal of electricity to both solenoids, it will be ready-to-run again. It does not remember the abnormality & stay in a locked-out state until intentionally reset. Therefore, cumulative abnormalities may go undetected,

c) Status indicator switch for valve condition (ready-to-run) feedback.

#### Mounting plate included.

Air Entry Combination	Port	Size	Model Number*	Air Entry	c	2v	Dimensions inches (mm)				
All Endy combination	1, 2	3	model Humber	Туре	1-2	2-3	Length	Width	Depth		
Cat-4 with DM1 Series E	1/4	1/2	RC304-09**	FR	1.3	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)		
Cat-4 with DM1 Series E	3/8	1/2	RC306-09**	FR	2.2	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)		
Cat-4 with DM1 Series E	1/4	1/2	RC304L-09**	FRL	1.3	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)		
Cat-4 with DM1 Series E	3/8	1/2	RC306L-09**	FRL	2.2	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)		

\* NPT pressure port threads.

\*\* Specify voltage when ordering. Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., RC304-09W. M12 connectors available, consult ROSS.

Standard Air Entry Packages supplied with metal bowl and manual drain. For automatic drain insert an "A" before the dash (-) in the model number, e.g., RC304A-09.

#### Custom designs available, consult ROSS.

#### DM<sup>2®</sup> Series E Double Valves, Manual Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulator

Pre-engineered panel-mounted design with air entry via a filter and regulator "FR", or filter, regulator and lubricator "FRL".

Includes DM<sup>2®</sup> Series E Double Valve with Monitoring & Memory:

a) Self-contained dynamic monitoring system requires no further valve monitoring controls,

b) Dynamic memory of abnormal function prevents unintentional reset with removal of air or electricity.
 All necessary features for safety applications are included:

All fields and the set of salety applica

a) Electrical reset valve,

b) Status indicator switch for valve condition (ready-to-run) feedback.

Mounting plate included.

Air Entry	Port	Size	Model	Air Entry	C	v	Dimensions inches (mm)						
Combination	1, 2	3	Number*	Туре	1-2	2-3	Length	Width	Depth				
Cat-4 with DM2® Series E	1/4	1/2	RC404-09**	FR	1.3	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)				
Cat-4 with DM2® Series E	3/8	1/2	RC406-09**	FR	2.2	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)				
Cat-4 with DM2® Series E	1/4	1/2	RC404L-09**	FRL	1.3	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)				
Cat-4 with DM2® Series E	3/8	1/2	RC406L-09**	FRL	2.2	2.4	13.00 (330.0)	11.00 (279.0)	5.40 (134.7)				

\* NPT pressure port threads.

\*\* Specify voltage when ordering. Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., RC404-09W. M12 connectors available, consult ROSS.

Standard Air Entry Packages supplied with metal bowl and manual drain. For automatic drain insert an "A" before the dash (-) in the model number, e.g., RC404A-09.

#### Custom designs available, consult ROSS.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Online Version Rev. 11/14/16





## **RC Series**

## DM<sup>2®</sup> Series C Double Valves, Manual Lockout L-O-X<sup>®</sup> Valves with Filter and Regulator

Pre-engineered panel-mounted design with air entry via a filter and regulator "FR", or filter, regulator and lubricator "FRL"

Includes DM<sup>2®</sup> Series C Double Valve with Monitoring & Memory:

a) Self-contained dynamic monitoring system requires no further valve monitoring controls,

b) Dynamic memory of abnormal function prevents unintentional reset with removal of air or electricity

All necessary features for safety applications are included:

a) Electrical reset valve,

b) Status indicator switch for valve condition (ready to run) feedback

Air Entry	Port	Size	Model	Air Entry	C	¢v	Dimensions inches (mm)			
Combination	1, 2	3	Number*	Туре	1-2	2-3	Length	Width Depth		
Cat-4 with DM2® Series C	1/2	1/2	RC408-06**	FR	3	10	24.0 (610)	14.5 (369)	7.4 (187)	
Cat-4 with DM2® Series C	1/2	1/2	RC408L-06**	FRL	4.4	13	24.0 (610)	15.7 (399)	8.3 (211)	
Cat-4 with DM2® Series C	3/4	3/4	RC412-06**	FR	4.4	13	27.0 (686)	19.0 (483)	9.0 (229)	
Cat-4 with DM2® Series C	3/4	3/4	RC412L-06**	FR	3	10	24.0 (610)	14.5 (369)	7.4 (187)	
Cat-4 with DM2® Series C	1	1	RC416-06**	FRL	4.4	13	24.0 (610)	15.7 (399)	8.3 (211)	
Cat-4 with DM2® Series C	1	1	RC416L-06**	FRL	4.4	13	31.0 (788)	19.0 (483)	9.0 (229)	

**F3** 

\* NPT pressure port threads.

\*\* Specify voltage when ordering. Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., RC408-06W. M12 connectors available, consult ROSS.

Standard Air Entry Packages supplied with metal bowl and manual drain. For automatic drain insert an "A" before the dash (-) in the model number, e.g., RC408A-06.

*Custom designs available, consult ROSS. Explosion proof solenoid pilot available, for more information consult ROSS.* 

# M DM<sup>2®</sup> Series C Double Valves with Integrated Soft Start, Manual Lockout L-O-X<sup>®</sup> Valves with Integrated Filter/Regulators



Pre-engineered panel mountable design with air entry via a filter and regulator "FR", or filter, regulator and lubricator "FRL"

Includes M DM<sup>2®</sup> Series C Double Valve with Monitoring & Memory:

a) Self-contained dynamic monitoring system requires no further valve monitoring controls,

b) Dynamic memory of abnormal function prevents unintentional reset with removal of air or electricity

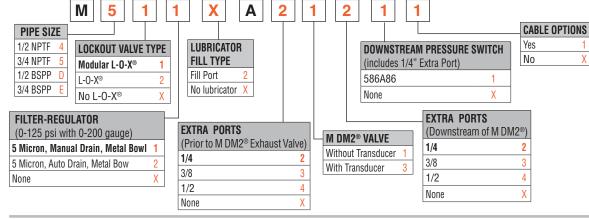
All necessary features for safety applications are included:

a) Electrical reset valve,

b) Status indicator switch for valve condition (ready to run) feedback

## HOW TO ORDER

(Choose your options (in red) to configure your valve assembly model number.)



Custom designs available, consult ROSS.

NOTE: Per specifications and regulations, these products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



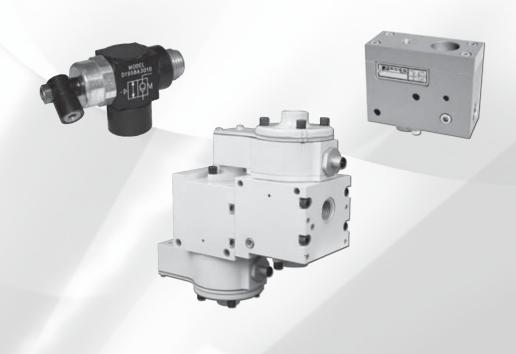






# ROSS CONTROLS®

# PILOT OPERATED CHECK VALVES 19, 27 AND SV27 SERIES



#### PILOT OPERATED CHECK VALVES RIGHT ANGLE – KEY FEATURES

- Right angle design for easy positioning of pipe or tubing
- Threaded outlet ports available with NPT or G threads
- Inlet ports available with NPTF threaded or push-to-connect fittings
- Quick and easy installation
- Galvanized zinc plated brass body construction
- Lube or non-lube operation

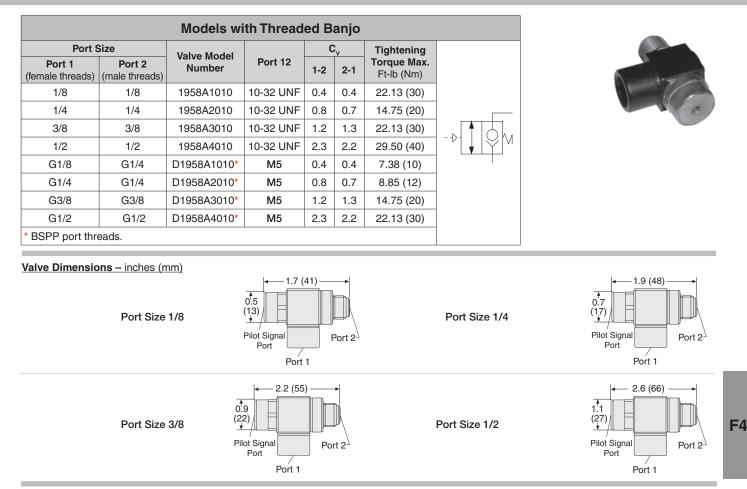
#### PILOT OPERATED CHECK VALVES - KEY FEATURES

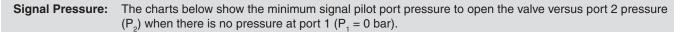
- Available with automatic or manual trapped pressure release when pressure is removed from the Blowdown Signal Port (BP)
- Poppet construction for near zero leakage
- Applications include Air Holding and Cylinder Load Holding

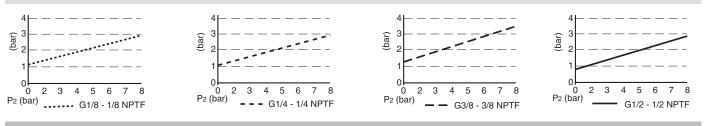
		~	0	PER	ATIO	N		AV	AILA	BLE	POR	T SIZ	ES				MA	X. FL	.ow (0	Cv)			Integrated	
	VALVE SERIES	Category	ilot	noid	е													Port	Size				Trapped Pressure	Page
F		ပိ	Air Pilot	Solenoid	Single	Dual	1/8	1/4	3/8	1/2	3/4	1	11/4	<b>1</b> ½	1/8	1/4	3/8	1/2	3/4	1	1¼	<b>1</b> ½	Relief	
	19	1													0.4	0.8	1.2						Optional	F4.4
	27	1														2.2	2.9	3.2						F4.5
	27	1													2.3	3.8	4	7.7	9	24	29	29		F4.6
	27	1														2.2	2.9	3.2					Remote	F4.7
	27	1															2.6	2.8	9.2				Remote	F4.7
	27	1															2.6	2.8	9.2				Manual	F4.8
	27	1															2.9	3.2	8.5	8.5				F4.9
	27	1															2.9	3.2	8.5	8.5			Remote	F4.10
	27	1															2.9	3.2	8.5	8.5			Manual	F4.11
	27	1															2.9	3.2	8.5	8.5			Solenoid	F4.12
	SV27	2															4.5	8.3	20	29	33			F4.13
	SV27	3															4.5	8.3	20	29	33			F4.14
	SV27	2															4.5	8.3	20	29	33			F4.15
	SV27	3															4.5	8.3	20	29	33			F4.16



## Pilot Operated Check Valves Right Angle







## Accessories & Options

		Manual Trappe	d Pressure Rel	ief Adapter	
Manual	Port 1	Port 2	Port Threads	Model Number*	
Manual	5/32	10-32 Manual Operated Check	NPT	1998A1015	The
Override	M5	M5 Manual Operated Check	BSPP	D1998A1010	O
	* Adapte				



Valve Illustrated with Optional Manual Trapped Pressure Relief Adapter

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 15° to 16 Flow Media: Filtered air. Operating Pressure: 15 to 150 psig (1 to 10 bar).

Ambient/Media Temperature: 15° to 160°F (-10° to 70°C).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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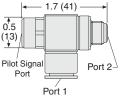
## **Pilot Operated Check Valves Right Angle**

	I	Models with F	Push-to-Co	onne	ct Fi	ting	
Port	Size	Valve Model		Cv		Tightening	
Port 1 <sup>#</sup> (tube fittings)	Port 2 (male threads)	Number Port 12		1-2	2-1	<b>Torque Max.</b> Ft-lb (Nm)	
5/32"	1/8	1958A1115	10-32 UNF	0.4	0.4	11.06 (15)	
1/4"	1/8	1958A1120	10-32 UNF	0.4	0.4	11.06 (15)	
1/4"	1/4	1958A2120	10-32 UNF	0.8	0.7	14.75 (20)	
3/8"	1/4	1958A2130	10-32 UNF	0.8	0.7	14.75 (20)	
3/8"	3/8	1958A3130	10-32 UNF	1.2	1.3	22.13 (30)	
4 mm	G1/8	D1958A1140*	M5	0.4	0.4	7.38 (10)	
6 mm	G1/8	D1958A1160*	M5	0.4	0.4	7.38 (10)	
8 mm	G1/8	D1958A1180*	M5	0.4	0.4	7.38 (10)	
6 mm	G1/4	D1958A2160*	M5	0.8	0.7	8.85 (12	
8 mm	G1/4	D1958A2180*	M5	0.8	0.7	8.85 (12)	
10 mm	G1/4	D1958A2110*	M5	0.8	0.7	8.85 (12)	
8 mm	G3/8	D1958A3180*	M5	1.2	1.3	14.75 (20)	
10 mm	G3/8	D1958A3110*	M5	1.2	1.3	14.75 (20	
# Port 1 tubing * BSPP port th		(") or millimeters	(mm).				

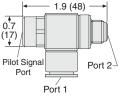


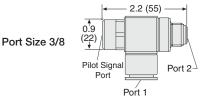
Valve Dimensions - inches (mm)



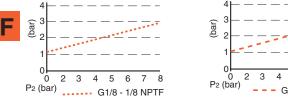


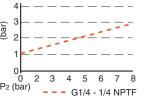


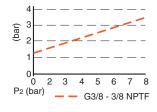


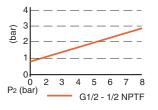


The charts below show the minimum signal pilot port pressure to open the valve versus port 2 pressure Signal Pressure:  $(P_2)$  when there is no pressure at port 1  $(P_1 = 0 \text{ bar})$ .









## **OPTIONS**

Manual Override		Manual Trappe	d Pressure Rel	ief Adapter		and and	
	Port 1 Port 2 Po		Port Threads	Model Number*		जा।	
	5/32	10-32 Manual Operated Check	NPT	1998A1015	STG.	and the	
	M5	M5 Manual Operated Check	BSPP D1998A1010		(a) con		
	* Adapte	er threads into the signal port.		Valve Illustrated with			
	I					Ontional Manual Tranned	

lional Manual Trapped Pressure Relief Adapter

### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 15° to 160°F (-10° to 70°C). Flow Media: Filtered air. Operating Pressure: 15 to 150 psig (1 to 10.3 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

F4.4

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## Pilot Operated Check Valves Single, without Trapped Pressure Relief

## 27 Series Load Holding

2-Way 2-Position, Pressure Controlled								
Ports Size	Valve Model Number*	Signal Port	Cv	Weight Ib (kg)				
1/4	2751A2908	1/8-27 NPT	2.2	2.3 (1.0)				
3/8	2751A3908	1/8-27 NPT	2.9	2.3 (1.0)				
1/2	2751A4915	1/8-27 NPT	3.2	2.3 (1.0)				
	1/4 3/8	Ports Size         Valve Model Number*           1/4         2751A2908           3/8         2751A3908	Ports Size         Valve Model Number*         Signal Port           1/4         2751A2908         1/8-27 NPT           3/8         2751A3908         1/8-27 NPT	Ports Size         Valve Model Number*         Signal Port         C <sub>v</sub> 1/4         2751A2908         1/8-27 NPT         2.2           3/8         2751A3908         1/8-27 NPT         2.9				

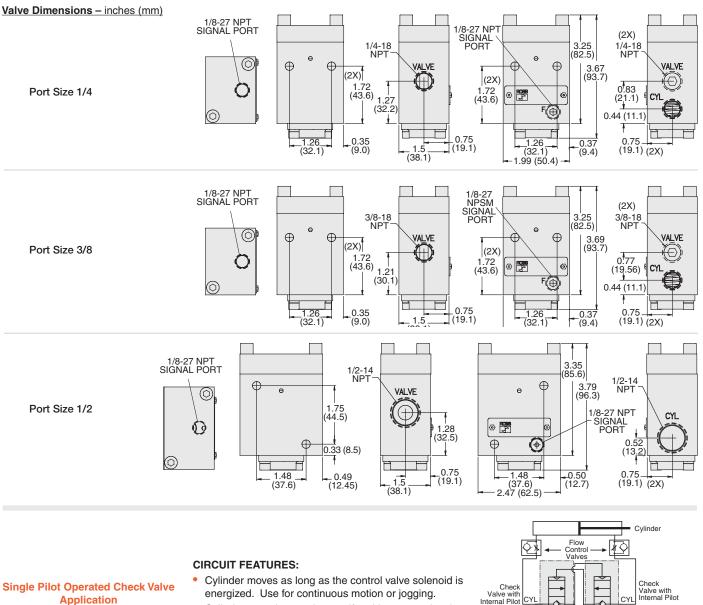




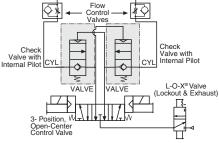
**F4** 

F

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D2751A2908.



energized. Use for continuous motion or jogging.
 Cylinder remains stationary if neither control valve solenoid is energized, or if electrical signal is lost.



#### STANDARD SPECIFICATIONS (for valves on this page):

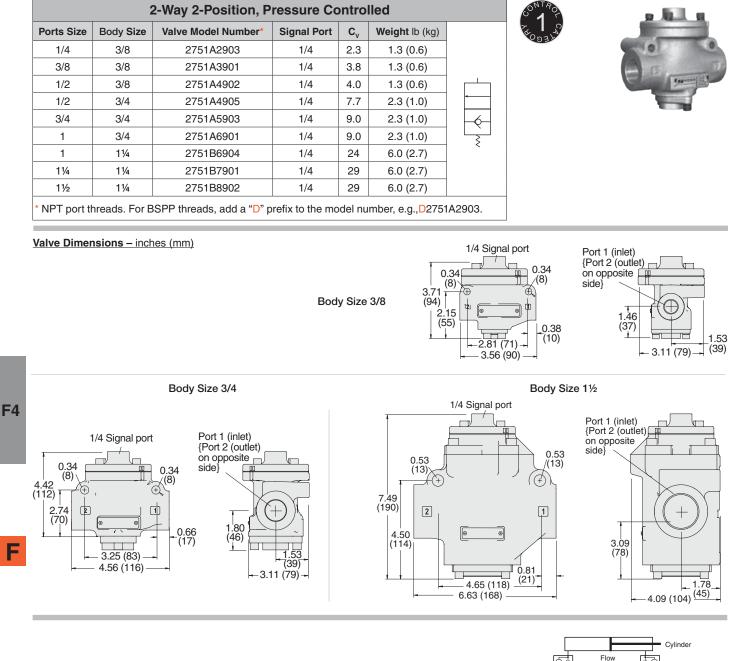
Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Inlet Pressure: 15 to 150 psig (1 to 10.3 bar). Flow Media: Filtered air. Signal Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

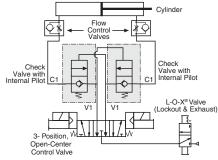
Online Version Rev. 11/14/16

## **Pilot Operated Check Valves** Single, without Trapped Pressure Relief



**CIRCUIT FEATURES:** 

- **Single Pilot Operated Check Valve Application**
- Cylinder moves as long as the control valve solenoid is energized. Use for continuous motion or jogging.
- Cylinder remains stationary if neither control valve solenoid is energized, or if electrical signal is lost.



#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C). Inlet Pressure: 15 to 150 psig (1 to 10.3 bar). Flow Media: Filtered air. Signal Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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**Online Version** Rev. 11/14/16



## **Pilot Operated Check Valves** Single, with Remote Trapped Pressure Relief

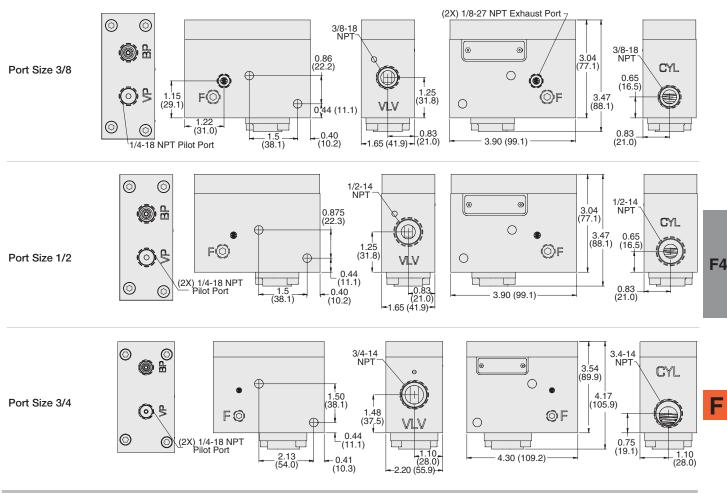
## 27 Series Load Holding

	2-Way 2-Position, Pressure Controlled								
Ports Size	Valve Model Number*	Signal Port	Cv	Weight Ib (kg)					
3/8	2751A3922	1/8-27 NPT	2.6	1.8 (0.8)	VLV CYL				
1/2	2751A4922	1/8-27 NPT	2.8	1.8 (0.8)					
3/4	2751A5917	1/8-27 NPT	9.2	2.9 (3.1)					
* NPT port t	breads For BSPP thread	ls add a "D" nr	ofix to th	ne model numbe	r e a D2751A3922				



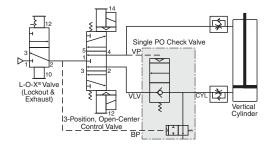
T port threads. For BSPP threads, add a "D" prefix to the model number, e.g.,D2751A392

#### Valve Dimensions - inches (mm)



#### **CIRCUIT FEATURES:**

- Trapped pressure between check valve and cylinder is exhausted when the air supply at the Blowdown Signal Port (BP) is lost or locked-out.
- Cylinder moves as long as the control valve solenoid is energized. Use for continuous motion or jogging.
- · Cylinder remains stationary if neither control valve solenoid is energized, or if electrical signal is lost.



Construction: Poppet. Mounting Type: In-Line.

Inlet Pressure: 15 to 150 psig (1 to 10.3 bar). Flow Media: Filtered air. Signal Pressure: Must be equal to or greater than inlet pressure.

Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**Online Version** Rev. 11/14/16

Single Pilot Operated Check Valve

with Trapped Pressure Relief

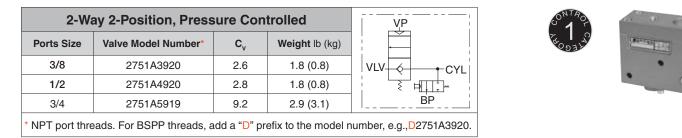
Application

STANDARD SPECIFICATIONS (for valves on this page):

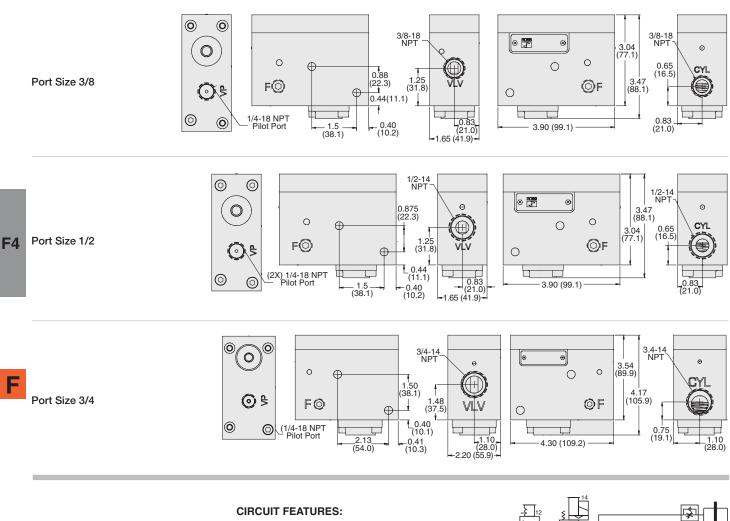
F4.7

## Pilot Operated Check Valves Single, with Manual Trapped Pressure Relief

## 27 Series Load Holding

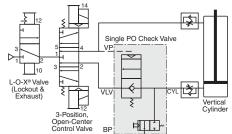


#### Valve Dimensions - inches (mm)



 Trapped pressure between check valve and cylinder is exhausted when the manual relief button is pressed.

- Cylinder moves as long as the control valve solenoid is energized. Use for continuous motion or jogging.
- Cylinder remains stationary if neither control valve solenoid is energized, or if electrical signal is lost.



STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Ambient/Media Temperature: 40° to 175°F (4° to 80°C).

**Single Pilot Operated Check Valve** 

with Manual Trapped Pressure Relief

**Application** 

Inlet Pressure: 15 to 150 psig (1 to 10.3 bar). Flow Media: Filtered air. Signal Pressure: Must be equal to or greater than inlet pressure.

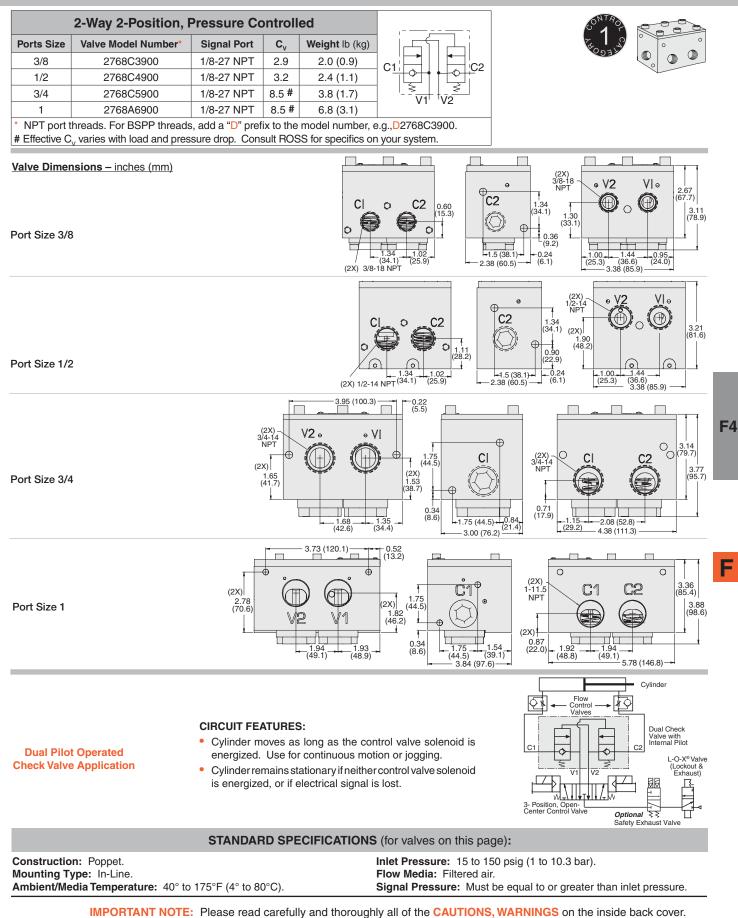
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Online Version Rev. 11/14/16



## **Pilot Operated Check Valves** Dual, without Trapped Pressure Relief

## 27 Series Load Holding

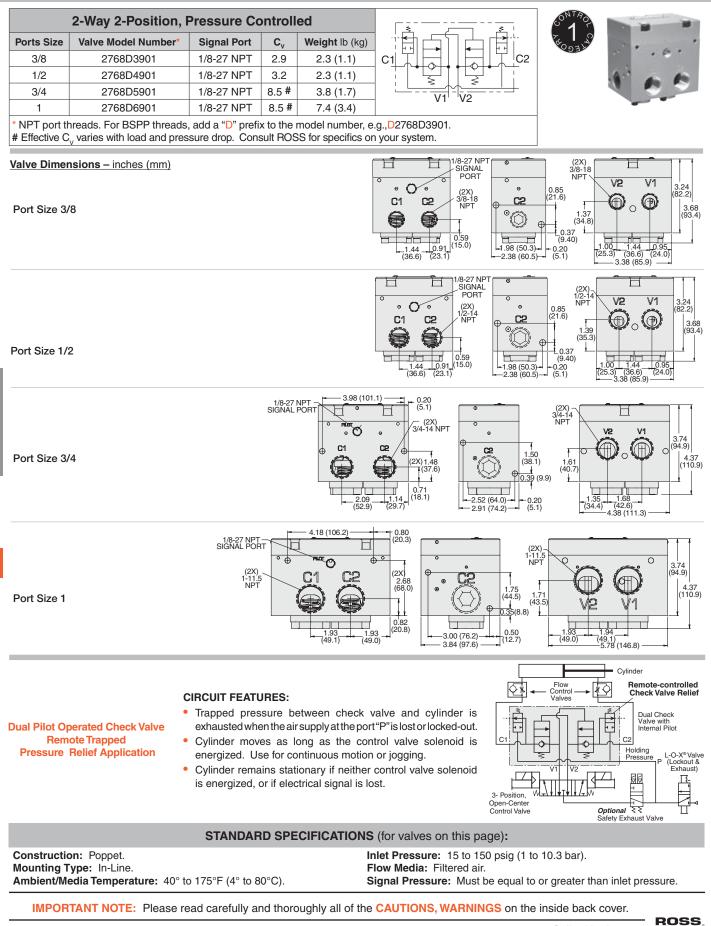


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Online Version Rev. 11/14/16

## **Pilot Operated Check Valves** Dual, with Remote Trapped Pressure Relief

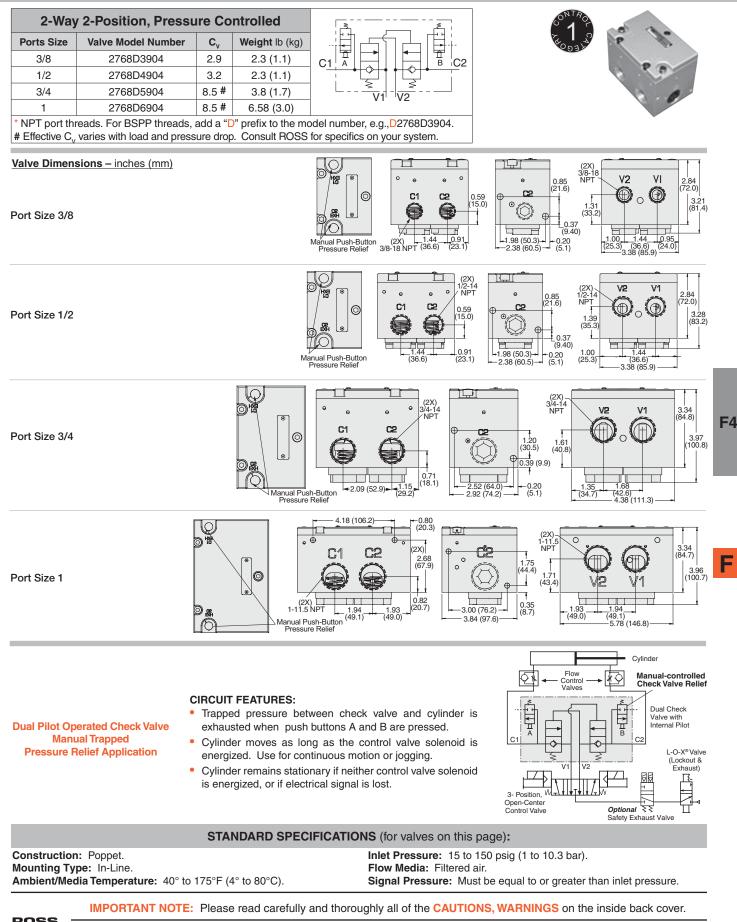
## 27 Series Load Holding



**F4** 

## **Pilot Operated Check Valves** Dual, with Manual Trapped Pressure Relief

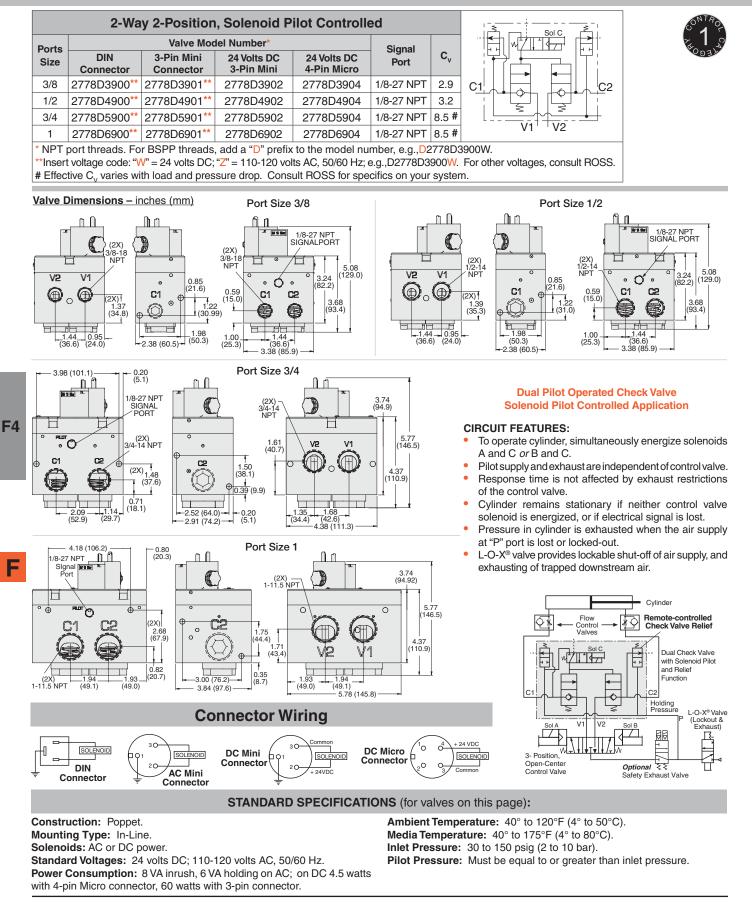
## 27 Series Load Holding



Online Version Rev. 11/14/16

## Pilot Operated Check Valves Dual Solenoid Controlled, with Remote Trapped Pressure Relief

## 27 Series Load Holding



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

ROSS

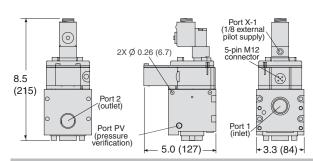
## **Pilot Operated Check Sensing Valves**

	2-Way 2-Position Valves, Solenoid Pilot Controlled									
Port Size	De du Cine	Valve Model Number*	Cv	Weight						
1, 2	Body Size	valve model Number"	1-2	lb (kg)						
1/2	3/4	SV27NC115408CSAA**	4.5	5.0 (2.3)	1/8" EPS-					
3/4	3/4	SV27NC115508CSAA**	8.3	5.0 (2.3)	1/8" PV					
1	3/4	SV27NC115608CSAA**	10.3	5.0 (2.3)	c v					
1	1¼	SV27NC117608CSAA**	20	12.5 (5.6)						
1¼	1¼	SV27NC117708CSAA**	29	12.5 (5.6)						
1½	1¼	SV27NC117808CSAA**	33	12.5 (5.6)	ΘČ					
* NPT port t	hreads. For BSPI	ວ threads, replace "N" in the model ກເ	umber with a "[	)", e.g., SV27	DC115408CSAA1A.					

\*\* Insert voltage code: "1A"=110-120 volts AC, 50/60 Hz; "1D"= 24 volts DC; .e.g., SV27NC115408CSAA1A. For other voltages, consult ROSS.

#### Valve Dimensions - inches (mm)





### Accessories & Options

Drocouro	Connection Type	Model Number*	Port Threads	EN Connector Pinout	M12 Connector Pinout			or Light Kit er Style Pilot
Pressure Switches	EN 175301-803 Form A	586A86	1/8 NPT	Normally Open Common	Pin 4 Pin 3 Normally Not Used			Number
<b>1D</b> 111	M12	1153A30			Pin 1 Pin 2 Normally		24 volts DC	110-120 volts AC
*Pressure switch o	loses on falling press	ure of 5 psig	(0.34 bar).	Ground	Common Closed	÷ ∎		50-60 Hz

11.8

(299)

## **Preassembled Wiring Kits**

Kit Number*	Length meters (feet)	Number of Cables		BRN BLUE PIN 3 PIN 2	PIN 2	
2239H77	4 (13.1)	2		( GBN/YEL	BLUE (O O O BRN BLK PIN 3 (O O O PIN 1	
2240H77	10 (32.8)	2	The wiring kits come with a cord grip on each cable. One cable	(GROUND) PIN 1	PIN 4 GRY PIN 5	
* Each cable h	as one connector.		has a 3-pin MINI connector for			
Contact conditions during switch travel (0 to 6 mm). Integrated Double-Pole Single-Throw 0 2 6 13-14 (NC)			e-Pole Single-Throw 0 2 6 5-pin M12 (Micro) connector			
	h (DPST) h States 1.2 @	21-22 (NO)	IOI THE SENSING SWICH.	Solenoid Cable with 3-pin MINI Connector	Sensing Switch Cable with 5-pin M12 Connector	

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet.

Mounting Type: In-Line. Solenoid: AC or DC power. Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: CNOMO Style: 11 VA inrush, 8.5 VA holding on 50 or 60 Hz; 6 watts on DC. Pacer Style: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Switch Current/Voltage Max.: 2.5 A/120 volts AC. Switch Current/Voltage Min.: 50 mA/24 volts DC.

NOTE: Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles.

#### Functional Safety Data:

**Category 2 PL d**; B10d: Valve - 20,000,000, Switch – 2,000,000; PFHd: 2.35x10<sup>-7</sup>; MTTFd: 98.15 ( $n_{op}$ : 7360); DC (obtained by monitoring safety switch status): 90%; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.



Online Version Rev. 11/14/16

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## Body Size 1¼ (Pacer Style Pilot)

3-pin Mini

Port X-1 // (1/8 external pilot supply)

5-pin M12 connector

> Port 1 (inlet)

862K87-W

862K87-Z

Port Y-3

(pilot exhaust)

2X Ø 0.53 (13.5)

Port 2

(outlet)

Port PV

(pressure verification)

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-

+3.8 (99)

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5.7 (145)

## SV27 Series Load Holding

F4

## Pilot Operated Check Sensing Valves Redundant

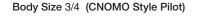
2-Way 2-Position Redundant Valves, Solenoid Pilot Controlled										
Port Size	Body	Valve Model Number*	C <sub>v</sub>	Weight		ह 3				
1, 2	Size	valve model Number	1-2	lb (kg)		C03				
1/2	3/4	SV27NC555408CSAA**	3.8	10.0 (4.5)	1/8" EPS					
3/4	3/4	SV27NC555508CSAA**	5.6	10.0 (4.5)						
1	3/4	SV27NC555608CSAA**	8	10.0 (4.5)						
1	1¼	SV27NC557608CSAA**	12	25.0 (11.3)						
1¼	1¼	SV27NC557708CSAA**	19	25.0 (11.3)						
1½	1¼	SV27NC557808CSAA**	22	25.0 (11.3)						

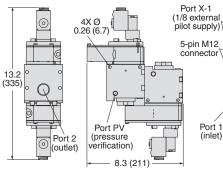
\* NPT port threads. For BSPP threads, replace "N" in the model number with a "D", e.g., SV27DC555408CSAA1A. \*\* Insert voltage code: "1A"=110-120 volts AC, 50/60 Hz; "1D"= 24 volts DC; .e.g., SV27NC555408CSAA1A. For other voltages, consult ROSS.

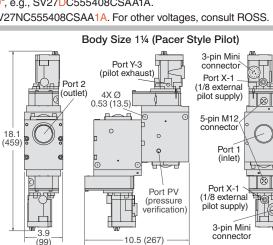
Ó

3.3 (84)

#### Valve Dimensions - inches (mm)







## F4

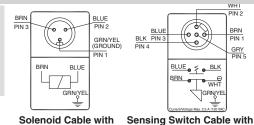
## ACCESSORIES & OPTIONS

	Connection Type	Model Number*	Port Threads	EN Connector Pinout	M12 Connector Pinout			or Light Kit
Pressure Switches	EN 175301-803 Form A	586A86	1/8 NPT	Normally Open Common	Pin 4 Pin 3 Normally Not Used	-		Number
	M12	1153A30	1/8 NPT	Closed 3	Pin 1 Pin 2 Pin 2	1		110-120 volts AC
*Pressure switch c	loses on falling press	ure of 5 psig	(0.34 bar).	Ground			24 volts DC	50-60 Hz

## **Preassembled Wiring Kits**

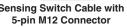
Kit Number*	Length meters (feet)	Number of Cables					
2239H77	4 (13.1)	2					
2240H77	10 (32.8)	2					
* Each cable has one connector.							
	Contact conditions durin	g switch travel (0 to 6 mm).					
Integrated Double-Pole Single-Throw Switch (DPST) Switch States 1.2 @1.7							

The wiring kits come with a cord grip on each cable. One cable has a 3-pin MINI connector for the solenoid and one has a 5-pin M12 (Micro) connector for the sensing switch.



862K87-W

Solenoid Cable with 3-pin MINI Connector



862K87-Z

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Solenoid: AC or DC power. Rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption: *CNOMO Style*: 11 VA inrush, 8.5 VA holding on 50 or 60 Hz; 6 watts on DC. *Pacer Style*: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar).

**Pilot Pressure:** Must be equal to or greater than inlet pressure.

Switch Current/Voltage Max.: 2.5 A/120 volts AC. Switch Current/Voltage Min.: 50 mA/24 volts DC.

NOTE: Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles.

#### **Functional Safety Data:**

**Category 3** PL e; B10d: Valve - 20,000,000, Switch – 2,000,000; PFHd: 2.47x10<sup>-8</sup>; MTTFd: 100 ( $n_{op}$ : 7360); DC (obtained by monitoring safety switch status): 90%; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## **Pilot Operated Check Sensing Valves**

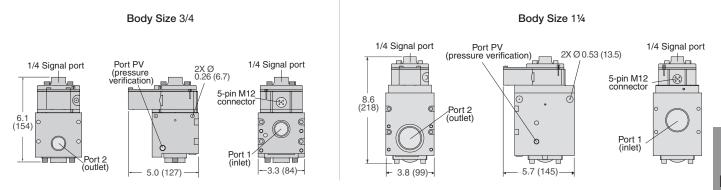
## SV27 Series Load Holding

	2-Way 2-Position Valves, Pressure Controlled										
Port Size	Body	Valve Model	Cv	Weight							
1, 2	Size	Number*	1-2	lb (kg)	1/4" Signal port						
1/2	3/4	SV27NC115405ASAA	4.5	4.0 (1.8)	1/8" PV						
3/4	3/4	SV27NC115505ASAA	8.3	4.0 (1.8)							
1	3/4	SV27NC115605ASAA	10.3	4.0 (1.8)	c v						
1	1¼	SV27NC117605ASAA	20	11.0 (5.0)							
1¼	1¼	SV27NC117705ASAA	29	11.0 (5.0)							
1½	1¼	SV27NC117805ASAA	33	11.0 (5.0)							



\* NPT port threads. For BSPP threads, replace "N" in the model number with a "D", e.g., SV27DC115405ASAA.

Valve Dimensions - inches (mm)



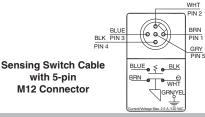
### ACCESSORIES & OPTIONS

_	Connection Type	Model Number*	Port Threads	EN Connector Pinout	M12 Connector Pinout	
Pressure Switches		586A86	1/8 NPT	Normally Open Common	Pin 4 Pin 3 Normally Not Used	
	M12	1153A30	1/8 NPT	Closed 3	Open Pin 2 Pin 1	
*Pressure switch	closes on falling pre-	ssure of 5 psig (0.34	4 bar).	Ground	Common Closed	L Į

## **Preassembled Wiring Kits**

Kit Number*	Length meters (feet)	Number of Cables					
2241H77	4 (13.1)	1					
2242H77	10 (32.8)	10 (32.8) 1					
* Each cable h	as one connector.						
	Contact conditions du	ring switch travel (0 to 6 m					

Integrated Double-Pole Single-Throw Switch (DPST) Switch States 1.2 @1.7 The wiring kits include one cable with a 5-pin M12 connector for the sensing switch, and a cord grip.



STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet. Mounting Type: In-Line. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Switch Current/Voltage Max.: 2.5 A/120 volts AC. Switch Current/Voltage Min.: 50 mA/24 volts DC. NOTE: Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles.

#### Functional Safety Data:

**Category 2 PL d**; B10d: Valve - 20,000,000, Switch – 2,000,000; PFHd: 2.35x10<sup>-7</sup>; MTTFd: 98.15 (n<sub>op</sub>: 7360); DC (obtained by monitoring safety switch status): 90%; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

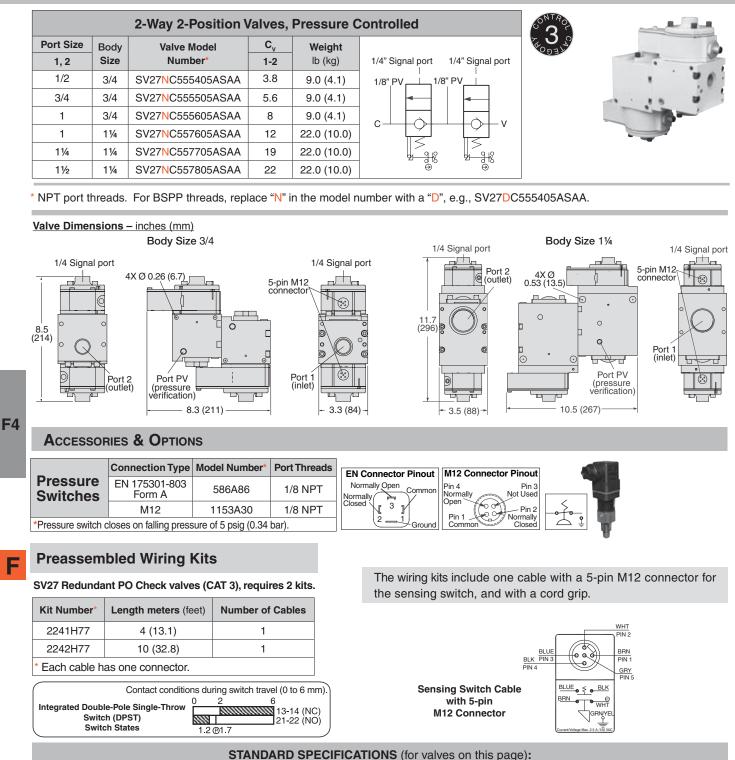
Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.



Online Version Rev. 11/14/16

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

## Pilot Operated Check Sensing Valves Redundant



Construction: Poppet. Mounting Type: In-Line. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.8 to 10.3 bar). Pilot Pressure: Must be equal to or greater than inlet pressure. Switch Current/Voltage Max.: 2.5 A/120 volts AC. Switch Current/Voltage Min.: 50 mA/24 volts DC.

NOTE: Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles.

#### Functional Safety Data:

**Category 3** PL e; B10d: Valve - 20,000,000, Switch – 2,000,000; PFHd: 2.47x10<sup>-8</sup>; MTTFd: 100 ( $n_{op}$ : 7360); DC (obtained by monitoring safety switch status): 90%; ROSS recommends testing the switch function and sealing for load holding valves every 8 hours.

Vibration/Impact Resistance: Calculated to BS EN 60068-2-27.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.





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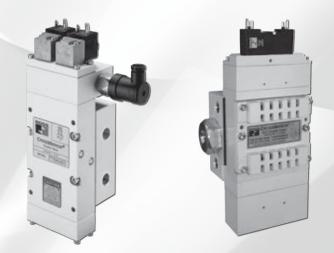






# **ROSS** CONTROLS®

# DOUBLE VALVES FOR CYLINDER RETURN TO HOME POSITION CROSSMIRROR® 77 AND CM SERIES



#### 5/2 PRESSURE RETURN - KEY FEATURES

- Can be used as 3/2 Normally Closed or 3/2 Normally Open valve function by plugging the unused outlet port
- Self-contained dynamic monitoring system; no additional monitoring required
- Valve fault results in a lockout condition and prevents unintentional reset with removal of air or electricity
- Reset can be electrical solenoid or remote pneumatic signal
- Status indication switch (ready-to-run) to inform machine controller of valve condition
- Base mounted, stainless steel spool valve construction
- Manifoldable for multi valve applications
- Includes non-clogging safety mufflers; for applications requiring ported exhaust, consult ROSS

		AVAILABLE PORT SIZES			MAX. FLOW Cv				RESET			
VALVE TYPE	VALVE					Port Size			[			Page
	SERIES	1/4	3/8	1/2	3/4	1/4	3/8	1/2	3/4	REMOTE	SOLENOID	l ugo
SOLENOID PILOT CONTROLLED												
with Pressure Switch	77						2.8	7.2	7.2			F5.3 - F5.4
without Pressure Switch	77						2.8	7.2	7.2			F5.3 - F5.4
PRESSURE CONTROLLED												
with Pressure Switch	77						2.8	7.2	7.2			F5.5 - F5.6
without Pressure Switch	77						2.8	7.2	7.2			F5.5 - F5.6
SOLENOID PILOT CONTROLLED												
with Pressure Switch	СМ					1.1	1.1	3.9				F5.7 - F5.10
without Pressure Switch	СМ					1.1	1.1	3.9				F5.7 - F5.10
COMPONENTS FOR MANIFOLD	ASSEMBLIES	- SOLE	ENOID	PILOT	CONT	ROLLE	D					
Valves, Manifold Bases and End S	Stations for M	anifold	l Asser	nblies								F5.7
PRESSURE CONTROLLED												
with Pressure Switch	СМ					1.1	1.1	3.9				F5.11 - F5.13
without Pressure Switch	СМ					1.1	1.1	3.9				F5.11 - F5.13
COMPONENTS FOR MANIFOLD ASSEMBLIES - PRESSURE CONTROLLED												
Valves, Manifold Bases and End Stations for Manifold Assemblies F5.11									F5.11			

**F5** 



## CROSSMIRROR<sup>®</sup> Double Valves Solenoid Pilot Control

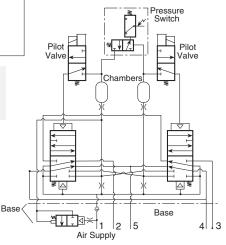
5 Ports, 4-Way 2-Position Valve, Solenoid Pilot Controlled											
Port Sizes	Basic	Pressure	Model Number		C	v		Weight	Model Number	Model Number	
1	2, 4	Size	Switch#	(valve and base)	1-2	1-4	2-3	4-5	lb (kg)	(valve only)	(base only)
1/2	3/8	2*	With	Y7776A3411**	2.0	1.6	1.6	2.8	8.4 (3.8)	Y7776A3400**	996C91
1/2	3/8	2*	Without	Y7776A3410**	2.0	1.6	1.6	2.8	7.6 (3.4)	Y7776A3401**	996C91
3/4	1/2	4*	With	Y7776A4421**	3.2	3.4	2.7	7.2	11.2 (5.1)	Y7776A4400**	1049C91
3/4	1/2	4*	Without	Y7776A4420**	3.2	3.4	2.7	7.2	10.2 (4.6)	Y7776A4401**	1049C91
3/4	3/4	4*	With	Y7776A5411**	3.2	3.4	2.7	7.2	11.2 (5.1)	Y7776A4400**	1153C91
3/4	3/4	4*	Without	Y7776A5410**	3.2	3.4	2.7	7.2	10.2 (4.6)	Y7776A4401**	1153C91
SAE	E 12	4	With	SY7776A4H10**	3.2	3.4	2.7	7.2	11.2 (5.1)	Y7776A4400**	1159G91
SAE	E 12	4	Without	SY7776A4H11**	3.2	3.4	2.7	7.2	10.2 (4.6)	Y7776A4401**	1159G91
* NF	* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., YD7776A3411W.										







ISO 13849-1:2006 Category 4 PL e applications 5/2 CROSSMIRROR® double valve with pressure switch



\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110 volts AC, 120 volts AC ; e.g., Y7776A3411W.
 For other voltages consult ROSS.
 #Pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

This valve is constructed with precision, stainless steel spools as the main valve elements, and is designed to offer added safety to the operation of many pneumatically controlled machines. The Pressure switch provides a signal when valve is in a faulted position.

### **ACCESSORIES & OPTIONS**

Duran and Oralitation	Pressu	Pressure Switch	
Pressure Switches &	24 Volts DC	120 Volts AC	Connector
A Pressure Switch Connectors	798E30	518E30	522E30
Tressure Switch Connectors	798E30	518E30	522E30

## **Electrical Connectors**

Electrical Connector Lyne	Cord Length	Cord Diameter	Electrica			
			Without	Lighted C		
			Light	24 Volts DC	120 Volts AC	
Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	_	723K77	724K77-W	724K77-Z	
Connector Only	-	-	937K87	936K87-W	936K87-Z	
	Prewired Connector (18 gauge) Prewired Connector (18 gauge) Connector for threaded conduit (1/2 inch electrical conduit fittings)	Electrical Connector Typemeters (feet)Prewired Connector (18 gauge)2 (6½)Prewired Connector (18 gauge)2 (6½)Connector for threaded conduit (1/2 inch electrical conduit fittings)-	Electrical Connector Typemeters (feet)DiameterPrewired Connector (18 gauge)2 (6½)6-mmPrewired Connector (18 gauge)2 (6½)10-mmConnector for threaded conduit (1/2 inch electrical conduit fittings)	Electrical Connector TypeCord Length meters (feet)Cord DiameterWithout LightPrewired Connector (18 gauge)2 (6½)6-mm721K77Prewired Connector (18 gauge)2 (6½)10-mm371K77Connector for threaded conduit (1/2 inch electrical conduit fittings)723K77	Electrical Connector Type         Cord Length meters (feet)         Cord Diameter         Without Light         Lighted C 24 Volts DC           Prewired Connector (18 gauge)         2 (6½)         6-mm         721K77         720K77-W           Prewired Connector (18 gauge)         2 (6½)         10-mm         371K77         383K77-W           Connector for threaded conduit (1/2 inch electrical conduit fittings)         -         -         723K77         724K77-W	Electrical Connector Typemeters (feet)DiameterWithoutLightedLightedConnectorPrewired Connector (18 gauge)2 (6½)6-mm721K77720K77-W720K77-ZPrewired Connector (18 gauge)2 (6½)10-mm371K77383K77-W383K77-ZConnector for threaded conduit (1/2 inch electrical conduit fittings)723K77724K77-W724K77-Z

NS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids

Explosion proof solenoid pilot available, for more information consult ROSS.

#### **STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Double spool and sleeve. Ambient Temperature: 40° to 120°F (4° to 50°C). Mounting Type: Base mounted. Media Temperature: 40° to 175°F (4° to 80°C). Pilot Solenoid: According to VDE 0580. Enclosure rating according to Flow Media: Filtered air. DIN 400 50 IP 65. Three (with pressure switch) or two solenoids (without Inlet Pressure: 40 to 150 psig (2.5 to 10.3 bar). pressure switch), rated for continuous duty. Functional Safety Data: Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10-9; Power Consumption (each solenoid): 6 watts on DC; 18 VA inrush, 14 MTTFd: 301.9 (n.:: 662400). VA holding on 50 or 60 Hz. Certifications: CE Marked for applicable directives, DGUV Test. Enclosure Rating: IP65, IEC 60529. Vibration/Impact Resistance: Tested to BS EN 60068-2-27. Electrical Connection: EN 175301-803 Form A. Uses cord-grip connectors at solenoids.

Meets Standards EN13736 and ANSI B11.2, Safety requirements for Pneumatic Cylinder Presses and other hazardous pneumatic cylinder applications.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



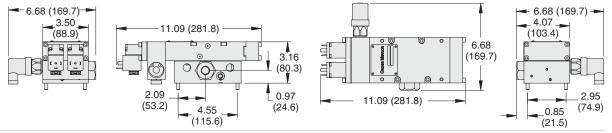
Online Version Rev. 11/14/16

## CROSSMIRROR<sup>®</sup> Double Valves Solenoid Pilot Control

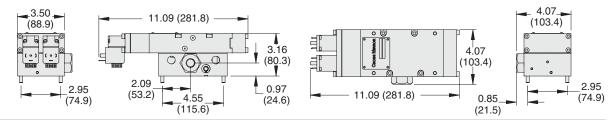
## 77 Series Valve Technical Data & Operation

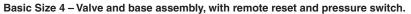
Valve Dimensions - inches (mm)

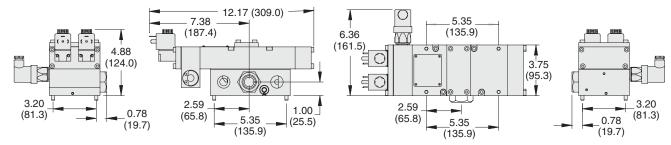
Basic Size 2 - Valve and base assembly, with remote reset and pressure switch.



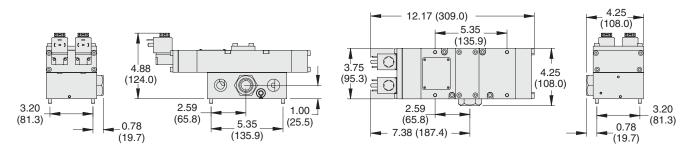
Basic Size 2 - Valve and base assembly, with remote reset and without pressure switch.







Basic Size 4 - Valve and base assembly, with remote reset and without pressure switch.



## Valve Operation

#### **Normal Operation:**

After installation the valve is operated by energizing both solenoid pilots (S1 and S2) simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4. Air downstream of port 2 is exhausted through port 3.

When the solenoid pilots are de-energizing, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2. Air downstream of port 4 is exhausted through port 5.

#### **Pressure Switch:**

Valves with model numbers ending in the number 1 have a pressure switch to provide user feedback when movement of the main valve elements was asynchronous.

#### **Safety Function:**

If the two main valve elements are not actuated or de-actuated synchronously, within 500 ms, the valve defaults so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. If this abnormal operation is the result of a temporary circumstance, the valve will be ready to resume normal operation as soon as both pilot signal ports have been de-energized and both main valve elements have returned to their normal ready-to-run position. Applying the electrical signal to both solenoids simultaneously will resume normal operation.

If the cause of the abnormal operation is still present, the valve will either remain in the default position (pressure on port 2 and not port 4) or will again go into this position on the next actuation attempt. The source of the abnormality must be investigated and corrected before further operation.

F5.4



## CROSSMIRROR<sup>®</sup> Double Valves Pressure Controlled

77 Series
<b>Cylinder Return to Home Position</b>

				5 Ports, 4-	Way	2-P	ositi	on V	alve		
Port	Sizes	Basic	Pressure	Model Number		C	v		Weight	Model Number	Model
1	2, 4	Size	Switch#	(valve and base)	1-2	1-4	2-3	4-5	lb (kg)	(valve only)	Number (base only)
1/2	3/8	2*	With	Y7786A3411**	2.0	1.6	1.6	2.8	8.4 (3.8)	Y7786A3400	996C91
1/2	3/8	2*	Without	Y7786A3410	2.0	1.6	1.6	2.8	7.6 (3.4)	Y7786A3401**	996C91
3/4	1/2	4*	With	Y7786A4421**	3.2	3.4	2.7	7.2	11.6 (5.3)	Y7786A4400	1049C91
3/4	1/2	4*	Without	Y7786A4420	3.2	3.4	2.7	7.2	10.6 (4.8)	Y7786A4401**	1049C91
3/4	3/4	4*	With	Y7786A5411**	3.2	3.4	2.7	7.2	11.6 (5.3)	Y7786A3400	1153C91
3/4	3/4	4*	Without	Y7786A5410	3.2	3.4	2.7	7.2	10.6 (4.8)	Y7786A3401**	1153C91
SAE	E 12	4	With	SY7786A4H11**	3.2	3.4	2.7	7.2	11.6 (5.3)	Y7786A4400	1159G91
SAE	E 12	4	Without	SY7786A4H10	3.2	3.4	2.7	7.2	10.6 (4.8)	Y7786A4401**	1159G91





ISO 13849-1:2006 Category 4 PL e applications

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., YD7786A3411W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., Y7786A3411W. For other voltages consult ROSS.

#Pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

This 77 Series 5/2 CROSSMIRROR<sup>®</sup> valve is a control reliable, two hand pressure controlled 4-way double valve that is controlled by two separate pneumatic signals essentially providing "AND" gate control for the output ports. Both pilot signals must be provided within approximately 500 milliseconds of each other to actuate the valve.

Proper actuation shifts output pressure to port 4. If the valve is not actuated, not provided appropriate pneumatic signals within the discordance window or if the valve actuates abnormally, inlet pressure will only be passed to port 2 - cylinder retracted.

This valve is constructed with precision, stainless steel spools as the main valve elements, and is designed to offer added safety to the operation of many pneumatically controlled machines.

#### **A**CCESSORIES & **O**PTIONS

Pressure Switches	Pressur	e Switch	Pressure Switch		
&	24 Volts DC	120 Volts AC	Connector		
Pressure Switch	798E30	518E30	522E30		
Connectors	798E30	518E30	522E30		

Customer Supplied 3/2 Valve CROSSMIRBOR® Control Reliable Pneumatic 5/2 "AND" Gate

Typical 2-Hand-Anti-Tie-Down Application

#### Status Indicator (pressure switch)

Terminals 1 and 4 are connected when air pressure is present and the valve is "Ready-to-Run". If an abnormal operation has occured or pressure is removed from the valve inlet, terminals 1 and 2 are connected. **Note:** DC voltage pressure switches do not have a ground terminal.

Pin 1: Common Pin 2: Normally Closed Pin G: Not used Pin 4 : Normally Open

0 4

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#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Double spool and sleeve. Mounting Type: Base mounted. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 100 psig (2.7 to 7 bar). Pilot Pressure: Must be equal or greater than inlet pressure, but should not exceed maximum inlet pressure.

#### Pressure Switch Rating: Max Current 4A, Max 250 volts AC. Max Current 50 mA, Max 24 volts DC. Pressure Switch: Pressure Switch signal indicates when the input signals or parts movement is asynchronous.

**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). **Certifications**: CE Marked for applicable directives, DGUV Test. **Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

Meets Standards EN13736 and ANSI B11.2, Safety requirements for Pneumatic Cylinder Presses and other hazardous pneumatic cylinder applications.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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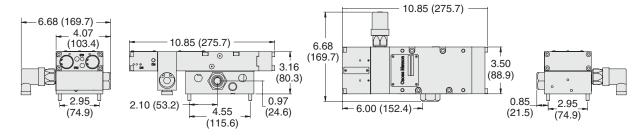
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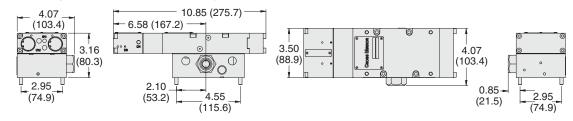
## 77 Series Valve Technical Data & Operation

#### Basic Size 2 - Valve and base assembly, with remote reset and pressure switch.

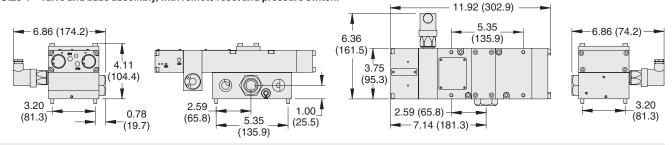
Valve Dimensions - inches (mm)



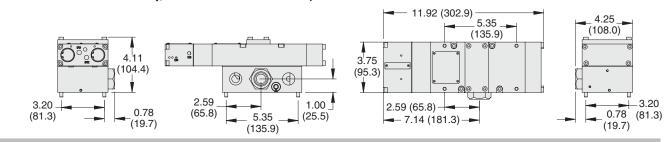
#### Basic Size 2 - Valve and base assembly, with remote reset and without pressure switch.



Basic Size 4 – Valve and base assembly, with remote reset and pressure switch.



Basic Size 4 – Valve and base assembly, with remote reset and without pressure switch.



## **Valve Operation**

Normal Operation: After installation the valve is operated by pressurizing both pilot supply ports (S1 and S2) simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4. Air downstream of port 2 is exhausted through port 3.

When the pilot supply ports are de-pressurized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2. Air downstream of port 4 is exhausted through port 5.

Pressure Switch: Valves with model numbers ending in the number 1 have a pressure switch to provide user feedback when movement of the main valve elements was asynchronous.

Safety Function: If the two main valve elements are not actuated or de-actuated synchronously, within 500 ms, the valve defaults so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. If this abnormal operation is the result of a temporary circumstance, the valve will be ready to resume normal operation as soon as both pilot signal ports have been de-pressurized and both main valve elements have returned to their normal ready-torun position. Applying pressure to both signal ports simultaneously will resume normal operation.

If the cause of the abnormal operation is still present, the valve will either remain in the default position (pressure on port 2 and not port 4) or will again go into this position on the next actuation attempt. The source of the abnormality must be investigated and corrected before further operation.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



Category 4 PL e

				Valve and	Base Assembly	,					CONTRO
			5 Por	ts, 4-Way 2-Posi	tion Valve, Pressu	ire R	etur	n			FLEGON
Port	Sizes	Basic	Pressure	Model	Number*		C	v		Weight	auv za
1	2, 4	Size	Switch	With Remote Reset	With Solenoid Reset	1-2	1-4	2-3	4-5	lb (kg)	Couv 700
1/4	1/4	0	With#	CM26PNA00**11	CM26PNA00**21	0.8	0.6	0.5	1.1	5.85 (2.7)	HSM 15026
1/4	1/4	0	Without	CM26PNA00**1X	CM26PNA00**2X	0.8	0.6	0.5	1.1	5.30 (2.4)	Sicherheit seprüft tested safety
3/8	3/8	0	With#	CM26PNA01**11	CM26PNA01**21	0.8	0.6	0.5	1.1	5.75 (2.6)	
3/8	3/8	0	Without	CM26PNA01**1X	CM26PNA01**2X	0.8	0.6	0.5	1.1	5.20 (2.4)	CE
1/2	1/2	2	With#	CM26PNA22**11	CM26PNA22**21	3.0	2.5	2.0	3.9	14.45 (6.56)	
1/2	1/2	2	Without	CM26PNA22**1X	CM26PNA22**2X	3.0	2.5	2.0	3.9	13.80 (6.26)	ISO
* Ino			oplied with N	IPT part throada Ear E	SPD threads replace "	" with	o "D"	n tha	model	number e a	13849-1:20

Includes base supplied with NPT port threads. For BSPP threads, replace "N" with a "D" in the model number, e.g., CM26PDA00A1X.\*\* Insert voltage code: "A" = 24 volts DC; "B" = 110 volts AC, 120 volts AC; e.g., CM26PNA00A1X. # Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

#### Valves, Manifold Bases, and End Stations for Manifold Assemblies

In addition to the manifold, an end station kit with a check valve must be ordered for each assembly. The number of manifolds with a single supply inlet will be limited to the pressure and flow rate of the system. Too many manifolds may result in too large of an internal pressure drop resulting in valve faults. The manifold end station kit with dual inlet check will allow the manifold to be supplied with air from both ends of the assembly.

					-				
Port	Size			Valve without Su	ub-Base	Manifold	Manifold	Dual Supply	
		Basic	Pressure	Model I	Number	Base	End Station	Manifold End Station	End Station
1	2, 4	Size	Switch	With Remote Reset	With Solenoid Reset	Model Number#	w/ Check Valve Kit Number##	w/ Check Valves Kit Number##	100
1/4	1/4	0	With*	CM26PXA0X**11	CM26PXA0X**21	Y1951D91	699K86	701K86	No la sur
1/4	1/4	0	Without	CM26PXA0X**1X	CM26PXA0X**2X	Y1951D91	699K86	701K86	
3/8	3/8	0	With*	CM26PXA0X**11	CM26PXA0X**21	Y1949D91	698K86	700K86	
3/8	3/8	0	Without	CM26PXA0X**1X	CM26PXA0X**2X	Y1949D91	698K86	700K86	End Station with Check Val
1/2	1/2	2	With*	CM26PXA2X**11	CM26PXA2X**21	Y1955D91	702K86	704K86	
1/2	1/2	2	Without	CM26PXA2X**1X	CM26PXA2X**2X	Y1955D91	702K86	704K86	and the second second
ROS	S. **	Insert vo	oltage code	ches with DIN type co e: "A" = 24 volts DC; "E PP threads, insert a '	3" = 110 volts AC, 120	) volts AC; e.g	., CM26PXA0XA	1X.	0 00
##N	РТ ро	rt threa	ds. For BS	SPP threads, add a "	D" prefix to the mode	el number, e.g	g., <mark>D</mark> 699K86, <mark>D</mark> 70	01K86.	Manifold Base

For other voltages consult ROSS.

Explosion proof solenoid pilot available, for more information consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Double spool and sleeve. Monitoring: Dynamically, cyclically, internally during each actuating and Mounting Type: Base mounted. de-actuating movement. Monitoring function has memory and requires Pilot Solenoid: According to VDE 0580. Two solenoids, rated for an overt act to reset unit after lockout. Solenoid Reset: Units with solenoid reset include a 3/2 solenoid valve. continuous duty. Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): Energize this solenoid momentarily to reset valve after lock-out condition Size 0: 24 volts DC: 1.2 watts on DC. 110 volts AC, 50 Hz: 5.4 VA; 120 occurs. volts AC, 60 Hz: 5.0 VA. Remote Reset: Remote signal to be supplied by customer's 3/2 valve Size 2: 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. (connect remote signal line to remote RESET port in valve). Apply signal 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC. momentarily to reset valve after fault condition occurs. Enclosure Rating: DIN 400 50 IP 65. NOTE: Main solenoids must be off when performing reset procedure. **Electrical Connection:** Product data for Sistema Library users, For Basic Size 0 only: Size 0: Connector socket according to EN 175301-803 Form C. Size 2: Connector socket according to EN 175301-803 Form A. Functional Safety Data: Category 4 PL e; B10d: 20,000,000; PFHd: Ambient Temperature: 15° to 122°F (-10° to 50°C). 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). Media Temperature: 40° to 175°F (4° to 80°C). Certifications: CE Marked for applicable directives, DGUV Test. Flow Media: Filtered air. Vibration/Impact Resistance: Tested to BS EN 60068-2-27. Inlet Pressure: 40 to 150 psig (3 to 10 bar). Pressure Switch (Status Indicator) Rating: 5 amps at 250 volts AC, or For Basic Size 2, Product data for Sistema Library users, pending. 5 amps at 30 volts DC. Meets Standards EN13736 and ANSI B11.2, Safety requirements for Pneumatic Cylinder Presses and other hazardous pneumatic cylinder applications.

#### This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



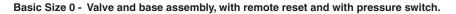
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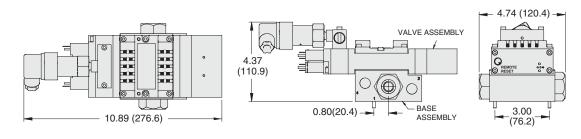
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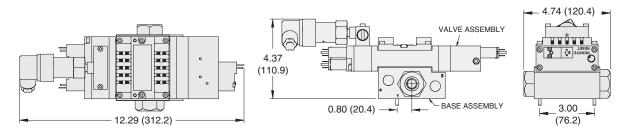
## CM Series Valve Technical Data

#### Valve Dimensions - inches (mm)

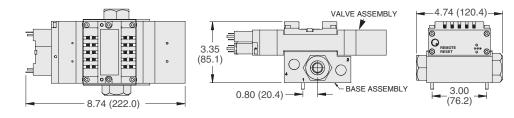


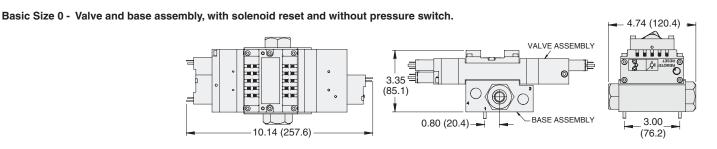




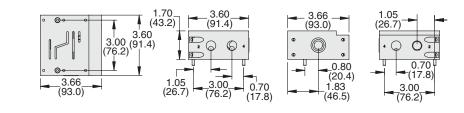


#### Basic Size 0 - Valve and base assembly, with remote reset and without pressure switch.



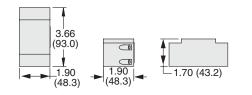


#### Dimensions - inches (mm)

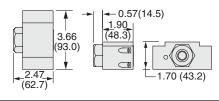


End Station for Basic Size 0

Manifold Base for Basic Size 0



End Station with Check Valve for Basic Size 0





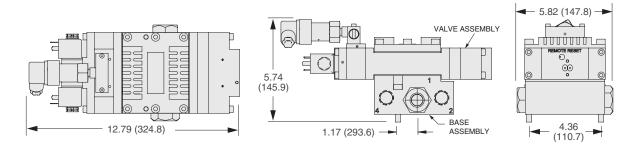


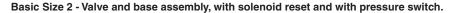
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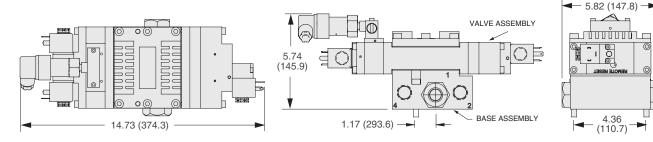
## **CM** Series Valve Technical Data

Basic Size 2 - Valve and base assembly, with remote reset and with pressure switch.

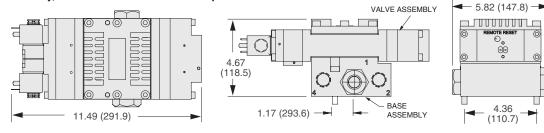
#### Valve Dimensions - inches (mm)





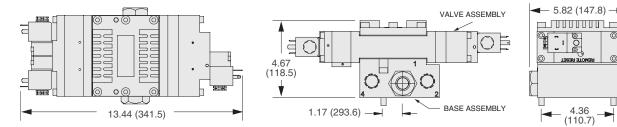


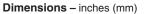
Basic Size 2 - Valve and base assembly, with remote reset and without pressure switch.



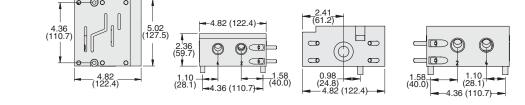
Basic Size 2 - Valve and base assembly, with solenoid reset and without pressure switch.

End Station for Basic Size 2

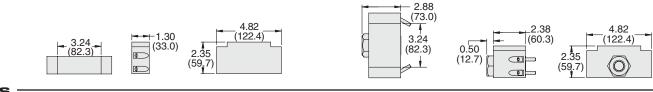




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Manifold Base for Basic Size 2

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## CROSSMIRROR<sup>®</sup> Double Valves Solenoid Pilot Controlled

## CM Series Valve Operation & Options

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Pilot

Valve

F

Pressure

3

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4

Optional

Reset Valve

Reset Por

 $\square$ 

Switch

Optional

Status

Indicator

Pilot Valve

wwo)

1

2

only reports the status of the main valve.

Valve Schematic

Status Indicator: The optional status indicator pressure

switch will actuate when the main valve is operating

normally, and will de-actuate when the main valve is in

the locked-out position or inlet pressure is removed. This

device is not part of the valve lockout function, but, rather,

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VALVE

**Normal Operation:** The valve is operated by energizing both pilot solenoids simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4, but not to port 2. Air downstream of port 2 is exhausted through port 3.

When the solenoids are de-energized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2, but no longer to outlet port 4. Air downstream of port 4 is exhausted through port 5. On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset.

Valve Locked-out: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized. The valve element (side B) that is partially actuated has pilot air available to fully actuate

it, but no air pressure on the return piston to fully de-actuate the valve element.

The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully home position.

**Detecting a Malfunction:** If the main valve elements are not both actuated or deactuated synchronously, the valve defaults to the locked-out position so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. The valve must now be "reset" to resume normal operation.

**Resetting the Valve:** The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied.

A remote reset signal must be applied to reset the valve. Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the main valve elements to their home position. Actuation of the reset piston also opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset. De-actuation of reset pistons causes the reset poppets to close and pilot supply timing chambers to fully pressurize. Reset pressure can be applied by a remote 3/2 normally closed valve, or from an optional 3/2 normally closed solenoid (which includes an integral manual reset button) mounted on the reset adapter.

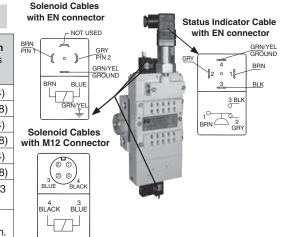
### **Electrical Connectors**

Ele	cirical Connecto	ors						
Basic		Electrical Connector	Cord	Card	Electrica	Connector Mo	del Number	
Valve	Electrical Connector Form	Electrical Connector Type	Length meters	Cord Diameter	Without	Lighted C	onnector	
Size		- 76 -	(feet)		Light	24 Volts DC	120 Volts AC	
0	EN 175301-803 Form C	Prewired Connector	3 (10)	8-mm	2449K77	2450K77-W	2450K77-Z	
0	EN 175301-803 Form C	Connector Only	-	-	2452K77	2453K77-W	2453K77-Z	
2	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
2	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
2	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
2	EN 175301-803 Form A	Connector Only	-	-	937K87	936K87-W	936K87-Z	L

CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

### **Preassembled Wiring Kits**

Basic		Kit Number			Length						
Valve	Connector	Lighted 0	Connector	Solenoid Connector Type	meters						
Size	without Light	24 Volts DC	120 Volts AC	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(feet)						
0*	2526H77	2529H77-W	2529H77-Z	EN 175301-803	5 (16.4)						
0	2527H77	2530H77-W	2530H77-Z	Form A and Form C	10 (32.8)						
	2283H77	2532H77-W	2532H77-Z	EN 175301-803 Form A	5 (16.4)						
•#	2284H77	2533H77-W	2533H77-Z	EN 175301-803 Form A	10 (32.8)						
2#	2288H77**	—	-	M12	5 (16.4)						
	2289H77**	—	-	M12	10 (32.8)						
				r the status indicator (EN 17 connector plus a cord grip							
# Each cable has one connector. **Coil includes light. Kits include 1 cable for the status indicator, and 3 cables with connector plus a cord grip for each.											



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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		5		alve and Base A ay 2-Position Valv			Retu	'n		
Por	t Sizes	Basic	Pressure	Valve					Weight	GUV 789
1	2, 4	Size	Switch	Model Number*	1-2	1-4	2-3	4-5	lb (kg)	
1/4	1/4	0	With#	CM26PNA00P11	0.8	0.6	0.5	1.1	6.15 (2.79)	HSM 15026 Sicherheit seprüft tested safety
1/4	1/4	0	Without	CM26PNA00P1X	0.8	0.6	0.5	1.1	5.60 (2.54)	
3/8	3/8	0	With#	CM26PNA01P11	0.8	0.6	0.5	1.1	6.05 (2.74)	<b>CE</b>
3/8	3/8	0	Without	CM26PNA01P1X	0.8	0.6	0.5	1.1	5.50 (2.49)	ISO
1/2	1/2	2	With#	CM26PNA22P1X	3.0	2.5	2.0	3.9	14.45 (6.56)	13849-1:2006
1/2	1/2	2	Without	CM26PNA22P11	3.0	2.5	2.0	3.9	13.80 (6.26)	Category 4 PL e

\* Model number includes base supplied with NPT port threads. For BSPP threads, replace "N" with a "D' in the model number, e.g., CM26PDA00P11.

\* Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

### Valves, Manifold Bases, and End Stations for Manifold Assemblies

In addition to the manifold, an end station kit with a check valve must be ordered for each assembly. The number of manifolds with a single supply inlet will be limited to the pressure and flow rate of the system. Too many manifolds may result in too large of an internal pressure drop resulting in valve faults. The manifold end station kit with dual inlet check will allow the manifold to be supplied with air from both ends of the assembly.

Port	Size		Valve w	vithout Sub-Base		Manifold	Dual Supply Manifold	
1	2, 4	Basic Size	Pressure Switch	Valve Model Number	Manifold Base Model Number#	End Station w/ Check Valve Kit Number##	End Station w/ Check Valves Kit Number##	End Station
1/4	1/4	0	With*	CM26PNA0XP11	Y1951D91	699K86	701K86	1 al
1/4	1/4	0	Without	CM26PNA0XP1X	Y1951D91	699K86	701K86	
3/8	3/8	0	With*	CM26PNA0XP11	Y1949D91	698K86	700K86	
3/8	3/8	0	Without	CM26PNA0XP1X	Y1949D91	698K86	700K86	End Stat
1/2	1/2	2	With*	CM26PNA22P11	Y1955D91	702K86	704K86	
1/2	1/2	2	Without	CM26PNA22P1X	Y1955D91	702K86	704K86	

\* Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

#NPT port threads. For BSPP threads, insert a "D" after "Y" in the model number, e.g., YD1951D91.

##NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D699K86, D701K86.



Manifold Base

F5

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Double spool and sleeve. Mounting Type: Base mounted. Ambient Temperature: 15° to 122°F (-10° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (3 to 10 bar). Pilot Pressure: Must be equal or greater than inlet pressure, but should not exceed maximum inlet pressure. Pressure Switch Rating: Max Current 4A, Max 250 volts AC. Max Current 50 mA, Max 24 volts DC. Pressure Switch: Pressure Switch signal indicates when the input signals

**Pressure Switch:** Pressure Switch signal indicates when the input signa or parts movement is asynchronous. **Monitoring:** Dynamically, cyclically, internally during each actuating and de-actuating movement. Monitoring function has memory and requires an overt act to reset unit after lockout.

Product data for Sistema Library users, For Basic Size 0 only:

**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 ( $n_{op}$ : 662400). **Certifications:** CE Marked for applicable directives, DGUV Test.

Vibration/Impact Resistance: Tested to BS EN 60068-2-27.

For Basic Size 2, Product data for Sistema Library users, pending.

Meets Standards EN13736 and ANSI B11.2, Safety requirements for Pneumatic Cylinder Presses and other hazardous pneumatic cylinder applications.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

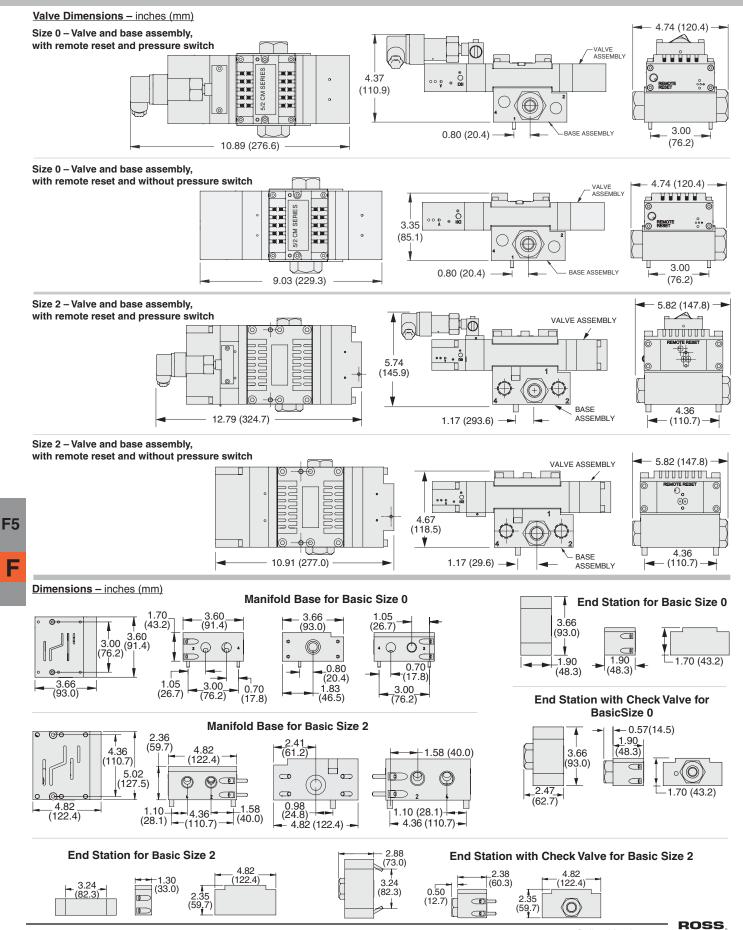


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## CROSSMIRROR<sup>®</sup> Double Valves Pressure Controlled

## CM Series Valve Technical Data



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Online Version Rev. 11/14/16

## CROSSMIRROR<sup>®</sup> Double Valves Pressure Controlled

**Normal Operation:** The valve is operated by pressurizing both pilot supply ports simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4, but not to port 2. Air downstream of port 2 is exhausted through port 3.

When the pilot supply ports are de-pressurized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2, but no longer to outlet port 4. Air downstream of port 4 is exhausted through port 5. On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset.

Valve Locked-out: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized.

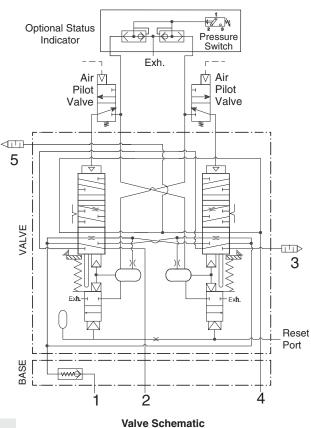
The valve element (side B) that is partially actuated has pilot air available to fully actuate it, but no air pressure on the return piston to fully de-actuate the valve element.

The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully home position.

**Detecting a Malfunction:** If the main valve elements are not both actuated or de-actuated synchronously, the valve defaults to the locked-out position so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. The valve must now be "reset" to resume normal operation.

**Resetting the Valve:** The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied.

A remote reset signal must be applied to reset the valve. Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the main valve elements to their home position. Actuation of the reset piston also opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset. De-actuation of reset pistons causes the reset poppets to close and pilot supply timing chambers to fully pressurize. Reset pressure can be applied by a remote 3/2 normally closed valve. CM Series Valve Operation & Options



Status Indicator: The optional status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve is in the locked-out position or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.

F5

#### **O**PTIONS

#### **PRESSURE SWITCHES For Verification Of Downstream Pressure Release**

Pressu	re Switches		EN Connector Pinout	M12 Connector Pinout	1.1
Connection Type	Model Number	Port Threads	Normally Open Common	Pin 4 Pin 3 Normally Not Used	
EN 175301-803 Form A	586A86	1/8 NPT	Normally Closed	Open Open Pin 2	$\left[ \right]$
M12	1153A30	1/8 NPT	2 Ground	Pin 1 Normally Common Closed	

May be installed downstream on all double valves

Provides means to verify the release of downstream pressure to next obstruction

Factory preset, 5 psi (0.3 bar) - falling

Redundant I	Pressure Sw	itch	EN Connecto
Connection Types	Model Number	Port Threads	Normally Closed
EN 175301-803 Form A	RC26-13	3/8 NPT	

May be installed downstream on all double valves

Provides a redundant means to verify the release of downstream pressure to next obstruction

Factory preset, 5 psi (0.3 bar) - falling





IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.





## **ROSS** CONTROLS®

EXPLOSION PROOF VALVES 27 & 21 Series, DM<sup>2®</sup> Series C ISO VALVES W60 & W64 Series



www.rosscontrols.com

#### POPPET 27 & 21 SERIES EXPLOSION PROOF VALVES - KEY FEATURES

- 27 Series Construction Acetal internals
- 21 Series Construction Metal, Aluminum
- Poppet construction for near zero leakage and high dirt tolerance
- Pilot can rotate, giving the ability to change orientation
- Self-cleaning
- Wear compensating
- Repeatability throughout the life of the valve

	DESCR			AVA	ILAE	3LE	INL	ET I	POR	T SI	ZES	5		FU	INC <sup>.</sup>	TIOI	٩S							Explosion Proof Certifications	
VALVE TYPE/ SERIES	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	<b>2</b> ½	2/2	3/2	3/4	4/2	5/2 Single	5/2 Double	Max Flow (Cv)	Solenoid Control	Normally Closed	Normally Open	CSA/UL	ATEX <sup>#</sup>	Page
27 SERIES	S Poppe	et Valve	s				1																-		
27																			72						F6.3
27																			71						F6.4
27																			25						F6.5
21 SERIES	S for Lo	w Temp	bera	ture																					
21																			29						F6.6
21																			31						F6.7
21																			25						F6.8
Accessori	ies																	I				•			F6.9

# For ATEX Certified valves order placement, consult ROSS.

#### CONTROL RELIABLE DOUBLE VALVES DM<sup>20</sup> SERIES - KEY FEATURES

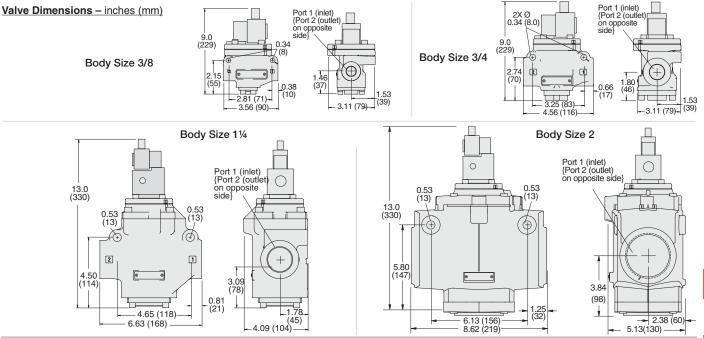
- Rapid response time to minimize stopping time
- Status Indicator switch for valve condition (ready to run) feedback
- Highly contaminant tolerant poppet construction

	>		Avail	able	Port	Size	S	MA	X.F	LOW	Cv			Reset		Explosic	on Proof	
VALVE TYPE/	Category								Port	Size			grated t Start	e	bid	Certific	ations	Page
SERIES	Cat	1/4 3/8 1/2 3/4 1 1 <sup>1</sup> /2 1/4 3/8 1/2 3/4 1 1 <sup>1</sup> /2 1/4 3/8 1/2 3/4 1 1 <sup>1</sup> /2		Remote	Solenoid	CSA/UL	ATEX											
Control Relia	ble Exp	olosi	on Pr	oof [	Doubl	e Va	lves											
DM <sup>2®</sup> C	4								10		20	64						F6.10 -F6.12

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#### 2-Way 2-Position Valves, Spring Return Valve Model Number Port Size С Weight **Body Size** lb (kg) 1.2 **Normally Closed Normally Open** NC NO FM SP. 1/43/8 2771B2002\* 2772B2002\* 2.3 2.3 3.0 (1.4) APPROVED 3/8 3/8 2771B3002\*\* 2772B3002\* 3.8 3.3 3.0 (1.4) 3/8 2771B4012\*\* 2772B4012\*\* 4.0 3.5 3.0 (1.4) 1/21/23/4 2771B4002\*\* 2772B4002\*\* 7.7 6.5 3.6 (1.6) 3/4 3/4 2771B5002\*\* 2772B5002\* 9.0 7.3 3.6 (1.6) 1 3/4 2771B6012\*\* 2772B6012\* 9.0 7.9 3.6 (1.6) 1 11/4 2771B6002\*\* 2772B6002\* 24 21 7.5 (3.4) Normally Closed (NC) 11/4 11/4 2771B7002\* 2772B7002\* 29 20 7.5 (3.4) 11/2 11/4 2771B8012\* 2772B8012\* 29 21 7.5 (3.4) 10 11 49 11/2 2 2771B8002\* 2772B8002\* 49 16.0 (7.3) 2 2 2771B9002\*\* 2772B9002\*\* 57 57 16.0 (7.3) Normally Open (NO) 2772B9012\*\* 21/2 2 2771B9012\*\* 64 72 16.0 (7.3) NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2772B2002. Insert voltage code: "W" = 24 volts DC; "Z" = 120 volts AC, 60 Hz; e.g., 2771B2002W. For other voltages, consult ROSS.



Applicable Requirements: C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II; CSA C22.2 No. 25-1966 - Enclosures for use in Class II Groups E, F and G Hazardous Locations; CSA C22.2 No. 142-M1987 - Process Control Equipment; C22.2 No. 213-M1987 - Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations; CAN/CSA E79-0-95 - Electrical apparatus for explosive atmospheres, Part 0: General requirements; CAN/CSA E79-18-95 - Electrical apparatus for explosive atmospheres, Part 18: Encapsulation "m".

APPROVED for use in the following Hazardous Locations - Ex m II T4 and Division 1 -

Specifications in accordance to CSA certificate: Class I, Division 1, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Class I, Division 2, Groups A, B, C, D.

Specifications in accordance to FM certificate: Explosion-proof Class I, Division 1, Groups A, B, C, D, T4, Ta = 60 °C (encapsulation/explosion-proof Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 - process control equipment - for hazardous locations; FM CLASS 3600, 3611, 3615, 3810 - hazardous (classified) location electrical equipment

#### For ATEX Certified valves order placement, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: In-Line. Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): 24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps.

 Ambient Temperature:
 40° to 140°F (4° to 60°C).

 Media Temperature:
 40° to 175°F (4° to 80°C).

 Flow Media:
 Filtered air.

 Inlet Pressure:
 Body Size 3/8, 3/4, 1½:
 15 to 150 psig (1 to 10 bar).

 Body Size 2:
 30 to 150 psig (2 to 10 bar).



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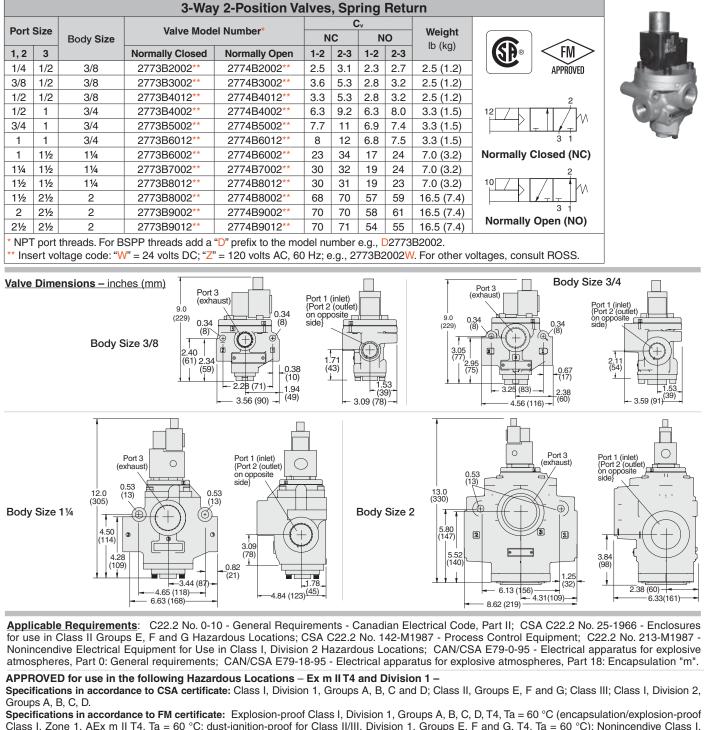
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**F6** 

27 Series

## 27 Series



Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 - process control equipment - for hazardous locations; FM CLASS 3600, 3611, 3615, 3810 - hazardous (classified) location electrical equipment

#### For ATEX Certified valves order placement, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: In-Line. Solenoid Pilot: Rated for continuous duty. Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): 24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps. 
 Ambient Temperature:
 40° to 140°F (4° to 60°C).

 Media Temperature:
 40° to 175°F (4° to 80°C).

 Flow Media:
 Filtered air.

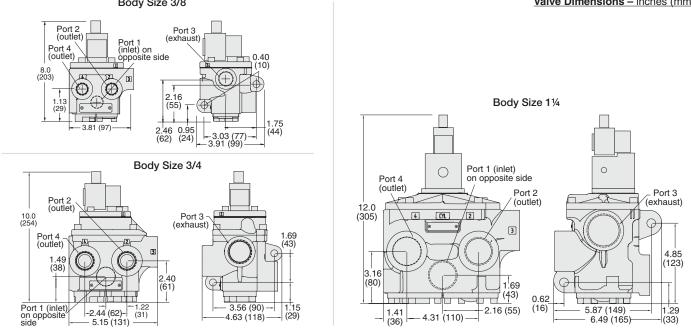
 Inlet Pressure:
 Body Size 3/8, 3/4, 1½:
 15 to 150 psig (1 to 10 bar).

 Body Size 2:
 30 to 150 psig (2 to 10 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



			4-Way 2-Positi	on Valve	es, Sprin	g Return		
Port S	Size	Rody Size	Valve Model Number*	0	Çv	Weight		
1, 2, 4	3	Body Size	valve model Number	1-2, 1-4	4-3, 2-3	lb (kg)		<N
1/4	1/2	3/8	2776B2002**	2.1	2.9	1.9 (0.9)		OVED
3/8	1/2	3/8	2776B3002**	2.9	4.2	1.9 (0.9)		
1/2	1/2	3/8	2776B4012**	3.1	4.3	1.9 (0.9)		
1/2	1	3/4	2776B4002**	5.6	8.1	4.2 (1.9)		
3/4	1	3/4	2776B5002**	7.0	9.3	4.2 (1.9)		
1	1	3/4	2776B6012**	7.8	10	4.2 (1.9)	4	2
1	1½	1¼	2776B6002**	19	26	11.0 (5.0)		Th.
1¼	1½	1¼	2776B7002**	21	27	11.0 (5.0)	]   riai	Ψ.
1½	1½	1¼	2776B8012**	22	27	11.0 (5.0)		
			threads add a "D" prefix to 24 volts DC; "Z" = 120 volts				er voltages, consult R	ROSS.
		Body	v Size 3/8		1		Val	lve Di



Applicable Requirements: C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II; CSA C22.2 No. 25-1966 - Enclosures for use in Class II Groups E, F and G Hazardous Locations; CSA C22.2 No. 142-M1987 - Process Control Equipment; C22.2 No. 213-M1987 -Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations; CAN/CSA E79-0-95 - Electrical apparatus for explosive atmospheres, Part 0: General requirements; CAN/CSA E79-18-95 - Electrical apparatus for explosive atmospheres, Part 18: Encapsulation "m".

#### APPROVED for use in the following Hazardous Locations – Ex m II T4 and Division 1 –

Specifications in accordance to CSA certificate: Class I, Division 1, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Class I, Division 2, Groups A, B, C, D.

Specifications in accordance to FM certificate: Explosion-proof Class I, Division 1, Groups A, B, C, D, T4, Ta = 60 °C (encapsulation/explosion-proof Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 - process control equipment - for hazardous locations; FM CLASS 3600, 3611, 3615, 3810 - hazardous (classified) location electrical equipment

#### For ATEX Certified valves order placement, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Acetal. Mounting Type: In-Line. Solenoid Pilot: Rated for continuous duty. Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): 24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps.

Ambient Temperature: 40° to 140°F (4° to 60°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 15 to 150 psig (1 to 10 bar).





<sup>5</sup> 

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

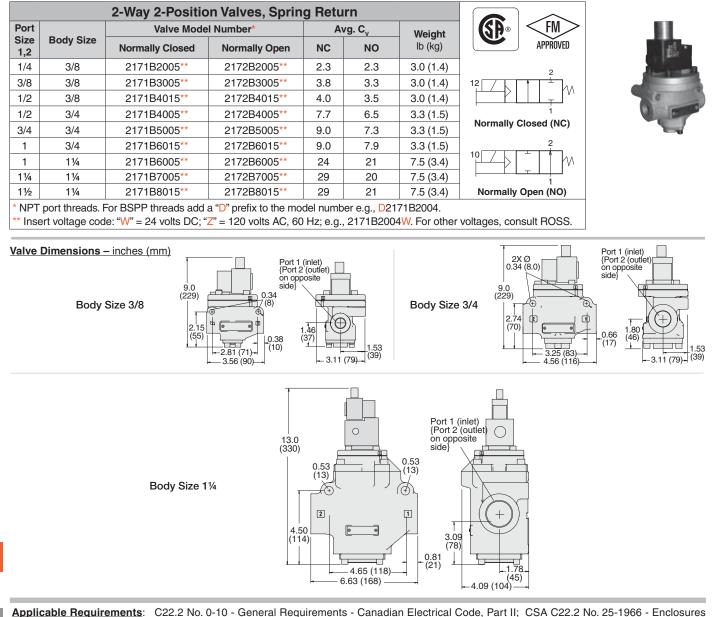


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### For Low Temperature Applications

## 21 Series



Applicable Hequirements: C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II; CSA C22.2 No. 25-1966 - Enclosures for use in Class II Groups E, F and G Hazardous Locations; CSA C22.2 No. 142-M1987 - Process Control Equipment; C22.2 No. 213-M1987 - Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations; CAN/CSA E79-0-95 - Electrical apparatus for explosive atmospheres, Part 0: General requirements; CAN/CSA E79-18-95 - Electrical apparatus for explosive atmospheres, Part 18: Encapsulation "m".

#### APPROVED for use in the following Hazardous Locations – Ex m II T4 and Division 1 – Specifications in accordance to CSA certificate: Class J. Division 1. Groups A. B. Cland D: Class J. Gro

Specifications in accordance to CSA certificate: Class I, Division 1, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Class I, Division 2, Groups A, B, C, D.

**Specifications in accordance to FM certificate:** Explosion-proof Class I, Division 1, Groups A, B, C, D, T4, Ta = 60 °C (encapsulation/explosion-proof Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 - process control equipment - for hazardous locations; FM CLASS 3600, 3611, 3615, 3810 - hazardous (classified) location electrical equipment

#### For ATEX Certified valves order placement, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

 Construction: Poppet; Metal.
 Ambient Temperature: -4° to 140°F (-20° to 60°C).

 Mounting Type: Inline.
 Media Temperature: -4° to 175°F (-20° to 80°C).

 Solenoid Pilot: Rated for continuous duty.
 For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.

 Standard Voltages/Pilot Solenoids Power Consumption (each solenoid):
 Power Consumption (each solenoid):

 24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps.
 Flow Media: Filtered air.

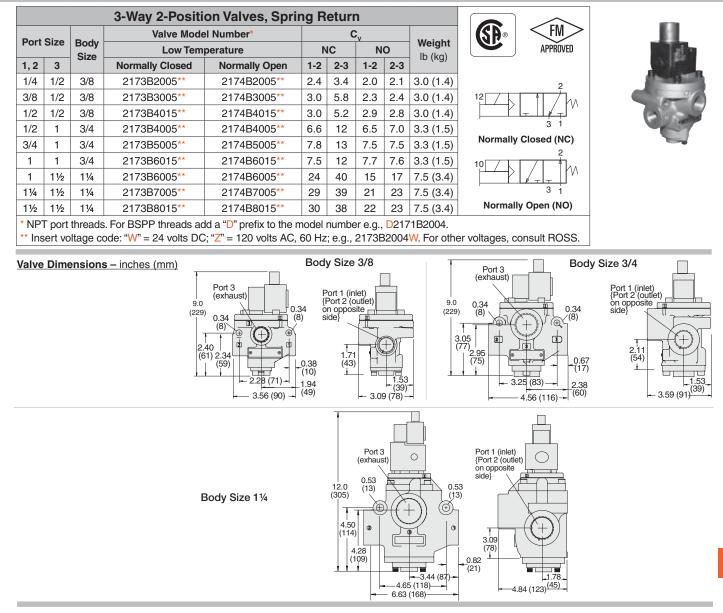
 Inlet Pressure: 30 to 150 psig (2 to 10 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



For Low Temperature Applications

## **21 Series**



Applicable Requirements: C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II; CSA C22.2 No. 25-1966 - Enclosures for use in Class II Groups E, F and G Hazardous Locations; CSA C22.2 No. 142-M1987 - Process Control Equipment; C22.2 No. 213-M1987 - Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations; CAN/CSA E79-0-95 - Electrical apparatus for explosive atmospheres, Part 0: General requirements; CAN/CSA E79-18-95 - Electrical apparatus for explosive atmospheres, Part 18: Encapsulation "m".

#### APPROVED for use in the following Hazardous Locations - Ex m II T4 and Division 1 -

Specifications in accordance to CSA certificate: Class I, Division 1, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Class I, Division 2, Groups A, B, C, D.

**Specifications in accordance to FM certificate:** Explosion-proof Class I, Division 1, Groups A, B, C, D, T4, Ta = 60 °C (encapsulation/explosion-proof Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 - process control equipment - for hazardous locations; FM CLASS 3600, 3611, 3615, 3810 - hazardous (classified) location electrical equipment

#### For ATEX Certified valves order placement, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal. Mounting Type: Inline. Solenoid Pilot: Rated for continuous duty. Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): 24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps. Ambient Temperature:  $-4^{\circ}$  to  $140^{\circ}$ F ( $-20^{\circ}$  to  $60^{\circ}$ C). Media Temperature:  $-4^{\circ}$  to  $175^{\circ}$ F ( $-20^{\circ}$  to  $80^{\circ}$ C). For temperatures below  $40^{\circ}$ F ( $4^{\circ}$ C) air must be free of water vapor to prevent formation of ice. Flow Media: Filtered air. Inlet Pressure: 30 to 150 psig (2 to 10 bar).



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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

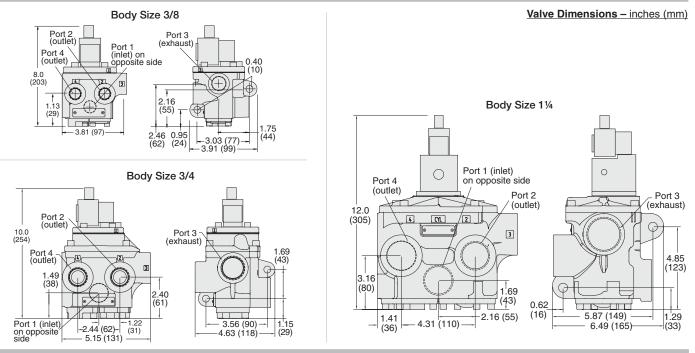
**F6** 

F6.7

For Low Temperature Applications

## 21 Series

		4-Way 2	Position Valves, Sp	oring Re	turn							
Port S	Size	Pody Size	Valve Model Number*	0	Ç <sub>v</sub>	Weight						
1, 2, 4	3	Body Size	Low Temperature	1-2, 1-4	4-3, 2-3	lb (kg)	APPROVED	CO BRUN				
1/4	1/2	3/8	2176B2005**	2.1	2.2	3.0 (1.4)		a				
3/8	1/2	3/8	2176B3005**	2.5	3.1	3.0 (1.4)		<b>O</b> -				
1/2	1/2	3/8	2176B4015**	2.9	3.8	3.0 (1.4)						
1/2	1	3/4	2176B4005**	5.7	6.5	5.8 (2.6)						
3/4	1	3/4	2176B5005**	7.1	8.7	5.8 (2.6)		16				
1	1	3/4	2176B6015**	7.7	10	5.8 (2.6)	4 2	11 3				
1	1½	1¼	2176B6005**	18	23	12.0 (5.4)						
1¼	1½	1¼	2176B7005**	20	28	12.0 (5.4)						
1½	1½	1¼	2176B8015**	21	29	12.0 (5.4)		Port Sizes 1 to 1				
* NPT port threads. For BSPP threads add a "D" prefix to the model number e.g., D2176B2004. ** Insert voltage code: "W" = 24 volts DC; "Z" = 120 volts AC, 60 Hz; e.g., 2176B2004W. For other voltages, consult ROSS.												



Applicable Requirements: C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II; CSA C22.2 No. 25-1966 - Enclosures for use in Class II Groups E, F and G Hazardous Locations; CSA C22.2 No. 142-M1987 - Process Control Equipment; C22.2 No. 213-M1987 - Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations; CAN/CSA E79-0-95 - Electrical apparatus for explosive atmospheres, Part 0: General requirements; CAN/CSA E79-18-95 - Electrical apparatus for explosive atmospheres, Part 18: Encapsulation "m".

APPROVED for use in the following Hazardous Locations – Ex m II T4 and Division 1 –

Specifications in accordance to CSA certificate: Class I, Division 1, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Class I, Division 2, Groups A, B, C, D.

**Specifications in accordance to FM certificate:** Explosion-proof Class I, Division 1, Groups A, B, C, D, T4, Ta = 60 °C (encapsulation/explosion-proof Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 - process control equipment - for hazardous locations; FM CLASS 3600, 3611, 3615, 3810 - hazardous (classified) location electrical equipment

#### For ATEX Certified valves order placement, consult ROSS.

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Poppet; Metal.Ambient Temperature: -4° to 140°F (-20° to 60°C).Mounting Type: Inline.Media Temperature: -4° to 175°F (-20° to 80°C).Solenoid Pilot: Rated for continuous duty.For temperatures below 40°F (4°C) air must be free of water vapor toStandard Voltages/Pilot Solenoids Power Consumption (each solenoid):For temperatures delow 40°F (4°C) air must be free of water vapor to24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps.Flow Media: Filtered air.Inlet Pressure: 30 to 150 psig (2 to 10 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



## 27 & 21 Series Accessories

Port size 21/2

### Silencers

E ....

Port size 1/8 thru 2

Port	Thread	Mode	I Number*	Avg.	rg. Dimensions inches (mm) Weic		Dimensions inches (mm) Weight			
Size	Туре	NPT Threads	BSPT Threads	C <sub>v</sub> A B lb (kg)						
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)			
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)	-	В	
1½	Female	5500A8001	D5500A8001	29.9	2.5 (64)	5.7 (144)	1.0 (0.5)	LLLI	Male Pipe Threads	В
21⁄2	Female	5500A9002	D5500A9002	103.7	4.0 (102)	5.7 (145)	2.9 (1.4)		Fe	male Pipe Thread

### **Conversion Kits**

ROSS Controls standard poppet solenoid pilot controlled valves for line mounting can be easily field-converted into an explosion-proof solenoid pilot poppet valve.

Listed below are the conversion kit numbers to replace the obsolete ROSS explosion proof pilot, or to convert a standard in-line valve to an explosion-proof valve.

Valve Basic Size	Kit Number
1/4" - 1" (Cv up to 10)	2370K77W
1" (Cv up to 29) - 21/2"	2371K77W



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

**F6** 

## **Control Reliable Explosion Proof Double Valves** with Dynamic Monitoring & Memory

## DM<sup>2®</sup> Series C Air Dump / Release

#### Basic Size 4, 12 and 30

**Dynamic Monitoring With Complete Memory:** Memory, monitoring, and air flow control functions are simply integrated into two identical valve elements. Valves lock-out due to asynchronous movement of valve elements during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply.

An Action is Required for Reset – cannot be reset by removing and re-applying supply pressure. Reset can only be accomplished by the optional integrated electrical (solenoid) reset.

**Basic 3/2 Normally Closed Valve Function:** Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance – operates with or without inline lubrication.

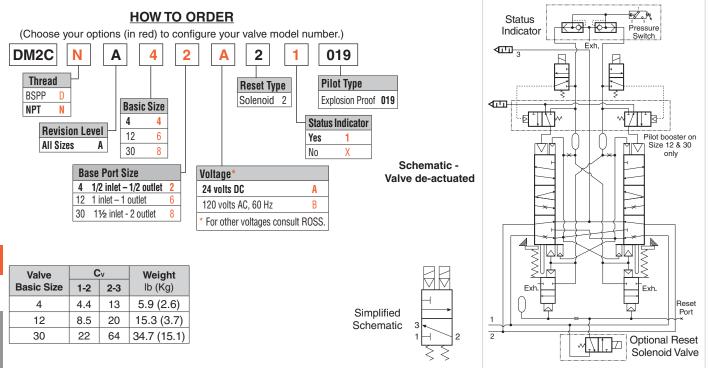
**Status Indicator:** Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the lockout or ready-to-run condition.

Silencers: All models include high flow, clog resistant silencers.

**Mounting:** Base mounted – with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included). Captive valve-to-base mounting screws.

#### Basic Size 12 and 30

**Intermediate Pilots:** Increases pilot air flow for fast valve response, making it possible to use the same size solenoids as valve sizes 4, thereby reducing electrical power requirements for these larger valves.



#### **F6**

Applicable Requirements: C22.2 No. 0-10 - General Requirements - Canadian Electrical Code, Part II; CSA C22.2 No. 25-1966 - Enclosures for use in Class II Groups E, F and G Hazardous Locations; CSA C22.2 No. 142-M1987 - Process Control Equipment; C22.2 No. 213-M1987 - Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations; CAN/CSA E79-0-95 - Electrical apparatus for explosive atmospheres, Part 0: General requirements; CAN/CSA E79-18-95 - Electrical apparatus for explosive atmospheres, Part 18: Encapsulation "m".

#### APPROVED for use in the following Hazardous Locations - Ex m II T4 and Division 1

Specifications in accordance to CSA certificate: Class I, Division 1, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Class I, Division 2, Groups A, B, C, D.

Specifications in accordance to FM certificate: Explosion-proof Class I, Division 1, Groups A, B, C, D, T4, Ta = 60 °C (encapsulation/explosion-proof Class I, Zone 1, AEx m II T4, Ta = 60 °C; dust-ignition-proof for Class II/III, Division 1, Groups E, F and G, T4, Ta = 60 °C); Nonincendive Class I, Division 2, Groups A, B, C, D, T4, Ta = 60 °C; Suitable for Class II, III, Division 2, Groups E, F, G, T4, Ta = 60 °C

CSA CLASS 2258 02 – process control equipment – for hazardous locations FM CLASS 3600, 3611, 3615, 3810 – hazardous (classified) location electrical equipment

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses,

see DM2<sup>®</sup> Series D for mechanical power press applications.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



applications

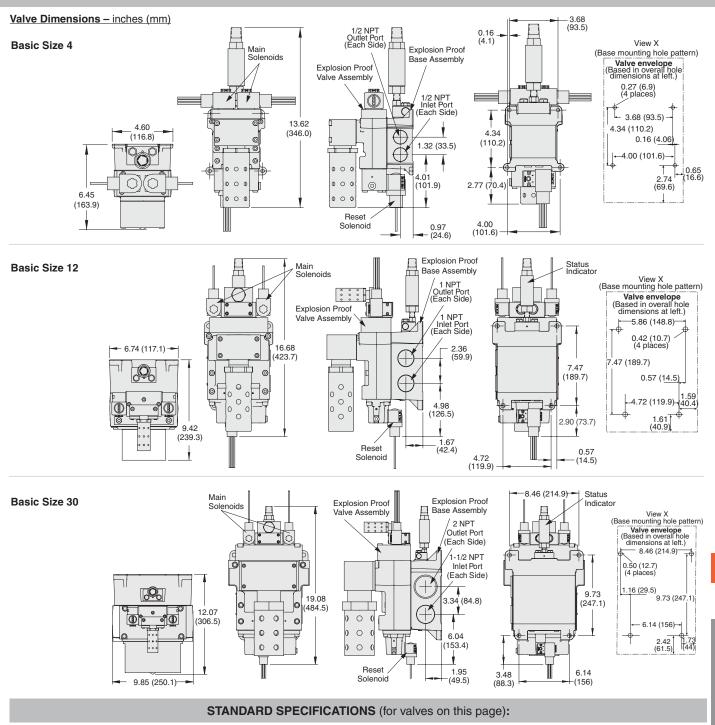
FM

APPROVED



# Control Reliable Explosion Proof Double Valves with Dynamic Monitoring & Memory

## DM<sup>2®</sup> Series C Valve Technical Data



#### Construction: Dual poppet.

Mounting Type: Base mounted.

**Pilot Solenoids:** According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Three solenoids, rated for continuous duty. **Standard Voltages/Pilot Solenoids Power Consumption** (each solenoid): *Primary and reset solenoids:* 

24 volts DC, 4.6 watts; 120 volts AC, 60 Hz, 6.8 volt amps.

Enclosure Rating: IP65, IEC 60529.

**Electrical Connection:** Three lead wires with 1/2 NPT conduit connection. **Ambient Temperature:**  $15^{\circ}$  to  $122^{\circ}$ F (- $10^{\circ}$  to  $50^{\circ}$ C).

Media Temperature: 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46).

**Inlet Pressure:** 30 to 120 psig (2 to 8 bar).

Pressure Switch (Status Indicator) Rating: Contacts - 1 amps at 250 volts AC, SPDT.

#### Pressure Switch Enclosure Rating: IP66.

**Monitoring:** Dynamically, cyclically, internally during each actuating and de-actuating movement. Monitoring function has memory and requires an overt act to reset unit after lockout.

**Mounting Orientation:** Preferably horizontally (valve on top of base) or vertically with pilot solenoids on top.

Product data for Sistema Library users, pending.

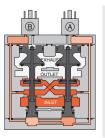


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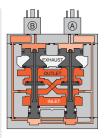
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

Valve de-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages from the inlet chamber is restricted by orifices that allow air pressure to bypass the lower inlet poppets. Flow is sufficient to quickly pressurize the pilot supply/timing chambers on both sides A and B. The upper inlet poppets prevent air flow from the crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the de-actuated position. (Internal air passages shown out of the valve body for clarity.)



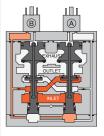
Valve actuated: Energizing the pilot solenoids simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated position, where inlet air flow to outlet is open and both exhaust poppets are closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the main solenoids causes the valve elements to return to the ready-to-run (de-actuated) position.



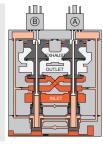
Asynchronous Operation: If the valve elements operate in a sufficiently asynchronous manner on ACTUATION, the valve will shift into a position where one crossover and its related timing chambers will be exhausted, and the other crossover and its related timing chambers will be pressurized.

In the illustration, side B is in the de-actuated position, but has no pilot air available to actuate with and has full pressure on its upper and lower inlet poppets and return piston to hold it in place.

Inlet air flow on side B into its crossover is restricted and flows through the open upper inlet poppet on side A, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. Once the main solenoids are de-energized, actuating pressure is removed from the top of the main pistons and then the lower inlet poppet return spring along with inlet air pressure acting on the side A return piston will push side A back into the de-actuated position. Inlet air pressurizes the crossovers and volume chambers. Pressure in the crossovers helps hold the upper inlet poppets on seat. The valve will then be in the ready-to-run position. On the next attempt to actuate normally, if side B is still unable to actuate synchronously with side A, the same sequence of events described above will occur again.

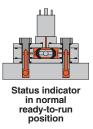


WARNING: If asynchronous operation occurs while DE-ACTUATING, the pilot supply/timing chambers on one side will still be exhausted as described above. However, this could be a temporary situation because the cause of the asynchronous operation may be able to correct itself allowing the stuck or slow acting side of the valve to eventually move back into the de-actuated position. Once the slow or stuck side has de-actuated, the pilot supply/timing chambers that were exhausted will then repressurize. If an external monitoring system is only checking the status indicator periodically this fault signal could be missed. The machine's safety system must be designed to ensure that this does not cause a hazardous situation.



#### Status Indicator:

The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve operation is sufficiently asynchronous or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.



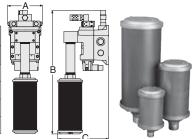
#### Accessories & Options

(EPNdB) in the 35-40 dB range.

### High-Flow, High Reduction Silencer KITS

Kit Number\* Dimensions inches (mm) Basic Flow Size scfm NPT threads **BSPT** threads С Α B (NPT) B (BSPT) 4 2324H77 2330H77 800 (378) 4.34 (110.2) 20.68 (525.3) 23.02 (584.7) 7.27 (184.7) 12 31.65 (803.91) 10.66 (270.8) 2326H77 2331H77 2080 (982) 6.74 (117.2) 29.3 (744.2) 2327H77 2332H77 9.85 (250.2) 42.69 (1084.3) 42.69 (1084.3) 13.47 (342.1) 30 7200 (3398) Kits include all plumbing required for installation. Pressure Range: 125 psig (8.6 bar) maximum.

Designed to improve equipment performance and reduce the Exponentially Perceived Noise



**Status Indicator** 

The Status Indicator pressure switch actuates when the valve is in a ready-to-run condition and de-actuates when the valve is in a lockout condition or when the inlet air pressure has been removed. Although, the valves can be purchased with this option already installed, the Status Indicator can be purchased separately.

Model Number

Y739B94

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



F

**F6** 

Online Version Rev. 11/14/16

## **Explosion Proof ISO Valves**

		DESCRIPTION				ON AVAILABLE PORT SIZES					FL	INC.	ΓΙΟΙ	NS						Explosic Certific	on Proof cations				
VALVE TYPE	Series	ISO Size	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	3/2 Single	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)	Solenoid Control	<b>Direct Solenoid Control</b>	Pressure Control	CSA/ UL	ATEX	Page
ISO																									
ISO 5599/I	W60 & W64	1																	0.8						A2.3 - A2.7
	W60 & W64	2																	1.9						A2.3 - A2.7
	W60 & W64	3																	3.8						A2.3 - A2.7

For Explosion-proof ISO Valves order placement, consult ROSS.







# **ROSS** CONTROLS®

## **AIR-FUSE FLOW DIFFUSERS**



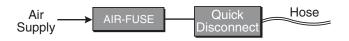
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## **AIR-FUSE Flow Diffusers**

## 19 Series Minimize Hose Whip

The ROSS AIR-FUSE Flow Diffuser automatically reduces air flow to minimize hose whip. After a hose failure has occurred, the AIR-FUSE is designed to minimize the whip effect of the hose. A minimal amount of media flow will occur after the AIR-FUSE is triggered. This pilot flow will escape to atmosphere and continue until the AIR-FUSE is reset, therefore, the AIR-FUSE is intended to be used only with non-corrosive, non-flammable, non-hazardous gases. To reset the AIR-FUSE, simply shut-off the air supply.



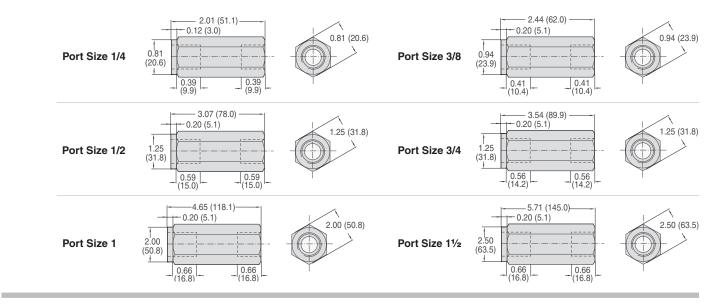


## **Ordering Information**

Proper sizing of the Air-Fuse unit is guided by the air-operated work elements. Required flow rating must be ensured; i.e., flow capacity of the pneumatic element (pressure regulator, ball valve) installed upstream of the Air-Fuse must be larger, than that of the used hose-break protection.

Port Size	Porting Type	Model Number*	Shut-off Flow Rate at 100 psi (7 bar) scfm (dm³/s)	Flow at 100 psi (7 bar) ΔΡ 1 psi (0.07 bar) scfm (dm³/s)	Weight Ib (kg)					
1/4	Female-Female	1969D2002	29.7 (14)	13.8 (8)	0.09 (0.04)	I I				
3/8	Female-Female	1969D3002	68.2 (32)	28.6 (14)	0.15 (0.07)					
1/2	Female-Female	1969D4002	102.3 (48)	49.2 (23)	0.33 (0.15)	1 2				
3/4	Female-Female	1969D5002	169.5 (80)	91.1 (43)	0.28 (0.13)					
1	Female-Female	1969D6002	271.0 (128)	144 (68)	1.19 (0.54)					
1½	Female-Female	1969D8002	568.0 (268)	307 (145)	2.20 (1.00)					
*NPT port threads. For BSPP threads add a "D" prefix to the model number, e.g., D1969D2002.										

Valve Dimensions - inches (mm)



#### Reduces the Dangers of Hose and Plastic Tubing Failure

#### STANDARD SPECIFICATIONS (for valves on this page):

Ambient/Media Temperature: 35° to 175°F (2° to 80°C). For temperature below 35°F (2°C), consult ROSS. Flow Media: Filtered air. Operating Pressure: Maximum 232 psi (16 bar). Minimum according to hose length. Drop pressure at shut-off flow: 4.4 psi (0.3 bar). Mounting: In-line two-way valve. To be inserted between fixed air supply and flexible air lines Material: *Housing:* Aluminum. *Inner parts:* Brass. *Spring:* Stainless Steel.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



#### **Coiled Hose Selection Information**

		Mini	mum Suj	oply Worki	ng pressui	re based o	n hose len	igth and di	ameter psi	g (bar)		
Model	Port	Hose				Inte	ernal Hose D	iameter inch	(mm)			
Number	Size	Length feet (meter)	0.25	0.313	0.370	0.470	0.500	0.590	0.750	1.000	1.250	1.500
		12 (3.65)	70 (4.82)	31 (2.13)	17 (1.17)	10 (0.69)	9 (0.62)	8 (0.55)	7 (0.48)	7 (0.48)	7 (0.48)	7 (0.48)
100000000	1/4	25 (7.62)	137 (9.45)	57 (3.93)	27 (1.86)	13 (0.90)	11 (0.76)	9 (0.62)	8 (0.55)	7 (0.48)	7 (0.48)	7 (0.48)
1969D2002	1/4	50 (15.24)		107 (7.38)	47 (3.24)	19 (1.31)	15 (1.03)	11 (0.76)	8 (0.55)	7 (0.48)	7 (0.48)	7 (0.48)
		100 (30.48)		207 (14.27)	87 (6)	30 (2.10)	23 (1.58)	14 (0.96)	9 (0.62)	8 (0.55)	7 (0.48)	7 (0.48)
		12 (3.65)		132 (9.10)	57 (3.93)	21 (1.45)	17 (1.17)	11 (0.76)	8 (0.55)	8 (0.55)	7 (0.48)	7 (0.48)
1969D3002	3/8	25 (7.62)			111 (7.65)	37 (2.55)	28 (1.93)	16 (1.10)	10 (0.69)	8 (0.55)	7 (0.48)	7 (0.48)
1909D3002	3/0	50 (15.24)			215 (14.82)	67 94.61)	49 (3.38)	25 (1.72)	12 (0.83)	8 (0.55)	8 (0.55)	7 (0.48)
		100 (30.48)				126 (8.69)	91 (6.27)	42 (2.90)	17 (1.17)	9 (0.62)	8 (0.55)	7 (0.48)
		12 (3.65)			119 (8.20)	39 (2.69)	30 (2.07)	17 (1.17)	10 (0.69)	8 (0.55)	7 (0.48)	7 (0.48)
1969D4002	1/2	25 (7.62)				74 (5.10)	54 (3.72)	27 (1.86)	13 (0.90)	8 (0.55)	8 (0.55)	7 (0.48)
1909D4002	1/2	50 (15.24)				141 (9.72)	102 (7.03)	46 (3.17)	19 (1.31)	10 (0.69)	8 (0.55)	8 (0.55)
		100 (30.48)					196 (13.51)	85 (5.86)	29 (2)	12 (0.83)	9 (0.62)	8 (0.55)
		12 (3.65)				96 (6.62)	70 (4.83)	33 (2.27)	15 (1.03)	9 (0.62)	8 (0.55)	7 (0.48)
1969D5002	3/4	25 (7.62)				193 (13.31)	139 (9.58)	62 (4.27)	23 (1.58)	11 (0.76)	8 (0.55)	8 (0.55)
1909D5002	5/4	50 (15.24)						116 (8)	38 (2.62)	14 (0.97)	9 (0.62)	8 (0.55)
		100 (30.48)						224 (15.44)	69 (4.76)	20 (1.38)	11 (0.76)	9 (0.62)
		12 (3.65)				231 (15.93)	166 (8)	73 (15.03)	26 (1.79)	11 (0.76)	8 (0.55)	8 (0.55)
1969D6002	1	25 (7.62)						144 (9.93)	47 (3.24)	16 (1.10)	10 (0.69)	8 (0.55)
19090002	1	50 (15.24)							85 (5.86)	24 (1.65)	12 (0.83)	9 (0.62)
		100 (30.48)							163(11.24)	14 (0.96)	17 (1.17)	11 (0.76)
		12 (3.65)							89 (6.14)	25 (1.72)	13 (0.89)	9 (0.62)
1969D8002	1½	25 (7.62)							179 (12.34)	44 (3.03)	18 (1.24)	12 (0.83)
13030002	172	50 (15.24)								81 (5.58)	20 (1.38)	16 (1.10)
		100 (30.48)								154 (10.62)	52 (3.58)	24 (1.65)

#### Important Notes:

Flow is automatically reduced to a non-hazardous level after the ROSS AIR-FUSE has sensed a broken hose or tube. Until the supply of the compressed media is turned off, a nominal amount of flow will occur through the AIR-FUSE, therefore use only with non-corrosive, non-flammable and non-hazardous gases (check material compatibility). AIR-FUSE size should equal hose inside diameter. No reduced fittings should be used downstream of the AIR-FUSE before the tool. Flow-reducing fittings may only be used if they are directly connected with the work element.

When applying the AIR-FUSE to a directional valve application, the valve should be oversized to eliminate excessive back pressure.

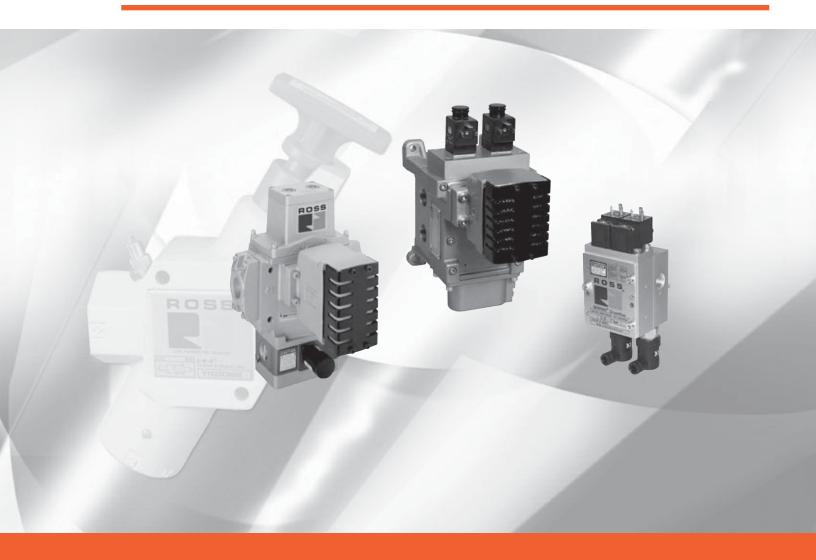






# ROSS CONTROLS®

## Double Valves for Clutch/Brake Control DM<sup>2®</sup> Series D and 35 Series





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35 Series Double Valves

	U		AV	AILA	BLE	POR	T SIZ	ES.				N	IAX. F	LOW	Cv			F	Rese	t	
VALVE	Basic Size												Port	t Size				_	e	bid	Page
SERIES	Basi	1/4	3/8	1/2	3/4	1	1¼	<b>1</b> ½	2	1/4	3/8	1/2	3/4	1	1¼	<b>1</b> ½	2	Manual	Remote	Solenoid	
DM <sup>2®</sup> D with Tota	al Dynai	nic N	lonit	oring	g & Co	ompl	ete N	lemo	ry												
DM <sup>2®</sup> D	2, 4, 8									2.17	2.17	2.8	4.63	4.63							G1.3 - G1.6
DM <sup>2®</sup> D	12, 30													8.86		20.22					G1.3 - G1.6
DM <sup>2®</sup> D Series E	& C Pre	asse	mble	ed Wi	ring l	Kits															G1.7
Accessories																					G1.8
35 SERPAR <sup>®</sup>																					
	4										3	3	3								G2.3 - G2.4
L-G Monitor	8											3.5	4	4							G2.5 - G2.6
L-G Monitor	12												8	8.5	9						G2.5 - G2.6
	30														20.0	21	21				G2.5 - G2.6
	8											3.5	4	4							G2.7 - G2.8
E-P Monitor	12												8	8.5	9						G2.7 - G2.8
	30														20	21	21				G2.7 - G2.8
DOM	8											3.5	4	4							G2.9 - G2.10
D-S Monitor	12												8	8.5	9						G2.9 - G2.10
	30														20	21	21				G2.9 - G2.10
35 SERPAR <sup>®</sup> Cro	ssflow																				
With or Without Pressure	1									0.9	1.2										G3.3 - G3.4
Switches	2											3.7	4.2								G3.5 - G3.6
	4										3	3	3								G3.7
With Pressure	8											3.5	4	4							G3.8 - G3.9
Switches	12												8	8.5	9						G3.8 - G3.9
	30														20	21	21				G3.8 - G3.9

G1

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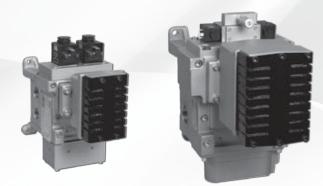


## **ROSS** CONTROLS®

## DOUBLE VALVES CONTROL RELIABLE FOR CLUTCH/BRAKE CONTROL DM<sup>2®</sup> SERIES D



www.rosscontrols.com



### DM<sup>2®</sup> Monitoring:

The DM<sup>2®</sup> is a patented 3/2 normally closed valve (with an intermediate, lockout position) distinguished by SERPAR<sup>®</sup> Crossflow passages with poppet and spool valving on the main valve stems. This arrangement provides the valve's outstanding flow characteristics and an integrated monitoring capability with total memory. The valve provides dynamic monitoring and dynamic memory.

*Dynamic Monitoring* means that all monitoring components change state on every valve cycle. Should the valve elements cycle asynchronously, the valve will exhaust downstream air and lock-out, prohibiting further operation.

*Dynamic Memory* within a monitoring system indicates that when a valve lock-out occurs, the valve will retain the fault information regardless of air or electrical changes. The DM<sup>2®</sup> system can only be reset by a defined operation/procedure, and will not self-reset (turning the valve off and on) or reset when inlet air supply is removed and re-applied. Such automatic resetting would conceal potential hazards from the operator.

	AVAILABLE PORT SIZES							I	MAX. FI		'			Reset		
VALVE SERIES									Port	Size			_	e	oid	Page
SENIES	1/4	3/8	1/2	3/4	1	1½	1/4	3/8	1/2	3/4	1	<b>1</b> ½	Manual	Remote	Solenc	
DM <sup>2®</sup> D							2.17	2.17	2.8	4.63	4.63 8.86	20.22				G1.3 - G1.6
DM <sup>2®</sup> D Series E & C Preassembled Wiring Kits										G1.7						
Accessories											G1.8					

#### Explosion-Proof solenoid pilot valves available, consult ROSS.



SP

CE

## Self Monitored - Clutch/Brake Control

#### Basic Size 2, 4, 8, 12 and 30

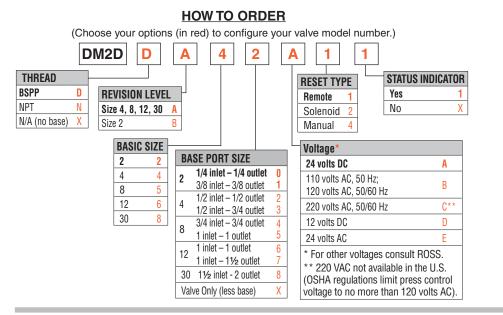
**Dynamic Monitoring With Complete Memory:** Memory, monitoring, and air flow control functions are simply integrated into two identical valve elements. Valves lock-out due to asynchronous movement of valve elements during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply. Overt action is required for reset – cannot be reset by removing and re-applying supply pressure. Reset can only be accomplished by remote air signal, optional electrical solenoid reset signal, or optional manual reset. **Basic 3/2 Normally Closed Valve Function:** Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. PTFE back-up rings on pistons to enhance valve endurance – operates with or without inline lubrication.

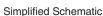
Status Indicator (Optional): Includes a pressure switch with both normally open and normally closed contacts to provide status feedback to the press control system indicating whether the valve is in the lockout or ready-torun condition. The Status Indicator can be ordered installed or purchased separately and added to any DM<sup>2®</sup> base. Silencers: All models include high flow, clog resistant silencers.

**Mounting:** Base mounted – with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included). Captive valve-to-base mounting screws.

#### Basic Size 12 and 30

**Intermediate Pilots:** Increases pilot air flow for fast valve response, making it possible to use the same size solenoids as valve sizes 2, 4 & 8, thereby reducing electrical power requirements for these larger valves.





Valve Basic	C	v	Weight#								
Size	1-2	2-3	lb (Kg)								
2	2.17	3.66	5 (2.3)								
4	2.80	6.70	6.0 (2.8)								
8	4.63	12.55	9.1 (4.2)								
12	8.86	20.78	15.5 (7.1)								
30	30 20.22 53.68										
# Valve and base assembly with status indicator and solenoid reset.											

Connectors ordered separately, refer to page G1.8. For other options, consult ROSS.

**STANDARD SPECIFICATIONS** (for valves on this page):

Construction: Dual poppet. Inlet Pressure: Basic Size 2: 45 to 150 psig (3.1 to 10.3 bar). Basic Size 4, 8, 12, 30: 30 to 120 psig (2.1 to 8.3 bar). Mounting Type: Base mounted. Pilot Solenoids: According to VDE 0580. Two solenoids, rated for Reset Pressure: For remote air reset option - must be equal to inlet pressure. continuous duty (additional solenoid on optional reset). Manual Pressure: Encapsulated, push button actuation. Standard Voltages/Pilot Solenoids Power Consumption (each solenoid): Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 Basic Size 2, 4, 12, 30: Primary and reset solenoids: volts AC, or 5 amps at 30 volts DC. 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz. Monitoring: Dynamically, cyclically, internally during each actuating and 5.8 watts nominal on AC and DC de-actuating movement. Monitoring function has memory and requires an 6.5 watts maximum on AC and DC. overt act to reset unit after lockout. Basic Size 8: 24 volts DC; 110 volts AC, 50/60 Hz. Mounting Orientation: Preferably horizontally (valve on top of base) or Primary solenoids:15 watts on DC; 36 VA inrush and 24.6 VA holding on AC. vertically (with pilot solenoids on top). Reset solenoid: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC Functional Safety Data: Category 4 PL e; B10d: 20,000,000; PFHd: Enclosure Rating: DIN 40050, IP65, IEC 60529. 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). Electrical Connection: EN 175301-803 Form A. Certifications: CE Marked for applicable directives, BG, CSA/UL, TSSA Ambient Temperature: 15° to 120°F (-10° to 50°C). for appropriately tested valves. Media Temperature: 40° to 175°F (4° to 80°C). Vibration/Impact Resistance: Tested to BS EN 60068-2-27. Flow Media: Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46).



Online Version Rev. 11/14/16

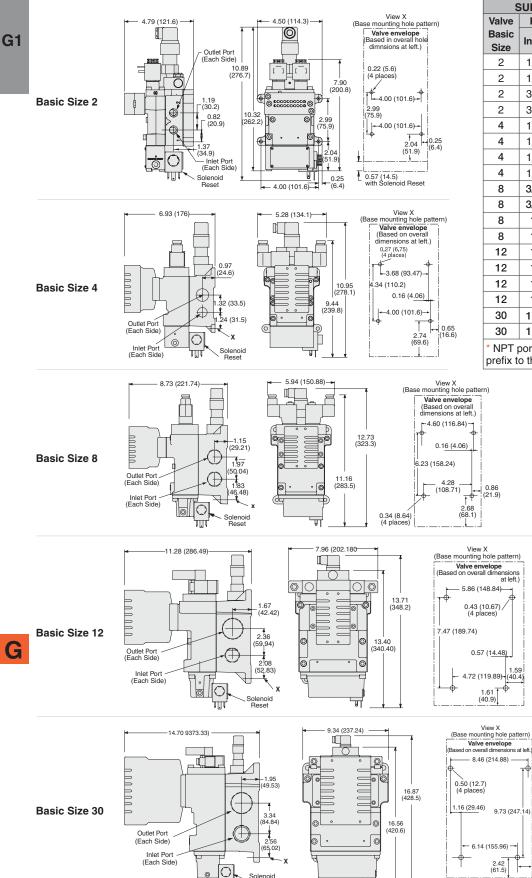
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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## **Control Reliable Double Valves** DM<sup>2®</sup> Series D

Valve Dimensions - inches (mm)



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L TUT

Solenoid Reset

## Valve Technical Data

SUB-BASE MODEL NUMBERS and SUB-BASE SPECIFIC INFORMATION					
Valve Basic Size	Por Inlet	t Size Outlet	Sub-Base Model Number	Status Indicator	Weight Ib (kg)
2	1/4	1/4	1872C91	No	1.7 (0.8)
2	1/4	1/4	1873C91	Yes	2.1 (1.0)
2	3/8	3/8	1874C91	No	1.7 (0.8)
2	3/8	3/8	1875C91	Yes	2.1 (1.0)
4	1/2	1/2	1697C91	No	1.7 (0.8)
4	1/2	1/2	1698C91	Yes	2.3 (1.1)
4	1/2	3/4	1699C91	No	1.7 (0.8)
4	1/2	3/4	1700C91	Yes	2.3 (1.1)
8	3/4	3/4	1701C91	No	3.6 (1.6)
8	3/4	3/4	1702C91	Yes	4.2 (1.9)
8	1	1	1703C91	No	3.6 (1.6)
8	1	1	1704C91	Yes	4.2 (1.9)
12	1	1	1705C91	No	6.2 (2.8)
12	1	1	1706C91	Yes	6.8 (3.1)
12	1	1½	1707C91	No	6.2 (2.8)
12	1	1½	1708C91	Yes	6.8 (3.1)
30	1½	2	1709C91	No	12.0 (5.4)
30	1½	2	1710C91	Yes	12.6 (5.7)
* NPT port threads. For BSPP threads add a "D"					

prefix to the model number, e.g., D1872C91.

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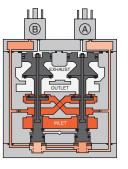


# Control Reliable Double Valves DM<sup>2®</sup> Series D

# Valve Operation

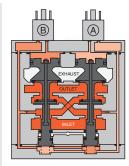
#### Valve de-actuated (ready-to-run):

The flow of inlet air pressure into the crossover passages is restricted by the size of the passage between the stem and the valve body opening. Flow is sufficient to quickly pressurize pilot supply/timing chambers A and B. The inlet poppets prevent air flow from crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the closed position. (Air passages shown out of position and reset adapter omitted for clarity.



#### Valve actuated:

Energizing the pilot valves simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated (open) position, where inlet air flow to crossover passages is fully open, inlet poppets are fully open and exhaust poppets are fully closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the pilots quickly causes the valve elements to return to the ready-to-run position.



**G1** 

#### Valve locked-out:

Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized. The valve element (side B) that is partially actuated has pilot air available to fully actuate it, but no air pressure on the return piston to fully de-actuate the valve element. Air pressure in the crossover acts on the differential of side B stem diameters creating a latching force. Side A is in a fully closed position, and has no pilot air available to actuate, but has full pressure on the inlet poppet and return piston to hold the element in the fully closed position.

Inlet air flow on side A into its crossover is restricted, and flows through the open inlet poppet on side B, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure.

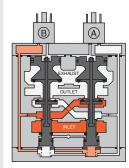
The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully closed position.

1 🛛 1

B

0 🗆 0

(A)



#### **Resetting the valve:**

The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied. A remote reset signal (air or electric), or a manual push button actuation must be applied to reset the valve.

Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the main valve elements to their closed position. Inlet air fully pressurizes the crossovers and holds the inlet poppets on seat. Actuation of the reset piston opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset. (Reset adapter added to illustration.)

De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize.

Reset air pressure can be applied by a remote 3/2 normally closed valve, or from an optional 3/2 normally closed solenoid, or a manual push button mounted on the reset adapter.

#### **Status Indicator:**

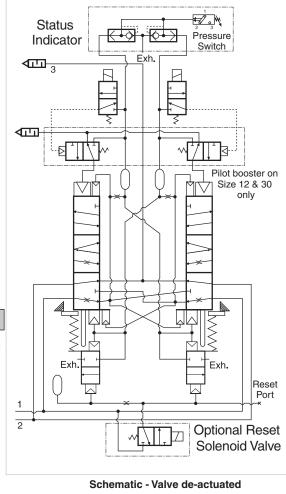
The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve is in the locked-out position or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.

A

Status indicator (optional) in normal ready-to-run position.

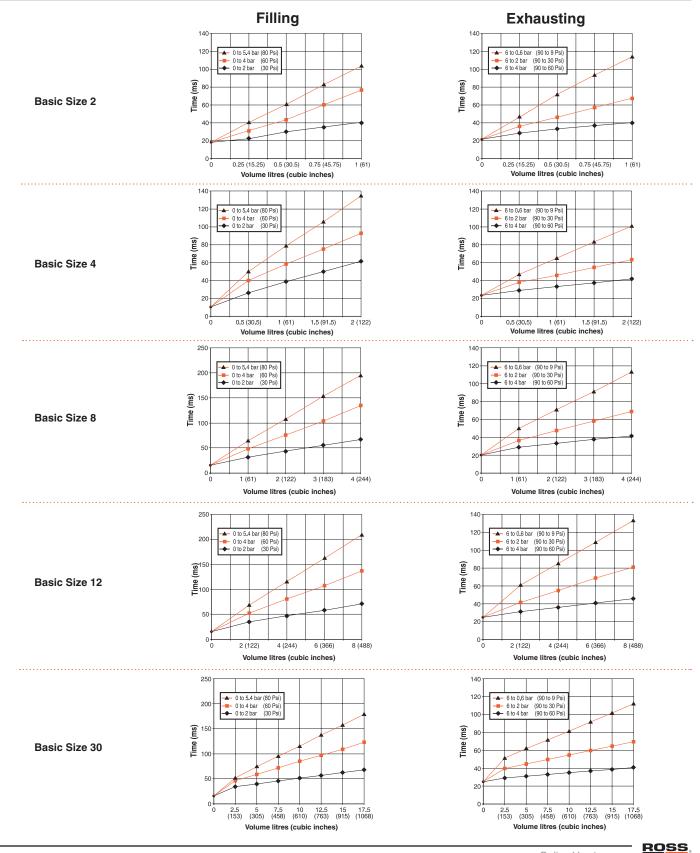
Basic Size 12 and 30 valves require relatively large pilots to actuate and de-actuate the main valve elements. In order to achieve extremely quick valve response for such large pilots, a 2-stage solenoid pilot system is incorporated into the design. This keeps the required electrical current to operate the pilots to a minimum.

Basic Size 12 & 30 pilots



B

The charts below represent the fill and exhaust times for each of the various sizes of DM<sup>2®</sup> Series D double valves. The "fill" times were measured while raising (filling) the pressure in a volume from 0 to 30, 60, & 80 psi (0 to 2.1, 4.1, & 5.5 bar) with a 90 psi (6.2 bar) inlet pressure. Conversely, the "exhaust" times were measured while lowering the pressure (exhausting) in a volume from 90 psi (6.2 bar) down to 90 to 60, 30, & 9 psi (4.1, 2.1, & 0.6 bar). **Exhausting tests performed with silencer installed.** 



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# DM<sup>2®</sup> Series D Preassembled Wiring Kits

Status Indicator Cable

with EN connector

• 1

<u>3 BL</u>M

GR'

GRY

GRN/YEL

**G1** 

BRN

<u>BLK</u>

Solenoid Cables

with EN connector

0 1

BBN

Solenoid Cables

with M12 Connector

4 BLACK

BLACH

BLUE

NOT USED

BLUE

GRN/YEI

GRY PIN 2

GRN/YEI GROUNI

# Preassembled Wiring Kits

	Kit Number*		Length				
Connector	Lighted C	connector	Solenoid Connector Type	meters			
without Light	24 Volts DC	120 Volts AC	туре	(feet)			
2283H77	2532H77-W	2532H77-Z	EN 175301-803 Form A	5 (16.4)			
2284H77	2533H77-W	2533H77-Z	EN 175301-803 Form A	10 (32.8)			
2288H77**	-	-	M12	5 (16.4)			
2289H77**	_	_	M12	10 (32.8)			
* Each cable h	* Each cable has one connector. **Coil includes light.						

These kits include 1 cable for the status indicator, and 3 cables with connector plus a cord grip for each.

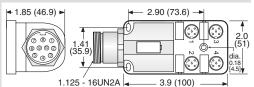
# Wiring Kits with J-Box

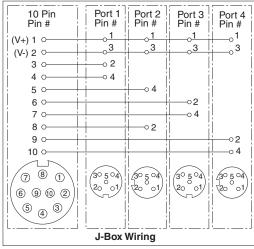
Kit Number*	Connector Types	Length meters (feet)				
2249H77	M12 - DIN	1 (3.3)				
2250H77	M12 - M12	1 (3.3)				
*24 volts DC only.						



A J-Box is a junction box with a 10-pin MINI connector for connecting to the user's control system and (4) 5-pin M12 ports for connecting to the 3 solenoids and the status indicator on the DM<sup>2®</sup> Series valve. The J-Box kits include the J-Box as described above and (4) 1-meter cables for connecting to the valve. These cables have a connector on each end. The status indicator cable and the (3) solenoid cables have an M12 connector on one end and a EN connector on the other end (M12-DIN).

Standard valves come with DIN type solenoid connections, but could be bought with M12 type connections as well. Therefore we also offer a kit that provides solenoid cables with an M12 connector on each end (M12-M12).





# **10 PIN MINI Cable**

Kit Number	Length meters (feet)
2253H77	3.66 (12)
2254H77	6.1 (20)
2255H77	9.1 (30)
2256H77	15.2 (50)

These cables have a 10-pin MINI connector for connecting the J-Box kits above to the user's control system. Kits include one cable with connector and cord grip. Cable conductors are 18-gauge wire.

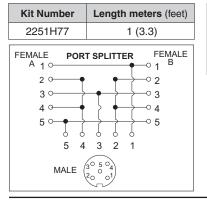
PI	N #	РI	N #	Wire
1	+24 volts DC	6	-	Oran
2	Common volts DC	7	Remote Reset	Blue
3	-	8	-	White
4	Solenoid A	9	Remote Valve Fault Light	Red
5	Solenoid B	10	Remote System OK Light	Gree

Wire Colors: Wire Colors: Orange Orange w/Black Blue Red White w/Black Green/Yellow Red w/Black Black Green w/Black White

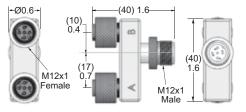
ack (7 8 1) (6 9 10 2) (6 4 3)

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# **Outlet Port Pressure Monitoring Wiring Kit**



Some customers prefer to monitor downstream pressure in addition to using the DM<sup>2®</sup> or DM<sup>1</sup> Series valve. A convenient way to do this is to install a pressure switch in the extra outlet port that is provided on the valve. The Outlet Port Pressure Monitoring kit can be used with one of the J-Box kits above to split one of the M12 ports on the J-Box so that a pressure switch can be wired in as well. These kits consist of one port splitter (a Tee with three M12 connectors) and one M12-DIN cable (1 meter).



Pressure switch available separately, see valve options.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



# **Accessories & Options**

# for Control Reliable Double Valves DM2<sup>®</sup> Series D

# **Electrical Connectors**

Flootwigel Compositor		O and Law atta	Oand	Electrica	I Connector Mo	del Number	
Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted C	Connector	
i onni	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Diamotor	Light	24 Volts DC	120 Volts AC	
EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	_	723K77	724K77-W	724K77-Z	
EN 175301-803 Form A	Connector Only	-	-	937K87	936K87-W	936K87-Z	

CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

# **Status Indicator**

# Model Number 670B94

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The Status Indicator pressure switch actuates when the valve is in a ready-to-run condition and de-actuates when the valve is in a lockout condition or when the inlet air pressure has been removed. Although, the valves can be purchased with this option already installed, the Status Indicator can be purchased separately.

# **Downstream Pressure Monitoring**

- · May be installed downstream on all double valves
- · Provides means to verify the release of downstream pressure to next obstruction
- Factory preset, 5 psi (0.3 bar) falling

Pressu	re Switches		EN Connector Pinout	M12 Connector Pinout	
Connection Type	Model Number	Port Threads	Normally Open Common	INOT USED	
EN 175301-803 Form A	586A86	1/8 NPT	Closed 3	Open Pin 2	
M12	1153A30	1/8 NPT	2 Ground	Pin 1 Normally Common Closed	L Ţ

# **RESET VALVES for DOUBLE VALVES with REMOTE RESET**

Valves with the remote reset option require a small 3/2 reset valve and the installation of a 1/8 inch air line from the reset valve to the reset port of the double valve. ROSS offers 3/2 normally closed valves with either manual or electric control that are suitable for this purpose.

Reset Valves					
Description	Model Number				
Flush Pushbutton: Green	1223B1FPG				
Mushroom Button: Green	1223B1MBG				
Direct Solenoid Control for Line Mounting	1613B1020**				
Direct Solenoid Control for Base Mounting	W1413A1409** (Base: 516B91)				

NPT threads. For BSPP threads add a "D" prefix to the model number, e.g., D1223B1FPG. \* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 1613B1020W.



Direct Solenoid Model for Base Mounting Valve: W1413A1409\*\* Sub-Base: 516B91

Direct Solenoid Model for Line Mounting: 1613B1020\*\*



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.







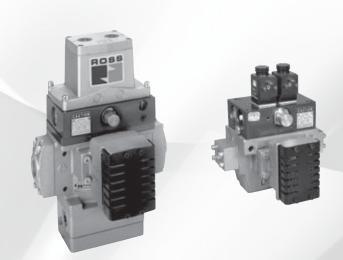






# ROSS CONTROLS®

# DOUBLE VALVES FOR CLUTCH/BRAKE CONTROL SERPAR<sup>®</sup> 35 SERIES



www.rosscontrols.com

# SERPAR® DOUBLE VALVES 35 SERIES DOUBLE VALVES WITH INTERNAL MONITORING & LOCKOUT – KEY FEATURES

- Internal monitoring requires no additional monitoring circuitry
- Automatic lock-out/inhibit upon detection of a malfunction
- Default to de-energized position upon fault detection
- Dedicated reset function
- No undesired automatic reset upon removal of electrical or pneumatic energy sources
- Built-in non-clogging silencers on Basic Sizes 4, 8, 12 and 30

35 Series SERPAR® valves are internally monitored double valves and are available in Basic Size 4, 8, 12 and 30 ranging from  $3/8" - 1\frac{1}{2}"$  port sizes. Internally monitored double valves contain a built-in monitoring device that checks for the proper operation of each valve element. If the internal monitor detects a valve fault on a particular cycle, the double valve will fail to a safe condition (all downstream air is exhausted) and the monitor will lock-out to inhibit further operation of the device. Normal operation can only be resumed by a momentary reset signal to the valve, either pneumatic or electric.

The original application for these double valves was in the control of clutch/brake mechanisms on stamping presses, but they have found their way into many other critical applications such as alternative lockout systems for energy isolation, air cylinder press load-holding systems, as well as other Category -3 and -4 safety circuits. ROSS double valves are a vital part of any control-reliable fluid power control system.

DESCRIPTION	Page
SERPAR <sup>®</sup> Double Valves with L-G Monitor Size 4	G2.3 - G2.4
SERPAR <sup>®</sup> Double Valves with L-G Monitor Size 8, 12, 30	G2.5 - G2.6
SERPAR <sup>®</sup> Double Valves with E-P Monitor Size 8, 12, 30	G2.7 - G2.8
SERPAR <sup>®</sup> Double Valves with D-S Monitor Size 8, 12, 30	G2.9 - G2.10



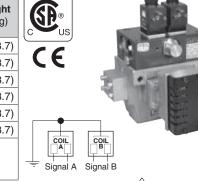
# SERPAR<sup>®</sup> Double Valves with L-G Monitor, Size 4

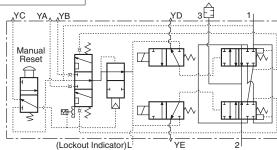
Port	Basic	Monitor	Model Number*		C <sub>v</sub>		Avg. Res	sponse Co	onstants	Weight
Size	Size	Reset	Right Inlet	Left Inlet	,	v	м	F	-	lb (kg)
			night inlet	Leit miet	1-2	2-3	IVI	1-2	2-3	
3/8	4	Manual	3573D3191**	3573D3195**	3.0	6.0	15	0.70	0.40	8.3 (3.7)
3/8	4	Remote	3573D3192**	3573D3196**	3.0	6.0	15	0.70	0.40	8.3 (3.7)
1/2	4	Manual	3573D4211**	3573D4215**	3.0	8.0	15	0.65	0.35	8.3 (3.7)
1/2	4	Remote	3573D4212**	3573D4216**	3.0	8.0	15	0.65	0.35	8.3 (3.7)
3/4	4	Manual	3573D5211**	3573D5215**	3.0	9.0	15	0.65	0.35	8.3 (3.7)
3/4	4	Remote	3573D5212**	3573D5216**	3.0	9.0	15	0.65	0.35	8.3 (3.7)

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573D3191W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573D3191W. For other voltages consult ROSS.

# Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:





# ACCESSORIES & OPTIONS

	Connection Type	Model Number*	Port Threads		EN Connector Pinout	M12 Connector Pinout
Pressure Switches	EN 175301-803 Form A	586A86	1/8 NPT		Normally Open Common	Pin 4 Pin 3 Normally Not Used
(Electrical Lockout Indicator)	M12	1153A30	1/8 NPT		Closed 3	Open Pin 2 Pin 1 Normally
	*Pressure switch closes on fa	alling pressure of 5	psig (0.34 bar).	Ţ Į	Ground	Common Closed

# **Piping Flange Kits**

Each kit includes two threaded (NPT) flanges and the required seals and mounting bolts.

Port Size	Basic Size	Kit Number
3/8	4	658K77
1/2	4	659K77
3/4	4	660K77

# **RESET VALVES for L-G MONITOR**

On valve models with manual reset a button on the side of the monitor is pushed to perform the reset function. Models for remote reset, however, require a small reset valve and the installation of a 1/8 line from the reset valve to the reset port on the monitor. ROSS offers 3/2 normally closed valves with either manual or electric control that are suitable for this purpose, valves size 8, 12, 30 with L-G monitor are suggested.

# **Valve Without Piping Flanges**

Port Size	Basic Monitor		Model Number*					
Port Size	Size	Reset	Right Inlet	Left Inlet				
3/8, 1/2,	4	Manual	3573D4241**	3573D4245**				
3/4	4	Remote	3573D4242**	3573D4246**				

Reset Valves								
Description	Model Numbers							
Flush Pushbutton: Green	1223B1FPG							
Mushroom Button: Green	1223B1MBG							
Direct Solenoid Control for Line Mounting	1613B1020**							
Direct Solenoid Control for Base Mounting	W1413A1409**							
Direct Sciencia Control for Base Mounting	(Base: 516B91)							

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573D4241W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573D4241W. For other voltages consult ROSS

Valve Without Silencer Exhaust port has threaded flange only, consult ROSS.

STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet. Mounting Type: Inline. Pilot Solenoids: Two, rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 30 VA inrush, 16 VA holding on 50 or 60 Hz; 11 watts on DC. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form A, uses two cord-grip connectors at solenoids. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 30 to 100 psig (2 to 7 bar). L-G Reset Pressure: Remote pneumatic reset models require a pressure of at least 30 psig (2 bar). Manual reset models use internal valve pressure. Inlet Port: Models are available with the inlet port on either the right or the left side of the valve body.

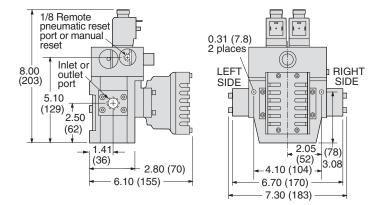
IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

G

**G2** 

# SERPAR<sup>®</sup> Double Valves with L-G Monitor

Valve Dimensions - inches (mm)



**O**PTIONS

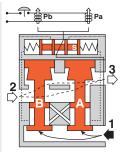
G2

Electrical	Electrical		Cord Length	0	Electrical Connector Model Number			
	Connector	Connector Electrical Connector Type		Cord Diameter	Without	Lighted Connector		
Connectors	Form	meters (feet) Diam	Diamotor	Light	24 Volts DC	120 Volts AC		
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
	EN 175301-803 Form A	Connector Only	_	_	937K87	936K87-W	936K87-Z	

# **VALVE OPERATION**

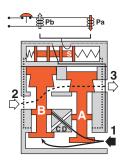
#### **Conditions at Start:**

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pilot air is ported from inlet 1 and through the center section of spool S to the normally closed pilots Pa and Pb. Monitoring pressure signals at both ends of spool S are exhausted.



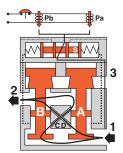
# **Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to the right end of spool S, and a reduced pressure goes to the left end. This pressure imbalance causes the spool to shift to the left. This shuts off and exhausts pilot air to both solenoid pilots, and allows valve element A to return to the closed position.



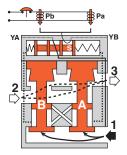
# G

**Normal Operation:** Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to each end of spool S and become equal to inlet pressure.



## L-G Monitor Locked-out:

When the L-G spool shifts it is held by a lockout pin (not shown). Pilot air is then exhausted to atmosphere via port YB, and pilot supply air is diverted to atmosphere via port YA. The lockout mechanism must be reset before the valve can return to normal operation. During and following reset, the pilot solenoids must be kept de-energized to prevent inadvertent and possibly dangerous cycling of the press. The reset function is either manual or remote-pneumatic depending on valve model.



ROSS

Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted. WARNING: If monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

G2.4

# SERPAR<sup>®</sup> Double Valves with L-G Monitor, Size 8, 12, 30

Port	Basic	Model	Number*	c	2v	Avg. Re	sponse Co	onstants	Weight	
Size	Size	With Overrides	Without Overrides	v		м	I	F	lb (kg)	
		with Overnues	without Overhues	1-2	2-3	IVI	1-2	2-3		
1/2	8	3573A4142**	3573A4162**	3.5	8.5	15	0.70	0.30	15.3 (6.9)	
3/4	8	3573A5142**	3573A5162**	4.0	12	15	0.65	0.23	15.3 (6.9)	
3/4	12	3573A5152**	3573A5172**	8.0	15	15	0.65	0.23	19.0 (8.6)	
1	8	3573A6152**	3573A6172**	4.0	12	20	0.33	0.21	15.3 (6.9)	
1	12	3573A6162**	3573A6182**	8.5	19	20	0.28	0.21	19.0 (8.6)	1
1¼	12	3573A7162**	3573A7182**	9.0	21	20	0.28	0.21	19.0 (8.6)	1
1¼	30	3573A7152**	3573A7172**	20	42	25	0.19	0.07	37.5 (16.9)	1
1½	30	3573A8162**	3573A8182**	21	43	25	0.18	0.07	37.5 (16.9)	1 [
2	30	2 inch port size av	ailable on size 30 valv	ves. O	rder pa	art numbe	r 1999H77	7 flange ki	t separately.	1
* NPT	port th	reads. For BSPP tl	nreads, add a "D" pre	efix to	the mo	del num	per e.a.	D3573A4	142W	1

**G2** 

prefix to the model number, e.g., threads, add a \* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573A4142W. For other voltages consult ROSS.

Valve Response Time The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

VIv. Resp. Time (msec)= M + F \*V **M** = avg. time for parts movement **F** = msec. per cubic inch of volume  $\mathbf{V}$  = volume in cubic inches

# Lockout Indicator YA Z (Pneumatic Reset Port)

1 2

Solenoid Solenoid

3

4

# **ACCESSORIES & OPTIONS**

Pressure Switches	Connect	tion Typ	e	Model Numb	er*	Port Threads	
(Electrical Lockout Indicator)	EN 175301-803 Form A			586A86		1/8 NPT	
, , , , , , , , , , , , , , , , , , ,	M	12		1153A30		1/8 NPT	
	*Pressure sw	vitch close	es on	falling pressure	e of 5	5 psig (0.34 bar).	
Ţ	EN Connector Pinout Normally Open Closed						
		Basic		Model N	lum	ber*	
Valve Without Piping Flanges	Port Size	Size	С	With Overrides		Without Overrides	
1 3	1/2, 3/4, 1	8	35	73A4202**	3	573A4222**	
				73A5202**		3573A5222**	
	3/4, 1, 1¼	12	35	73A5202**	3	573A5222**	

**RESET VALVES for L-G MONITOR** 

Piping Flange Kits	Port Size	Bas Siz
	1/2	8
Each kit includes two	3/4	8
threaded (NPT) flanges	1	8
and the required seals	3/4	12
and mounting bolts.	1	12
	11⁄4	12
	1¼	30
	1½	30

ge Kits	Port Size	Basic Size	Pipe Flange Kit Number
	1/2	8	661K77
s two	3/4	8	662K77
flanges	1	8	663K77
d seals olts.	3/4	12	664K77
ons.	1	12	665K77
	1¼	12	666K77
	1¼	30	667K77
	1½	30	668K77

#### **Reset Valves** Description Model Number\* 1223B1FPG Flush Pushbutton: Green Models for remote reset, however, require a small reset valve and the installation Mushroom Button: Green 1223B1MBG of a 1/8 line from the reset valve to the reset port on the monitor. ROSS offers 3/2 1613B1020\*\* Direct Solenoid Control for Line Mounting normally closed valves with either manual or electric control that are suitable for this W1413A1409\* Direct Solenoid Control for Base Mounting (Base: 516B91)

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573A4202W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573A4202W. For other voltages consult ROSS.

Valve Without Silencer Exhaust port has threaded flange only, consult ROSS.

# STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet. Mounting Type: Inline. Pilot Solenoids: Two, rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

purpose, valves size 8, 12, 30 with L-G monitor are suggested.

Electrical Connections: Uses terminal strip connectors. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 30 to 125 psig (2 to 8.5 bar). L-G Reset Pressure: 60 psig (4 bar) minimum.

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

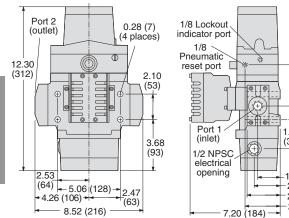
**35 Series** 

# SERPAR<sup>®</sup> Double Valves with L-G Monitor

VALVE OPERATION

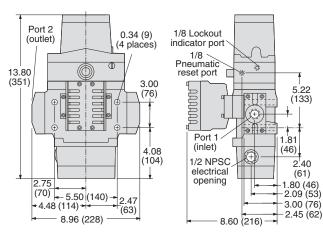
Valve Dimensions - inches (mm)

#### **Basic Size 8**

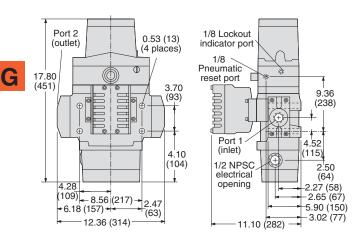


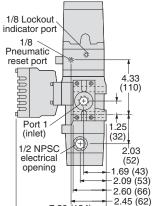
# G2

#### **Basic Size 12**



## **Basic Size 30**





exhausted.

**Conditions at Start:** 

**Normal Operation:** Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to each end of spool S and become equal to inlet pressure.

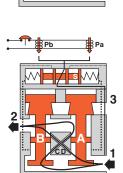
Inlet 1 is closed to outlet 2 by both valve

elements A and B. Outlet 2 is open to

exhaust 3. Pilot air is ported from inlet 1 and

through the center section of spool S to the

normally closed pilots Pa and Pb. Monitoring pressure signals at both ends of spool S are

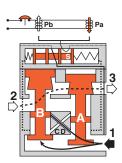


₿Pa

MΛ

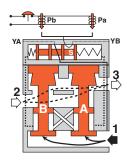
#### **Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to the right end of spool S, and a reduced pressure goes to the left end. This pressure imbalance causes the spool to shift to the left. This shuts off and exhausts pilot air to both solenoid pilots, and allows valve element A to return to the closed position.



#### L-G Monitor Locked-out:

When the L-G spool shifts it is held by a lockout pin (not shown). Pilot air is then exhausted to atmosphere via port YB, and pilot supply air is diverted to atmosphere via port YA. The lockout mechanism must be reset before the valve can return to normal operation. During and following reset, the pilot solenoids must be kept de-energized to prevent inadvertent and possibly dangerous cycling of the press. The reset function is either manual or remote-pneumatic depending on valve model.



Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted. WARNING: If monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

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# SERPAR<sup>®</sup> Double Valves with E-P Monitor

			Model Number*					Avg	. Resp	onse	
Port	Basic	Single Sig	gnal Input	Dual Sig	Dual Signal Input			Constants			Weight
Size	Size	With Overrides	Without	With Overrides	Without	1-2	2-3	м	F	-	lb (kg)
		with overnides	Overrides	with overhoes	Overrides	1-2	2-5	141	1-2	2-3	
1/2	8	3573A4141**	3573A4161**	3573A4341**	3753A4361**	3.5	8.5	15	0.70	0.30	11.8 (5.3)
3/4	8	3573A5141**	3573A5161**	3573A5341**	3573A5361**	4.0	12	15	0.65	0.23	11.8 (5.3)
3/4	12	3573A5151**	3573A5171**	3573A5351**	3573A5371**	8.0	15	15	0.65	0.23	15.5 (7.0)
1	8	3573A6151**	3573A6171**	3573A6351**	3573A6371**	4.0	12	20	0.33	0.21	11.8 (5.3)
1	12	3573A6161**	3573A6181**	3573A6361**	3573A6381**	8.5	19	20	0.28	0.21	15.5 (7.0)
1¼	12	3573A7161**	3573A7181**	3573A7361**	3573A7381**	9.0	21	20	0.28	0.21	15.5 (7.0)
1¼	30	3573A7151**	3573A7171**	3573A7351**	3573A7371**	20	42	25	0.19	0.07	35.0 (15.8)
1½	30	3573A8161**	3573A8181**	3573A8361**	3573A8381**	21	43	25	0.18	0.07	35.0 (15.8)
2	30	2 inch port size	e available on si	ze 30 valves. O	rder part numbe	r 199	9H77	flang	e kit se	parate	ely.

# **35 Series**

É 3

**G2** 

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573A4141W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573A4141W. For other voltages consult ROSS.

Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula below:

VIv. Resp. Time (msec)= M + F \*V

- $\mathbf{M} = avg.$  time for parts movement
- F = msec. per cubic inch of volume
- V = volume in cubic inches

**O**PTIONS

**Valve Without Piping Flanges** 

SOL INPUT COM. RESET	- SOL RESET - SOL
1234567	8 9
Single Input Wiring F	Diagram

Single Input Wiring Diagram

During lock-out: Terminals 3 and 7 are connected which allows a panel light, bell, or other electrical device to be wired

	through te	rminals 7 and 3 to	serve as a lockout ind	icator.			
[	1	1					
	Basic		Model N	Number*			
Port Size	Size	Single S	ignal Input	Dual Signal Input			
	0120	With Overrides	Without Overrides	With Overrides	Without Overrides		
1/2, 3/4, 1	1 8	3573A4201**	3573A4221**	3573A4301**	3573A4321**		
3/4, 1, 11/2	4 12	3573A5201**	3573A5221**	3573A5301**	3573A5321**		
11/4, 11/2	30	3573A7201**	3573A7221**	3573A7301**	3573A7321**		

SOLA

SOLE

1 2 3 4 5 6 7 8 9

Dual Input Wiring Diagram

Чb

SOL SOL SOL

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573A4201W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573A4201W. For other voltages consult ROSS.

		Port Size	Basic Size	Kit Number
Piping Flange Kits		1/2	8	661K77
Each kit includes two threade	d (NPT) flanges and the required seals and mounting bolts.	3/4	8	662K77
		1	8	663K77
		3/4	12	664K77
		1	12	665K77
		11⁄4	12	666K77
Valve Without Silencer	Exhaust port has threaded flange only, consult ROSS.	11⁄4	30	667K77
		11⁄2	30	668K77
	STANDARD SPECIFICATIONS (for valves on this pa	age):		
Construction: Dual poppet.	E-P Reset Solenoid: R	ated for intermit	tent duty. Vol	tages: 24-48 or

Mounting Type: Inline. Pilot Solenoids: Two, rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

100-120 volts AC or DC. Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Pressure Range: 30 to 125 psig (2 to 8.5 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

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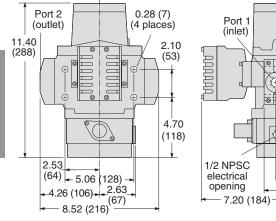
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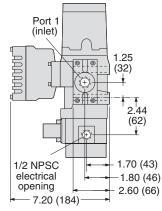
# SERPAR<sup>®</sup> Double Valves with E-P Monitor

Valve Dimensions - inches (mm)

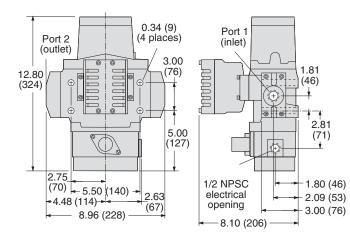
#### **Basic Size 8**

G2



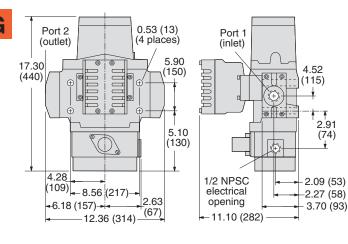


#### **Basic Size 12**



#### **Basic Size 30**

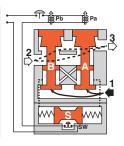




# VALVE OPERATION

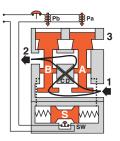
#### **Conditions at Start:**

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Contacts of switch SW are closed. Monitoring pressure signals at both ends of spool S are exhausted.



#### **Normal Operation:**

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to each end of spool S and become equal to inlet pressure.

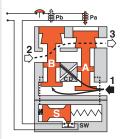


#### **Completion of Normal Cycle:**

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described above.

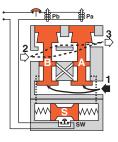
#### **Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to the right end of spool S, and a reduced pressure goes to the left end. This pressure imbalance causes the spool to shift to the left. This trips switch SW, breaks the electrical circuit to the pilot solenoids, and allows valve element A to return to the closed position.



#### **E-P Monitor Locked-out:**

With both valve elements closed, monitoring air pressure is exhausted from both ends of spool S so that it returns to its normal position. The electrical circuit to the pilot solenoids remains broken by switch SW. To restore the electrical circuit and return the valve to normal operation, the reset solenoid (not shown) must be briefly energized to reset switch SW. During and following reset, the pilot solenoids must be kept de-energized to prevent inadvertent and possibly dangerous cycling of the press. Prolonged energizing of the reset solenoid can cause burnout and nullify the reset function.





# SERPAR<sup>®</sup> Double Valves with D-S Monitor

Port	Basic	Model	Number*	C <sub>v</sub> Avg. Resp		sponse Co	onstants	Weight	
Size	Size	With	Without		v	м	F		lb (kg)
		Overrides	Overrides	1-2	2-3	IVI	1-2	2-3	
1/2	8	3573B4143**	3573B4163**	3.5	8.5	15	0.70	0.30	16.8 (7.6)
3/4	8	3573B5143**	3573B5163**	4.0	12	15	0.65	0.23	16.8 (7.6)
3/4	12	3573B5153**	3573B5173**	8.0	15	15	0.65	0.23	20.5 (9.2)
1	8	3573B6153**	3573B6173**	4.0	12	20	0.33	0.21	16.8 (7.6)
1	12	3573B6163**	3573B6183**	8.5	19	20	0.28	0.21	20.5 (9.2)
1¼	12	3573B7163**	3573B7183**	9.0	21	20	0.28	0.21	20.5 (9.2)
1¼	30	3573B7153**	3573B7173**	20	42	25	0.19	0.07	39.3 (17.7)
1½	30	3573B8163**	3573B8183**	21	43	25	0.18	0.07	39.3 (17.7)
2	30	2 inch port size	available on size 3	0 valve	es. Oro	ler part nu	mber 1999	9H77 flang	e kit separately.

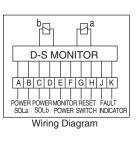
\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573B4143W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573B4143W. For other voltages consult ROSS.

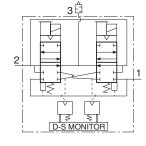
# Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula below:

VIv. Resp. Time (msec)= M + F \*V

- $\mathbf{M} = avg.$  time for parts movement
- F = msec. per cubic inch of volume
- **V** = volume in cubic inches





# **O**PTIONS

	Port Size	Basic Size	Model Number*				
Valve Without Piping Flanges	Port Size	Dasic Size	With Overrides	Without Overrides			
	1/2, 3/4, 1	8	3573A4203**	3573A4223**			
	3/4, 1, 1¼	12	3573A5203**	3573A5223**			
	1¼, 1½	30	3573A7203**	3573A7223**			

NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573A4203W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573A4203W. For other voltages consult ROSS.

# **Piping Flange Kits**

Each kit includes two threaded (NPT) flanges and the required seals and mounting bolts.

Port Size	Basic Size	Kit Number
1/2	8	661K77
3/4	8	662K77
1	8	663K77
3/4	12	664K77
1	12	665K77
1¼	12	666K77
1¼	30	667K77
1½	30	668K77

## Valve Without Silencer

Exhaust port has threaded flange only, consult ROSS.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet. Mounting Type: Inline. Pilot Solenoids: Two, rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC. D-S Monitor: Rated for same voltage as pilot solenoids. Power supply to monitor must be independent and continuous.
Ambient Temperature: 40° to 120°F (4° to 50°C).
Media Temperature: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air.
Pressure Range: 30 to 125 psig (2 to 8.5 bar).

ROSS,

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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

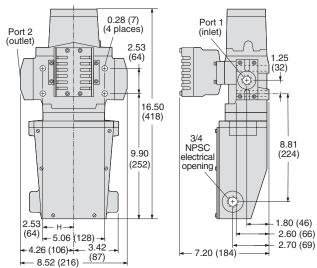
# 35 Series

# SERPAR<sup>®</sup> Double Valves with D-S Monitor

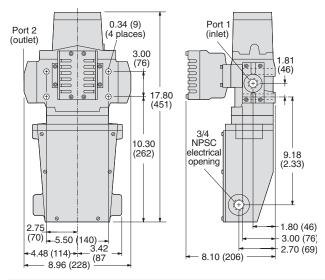
Valve Dimensions - inches (mm)

#### **Basic Size 8**

G2

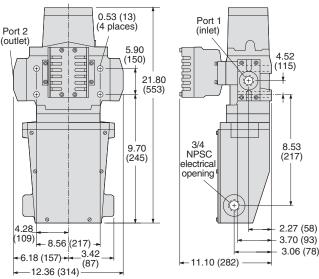


#### Basic Size 12



#### **Basic Size 30**

G



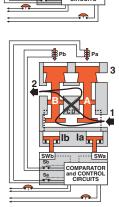
# VALVE OPERATION

## Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Contacts of switch SW are closed. Monitoring pressure signals at both ends of spool S are exhausted.

#### **Normal Operation:**

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to pressure indicators la and Ib, causing the indicator pins to be extended and to actuate proximity switches SWa and SWb. In normal operation, each pair - solenoids, valve elements, indicators, and proximity switches - responds in unison so that the comparator circuits "read" the operation as normal.



TIb la

COMPARAT

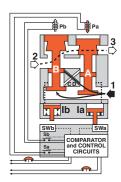
nd CONT

#### Completion of Normal Cycle:

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described above.

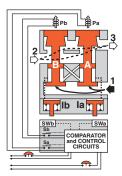
#### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to pressure indicator la so that its pin is extended and actuates proximity switch SWa. When the time interval between the signal to a solenoid and the signal from its corresponding proximity switch exceeds approximately 175 milliseconds, the D-S monitor breaks contacts Sa and Sb as soon as solenoid power is removed. This allows valve element A to return to the closed position.

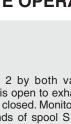


#### **D-S Monitor Locked-out:**

With the valve locked out by contacts Sa and Sb, solenoids Pa and Pb cannot be energized. The monitor must be reset before another valve cycle can begin. Reset can be achieved by a separately connected ancillary switch, but not if the pilot solenoids are energized. The monitor can be reset by removing and reapplying power to the monitor even when the pilot solenoids are energized. For this reason it is necessary to have the pilot solenoids de-energized during and following reset to prevent inadvertent and possibly dangerous cycling of the press.



ROSS









# ROSS CONTROLS®

# DOUBLE VALVES FOR CLUTCH/BRAKE CONTROL SERPAR<sup>®</sup> Crossflow 35 Series



www.rosscontrols.com

# SERPAR® CROSSFLOW DOUBLE VALVES 35 SERIES WITH PRESSURE SWITCHES FOR

# EXTERNAL MONITORING - KEY FEATURES

- Designed to enable users to comply with current safety regulations
- Can be integrated with external monitoring systems to provide for lockout and inhibiting further machine operation until the controls system is reset
- Default to de-energized position upon fault condition
- Built-in non-clogging silencers on Basic Sizes 4, 8, 12 and 30

Basic Size 1 and 2 SERPAR<sup>®</sup> Crossflow valves with pressure switches (for external monitoring) are available from ¼" to ¾" port sizes. Externally monitored double valves provide feedback signals (via the pressure switches), which allows the main press controls, or separate monitoring device,

The original application for these double valves was in the control of clutch/brake mechanisms on stamping presses, but they have found their way into many other critical applications such as alternative lockout systems for energy isolation, air cylinder press load-holding systems, as well as other Category -3 and -4 safety circuits. ROSS double valves are a vital part of any control-reliable fluid power control system.

DESCRIPTION	Page
SERPAR <sup>®</sup> Crossflow Double Valves with or without Pressure Switches Size 1	G3.3 - G3.4
SERPAR <sup>®</sup> Crossflow Double Valves with or without Pressure Switches Size 2	G3.5 - G3.6
SERPAR <sup>®</sup> Crossflow Double Valves with Pressure Switches Size 4	G3.7
SERPAR <sup>®</sup> Crossflow Double Valves with Pressure Switches Size 8, 12, 30	G3.8 - G3.9

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# SERPAR<sup>®</sup> Crossflow Double Valves with or without Pressure Switches, Size 1

Port	Port Sizes Basic		Durante	Pressure			, v	Avg. Respo	Weight			
FUIL	51265	Size	Pressure Switches	Switch	Model Number*		v	м	I	F	Weight Ib (kg)	
1, 2	3			Provision		1-2 2-3		IVI	1-2	2-3	(	
1/4	1/4	1	None	Yes	3573B2632**	0.9	1.4	28	4.6	3.4	2.1 (95)	] (
1/4	3/8	1	None	No	3573B2640**	0.9	1.4	24	4.4	3.1	2.1 (95)	1
1/4	1/4	1	Two##	Yes	3573B2642**	0.9	1.4	28	4.6	3.4	2.5 (1.14)	1
3/8	3/8	1	Two##	Yes	3573B2644**	1.2	1.7	25	3.1	2.8	2.9 (1.32)	1
3/8	3/8	1	None	Yes	3573B2645**	1.2	1.7	25	3.1	2.8	2.5 (1.14)	1

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573B2632W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573B2632W. For other voltages consult ROSS.

Valve and base can be ordered separately, consult ROSS.

## Only valves with pressure switches should be used to control clutch/brake mechanisms on press machinery. The pressure switches must be used in conjunction with a monitoring device to assist with OSHA compliance (Ref. 1910.217).

##Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

## Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

#### VIv. Resp. Time (msec)= M + F \*V M = avg. time for parts movement F = msec. per cubic inch of volume V = volume in cubic inches

# \* Non-monitored



# ## Pressure Switches & Monitoring:

Valves without pressure switches must not be used to control clutch/brake mechanisms on press machinery. Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217). The valves on this page do not have a built-in monitor, and must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve in the event of a failure within the valve.

## To customer's external monitor

Solenoid

В

SWB

3

G

# ACCESSORIES & OPTIONS

Electrical		Elect	trical				O and L an atta	Cord	Electrical Connector Model Number		
Connector		Connector		Electrical Con	nector	Гуре	Cord Length meters (feet)	Diameter	Without	Lighted Connector	
Connector	5	Fo	rm						Light	24 Volts DC	120 Volts AC
EN 175301-803 Form I				Prewired Connec	ctor (18	gauge)	2 (61⁄2)	10-mm	266K87	267K77-W	267K77-Z
	EN 175301-803 Form						_	-	372K77	382K77-W	382K77-Z
			S: Do not use the solenoids.	electrical connect	tors witl	h surge s	uppressors, a	s this may	increase val	lve response tin	ne when de-
	Port	Thread	Mode	l Number	Avg.	Dimens	<b>ions</b> inches (m	ons inches (mm) Weigh			
	Size	Туре	NPT Threads	BSPT Threads	C <sub>v</sub>	Α	В	lb (kg	)	(i)	-A-1
Silencers	1/4	Male	5500A2003	3 D5500A2003 2.1 0.9 (2		0.9 (2 <sup>-</sup>	1) 2.2 (55)	) 0.1 (0.	1) -		
	3/8	Male	5500A3013	D5500A3013	2.7	0.9 (2	1) 2.2 (55)	) 0.1 (0.	1)		
	Press	ure Rang	e: 0 to 150 p	sig (0 to 10.3 bar	) maxin	num. F	low Media: F	iltered air.			

#### STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet. Mounting Type: Inline. Pilot Solenoids: Two, rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz.

Power Consumption (each solenoid): 12 VA maximum inrush, 9.8 VA maximum holding on 50 or 60 Hz; 7.5 watts nominal on DC. Enclosure Rating: IP65, IEC 60529.

Electrical Connections: EN 175301-803 Form A, uses two cord-grip connectors at solenoids.

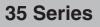
Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 100 psig (2.8 to 7 bar).

**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). **Certifications**: CE Marked for applicable directives, DGUV Test, CSA/UL. **Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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Solenoid

A

SW A

G<sub>3</sub>

# SERPAR<sup>®</sup> Crossflow Double Valves with or without Pressure Switches

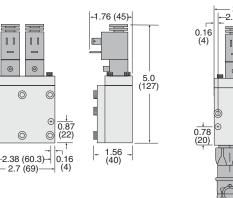
# **35 Series** Valve Technical Data & Operation

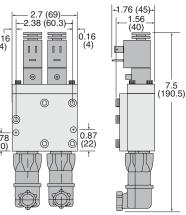
Valve Dimensions - inches (mm)

#### Valve without Pressure Switches

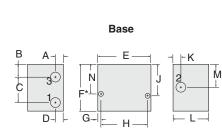
6

2.7 (69)





Valve with Pressure Switches



G3	Valve Model Number	r N

Valve Model	Base Model		BASE Dimensions – inches (mm)												
Number	Number	Α	В	С	D	Е	F	G	н	J	К	L	М	N	
3573B2632	1120C91	0.4 (11)	0.7 (17)	1.29 (32.8)	0.4 (11)	2.7 (69)	2.4 (61)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.4 (11)	1.8 (46)	1.2 (30)	1.5 (38)	
3573B2640	1042C91	0.5 (13)	0.6 (15)	1.36 (34.5)	0.4 (11)	2.7 (69)	2.4 (61)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.4 (11)	1.8 (46)	1.2 (30)	1.5 (38)	
3573B2642	888C91	0.4 (11)	0.7 (17)	1.29 (32.8)	0.4 (11)	2.7 (69)	2.4 (61)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.4 (11)	1.8 (46)	1.2 (30)	1.5 (38)	
3573B2644	1171C91	0.5 (13)	0.6 (15)	1.47 (37.2)	0.5 (13)	2.7 (69)	2.5 (63)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.8 (19)	1.8 (46)	1.1 (27)	1.5 (38)	
3573B2645	1172C91	0.5 (13)	0.6 (15)	1.47 (37.2)	0.5 (13)	2.7 (69)	2.5 (63)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.8 (19)	1.8 (46)	1.1 (27)	1.5 (38)	
	For replacement valve (less base), order model 3573B2602.														

Valve Operation: Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted. CAUTION: If the monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

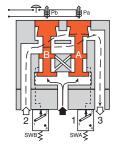
# **VALVE OPERATION**

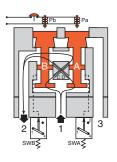
#### **Conditions at Start:**

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both switches SWA and SWB are exhausted. Contacts 1 and 2 of switches SWA and SWB are connected.

#### **Normal Operation:**

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Sensing pressure signals go to each pressure switch and become equal to inlet pressure. Both switches trip and now contacts 1 and 4 of switches SWA and SWB are connected instead of contacts 1 and 2.



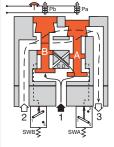


#### **Completion of Normal Cycle:**

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described at left.

#### **Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below 2 % of inlet pressure. Full sensing air pressure from side A goes to switch SWA, and a reduced pressure goes to switch SWB. This full pressure signal causes switch SWA to trip. Switch SWB, with a reduced pressure signal, does not trip. An external monitoring system can detect the malfunction by monitoring the condition of the switches SWA and SWB. The external monitoring system may then react accordingly by shutting down the power to the valve solenoids and any other components deemed necessary to stop the machine.





**Online Version** 

Rev. 11/14/16

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# With or without Pressure Switches, Size 2 Port Sizes Pressure Pressure Avg. Response Constants

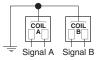
SERPAR<sup>®</sup> Crossflow Double Valves

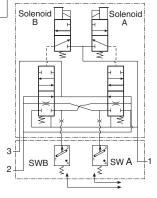
Dent C	1	- ·		-	Pressure		· ·		Avg. nesponse cons		istants	Starits Weight	
Port S	bizes	Basic Size	Inlet Orientation	Pressure Switches	Switch	Model Number*	C	v	м	F	-	Weight Ib (kg)	
1, 2	3	5120	Onentation	Switches	Provision		1-2	2-3	IVI	1-2	2-3	ib (kg)	
1/2	1/2	2	Left Hand	None	No	3573C4620**	3.7	6.6	30	1.2	1.0	4.3 (1.95)	
1/2	1/2	2	Left Hand	None	Yes	3573C4632**	3.7	6.6	30	1.2	1.0	4.3 (1.95)	
1/2	3/4	2	Left Hand	None	No	3573C4640**	3.7	9.0	25	1.1	0.9	4.3 (1.95)	
1/2	1/2	2	Left Hand	Two##	Yes	3573C4642**	3.7	6.6	30	1.2	1.0	4.8 (2.18)	
3/4	3/4	2	Left Hand	None	No	3573C4643**	4.2	9.0	25	1.1	0.9	4.7 (2.13)	
3/4	3/4	2	Left Hand	Two##	Yes	3573C4644**	4.2	9.0	25	1.1	0.9	5.2 (2.36)	
3/4	3/4	2	Left Hand	None	Yes	3573C4645**	4.2	9.0	25	1.1	0.9	4.7 (2.13)	
1/2	3/4	2	Left Hand	Two##	Yes	3573C4652**	3.7	9.0	25	1.1	0.9	4.3 (1.95)	
1/2	1	2	Right Hand	Two##	Yes	3573C4706**	3.7	9.0	30	1.2	1.0	4.3 (1.95)	
3/4	1	2	Right Hand	Two##	Yes	3573C4715**	4.2	9.0	25	1.1	0.9	5.2 (2.36)	
1/2	1	2	Left Hand	None	No	3573A4735**	3.7	9.0	30	1.2	1.0	4.3 (1.95)	
1/2	1	2	Left Hand	Two##	Yes	3573A4736**	3.7	9.0	30	1.2	1.0	4.3 (1.95)	
3/4	1	2	Left Hand	None	No	3573A4737**	4.2	9.0	25	1.1	0.9	5.2 (2.36)	
3/4	1	2	Left Hand	Two##	Yes	3573A4738**	3.7	9.0	25	1.1	0.9	5.2 (2.36)	
3/4	1	2	Right Hand	None	No	3573B4883**	4.2	9.0	25	1.1	0.9	5.2 (2.36)	
1/2	1	2	Right Hand	None	No	3573B4891**	4.2	9.0	30	1.2	1.0	4.3 (1.95)	





\* Non-monitored





To customer's external monitor

G

G<sub>3</sub>

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573C4620W.

\*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573C4620W. For other voltages consult ROSS.

Valve and base can be ordered separately, consult ROSS.

## Only valves with pressure switches should be used to control clutch/brake mechanisms on press machinery. The pressure switches must be used in conjunction with a monitoring device to assist with OSHA compliance (Ref. 1910.217). ##Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

# Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

# VIv. Resp. Time (msec)= M + F \*V M = avg. time for parts movement F = msec. per cubic inch of volume V = volume in cubic inches

## ## Pressure Switches & Monitoring:

Valves without pressure switches must not be used to control clutch/brake mechanisms on press machinery. Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217). The valves on this page do not have a built-in monitor, and must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve in the event of a failure within the valve.

**Valve Operation:** Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted. **CAUTION:** If the monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

## STANDARD SPECIFICATIONS (for valves on this page):

Construction: Dual poppet. Mounting Type: Inline. Pilot Solenoids: Two, rated for continuous duty. Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. Power Consumption (each solenoid): 8.5 VA maximum inrush, 8.5 VA maximum holding on 50 or 60 Hz; 6 watts nominal on DC. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form A, uses two cord-grip connectors at solenoids. Ambient Temperature:  $40^{\circ}$  to  $120^{\circ}$ F ( $4^{\circ}$  to  $50^{\circ}$ C). Media Temperature:  $40^{\circ}$  to  $175^{\circ}$ F ( $4^{\circ}$  to  $80^{\circ}$ C). Flow Media: Filtered air. Inlet Pressure: 40 to 100 psig (2.8 to 7 bar).

**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). **Certifications**: CE Marked for applicable directives, DGUV Test, CSA/UL. **Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

ROSS

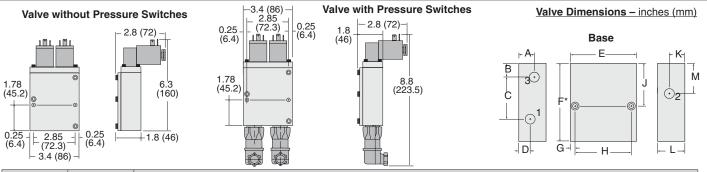
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IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

# SERPAR<sup>®</sup> Crossflow Double Valves with or without Pressure Switches

# 35 Series Valve Technical Data & Operation



Valve Model	Base Model		BASE Dimensions – inches (mm)										
Number	Number	Α	В	С	D	E	F	G	Н	J	К	L	М
3573B4620	1136C91	0.8 (19)	0.7 (17)	2.15 (54.6)	0.6 (15)	3.4 (86)	4.0 (101)	0.3 (7)	2.85 (72.4)	2.2 (56)	0.8 (19)	1.4 (36)	1.6 (39)
3573B4632	1122C91	0.8 (19)	0.7 (17)	2.15 (54.6)	0.6 (15)	3.4 (86)	4.0 (101)	0.3 (7)	2.85 (72.4)	2.2 (56)	0.8 (19)	1.4 (36)	1.6 (39)
3573B4640	1028C91	1.1 (27)	1.0 (24)	2.32 (58.9)	0.6 (15)	3.4 (86)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.8 (19)	1.7 (44)	1.9 (48)
3573B4642	893C91	0.8 (19)	0.7 (17)	2.15 (54.6)	0.6 (15)	3.4 (86)	4.0 (101)	0.3 (7)	2.85 (72.4)	2.2 (56)	0.8 (19)	1.4 (36)	1.6 (39)
3573B4643	1123C91	1.1 (27)	0.8 (19)	2.64 (67.1)	1.3 (33)	3.7 (94)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.7 (17)	2.0 (50)	1.8 (46)
3573B4644	1163C91	1.1 (27)	0.8 (19)	2.86 (72.7)	0.7 (17)	3.7 (94)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.7 (17)	2.0 (50)	1.8 (46)
3573B4645	1164C91	1.1 (27)	0.8 (19)	2.86 (72.7)	0.7 (17)	3.7 (94)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.7 (17)	2.0 (50)	1.8 (46)
3573B4652	1129C91	1.1 (27)	1.0 (24)	2.32 (58.9)	0.6 (15)	3.4 (86)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.8 (19)	1.7 (44)	1.9 (48)
For replacer	For replacement valve (less base), order model 3573B4602.												

# Accessories

Electrical		Elect	trical				O and L an adda	Ocurt	Electrica	al Connector	Model Number
		Conn	ector	Electrical Co	nnecto	r Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted Connector	
Connectors Form							Light	24 Volts DC	120 Volts AC		
	E	EN 175301-803 Form A Prewired Co			ctor (18	gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z
	E	EN 175301-803 Form A Prewired Cor			ctor (18	gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z
EN 175301-803 Form A				Connector for threaded conduit (1/2 inch electrical conduit fittings)			-	-	723K77	724K77-W	724K77-Z
	E	N 175301-	803 Form A	Connector Only			_	-	937K87	936K87-W	936K87-Z
CAUTIONS: Do	not us	se electrica	l connectors v	vith surge suppre	essors,	as this ma	y increase valv	e respons	e time when	de-actuating	the solenoids.
	Port	Thread	Model	Number*	Avg.	Dimensi	i <b>ons</b> inches (m	m) Wei	ght		
	Size	Туре	NPT Threads	<b>BSPT Threads</b>	Cv	Length	Width	lb (	kg)		
	1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	) 3.6 (91)	0.2	0.1)		
Silencers	3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	) 3.6 (92)	0.2	0.1)		
	3/4	Male	5500A5003	D5500A5003	11.5	2.0 (51)	) 5.3 (135	6) 0.6	0.3)		
	1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	) 5.4 (138	3) 0.6	(0.3)		B

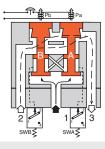
Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air.

# **VALVE OPERATION**

## **Conditions at Start:**

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Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both switches SWA and SWB are exhausted. Contacts 1 and 2 of switches SWA and SWB are connected.



# 3

# **Normal Operation:**

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Sensing pressure signals go to each pressure switch and become equal to inlet pressure. Both switches trip and now contacts 1 and 4 of switches SWA and SWB are connected instead of contacts 1 and 2.

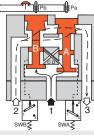
#### **Completion of Normal Cycle:**

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described at left.

#### **Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port

below 2 % of inlet pressure. Full sensing air pressure from side A goes to switch SWA, and a reduced pressure goes to switch SWB. This full pressure signal causes switch SWA to trip. Switch SWB, with a reduced pressure signal, does not trip. An external monitoring system can detect the malfunction by monitoring the condition of the switches SWA and SWB. The external monitoring system may then react accordingly by shutting down the power to the valve solenoids and any other components deemed necessary to stop the machine.





**G**3

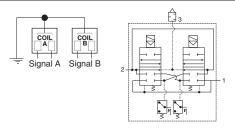
# SERPAR<sup>®</sup> Crossflow Double Valves with Pressure Switches, Size 4

Port Size	Basic Size	Model N Flange	c	v	Weight Ib (kg)	
		With Overrides	Without Overrides	1-2	2-3	10 (1(g)
3/8	4	3573C3270**	3573C3276**	3	7	8.4 (3.8)
1/2	4	3573C4270**	3573C4276**	3	9	8.4 (3.8)
3/4	4	3573C5230**	3573C5236**	3	11	8.4 (3.8)

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573C3270W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573C3270W. For other voltages consult ROSS.

#Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

Valve and base can be ordered separately, consult ROSS.





6.1 (155)

7.2 (185) **G**3

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- 8.2 (209)-Flanged-port model G 3/4

Flanged-port model G 3/8 - G1/2



Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217).

The valves on this page do not have a built-in monitor, and so must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve and associated machinery in the event of a failure within the valve.

**CAUTION:** If the system must be reset, electrical signals to both solenoids must be removed to prevent the machine from immediately recycling and producing a potentially hazardous condition.

## ACCESSORIES

Electrical	Electrical		O a well be an arable	Quard	Electrical Connector Model Number					
	Connector	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted Connector				
Connectors	Form				Light	24 Volts DC	120 Volts AC			
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z			
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z			
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z			
	EN 175301-803 Form A	Connector Only	_	-	937K87	936K87-W	936K87-Z			
CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.										

# VALVE OPERATION

**Online Version** 

Rev. 11/14/16

Refer to page G3.9.

STANDARD SPECIFICATIONS (for valves on this page):

struction: Dual poppet. nting Type: Inline. t Solenoids: Two, rated for continuous duty. ndard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz. ages at pressure switches must not exceed 250 volts. er Consumption (each solenoid): 35 VA maximum in-rush, 22 VA	Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 40 to 150 psig (2.5 to 10 bar).				
Voltages at pressure switches must not exceed 250 volts. Power Consumption (each solenoid): 35 VA maximum in-rush, 22 VA holding on 50 or 60 Hz; 14 watts nominal on DC. Enclosure Rating: IP65, IEC 60529. Electrical Connections: EN 175301-803 Form A, uses two cord-grip connectors at solenoids.	Functional Safety Data: Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10 <sup>-9</sup> ; MTTFd: 301.9 ( $n_{op}$ : 662400). Certifications: CE Marked for applicable directives, DGUV Test, CSA/UL Vibration/Impact Resistance: Tested to BS EN 60068-2-27.				

# **35 Series**





G3.7

# SERPAR<sup>®</sup> Crossflow Double Valves with Pressure Switches, Size 8, 12, & 30

Port Size	Basic	Model Number*#	C	v	Weight
Port Size	Size	Flanged Ports	1-2	2-3	lb (kg)
1/2	8	3573B4638**	3.5	10	11.4 (5.2)
3/4	8	3573B5638**	4	14	11.4 (5.2)
1	8	3573B6638**	4	14	11.4 (5.2)
3/4	12	3573B5632**	8	15	15.4 (7.0)
1	12	3573B6632**	8.5	19	15.4 (7.0)
1¼	12	3573B7632**	9.0	21	15.4 (7.0)
1¼	30	3573B7630**	20	42	33.9 (15.4)
1½	30	3573B8630**	21	43	33.9 (15.4)

\* NPT port threads. For BSPP threads, add a "D" prefix to the model number, e.g., D3573B4638W. \*\* Insert voltage code: "W" = 24 volts DC; "Z" = 110-120 volts AC, 50/60 Hz; e.g., 3573B4638W. For other voltages consult ROSS.

#Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

Valve and base can be ordered separately, consult ROSS.

G3

**Pressure Switches & Monitoring:** Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217).

The valves on this page do not have a built-in monitor, and so must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve and associated machinery in the event of a failure within the valve.

**CAUTION:** If the system must be reset, electrical signals to both solenoids must be removed to prevent the machine from immediately recycling and producing a potentially hazardous condition.

### Valve Dimensions - inches (mm)

Basic Size 8

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## STANDARD SPECIFICATIONS (for valves on this page):

6.72 (172) -

Treaded-port model – 8.8 (224) – Flanged-port model 11.2 (284)

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7.2 (184)

Construction: Dual poppet. Mounting Type: Inline.

Pilot Solenoids: Two, rated for continuous duty.

Standard Voltages: 24 volts DC; 110-120 volts AC, 50/60 Hz.

Voltages at pressure switches must not exceed 250 volts.

**Power Consumption** (each solenoid): 87 VA maximum in-rush, 30 VA holding on 50 or 60 Hz; 14 watts nominal on DC.

**Electrical Connections:** EN 175301-803 Form A, uses two cord-grip connectors at solenoids.

**Enclosure Rating:** IP 65 according to IEC-Publication 144 and DIN 40050, Sheet 1.

Ambient Temperature: 40° to 120°F (4° to 50°C). Media Temperature: 40° to 175°F (4° to 80°C). Flow Media: Filtered air. Inlet Pressure: 30 to 125 psig (2 to 8.5 bar).

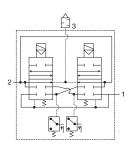
**Functional Safety Data:** Category 4 PL e; B10d: 20,000,000; PFHd: 7.71x10<sup>-9</sup>; MTTFd: 301.9 (n<sub>op</sub>: 662400). **Certifications**: CE Marked for applicable directives, DGUV Test, CSA/UL. **Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**35 Series** 



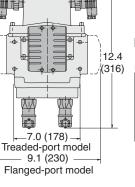


G3.8



Valve Dimensions - inches (mm)

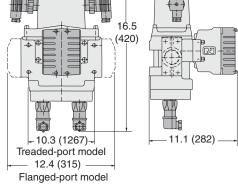
**Basic Size 12** 



t the

8.6 (219) -

Basic Size 30

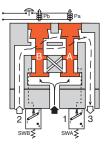


# Accessories

Electrical	Electrical		O a well have welle	Oand	Electrica	I Connector Mo	odel Number	
	Connector	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Without	Lighted C	Connector	
		120 Volts AC						
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
	EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
	EN 175301-803 Form A	Connector Only	_	-	937K87	936K87-W	936K87-Z	
CAUTIONS: Do not	use electrical connectors	with surge suppressors, as this ma	y increase valv	e response	e time when	de-actuating th	e solenoids.	

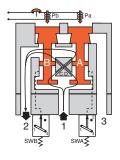
# Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both switches SWA and SWB are exhausted. Contacts 1 and 2 of switches SWA and SWB are connected.



# Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Sensing pressure signals go to each pressure switch and become equal to inlet pressure. Both switches trip and now contacts 1 and 4 of switches SWA and SWB are connected instead of contacts 1 and 2.



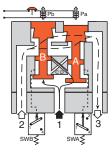
# VALVE OPERATION

**Completion of Normal Cycle:** 

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described at left.

#### **Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below 2 % of inlet pressure. Full sensing air pressure from side A goes to switch SWA, and a reduced pressure goes to switch SWB. This full pressure signal causes switch SWA to trip. Switch SWB, with a reduced pressure signal, does not trip. An external monitoring system can detect the malfunction by monitoring the condition of the switches SWA and SWB. The external monitoring system may then react accordingly by shutting down the power to the valve solenoids and any other components deemed necessary to stop the machine.





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# ROSS CONTROLS®

# Accessories



www.rosscontrols.com



# **Silencers**

# Accessories

Port	Thread	Model	Number	Avg.	Dimension	<b>s</b> inches (mm)	Weight	
Size	Туре	NPT Threads	BSPT Threads	Cv	A	В	lb (kg)	
1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	2.0 (51)	0.1 (0.1)	
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)	
3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)	Port size Port size 21/2
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)	1/8 thru 2
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)	
3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (92)	0.2 (0.1)	
3/4	Male	5500A5003	D5500A5003	11.5	2.0 (51)	5.3 (135)	0.6 (0.3)	Male Pipe Threads
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)	For ports 1/8 through 1¼
1¼	Male	5500A7013	D5500A7013	16.4	2.0 (51)	5.5 (140)	0.6 (0.3)	
1¼	Female	5500A7001	D5500A7001	24.0	2.5 (64)	5.7 (144)	1.0 (0.5)	
1½	Female	5500A8001	D5500A8001	29.9	2.5 (64)	5.7 (144)	1.0 (0.5)	Female Pipe Threads
2	Female	5500B9001	D5500B9001	34.2	3.0 (76)	6.6 (168)	1.5 (0.7)	For ports 1¼ through 2½
21⁄2	Female	5500A9002	D5500A9002	103.7	4.0 (102)	5.7 (145)	2.9 (1.4)	

# HIGH-FLOW, HIGH-REDUCTION SILENCERS for DM<sup>1</sup>, DM<sup>2®</sup> Series E & DM<sup>2®</sup> Series C Double Valves

Valve	Basic	Thread	Kit	Flow	Dim	nensions inches	(mm)			
Model	Size	Туре	Number*	scfm	Α	В	С	A	ŧ	
DM	2	NPT	2323H77	256 (121)	4.96 (126.1)	14.24 (361.7)	5.68 (144.3)			
Series E	2	BSPT	2328H77	256 (121)	4.96 (126.1)	16.05 (407.7)	5.73 (145.5)			
	4	NPT	2324H77	800 (378)	4.34 (110.2)	19.06 (484.1)	7.27 (184.7)	<u> </u>		
	8	NPT	2325H77	800 (378)	5.41 (137.4)	21.18 (538.0)	8.41 (213.6)			
	12	NPT	2326H77	2080 (982)	6.74 (117.2)	25.85 (656.6)	10.66 (270.8)		B	
DM Series	30	NPT	2327H77	7200 (3398)	9.85 (250.2)	41.55 (1055.4)	13.47 (342.1)		Ĩ 📥	
C	4	BSPT	2329H77	800 (378)	4.34 (110.2)	21.40 (543.6)	7.27 (184.7)			-
Ũ	8	BSPT	2330H77	800 (378)	5.41 (137.4)	23.52 (597.4)	8.41 (213.6)			
	12	BSPT	2331H77	2080 (982)	6.74 (117.2)	28.20 (716.3)	10.66 (270.8)			
	30	BSPT	2332H77	7200 (3398)	9.85 (250.2)	41.55 (1055.4)	13.47 (342.1)			
* Kits inc	lude all	plumbin	g required	for installation	on.					

Pressure Range: 125 psig (8.6 bar) maximum.

# **Stainless Steel Silencers**

- Port sizes 1/4 thru 1 NPT have all stainless steel construction
- Port sizes 2 NPT and all BSPT have standard construction consisting of nickel plated cold rolled steel
- Supplied with a standard pipe thread fitting for attaching directly to the exhaust ports of air-operated equipment

Port	Thread	Model	Number	Avg.	Dimension	<b>s</b> inches (mm)	Weight	A.	
Size	Туре	NPT Threads	<b>BSPT</b> Threads	Cv	Α	В	lb (kg)		
1/4	Male	5500B2004	D5500B2004	1.44	0.56 (14.2)	1.75 (44.5)	0.05 (0.23)		
1/2	Male	5500B4004	D5500B4004	3.01	0.87 (22.1)	2.75 (69.7)	0.25 ( 0.11)	B	
1	Male	5500B6004	D5500B6004	10.41	1.31 (33.3)	3.87 (98.3)	0.45 (0.20)		
2	Male	5500B9004	D5500B9004	28.11	2.37 (60.2)	5.50 (139.7)	1.5 (0.68)		

Pressure Range: 0 to 150 psig (0 to 10.3 bar) maximum. Flow Media: Filtered air; 5 micron recommended.

# Silencers for Stainless Steel L-O-X<sup>®</sup> Air Entry Combinations

316 Stainless Steel sintered element silencers used to protect ports open to the atmosphere.

Port	Thread	Model	Number	Avg.	Dimension	<b>s</b> inches (mm)						- neisial
Size	Туре	NPT Threads	<b>BSP</b> Threads	Cv	Α	В		A	B		100	122
1/4	Male	5500A2005	D5500A2005	1.5	0.67 (17)	1.50 (38)					100	
1/2	Male	5500A4005	D5500A4005	3.5	0.94 (24)	2.17 (55				Acres 1	1	A DESCRIPTION OF
1	Male	5500A6005	D5500A6005	5.7	1.41 (36)	2.95 (75)		<b>~</b>		THE .	1000	1 EITH
Pressu	ire Rang	e: 0 to 174 ps	ig (0 to 12 bar) r	naximu	m. Flow Med	lia: Filtered air;	5 micron recom	nmended.	Seals: Nitrile.			

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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# Electrical Connectors Pressure Switches

# Accessories

# **ELECTRICAL** Connectors

Fleetricel Compositor		Cord	Quard	Electrica	al Connector Mo	odel Number	
Electrical Connector Form	Electrical Connector Type	Length	Cord Diameter	Without	Lighted C	connector	- Alt
		meters (feet)		Light	24 Volts DC	120 Volts AC	
EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	6-mm	721K77	720K77-W	720K77-Z	
EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	371K77	383K77-W	383K77-Z	
EN 175301-803 Form A	Connector for threaded conduit (1/2 inch electrical conduit fittings)	-	-	723K77	724K77-W	724K77-Z	
EN 175301-803 Form A	Connector Only	-	-	937K87	936K87-W	936K87-Z	
EN 175301-803 Form B	Prewired Connector (18 gauge)	2 (61⁄2)	10-mm	266K87	267K77-W	267K77-Z	-
EN 175301-803 Form B	Connector Only	-	-	372K77	382K77-W	382K77-Z	
EN 175301-803 Form C	Prewired Connector (18 gauge)	2 (61⁄2)	5-mm	-	2476K77-W	2476K77-Z	
EN 175301-803 Form C	Prewired Connector (18 gauge)	3 (10)	8-mm	2449K77	2450K77-W	2450K77-Z	100
EN 175301-803 Form C	Connector Only	-	-	2452K77	2453K77-W	2453K77-Z	יי
CAUTIONS: Do not us	e electrical connectors with surge s	uppressors. a	as this mav	increase va	lve response tir	ne when de-actu	ating the solenoid

# PRESSURE SWITCHES For Verification Of Downstream PRESSURE RELEASE

May be installed downstream on all double valves

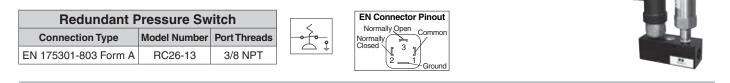
- Provides means to verify the release of downstream pressure to next obstruction
- Factory preset, 5 psi (0.3 bar) falling

Pressu	e Switches			EN Connector Pinout	M12 Connector Pinout
<b>Connection Type</b>	Model Number	Port Threads	$\leq$	Normally Open Common	Pin 4 Pin 3 Normally Not Used
EN 175301-803 Form A	586A86	1/8 NPT		Normally Closed	Open Pin 2
M12	1153A30	1/8 NPT		2 Ground	Pin 1 Common Closed

May be installed downstream on all double valves

Provides a redundant means to verify the release of downstream pressure to next obstruction

Factory preset, 5 psi (0.3 bar) - falling



# **POP-UP Indicator**

Model Number\*\*988A30\*\* 1/8 NPT port threads.



# **STATUS Indicator**



The Status Indicator pressure switch actuates when the valve is in a ready-to-run condition and de-actuates when the valve is in a lockout condition or when the inlet air pressure has been removed. Although, the valves can be purchased with this option already installed, the Status Indicator can be purchased separately.



IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



**Online Version** 

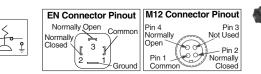
Rev. 11/14/16

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MAR A

# PRESSURE SWITCHES & INDICATOR Light Kit for SV27 & SV27 PO Check Sensing Valves

Pressure Switches							
Connection Type	Model Number	Port Threads					
EN 175301-803 Form A	586A86	1/8 NPT					
M12	1153A30	1/8 NPT					





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INDICATOR LIGHT Kit		Kit Number		Indicator Light	
for 27 & 21 Series, SV27, SV27 PO Check Valves with Solenoid Controlled	24 volts DC	110-120 volts AC 50-60 Hz	220 volts 50-60 Hz		Indicator
Pacer Pilot	862K87-W	862K87-Z	862K87-Y		Light Kit

To visually verify valve operation indicator lights are available in kit form. The indicator light extends through the solenoid or pilot cover and is illuminated when the solenoid is energized. Such lights are standard on double solenoid valves. Indicator light kit is available for single solenoid models.

# **PRESSURE** Gauges

Port Size	Model Number*	Pressure Range psig (bar)	Case Diameter inches (mm)
1/8	5400A1002	0-160 (0-11)	1.5 (38)
1/4	5400A2010	0-60 (0-4)	2.0 (51)
1/4	5400A2011	0-200 (0-14)	2.0 (51)
1/4	5400A2012	0-300 (0-20)	2.0 (51)
1/4	5400A2014**	0-160 (0-11)	2.5 (64)
1/4	5400A2015***	0-160 (0-11)	2.0 (51)

\* Center back mounting; male pipe threads.

\*\* 5400A2014 - Stainless steel case liquid filled.

\*\*\* 5400A2015 - Green shade between 40-70 psi (2.7-4.8 bar).

**MULTIPLE LOCK-OUT Device** 

Model Number

356A30

# **MANUAL OVERRIDE Kits**

Flush flexible manual overrides are standard on single solenoid models. Double solenoid models have flush metal-button overrides. Both types are non-locking.

Each of the buttons in the override kits below is made of metal and is spring-returned. The locking type button, however, can be kept in the actuated position by turning the slot in the top of the button with a screwdriver.

FLUSH B	UTTON	EXTENDED	BUTTON	Ρ		EXTENDED with P		
Locking Type	Kit Number	Locking Type	Kit Number		ł	Locking Type	Kit Number	J.
Non-Locking	790K87					•		
Locking	792K87	Non-Locking	791K87			Non-Locking	984H87	

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.



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1007K77 to 1009K77	A2.10	2152B7900	B3.12	2173B5005**	F6.7	2255H77	G1.7	2751A6012,	B2.17
1010K77	E6.8	2152B8011, 8012	B3.6	2173B5900**	B3.10	2256H77	F3.8,11,15	2751A6014	B2.21
1028C91	G3.6	2153A3913 to 9903	B3.13	2173B6001**, 6002**	B3.4	2256H77	G1.7	2751A6017	B2.15
1042C91, 1120C91	G3.4	2153B2001, 2002	B3.7	2173B6005**	F6.7	2283H77	F3.11,15	2751A6901	F4.6
1121A2001	C1.4	2153B2900	B3.13	2173B6011**, 6012**	B3.4	2283H77	F5.10	2751A7001	B2.12
1121A2002 1122C91	C1.6 G3.6	2153B3001 to 4012 2153B4903	B3.7 B3.13	2173B6015**	F6.7	2283H77 2284H77	G1.7 F3.11,15	2751A7002, 7003 2751A7004	B2.17 B2.21
1123A2001	C1.4	2153B5001, 5002	B3.13 B3.7	2173B6901**, 6902**	B3.10	2284H77	F5.10	2751A7004 2751A7007, 8001	B2.21 B2.15
1123A2001	C1.6	2153B5903	B3.13	2173B7001**, 7002** 2173B7005**	B3.4 F6.7	2284H77	G1.7	2751A8011	B2.13
1123C91, 1129C91	G3.6	2153B6001 to 8012	B3.7	2173B7005 2173B7901**, 7904**	B3.10	2288H77	F3.11,15	2751A8012, 8013	B2.12
1131A2001 to 1133A2001	C1.12	2153B8900, 2153C6905	B3.13	2173B8011**, 8012**	B3.4	2288H77	F5.10	2751A8014	B2.21
1136C91	G3.6	2154B2001 to 8012	B3.7	2173B8015**	F6.7	2288H77	G1.7	2751A8017	B2.15
1153A30	H1.4	2156B2001 to 8012	B3.8	2173B8911**	B3.10	2289H77	F3.11,15	2751A9001, 9011	B2.12
1155H30, 1162A30	F1.10	2171A4917**	B3.9	2174B2001**, 2002**	B3.4	2289H77	F5.10	2751B2008 to 6018	B2.19
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1171C91, 1172C91	G3.4	2171B2005**	F6.6	2174B3001**, 3002**	B3.4	2301K77	A7.4	2751B7008	B2.19
1221B2001, 2003	C1.4	2171B2901**	B3.9	2174B3005**	F6.7	2323H77 to 2332H77	H1.3	2751B7901	F4.6
1223B1FPG to 1MBR	C1.3 C1.5	2171B3001**, 3002** 2171B3005**	B3.3 F6.6	2174B4001**, 4002**	B3.4	235A40, 236A40	A2.10	2751B8018	B2.19
1223B1SLB 1223B2001, 2003	C1.5 C1.4	2171B3906**	B3.9	2174B4005**	F6.7	2370K77W, 2371K77W 237A40	F6.9 A2.10	2751B8902 2752A2001	F4.6 B2.12
1223B2FPG to 1MBR	C1.4	2171B4001**, 4002**	B3.3	2174B4011**, 4012**	B3.4	2431H77 to 2447H77	F3.18	2752A2001 2752A2002, 2003	B2.12 B2.17
1223B2SLB	C1.5	2171B4001 , 4002 2171B4005**	F6.6	2174B4015** 2174B4900**	F6.7 B3.11	2449K77 to 2453K77-**	H1.4	2752A2004	B2.11 B2.21
1300K91 to 1307K91	A2.9	2171B4005 2171B4011**, 4012**	B3.3	2174B4900 2174B5001**, 5002**	B3.4	2476K77-**	B1.25	2752A2007	B2.15
1371N77 to 1389N77	A2.16	2171B4015**	F6.6	2174B5005**	F6.7	2526H77 to 2530H77-**	F5.10	2752A3001	B2.12
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1616C2322**	B6.4	2171B7901**	B3.9	2176B2001**, 2002** 2176B2005**	F6.8	2751A2002, 2003	B2.17	2752A4017	B2.15
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1958A3010	F4.3	2172B6005**	F6.6	2176B8011**, 8012**	B3.5	2751A4004	B2.21	2752A7004	B2.21
1958A3130	F4.4	2172B6011**, 6012**	B3.3	2176B8015**	F6.8	2751A4007	B2.15	2752A7007	B2.15
1958A4010	F4.3	2172B6015**	F6.6	2239H77	F2.3, 5, 8	2751A4011	B2.12	2752A8001, 8011	B2.12
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1968A4107 to 9117	D1.6	2172B7005**	F6.6	2240H77	F2.3, 5, 8	2751A4014	B2.21	2752A8014	B2.21
1968B2007 to 9017	D1.4	2172B8011**, 8012**	B3.3	2240H77	F4.13,14	2751A4017	B2.15	2752A8017	B2.15
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2753A6004	B2.21	2756A6004	B2.21	2772B6002**	F6.3	2773B8001**	B2.4	2776B3003**	B2.11
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531K91**	A5.17	5B02C0115, 0117	E5.21	5B08B0500 to 0800	E1.12	5D05C0220	E3.3	5H00C*** F, R & L	E5.31
5321B2012	E3.7	5B02C0125, 0127	E5.22	5B08C0010 to 0060	E2.4	5D05C0226, 0227	E5.12	5H00C5110 to 6410	E5.6
5321B2052, 2062 5321B2072, 3012	E3.5 E3.7	5B02C0216, 0217 5B02C0226, 0227	E5.21 E5.22	5B08C0115, 0117 5B08C0125, 0127	E5.21 E5.22	5D05C0310 5D05C0315, 0317	E3.3 E5.11	5H00C5111 to 6412 5M00B*** F, R & L	E5.30 E5.24
5321B3052, 3062	E3.7 E3.5	5B02C0315, 0317	E5.22	5B08C0216. 0217	E5.22	5D05C0315, 0317	E3.11	5M09B*** F, R & L	E5.24 E5.24
5321B3072, 4012	E3.7	5B02C0325, 0327	E5.22	5B08C0226, 0227	E5.22	5D05C0325, 0327	E5.12	5M10B*** F, R & L	E5.24
5321B4052, 4062	E3.5	5B02C0416, 0417	E5.21	5B08C0315, 0317	E5.21	5D05C0410	E3.3	5M11B*** F, R & L	E5.24
5321B4072 to 5072	E3.7	5B02C0426, 0427	E5.22	5B08C0325, 0327	E5.22	5D05C0416, 0417	E5.11	5M11B2101 to 4402	E5.8
5321C1002, 1022	E3.4	5B03B0005 to 0008	E4.3	5B08C0416, 0417	E5.21	5D05C0420	E3.3	5M11B2110 to 4410	E5.4
5321C1026, 1027	E5.3	5B03B0100 to 0400	E1.3	5B08C0426, 0427	E5.22	5D05C0426, 0427	E5.12	5N00B*** F/R + L	E5.15
5321C1032	E3.4	5B03B0500 to 0800	E1.12	5D01C0110	E3.3	5D06C0110	E3.3	5N09B*** F/R + L	E5.15
5321C1036, 1037	E5.3	5B03C0010 to 0060	E2.4	5D01C0115, 0117	E5.11	5D06C0115, 0117	E5.11	5N10B*** F/R + L	E5.15
5321C1042 to 2022	E3.4	5B03C0115, 0117	E5.21	5D01C0125, 0127	E5.12	5D06C0120	E3.3	5N11B*** F/R + L	E5.15
5321C2026, 2027	E5.3	5B03C0125, 0127	E5.22	5D01C0210	E3.3	5D06C0125, 0127	E5.12	5X00B1025	E2.11
5321C2032	E3.4	5B03C0216, 0217	E5.21	5D01C0216, 0217	E5.11	5D06C0210	E3.3	5X00B2010	E2.8
5321C2036, 2037	E5.3	5B03C0226, 0227	E5.22	5D01C0226, 0227	E5.12	5D06C0216, 0217	E5.11	5X00B2035	E2.6
5321C2042 5322B2011	E3.4 E3.7	5B03C0315, 0317 5B03C0325, 0327	E5.21 E5.22	5D01C0310 5D01C0315, 0317	E3.3 E5.11	5D06C0220 5D06C0226, 0227	E3.3 E5.12	5X00B2037 5X00B2039	E2.17 E2.6
5322B2051, 2061	E3.7 E3.5	5B03C0416, 0417	E5.22	5D01C0325, 0327	E5.12	5D06C0226, 0227	E3.12 E3.3	5X00B2039	E2.0
5322B2071, 3011	E3.7	5B03C0426, 0427	E5.22	5D01C0410	E3.3	5D06C0315, 0317	E5.11	5X00B3004, 3012	E2.8
5322B3051, 3061	E3.5	5B04B0005 to 0008	E4.3	5D01C0416, 0417	E5.11	5D06C0320	E3.3	5X00B3021, 3024	E2.6
5322B3071, 4011	E3.7	5B04B0100, 0200	E1.3	5D01C0426, 0427	E5.12	5D06C0325, 0327	E5.12	5X00B3025	E2.17
5322B4051, 4061	E3.5	5B04B0300, 0400	E1.3	5D02C0110	E3.3	5D06C0410	E3.3	5X00B3052	E2.11
5322B4071 to 5071	E3.7	5B04B0500 to 0800	E1.12	5D02C0115, 0117	E5.11	5D06C0416, 0417	E5.11	5X00B4004	E2.8
5322C1001, 1021	E3.4	5B04C0010 to 0060	E2.4	5D02C0125, 0127	E5.12	5D06C0420	E3.3	5X00B4023	E2.6
5322C1024, 1025	E5.3	5B04C0115, 0117	E5.21	5D02C0210	E3.3	5D06C0426, 0427	E5.12	5X00B4040	E2.17
5322C1031	E3.4	5B04C0125, 0127	E5.22	5D02C0216, 0217	E5.11	5D07C0110	E3.3	5X00B4041	E2.6
5322C1034, 1035	E5.3	5B04C0216, 0217	E5.21	5D02C0226, 0227	E5.12	5D07C0115, 0117	E5.11	5X00B4047, 5034	E2.8
5322C1041 to 2021	E3.4	5B04C0226, 0227	E5.22	5D02C0310 5D02C0315.0317	E3.3	5D07C0120	E3.3	5X00B5035 5X00B5044	E2.17
5322C2024, 2025 5322C2031	E5.3 E3.4	5B04C0315, 0317 5B04C0325, 0327	E5.21 E5.22	5D02C0315, 0317	E5.11 E5.12	5D07C0125, 0127 5D07C0210	E5.12 E3.3	5X00B5044	E2.8 E2.20
5322C2034, 2035	E5.3	5B04C0416, 0417	E5.21	5D02C0323, 0327	E3.3	5D07C0216, 0217	E5.11	5X00B5049, 5050	E2.10
5322C2041	E3.4	5B04C0426, 0427	E5.22	5D02C0416.0417	E5.11	5D07C0220	E3.3	5X00B5076	E1.18
532K91**	A5.17	5B05B0005 to 0008	E4.3	5D02C0426, 0427	E5.12	5D07C0226, 0227	E5.12	5X00B5086, 5087	E1.19
5331C1005 to 2106	E5.23	5B05B0100 to 0400	E1.3	5D03C0110	E3.3	5D07C0310	E3.3	5X00B5099, 6027	E1.18
533K91**	A5.17	5B05B0500 to 0800	E1.12	5D03C0115, 0117	E5.11	5D07C0315, 0317	E5.11	5X00B6038	E2.10
5341C1005 to 2106	E5.14	5B05C0010 to 0060	E2.4	5D03C0120	E3.3	5D07C0320	E3.3	5X00B6039	E2.20
534K91**	A5.17	5B05C0115, 0117	E5.21	5D03C0125, 0127	E5.12	5D07C0325, 0327	E5.12	5X00B6054	E1.18
5351C1005 to 2106	E5.13	5B05C0125, 0127	E5.22	5D03C0210	E3.3	5D07C0410	E3.3	5X00B6064	E1.19
535K91	A7.3	5B05C0216, 0217	E5.21	5D03C0216, 0217	E5.11	5D07C0416, 0417	E5.11	5X00B6065	E1.19
537H77	A2.9	5B05C0226, 0227	E5.22	5D03C0220	E3.3	5D07C0420	E3.3	5X00B7016	E2.10
539K91	A6.8	5B05C0315, 0317	E5.21	5D03C0226, 0227	E5.12	5D07C0426, 0427	E5.12	5X00B7019	E1.21
5400A1002 to 2015	E6.6	5B05C0325, 0327	E5.22	5D03C0310	E3.3	5D08C0110	E3.3	5X00B7021	E2.20
540K91 to 542K91	A6.8	5B05C0416, 0417	E5.21	5D03C0315, 0317	E5.11	5D08C0115, 0117	E5.11	5X00B7025	E1.11
546H77 5500A1003 to	A2.9	5B05C0426, 0427 5B06B0005 to 0008	E5.22 E4.3	5D03C0320 5D03C0325, 0327	E3.3 E5.12	5D08C0120 5D08C0125, 0127	E3.3 E5.12	5X00B7034, 7036 5X00B7051, 7052	E1.20 E1.10
5500B9004	H1.3	5B06B0100 to 0400	E4.3	5D03C0410, 0410	E3.3	5D08C0210	E3.12	5X00B7054	E1.10
553K91 to 555K91	A6.9	5B06B0500 to 0800	E1.3 E1.12	5D03C0410, 0410	E3.3 E5.11	5D08C0210 5D08C0216, 0217	E3.3 E5.11	5X00B7054	E1.11 E1.21
	A6.8	5B06C0010 to 0060	E2.4	5D03C0426, 0427	E5.12	5D08C0220	E3.3	5X00B8018, 8019	E1.11
577K91 to 579K91					E3.3	5D08C0226, C0227	E5.12		E2.10
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	A6.9 A6.8	5B06C0115, 0117 5B06C0125, 0127	E5.21 E5.22	5D04C0110 5D04C0115, 0117		5D08C0310		5X00B8024 5X00B8035, 8036	E1.20
580K91, 581K91		5B06C0115, 0117 5B06C0125, 0127 5B06C0216, 0217	E5.21 E5.22 E5.21	5D04C0110 5D04C0115, 0117 5D04C0120	E5.11 E3.3		E3.3 E5.11	5X00B8024 5X00B8035, 8036 5X00B8037	



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5X00B8051	E1.10	9574K1001** to 3001**	B4.3	C5012B4006	E1.7	C5111B5009	E4.9	C5321B3052, 3062	E3.5
5X00B9003, 9004	E1.11	9576K1001**	B4.4	C5012B4007	E1.5	C5111B5014, 5108	E4.7	C5321B3072, 4012	E3.7
5X00B9009, 9021	E1.22	9576K1002**	B4.5	C5012B5006	E1.9	C5111B5109	E4.9	C5321B4052, 4062	E3.5
5X00C7003, 8001	E2.10	9576K2001**	B4.4	C5012B5016	E1.7	C5111B5114	E4.7	C5321B4072 to 5072	E3.7
5X00D6003	E2.10	9576K2002**	B4.5	C5012B6006	E1.9	C5111B6009 to 8109	E4.9	C5321C1002, 1022	E3.4
600C01 to 602C01 609E94	A2.8 A7.5	9576K2901**, 2902** 9576K3001**	B5.3 B4.4	C5012B7018 C5012B7019	E1.11 E1.10	C5112B1010 to 1112 C5112B2007	E4.4 E4.5	C5321C1026, 1027 C5321C1032 to 2022	E5.3 E3.4
626C91 to 633C91	A7.5 A5.19	9576K3002**	B4.4 B4.5	C5012B7019	E1.10	C5112B2008	E4.5 E4.7	C5321C1032102022	E5.3
642K91 to 654K91	A3.13 A2.8	9576K4001**	B4.3	C5012B8019	E1.10	C5112B2010, 2012	E4.4	C5321C2032, 2027	E3.4
658K77 to 660K77	G2.3	9576K4002**	B4.5	C5012B9018	E1.11	C5112B2014	E4.7	C5322B2011	E3.7
661K77	G2.5, 7, 9	9577K1007** to 2007**	B4.6	C5021B1010	E1.4	C5112B2107	E4.5	C5322B2051, 2061	E3.5
662K77 to 664K77	G2.5, 7, 9	9577K2010	B4.10	C5021B2007	E1.5	C5112B2108	E4.7	C5322B2071, 3011	E3.7
664K91	A2.8	9577K2010** to 4019**	B4.6	C5021B2008	E1.7	C5112B2110, 2112	E4.4	C5322B3051, 3061	E3.5
665K77	G2.5, 7, 9	957N91, 958N91	A2.14	C5021B2010	E1.4	C5112B2114	E4.7	C5322B3071, 4011	E3.7
665K91	A2.8	959N91 to 964N91	A2.15	C5021B3008	E1.7	C5112B3007	E4.5	C5322B4051, 4061	E3.5
666K77	G2.5, 7, 9	965N91 to 970N91	A2.16	C5021B3027	E1.5	C5112B3008, 3014	E4.7	C5322B4071 to 5071	E3.7
666K91	A2.8	971N91, 972N91	A2.14	C5021B4007	E1.5	C5112B3107	E4.5	C5322C1001, 1021	E3.4
667K77, 668K77 670B94	G2.5, 7, 9 H1.4	981K77 984H87	E6.8 H1.5	C5021B4008 C5021B5008	E1.7 E1.9	C5112B3108, 3114 C5112B4007	E4.7 E4.5	C5322C1024, 1025 C5322C1031 to 2021	E5.3 E3.4
692K77	A2.10	988A30	F1.3	C5021B5008	E1.9 E1.7	C5112B4007	E4.5 E4.7	C5322C103110 2021	E5.4
694K77	A2.9	996C91	F5.3, 5	C5021B6008	E1.9	C5112B4107	E4.5	C5322C2031, 2041	E3.4
698K86 to 700K86	F5.7, 11	1049C91	F5.3, 5	C5022B1010	E1.4	C5112B4108 to 5008	E4.7	C5331C1005 to 2106	E5.23
701B77	A2.9	1153C91	F5.3, 5	C5022B2005	E1.7	C5112B	E4.7	C5332C1005 to 2106	E5.23
701K86	F5.7, 11	1159G91	F5.3, 5	C5022B2007	E1.5	C5112B5009	E4.9	C5341C1005 to 2106	E5.14
702B77	A2.9	BL67-16D0-0.5A-P	A4.6	C5022B2010	E1.4	C5112B5014	E4.7	C5342C1005 to 2106	E5.14
702K86	F5.7, 11	BL67-1RS232	A4.4, 7	C5022B3005	E1.7	C5112B5019, 5029	E4.9	C5351C1005 to 2106	E5.13
703K77	A2.10	BL67-1RS485/422	A4.7	C5022B3027	E1.5	C5112B5108	E4.7	C5352C1005 to 2106	E5.13
704K86	F5.7, 11	BL67-1SSI	A4.7, 7	C5022B4005	E1.7	C5112B5109	E4.9	C5B01B0005 to 0008	E4.3
713C91 to 715C91	A5.19	BL67-2AI-I	A4.4	C5022B4007	E1.5	C5112B5114	E4.7	C5B01B0100 to 0400	E1.3
715K77	A2.10	BL67-2A0-I, AO-V	A4.4, 6	C5022B5005	E1.9	C5112B5119 to 6009	E4.9	C5B01B0500 to 0800	E1.12
720K77-**, 721K77	H1.4	BL67-4DI4DO-PD	A4.6	C5022B5015 C5022B6005	E1.7	C5112B6011 to 8129	E4.9	C5B01C0010 to 0060	E2.4
722B77 723K77, 724K77-**	A2.9 H1.4	BL67-4DI-I, DI-N BL67-4DI-P	A4.6 A4.4,6,7	C5022B7018	E1.9 E1.11	C5210B1001 to 2004 C5211B2015	E2.23 E2.6	C5B01C0115, 0117 C5B01C0125, 0127	E5.21 E5.22
725K77	A2.10	BL67-4DI-PD	A4.4,6,7 A4.4, 6	C5022B7018	E1.10	C5211B2017	E2.0 E2.8	C5B01C0125, 0127	E5.22 E5.21
728K91	A6.8	BL67-4DI-V/I	A4.6	C5022B8018	E1.10	C5211B3015	E2.6	C5B01C0226, 0227	E5.22
790K87 to 792K87	H1.5	BL67-4D0-0.5A-P	A4.4, 6	C5022B8019	E1.10	C5211B3017	E2.8	C5B01C0315, 0317	E5.21
798E30	F5.3, 5	BL67-4D0-2A-N	A4.6	C5022B9018	E1.11	C5211B4015	E2.6	C5B01C0325, 0327	E5.22
8076B6311 to C4361	A6.3	BL67-4D0-2A-P	A4.4, 6	C5031B1028, 1128	E1.13	C5211B4017, 5027	E2.8	C5B01C0416, 0417	E5.21
8076B6312 to C4352**	A6.4	BL67-8DI-N	A4.4	C5031B2008	E1.16	C5211B8027 to 9008	E2.22	C5B01C0426, 0427	E5.22
8077A4904** to C4362	A6.5	BL67-8DI-P, DI-PD	A4.4, 6	C5031B2028	E1.13	C5211C1004 to 2005	E2.5	C5B02B0005 to 0008	E4.3
816H91 to 822K77	A6.10	BL67-8D0-0.5A-P	A4.4, 6	C5031B2108	E1.16	C5211C2007 to 5007	E2.16	C5B02B0100 to 0400	E1.3
840C91, 841C91	A5.19	BL67-8XSG-P	A4.6	C5031B2128	E1.13	C5211C7017 to 6017	E2.10	C5B02B0500 to 0800	E1.12
8476B6311 to C4361 **	A6.6	BL67-8XSG-PD	A4.4, 6	C5031B2208 to 5008	E1.16	C5212B2015	E2.6	C5B02C0010 to 0060	E2.4
8476B6312 to C4362 857K77 to 862K77	A6.7 E6.4	BL67-B-1M12, M12-8 BL67-B-1M23, M23-19,	A4.8	C5031C6008 C5032B1028, 1118	E1.18 E1.13	C5212B2017 C5212B3015	E2.8 E2.6	C5B02C0115 to 0417 C5B02C0125 to 0427	E5.21 E5.22
862K87-**	H1.5	M23-VI	A4.8	C5032B1028, 1118 C5032B2018 to 4229	E1.13 E1.16	C5212B3017	E2.0	C5D01C0110	E3.3
863K77 to 871K77	E6.4	BL67-B-1RSM, 1RSM-4	A4.8	C5032B2010 to 4229	E1.14	C5212B3017	E2.6	C5D01C0115, 0117	E5.11
872K77	E6.3	BL67-B-2M12, 2M12-P	A4.8	C5032B5018	E1.18	C5212B4017, 5027	E2.8	C5D01C0125, 0127	E5.12
873H91	A6.10	BL67-B-4M8, 8M8	A4.8	C5032B5019 to 6019	E1.19	C5212C1004, 1005	E2.5	C5D01C0210	E3.3
873K77 to 887K77	E6.3	BL67-GW-CO	A4.5	C5032B6117	E1.18	C5212C1006	E2.12	C5D01C0216, 0217	E5.11
888C91	G3.4	BL67-GW-DN, DPV1	A4.4, 5	C5032B7019 to 8029	E1.20	C5212C2004, 2005	E2.5	C5D01C0226, 0227	E5.12
888K77 to 891K77	E6.3	BL67-GW-EN, EN-IP, EN-PN	A4.5	C5032B9018	E1.22	C5212C2006	E2.12	C5D01C0310	E3.3
892K77	E6.4	BL67-PF-24 V DC	A4.4, 7	C5032C6028	E1.19	C5212C7017 to D6017	E2.10	C5D01C0315, 0317	E5.11
893C91	G3.6	BL67-PG-DP to PG-EN-IP	A4.5	C5055B4009 to 6009	E1.29	C5213B2015	E2.6	C5D01C0325, 0327	E5.12
893K77 to 900K77	E6.4	C5011B1010	E1.4	C5111B1010 to 1112	E4.4	C5213B2017	E2.8	C5D01C0410	E3.3
915K77	E6.3	C5011B2007	E1.5	C5111B2007	E4.5	C5213B3015	E2.6	C5D01C0416, 0417	E5.11
933K77, 936K77	E6.8	C5011B2008	E1.7	C5111B2008	E4.7	C5213B3017	E2.8	C5D01C0426, 0427	E5.12
936K87-**, 937K87	H1.4	C5011B2010	E1.4	C5111B2010, 2012	E4.4	C5213B4015	E2.6	C5D02C0110	E3.3
939K77 to 949K77	E6.8	C5011B3008	E1.7	C5111B2014 C5111B2107	E4.7 E4.5	C5213B4017, 5027 C5213C1004 to 2005	E2.8 E2.5	C5D02C0115, 0117 C5D02C0125, 0127	E5.11 E5.12
949N91 to 951N91 952K77	A2.14	C5011B3026, 4007	E1.5	C5111B2107	E4.5 E4.7	C5213C2018 to 5018	E2.5 E2.13	C5D02C0125, 0127	E3.12 E3.3
952N91	E6.8 A2.14	C5011B4008	E1.7	C5111B2100	E4.7	C5213D5017 to 8017	E2.15	C5D02C0216, 0217	E5.11
953K77	E6.8	C5011B5008	E1.9	C5111B2114	E4.4	C5214C2018 to 5018	E2.13	C5D02C0226, 0217	E5.12
953N91, 954N91	A2.14	C5011B5018	E1.7	C5111B3007	E4.5	C5214D5017 to 8017	E2.15	C5D02C0310	E3.3
9553K1000 to 3000	B4.7	C5011B6008	E1.9	C5111B3008, 3014	E4.7	C5215B1004 to 3004	E2.10	C5D02C0315, 0317	E5.11
9554K1000 to 3000	B4.7	C5012B1010	E1.4	C5111B3107	E4.5	C5216A2007 to 4007	E2.18	C5D02C0325, 0327	E5.12
9556K1001 to 4001	B4.8	C5012B2006	E1.7	C5111B3108, 3114	E4.7	C5216A5007 to 7007	E2.21	C5D02C0410	E3.3
9556K1002 to 4002	B4.9	C5012B2007 C5012B2010	E1.5 E1.4	C5111B4007	E4.5	C5311C1011 to 2112	E5.7	C5D02C0416, 0417	E5.11
9000K1002 10 400Z		10001707010	E1.4						
9557K1007 to 4019	B4.10			C5111B4008, 4014	E4.7	C5312C1011 to 2112	E5.7	C5D02C0426, 0427	E5.12
	B4.10 A2.14 B4.3	C5012B3006 C5012B3026	E1.7 E1.5	C5111B4008, 4014 C5111B4107	E4.7 E4.5	C5312C1011 to 2112 C5321B2012 to 2062	E5.7 E3.7	C5F00B*** F, R & L	E5.12 E5.27

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Griosenti, F. R. A.,         B. S. 20273 A2001         OPEN A2001         DissBe4001         DissBe4001         DissBe4001         DissBe4007         DissBe4007 <thdissbe4007< th=""></thdissbe4007<>	
CF11F**         FE 1         D1588E4007 m 007         D14         D12728801**         B03         D2751A2004           CF11E2010 5420         E58         CM26PDA2****         F67         D15982010 5400         D2728800***         F68         D2751A2003           CF102010 5420         E510         CM26PDA22****         F67         D15982010 5010         F16         D2728800***         B83         D 2751A2030           CF10025110         E58         CM26PMA01***         F57         D15984010         F43         D27138200***         B84         D2751A3003           CF40025110         E58         CM26PMA01***         F57         D215182010 4012         B36         D2751A3004         C575A3002         C575A3002         C575A3002         C575A3002         C575A3004         C575A3002         C575A3002         C575A3002         C575A3004         C575A3002         C575A3004	B2.12
DEFILE         DEFILE <thdefile< th=""> <thdefile< th=""> <thdefile< td="" th<=""><td>B2.17</td></thdefile<></thdefile<></thdefile<>	B2.17
CFH 1821201 0.54/10         ES.5         DMMEPHA22P1*         ES.1         D196862100.0310         F1.2         D27288800**         B2.9         D2751A8003           CHHORCTIT         F.A.L         ES.31         DMCSPNA00***         F.F.7         D198A1010         F.F.2         D2738805***         B3.4         D2734800**         F.F.7         D2751A8001         D2751A8005**         F.F.7         D2751A800**         B3.4         D2751A800**         B3.4         D2751A800**         F.F.7         D2751A800**         F.F.7         D2751A800**         F.F.7         D2751A800**         B3.1         D2751A800**         B3.1         D2751A800**         B3.1         D2751A800**         B3.1         D2751A800**         B3.1         D2751A800**         D2751A400**         B3.4         D2751A800**         B3.1         D2751A800**         B3.1 </td <td>B2.21</td>	B2.21
CH-H0BK101 to 6402         E5.10         CMX0PHA00P***         F5.11         D196902002         P7.2         D273A895'*         D275A8085'         D275A8005         D275A8005           CH-H0CK111         E5.80         CMX0PHA0P1**         F5.11         D275A8001         D275A80	B2.15
CHMOC:** F. R. AL.         E.3.1         CMR2PHA0P1**         F5.7         Distantion         F4.3         Distantion         F6.7         Distantion         F6.7 <thdistantin< th=""> <thdistantion< th="">         F6.7</thdistantion<></thdistantin<>	F4.6
CHHOCS110         E5.60         CMASEPHANP1**         F5.1         D2151A2901 07909         88.10         D27382005**         R5.7         D2751A3001         D20251A3001           CSHOOCS110         E5.60         CMASEPHANP1**         F5.11         D21518001 04014         88.6         D27383005**         R5.40         D2751A3001         B3.6         D27383005**         R5.40         D2751A3901         D2751A3901         D2751A3901         B3.6         D27383005**         R5.7         D251518011         B3.6         D27383005**         R5.7         D275158001         B3.6         D27384005**         R5.7         D275158001         D215         D27514002**         D27514002**         D27514002**         D27514001***         D27514001***         D27514001***         D27514001****         D27514001****         D27514001****         D27514001*****         D27514001******         D27514001*******         D27514001**********************************	F4.5
CHHOCS111         E5.40         CM22FHA001P1*         F5.11         D215120110_012         B5.60         D277828001***         S3.10         D2751A3004           CSHOCS212         E5.30         CM22FHA22****         F5.7         D21518001         B3.12         D27783800***         B3.10         D2751A300           CSHOCS311         E5.6         CM22FHA22****         F5.7         D21518001         B3.12         D27784300***         F6.7         D2751A302           CSHOCS412         E5.30         CM22FHA24X****         F5.7         D21518001         B3.12         D27784405***         D2751A302           CSHOCS412         E5.30         CM22FHA24X***         F5.7         D21518010         B3.12         D27784415***         F7.7         D2751A400*           CSHOCS412         E5.30         CM08PHA24***         B1.3         D215282011         D32<12528501         B3.12         D2738414***         B3.11         D2751A4004           CSHOCS412         E5.30         CX100B0501 Is         B1.14         D215282011         D32<1278801***         B3.14         D2751A4014**           CSHOCS414         E5.30         CX100B0501 Is         B1.14         D215820111         D312         D32         D2731A4014** <thd31< th="">         D2751A4004**</thd31<>	B2.12
CHHOCS210         E.5.6         CM28FMAX2***         F5.7         D21518001         D21788100**         F6.7         D275143001*           CHHOCS310         E.5.6         CM28FMAX2****         F5.7         D21518001         B3.6         D27734301**         A02         D275143001*         A02         D275143001**         A02         D275144001*         D275144001**         A02         D275144001**         A0275144001**         A0	B2.17 B2.21
CHOCG212         E5.30         CM26FM422****         F5.7         D215182001 to 5012         B3.8         D21738300***         F6.7         D2751A390           CHOOCG311         E5.6         CM26FVA22***         F6.7         D21518200         B3.12         D21738300***         F6.7         D2751A390           CHOOCG311         E5.6         CM26FVA22***         F6.7         D2751A390         B3.12         D21738400***         F6.7         D2751A390           CHOOCG311         E5.6         CP10000710***         F6.7         D2751A390         B3.12         D21738401***         F6.7         D2751A4902           CHOOCG311         E5.6         CP10000711***         B1.3         D21528201         D321528201**         D21528201**         D21738401***         F6.7         D2751A4002         D33           CHOOCG311         E5.30         CP10000711***         B1.12         D21528201         D302         B3.1         D21738500***         F6.7         D2751A402	B2.21 B2.15
CHHOCK310         E.5.6         CMAREPHA2P1*         F5.1         D21518900         B3.10         D27184301**         A02**         B3.40         D2751A300           CHHOCK310         E.5.6         CMAREPHA2X****         F5.7         D21518700         D36.6         D2738401**         402**         F6.7         D2751A302           CHHOCK311         E.5.6         CMAREPHA2X****         F5.7         D21518700         D36.6         D2738401**         402**         F6.7         D2751A402         A02         D2751A402         D2751A402         D2751A402         D2751A402         D2751A402         D2751A4011*         D2751A401*         D2751A401*         D2751A402         D2751A401*         D2751A401*         D2751A402         D2751A402         D2751A402         D2751A402*         D2	F4.6
CH-H00C311         E5.80         CM2FPAXX****         F5.7         D21518011.0012         B3.8         D27354005**         B3.1         D27354005**           CSH00C5412         E5.80         CP1000710**         B3.12         D27354005**         F6.7         D2751A922           CSH00C511         E5.80         CP1000711**         B1.31         D27354001*         B3.12         D27354001**         A02**         B3.11         D2751A4002         A00**           CSH00C5212         E5.80         CX10005501 to         B1.11         D27354001**         D07354001**         D073544014         D273544014         D273544014 <td>F4.5</td>	F4.5
CHH00C5410         E5.6         CM26PAX2X****         F5.7         D215188001.8012         B3.6         D217384011**.4012*         B3.7         D2751A402           CSH00C5110         E5.6         CP10080711***10         B1.3         D21518800         B3.12         D217384011**.4015**         F6.7         D2751A4001           CSH00C5110         E5.6         CP10080711***10         B1.12         D215382001         D215327000         B3.12         D217384011**.4012*         B3.11         D2751A4001           CSH00C5212         E5.30         CV1008055110         B1.12         D21538201.5012*         B3.4         D2751A4012.4013           CSH00C5412         E5.30         CV1008055110*         B1.17         D215382001.2002*         B3.7         D217385001***         G8.1         D217385001***         G8.1         D2751A4012.4013           CSH00C5412         E5.30         CV10809570***         R         L         D215382001.5002**         B3.7         D217385001***         G8.1         D27364025**         F8.2         D27364025**         F8.7         D27144902         D21534292           CSM1087***         R<1	F4.8
CH-H0026110         E5.6         CP449086710***         B1.3         D21524901         B3.12         D27384901**         F6.7         D273144024         A003           CSH0006210         E5.6         CP40806711***         B1.5         D21582901         D217384901**, 402**         B3.10         D273544014         D215744014	F4.7
D2H0006110         E5.8         D2F38480711X***         D2F3848071         B5.7         D2F3144002,403           C6H0006210         E5.6         D2F384801**         F6.7         D2F3144007         B3.10         D2F384801**,4802**         B3.11         D2F3144007           C6H0006212         E5.30         CX100B055010         B1.12         D2F384801**,5002***         B3.10         D2F3144007         D2F3144007           C6H0006311         E5.30         CX100B0551X 10         B1.12         D2F382001*         D2F388000***         F6.7         D2F3144012,403           C6H0006410         E5.40         CX100B0551X 10         B1.11         D2F3880001*0         D2F3880001**         F6.7         D2F3144012,403           C5M006*** F, R & L         E5.24         CX100B0571X**10         B1.14         D2F388001*0         D2F388001**         F6.7         D2F314402.4005           C5M010*** F, R & L         E5.42         CX400B751X**10         B1.10         D2F388001*0         D21388001**         D2738001***         F6.7         D2F314402.4035           C5M0102** F, R & L         E5.42         CX400B751X**10         D1.10         D2F3848007         D2F3144002.4035         D2F3148002.4035         D2F314402.4035         D2F3148002.4035         D2F3148001.5         D2F3148002.4035         D2F3148001	B2.12
CHHOOG210         E5.6         CP46MB0211X**         B1.5         CP253P200         B3.12         CP213B01**         CP354B41**         B3.11         CP251A4012         CP351A4011           CSH0005310         E5.6         CX100B15501 to         B1.12         CP354B401**         D273B500***         F6.7         D2751A4012         D2751A4022         D2751A5001*         D27	B2.17
CSH0006210         E5.6         D*Famber 11.4**         D215282900         B3.12         D275144001*         D275144007           CSH0006310         E5.6         CX10080551X to         B1.12         D27538001**         S0.7         B3.4         D275144011         D275144012, 4013         D275144022         D275144022         D275144012, 4013         D275144022         D275145001***         F6.7         D275144022         D275145001***         F6.7         D275144022         D275145001***         D275145001****         D275145001****         D275145001****	B2.21
CSH00C6310         E5.8         CX100E051X ID         B1.12         D153A3313 ib 0003         B3.13         D217385005***         F6.7         D2751A4012,4013           CSH00C6311         E5.30         CX100E051X ID         B1.17         D215382001,2002         B3.7         D217385005***         F6.7         D2751A4014         D2751A4017           CSM00E*** F, R & L         E5.24         CX100E0751X**10         B1.10         D215382001 10 4012         B3.7         D217386005***         F6.7         D2751A402,403           CSM00E*** F, R & L         E5.24         CX400B751X**10         B1.14         D215382001 10 4012         B3.7         D217386001**,602**         F6.7         D2751A402,202         D	B2.15
Display         Display <t< td=""><td>B2.12</td></t<>	B2.12
CSH000C6412         CSA008205         CSA00276         CONTRACT         D013         D027386001**         D002**         F67         D0273144902         A095           CSM000****         FR & L         E524         CX2008275***         F67         D027386001**         D027386001**         F67         D0273144902         D0273144901         D0273144902         D0273144902         D0273144902         D0273144902         D0273144902         D0273144902         D0273144902         D0273144901         D0273144902         D0273145901         D0273	B2.17
Dirthouch10         Explosition         B1-9           CSM0064712         ES.30         CX20B807501***         B1-9           CSM0067***         F. R. & L         ES.24         CX20B807501***         B1-14           CSM0087***         F. R. & L         ES.24         CX20B807501***         B1-14           CSM018***         F. R. & L         ES.24         CX20B80751***         B1-14           CSM018***         F. R. & L         ES.24         CX20B80751***         B1-14           CSM0118***         F. R. & L         ES.24         CX30B87571***         B1-16           CSM0118***         F. R. & L         ES.44         CX30B87571***         B1-16           CX30D82705         E2.1         D1121A2001         C1-6         D121386001 to 8012         B3.7           CSX00B2037         E2.1         D1121A2002         C1-6         D2751A5002         D2751A5003           CSX00B2037         E2.1         D1122A002         C1-6         D2751A5003         D2751A5003           CSX00B2037         E2.1         D1123A2001         C1-6         D2751A5003         D2751A5014           CSX00B2037         E2.1         D12324001         C1-12         D2751A5014         D2751A5001         D2751A5001         D2751A500	B2.21
District	B2.15
Domotog         F. R & L         E.5.44         CV10DB0751X** to CX30DB3751X** to CX30DB3751	F4.6
Damage         F. N. K. L.         C.2.4.2         Dit / A	F4.5
Com/10***         F. R & L         E.5.24         CX3ADB37501**         D         D271348901**         S010         D271348901**         S010         D271348901**         B010           CSM0118**         F. R L         E5.24         CX40NB67501**         B1.10         CX40NB6751X**         B1.16         CX50NB2502**         F6.7         D271347001**         CM40NB67501**         B3.10         D27387001**         F6.7         D271345001         CM40NB6751X**         B1.16         CX50NB2025**         F6.7         D27145001         CM40NB6751X**         B1.16         CX50NB2025**         F6.7         D27145001         C27148001**         B3.10         D275145007         D27145001**         B3.11         D275145007         D27145001**         B3.10         D275145001         D275145001         D275145001         D2035         E2.6         D1123A2001         C1.14         D11742001**         D271482001**         B3.10         D275145001         D275145001         D2035         E2.6         D27148001**         D275146001         D2035         E2.7         D275146001	F4.8
CSM11B2101 to 4402         ES.8         CX40BB/371X** to CX40BB/371X** to CSM0B203C         B1.16         D2153B8900         B3.13         D2173B7005**         F6.7         D2751A5002,5003           CSM0B1025         E2.11         D1121A2001         C1.4         D215482001 to 6012         B3.7         D2173B7004**         B3.10         D2751A5002         D215482001 to 6012         B3.7         D2173B704**         B3.10         D2751A5002           CSX00B2037         E2.17         D1123A2002         C1.6         D1217482001**         D2171B2001**         D2171B2001**         D2171B2001**         B3.9         D2173B8011**         D2751A5002         D2751A5003           CSX00B2039         E2.6         D1133A2001 to 2003         C1.12         D1232B1FF6, IFPR         C1.31         D2171B2001**         D3.9         D2174B2001**, 4002**         B3.4         D2751A6007         D2751A6007           CSX00B302         E2.17         D1223B1FF6, IFPR         C1.31         D1223B1FF6, IFPR         C1.31         D2171B4001**, 4002**         B3.3         D2174B4001**, 4002**         B3.4         D2751A6017         D2751A6017           CSX00B4040         E2.6         D1223B2FF6, IFPR         C1.31         D123B282001, 2003         C1.4         D123B28201, 2003         C1.4         D2171B4001**, 4002**         B3.3	F4.7 B2.12
CSM1182110 to 4410         E5.4         CX34083151.X**10         B1.16         D2153C905         B3.13         D217387901**         B3.10         D2751A5004           CSX0082010         E2.4         D1121A2001         C1.4         D215682001 to 8012         B3.7         D217388015**         B3.11         D2751A5007           CSX0082035         E2.6         D1123A2002         C1.6         D217182005**         F6.7         D2751A5913         D2751A5913           CSX0082076         E2.11         D1133A2001 to 2003         C1.12         D217182005**         F6.7         D2751A6001         D2751A6004           CSX0082076         E2.11         D1133A2001 to 2003         C1.12         D217182005**         F6.7         D2751A6001         D2751A6004           CSX0083021, 3024         E2.6         D1223B1496, 1MBR         C1.3         D217183005**         F6.7         D2751A6017         D2751A6017           CSX0084023         E2.4         D1223B1496, 1MBR         C1.3         D217183005**         F6.6         D21748400**, 402**         B3.4         D2751A6017           CSX0084004         E2.4         D122382158         C1.5         D217184005**         F6.6         D21748400**, 602**         B3.4         D2751A6017         D2751A6017           CSX0084040 </td <td>B2.12 B2.17</td>	B2.12 B2.17
CSX0081025         E2.11         CX40080'51X**         C1.4         D215482001 to 8012         B3.7         D2173B7904**         B3.11         D2751A5007           CSX0082030         E2.6         D1121A2001         C1.4         D21708201**         B3.8         D2173B8911**         B012**         B3.4         D2751A5007           CSX0082037         E2.17         D1123A2002         C1.6         D21718201**         C202***         B3.3         D2173B8911**         B3.4         D2751A6007         D2751A6001           CSX0082039         E2.6         D1133A2001 to 2003         C1.12         D217182001**         C202***         B3.4         D2751A6001         D2751A6004         D2751A6001         D2751A6004         D2751A6001         D2751A6007         D2751A6007         D2751A6007         D2751A6007         D2751A6007         D2751A6001         D2751A6001         D2751A6001         D2751A6001         D2751A6001         D2751A6017	B2.17 B2.21
CSX00B2010         E2.8         D1121A2001         C1.4         D2156B2001 to 8012         B3.8         D2173B8011**, 8012**         B3.4         D2751A5919           CSX00B2035         E2.6         D113A2001 to 2003         C1.4         D2171B2001**, 2002**         B3.9         D2173B8011**, 8012**         B3.10         D2751A5919           CSX00B2039         E2.6         D113A2001 to 2003         C1.12         D2171B2001**, 2002**         B3.9         D2174B2001**, 2002**         B3.4         D2751A6919           CSX00B2039         E2.6         D113A2001 to 2003         C1.12         D2171B2001**, 3002**         B3.9         D2174B2001**, 2002**         B3.4         D2751A6004           CSX00B3021, 3024         E2.6         D1223B1FPG, 1FPR         C1.3         D2171B3005**         F6.6         D2174B3005**         F6.7         D2751A6014         D2751A7001         D2751A7004         D2751A7001         D2751A7001         D2751A7001         D2751A7001         D2751A7001         D2751A7001         D2751A7001         D2751A6012         D2751A6012         D2751A6012         D2751A6012         D2751A6012	B2.21 B2.15
CSX00B2035         E2.6         D1112A2001         C1.6         D2171A4917**         B3.9         D2173B8015**         F6.7         D2751A5917           CSX00B2037         E2.17         D113A2001         C1.6         D2171B201**         202**         B3.3         D2173B8015**         F6.7         D2751A5917           CSX00B2076         E2.11         D113A2001 to 2003         C1.4         D2171B2001**         B3.9         D2174B2005**         F6.7         D2751A6001         D2751A6002, 6003           CSX00B3025         E2.17         D1223B1F6, 1FPR         C1.3         D2171B3005**         F6.7         D2751A6007         D2751A6007           CSX00B3025         E2.11         D123B21MB6, 1MBR         C1.3         D2171B4005**         F6.7         D2751A6017         D2751A6017         D2751A6017           CSX00B4023         E2.6         D1223B21MB6, 1MBR         C1.3         D2171B4005**         F6.6         D2174B4015**         F6.7         D2751A6017           CSX00B4041         E2.8         D1223B27F6, 2FPR         F1.4         D2171B4015**         F6.6         D2174B4005**         F6.7         D2751A6017           CSX00B5044         E2.8         D1223B2MB6, 2MBR         C1.3         D2171B4015**         F6.6         D274B4001**, 6002**         B	F4.6
C5X00B2037         E2.17         D1123A2001         C1.4         D2171B2001**.2002**         B3.3         D2173B8911**         B3.10         D2751A5919           C5X00B2039         E2.6         D1131A2001 to 2003         C1.12         D2171B2001**.2002**         F6.6         D2174B2005**         F6.7         D2751A6001           C5X00B3004, 3012         E2.8         D12381PL6, 1FPR         C1.3         D2171B2001**.3002**         B3.3         D2174B2005**         F6.7         D2751A6004           C5X00B3025         E2.17         D122381PL6, 1FPR         C1.3         D2171B3006**         F6.6         D2174B4001**, 4002**         B3.4         D2751A6014           C5X00B4004         E2.8         D122381PLB, 1MBR         C1.3         D2171B3006**         F6.6         D2174B4001**, 4002**         B3.4         D2751A6014           C5X00B4040         E2.17         D1223821BLB, 2MBR, 2MBR         C1.3         D2171B4001**, 4012**         B3.3         D2174B4001**, 4002**         F6.7         D2751A6014           C5X00B4040         E2.17         D122382MBLB, 2MBR         C1.3         D2171B4015**         F6.6         D2174B4015**         F6.7         D2751A6017           C5X00B5045         E2.17         D1423822MBLB, 2MBR         C1.3         D2171B5005***         F6.6	F4.7
C5X00B2039         E2.6         D1123A2001 to 2003         C1.12           C5X00B2076         E2.11         D113A2001 to 2003         C1.12         D2171B2001**. 3002**         B3.4         D2751A6001           C5X00B3021, 3024         E2.8         D1223B1FD6, 1FPR         C1.3         D2171B3005**         F6.6         D2174B3005**         F6.7         D2751A6007           C5X00B3025         E2.17         D1223B1FD6, 1FPR         C1.3         D2171B3005**         F6.6         D2174B3005**         F6.7         D2751A6017           C5X00B3025         E2.17         D1223B1FD6, 1FPR         C1.3         D2171B4001**, 4002**         B3.3         D2174B4001**, 4002**         B3.4         D2751A6017           C5X00B4023         E2.6         D1223B2VB6, 2VPR         C1.3         D2171B401**, 4012**         B3.3         D2174B401**, 4012**         B3.4         D2751A6017           C5X00B4041         E2.6         D1223B2VB6, 2VPR         C1.3         D2171B401**, 4012**         B3.3         D2174B401**, 602**         B3.4         D2751A6017           C5X00B5044         E2.8         D1223B2VB6, 2VPR         C1.3         D2171B5001**, 5002**         B3.3         D2174B400**         F6.6         D2174B401**, 6002**         B3.4         D2751A6017         D2.55007         D2.5005** <td>F4.8</td>	F4.8
CSX00B2076         E2.11         D1133A2001 to 2003         C1.12         D2171B2901**         B3.9         D2174B2005**         F6.7         D2751A6002, 6003           CSX00B3004, 3012         E2.8         D1221B2001, 2003         C1.4         D2171B3005**         F6.7         D2751A6004           CSX00B3025         E2.17         D1223B1FPG, 1FPR         C1.3         D2171B3005**         F6.6         D2174B4001**, 4002**         B3.4         D2751A6007           CSX00B4004         E2.8         D1223B1FPG, 1FPR         C1.3         D2171B4001**, 4002**         B3.4         D2751A6014           CSX00B4004         E2.7         D1223B2010, 2003         C1.4         D2171B401**, 4012**         B3.3         D2174B4005**         F6.7         D2751A6017           CSX00B4004         E2.7         D1223B2MBG, 2MBR         C1.3         D2171B401**, 4012**         B3.3         D2174B4015**         F6.7         D2751A6014           CSX00B4041         E2.6         D1223B2MBG, 2MBR         C1.3         D2171B405**         F6.6         D2174B4015**, 5002**         B3.4         D2751A7002, 7003           CSX00B505         E2.7         D1390H91 to D1440H91         B4.11         D2171B5005**         F6.6         D2174B5005**         F6.7         D2751A7002, 7003           C	B2.12
C5X0083004, 3012         E2.8         D122182001, 2003         C1.4         D217183001**, 302**         B3.3         D217483001**, 302**         B3.4         D2751A6004           C5X0083025         E2.17         D122381FBC, 1FPR         C1.3         D122381SLB         C1.3         D12238201, 2003         C1.4         D2751A6011**, 4002**         B3.4         D2751A6014           C5X0083052         E2.17         D122382D01, 2003         C1.4         D122382PC, 2FPR         C1.3         D17184001**, 4002**         B3.3         D217484001**, 4002**         B3.4         D2751A6014           C5X0084040         E2.6         D122382PC, 2FPR         C1.3         D122382VB, QBR         C1.3         D21718401**, 4012**         B3.3         D217484001**, 4002**         B3.4         D2751A6014           C5X0084047         E2.8         D122382VB, QBR         C1.5         D12738200F, 2003**         F6.6         D217484001**, 6002**         B3.4         D2751A7001           C5X0085035         E2.17         D1472H91 to D1500H91         B4.12         D1472H91 to D1500H91         B4.12         D1472H91 to D1500H91         B4.12         D2751A6017         D2751A7004           C5X0085045         E2.10         D1613202**, 2020**         B6.3         D217186001**, 6002**         B3.3         D217486001**, 6002**	B2.17
C5X00B3021, 3024         E2.6         D1223B1FPG, 1FPR         C1.3         D2171B3006**         F6.6         D2174B3005**         F6.7         D2751A6011           C5X00B3025         E2.11         D1223B1MBG, 1MBR         C1.3         D1223B11B4         D123B1SLB         D123B1SLB         D123B1SLB         D123B2001.2003         D1.4           C5X00B4040         E2.17         D1223B2VBG, 2FPR         C1.3         D1223B2VBG, 2FPR         D123B22001.2003         D1.4           C5X00B4041         E2.6         D1223B2VBG, 2MBR         C1.3         D1217B4011**, 4012**         B3.3         D2174B4005**         F6.6         D2174B4005**         F6.7         D2751A6011           C5X00B4041         E2.6         D1223B2VBG, 2MBR         C1.3         D1217B4011**, 4012**         B3.3         D2174B400**         B3.11         D2751A6012, 6013           C5X00B5035         E2.17         D1422H91 to D140H91         B4.12         D1472H91 to D150H91         B4.12         D1472H91 to D150H91         B4.12         D2171B5001**, 6002**         B3.3         D2174B6001**, 6002**         B3.4         D2751A7002           C5X00B5046         E2.20         D1472H91 to D150H91         B4.12         D16132322**         D2171B5001**, 6012**         B3.3         D2174B6015**         F6.6         D2174B6015**	B2.21
C5X00B3025         E2.17         D1223B1MBG, 1MBR         C1.3         D1271B3006**         B3.9         D2174B4001**, 4002**         B3.4         D2751A6011           C5X00B4004         E2.8         D1223B2U01, 2003         C1.4         D1223B2VBG, 2FPR         C1.3         D2171B4001**, 4012**         B3.3         D2174B4001**, 4012**         B3.4         D2751A6012, 6013           C5X00B4040         E2.7         D1223B2VBG, 2FPR         C1.3         D1273B2VBG, 2FPR         D1273B2VBG, 2FPR         D1273B4015**         F6.6         D2174B4001**, 4002**         B3.4         D2751A6012, 6013           C5X00B4041         E2.6         D1223B2VBG, 2FPR         C1.3         D1273B2015**         F6.6         D2174B5005**         F6.7         D2751A6017         D2751A6017           C5X00B5035         E2.17         D1390H91 to D1440H91         B4.12         D171B5005**         F6.6         D2174B5005**         F6.7         D2751A7007         D2751A7007           C5X00B5046         E2.20         D1613C322**, 2020**         B6.4         D2171B6005**         F6.6         D2174B6015**         F6.7         D2751A8011, 8011           C5X00B5046, 5087         E1.18         D161481020**         B6.3         D2171B6015**         F6.6         D2174B6015**         F6.7         D2751A8001, 8011 </td <td>B2.15</td>	B2.15
C5X00B4004         E2.8         D1223B2D1, 2003         C1.4         D2171B4005**         F6.6         D2174B4011**, 4012**         B3.4         D2751A6014           C5X00B4040         E2.17         D1223B2D1, 2003         C1.4         D1223B2D1, 2003         C1.4         D2171B4015**         F6.6         D2174B4015**         F6.7         D2751A6017         D2751A6017           C5X00B4041         E2.6         D1223B2SLB         C1.5         D2171B4015**         F6.6         D2174B500**         F6.7         D2751A7002, 7003           C5X00B5044         E2.8         D1390H91 to D140H9H         B4.12         D2171B5005**         F6.6         D2174B5005**         F6.7         D2751A7002, 7003           C5X00B5046         E2.20         D1472H91 to D1500H9H         B4.11         D1532B2004 to 9004         F1.7         D1613B1020**, 2020**         B6.3         D2171B601**, 6012**         B3.4         D2751A7007         D2751A8011, 8011           C5X00B5049, 5050         E2.10         D1614B1020***         B6.3         D12171B601**, 6012**         B3.3         D2174B601**, 7002**         B3.4         D2751A8011, 8011           C5X00B5076         E1.18         D1614B1222**         B6.4         D2171B501**         F6.6         D2174B701**, 7002**         B3.4         D2751A8011, 8011* <td>B2.12</td>	B2.12
C5X00B4023         E2.6         D122382FG, 2FPG, 2FPG         C1.3         D2171B4011**, 4012**         B3.3         D2174B4015**         F6.7         D2751A6017           C5X00B4040         E2.17         D122382FG, 2FPG         C1.3         D122382FG, 2FPG         D123382FG, 2FPG         D123382FG         D127382FG, 2FPG         D127382FG         D127384015**         F6.6         D2174B5001**, 5002**         B3.1         D2751A7001           C5X00B5035         E2.17         D1472H91 to D140H9H         B4.12         D1472B5005**         F6.6         D2174B5005**         F6.7         D2751A7002, 7003           C5X00B5046         E2.20         D1472H91 to D150H9H         B4.11         D2171B6005**         F6.6         D2174B6005**         F6.7         D2751A7007           C5X00B5046         E2.20         D143282004 to 9004         F1.7         D15138202**         D6.4         D2171B601**, 6012**         B3.3         D2174B6015**         F6.6         D2174B6015**         F6.7         D2751A8001, 8011           C5X00B5076         E1.18         D16148202**         B6.4         D16148232**         B6.4         D2171B601**, 7002**         B3.3         D2174B701**, 7002**         B3.4         D2751A8014         D2751A8017         D2751A8017         D2751A8017         D2751A8017         D2751A8017	B2.17
C5X00B4040         E2.17         D1223B2PR0, 2PR         C1.3         D2171B4015**         F6.6         D2174B4900**         B3.11         D2751A6901           C5X00B4041         E2.6         D1223B2XB         C1.3         D1223B2XB         D123B2XB         D123B2XB         D123B2XB         D123B2XB         D123B2XB         D123B2XB         D123B2XB         D123B2XB         D130H91 to D1440H91         B4.12         D2171B5005**         F6.6         D2174B5005**         F6.7         D2751A7002, 7003           C5X00B5044         E2.8         D1432B2XB, 2020**         B6.3         D1613B1020**, 2020**         B6.3         D2171B6001**, 6002**         B3.3         D2174B605**         F6.7         D2751A8001, 8011         D2751A801, 8011           C5X00B5046         E2.10         D1613B1020**, 2020**         B6.3         D2171B6015**         F6.6         D2174B601**, 6012**         B3.4         D2751A801, 8011         D2751A8014           C5X00B5076         E1.18         D1614B2322**         B6.4         D2171B6015**         F6.6         D2174B705**         F6.7         D2751A8014         D2751A9001, 9011           C5X00B6039         E2.00         D1610C3222**         B6.4         D2171B700**, 7002**         B3.3         D2174B8015**         F6.6         D2174B801**, 8012**         B3.4	B2.21
C5X00B4041         E2.6         D122382/MB6, 2/MBR         C1.3         D2171B5001**, 5002**         B3.3         D2174B5001**, 5002**         B3.4         D2751A7001           C5X00B5035         E2.17         D1390H91 to D1440H91         B4.12         D1472H91 to D1500H91         B4.11         D2171B5005**         F6.6         D2174B6001**, 6002**         B3.4         D2751A7004         D2751A7007           C5X00B5046         E2.20         D1472H91 to D1500H91         B4.11         D1523B2004 to 9004         F1.7         D1613B1020**, 2020**         B6.3         D2171B6005**         F6.6         D2174B6015**         F6.7         D2751A7007           C5X00B5076         E1.18         D1614B1020**         B6.3         D2171B6015**         F6.6         D2174B6015**         F6.7         D2751A8012, 8013           C5X00B5086, 5087         E1.19         D1614B1020**         B6.3         D2171B6015**         F6.6         D2174B701**, 7002**         B3.4         D2751A8014         D2751A8014           C5X00B5086, 5087         E1.19         D1616C2020**         B6.3         D2171B701**, 7002**         B3.3         D2174B703**         B3.11         D2751A8017           C5X00B6038         E2.10         D1616C2322**         B6.4         D2171B701**, 7002**         B3.3         D2174B703**	B2.15
C5X00B4047, 5034         E2.8         D1223B2SLB         C1.5           C5X00B5035         E2.17           C5X00B5035         E2.17           C5X00B5035         E2.17           C5X00B5044         E2.8           C5X00B5044         E2.80           C5X00B5046         E2.20           D1613B1020**, 2020**         B6.3           D1614B2322**, 2020**         B6.3           D1614B2322**         B6.4           D1614B2322**         B6.4           D1614B2322**         B6.4           D1614B2322**         B6.4           D1614B2322**         B6.4           D1616C2322**         B6.4           D1630039         E2.20           C5X00B6054         E1.19           C5X00B6055         E1.19           D1616C2322**         B6.4           D1697C91 to D1710C91         G1.4           D1697C91 to D1710C91         G1.4           D1697C91 to D1787C91	F4.6 B2.12
C5X00B5035         E2.17         D1390H91 to D1440h91         B4.12         D2171B5905**         B3.9         D2174B6001**, 6002**         B3.4         D2751A7004           C5X00B5044         E2.80         D1613B1020**, 2020**         B6.3         D16132222**, 2020**         B6.3         D16132222**         B6.4         D2171B6001**, 6012**         B3.3         D2174B6001**, 6012**         B3.4         D2751A7007           C5X00B5076         E1.18         D16132222**         B6.4         D161482322**         B6.4         D161482322**         B6.4           D161602202**         B6.3         D161602222**         B6.4         D161602222**         B6.4           D161602322**         B6.4         D161602222**         B6.4         D2711B6001**, 6012**         B3.3           D2171B7005**         F6.6         D2174B7005**         F6.7         D2751A8017           D2174B7005**         F6.6         D2174B7005**         F6.7         D2751A8017           D2171B7005**         F6.6         D2174B7005**         F6.7         D2751A8017           D2171B7001**, 7002**         B3.3         D2174B705**         F6.6         D2751B2001**         D2751B2001**           C5X00B6054         E1.18         D1697C91 to D1710C91         G1.4         D2171B801**, 8012**	B2.12 B2.17
C5X00B5044         E2.8         D14/2H9116 0 D1500H91         B4.11         D2171B6001**, 6002**         B3.3         D2174B6005**         F6.7         D2751A7007           C5X00B5046         E2.20         D1614B1020**, 2020**         B6.3         D161322322**, 2020**         B6.4         D2171B6005**         F6.6         D2174B6015**         F6.7         D2751A8011, 8011           C5X00B5076         E1.18         D1614B1020**         B6.3         D1614B2322**         B6.3         D1614B2322**         B6.4         D2171B6015**         F6.6         D2174B7001**, 7002**         B3.4         D2751A8012, 8013           C5X00B5099, 6027         E1.18         D1614B2322**         B6.4         D1616C2322**         B6.4         D2171B701**, 7002**         B3.3         D2174B703**         F6.7         D2751A8017           C5X00B6038         E2.10         D1616C2322**         B6.4         D2171B701**, 702**         B3.3         D2174B703**         B3.11         D2751A8017           C5X00B6034         E1.18         D1616C2322**         B6.4         D1710C91         G1.4         D2171B701**, 8012**         B3.3         D2176B201**, 2002**         B3.5         D2751B2008 to 6018           C5X00B7016, 7021         E2.10         D1697C91 to D1710C91         G1.4         D2171B8011**, 8012**	B2.17 B2.21
C5X00B5046         E2.20         D1323B2044 lb 9004         F1.7         D2171B6005**         F6.6         D2174B6011**, 6012**         B3.4         D2751A8001, 8011           C5X00B5049, 5050         E2.10         D1614B1020**, 2020**         B6.3         D1614B2322**         B6.3         D2171B6005**         F6.6         D2174B7001**, 7002**         B3.4         D2751A8012, 8013           C5X00B5099, 6027         E1.18         D1614B2322**         B6.4         D1614B2322**         B6.4         D2171B6004**, 6916**         B3.9         D2174B7001**, 7002**         B3.4         D2751A8014         D2751A8017           C5X00B6038         E2.10         D161462222**         B6.4         D1616C2322**         B6.4         D2171B7001**, 7002**         B3.3         D2174B7005**         F6.7         D2751A8017           C5X00B6039         E2.20         D1616C2322**         B6.4         D171B7001**, 7002**         B3.3         D2174B7005**         F6.6         D2174B7005**	B2.21
C5X00B5049, 5050         E2.10         D1613B1020 <sup>-1</sup> , 2020 <sup>+</sup> B6.3         D2171B6011 <sup>++</sup> , 6012 <sup>++</sup> B3.3         D2174B6015 <sup>++</sup> F6.7         D2751A8012, 8013           C5X00B5076         E1.18         D161482322 <sup>++</sup> , 2020 <sup>++</sup> B6.3         D161482322 <sup>++</sup> B6.3         D2171B6015 <sup>++</sup> F6.6         D2174B7001 <sup>++</sup> , 7002 <sup>++</sup> B3.3         D2174B7005 <sup>++</sup> F6.7         D2751A8012, 8013           C5X00B6038         E2.10         D16162202 <sup>++</sup> B6.3         D16162222 <sup>++</sup> B6.4         D2171B7001 <sup>++,</sup> 7002 <sup>++</sup> B3.3         D2174B7005 <sup>++</sup> F6.7         D2751A8017         D2751A8017           C5X00B6038         E2.10         D1616C2322 <sup>++</sup> B6.4         D1616C2322 <sup>++</sup> B6.4         D2171B7001 <sup>++,</sup> 7002 <sup>++</sup> B3.3         D2174B8011 <sup>++,</sup> 8012 <sup>++</sup> B3.4         D2751A8017         D2751A8017           C5X00B6039         E2.20         D1616C2322 <sup>++</sup> B6.4         D1710C91         G1.4         D2171B7001 <sup>++,</sup> 7002 <sup>++</sup> B3.3         D2176B2001 <sup>+,+</sup> , 2002 <sup>++</sup> B3.5         D2751B8018           C5X00B7046, 6065         E1.11         D186A33005 to 6005         D1.7         D1872C91 to D1770C91         G1.4         D2171B8001 <sup>+,+</sup> , 802 <sup>+,+</sup> D2176B3001 <sup>+,+</sup> , 3002 <sup>+,+</sup> B3.5         D2751B8018 <td>B2.10</td>	B2.10
C5X00B5076         E1.18         D101302322 *, 2020         b0.4           C5X00B5086, 5087         E1.19         D1614B1020**         B6.3         D1614B2322**         B6.4         D2171B6015**         F6.6         D2174B7001**, 7002**         B3.4         D2751A8014           C5X00B6038         E2.10         D1616C2322**         B6.4         D1616C2322**         B6.4         D2171B7001**, 7002**         B3.3         D2174B7005**         F6.7         D2751A8017           C5X00B6039         E2.20         D1616C2322**         B6.4         D1616C2322**         B6.4         D2171B7001**, 7002**         B3.3         D2174B8015**         F6.7         D2751B2008 to 6018           C5X00B6034         E1.18         D1616C2322**         B6.4         D171B7001**, 8012**         B3.3         D2176B2001*, 2002**         B3.5         D2751B8018           C5X00B604, 6065         E1.19         D1868A3005 to 6005         D1.7         D1872C91 to D1710C91         G1.4         D2171B800**, 8906**         B3.9         D2176B2001**, 3002**         B3.5         D2751B8018           C5X00B7036         E1.20         D1872C91 to D1875C91         G1.4         D2171B900**, 8906**         B3.9         D2176B3005**         F6.8         D2751B8018         D2751B8018         D2751B8018         D2751B8018         <	B2.17
C5X00B5086, 5087         E1.19         D1014B1020         B0.3         D2171B6904**, 6916**         B3.9         D2174B7005**         F6.7         D2751A8017           C5X00B5099, 6027         E1.18         D1616C2202**         B6.4         D1616C2202**         B6.3         D2171B6904**, 6916**         B3.9         D2174B7005**         F6.7         D2751A8017           C5X00B6038         E2.00         D1616C2322**         B6.4         D1616C2322**         B6.4         D2171B7001**, 7002**         B3.3         D2174B8015**         F6.7         D2751A9001, 9011           C5X00B6039         E2.20         D1616C2322**         B6.4         D1650H91 to 58H91         B4.12         D2171B7005**         F6.6         D2174B8015**         F6.7         D2751B2008 to 6018           C5X00B6054         E1.18         D1650H91 to 58H91         B4.12         D1697C91 to D1710C91         G1.4         D2171B8011**, 8012**         B3.3         D2176B2001**, 2002**         B3.5         D2751B7008           C5X00B7016, 7021         E2.10         D1872C91 to D1875C91         G1.4         D1958A1100         F4.3         D2172B2001**, 2002**         B3.3         D2176B3005**         F6.8         D2751B8902         D2175B8902           C5X00B7051, 7052         E1.10         D1958A1140 to 1180         F4.4	B2.21
C5X00B5099, 6027         E1.18         D1616C2020**         B6.3         D2171B7001**, 7002**         B3.3         D2174B793**         B3.11         D2751A9001, 9011           C5X00B6038         E2.10         D1616C2322**         B6.4         D1616C2322**         B6.4         D2171B7005**         F6.6         D2174B8011**, 8012**         B3.3         D2174B8011**, 8012**         B3.4         D2751B2008 to 6018           C5X00B6054         E1.18         D1697C91 to D1710C91         G1.4         D2171B7001**, 7002**         B3.3         D2176B2001**, 2002**         B3.5         D2751B2008         D2751B2008           C5X00B7016, 7021         E2.10         D1697C91 to D1770C91         G1.4         D17188015**         F6.6         D2176B2001**, 3002**         B3.5         D2751B7008           C5X00B7025         E1.11         D1872C91 to D1875C91         G1.4         D2171B901**         B3.9         D2176B3001**, 3002**         B3.5         D2751B8018           C5X00B7036         E1.20         D1958A11010         F4.3         D1958A2010         F4.3         D2172B2001**, 2002**         B3.3         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         B3.3         D2176B4001**, 4002**<	B2.15
C5X00B6038         E2.10         D1616C2322**         B6.4         D2171B7005**         F6.6         D2174B8011**, 8012**         B3.4         D2751B2008 to 6018           C5X00B6039         E2.20         D1650H91 to 58H91         B4.12         D1697C91 to D1710C91         G1.4         D2171B701**         B3.3         D2176B2001**, 2002**         B3.5         D2751B2008 to 6018           C5X00B604, 6065         E1.19         D1868A3005 to 6005         D1.7         D1872C91 to D1875C91         G1.4         D2171B800**, 8906**         B3.9         D2176B2001**, 3002**         B3.5         D2751B2008         D2751B2008           C5X00B7025         E1.11         D1873C91 to D1875C91         G1.4         D2171B8000**, 8906**         B3.9         D2176B3001**, 3002**         B3.5         D2751B8018         D2751B8018           C5X00B7036         E1.20         D1958A11010         F4.3         D1958A2010         F4.3         D2172B2001**, 2002**         B3.3         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D17282001**, 3002**         B3.3         D2176B4001**, 4012**         B3.5         D2752A2004	B2.12
C5X00B6039         E2.20         D1650H91 to 58H91         B4.12         D2171B7901**         B3.9         D2174B8015**         F6.7         D2751B6904           C5X00B6054         E1.18         D1697C91 to D1710C91         G1.4         D197C91 to D1710C91         G1.4         D2171B8011**, 8012**         B3.3         D2176B2001**, 2002**         B3.5         D2751B7008           C5X00B6064, 6065         E1.19         D1868A3005 to 6005         D1.7         D1872C91 to D1875C91         G1.4         D2171B800**, 8906**         B3.9         D2176B3001**, 3002**         B3.5         D2751B8018         D2751B8018           C5X00B7036         E1.20         D1958A1140 to 1180         F4.4         D1958A2010         F4.3         D2172B2001**, 2002**         B3.3         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         B3.3         D2176B4001**, 4012**         B3.5         D2752A2001           D1958A2110 to 2180         F4.4         D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         B3.3         D2176B4011**, 4012**         B3.5         D2752A2004	B2.19
C5X00B6054         E1.18         D1697C91 to D1710C91         G1.4         D2171B8011**, 8012**         B3.3         D2176B2001**, 2002**         B3.5         D2751B7008           C5X00B6064, 6065         E1.19         D1697C91 to D1710C91         G1.4         D1697C91 to D1710C91         G1.4         D2171B8011**, 8012**         B3.3         D2176B2001**, 2002**         B3.5         D2751B7008           C5X00B7016, 7021         E2.10         D1872C91 to D1875C91         G1.4         D1958A1010         F4.3         D2171B8001**, 8006**         B3.9         D2176B3005**         F6.8         D2751B8018         D2751B8018           C5X00B7036         E1.20         D1958A1140 to 1180         F4.4         D1958A2010         F4.3         D2172B2005**         F6.6         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         B3.3         D2176B4011**, 4012**         B3.5         D2752A2004	F4.6
C5X00B7016, 7021         E2.10         D1808A30516 0003         D1.7         D2171B8900**, 8906**         B3.9         D2176B3001**, 3002**         B3.5         D2751B8018           C5X00B7025         E1.11         D1958A1010         F4.3         D1958A1140 to 1180         F4.4         D1958A2010         F4.3         D2172B2001**, 2002**         B3.3         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7051, 7052         E1.10         D1958A2110         F4.3         D1958A2110         F4.3         D2172B2005**         F6.6         D2176B4005**         F6.8         D2752A2001           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         B3.3         D2176B4011**, 4012**         B3.5         D2752A2002, 2003           D2172B3001**, 3002**         B3.3         D2176B4011**, 4012**         B3.5         D2752A2004         D2752A2004	B2.19
C5X00B7025         E1.11         D1072031         G1.3         D2171B9901**         B3.9         D2176B3005**         F6.8         D2751B8902           C5X00B7036         E1.20         D1958A1100         F4.3         D1958A1100         F4.4         D2172B2001**, 2002**         B3.3         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7051, 7052         E1.10         D1958A2010         F4.3         D1958A2110         F4.3         D2172B2005**         F6.6         D2176B4005**         F6.8         D2752A2001         D2752A2002, 2003         D2752A2002, 2003         D2752A2004         D2755A20204         D2755A20204         D275	F4.6
C5X00B7036         E1.20         D1958A1010         F4.3         D2172B2001**, 2002**         B3.3         D2176B4001**, 4002**         B3.5         D2752A2001           C5X00B7051, 7052         E1.10         D1958A210         F4.3         D2172B2001**, 2002**         F6.6         D2176B4001**, 4002**         F6.8         D2752A2002, 2003           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         F3.3         D2176B4011**, 4012**         B3.5         D2752A2002, 2003	B2.19
C5X00B7051, 7052         E1.10         D1958A1140 to 1180         F4.4         D2172B2005**         F6.6         D2176B4005**         F6.8         D2752A2002, 2003           C5X00B7054 to 8019         E1.11         D1958A2110 to 2180         F4.4         D2172B2005**         F6.6         D2176B4005**         F6.8         D2752A2002, 2003           D1958A2110 to 2180         F4.4         D2172B3001**, 3002**         B3.3         D2176B4011**, 4012**         B3.5         D2752A2004	F4.6
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	B2.17 B2.21
	B2.21 B2.15
C5Y00B8025_8026D1958A3010F4.3D2172B4001**_4002**B3.3D2176B5001**_5002**B3.5D2752A3001	B2.15 B2.12
C5Y00B8037 E1 10 D1950A5110, 5100 14.4 D2172B4005** E6.6 D2176B5005** E6.8 D2752A3002 3003	B2.12
C5Y00B8040 E2 20 D1938A4010 F4.3 D2172B4011** 4012** B3 3 D2176B6001** 6002** B3 5 D2752A3004	B2.11
C5V008051 E1 10 D1900A1000 10 4010 D1.3 D217284015** E6.6 D217686005** E6.8 D2752A3007	B2.15
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CM26PDA00****         F5.7           D100000000         D1.7           D2172B6015**         F6.6           D2176B8015**         F6.8           D2752A4012, 4013	B2.17



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D2752A4014         B2           D2752A4017         B2           D2752A5001         B2           D2752A5002, 5003         B2           D2752A5004         B2           D2752A5007         B2           D2752A6001         B2           D2752A6007         B2           D2752A6007         B2           D2752A6007         B2           D2752A6007         B2           D2752A6007         B2           D2752A6011         B2           D2752A6012, 6013         B2           D2752A6014         B2           D2752A7001         B2           D2752A7001         B2           D2752A7001         B2           D2752A7007         B2           D2752A7007         B2           D2752A8018, 8011         B2           D2752A8019, 8011         B2           D2752A8017         B2           D2752A8017         B2           D2752A8018         B1           D2752A8019         B2           D2753A2001         B2           D2753A2001         B2           D2753A2001         B2           D2753A4001         B2	15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .13           .17           .21           .15           .13           .17           .13           .17	D2754A4002, 4003 D2754A4004 D2754A4007 D2754A4017 D2754A4012, 4013 D2754A4014 D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5004 D2754A5004 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6012, 6013 D2754A6014 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A6018 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A6018 D2754A7002, 7003 D2754A7004 D2754A7004 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A801, 9011 D2754A8010 D2754A2001 D2756A2001 D2756A2004 D2756A2004	B2.17           B2.17           B2.15           B2.15           B2.17           B2.15           B2.17           B2.17           B2.17           B2.17           B2.17           B2.17           B2.17           B2.17           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.11           B2.12           B2.13           B2.17           B2.11           B2.12           B2.13           B2.14           B2.14	D2773B2009** to 8019** D2774B2001** to 9011** D2774B2003** to 8013** D2774B2004** to 8015** D2774B2004** to 8017** D2776B2001** to 8011** D2776B2002** to 8012** D2776B2003** to 8013** D2776B2006** to 8017** D2776B2006** to 8017** D2776B2006** to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2782A2002 to 8013 D2783A2001 to 8014 D2783A2002 to 8013 D2783A2002 to 8013 D2783A2002 to 8013 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783A2004 to 8014 D2784A2002 to 8013 D2784A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8014 D2786B2005 to 8015 D2786A2002 to 8013 D2786A2002 to 8013	B2.6           B2.4           B2.10           B2.8           B2.9           B2.25           F6.5           B2.11           B2.9           B2.77           F4.12           B2.18           B2.22           F1.19           B2.20           B2.18           B2.22           B2.16           B2.18           B2.20           F1.20           B2.18           B2.22           B2.16           B2.18           B2.22           B2.10           F1.20           B2.18           B2.22           B2.18           B2.21           B2.18           B2.21           B2.18           B2.21           B2.18           B2.18           B2.18           B2.18           B2.18           B2.18           B2.18           B2.18           B2.18           B2.18	D3573A7152** D3573A7162** D3573A7162** D3573A7162** D3573A7172** D3573A7172** D3573A7181** D3573A7201** D3573A7202** D3573A7202** D3573A7203** D3573A7222** D3573A7222** D3573A7222** D3573A7222** D3573A7222** D3573A7223** D3573A7223** D3573A8162** D3573A8162** D3573A8182** D3573A8182** D3573B483** D3573B483** D3573B4433** D3573B4433** D3573B5143** to 5173** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B7153** to 6183**	G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8           G2.9           G3.8           G3.8           G2.9           G3.8	D600C01 to D602C01 D664K91 to D666K91 D698K86 to D704K86 D864K77 to D900K77 D949N91 to D953N91 D9553K1000 to 3000 D9554K1001 to 3000 D9556K1002 D9556K1002 D9556K1002 D9556K2001 D9556K2002 D9556K3001 D9556K4001 D9556K4001 D9556K4002 D9557K1007 to D957K4019 D957K4019 D957K4019 D957K1001** to 3001** D9576K1002** D9576K1002** D9576K2002** D9576K2001** D9576K3002** D9576K3002** D9576K3002** D9576K3002**	A2.8 A2.8 F5.7, 11 E6.4 A2.14 B4.7 B4.7 B4.7 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.3 B4.3 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5
D2752A5001         B2           D2752A5002, 5003         B2           D2752A5004         B2           D2752A5007         B2           D2752A6002, 6003         B2           D2752A6002, 6003         B2           D2752A6004         B2           D2752A6007         B2           D2752A6004         B2           D2752A6007         B2           D2752A6011         B2           D2752A6011, 6013         B2           D2752A6014         B2           D2752A6017         B2           D2752A6017         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A8018, 8011         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2753A2001         B2           D2753A2001         B2           D2753A2001         B2           D2753A2004         B2           D2753A3007         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2 <td>.12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .13           .17</td> <td>D2754A4007 D2754A4012 D2754A4012 D2754A4014 D2754A4014 D2754A4017 D2754A5001 D2754A5002 D2754A5004 D2754A6001 D2754A6001 D2754A6007 D2754A6004 D2754A6007 D2754A6014 D2754A6012 D2754A6014 D2754A6013 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7001 D2754A7001 D2754A7007 D2754A8018 D2754A7007 D2754A8018 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2756A2001 D2756A2001</td> <td>B2.15           B2.13           B2.17           B2.21           B2.15           B2.17           B2.18           B2.17           B2.17           B2.18           B2.17           B2.18           B2.17           B2.15           B2.16           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.15           B2.11           B2.15           B2.11           B2.15           B2.11           B2.12           B2.13           B2.19           B2.13           B2.19           B2.14</td> <td>D2774B2003** to 8013** D2774B2004** to 8015** D2774B2006** to 8017** D2776B2001** to 8011** D2776B2002** to 8013** D2776B2008** to 8013** D2776B2006** to 8013** D2776B2008** to 8013** D2776B2008** to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2002 to 8013 D2783B2005 to 8015 D2783B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8013</td> <td>B2.10 B2.8 B2.9 B2.25 F6.5 B2.11 B2.9 B2.7 F4.12 B2.18 B2.22 F1.19 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 F1.20 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 B2.16 B2.18</td> <td>D3573A7162** D3573A7171** D3573A7172** D3573A7181** D3573A7182** D3573A7201** D3573A7201** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7223** D3573A7223** D3573A7231** to 8161** D3573A8162** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B5438** D3573B5438** D3573B5438** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B7153** to 7183**</td> <td>G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8</td> <td>D698K86 to D704K86 D864K77 to D900K77 D949N91 to D953N91 D9553K1000 to 3000 D9554K1001 to 3000 D9556K1002 D9556K2001 D9556K2002 D9556K3002 D9556K3002 D9556K4001 D9556K4001 D9555K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D957K1001** to 3001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K2001**</td> <td>F5.7, 11 E6.4 A2.14 B4.7 B4.7 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.10 A2.14 B4.3 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5 B5.3 B4.4</td>	.12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .13           .17	D2754A4007 D2754A4012 D2754A4012 D2754A4014 D2754A4014 D2754A4017 D2754A5001 D2754A5002 D2754A5004 D2754A6001 D2754A6001 D2754A6007 D2754A6004 D2754A6007 D2754A6014 D2754A6012 D2754A6014 D2754A6013 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7001 D2754A7001 D2754A7007 D2754A8018 D2754A7007 D2754A8018 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2754A8019 D2756A2001 D2756A2001	B2.15           B2.13           B2.17           B2.21           B2.15           B2.17           B2.18           B2.17           B2.17           B2.18           B2.17           B2.18           B2.17           B2.15           B2.16           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.15           B2.11           B2.15           B2.11           B2.15           B2.11           B2.12           B2.13           B2.19           B2.13           B2.19           B2.14	D2774B2003** to 8013** D2774B2004** to 8015** D2774B2006** to 8017** D2776B2001** to 8011** D2776B2002** to 8013** D2776B2008** to 8013** D2776B2006** to 8013** D2776B2008** to 8013** D2776B2008** to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2002 to 8013 D2783B2005 to 8015 D2783B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2002 to 8013	B2.10 B2.8 B2.9 B2.25 F6.5 B2.11 B2.9 B2.7 F4.12 B2.18 B2.22 F1.19 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 F1.20 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 B2.16 B2.18	D3573A7162** D3573A7171** D3573A7172** D3573A7181** D3573A7182** D3573A7201** D3573A7201** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7223** D3573A7223** D3573A7231** to 8161** D3573A8162** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B5438** D3573B5438** D3573B5438** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B7153** to 7183**	G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D698K86 to D704K86 D864K77 to D900K77 D949N91 to D953N91 D9553K1000 to 3000 D9554K1001 to 3000 D9556K1002 D9556K2001 D9556K2002 D9556K3002 D9556K3002 D9556K4001 D9556K4001 D9555K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D957K1001** to 3001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K2001**	F5.7, 11 E6.4 A2.14 B4.7 B4.7 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.10 A2.14 B4.3 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5 B5.3 B4.4
D2752A5002, 5003         B2           D2752A5004         B2           D2752A5007         B2           D2752A6001         B2           D2752A6002, 6003         B2           D2752A6004         B2           D2752A6007         B2           D2752A6007         B2           D2752A6011         B2           D2752A6012, 6013         B2           D2752A6014         B2           D2752A6017         B2           D2752A6017         B2           D2752A6017         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A8001, 8011         B2           D2752A8001, 8013         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2753A2001         B2           D2753A2001         B2           D2753A2001         B2           D2753A3001         B2           D2753A3001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2 <td>.17           .21           .15           .12           .17           .21           .15           .12           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .13           .17           .21           .15           .13           .17           .13           .17</td> <td>D2754A4011 D2754A4012, 4013 D2754A4014 D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5007 D2754A6001 D2754A6001 D2754A6001 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6017 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7001 D2754A7004 D2754A7007 D2754A8018, 8011 D2754A801, 8011 D2754A801, 8011 D2754A801, 9011 D2754A8017 D2754A8017 D2754A9001, 9011 D2756A2001 D2756A2004 D2756A2004</td> <td>B2.13           B2.17           B2.17           B2.15           B2.15           B2.17           B2.15           B2.17           B2.15           B2.15           B2.15           B2.13           B2.15           B2.13           B2.15           B2.13           B2.14</td> <td>D2774B2004** to 8015** D2774B2006** to 8017** D2776B2001** to 8011** D2776B2002** to 8012** D2776B2003** to 8013** D2776B2008** to 8013** D2776B2008** to 8013** D2776B2008** to 8013** D2778D3900** to 6904 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2004 to 8014 D2782A2002 to 8013 D2782A2004 to 8014 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784A2002 to 8013 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2001 to 8013 D2786A2001 to 8014 D2786A2001 to 8014 D2786A2001 to 8013</td> <td>B2.8           B2.9           B2.25           F6.5           B2.11           B2.9           B2.77           F4.12           B2.18           B2.20           B2.18           B2.20           B2.16           B2.18           B2.22           B2.16           B2.18           B2.20           B2.16           B2.18           B2.22           B2.20           B2.16           B2.18           B2.22           B2.18           B2.22           B2.18           B2.22           B2.18</td> <td>D3573A7171** D3573A7172** D3573A7182** D3573A7182** D3573A7201** D3573A7202** D3573A7203** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7223** D3573A8162** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B5438** D3573B5438** D3573B5438** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632**</td> <td>G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8           G3.8           G2.9           G3.8           G3.8           G3.8           G3.8           G3.8           G3.8           G3.8           G3.8           G3.8           G3.8</td> <td>D864K77 to D900K77 D949N91 to D953N91 D9553K1000 to 3000 D9554K1000 to 3000 D9556K1001 D9556K2001 D9556K2002 D9556K3001 D9556K3002 D9556K4002 D9556K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D957K1001** to 3001** D957K1001** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K2001**</td> <td>E6.4 A2.14 B4.7 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.10 A2.14 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5 B5.3 B4.4</td>	.17           .21           .15           .12           .17           .21           .15           .12           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .13           .17           .21           .15           .13           .17           .13           .17	D2754A4011 D2754A4012, 4013 D2754A4014 D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5007 D2754A6001 D2754A6001 D2754A6001 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6017 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7001 D2754A7004 D2754A7007 D2754A8018, 8011 D2754A801, 8011 D2754A801, 8011 D2754A801, 9011 D2754A8017 D2754A8017 D2754A9001, 9011 D2756A2001 D2756A2004 D2756A2004	B2.13           B2.17           B2.17           B2.15           B2.15           B2.17           B2.15           B2.17           B2.15           B2.15           B2.15           B2.13           B2.15           B2.13           B2.15           B2.13           B2.14	D2774B2004** to 8015** D2774B2006** to 8017** D2776B2001** to 8011** D2776B2002** to 8012** D2776B2003** to 8013** D2776B2008** to 8013** D2776B2008** to 8013** D2776B2008** to 8013** D2778D3900** to 6904 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2004 to 8014 D2782A2002 to 8013 D2782A2004 to 8014 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784A2002 to 8013 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2001 to 8013 D2786A2001 to 8014 D2786A2001 to 8014 D2786A2001 to 8013	B2.8           B2.9           B2.25           F6.5           B2.11           B2.9           B2.77           F4.12           B2.18           B2.20           B2.18           B2.20           B2.16           B2.18           B2.22           B2.16           B2.18           B2.20           B2.16           B2.18           B2.22           B2.20           B2.16           B2.18           B2.22           B2.18           B2.22           B2.18           B2.22           B2.18	D3573A7171** D3573A7172** D3573A7182** D3573A7182** D3573A7201** D3573A7202** D3573A7203** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7223** D3573A8162** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B5438** D3573B5438** D3573B5438** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632**	G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8           G3.8           G2.9           G3.8	D864K77 to D900K77 D949N91 to D953N91 D9553K1000 to 3000 D9554K1000 to 3000 D9556K1001 D9556K2001 D9556K2002 D9556K3001 D9556K3002 D9556K4002 D9556K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D957K1001** to 3001** D957K1001** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K2001**	E6.4 A2.14 B4.7 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.10 A2.14 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5 B5.3 B4.4
D2752A5004         B2           D2752A5007         B2           D2752A6001         B2           D2752A6002, 6003         B2           D2752A6004         B2           D2752A6007         B2           D2752A6011         B2           D2752A6012, 6013         B2           D2752A6014         B2           D2752A6014         B2           D2752A6014         B2           D2752A6017         B2           D2752A6018         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A8018, 8011         B2           D2752A8018, 8013         B2           D2752A8017, 8013         B2           D2752A8017, 8013         B2           D2752A8017, 8013         B2           D2752A8017, 8013         B2           D2753A2001, 9011         B2           D2753A2001, 9011         B2           D2753A2001, 8018         B2           D2753A2001         B2           D2753A3001         B2           D2753A3001         B2           D2753A4001         B2           D2753A4001         B2           D2753A40	21           15           12           17           21           15           12           17           21           15           12           17           21           15           12           17           21           15           12           17           21           17           21           17           21           17           21           15           13           17           21           15           13           17           21           15           13           17	D2754A4012, 4013 D2754A4014 D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5004 D2754A5007 D2754A6007 D2754A6002, 6003 D2754A6004 D2754A6012, 6013 D2754A6017 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2756A2001 D2756A2001 D2756A2001	B2.17           B2.11           B2.15           B2.15           B2.17           B2.15           B2.17           B2.17           B2.17           B2.17           B2.17           B2.17           B2.15           B2.13           B2.17           B2.18           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.15           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.19           B2.13           B2.19           B2.14	D2774B2006** to 8017** D2776B2001** to 8011** D2776B2002** to 8012** D2776B2003** to 8013** D2776B2006** to 8013** D2776B2008** to 8013** D2778D3900** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781A2007 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2002 to 8013 D2783A2001 to 8011 D2783B2005 to 8015 D2783A2001 to 8011 D2783B2005 to 8015 D2783B2005 to 8015 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2002 to 8013 D2784A2002 to 8013 D2784A2002 to 8013 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2002 to 8013 D2786A2002 to 8013	B2.9           B2.25           F6.5           B2.11           B2.9           B2.7           F4.12           B2.18           B2.20           B2.16           B2.18           B2.22           B2.16           B2.18           B2.22           B2.20           B2.16           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.18           B2.22           B2.18           B2.22           B2.18           B2.22           B2.18	D3573A7172** D3573A7182** D3573A7182** D3573A7201** D3573A7202** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B2632** to 2645** D3573B2632** to 2645** D3573B4143*, 4163** D3573B4638** D3573B5632** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632**	G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D949N91 to D953N91 D9553K1000 to 3000 D9554K1000 to 3000 D9556K1001 D9556K2001 D9556K2002 D9556K2002 D9556K3001 D9556K4001 D9556K4002 D9557K1007 to D9557K1001** to 3001** D9573K1001** to 3001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001**	A2.14 B4.7 B4.7 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.8 B4.9 B4.10 A2.14 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5 B5.3 B4.4
D2752A5007         B2           D2752A6001         B2           D2752A6002, 6003         B2           D2752A6004         B2           D2752A6007         B2           D2752A6011         B2           D2752A6011         B2           D2752A6012, 6013         B2           D2752A6017         B2           D2752A6017         B2           D2752A6017         B2           D2752A7001         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A801, 8011         B2           D2752A801, 8013         B2           D2752A801, 8011         B2           D2752A801, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8017         B2           D2753A2001         B2           D2753A2001         B2           D2753A2001         B2           D2753A3002, 3003         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2	15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .17           .17           .12           .17           .12           .17           .12           .17           .12           .17           .117           .21           .13           .17           .21           .13           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17	D2754A4014 D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5004 D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6014 D2754A6012, 6013 D2754A6014 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2756A2001 D2756A2001 D2756A2001	B2.21           B2.15           B2.13           B2.17           B2.18           B2.17           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.19           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.17           B2.11           B2.12           B2.13           B2.13           B2.19           B2.14	D2776B2001** to 8011** D2776B2002** to 8012** D2776B2003** to 8013** D2776B2006** to 8013** D2776B2006** to 8013** D2776B2008** to 8018** D2778D3900** to 6904 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2002 to 8013 D2783A2001 to 8011 D2783B2005 to 8015 D2783B2005 to 8015 D2783B2005 to 8015 D2783B2005 to 8013 D2783B2005 to 8013 D2784A2002 to 8013 D2784A2002 to 8013 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2002 to 8013	B2.25 F6.5 B2.11 B2.9 B2.7 F4.12 B2.18 B2.22 B2.20 B2.18 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 B2.18 B2.22 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18	D3573A7181** D3573A7182** D3573A7201** D3573A7202** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B2632** to 2645** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4383**, 4891** D3573B5632** D3573B5632** D3573B5632** D3573B5632** D3573B6632** to 6183** D3573B6632**, 6638** D3573B6632**, 6638**	G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D9553K1000 to 3000 D9554K1000 to 3000 D9556K1001 D9556K2001 D9556K2002 D9556K2002 D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K1001** to 3001** D9573K1001** to 3001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001**	B4.7           B4.7           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B5.3           B4.4
D2752A6001         B2           D2752A6002, 6003         B2           D2752A6004         B2           D2752A6004         B2           D2752A6011         B2           D2752A6011         B2           D2752A6011         B2           D2752A6011         B2           D2752A6011         B2           D2752A6014         B2           D2752A7001         B2           D2752A7001         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A7007         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8019, 9011         B2           D2753A2001         B2           D2753A2001         B2           D2753A2001         B2           D2753A3002, 3003         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2 <td>.12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .17           .12           .17           .117           .12           .17           .117           .12           .13           .17           .21           .13           .17           .21           .13           .13           .13           .13           .13           .147</td> <td>D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5004 D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6014 D2754A6014 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2756A2001 D2756A2001 D2756A2001</td> <td>B2.15           B2.13           B2.17           B2.21           B2.15           B2.17           B2.18           B2.17           B2.21           B2.17           B2.21           B2.17           B2.13           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.14</td> <td>D2776B2002** to 8012** D2776B2003** to 8013** D2776B2006** to 8013** D2776B2006** to 8017** D2776B2008** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2002 to 8013 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2002 to 8013 D2783A2002 to 8013 D2783B2005 to 8015 D2783B2005 to 8015 D2783A2004 to 8014 D2784A2002 to 8013 D2784A2004 to 8014 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2001 to 8013</td> <td>F6.5           B2.11           B2.9           B2.7           F4.12           B2.18           B2.22           F1.19           B2.18           B2.20           B2.18           B2.20           B2.18           B2.20           B2.18           B2.22           B2.10           B2.18           B2.22           B2.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.20           B2.18</td> <td>D3573A7182** D3573A7201** D3573A7202** D3573A7203** D3573A7222** D3573A7222** D3573A7222** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B2632** to 2645** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4383**, 4891** D3573B5632** D3573B5632** D3573B5632** D3573B5632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B6632**, 6638**</td> <td>G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8</td> <td>D9554K1000 to 3000 D9556K1001 D9556K2001 D9556K2002 D9556K2002 D9556K3002 D9556K4002 D9556K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D9574K1001** to 3001** D9576K1002** D9576K2002** D9576K2002** D9576K2001** D9576K2001** D9576K3001**</td> <td>B4.7           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.3           B4.3           B4.4           B4.5           B5.3           B4.4</td>	.12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .17           .12           .17           .117           .12           .17           .117           .12           .13           .17           .21           .13           .17           .21           .13           .13           .13           .13           .13           .147	D2754A4017 D2754A5001 D2754A5002, 5003 D2754A5004 D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6014 D2754A6014 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2756A2001 D2756A2001 D2756A2001	B2.15           B2.13           B2.17           B2.21           B2.15           B2.17           B2.18           B2.17           B2.21           B2.17           B2.21           B2.17           B2.13           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.14	D2776B2002** to 8012** D2776B2003** to 8013** D2776B2006** to 8013** D2776B2006** to 8017** D2776B2008** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2002 to 8013 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2002 to 8013 D2783A2002 to 8013 D2783B2005 to 8015 D2783B2005 to 8015 D2783A2004 to 8014 D2784A2002 to 8013 D2784A2004 to 8014 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2001 to 8013	F6.5           B2.11           B2.9           B2.7           F4.12           B2.18           B2.22           F1.19           B2.18           B2.20           B2.18           B2.20           B2.18           B2.20           B2.18           B2.22           B2.10           B2.18           B2.22           B2.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.20           B2.18	D3573A7182** D3573A7201** D3573A7202** D3573A7203** D3573A7222** D3573A7222** D3573A7222** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8182** D3573B2632** to 2645** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4383**, 4891** D3573B5632** D3573B5632** D3573B5632** D3573B5632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B6632**, 6638**	G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D9554K1000 to 3000 D9556K1001 D9556K2001 D9556K2002 D9556K2002 D9556K3002 D9556K4002 D9556K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D9574K1001** to 3001** D9576K1002** D9576K2002** D9576K2002** D9576K2001** D9576K2001** D9576K3001**	B4.7           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.3           B4.3           B4.4           B4.5           B5.3           B4.4
D2752A6002, 6003         B2.           D2752A6004         B2.           D2752A6007         B2.           D2752A6011         B2.           D2752A6012, 6013         B2.           D2752A6014         B2.           D2752A6017         B2.           D2752A6017         B2.           D2752A7001         B2.           D2752A7002, 7003         B2.           D2752A7007         B2.           D2752A8001, 8011         B2.           D2752A7007         B2.           D2752A8012, 8013         B2.           D2752A8012, 8013         B2.           D2752A8014         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8017         B2.           D2753A2001         B2.           D2753A2002, 2003         B2.           D2753A2004         B2.           D2753A3001         B2.           D2753A3001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A500	.17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .17           .21           .17           .12           .17           .12           .17           .12           .19           .13           .17           .21           .13           .17           .21           .13           .13           .17           .21           .13           .17           .13           .17           .13           .17	D2754A5001 D2754A5002, 5003 D2754A5004 D2754A5007 D2754A6001 D2754A6001 D2754A6004 D2754A6007 D2754A6017 D2754A6014 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8018, 8011 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2756A2001 D2756A2001 D2756A2001	B2.13           B2.17           B2.21           B2.15           B2.13           B2.17           B2.21           B2.17           B2.21           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.17           B2.13           B2.15           B2.13           B2.15           B2.13           B2.15           B2.13           B2.14	D2776B2003** to 8013** D2776B2006** to 8017** D2776B2006** to 8017** D2776B2008** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2002 to 8013 D2783A2001 to 8014 D2783A2001 to 8014 D2783B2005 to 8015 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2001 to 8013	B2.11 B2.9 B2.7 F4.12 B2.18 B2.22 F1.19 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18	D3573A7201** D3573A7202** D3573A7203** D3573A7203** D3573A7221** D3573A7223** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8181** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B5632** D3573B5632** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632**	G2.7           G2.5           G2.9           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G3.8           G3.8	D9556K1001 D9556K1002 D9556K2001 D9556K2002 D9556K3002 D9556K4001 D9556K4001 D9556K4002 D9557K1007 to D9557K1007 to D9573K1001** to 3001** D9576K1001** D9576K1002** D9576K2002** D9576K2002** D9576K2001** D9576K2001** D9576K3001**	B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B5.3           B4.4
D2752A6004         B2.           D2752A6007         B2.           D2752A6011         B2.           D2752A6012, 6013         B2.           D2752A6014         B2.           D2752A6017         B2.           D2752A6017         B2.           D2752A7001         B2.           D2752A7002, 7003         B2.           D2752A7007         B2.           D2752A8001, 8011         B2.           D2752A8001, 8011         B2.           D2752A8012, 8013         B2.           D2752A8012, 8013         B2.           D2752A8014         B2.           D2752A8001, 9011         B2.           D2752A8001, 9011         B2.           D2753A2002, 2003         B2.           D2753A2004         B2.           D2753A2004         B2.           D2753A3001         B2.           D2753A3004         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A5001         B2.           <	21 15 12 17 21 15 12 17 21 17 21 15 12 17 21 15 12 17 21 15 12 17 21 15 12 17 21 15 12 17 21 15 12 17 21 17 21 17 21 17 21 15 12 12 17 21 15 12 12 17 17 17 21 15 12 17 17 17 17 17 17 17 17 17 17	D2754A5002, 5003 D2754A5004 D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6017 D2754A6012, 6013 D2754A6017 D2754A6017 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7004 D2754A7004 D2754A7007 D2754A801, 8011 D2754A801, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A8019 011 D2756A2001 D2756A2001	B2.17           B2.17           B2.15           B2.15           B2.17           B2.17           B2.18           B2.17           B2.15           B2.11           B2.15           B2.17           B2.18           B2.17           B2.17           B2.18           B2.17           B2.18           B2.19           B2.13           B2.15           B2.13           B2.15           B2.13           B2.15           B2.13           B2.14	D2776B2006** to 8017** D2776B2008** to 8018** D2778D3900** to 6904 D2781A2002 to 8013 D2781A2002 to 8013 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2004 to 8014 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2004 to 8014 D2784A2004 to 8014 D2784A2004 to 8014 D2784A2004 to 8011 D2786A2001 to 8013 D2786A2001 to 8013 D2786A2001 to 8013 D2786A2001 to 8014	B2.9           B2.7           F4.12           B2.18           B2.22           F1.19           B2.20           B2.18           B2.22           B2.18           B2.22           B2.16           B2.16           B2.22           B2.16           B2.22           B2.20           B2.18           B2.22           B2.20           B2.18           B2.22           B2.18           B2.21           B2.21	D3573A7202** D3573A7203** D3573A7221** D3573A7222** D3573A7222** D3573A7201** to 8161** D3573A8162** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B4632** to 2645** D3573B4483**, 4163** D3573B4883**, 4891** D3573B5632** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.5           G2.9           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.8	D9556K1002 D9556K2001 D9556K2002 D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K4007 to D9557K4007 to D9557K1007 to D9573K1001** to 3001** D9576K1001** D9576K1002** D9576K2002** D9576K2002** D9576K2001** D9576K2001** D9576K3001**	B4.9           B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A6007         B2           D2752A6011         B2           D2752A6012, 6013         B2           D2752A6014         B2           D2752A6017         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A8001, 8011         B2           D2752A8001, 8011         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8001, 9011         B2           D2752A8001, 9011         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A2007         B2           D2753A3004         B2           D2753A3004         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001	.15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17	D2754A5004 D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6017 D2754A6012, 6013 D2754A6017 D2754A6017 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7007 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A801, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A8019, 9011 D2754A2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.21           B2.15           B2.13           B2.17           B2.18           B2.17           B2.17           B2.18           B2.19           B2.13           B2.14	D2776B2008** to 8018** D2778D3900** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2002 to 8013 D2782A2004 to 8014 D2783B2005 to 8015 D2783A2001 to 8011 D2783B2005 to 8013 D2783B2005 to 8013 D2783B7037 to C6047 D2784A2004 to 8014 D2784A2004 to 8014 D2784A2004 to 8014 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2001 to 8013 D2786A2001 to 8014 D2786A2001 to 8014 D2786A2002 to 8013	B2.7           F4.12           B2.18           B2.22           F1.19           B2.20           B2.18           B2.22           B2.18           B2.22           B2.16           B2.18           B2.22           B2.18           B2.22           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.216           B2.18	D3573A7203** D3573A7221** D3573A7222** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361*, 8381** D3573B4632** D3573B4638** D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B735* to 7183**	G2.9           G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.3           G2.9           G3.8	D9556K2001 D9556K2002 D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K1007 to D9557K1001** to 3001** D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**	B4.8           B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A6011         B2           D2752A6012, 6013         B2           D2752A6014         B2           D2752A6017         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A7007         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8012, 8013         B2           D2752A8012, 8013         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8001, 9011         B2           D2753A2001         B2           D2753A2001         B2           D2753A2004         B2           D2753A2007         B2           D2753A3004         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4011         B2           D2753A4014         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2 </td <td>.12           .17           .21           .15           .12           .17           .21           .17           .12           .17           .12           .17           .11           .15           .12           .13           .17           .21           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17           .13           .17           .21</td> <td>D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7004 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A801, 9011 D2754A8017 D2754A8019, 9011 D2756A2001 D2756A2001 D2756A2004 D2756A2004</td> <td>B2.15           B2.13           B2.17           B2.21           B2.15           B2.13           B2.14</td> <td>D2778D3900** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2002 to 8013</td> <td>F4.12           B2.18           B2.22           F1.19           B2.20           B2.18           B2.22           B2.16           B2.18           B2.20           B2.16           B2.21           B2.22           B2.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.21           B2.18</td> <td>D3573A7221** D3573A7222** D3573A7222** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4638** D3573B483**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**</td> <td>G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8</td> <td>D9556K2002 D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K1001** to 3001** D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**</td> <td>B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4</td>	.12           .17           .21           .15           .12           .17           .21           .17           .12           .17           .12           .17           .11           .15           .12           .13           .17           .21           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17           .13           .17           .21	D2754A5007 D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7001 D2754A7004 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A801, 9011 D2754A8017 D2754A8019, 9011 D2756A2001 D2756A2001 D2756A2004 D2756A2004	B2.15           B2.13           B2.17           B2.21           B2.15           B2.13           B2.14	D2778D3900** to 6904 D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2002 to 8013	F4.12           B2.18           B2.22           F1.19           B2.20           B2.18           B2.22           B2.16           B2.18           B2.20           B2.16           B2.21           B2.22           B2.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.21           B2.18	D3573A7221** D3573A7222** D3573A7222** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4638** D3573B483**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.7           G2.5           G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8	D9556K2002 D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K1001** to 3001** D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**	B4.9           B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A6012, 6013         B2.           D2752A6014         B2.           D2752A6017         B2.           D2752A7001         B2.           D2752A7004         B2.           D2752A7007         B2.           D2752A7007         B2.           D2752A7007         B2.           D2752A7007         B2.           D2752A8012, 8013         B2.           D2752A8012, 8013         B2.           D2752A8014         B2.           D2752A8014         B2.           D2752A8017         B2.           D2752A8014         B2.           D2752A8017         B2.           D2752A8018         B2.           D2753A2001         B2.           D2753A2002, 2003         B2.           D2753A2007         B2.           D2753A3001         B2.           D2753A3007         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A5001         B2.           D2753A5001 <td< td=""><td>.17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .13           .17           .21           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .21</td><td>D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A8017 D2754A8017 D2754A8017 D2754A8019 0011 D2754A2001 D2756A2001 D2756A2001</td><td>B2.13           B2.17           B2.17           B2.15           B2.13           B2.14</td><td>D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2002 to 8013</td><td>B2.18 B2.22 F1.19 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18</td><td>D3573A7222** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**</td><td>G2.5           G2.9           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8</td><td>D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K1001** to 3001** D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**</td><td>B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4</td></td<>	.17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .13           .17           .21           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .21	D2754A6001 D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6018 D2754A6018 D2754A6018 D2754A7001 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A8017 D2754A8017 D2754A8017 D2754A8019 0011 D2754A2001 D2756A2001 D2756A2001	B2.13           B2.17           B2.17           B2.15           B2.13           B2.14	D2781A2002 to 8013 D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2002 to 8013	B2.18 B2.22 F1.19 B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18	D3573A7222** D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.5           G2.9           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D9556K3001 D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K1001** to 3001** D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**	B4.8           B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A6014         B2           D2752A6017         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A7007         B2           D2752A7007         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2753A2001         B2           D2753A2001         B2           D2753A2004         B2           D2753A3001         B2           D2753A3002, 3003         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4011         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2	21 15 12 17 21 15 12 17 21 15 12 17 21 15 13 17 21 15 13 17 21 15 13 17 21 15 12 17 12 17 15 12 17 12 17 12 17 15 12 17 17 17 17 17 17 17 17 17 17	D2754A6002, 6003 D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A7001 D2754A7001 D2754A7004 D2754A7007 D2754A7007 D2754A801, 8011 D2754A801, 8011 D2754A8017 D2754A8017 D2754A8017 D2754A2001 D2756A2001 D2756A2001	B2.17           B2.21           B2.15           B2.13           B2.17           B2.21           B2.17           B2.17           B2.18           B2.19           B2.13           B2.17           B2.13           B2.17           B2.21           B2.13           B2.13           B2.13           B2.14	D2781A2004 to 8014 D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2004 to 8014 D2784A2004 to 8014 D2784A2004 to 8015 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2004 to 8014 D2786A2004 to 8014	B2.22           F1.19           B2.20           B2.18           B2.22           B2.00           B2.16           B2.18           B2.20           B2.16           B2.18           B2.20           B2.18           B2.20           B2.18           B2.22           B2.18           B2.20           B2.18           B2.20           B2.18	D3573A7223** D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B483**, 4891** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** D3573B6632** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G2.9 G2.7 G2.5 G2.7 G2.5 G2.7 G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8	D9556K3002 D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K1001** to 3001** D957K1001** to 3001** D9576K1002** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**	B4.9           B4.8           B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A6017         B2           D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A7004         B2           D2752A7007         B2           D2752A8001, 8011         B2           D2752A8001, 8013         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A9001, 9011         B2           D2752A9001, 9011         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A3001         B2           D2753A3001         B2           D2753A3001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4012, 4013         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2 </td <td>.15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .13           .17           .21           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17           .13           .17</td> <td>D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A9001, 9011 D2754A2001 D2756A2001 D2756A2004 D2756A2004</td> <td>B2.21           B2.15           B2.13           B2.17           B2.21           B2.17           B2.18           B2.19           B2.13           B2.17           B2.21           B2.13           B2.17           B2.21           B2.13           B2.13           B2.13           B2.14</td> <td>D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2784A2002 to 8013 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2002 to 8013</td> <td>F1.19           B2.20           B2.18           B2.22           B2.00           B2.16           B2.18           B2.22           B2.16           B2.18           B2.22           B2.21           B2.22           B2.22           B2.18           B2.22           B2.20           B2.18           B2.20           B2.16           B2.18</td> <td>D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4638** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**</td> <td>G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8           G3.8</td> <td>D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K4019 D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**</td> <td>B4.8           B4.9           B4.10           A2.14           B4.3           B4.4           B4.5           B4.4           B4.5           B5.3           B4.4</td>	.15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .15           .12           .17           .21           .13           .17           .21           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17           .13           .17	D2754A6004 D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A8017 D2754A8017 D2754A8017 D2754A9001, 9011 D2754A2001 D2756A2001 D2756A2004 D2756A2004	B2.21           B2.15           B2.13           B2.17           B2.21           B2.17           B2.18           B2.19           B2.13           B2.17           B2.21           B2.13           B2.17           B2.21           B2.13           B2.13           B2.13           B2.14	D2781A2007 to 8017 D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2784A2002 to 8013 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2002 to 8013	F1.19           B2.20           B2.18           B2.22           B2.00           B2.16           B2.18           B2.22           B2.16           B2.18           B2.22           B2.21           B2.22           B2.22           B2.18           B2.22           B2.20           B2.18           B2.20           B2.16           B2.18	D3573A7301** to 8161** D3573A8162** D3573A8182** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4638** D3573B5632** D3573B5632** D3573B6632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.7           G2.5           G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D9556K4001 D9556K4002 D9557K1007 to D9557K4019 D9557K4019 D957K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**	B4.8           B4.9           B4.10           A2.14           B4.3           B4.4           B4.5           B4.4           B4.5           B5.3           B4.4
D2752A7001         B2           D2752A7002, 7003         B2           D2752A7004         B2           D2752A7007         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8001, 9011         B2           D2752A8001, 9011         B2           D2753A2001         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A3001         B2           D2753A3001         B2           D2753A3001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4012, 4013         B2           D2753A5001         B2           D2753A5002, 5003         B2           D2753A5004         B2           D2753A5007         B2 </td <td>.12           .17           .21           .15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17</td> <td>D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A8017 D2754A9001, 9011 D2754A9001 D2756A2001 D2756A2004 D2756A2007</td> <td>B2.15           B2.13           B2.17           B2.21           B2.15           B2.19           B2.13           B2.17           B2.21           B2.13           B2.14</td> <td>D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2004 to 8014</td> <td>B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18</td> <td>D3573A8162** D3573A8181** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B443**, 4163** D3573B4638** D3573B4638** D3573B5632** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**</td> <td>G2.5 G2.7 G2.5 G2.7 G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8</td> <td>D9556K4002 D9557K1007 to D9557K4019 D955N91, D956N91 D9573K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**</td> <td>B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4</td>	.12           .17           .21           .15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .13           .17           .21           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17           .13           .17	D2754A6007 D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A8017 D2754A9001, 9011 D2754A9001 D2756A2001 D2756A2004 D2756A2007	B2.15           B2.13           B2.17           B2.21           B2.15           B2.19           B2.13           B2.17           B2.21           B2.13           B2.14	D2781B2005 to 8015 D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2001 to 8011 D2783A2004 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2004 to 8014	B2.20 B2.18 B2.22 B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18	D3573A8162** D3573A8181** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B443**, 4163** D3573B4638** D3573B4638** D3573B5632** D3573B5632** D3573B5632** D3573B6632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.5 G2.7 G2.5 G2.7 G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8 G3.8	D9556K4002 D9557K1007 to D9557K4019 D955N91, D956N91 D9573K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001** D9576K3002**	B4.9           B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A7002, 7003         B2.           D2752A7004         B2.           D2752A7007         B2.           D2752A8001, 8011         B2.           D2752A8012, 8013         B2.           D2752A8014, 8013         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8001, 9011         B2.           D2753A2001         B2.           D2753A2002, 2003         B2.           D2753A2007         B2.           D2753A3001         B2.           D2753A3002, 3003         B2.           D2753A4001         B2.           D2753A4012, 4013         B2.           D2753A4014         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5004         B2.           D27	.17           .21           .15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .15           .13           .17           .21           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17	D2754A6011 D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8017 D2754A9001, 9011 D2754A9001, 9011 D2754A9001 D2756A2001 D2756A2004 D2756A2007	B2.13           B2.17           B2.17           B2.15           B2.19           B2.13           B2.17           B2.13           B2.17           B2.21           B2.13           B2.17           B2.15           B2.15           B2.17           B2.18           B2.17           B2.18           B2.17           B2.18           B2.19           B2.11           B2.12           B2.13           B2.19           B2.14	D2782A2002 to 8013 D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to 8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2786A2001 to 8015 D2786A2002 to 8013 D2786A2004 to 8014 D2786A2004 to 8014 D2786A2004 to 8014	B2.18           B2.22           B2.00           B2.16           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.10           F1.20           B2.18           B2.22           B2.20           F1.20           B2.18           B2.20           B2.16           B2.18	D3573A8181** D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4883**, 4891** D3573B5632** D3573B5632** D3573B5638** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.7           G2.5           G2.7           G3.3           G2.9           G3.8           G3.5           G2.9           G3.8	D9557K1007 to D9557K4019 D955N91, D956N91 D9573K1001** to 3001** D9574K1001** to 3001** D9576K1002** D9576K2001** D9576K2001** D9576K2001** D9576K2001** D9576K3001**	B4.10           A2.14           B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4           B4.5           B4.4
D2752A7004         B2           D2752A7007         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A9001, 9011         B2           D2753A2001         B2           D2753A2002, 2003         B2           D2753A2007         B2           D2753A3001         B2           D2753A3007         B2           D2753A3007         B2           D2753A3007         B2           D2753A4007         B2           D2753A4004         B2           D2753A4007         B2           D2753A4001         B2           D2753A4001         B2           D2753A4017         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2           D2753A6001         B2	21 15 12 17 21 15 12 17 15 12 19 13 17 21 15 13 17 21 15 13 17 21 15 13 17 21 15 13 17 17 21 15 12 17 15 12 15 12 15 12 15 12 15 12 15 12 15 15 12 15 15 15 15 15 15 15 15 15 15	D2754A6012, 6013 D2754A6014 D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8017 D2754A9001, 9011 D2754A9001, 9011 D2754A9001 D2756A2001 D2756A2004 D2756A2007	B2.17           B2.21           B2.15           B2.19           B2.13           B2.17           B2.21           B2.15           B2.15           B2.17           B2.15           B2.13           B2.14	D2782A2004 to 8014 D2782B2005 to 8015 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784A2004 to 8014 D2786A2001 to 8011 D2786A2001 to 8013 D2786A2004 to 8014 D2786A2004 to 8014	B2.22           B2.20           B2.16           B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.18           B2.22           B2.18           B2.21           B2.18           B2.21           B2.21           B2.22           B2.20           B2.16           B2.18	D3573A8182** D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5638** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.5 G2.7 G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G2.9 G3.8	D9557K4019 D955N91, D956N91 D9573K1001** to 3001** D9574K1001** to 3001** D9576K1002** D9576K2002** D9576K2002** D9576K2002** D9576K2001** D9576K3001** D9576K3002**	A2.14 B4.3 B4.3 B4.4 B4.5 B4.4 B4.5 B5.3 B4.4
D2752A7007         B2           D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8001, 9011         B2           D2752B2008 to 8018         B2           D2753A2001         B2           D2753A2007         B2           D2753A3001         B2           D2753A3001         B2           D2753A3001         B2           D2753A3007         B2           D2753A3007         B2           D2753A4007         B2           D2753A4001         B2           D2753A4004         B2           D2753A4004         B2           D2753A4004         B2           D2753A4001         B2           D2753A4001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2           D2753A6001         B2           D2753A6001         B2	.15           .12           .17           .21           .15           .12           .19           .13           .17           .21           .15           .12           .19           .13           .17           .21           .15           .13           .17           .21           .15           .13           .17           .21	D2754A6014 D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2756A2001 D2756A2001 D2756A2001	B2.21           B2.15           B2.19           B2.13           B2.17           B2.21           B2.15           B2.15           B2.13           B2.15           B2.13           B2.15           B2.13           B2.14	D2782B2005 to 8015 D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.20 B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.20 B2.16 B2.18	D3573A8361**, 8381** D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4638** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.7 G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G2.9 G3.8 G2.9 G3.8	D9573K1001** to 3001** D9574K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2002** D9576K2002** D9576K2001** D9576K3001** D9576K3002**	B4.3           B4.3           B4.4           B4.5           B4.4           B4.5           B4.5           B5.3           B4.4
D2752A8001, 8011         B2           D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8001, 9011         B2           D2753A2001         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A3001         B2           D2753A3001         B2           D2753A3002, 3003         B2           D2753A3004         B2           D2753A4007         B2           D2753A4001         B2           D2753A4004         B2           D2753A4004         B2           D2753A4011         B2           D2753A4012, 4013         B2           D2753A5001         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2           D2753A6001         B2           D2753A6001         B2           D2753A6001         B2 <td>12 17 21 15 12 19 13 17 21 15 13 17 21 15 13 17 21 15 13 17</td> <td>D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A9001, 9011 D2756A2008 to 8018 D2756A2001 D2756A2004 D2756A2007</td> <td>B2.15           B2.19           B2.13           B2.17           B2.17           B2.15           B2.15           B2.11           B2.15           B2.13           B2.14</td> <td>D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015</td> <td>B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.20 B2.16 B2.18</td> <td>D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**</td> <td>G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G2.9 G3.8</td> <td>D9574K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2002** D9576K2002** D9576K3001** D9576K3002**</td> <td>B4.3           B4.4           B4.5           B4.4           B5.3           B4.4</td>	12 17 21 15 12 19 13 17 21 15 13 17 21 15 13 17 21 15 13 17	D2754A6017 D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8017 D2754A8017 D2754A8017 D2754A9001, 9011 D2756A2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.15           B2.19           B2.13           B2.17           B2.17           B2.15           B2.15           B2.11           B2.15           B2.13           B2.14	D2783A2001 to 8011 D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.16 B2.18 B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.20 B2.16 B2.18	D3573B2632** to 2645** D3573B4143**, 4163** D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G3.3 G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G3.8 G2.9 G3.8	D9574K1001** to 3001** D9576K1001** D9576K1002** D9576K2001** D9576K2002** D9576K2002** D9576K3001** D9576K3002**	B4.3           B4.4           B4.5           B4.4           B5.3           B4.4
D2752A8012, 8013         B2           D2752A8014         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8017         B2           D2752A8001, 9011         B2           D2753A2001         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A3001         B2           D2753A3001         B2           D2753A3004         B2           D2753A3004         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4011         B2           D2753A4017         B2           D2753A5001         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2           D2753A5007         B2           D2753A6001         B2           D2753A6001         B2	.17 .21 .15 .12 .19 .13 .17 .21 .15 .13 .17 .21 .15 .13 .13 .13 .17	D2754A6018 D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A8001, 9011 D2754A2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.19 B2.13 B2.17 B2.21 B2.15 B2.13 B2.17 B2.21 B2.15 B2.13 B2.13 B2.19 B2.14	D2783A2002 to 8013 D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.18           B2.22           B2.20           F1.20           B2.18           B2.22           B2.20           B2.18           B2.21           B2.22           B2.21           B2.22           B2.21           B2.22           B2.21           B2.22           B2.23           B2.24           B2.25           B2.26           B2.27	D3573B4143**, 4163** D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5632** D3573B6632**, 6638** D3573B6632**, 6638** D3573B7153** to 7183**	G2.9 G3.8 G3.5 G2.9 G3.8 G3.8 G2.9 G3.8 G2.9 G3.8	D9576K1001** D9576K1002** D9576K2001** D9576K2002** D9576K2901**, 2902** D9576K3001** D9576K3002**	B4.4 B4.5 B4.4 B4.5 B5.3 B4.4
D2752A8014         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8017         B2.           D2752A8001, 9011         B2.           D2753A2001         B2.           D2753A2002, 2003         B2.           D2753A2004         B2.           D2753A3001         B2.           D2753A3007         B2.           D2753A3004         B2.           D2753A3004         B2.           D2753A3004         B2.           D2753A4001         B2.           D2753A4002, 4003         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4011         B2.           D2753A4012, 4013         B2.           D2753A4014         B2.           D2753A5001         B2.           D2753A5001 <td< td=""><td>.21 .15 .12 .19 .13 .17 .21 .15 .13 .17 .21 .15 .13 .15 .13 .17 .17</td><td>D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2756A2001 D2756A2001 D2756A2004 D2756A2007</td><td>B2.13 B2.17 B2.21 B2.15 B2.13 B2.17 B2.21 B2.15 B2.13 B2.15 B2.13 B2.19 B2.14</td><td>D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015</td><td>B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18</td><td>D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5638** D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**</td><td>G3.8 G3.5 G2.9 G3.8 G3.8 G2.9 G3.8</td><td>D9576K1002** D9576K2001** D9576K2002** D9576K2901**, 2902** D9576K3001** D9576K3002**</td><td>B4.5 B4.4 B4.5 B5.3 B4.4</td></td<>	.21 .15 .12 .19 .13 .17 .21 .15 .13 .17 .21 .15 .13 .15 .13 .17 .17	D2754A7001 D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2756A2001 D2756A2001 D2756A2004 D2756A2007	B2.13 B2.17 B2.21 B2.15 B2.13 B2.17 B2.21 B2.15 B2.13 B2.15 B2.13 B2.19 B2.14	D2783A2004 to 8014 D2783B2005 to8015 D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.22 B2.20 F1.20 B2.18 B2.22 B2.20 B2.16 B2.18	D3573B4638** D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5638** D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G3.8 G3.5 G2.9 G3.8 G3.8 G2.9 G3.8	D9576K1002** D9576K2001** D9576K2002** D9576K2901**, 2902** D9576K3001** D9576K3002**	B4.5 B4.4 B4.5 B5.3 B4.4
D2752A8017         B2           D2752A9001, 9011         B2           D2752B2008 to 8018         B2           D2753A2001         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A2007         B2           D2753A3001         B2           D2753A3001         B2           D2753A3001         B2           D2753A3001         B2           D2753A3004         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4014         B2           D2753A4017         B2           D2753A5001         B2	.15 .12 .19 .13 .17 .21 .15 .13 .17 .21 .15 .13 .15 .13 .17 .17	D2754A7002, 7003 D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.17 B2.21 B2.15 B2.13 B2.17 B2.21 B2.15 B2.13 B2.13 B2.19 B2.14	D2783B2005 to8015           D2783B7037 to C6047           D2784A2002 to 8013           D2784A2004 to 8014           D2784B2005 to 8015           D2786A2001 to 8011           D2786A2002 to 8013           D2786A2004 to 8014           D2786A2005 to 8015	B2.20           F1.20           B2.18           B2.22           B2.20           B2.16           B2.18	D3573B4883**, 4891** D3573B5143** to 5173** D3573B5632** D3573B5638** D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G3.5 G2.9 G3.8 G3.8 G2.9 G3.8	D9576K2001** D9576K2002** D9576K2901**, 2902** D9576K3001** D9576K3002**	B4.4 B4.5 B5.3 B4.4
D2752A9001, 9011         B2           D2752B2008 to 8018         B2           D2753A2001         B2           D2753A2002, 2003         B2           D2753A2004         B2           D2753A2007         B2           D2753A3001         B2           D2753A3007         B2           D2753A3001         B2           D2753A3007         B2           D2753A3007         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4001         B2           D2753A4011         B2           D2753A4014         B2           D2753A4017         B2           D2753A5001         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2           D2753A5007         B2           D2753A6001         B2           D2753A6001         B2           D2753A6001         B2           D2753A6001         B2           D2753A6001         B2	.12 .19 .13 .17 .21 .15 .13 .17 .21 .15 .15 .13 .13 .17	D2754A7004 D2754A7007 D2754A8001, 8011 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.21 B2.15 B2.13 B2.17 B2.21 B2.15 B2.13 B2.19 B2.14	D2783B7037 to C6047 D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	F1.20 B2.18 B2.22 B2.20 B2.16 B2.18	D3573B5143** to 5173** D3573B5632** D3573B5638** D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G2.9 G3.8 G3.8 G2.9 G3.8	D9576K2002** D9576K2901**, 2902** D9576K3001** D9576K3002**	B4.5 B5.3 B4.4
D2753A2001         B2.           D2753A2002, 2003         B2.           D2753A2004         B2.           D2753A2007         B2.           D2753A3001         B2.           D2753A3001         B2.           D2753A3001         B2.           D2753A3002, 3003         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.           D2753A6001         B2.           D2753A6001         B2.	.13 .17 .21 .15 .13 .17 .21 .15 .15 .13 .17	D2754A8001, 8011 D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.13 B2.17 B2.21 B2.15 B2.13 B2.19 B2.14	D2784A2002 to 8013 D2784A2004 to 8014 D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.22 B2.20 B2.16 B2.18	D3573B5632** D3573B5638** D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G3.8 G2.9 G3.8	D9576K2901**, 2902** D9576K3001** D9576K3002**	B5.3 B4.4
D2753A2001         B2.           D2753A2002, 2003         B2.           D2753A2004         B2.           D2753A2007         B2.           D2753A3001         B2.           D2753A3001         B2.           D2753A3001         B2.           D2753A3002, 3003         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.           D2753A6001         B2.           D2753A6001         B2.	.13 .17 .21 .15 .13 .17 .21 .15 .15 .13 .17	D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.17 B2.21 B2.15 B2.13 B2.19 B2.14	D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.20 B2.16 B2.18	D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G2.9 G3.8	D9576K3001** D9576K3002**	B4.4
D2753A2002, 2003         B2.           D2753A2004         B2.           D2753A2007         B2.           D2753A3001         B2.           D2753A3002, 3003         B2.           D2753A3004         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4001         B2.           D2753A4002, 4003         B2.           D2753A4001         B2.           D2753A4002, 4003         B2.           D2753A4004         B2.           D2753A4011         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5004         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A5007         B2.           D2753A6001         B2.	.17 .21 .15 .13 .17 .21 .15 .13 .13 .17	D2754A8012, 8013 D2754A8014 D2754A8017 D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.21 B2.15 B2.13 B2.19 B2.14	D2784B2005 to 8015 D2786A2001 to 8011 D2786A2002 to 8013 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.16 B2.18	D3573B6153** to 6183** D3573B6632**, 6638** D3573B7153** to 7183**	G3.8	D9576K3002**	
D2753A2004         B2.           D2753A2007         B2.           D2753A3001         B2.           D2753A3002, 3003         B2.           D2753A3004         B2.           D2753A3004         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4002, 4003         B2.           D2753A4004         B2.           D2753A4007         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.	.15 .13 .17 .21 .15 .13 .17	D2754A8017 D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.15 B2.13 B2.19 B2.14	D2786A2001 to 8011 D2786A2002 to 8013 D2786A2004 to 8014 D2786B2005 to 8015	B2.18	D3573B6632**, 6638** D3573B7153** to 7183**			B4.5
D2753A3001         B2           D2753A3002, 3003         B2           D2753A3004         B2           D2753A3007         B2           D2753A4001         B2           D2753A4002, 4003         B2           D2753A4004         B2           D2753A4007         B2           D2753A4007         B2           D2753A4011         B2           D2753A4017         B2           D2753A4017         B2           D2753A4017         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5001         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2	.13 .17 .21 .15 .13 .17	D2754A9001, 9011 D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.13 B2.19 B2.14	D2786A2004 to 8014 D2786B2005 to 8015			G2.9	D9576K4001**	
D2753A3002, 3003         B2.           D2753A3004         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4002, 4003         B2.           D2753A4004         B2.           D2753A4004         B2.           D2753A4004         B2.           D2753A4007         B2.           D2753A4011         B2.           D2753A4012, 4013         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.	.17 .21 .15 .13 .17	D2754B2008 to 8018 D2756A2001 D2756A2004 D2756A2007	B2.19 B2.14	D2786B2005 to 8015	00.00				B4.4
D2753A3004         B2.           D2753A3007         B2.           D2753A4001         B2.           D2753A4002, 4003         B2.           D2753A4004         B2.           D2753A4007         B2.           D2753A4007         B2.           D2753A4011         B2.           D2753A4012, 4013         B2.           D2753A4017         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.           D2753A6001         B2.           D2753A6001         B2.	.21 .15 .13 .17	D2756A2001 D2756A2004 D2756A2007	B2.14		DZ.ZZ	D3573B7630**, 7632**	G3.8	D9576K4002**	B4.5
D2753A3007         B2           D2753A4001         B2           D2753A4002, 4003         B2           D2753A4004         B2           D2753A4007         B2           D2753A4011         B2           D2753A4012, 4013         B2           D2753A4014         B2           D2753A4017         B2           D2753A5001         B2           D2753A5002, 5003         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2           D2753A6001         B2	.15 .13 .17	D2756A2004 D2756A2007		D210642007 to 2010	B2.20	D3573B8163**, 8183**	G2.9	D9577K1007** to 2007**	B4.6
D2753A4001         B2           D2753A4002, 4003         B2           D2753A4004         B2           D2753A4007         B2           D2753A4011         B2           D2753A4012, 4013         B2           D2753A4014         B2           D2753A4017         B2           D2753A4017         B2           D2753A5001         B2           D2753A5002, 5003         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2	.13 .17	D2756A2007	B2.21	D3126A3007 to 6010	C1.8	D3573B8630**	G3.8	D9577K2010	B4.10
D2753A4002, 4003         B2.           D2753A4004         B2.           D2753A4007         B2.           D2753A4011         B2.           D2753A4012, 4013         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A6001         B2.           D2753A6001         B2.           D2753A6001         B2.           D2753A6001         B2.	.17			D3126A3009 to 4014	C1.9	D3573C3270** to 4276**	G3.7	D9577K2010** to 3019**	B4.6
D2753A4004         B2.           D2753A4007         B2.           D2753A4011         B2.           D2753A4012, 4013         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5001         B2.           D2753A5004         B2.           D2753A6001         B2.           D2753A6001         B2.           D2753A6001         B2.			B2.15	D326K86, 27K86, 28K86	A2.8	D3573C4620** to 4715**	G3.5	D9577K4007** to 4019**	B4.6
D2753A4007         B2           D2753A4011         B2           D2753A4012, 4013         B2           D2753A4014         B2           D2753A4017         B2           D2753A5001         B2           D2753A5002, 5003         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2	.21	D2756A3001	B2.14	D355K86, 56K86	A2.10	D3573C5230**, 5236**	G3.7	D957N91, D958N91	A2.14
D2753A4011         B2           D2753A4012, 4013         B2           D2753A4014         B2           D2753A4017         B2           D2753A5001         B2           D2753A5002, 5003         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2		D2756A3004	B2.21	D3573A4141**	G2.7	D3573D3191** to 5216**	G2.3	D959N91 to D964N91	A2.15
D2753A4012, 4013         B2.           D2753A4014         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.	.15	D2756A3007	B2.15	D3573A4142**	G2.5	D357K86	A2.10	DM1C*** Valves	F3.5
D2753A4014         B2.           D2753A4017         B2.           D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.		D2756A4001	B2.14	D3573A4161**	G2.7	D359B91, D360B91	A5.18	DM1E*** Valves	F3.3
D2753A4017         B2           D2753A5001         B2           D2753A5002, 5003         B2           D2753A5004         B2           D2753A5007         B2           D2753A6001         B2		D2756A4004	B2.21	D3573A4162**	G2.5	D361B91	A5.14, 15	DM2C*** Valves	F3.12
D2753A5001         B2.           D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.		D2756A4007	B2.15	D3573A4201**	G2.7	D3623A2003, 2004	C1.7	DM2C***019 Expl Proof DM2D*** Valves	F6.10 G1.3
D2753A5002, 5003         B2.           D2753A5004         B2.           D2753A5007         B2.           D2753A6001         B2.		D2756A4011	B2.14	D3573A4202**	G2.5	D3626A2003, 2004	C1.7		F3.9
D2753A5004 B2. D2753A5007 B2. D2753A6001 B2.		D2756A4014	B2.21	D3573A4203**	G2.9	D362B91, D363B91	A5.14, 15	DM2E*** Valves DW1413A1409**	G1.8
D2753A5007 B2. D2753A6001 B2.		D2756A4017	B2.15	D3573A4221**	G2.7	D3643A2001, 2002	C1.10	LF10DB07101** to	
D2753A6001 B2.		D2756A5001	B2.14	D3573A4222**	G2.5	D3646A2001, 2002	C1.10	LF29NB07101**	B1.7
		D2756A5004	B2.21	D3573A4223**	G2.9	D364B91 to D368B91	A5.14, 15	LT32DB27500**	B1.22
1D2753A6002 6003		D2756A5007	B2.15	D3573A4301**	G2.7	D369B91 to D374B91	A5.16	LT32DB27500**01	B1.23
	.17	D2756A6001	B2.14	D3573A4321**, 4341**	G2.7	D3753A4361**	G2.7	LT32NB27500**	B1.22
D2753A6004 B2		D2756A6004	B2.21	D3573A4735**, 4736**	G3.5	D375B91, D376B91	A5.16	LT32NB27500**01	B1.23
D2753A6007 B2		D2756A6007	B2.15	D3573A4737**, 4738**	G3.5	D377B91 to D379B91	A5.17	LX10DB05501 to	B1.21
D2753A6011 B2.		D2756A6011	B2.14	D3573A5141**	G2.7	D380B91 to D382B91	A5.17	LX19NB95501	D1.21
D2753A6012, 6013 B2.		D2756A6014	B2.21	D3573A5142**	G2.5	D383B91 to D385B91	A5.18	LX10DB07501** to	B1.19
D2753A6014 B2		D2756A6017	B2.15	D3573A5151**	G2.7	D386B91 to D388B91	A5.18	LX29NB97501** M41***, 42, 4X Air Entry	F3.20
D2753A6017 B2. D2753A7001 B2.		D2756A7001 D2756A7004	B2.14 B2.21	D3573A5152** D3573A5161**	G2.5 G2.7	D460K91 to D462K91 D468B91, D469B91	A2.8 A5.18	M51***, 52, 5X Air Entry	F3.20
D2753A7002, 7003 B2.		D2756A7007	B2.21 B2.15	D3573A5162**	G2.5	D400B91, D409B91 D472K91, D473K91	A5.17	MD1*** Air Entry	F3.20
D2753A7002, 7003 D2.		D2756A8011	B2.13 B2.14	D3573A5102	G2.7	D474K91, D475K91	A5.14, 15	MD2*** Air Entry	F3.20
D2753A7007 B2		D2756A8014	B2.14 B2.21	D3573A5172**	G2.5	D476K91, D477K91**	A5.16	MD3*** F, R & L Combo	E5.25
D2753A8001, 8011 B2.		D2756A8017	B2.15	D3573A5201**	G2.7	D478K91** to D481K91**	A5.17	MD3*** F/R + L Combo	E5.16
D2753A8012, 8013 B2.		D2768A6900 to C4900	F4.9	D3573A5202**	G2.5	D482K91**, D485K91**	A5.14	MD350E*** Coal. Filters	E1.15
D2753A8014 B2		D2768D3901 to D6901	F4.10	D3573A5203**	G2.9	D486K91**	A5.16	MD350EC*** Adsb. Fltr.	E1.23
D2753A8017 B2		D2768D3904 to D6904	F4.11	D3573A5221**	G2.7	D493N86 to D495N86	A2.15	MD350M*** Coal. Filters	E1.15
D2753A9001, 9011 B2.		D2771B2001** to 9011**	B2.3	D3573A5222**	G2.5	D499B91	A5.16	MD350M*** Filters	E1.6
D2753B2008 to 8018 B2.		D2771B2002** to 9012**	F6.3	D3573A5223**	G2.9	D500B91, D501B91	A5.14, 15	MD350MC*** Adsb. Fltr.	E1.23
D2754A2001 B2.		D2771B2004** to 8015**	B2.8	D3573A5301** to 6151**	G2.7	D502B91, D503B91	A5.17	MD350P*** Coal. Filters	E1.15
D2754A2002, 2003 B2.		D2772B2001** to 9011**	B2.3	D3573A6152**	G2.5	D516B91	A7.3	MD350P*** Filters	E1.6
D2754A2004 B2		D2772B2002** to 9012**	F6.3	D3573A6161**	G2.7	D5214A1010 to 4010	E2.3	MD350PC*** Adsb. Fltr.	E1.23
D2754A2007 B2		D2772B2004**to 8015**	B2.8	D3573A6162**	G2.5	D525K91** to D528K91**	A5.14	MD351*** Lubricators	E4.6
D2754A3001 B2.		D2773A6037** to 8047**	F1.17	D3573A6171**	G2.7	D529K91**, 30K91**	A5.16	MD352*** Regulators	E2.7
D2754A3002, 3003 B2.		D2773B2001** to 9011**	B2.4	D3573A6172**	G2.5	D531K91** to D534K91**	A5.17	MD353*** Intgr. F/R	E3.6
D2754A3004 B2.	. 17	D2773B2003** to 8013**	B2.10	D3573A6181**	G2.7	D5500A1003 to		MD3CAP*** Cln Air Pk	E1.25
D2754A3007 B2.		D2773B2004** to 8015**	B2.8	D3573A6182**	G2.5	D5500B9004	H1.3	MD4*** F, R & L Combo	E5.28
D2754A4001 B2.	.21		B2.9	D3573A6351** to 7151**	G2.7	D5X00D6012	E2.24	MD4*** F/R + L Combo	E5.19

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MD450E*** Coal. Fltr.	E1.17	R-A118-105	F3.18	RPS5632P	A3.11	W6676A0401 to 0457	A1.7
MD450M*** Adsb. Fltr.	E1.24	R-A118-105M	E6.5	RPS5634P	A1.10	W6676A0461 to 0497	A1.3
MD450M*** Coal. Fltr.	E1.17	R-A118-105M	F3.18	RPS5635P	A1.11	W6676A1401 to 1457	A1.7
MD450M*** Filters	E1.8	R-A127-11, R-A37-381	E6.3	RPS5637***	A1.6	W6676A1461 to 1497	A1.3
MD450P*** Coal. Fltr.	E1.17	R-A60F-03E3 to -32E9	E6.8	RPS5638***	A1.11	W6677A0401 to 0457	A1.8
MD450P*** Filters	E1.8	RB1*** to RB4*** E-P Booster	E2.26	RPS5642P	A1.6	W6677A0461 to 0497	A1.4
MD451*** Lubricators	E4.8	RC010-13	E3.9	RPS5651160P	A1.6	W6677A1401 to 1457	A1.8
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MD452K*** Prec. Reg. MD452T*** Regulators	E2.14 E2.9	RC012-01 to 12-01-BV	E1.30	RPSSCCNA	A3.3, 4, 6	W7016A3331 10 4332 W7017A3331**, 3332**	A5.3 A5.3
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MD4CAP*** Cln Air Pk	E1.26	RC013-01 to 013-01-BV	E1.30	RPSSCDM12A	A3.9,11	W7056A3331 to	
MDM2CD***	F3.16	RC013-13	E3.9	RPSSCDM18PA	A3.3, 4, 6	W7056B4331	A5.7
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MDX*** Air Entry	F3.20	RC014-01 to 016-01-225	E1.30	RPSSCENA	A3.3, 4,6	W7056A6332 W7057A3331 to	
ME1*** Air Entry	F3.20	RC208-06** to 216LA-06**	F2.10	RPSSCENA	A3.9,11	W7057B4332	A5.9
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MEX*** Air Entry	F3.20	RC304-09** to 406**-09**	F3.19	RPSSCPBA	A3.9,11	W7076D4331**	AJ.4
R-106-35, R-106-35**	E6.6	RC408-06** to 416**-06** RD01BD0	F3.20 A1.6,10	RPSSEXT1, RPSSEXT2	A3.5	W7076A3332** to W7076D4332**	A5.5
R-118-100-2	E6.5	RD01BD0 RD01P-02-80	A1.0,10 A1.6	RPSSN8M12A,	A3.4,7,10	W7070D4352 W7077A3331** to	
R-118-100-2, 0-2W	F3.18	RD02BD0	A1.6,10	RPSSN8xxx	A3.6	W7077D4332**	A5.6
R-118-100-3	E6.5	RD02P-01-80	A1.6	RPSSNACM12A, AVM12A	, , ,	W7456A3331 to	A5.12
R-118-100-3, 0-3W	F3.18 E6.5	R-DED-115V-2 to 24V-4W	E6.7	RPSSP8M12A, M23A, M8A		W7456C4336 W7456A3332 to	710.12
R-118-100-4 R-118-100-4, 0-4W	F3.18	RDX01BLK, RDX02BLK	A1.6	RPSSP8xxx RPSSSE24A	A3.6 A3.5,6,9	W7456C4337	A5.13
R-118-100-4, 0-4W	F3.18	RER1*** E-P Valves	E2.25	RPSST8M12A. M23A. M8A		W7476A3331** to	AE 10
R-118-100-6	E6.5	RER-CBL-12, BL-6, BL-25	E2.25, 26	RPSST8xxx	A3.6	W7476C4336**	A5.10
R-118-100-6, 0-6W	F3.18	R-K103-151	E6.6	RPSSTACM12A, AVM12A		W7476A3332** to	A5.11
R-118-106-2	E6.5	RM4F210-08G, 08LG	C1.11	RPSSTERM	A3.5	W7476C4337** Y1523A2003 to	
R-118-106-2, 6-2W	F3.18	RP8BPA00MA, 00MB	A3.5	RPSSTR4M12A	A3.7,10	Y1523A5013	F1.4
R-118-106-3	E6.5	RPEJ01-03-80, 02-02-80	A1.5	RPSSTR4MRA	A3.6	Y1523A2103 to	F1.21
R-118-106-3, 6-3W	F3.18	RPJLP01-202-70 to P02-201-80	A1.5	RPSSV32A	A3.5,6,8	Y1523A5113	
R-118-106-4	E6.5	RPL01-02-70 to 02-01-80	A1.5	RPSTR4M12A	A3.4	Y1523B3102 to 7112	F1.22
R-118-106-4, 6-4W	F3.18	RPS4011***	A2.17	RVS215PNL-2-15	A1.6,11,19	Y1523C3002 to 9012 Y1523D2002, 3012	F1.5 F1.3
R-118-109-2F	E6.5	RPS401500CP, 01CP	A2.18	SV27DC105405ASAA to SV27NC107805ASAA	F2.6	Y1949D91 to Y1955D91	F5.7, 11
R-118-109-2F, 9-2FW	F3.18	RPS4020***	A2.18	SV27DC105407P*** to		Y2773A2072** to 9082**	F1.11
R-118-109-3F R-118-109-3F, 9-3FW	E6.5 F3.18	RPS4024P	A3.5, 11	SV27NC107807P***	F2.3	Y2773B2075** to 8085**	F1.24
R-118-109-3F, 9-3FW	E6.5	RPS4030***to 4032CP	A2.18	SV27DC115405ASAA to	F4.15	Y2783A6006 to 9016	F1.13
R-118-109-4F, 9-4FW	F3.18	RPS4032P	A3.11	SV27NC117805ASAA SV27DC115408C*** to		Y2783B2055 to 6065	F1.23
R-118-109-6F	E6.5	RPS4033CP, 034CP	A2.18	SV27NC117808C***	F4.13	Y3900A0829	F1.15
R-118-109-6F, 9-6FW	F3.18	RPS4035CP	A2.19	SV27DC305405ASAA to	F2.7	Y3900A0896**	F1.14
R-127-11	E6.3	RPS4037***	A2.9	SV27NC309955ASAA	ΓΖ./	Y7776A3410** to 5411**	F5.3
R207P-2	A1.6,11,19	RPS4111***	A2.17	SV27DC305407P*** to	F2.4	Y7776A3400, 4401**	F5.3
R-A103-160L	E1.16	RPS411500CP, 01CP RPS4120*** to 4132CP	A2.18 A2.18	SV27NC309957P*** SV27DC3L5405ASAA to		Y7786A3410, 5411**	F5.5
R-A103-160LE8	E6.8	RPS4135CP	A2.10	SV27NC3L7805ASAA	F2.9	Y7786A3400 to 4401**	F5.5
R-A106-24E8, 24LE8	E6.8	RPS4137***	A2.13	SV27DC3L5407P*** to	F2.8	YD1523A2003	F1.4
R-A109-106E8	E6.8	RPS4138***	A2.18	SV27NC3L7807P***	12.0	YD1523A2103 YD1523A3003	F1.21 F1.4
R-A-10F-16E8	E6.8	RPS4211***	A2.17	SV27DC555405ASAA to SV27NC557805ASAA	F4.16	YD1523A3103	F1.4
R-A114-106E3	E6.8	RPS421500CP to	A2.18	SV27DC555408C*** to	E4.14	YD1523A4003	F1.4
R-A114-112, 112E8	E6.8	RPS4234CP		SV27NC557808C***	F4.14	YD1523A4103	F1.21
R-A114-112E8	E1.20	RPS4235CP	A2.19	SY7776A4H10**, H11**	F5.3	YD1523A5013	F1.4
R-A114-113 R-A114-113E8	E6.8,E1.20	RPS4237***	A2.9	SY7786A4H10, 4H11**	F5.5	YD1523A5113	F1.21
R-A115-106PE3	E6.8, E1.20 E6.8	RPS4238***	A2.19	SYD7776A4H10**, H11**	F5.3	YD1523B3102 to 7112	F1.22
R-A115-106PE5	E1.8	RPS5511***	A1.9	SYD7786A4H10	F5.5	YD1523C3002 to 7012	F1.5
R-A115-106PE5	E1.26	RPS551600P to 1701P RPS552600P to 2701P	A1.11	SYD7786A4H11**	F5.5	YD1523C8002, C9012	F1.6
R-A115-106PE5	E3.8	RPS552600P to 2701P RPS5534P	A1.6 A1.10	W1413A1408**, 1409**	A7.3	YD1523D2002, 3012	F1.3
R-A115-106PE5	E5.19, 28	RPS5535P	A1.10 A1.11	W6056B2411 to 4417 W6057A2934 to 4937	A2.5 A2.5	YD1949D91 to 55D91	F5.7, 11
R-A115-117, 117E8	E6.8	RPS5537***	A1.11	W6057B2411 to 4417	A2.5 A2.5	YD2773A2072** to 9082**	F1.11
R-A115-117E8	E1.26	RPS5538***	A1.11	W6076B2401** to 4407**	A2.3	YD2773B2075** to 8085**	F1.24
R-A115-117E9	E6.8	RPS5542P	A1.6	W6076E4407**	A2.3	YD2783A6006 to 9016	F1.13
R-A115-117E9	E1.26	RPS5611***	A1.9	W6077A2951**, 3945**	A2.4	YD2783B2055 to 6065	F1.23
R-A115-118, -118E8	E6.8	RPS561600P to 1701P	A1.11	W6077B2401** to 4934**	A2.4	YD7776A3410** to 5411**	F5.3
R-A115-118E8	E1.26	RPS5620***	A1.10	W6456B2411 to 4418	A2.7	YD7786A3410, 5411**	F5.5
R-A115-118E9	E6.8	RPS5624P	A3.5	W6476B2401** to 4408**	A2.6		
R-A118-103	E6.5	RPS5624P	A3.11	W6556A2411 to 4900	A2.13		
R-A118-103	F3.18	RPS562600P to 2701P	A1.6	W6576A2401** to 4407**	A2.11		



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## **Standard Specifications**

The standard specifications for the products on each page of this catalog are given on the same page or referenced. For solenoid pilot valves, models with internal pilot supply are listed. Most models are also available for use with external pilot supply or have a built-in pilot supply selector valve.

The products in this catalog are intended for use in industrial pneumatic systems. Most products are adaptable to other uses and conditions not covered by the standard specifications given in this catalog. Weights shown are approximate and are subject to change. Dimensions given, unless otherwise noted, are envelope dimensions (not for mounting). Consult ROSS for further information.

#### **Port Threads**

Ports of valves and bases described in this catalog have NPT (ANSI B2.1) threads. Other thread types can be specified by putting an appropriate prefix letter on the model or part number when ordering.

<b>Thread Types</b>	by	Model	Prefix	Letter
---------------------	----	-------	--------	--------

None	NPT
C*	_
D	G
J	ISO
S	NPT
	C* D J

\* Used only for filters, regulators, lubricators.

# ISO 228 threads superseds BSPP, G and JIS thread types.

#### **Flow Ratings**

Flow ratings are expressed as  $C_v$  where  $C_v = 1$  corresponds to a steady state air flow of approximately 32 scfm under the following conditions:

Inlet pressure = 100 psig (6.7 bar) Pressure drop = 10 psi (0.69 bar) Air temperature =  $68^{\circ}F$  (20°C) Relative humidity = 36%

**Note:** Because widely differing test standards are used to measure  $C_v$  values, the figures given in this catalog should not be used to compare ROSS valves with those of other makers. The  $C_v$  ratings given here are intended only for use with performance charts published by ROSS. The  $C_v$  ratings are averages for the various flow paths through the valve and are for steady flow conditions.

#### **Approvals and Certifications**

ROSS products are designed to meet a number of industrial standards, including the Canadian Standards Association (C.S.A.) guidelines. For more information on specific product approvals, contact your local distributor or ROSS.

#### Solenoids

All ROSS standard solenoids are rated for continuous duty (unless noted otherwise) and will operate the valve within the air pressure range specified in this catalog.

Explosion-Proof Solenoid Pilot available, for more information consult ROSS.

### Voltage & Hertz

When ordering a solenoid valve, also specify the desired solenoid voltage and hertz.

Voltage	Types	by	Model	Suffix	Letter
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Voltage	Suffix Letter
120 volts AC	Z
220 volts AC	Y
12 volts DC	Н
24 volts DC	W
48 volts DC	М
90 volts DC	К
110 volts DC	Р
125 volts DC	С

# **Recommended Solenoid Voltages:** 100-110 volts AC, 50 Hz; 100-120 volts AC, 60 Hz; 24 volts DC; 110 volts DC.

In addition, the following voltages are available:

200, 220 volts AC, 50 Hz 200, 240, 480 volts AC, 60 Hz

24, 48, 220 volts AC, 50 Hz 240 volts AC, 60 Hz

200, 220 volts AC, 50 Hz 200, 240 volts AC, 60 Hz.

For example: Model 2773B5001, 120 volts AC, 60 Hz. Model W6076B2401, 220 volts AC, 50 Hz.

#### Please note that not all configurations are available for all models.

For additional information or help with voltage configuration, please contact your local distributor or ROSS.

#### **Port Identification**

Valve symbols in this catalog conform to the ISO 1219-1:1991 standard of the International Organization for Standardization (ISO) and the SAE J2051 standard of the Society of Automotive Engineers (SAE) respectively.

#### Information or Technical Assistance

For additional information or application assistance concerning ROSS products, consult ROSS or your local ROSS distributor (see contact information on the back cover).

# **Order Placement**

For order placement, consult ROSS or your local ROSS distributor.

For a current list of countries and local distributors, visit ROSS' website at <u>www.rosscontrols.com</u>.



## **PRE-INSTALLATION or SERVICE**

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use. If you have any questions, call your nearest ROSS location listed on the cover of this document.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products.

WARNING: Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury or damage to property.

## FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury or damage to property. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure which risks human injury, and/or damage to property.

#### **AVOID INTAKE/EXHAUST RESTRICTION**

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and must have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

#### WARNING: ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or an inadequately maintained silencer installed with a ROSS product.

#### **POWER PRESSES**

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

# ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X**<sup>®</sup> and **L-O-X**<sup>®</sup> with **EEZ-ON**<sup>®</sup> operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

# STANDARD WARRANTY

All products sold by ROSS CONTROLS are warranted for a one-year period [with the exception of all Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven years] from the date of purchase to be free of defects in material and workmanship. ROSS' obligation under this warranty is

limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty becomes void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering.

THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT IS ROSS LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS MAY EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.





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# Full-Service Global Locations

There are ROSS Distributors Throughout the World

To meet your requirements across the globe, ROSS distributors are located throughout the world. Through ROSS or its distributors, guidance is available for the selection of ROSS products, both for those using pneumatic components for the first time and those designing complex pneumatic systems.

Other literature is available for engineering, maintenance, and service requirements. If you need products or specifications not shown here, please contact ROSS or your ROSS distributor. They will be happy to assist you in selecting the best product for your application.

For a current list of countries and local distributors, visit ROSS' website at <u>www.rosscontrols.com</u>.