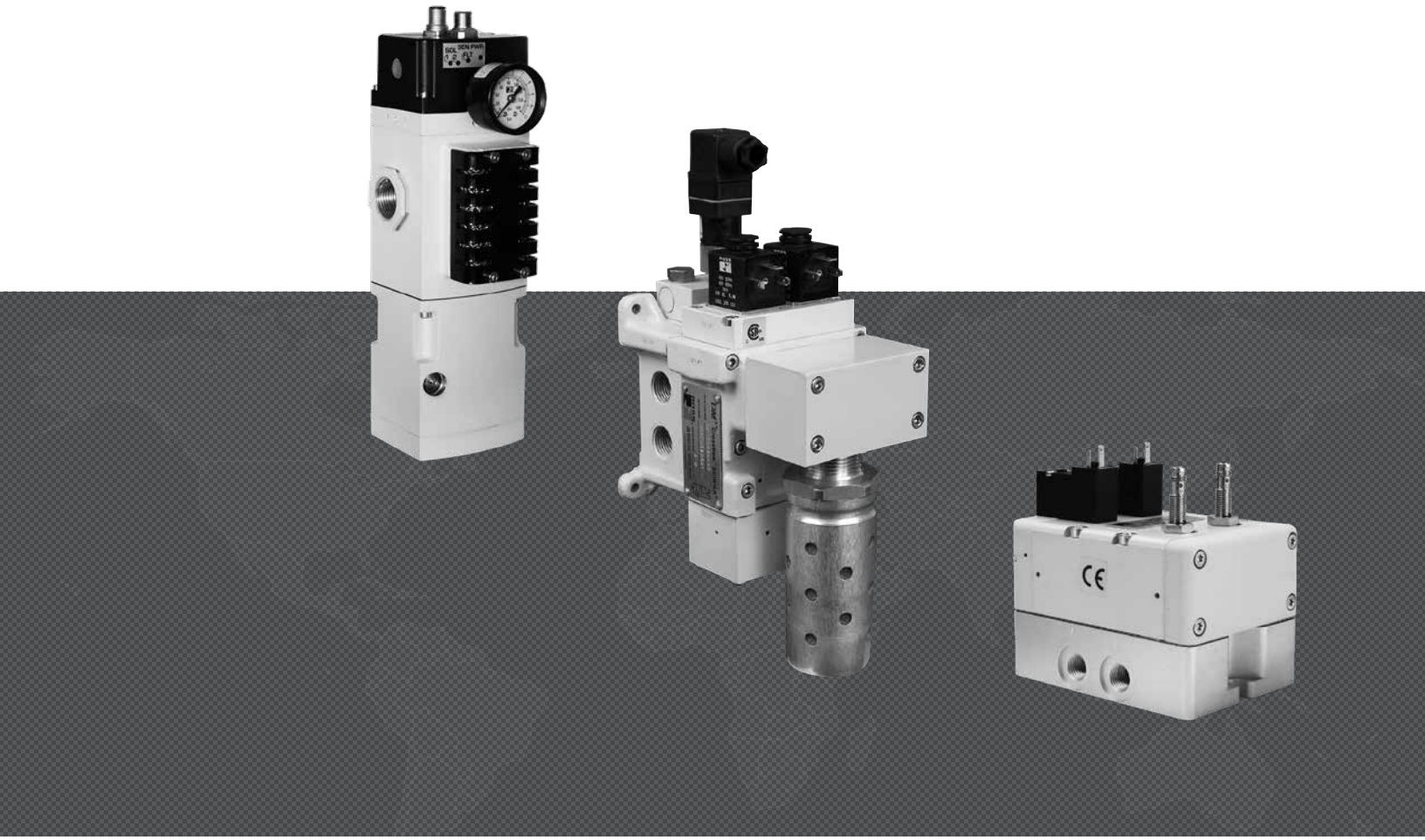
Safety Exhaust
Control Reliable Monitored Valves



ROSS CONTROLS

CONTROL RELIABLE DOUBLE VALVES M35 SERIES – KEY FEATURES:

- Pressure sensors - allow for external monitoring of valve state
- Modular or threaded port connection - allows modular connection to Air Entry System (Lockout Valve, FRLs)
- Integrated EEZ-ON® (soft-start) module option
- LED indicators - aid troubleshooting
- Includes high-flow, clog-resistant silencer

CONTROL RELIABLE DOUBLE VALVES RSe Series – KEY FEATURES

- Rapid response for minimum actuating time
- Status indicator provides valve condition (ready-to-run) feedback
- Position sensors for valve fault monitoring – external monitoring device required
- Well-proven spool valve design for reliable, smooth function
- External pilot supply port is a standard feature
- Base-mounting design

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

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2® Series D double valves for mechanical power press applications.

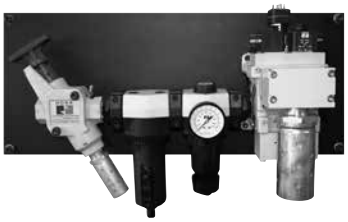

Double Valves for External Monitoring

Double Valves with Internal Monitoring

Double Valves with Dynamic Monitoring and Memory

Double Valves with Dynamic Monitoring and Automatic Reset

Air Entry Assemblies
Control Reliable Energy Isolation
Lockout L-O-X® Valves
with Integrated Filter/Regulator



VALVE TYPE SERIES	Category	AVAILABLE PORT SIZES							MAX. FLOW Cv								MONITORING		RESET		Page
									Port Size												
		1/8	1/4	3/8	1/2	3/4	1	1½	1/8	1/4	3/8	1/2	3/4	1	1½	Integrated Soft-Start	External	Internal	Automatic	Solenoid	
M35	4				■	■					7.5	7.5				■	■			■	A1.3 - A1.5
RSe	4	■	■		■				0.75	0.85		1.81					■		■		A1.6 - A1.7
MCSE					■							3.9				■		■			A1.8 - A1.9
DM2® C	4		■	■	■	■	■	■		2.61	2.61	10	13	20	64			■		■	A1.10 - A1.12
	DM2® Series C Preassembled Wiring Kits																				A1.13
DM1 C	4		■	■	■	■	■			2.61	2.61	10	13	13				■	■		A1.14 - A1.16
	DM1 Series C Preassembled Wiring Kits																				A1.17
Air Entry Assemblies	with MCSE Series Safety Exhaust Double Valves																				A1.18
	with M35 Series Safety Exhaust Double Valves																				A1.19
	with DM2® Series C Safety Exhaust Double Valves																				A1.20

3/2 Double Valve with or without EEZ-ON® (Soft-Start) Module

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

M35	S	40	G	A	E	X	AA	G	A
Series	Soft-Start Function		Thread	Voltage	Monitoring	Communication		Pressure Gauge	Revision Level

Soft-Start Function

With Soft-Start	S
No Soft-Start	X

Thread

G	G
NPT	N

Voltage

24 volts DC

Monitoring

External

Communication

None

Pressure Gauge

With Gauge	G
No Gauge	X
With Transducer	T

Revision Level

A

Port Size			Exhaust Type	
Inlet	Outlet	Exhaust		
1/2	1/2	–	Built-in Silencer	40
3/4	3/4	–	Built-in Silencer	50
1/2	1/2	1	Threaded Exhaust Flange*	46
3/4	3/4	1	Threaded Exhaust Flange*	56

* Silencer not included but recommended, see accessories.

Pin Configuration Combination*

Solenoid	Sensor	
A	A	AA
A	B	AB
A	C	AC
C	C	CC
D	B	DB
D	C	DC

*Pinouts details, see below.

SIL 3 Functional Safe
Cat. 4 PL e
DGUV Test HSM 18017 Sicherheit geprüft tested safety
CE
ISO 13849-1 CAT 4, PL e
CSA C US

Model with EEZ-ON®(Soft-Start) and Pressure Gauge

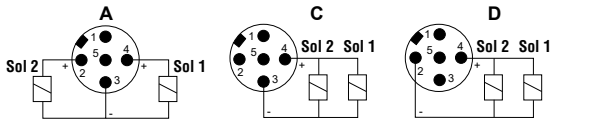
Model without EEZ-ON®(Soft-Start) and Pressure Gauge

Port Size	Basic Size	Soft Start	Valve with Built-in Silencer			Valve with Threaded Exhaust Flange		
			C_v		Weight lb (Kg)	C_v		Weight lb (Kg)
			1-2	2-3		1-2	2-3	
1/2	8	With	4.1	7.5	6.5 (2.9)	4.1	7.57	6.6 (3.0)
1/2	8	Without	4.3	7.5	4.2 (1.9)	4.3	7.57	4.3 (2.0)
3/4	8	With	4.1	7.5	6.5 (2.9)	4.1	7.57	6.6 (3.0)
3/4	8	Without	4.3	7.5	4.2 (1.9)	4.3	7.57	4.3 (2.0)

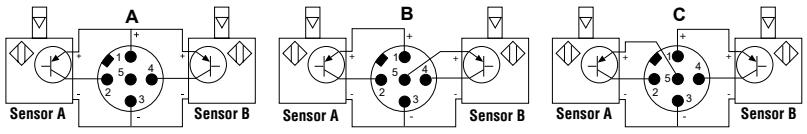
Digital Pressure Transducer Specifications	Pressure Range psig (bar)	Electrical Output	Electrical Connection	Pressure Port Size	Weight lb (Kg)
	0 (0) to 145 (10)	(1) PNP with (1) 4-20ma	M8, 4 Pin	1/8 NPT male	0.099 (0.045)

Digital Transducer

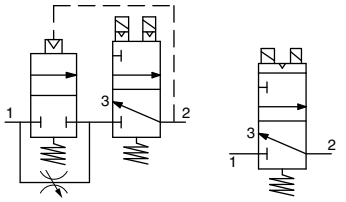
Solenoid Pinouts



Pressure Sensor Pinouts



Simplified Schematics



STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Redundant, 3/2 Normally Closed, Dual Poppet
Actuation	Solenoid pilot operated with air assisted spring return. One solenoid per valve element (2 total) – both to be operated synchronously.
Mounting	Type: In-line mounted - modular/threaded Orientation: Any, preferably vertical
Solenoids	According to VDE 0580; Rated for continuous duty
Voltage	24 volts DC
Power Consumption (each solenoid)	1.5 watts
Enclosure Rating	According to DIN 400 50 IP 65
Electrical Connection	Two 5-pin M12 connectors
Temperature	**Ambient:** 40° to 120°F (4° to 50°C) **Media:** 40° to 175°F (4° to 80°C)
Flow Media	Compressed air according to ISO 8573-1 Class 7:4:4
Operating Pressure	30 to 150 psig (2 to 10 bar)

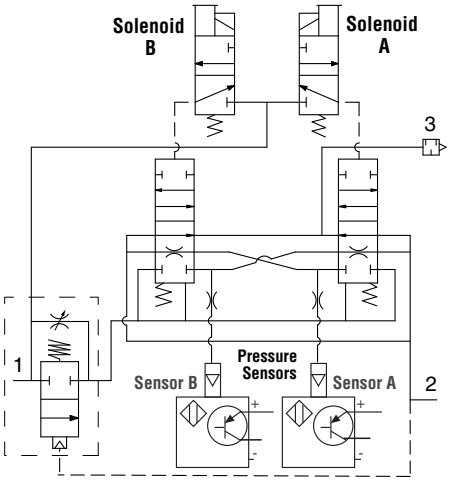
Pressure Sensors (2 per valve)	PNP solid state
Pressure Sensors Current Consumption (each sensor)	<23mA (each without contacts)
Pressure Switch (Status Indicator) Rating	Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC
Monitoring	Dynamic, cyclical, external with customer supplied equipment. Monitoring should check state of both valve pressure sensors with any and all changes in state of valve control signals.
Minimum Operation Frequency	Once per month, to ensure proper function
Maximum Recommended Allowable Discordance Time:	150 msec
Construction Material	**Valve Body:** Cast Aluminum **Poppet:** Acetal and Stainless Steel **Seals:** Buna-N
Functional Safety Data: Category 4, PL e; B_{10D}: 20,000,000; SIL 3; $MTTF_D = B_{10d}/(0.1 x n_{op})$, ($n_{op}$=number of annual operation cycles) **Certifications:** CE Marked for applicable directives, DGUV, CSA/UL.	

These valves a not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2® Series D double valves for mechanical power press applications.

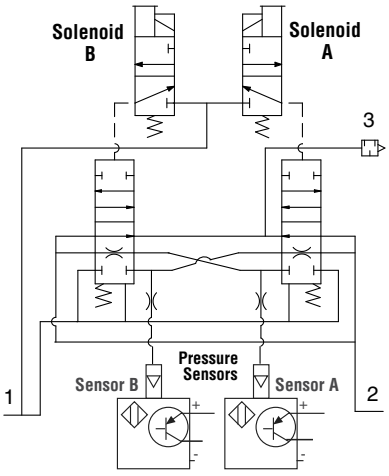
IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Valves Schematics

With EEZ-ON® (Soft-Start) module



Without EEZ-ON® (Soft-Start) module



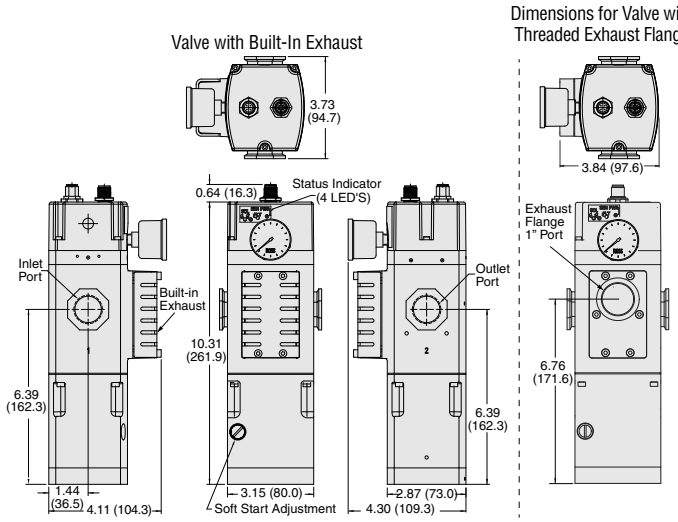
An Integration Guide for the M35 Series valves is available from ROSS to provide information such as operation & monitoring, and validation test procedure for valve operation and external monitoring logic.

Exhaust Time – Normal and Faulted Conditions (s)

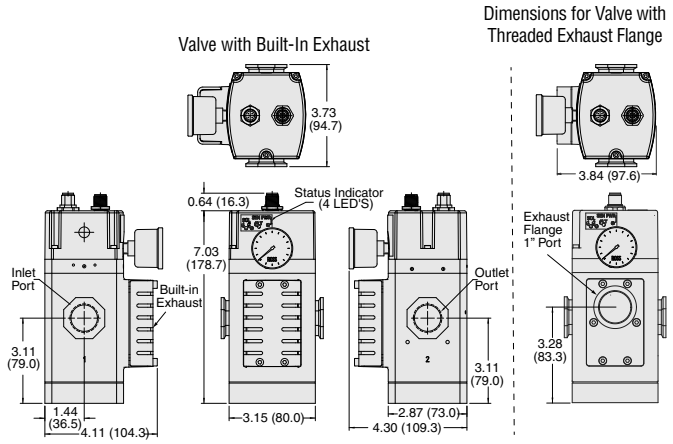
Volume ft³ (L)	Normal or Faulted	Valve with Built-in Silencer						Valve with Threaded Exhaust Flange					
		Operating Pressure psig (bar)						Operating Pressure psig (bar)					
		30 (2)		90 (6)		145 (10)		30 (2)		90 (6)		145 (10)	
		to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)
0.071 (2)	N	0.055	0.071	0.094	0.112	0.120	0.135	0.052	0.070	0.093	0.113	0.123	0.142
	F	0.072	0.098	0.147	0.183	0.200	0.247	0.065	0.091	0.137	0.175	0.203	0.272
0.35 (10)	N	0.131	0.208	0.317	0.393	0.424	0.507	0.120	0.191	0.308	0.409	0.437	0.520
	F	0.185	0.301	0.533	0.710	0.789	1.024	0.163	0.300	0.503	0.697	0.805	1.048
0.71 (20)	N	0.226	0.379	0.597	0.746	0.804	0.971	0.204	0.342	0.577	0.779	0.829	0.992
	F	0.326	0.555	1.016	1.368	1.526	1.997	0.285	0.562	0.961	1.349	1.558	2.017
1.41 (40)	N	0.416	0.721	1.155	1.451	1.564	1.899	0.373	0.645	1.115	1.519	1.615	1.937
	F	0.608	1.063	1.983	2.685	3.000	3.941	0.530	1.086	1.878	2.655	3.064	3.957
5.30 (150)	N	1.462	2.604	4.227	5.326	5.743	7.006	1.301	2.310	4.071	5.588	5.934	7.130
	F	2.160	3.855	7.298	9.929	11.107	14.635	1.874	3.968	6.919	9.834	11.345	14.622

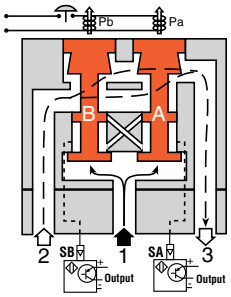
Valve Dimensions – inches (mm)

Models with optional EEZ-ON® (soft-start) module

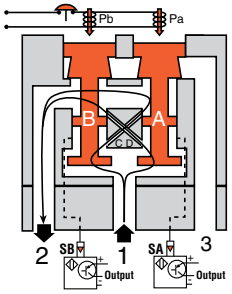


Models without EEZ-ON® (soft-start) module



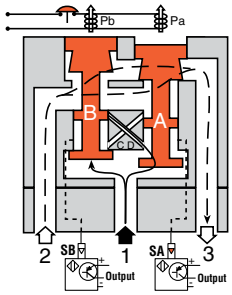


Conditions at Start: Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both sensors SA and SB are exhausted. Sensors outputs SA and SB are ON.



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 sensor and become equal to inlet pressure. Sensors outputs SA and SB are OFF.

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 sensor SA, and a reduced pressure goes to sensor SB. This full pressure signal causes sensor outputs SA to turn OFF. Sensor outputs SB, with a reduced pressure signal, does not turn OFF. An external monitoring system can detect the malfunction by monitoring the condition of the sensors SA and SB. 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.

Accessories & Options

M35 Series valves have both modular receptacles for piping and female threaded ports inside receptacles, which allows either modular connection or direct piping. Mounting accessories listed below are used for modular connection to ROSS MD Series filter-regulator units.

Mounting Brackets & Clamp for Module Connections

Description	Model Number
Bracket and Screw	R-A118-103
Clamp	R-A118-105
Bracket, Screw, and Clamp	R-A118-105M

End Ports

Port Size	Type	Model Number	
		NPT Threads	G Threads
1/2	Female	R-118-100-4	R-118-100-4W
	Male	R-118-109-4F	R-118-109-4FW
3/4	Female	R-118-100-6	R-118-100-6W
	Male	R-118-109-6F	R-118-109-6FW

Extra Port Blocks

Port Size	Model Number	
	NPT Threads	G Threads
1/2	R-118-106-4	R-118-106-4W

Female End Port

Male End Port

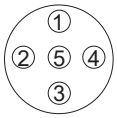
Port Block

Pressure Gauge	Port Size	Model Number*	Pressure Range psig (bar)	Case Diameter inches (mm)
	1/8	5400A1002	0-160 (0-11)	1.5 (38)
	* Center back mounting; male pipe threads.			

Silencers for Threaded Exhaust Flange Option	Port Size	Thread Type	Model Number		Avg. C_v	Dimensions inches (mm)	
			NPT Threads	R/Rp Threads		Length	Width
	1	Male	5500A6003	D5500A6003	14.6	5.4 (138)	2.0 (51)

Wiring Kits	Solenoid Connector		Cord Type/Termination		Kit Number	Length meters (feet)	Cord Quantity
	Type	Form	End 1	End 2			
	Prewired Connector	M12 5-pin, straight A-coded	Female	Flying Leads	2644B77	5 (16.4)	2
			Female	Male	2645B77	5 (16.4)	2

Wire Colors



1 Brown
2 White
3 Blue
4 Black
5 Grey

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

3/2 Redundant Double Valve – Sub-base Mounted

SIL 3 Functional Safe
Cat. 4 PL e
DGUV Test HSM xxxxx Sicherheit geprüft tested safety
CE
(Certifications pending)

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

RSe	3	E	D	B	10	A	3	1	P
Series	Type/Function: 3/2	External Monitoring	Thread: G D, NPT N	Revision Level	Base Port Size	Voltage: 24 volts DC	Automatic Reset Type	Sensor Feedback	Sensor: Sensor Output PNP

Base Port Size

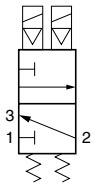
Inlet	Outlet	
1/8	1/8	10
1/4	1/4	20
1/2	1/2	40

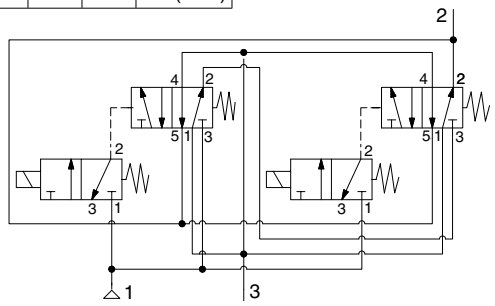
The 3/2 RSe Series valve is designed to supply air to a zone or entire machine/system until signaled to shut off and exhaust residual downstream pneumatic energy from the machine. Thus, reducing the hazards associated with the presence of residual energy during employee access and/or minor servicing. The safety function of the 3/2 RSe Series valve is to shut off supply of pneumatic energy and to exhaust any pneumatic energy from downstream of the valve. Note: The 3/2 RSe Series valve cannot exhaust pneumatic energy from downstream of obstructions such as check valves and closed center function valves.

The RSe Series valves are designed for external monitoring for safe, redundant operation of the valves. The RSe Series valves are constructed of redundant, 3/2 spool type valves, and have an overall function of a single solenoid pilot-operated, spring return valve. Each single valve in the RSe Series is equipped with a PNP proximity sensor. Monitoring both of these sensors on each actuation and de-actuation of the RSe Series valve provides a diagnostic coverage of 99%. Monitoring of these sensors is to be done by an external monitoring system.

Port Size	C_v 1-2	C_v 2-3	Weight lb (Kg)
1/8	0.44	1	2.9 (1.3)
1/4	0.7	1.47	3.7 (1.7)
1/2	1.9	3.85	6.6 (2.99)

Simplified Schematic





An Integration Guide for the RSe Series Valves is available from ROSS to provide information such as operation & monitoring, and validation test procedure for valve operation and external monitoring logic.

Exhaust Time – Normal and Faulted Conditions (s)	Volume ft³ (L)	Normal or Faulted	Port Size 1/8						Port Size 1/4						Port Size 1/2					
			Operating Pressure psig (bar)						Operating Pressure psig (bar)						Operating Pressure psig (bar)					
			30 (2)		90 (6)		145 (10)		30 (2)		90 (6)		145 (10)		30 (2)		90 (6)		145 (10)	
			to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)	to 15 (1)	to 7 (0.5)
	0.071 (2)	N	0.212	0.319	0.391	0.506	0.578	0.698	0.159	0.218	0.290	0.354	0.420	0.493	0.184	0.219	0.290	0.321	0.395	0.430
		F	0.250	0.358	0.432	0.547	0.597	0.715	0.197	0.272	0.361	0.445	0.476	0.560	0.197	0.231	0.316	0.351	0.446	0.488
	0.35 (10)	N	0.871	1.418	1.704	2.257	2.545	3.073	0.574	0.854	1.098	1.392	1.679	2.007	0.392	0.561	0.658	0.810	1.003	1.165
		F	1.084	1.602	1.897	2.451	2.590	3.114	0.775	1.135	1.461	1.851	1.892	2.294	0.407	0.574	0.744	0.901	1.228	1.429
	0.71 (20)	N	1.695	2.792	3.344	4.447	5.005	6.043	1.094	1.649	2.108	2.689	3.253	3.901	0.652	0.989	1.119	1.421	1.763	2.083
		F	2.126	3.158	3.729	4.831	5.082	6.113	1.494	2.213	2.836	3.609	3.662	4.462	0.669	1.001	1.280	1.587	2.205	2.605
	1.41 (40)	N	3.344	5.539	6.625	8.826	9.924	11.982	2.132	3.239	4.127	5.284	6.400	7.687	1.171	1.845	2.039	2.642	3.284	3.920
		F	4.211	6.269	7.391	9.591	10.066	12.110	2.942	4.370	5.586	7.125	7.203	8.798	1.193	1.857	2.350	2.961	4.161	4.957
	5.30 (150)	N	12.410	20.651	24.670	32.911	36.980	44.647	7.845	11.983	15.233	19.554	23.710	28.515	4.027	6.552	7.104	9.360	11.645	14.022
		F	15.676	23.380	27.537	35.771	37.475	45.096	10.888	16.232	20.712	26.465	26.677	32.643	4.075	6.564	8.238	10.514	14.915	17.896

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Spool and Sleeve
Actuation	Solenoid pilot operated with spring return One solenoid per valve element – both to be operated synchronously
Mounting	Type: Base Orientation: Any, preferably vertical
Solenoids	Version as per VDE 0580. Rated for continuous duty Electrical connection according to EN 175301-803 Form C Enclosure rating according to DIN 400 50 IP 65
Voltage	24 volts DC
Power Consumption (each solenoid)	1.5 watts on DC
Proximity Sensors (2 per valve)	PNP
Current Consumption (each sensor)	<23mA
Temperature	**Ambient/Media:** 40° to 120°F (4° to 50°C)
Flow Media	Compressed, filtered air according to ISO 8573-1 Class 7:4:4

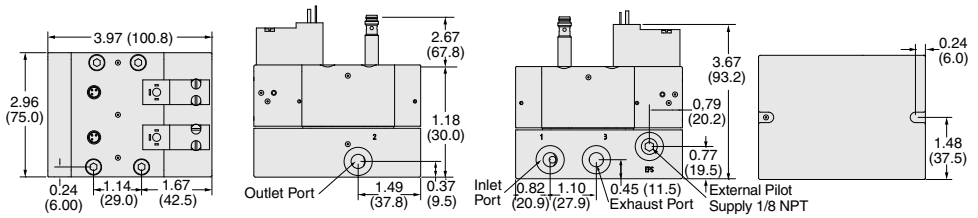
Pilot Supply	Internal or External
Operating Pressure	**With Internal Pilot Supply:** 43 to 145 psig (3 to 10 bar) **With External Pilot Supply:** 0 to 145 psig (0 to 10 bar)
	Pilot Supply - *When external pilot supply, pressure must be equal to or greater than inlet pressure.*
Monitoring	Dynamic, cyclical, external with customer supplied equipment. Monitoring should check state of both valve position sensors with any and all changes in state of valve control signals.
Minimum Operation Frequency	Once per month, to ensure proper function
Maximum Recommended Allowable Discordance Time:	250 msec
Construction Material	**Valve Body:** Cast Aluminum **Poppet:** Stainless Steel **Seals:** Buna-N
Pending Functional Safety Data	

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM2® Series D double valves for mechanical power press applications.

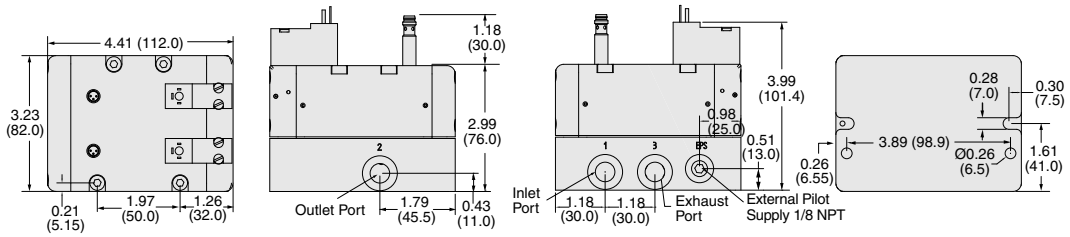
IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Valve Dimensions – inches (mm)

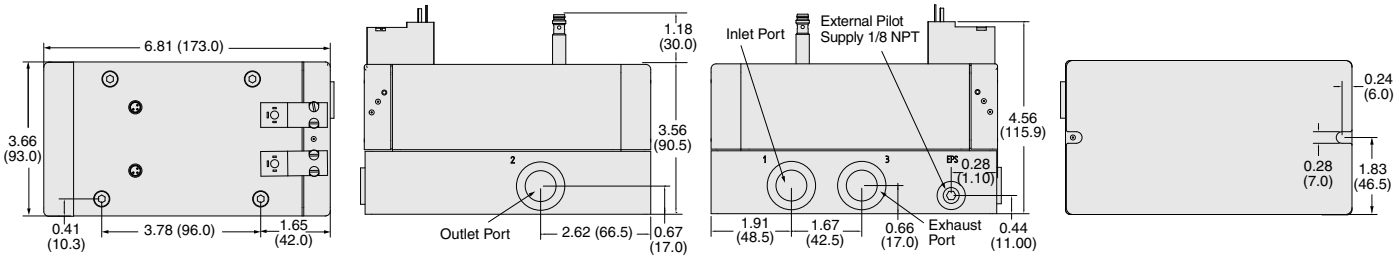
Port Size 1/8



Port Size 1/4



Port Size 1/2



Accessories & Options

Silencers

Port Size	Thread Type	Model Number		Avg. C_v	Dimensions inches (mm)		Weight lb (kg)
		NPT Threads	R/Rp Threads		Length	Width	
1/8	Male	5500A1003	D5500A1003	1.2	0.9 (21)	0.9 (21)	0.1 (0.1)
1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	0.9 (21)	0.1 (0.1)
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	1.3 (32)	0.2 (0.1)

Pressure Range: 0 to 290 psig (0 to 20 bar) maximum. **Flow Media**: Filtered air.

Electrical Connectors

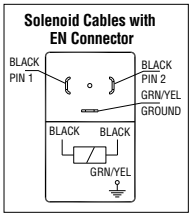
Connection	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Model Number	
					Without Light	Lighted Connector 24 Volts DC
Solenoid	EN 175301-803 Form C	Prewired Connector (18 gauge)	3 (10)	8-mm	2449K77	2450K77-W
	DIN 43650 Form C	Connector Only	–	–	2452K77	2453K77-W
Feedback Sensor	M8 Connector (sensing)	Prewired Connector	2 (6.5)	–	249L74	–

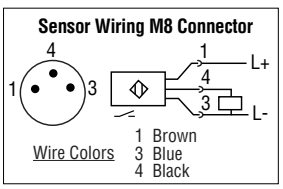
CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

Preassembled Wiring Kits

Connector Type	Model Number* Lighted Connector	Length meters (feet)
EN 175301-803 Form C (solenoids) M8 (sensors)	2657B77	2 (6.5)

* Each cable has one connector. This kit includes 2 cables for the sensors (M8), and 2 cables (EN 175301-803 Form C) with connector plus a cord grip for each.





3/2 Double Valve with EEZ-ON® (Soft-Start) Function

SIL 3 Functional Safe

Cat. 4 PL e

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

MCSE	A	40	G	A	I	X	AA	G	B
Series	Version	Port Size	Thread	Voltage	Monitoring	Communication	PIN Configuration Combination	Pressure Measuring Device	Revision Level

Version	
PP	A
PM	B
Start-Button NCNC	C
Start-Button NCNO	D

Port Size
1/2

Thread	
BSPP	G
NPT	N

Voltage
24 volts DC

Monitoring
Internal

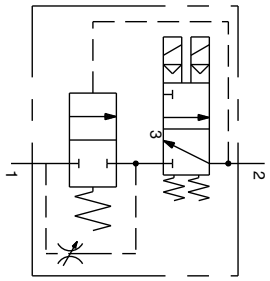
Communication
None

PIN Configuration Combination	
Solenoid	Sensor
A	A

Pressure Measuring Device	
Gauge	G
Digital Transducer	T
None (plugged port)	X

MCSE Valve shown with Pressure Gauge

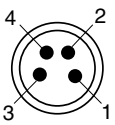
* EEZ-ON® Soft-Start function can be disabled if not needed.
Sintered bronze silencer included.



Port Size			C_v		Weight lb (kg)
Inlet	Outlet	Exhaust	1-2	2-3	
1/2	1/2	1/2	3.9	9.4	9.26 (4.2)

Digital Pressure Transducer Specifications				
Pressure Range psig (bar)	Electrical Output	Electrical Connection	Pressure Port Size/Type	Weight lb (Kg)
0 (0) to 145 (10)	(1) PNP with (1) 4-20ma	M8, 4 Pin	1/8 NPT male	0.099 (0.045)
For Digital Pressure Readout, Analog 4-20mA Output, and Transistor Switching Output.				

Sensor Pinout with Analog Output



Wire Colors
1 - Brown - 24 VDC
2 - White - 4 to 20mA
3 - Blue - 0 VDC
4 - Black PNP Open Collector Output 1

Digital Transducer

APPLICATIONS: Up to Cat. 4, PLe, e.g., pneumatic control processes, air dump/release.

STANDARD SPECIFICATIONS (for valves on this page):

Design	Redundant, 3/2 Normally Closed, Dual Poppet
Actuation	Electromagnetically externally piloted with air-assisted spring return. One magnet per valve element (2 in total) - both must be operated simultaneously.
Mounting	Type: In-line mounted - modular/threaded Orientation: Any, preferably vertical
Electrical Data	See next page
Standard Voltages	24 volts DC
Temperature	Ambient/Media: 40° to 120°F (4° to 50°C) For temperatures below 4°C, the compressed air must be dried according to ISO 8573-3, class 7.

Flow Media	Permissible medium Compressed air acc. to ISO 8573-1 Max. particle size 5-µm Oil content of compressed air 0…1 mg/m³ The oil content of compressed air must remain constant during the life cycle.
Inlet Pressure	30 to 150 psig (2 to 10 bar)
Monitoring	Dynamic, cyclic, internal
Minimum Operation Frequency	Once per month, to ensure proper function
Functional Safety Data	**DC:** High, 99% **CCF:** >65 **B10D:** see ROSS SISTEMA Library Could be used up to Cat 4, PL e, SIL 3

These valves a not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM$^{2®}$ Series D double valves for mechanical power press applications.

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

ELECTRICAL DATA

Supply voltage	Power pack/mains supply SELV power pack in accordance with DIN EN 60950 for operation in a PELV circuit in accordance with EN/IEC 60204-1
Inputs S12, S22, X2	24 V DC, 8 mA
Clock output S11, 21	20 V DC, 10 mA per output
Cable length	1500 m at 1.5 mm² 2500 m at 2.5 mm²
Line resistance	max. 40 Ω
Power consumption	280 mA

Protection class according to IEC 60529/EN 60529	IP65 (only when assembled and with all electrical plugs connected)
Electrical connections	1x plug and 1x socket, 5-pin, M12
Tightening delay	< 150 ms
Drop-out delay	In case of emergency stop: < 10 ms In case of power failure: < 10 s
Override time in case of voltage drop	5 ms
Time until ready for operation after switch on	> 1.0s
Switching capacity of signal outputs	41–42: 24 V DC, 0.2 A

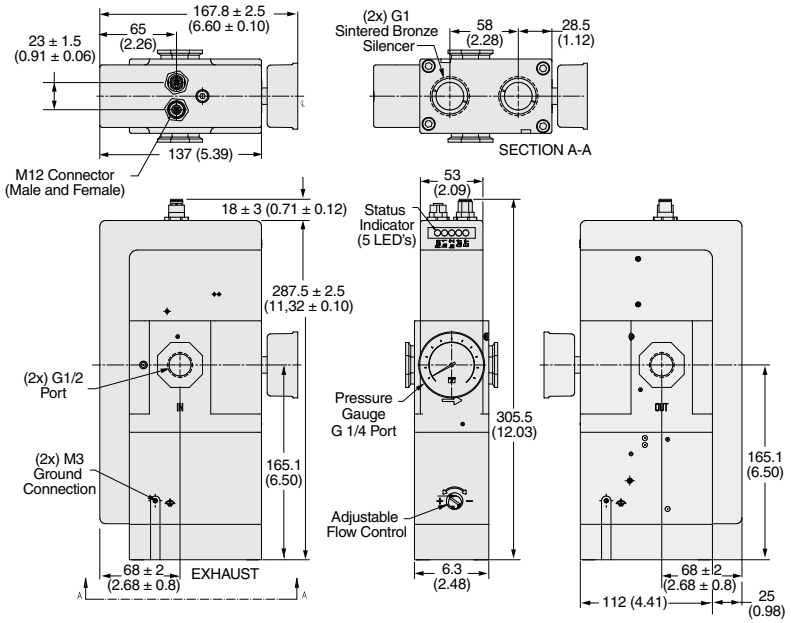
The MCSE Series double valves are safety components designed and manufactured in accordance with Machinery Directive 2006/42/EC. Its intended use is to control ventilation and exhaust in compressed air systems or similar applications, as well as to avoid unexpected switch-on and release of energy in pneumatic tubing systems and end devices in the industry.

The MCSE Series double valves are designed for safe, redundant operation and have internal monitoring. The valves consist of redundant 3/2 valves and have the overall function of an externally piloted valve with spring return.

Soft-Start

The MCSE Series double valves have a EEZ-ON® soft-start function. The function of the soft-start module is that the output pressure increases slower than normal during pressurization, until it reaches approximately 50% of the inlet pressure. The valve then opens fully at this point and fills the system with the full flow rate. This feature can be used to reduce the surge of a sudden, quick pressure application of cylinders. This function is particularly useful when inline flow controllers are placed in the cylinder control lines. The soft-start function could be bypassed by fully opening.

Valve Dimensions – inches (mm)



OPTIONS

Wiring Kit	Kit Number	Length
	2431H77	Wiring Kit - 5 meters (16.4 feet). Includes two cords, and the cord grips.

Control Reliable Double Valves with Dynamic Monitoring and Memory

Safety Exhaust (Dump) DM²® Series C

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 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 in-line 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.

SIL 3 Functional Safe

Cat. 4 PL e

DGUV Test HSM 06008 Sicherheit sprüft tested safety

CE

ISO 13849-1 CAT 4, PL e

cULus

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

DM2C	N	B	21	A	2	1	
Series	Thread	Revision Level	Port Size	Voltage*	Solenoid Reset Type	Status Indicator*	Other OPTIONS

Thread

G	D
NPT	N
Valve Only (No Base)	X

Revision Level

Basic Size	
4, 8, 12, 30	A
2	B

Port Size

Basic Size	Inlet	Outlet	
2	1/4	1/4	20
	3/8	3/8	21
	Valve Only (No Base)		2X
4	1/2	1/2	42
	Valve Only (No Base)		4X
8	3/4	3/4	54
	1	1	55
	Valve Only (No Base)		5X
12	1	1	66
	Valve Only (No Base)		6X
30	1½	2	88
	Valve Only (No Base)		8X

Voltage*

24 volts DC	A
110 volts AC, 50 Hz 120 volts AC, 50/60 Hz	B

* For other voltages consult ROSS.

Solenoid Reset Type

Status Indicator*

Yes	1
No/Valve Only (N/A)	X

*Installed in the base.

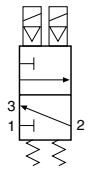
Other OPTIONS

EN 175301-803 Form A* (connector not included)	Leave Blank
M12 (connector included)	005

*See options for connectors or wiring kits.

Basic Size	Inlet Port Size	Cv 1-2	Cv 2-3	Weight lb (Kg)
2	1/4	1.67	2.61	5.3 (2.4)
	3/8	2.17	3.57	5.3 (2.4)
4	1/2	3.01	6.51	5.9 (2.6)
8	3/4	4.20	9.36	8.4 (3.7)
	1	4.32	9.36	8.4 (3.7)
12	1	8.68	17.31	15.3 (3.7)
30	1½	20.11	55.10	34.7 (15.1)

Valve and base assembly with status indicator.



Simplified Schematic

Explosion proof valves available, see explosion proof valves.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Dual Poppet
Mounting	**Type:** Base **Orientation:** Vertically with pilot solenoids on top
Solenoids	According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Three solenoids, rated for continuous duty
Voltage/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 Solenoids:** 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
Temperature	**Ambient:** 15° to 122°F (-10° to 50°C) **Media:** 40° to 175°F (4° to 80°C)

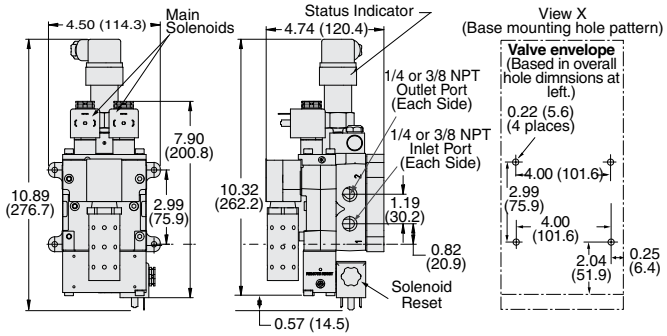
Flow Media	Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46)
Operating Pressure	**Basic Size 2:** 45 to 150 psig (3.1 to 10.3 bar). **Basic Size 4, 8, 12, 30:** 30 to 120 psig (2.1 to 8.3 bar)
Pressure Switch (Status Indicator) Rating	Contacts - 5 amps 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
Minimum Operation Frequency	Once per month, to ensure proper function
Construction Material	**Valve Body:** Cast Aluminum **Poppet:** Acetal and Stainless Steel **Seals:** Buna-N
Functional Safety Data: Category 4, PL e; B_{10D}: 20,000,000; PFH_D: 7.71x10^{-9}; $MTTF_D$: 301.9 (n_{op}: 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.	

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM²® Series D double valves for mechanical power press applications.

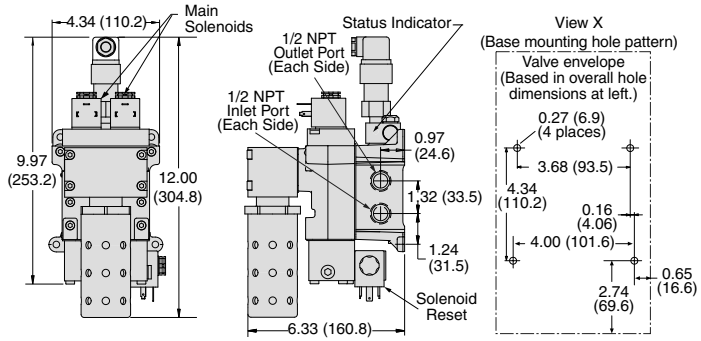
IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Valve Dimensions – inches (mm)

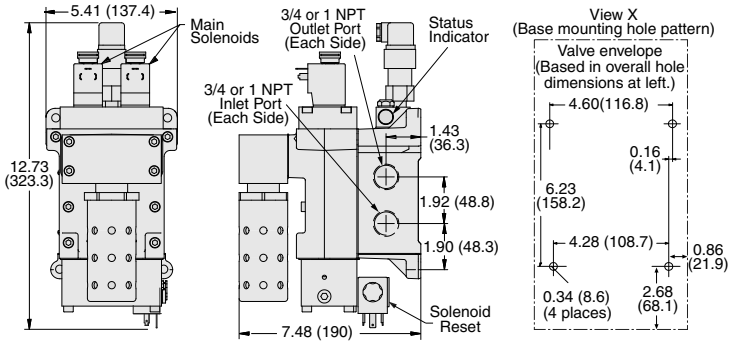
Basic Size 2



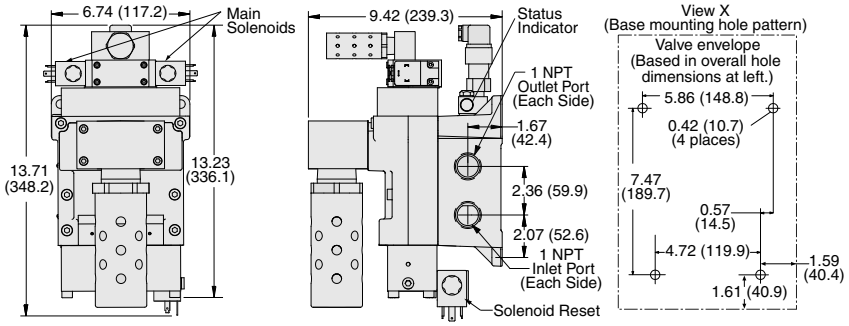
Basic Size 4



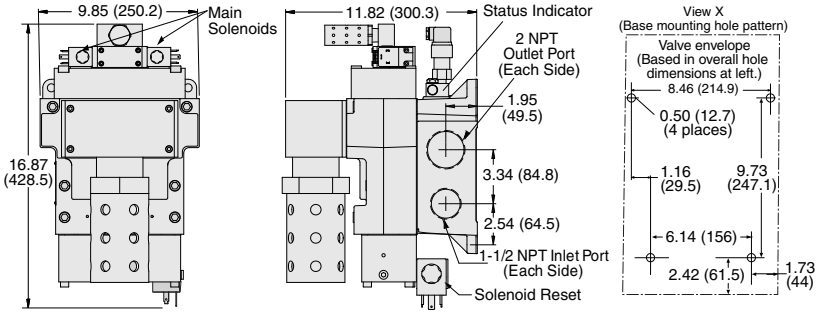
Basic Size 8

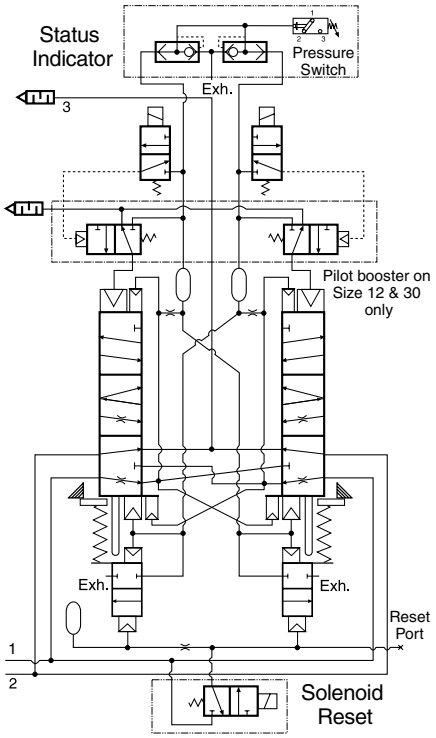


Basic Size 12



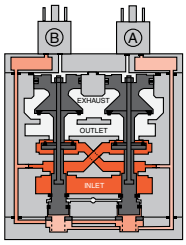
Basic Size 30



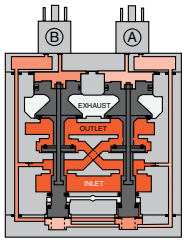


Schematic - Valve de-actuated

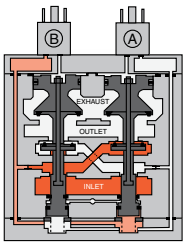
Valve De-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages is restricted by the size of the passage between the stem and the valve body opening. Flow is sufficient to quickly pressurize pilot supply/timing chambers A and B. The inlet poppets prevent air flow from crossover 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.)



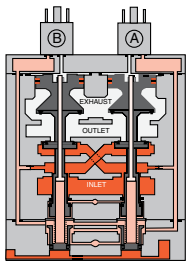
Valve Actuated: Energizing the pilot valves simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated (open) position, where inlet air flow to crossover passages is fully open, inlet poppets are fully open and exhaust poppets are fully closed. The outlet is 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.



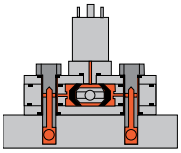
Valve Locked-out: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related 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.



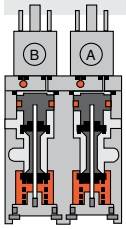
Resetting the Valve: The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied. A remote reset signal must be applied to reset the valve. Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the 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 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 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.



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

Accessories & Options

Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
						24 Volts DC	120 Volts AC
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
				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

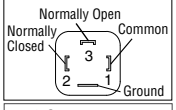
CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

Downstream Pressure Monitoring

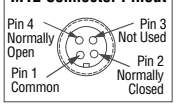
Pressure Switches		
Connection Type	**Model Number**	**Port Threads**
EN 175301-803 Form A	586A86	1/8 NPT
M12	1153A30	1/8 NPT

*Pressure switch closes on falling pressure of 5 psig (0.34 bar).

EN Connector Pinout



M12 Connector Pinout



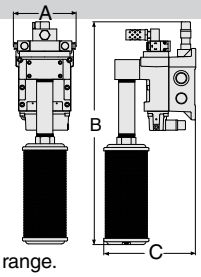
Redundant Downstream Feedback Switch	Model Number	Port Threads
	RC026-13	3/8 NPT

- 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

High-Flow, High Reduction Silencer Kits

Port Size	Kit Number*		Flow scfm (l/s)	Dimensions inches (mm)			
	NPT Threads	G Threads		A	B (NPT)	B (G)	C
4	2324H77	2329H77	800 (378)	4.34 (110.2)	19.06 (484.1)	21.40 (543.6)	7.27 (184.7)
8	2325H77	2329H77	800 (378)	5.41 (137.4)	21.18 (538.0)	23.52 (597.4)	8.41 (213.6)
12	2326H77	2330H77	2080 (982)	6.74 (117.2)	25.85 (656.6)	28.20 (716.3)	10.66 (270.8)
30	2327H77	2331H77	7200 (3398)	9.85 (250.2)	41.55 (1055.4)	41.55 (1055.4)	13.47 (342.1)

* 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.

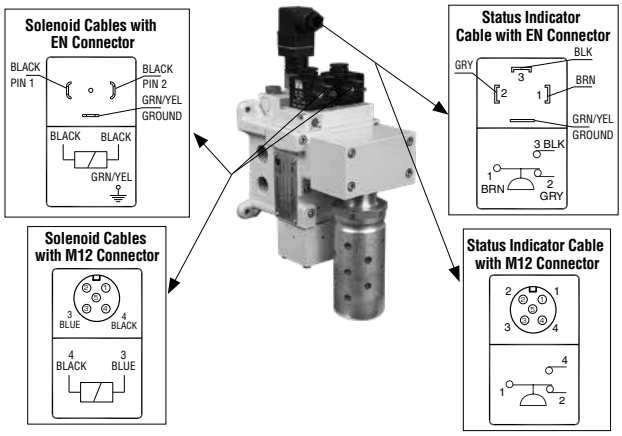
Preassembled Wiring Kits

Preassembled Wiring Kits

Solenoid Connector Type	Kit Number*			Length meters (feet)
	Connector without Light	Lighted Connector		
		24 Volts DC	120 Volts AC	
EN 175301-803 Form A	2283H77	2532H77-W	2532H77-Z	5 (16.4)
	2284H77	2533H77-W	2533H77-Z	10 (32.8)
M12	2288H77	–	–	5 (16.4)
	2289H77	–	–	10 (32.8)

* Each cable has one connector.

These kits include 1 cable for the status indicator, and 3 cables with connector plus a cord grip for each.



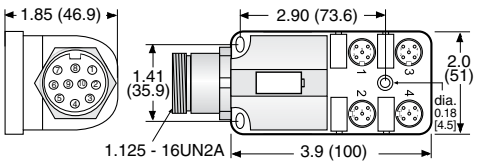
Wiring Kits with J-Box

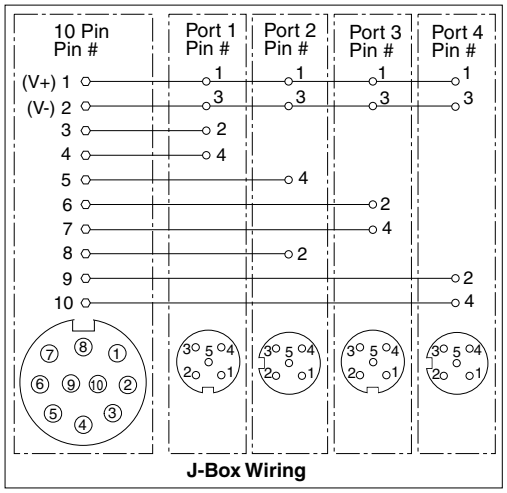
Connector Types	Kit Number*	Length meters (feet)
M12 - DIN	2249H77	1 (3.3)
M12 - M12	2250H77	1 (3.3)

*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).



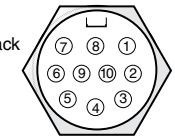


10 PIN MINI Cable

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.

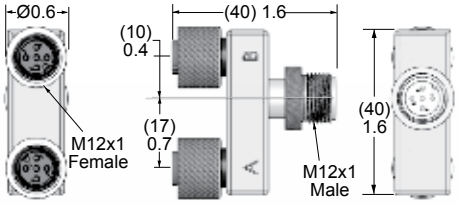
PIN #		PIN #		Wire Colors:	Wire Colors:
1	+24 volts DC	6	-	Orange	Orange w/Black
2	Common volts DC	7	Remote Reset	Blue	Red
3	-	8	-	White w/Black	Green/Yellow
4	Solenoid A	9	Remote Valve Fault Light	Red w/Black	Black
5	Solenoid B	10	Remote System OK Light	Green w/Black	White

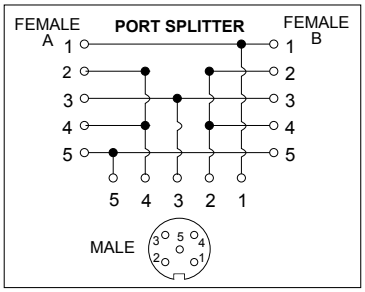


Outlet Port Pressure Monitoring Wiring Kit

Kit Number	Length meters (feet)
2251H77	1 (3.3)

Some customers prefer to monitor downstream pressure in addition to using the DM²® or DM¹ 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.

Control Reliable Double Valves with Dynamic Monitoring and Automatic Reset

Safety Exhaust (Dump) DM[1] Series C

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[2®] Series E and DM[2®] 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 in-line 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 "ready-to-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.

SIL 3 Functional Safe

Cat. 4 PL e

DGUV Test HSM 16008 Sicherheit sprüft tested safety

CE

ISO 13849-1 CAT 4, PL e

SP C US

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

DM1C	N	A	42	A	3	1	
Series							

Thread

G	D
NPT	N
Valve Only (No Base)	X

Revision Level

Basic Size	
4, 8	A
2	B

Basic Size	Port Size Inlet	Port Size Outlet	
2	1/4	1/4	20
	3/8	3/8	21
	Valve Only (No Base)		2X
4	1/2	1/2	42
	Valve Only (No Base)		4X
8	3/4	3/4	54
	1	1	55
	Valve Only (No Base)		5X

Voltage*

24 volts DC	A
110 volts AC, 50 Hz 120 volts AC, 50/60 Hz	B

* For other voltages consult ROSS.

Automatic Reset Type

Status Indicator*

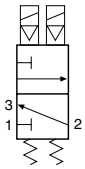
Yes	1
No/Valve Only (N/A)	X

*Installed in the base.

Other OPTIONS

EN 175301-803 Form A* (connector not included)	Leave Blank
M12 (connector included)	005

*See options for connectors or wiring kits.



Simplified Schematic

Basic Size	Inlet Port Size	Cv 1-2	Cv 2-3	Weight lb (Kg)
2	1/4	1.67	2.61	5.3 (2.4)
	3/8	2.17	3.57	5.3 (2.4)
4	1/2	3.01	6.51	5.9 (2.6)
8	3/4	4.20	9.36	8.4 (3.7)
	1	4.32	9.36	8.4 (3.7)

Valve and base assembly with status indicator.

Explosion proof solenoid pilot available for basic size 2 & 4 valves, for more information consult ROSS.

STANDARD SPECIFICATIONS (for valves on this page):

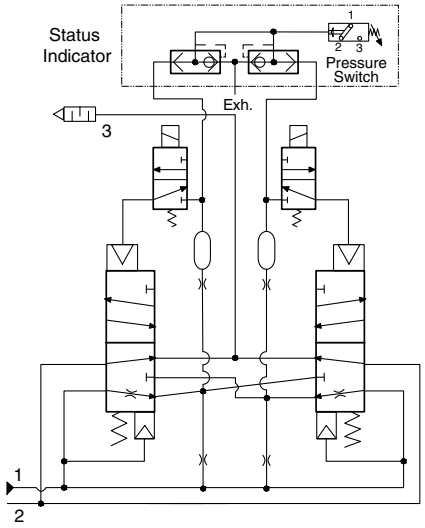
Construction Design	Dual Poppet
Mounting	**Type:** Base **Orientation:** Preferably horizontally (valve on top of base) or vertically with pilot solenoids on top
Solenoids	According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Three solenoids, rated for continuous duty
Voltage/Power Consumption (each solenoid)	**Basic Size 2 & 4** 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** 15 watts on DC; 36 VA inrush and 24.6 VA holding on AC
Enclosure Rating	IP65, IEC 60529
Electrical Connection	EN 175301-803 Form A, or M12
Temperature	**Ambient:** 15° to 122°F (-10° to 50°C) **Media:** 40° to 175°F (4° to 80°C)

Flow Media	Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46)
Operating Pressure	**Basic Size 2:** 45 to 150 psig (3.1 to 10.3 bar). **Basic Size 4 & 8:** 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
Minimum Operation Frequency	Once per month, to ensure proper function
Construction Material	**Valve Body:** Cast Aluminum **Poppet:** Acetal and Stainless Steel **Seals:** Buna-N
Functional Safety Data: Category 4, PL e; B_{10D}: 20,000,000; PFH_D: 7.71x10^{-9}; $MTTF_D$: 301.9 (n_{op}: 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.	

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM[2®] Series D double valves for mechanical power press applications.

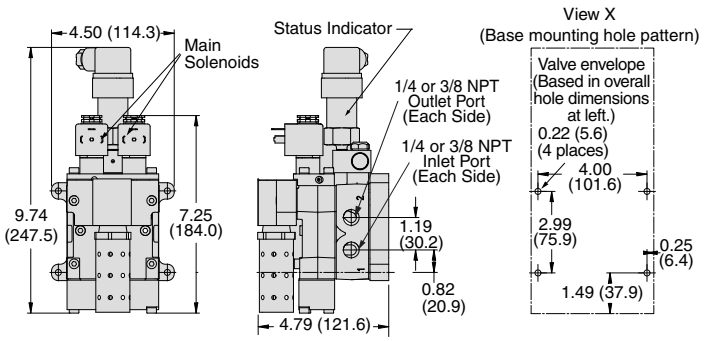
IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Schematic - Valve de-actuated

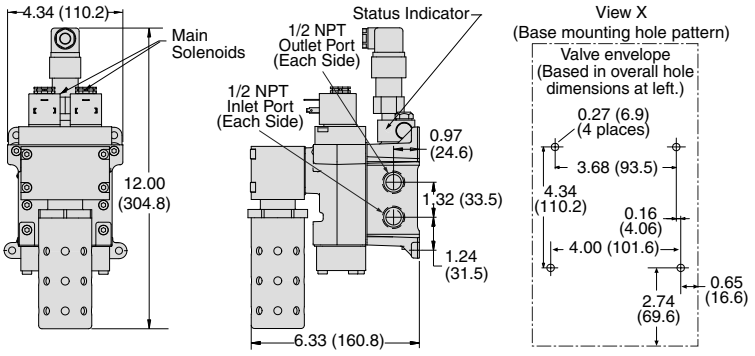


Valve Dimensions – inches (mm)

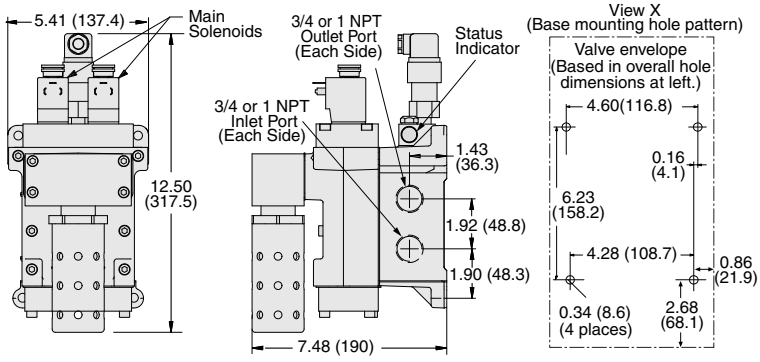
Basic Size 2



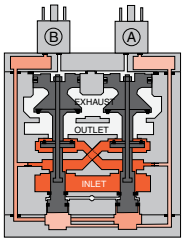
Basic Size 4



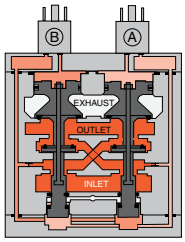
Basic Size 8



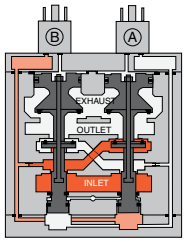
Valve De-actuated (ready-to-run): The flow of inlet air pressure into the crossover passages from the inlet chamber is restricted by orifices that allow air pressure to bypass the lower inlet poppets. Flow is sufficient to quickly pressurize the pilot supply/timing chambers on both sides A and B. The 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.)



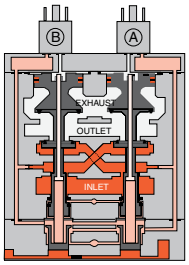
Valve Actuated: Energizing the pilot solenoids simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated position, where inlet air flow to outlet is open and both exhaust poppets are closed. The outlet is then quickly pressurized, and pressure in the inlet, 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.



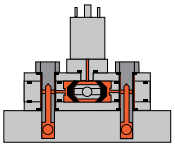
Asynchronous Operation: If the valve elements operate in a sufficiently asynchronous manner on ACTUATION, the valve will shift into a position where one crossover and its related timing chambers will be exhausted, and the other crossover and its related timing chambers will be pressurized.
In the illustration, 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.



Status indicator in normal ready-to-run position

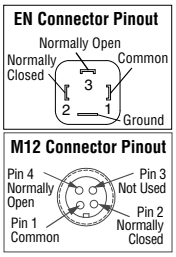
Options

Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
						24 Volts DC	120 Volts AC
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
				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

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 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).		



Redundant Downstream Feedback Switch	Model Number	Port Threads
	RC026-13	3/8 NPT

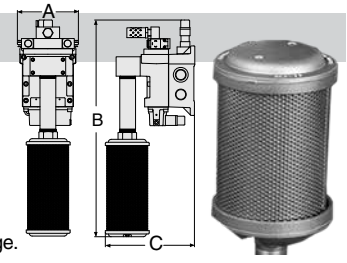
- May be installed downstream on all double valves
- Provides a redundant means to verify the release of downstream pressure to next obstruction
- Factory preset, 5 psi (0.3 bar) - falling

High-Flow, High Reduction Silencer Kits

Basic Size	Kit Number*		Flow scfm (l/s)	Dimensions inches (mm)			
	NPT Threads	G Threads		A	B (NPT)	B (G)	C
2, 4	2324H77	2329H77	800 (378)	4.34 (110.2)	19.06 (484.1)	21.40 (543.6)	7.27 (184.7)
8	2325H77	2339H77	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.



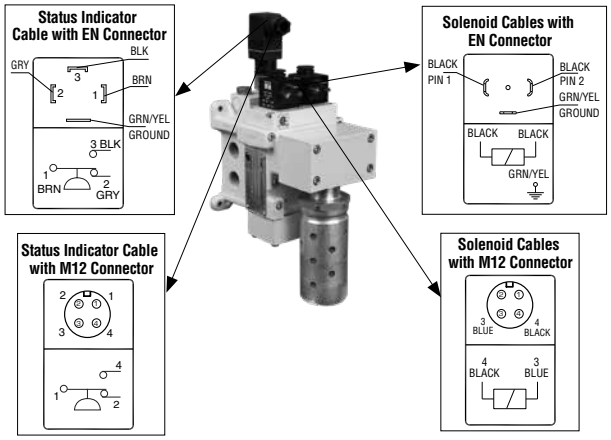
IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Wiring Kits

Preassembled Wiring Kits

Solenoid Connector Type	Kit Number			Length meters (feet)
	Connector without Light	Lighted Connector		
		24 Volts DC	120 Volts AC	
EN 175301-803 Form A	2243H77	2268H77-W	2268H77-Z	5 (16.4)
	2244H77	2269H77-W	2269H77-Z	10 (32.8)
M12	2245H77	–	–	5 (16.4)
	2246H77	–	–	10 (32.8)

These kits include 2 cables with either EN or M12 connectors for the solenoids. All cables include cord grips.



Status Indicator kit ordered separately.

Status Indicator Kits	Solenoid Connector Type	Kit Number	Length meters (feet)	Description
	EN 175301-803 Form A	2247H77	5 (16.4)	Status Indicator kits include one cable with EN or M12 connector and a cord grip.
		2248H77	10 (32.8)	
	M12	2241H77	5 (16.4)	
		2242H77	10 (32.8)	

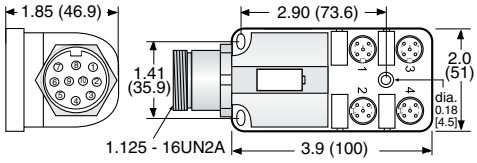
Wiring Kits with J-Box

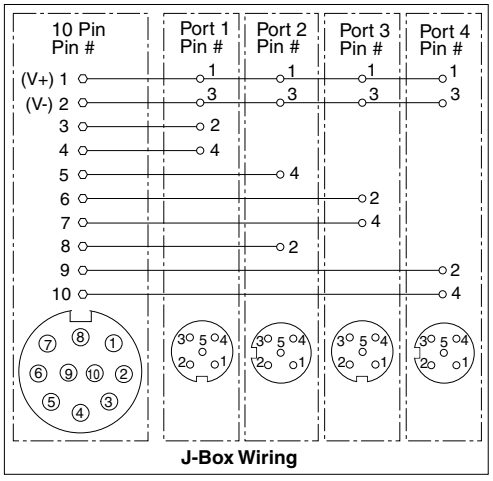
Connector Type	Kit Number*	Length meters (feet)
M12 - DIN	2249H77	1 (3.3)
M12 - M12	2250H77	1 (3.3)

*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

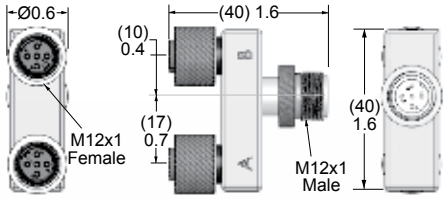
Kit Number	Length meters (feet)
2253H77	3.66 (12)
2254H77	6.1 (20)
2255H77	9.1 (30)
2256H77	15.2 (50)

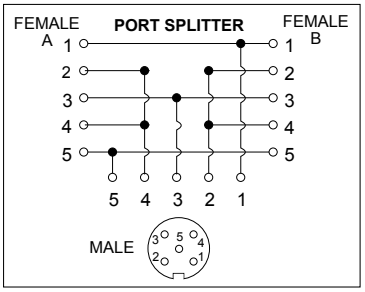
These cables have a 10-pin MINI connector for connecting the J-Box kits above to the user's control system. Kits include one cable with connector and cord grip. Cable conductors are 18-gauge wire.

PIN #		PIN #		Wire Colors:	Wire Colors:
1	+24 volts DC	6	-	Orange	Orange w/Black
2	Common volts DC	7	Remote Reset	Blue	Red
3	-	8	-	White w/Black	Green/Yellow
4	Solenoid A	9	Remote Valve Fault Light	Red w/Black	Black
5	Solenoid B	10	Remote System OK Light	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 DM2® or DM[1] 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).

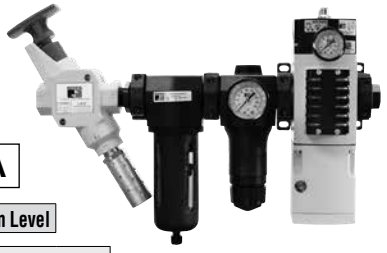
Pressure switch available separately, see valve options.

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

Control Reliable Energy Isolation M35 Series Double Valves with or without Soft-Start Module, Manual Lockout L-O-X® Valves with Integrated Filter, Regulator, & Lubricator Combinations

SIL 3 Functional Safe | Cat. 4 PL e

Pre-engineered panel mountable design with air entry via a filter and regulator "FR", or filter, regulator and lubricator "FRL". Includes M35 Series Double Valve with or without Soft-Start function. Applications include Pneumatic Control and Air Dump/Release.



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

M35	S	L	R	2U	40	G	A	E	X	AA	G	A
Series												

M35 Valve

With Soft-Start	S
No Soft-Start	X

Lockout Valve Type*

L-O-X®	L
Modular L-O-X®	M
No L-O-X®	X

* Silencer included.

Filter, Regulator, Lubricator

Integrated Filter/Regulator	F
Filter and Regulator	**R**
Filter, Regulator,and Lubricator	L
No Filter, Regulator, Lubricator	X

Extra Port (in relation to M35 valve)

Location	Size	Code
Upstream	**1/4**	**2U**
Upstream	3/8	3U
Upstream	1/2	4U
Downstream	1/4	2D
Downstream	3/8	3D
Downstream	1/2	4D
Both	1/4	2B
Both	3/8	3B
Both	1/2	4B
None	NA	XX

Thread

G	G
NPT	N

Port Size

Inlet	Outlet	Exhaust	Exhaust Type	
1/2	**1/2**	**–**	**Built-in Silencer**	**40**
3/4	3/4	–	Built-in Silencer	50
1/2	1/2	1	Threaded Exhaust Flange*	46
3/4	3/4	1	Threaded Exhaust Flange*	56

* Silencer not included.

Voltage

24 volts DC

Communication

None

Monitoring

External

Pressure Gauge (for M35 valve)

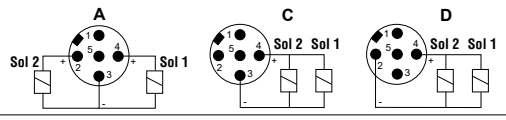
With Gauge	G
No Gauge	X
With Transducer	T

Revision Level

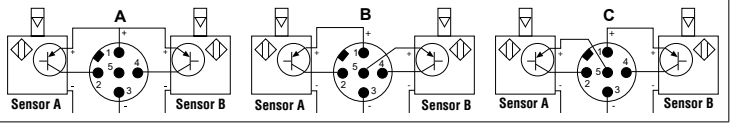
Pin Configuration Combination*

Solenoid	Sensor	
A	**A**	**AA**
A	B	AB
A	C	AC
C	C	CC
D	B	DB
D	C	DC

Solenoid Pinouts



Pressure Sensor Pinouts

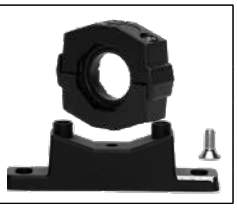


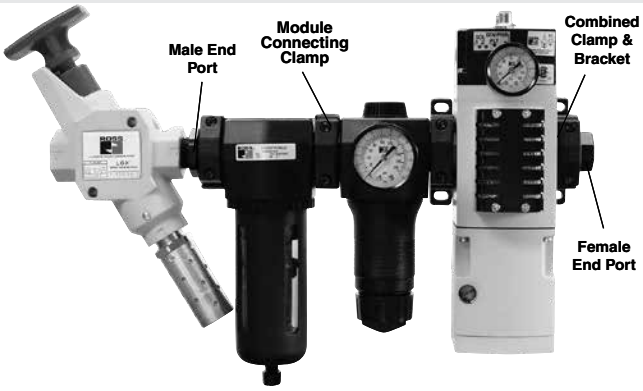
Mounting Accessories

M35 Series valves have both modular receptacles for piping and female threaded ports inside receptacles, which allows either modular connection or direct piping. Mounting accessories listed below are used for modular connection to ROSS MD series filter-regulator units.

Mounting Brackets & Clamp for Module Connections

Description	Model Number
Bracket and Screw	R-A118-103
Clamp	R-A118-105
Bracket, screw, and Clamp	R-A118-105M





Extra Port Blocks

Port Size	Model Number	
	NPTF Threads	G Threads
1/2	R-118-106-4	R-118-106-4W

End Ports

Port Size	Model Number	
	NPTF Threads	G Threads
1/2	R-118-100-4	R-118-100-4W
3/4	R-118-100-6	R-118-100-6W

Male End Ports

Port Size	Model Number	
	NPTF Threads	G Threads
1/2	R-118-109-4F	R-118-109-4FW
3/4	R-118-109-6F	R-118-109-6FW

NOTE: Per specifications and regulations, lockout L-O-X® products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES. These valve assemblies are 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.

Control Reliable Energy Isolation MSCE Series Double Valves with Soft-Start Function, Manual Lockout L-O-X® Valves with Integrated Filter, Regulator, & Lubricator Combinations

SIL 3 Functional Safe | Cat. 4 PL e

Pre-engineered panel mountable design with air entry via a filter and regulator "FR", or filter, regulator and lubricator "FRL". Includes MCSE Series Double Valve with or without Soft-Start function.
Applications include Pneumatic Control and Air Dump/Release.

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

MCSE	A	L	R	2U	G	A	I	X	AA	G	B
Series	Version	Lockout Valve Type*	Filter, Regulator, Lubricator	Extra Port (in relation to MCSE valve)	Thread	Voltage	Monitoring	Communication	PIN Configuration Combination	Pressure Measuring Device (for MCSE valve)	Revision Level

Version

PP	A
PM	B
Start-Button NCNC	C
Start-Button NCNO	D

Lockout Valve Type*

L-O-X®	L
Modular L-O-X®	M
No L-O-X®	X

* Silencer included.

Filter, Regulator, Lubricator

Integrated Filter/Regulator	F
Filter and Regulator	**R**
Filter, Regulator,and Lubricator	L
No Filter, Regulator, Lubricator	X

Extra Port (in relation to MCSE valve)

Location	Size	Code
Upstream	1/2	4U
Downstream	1/2	4D
Both	1/2	4B
None	NA	XX

Thread

G	G
NPT	N

Voltage

24 volts DC

Monitoring

Internal

Communication

None

PIN Configuration Combination

Solenoid	Sensor
A	A

Pressure Measuring Device (for MCSE valve)

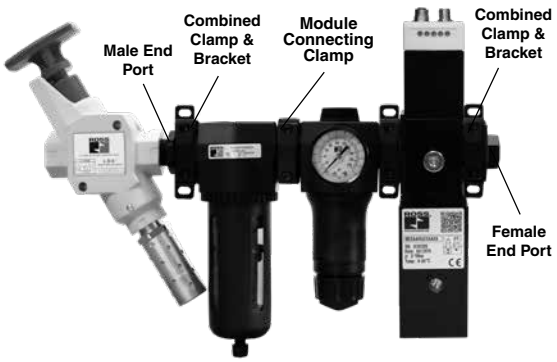
Gauge	G
Digital Transducer	T
None (plugged port)	X

Revision Level

B

Mounting Accessories

MCSE Series valves have both modular receptacles for piping and female threaded ports inside receptacles, which allows either modular connection or direct piping. Mounting accessories listed below are used for modular connection to ROSS MD series filter-regulator units.



Mounting Brackets & Clamp for Module Connections

Description	Model Number
Bracket, Screw, Clamp and Mounting Adapter	2737K77*
Clamp	R-A118-105

* Bracket, Screw, Clamp and Mounting Adapter shown above.

Extra Port Blocks

Port Size	Model Number	
	NPTF Threads	G Threads
1/2	R-118-106-4	R-118-106-4W

End Ports

Port Size	Model Number	
	NPTF Threads	G Threads
1/2	R-118-100-4	R-118-100-4W
3/4	R-118-100-6	R-118-100-6W

Male End Ports

Port Size	Model Number	
	NPTF Threads	G Threads
1/2	R-118-109-4F	R-118-109-4FW
3/4	R-118-109-6F	R-118-109-6FW

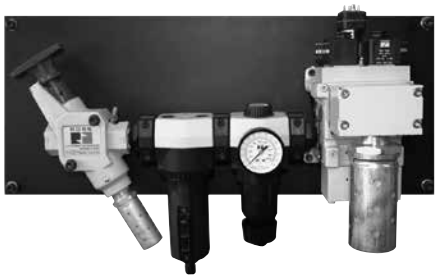
NOTE: Per specifications and regulations, lockout L-O-X® products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES. These valve assemblies are not designed for controlling clutch/brake mechanisms on mechanical power presses.

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

DM²® Series C Double Valves, Manual Lockout L-O-X® Valves with Filter and Regulator

SIL 3 Functional Safe | Cat. 4 PL e

Pre-engineered panel-mounted design with air entry via a filter and regulator “FR”, or filter, regulator and lubricator “FRL”
Includes DM²® 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 Assembly	Port Size		Model Number#	Air Entry Type	C_v		Dimensions inches (mm)		
	1, 2	3	NPT Threads		1-2	2-3	Length	Width	Depth
DM2® Series C	1/2	1/2	RC408-06W	FR	3	10	24.0 (610)	14.5 (369)	7.4 (187)
			RC408L-06W	FRL	4.4	13	24.0 (610)	15.7 (399)	8.3 (211)
	3/4	3/4	RC412-06W	FR	4.4	13	27.0 (686)	19.0 (483)	9.0 (229)
			RC412L-06W	FRL	3	10	24.0 (610)	14.5 (369)	7.4 (187)
	1	1	RC416-06W	FR	4.4	13	24.0 (610)	15.7 (399)	8.3 (211)
			RC416L-06W	FRL	4.4	13	31.0 (788)	19.0 (483)	9.0 (229)

Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., RC408-06Z.
M12 connectors available, consult ROSS.
Silencer included. Standard Air Entry Assemblies supplied with metal bowl and automatic drain.

Custom designs available, consult ROSS. Explosion proof solenoid pilot available, for more information consult ROSS.

CAUTIONS, WARNINGS And STANDARD WARRANTY

ROSS OPERATING VALVE, ROSS CONTROLS®, ROSS DECCO®, and AUTOMATIC VALVE INDUSTRIAL, collectively the "ROSS Group".

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure all sources of energy are turned off, the entire pneumatic system is shut down and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS Group Products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any product can be tampered with and/or need servicing after installation, persons responsible for the safety of others or the care of equipment must check ROSS Group Products on a regular basis and perform all necessary maintenance to ensure safe operating conditions.

3. All applicable instructions should be read and complied with before using any fluid power system 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 Group location.

4. Each ROSS Group Product should be used within its specification limits. In addition, use only ROSS Group components to repair ROSS Group Products.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

FILTRATION and LUBRICATION

1. 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. The ROSS Group recommends a filter with a 5-micron rating for normal applications.

2. All standard ROSS Group filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. 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 and hazardous leakage. Immediately replace crazed, cracked, or deteriorated bowls.

3. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base 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 personal injury, and/or damage to property.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

AVOID INTAKE/EXHAUST RESTRICTION

1. Do not restrict air flow in the supply line. To do so could reduce the pressure of the supply air below minimum requirements for the valve and thereby causing erratic action.

2. 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.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

SAFETY APPLICATIONS

1. 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.

2. Safety exhaust (dump) valves without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All safety exhaust valve installations should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

3. Per specifications and regulations, the ROSS L-O-X® and L-O-X® with EEZ-ON®, N06 and N16 Series operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

STANDARD WARRANTY

All products sold by the ROSS Group are warranted for a one-year period [with the exception of Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven (7) years] from the date of purchase. All products are, during their respective warranty periods, warranted to be free of defects in material and workmanship. The ROSS Group's obligation under this warranty is limited to repair, replacement or refund of the purchase price paid for products which the ROSS Group has determined, in its sole discretion, are defective. All warranties become void if a product has been subject to misuse, misapplication, improper maintenance, modification or tampering. Products for which warranty protection is sought must be returned to the ROSS Group freight prepaid.

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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 systems.

Other literature is available for engineering, maintenance, and service requirements.

If you need products or specifications not shown in this catalog, please visit ROSS' website, contact ROSS or your ROSS distributor. The ROSS Support Team 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' at rosscontrols.com.