Industrial Gas Springs – Pull Type

Takes over when things get too tight for gas pressure springs

If ACE gas push type springs cannot be used due to a lack of space, ACE's industrial gas pull type springs come into their own. The compact assistants with body diameters of 15 to 40 mm are effective in the direction of traction and work in the opposite way to the principle of gas push type springs.

This means that the gas pressure in the cylinder draws the piston rod in and, when closing a flap for example, supports the manual force with the pressure springs. ACE's gas pull type springs are also self-contained, maintenance-free machine elements and equipped with a standard valve to individually regulate the gas pressure, whereby they cover forces between 30 and 5,000 N. Any installation position, extensive DIN standardised accessories and various models enable universal use.

- Compact design
- Individual filling valve technology
- Calculation program for specific design
- Universally applicable
- Delivery time within 24 hours

Function of a Gas Spring – Pull Type

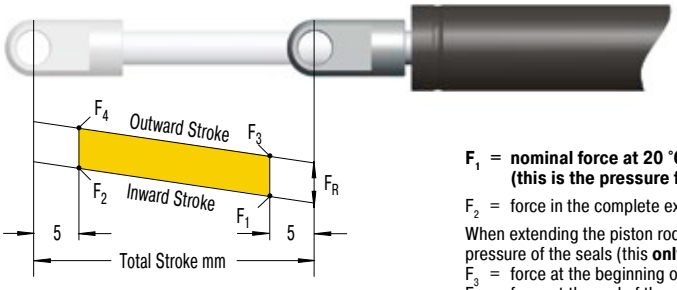
Gas pull type springs work based on the reverse principle of a gas push type spring. They are also individually filled according to customer request to a certain pressure (extension force F_1). However, the piston rod here is pulled inwards by the gas pressure in the cylinder. The higher the pressure, the greater the extension force.

The piston ring surface between the piston rod and the inner tube is decisive for the function. When the piston rod pulls out, the nitrogen from the piston is compressed in the inner tube. The force increase (progression) of the gas spring is due to the rising pressure. The force increase is almost linear.

Free calculation service see page 168 !

Calculation Principles

Force-Stroke Characteristics of Traction Gas Spring (Pull Type)



F_1 = nominal force at 20 °C
(this is the pressure figure normally used when specifying the gas spring)

F_2 = force in the complete extended position

When extending the piston rod, there is an additional friction force caused by the contact pressure of the seals (this **only** occurs **during the extension stroke**):
F_3 = force at the beginning of the extension stroke
F_4 = force at the end of the extension stroke

Gas Springs (Pull Type)

Type	Progression approx. %	[1] Friction F_R approx. in N
GZ-15	23	55 - 140
GZ-19	10	20 - 40
GZ-28	20	100 - 200
GZ-40	40	

[1] Depending on the filling force
[2] Depending on the stroke

Progression: (the slope of the force line in the diagram above) is due to the reduction of the internal gas volume as the piston rod moves from its initial position to its fully stroked position. The approx. progression values given above for standard springs can be altered on request.

Effect of termperature: The nominal F_1 figure is given at 20 °C. An increase of 10 °C will increase force by 3.4 %.

Filling tolerances: 20 N to +40 N or 5 % to 7 %. Depending on size and extension force the tolerances can differ.

Industrial Gas Springs – Pull Type

GZ-15 to GZ-40

Page 156

Valve Technology
Very low progression rate
Hoods, Shutters, Machine housing, Conveyor systems

GZ-15-V4A to GZ-40-VA

Page 162

Valve Technology, Stainless Steel
Very low progression rate with FDA approval
Hoods, Shutters, Machine housing, Conveyor systems

Issue 08.2016 – Specifications subject to change

GZ-15 to GZ-40

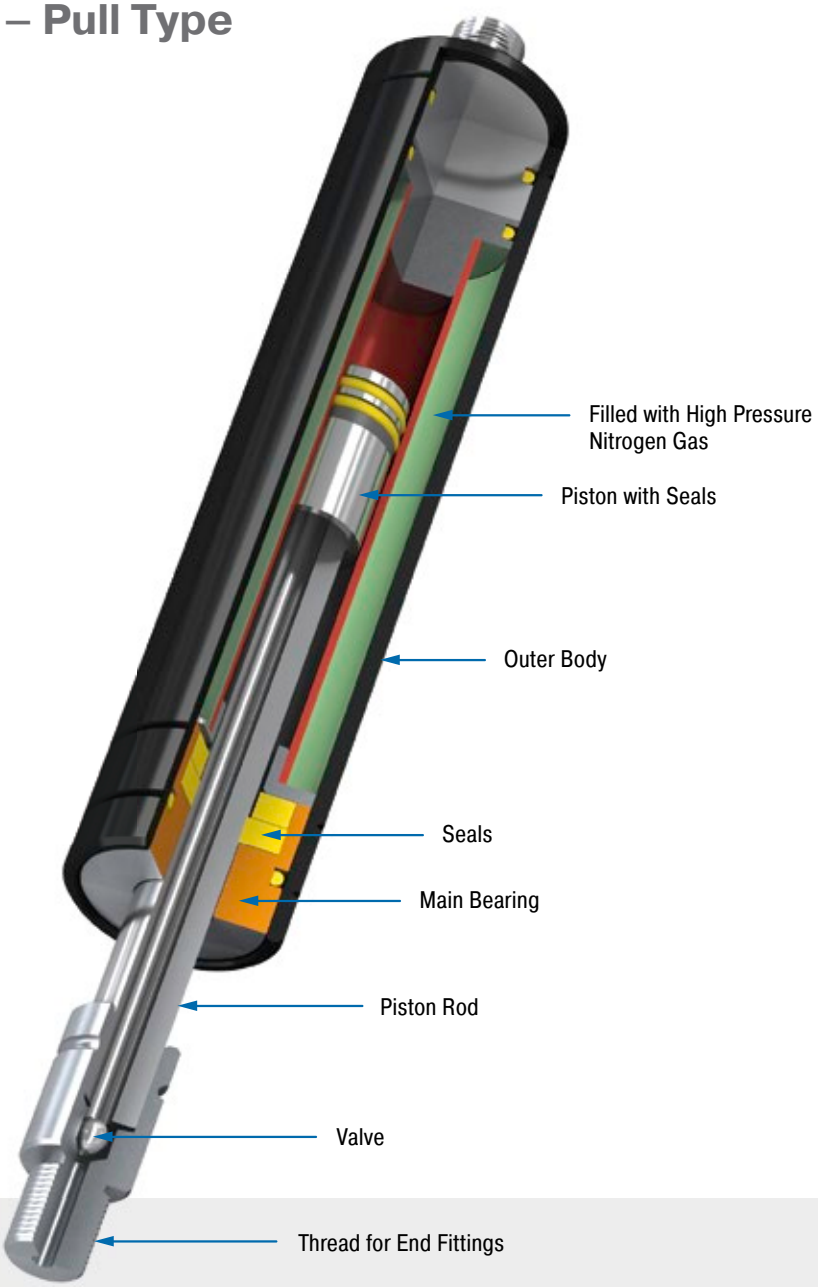
Industrial Gas Springs – Pull Type

Very low progression rate

The solution to a lack of space: If standard push type gas springs cannot be used due to a lack of space, ACES' industrial pull type gas springs come into their own. They work in the opposite way to standard push type gas springs. The piston rod is retracted when the cylinder is unloaded. The gas pressure in the cylinder draws the piston rod in.

ACE pull type gas springs offer the maximum service life thanks to the solid chrome-plated piston rod and an integrated sliding bearing. The maintenance-free and ready-to-install products are available in body diameters of 15 to 40 mm as well as forces from 40 to 5,000 N and are available from stock with valve and large selection of accessories. The traction force can be subsequently adjusted using the valve.

Gas traction springs from ACE are used in industrial applications, especially in mechanical engineering and in medical technology as well as in the electronics and furniture industries.



Technical Data

Traction force range: 40 N to 5,000 N

Piston rod diameter: Ø 4 mm bis Ø 28 mm

Progression: Approx. 20 % bis 40 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel or stainless steel with wear-resistant coating

Operating fluid: Nitrogen gas

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.

Application field: Hoods, Shutters, Machine housing, Conveyor systems

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

On request: Special oils and other special options. Alternative accessories. Traction gas springs with end position damping also available on request.

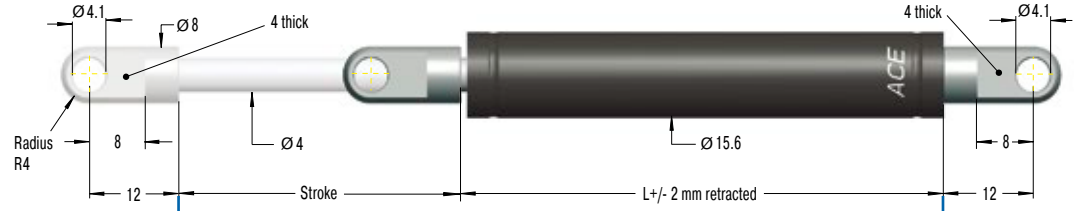
Issue 08.2016 – Specifications subject to change

End Fitting

Standard Dimensions

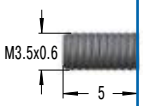
End Fitting

A3,5



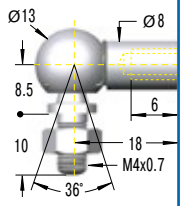
Eye A3,5
max. force 370 N

B3,5

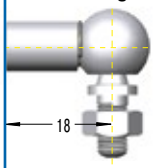


Stud Thread B3,5

C3,5



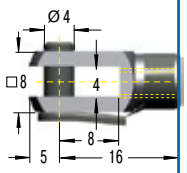
Angle Ball Joint C3,5
max. force 370 N



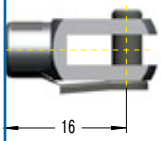
Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-15-20	20	87	150
GZ-15-40	40	107	150
GZ-15-50	50	117	150
GZ-15-60	60	127	150
GZ-15-80	80	147	150
GZ-15-100	100	167	150
GZ-15-120	120	187	150
GZ-15-150	150	217	150

D3,5



Clevis Fork D3,5
max. force 370 N

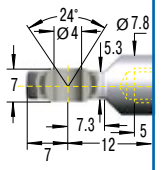


Ordering Example

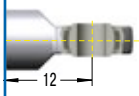
GZ-15-150-AC-150

- Type (Pull Type)
- Body Ø (15 mm)
- Stroke (150 mm)
- Piston Rod End Fitting A3,5
- Body End Fitting C3,5
- Traction Force F_1 150 N

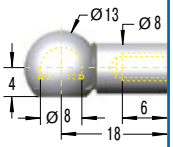
E3,5



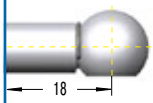
Swivel Eye E3,5
max. force 370 N



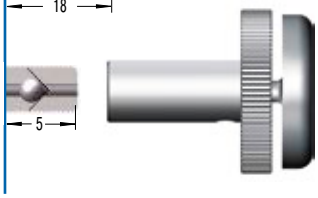
G3,5



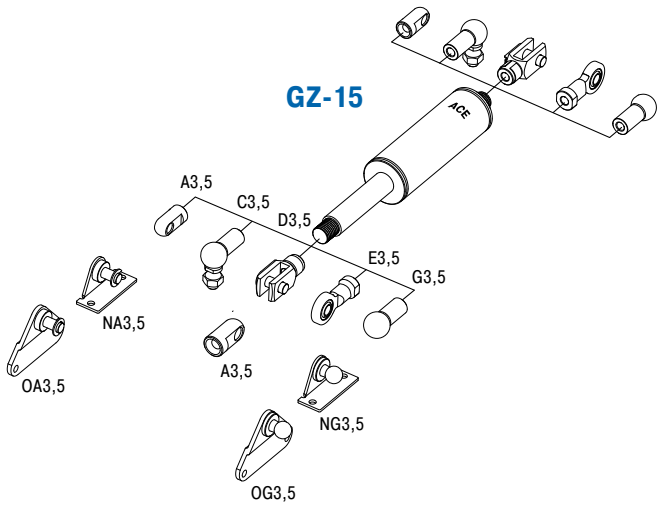
Ball Socket G3,5
max. force 370 N



Mounting accessories see from page 194.



Adjuster Knob
DE-GAS-3,5
See page 171.



Technical Data

Traction force range: 50 N to 150 N (extended up to 185 N)

Progression: Approx. 23 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, End fittings: Zinc plated steel; Piston rod: Stainless steel (1.4301/1.4305, AISI 304/303)

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.

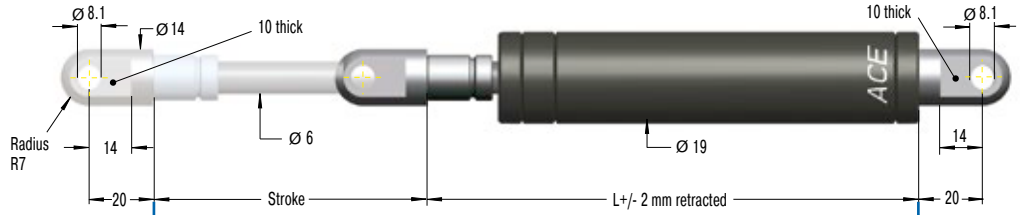
End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

Industrial Gas Springs – Pull Type GZ-19

Valve Technology, Traction force range 40 N to 350 N (extended up to 448 N)

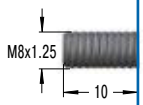
End Fitting | **Standard Dimensions** | **End Fitting**

A8



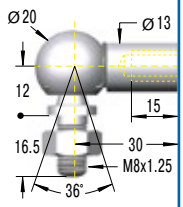
Eye A8
max. force 3.000 N

B8

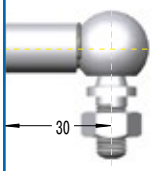


Stud Thread B8

C8



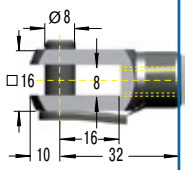
Angle Ball Joint C8
max. force 1,200 N



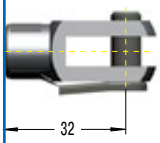
Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-19-30	30	112	300
GZ-19-50	50	132	300
GZ-19-100	100	182	300
GZ-19-150	150	232	300
GZ-19-200	200	282	300
GZ-19-250	250	332	300

D8



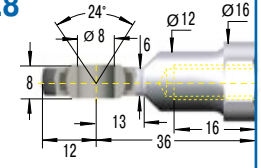
Clevis Fork D8
max. force 3,000 N



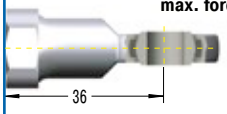
Ordering Example **GZ-19-150-AC-250**

Type (Pull Type)
Body Ø (19 mm)
Stroke (150 mm)
Piston Rod End Fitting A8
Body End Fitting C8
Traction Force F_1 250 N

E8

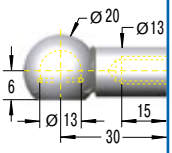


Swivel Eye E8
max. force 3,000 N

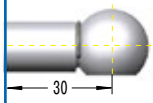


Mounting accessories see from page 194.

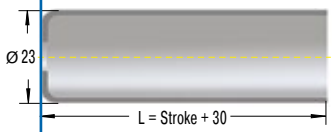
G8

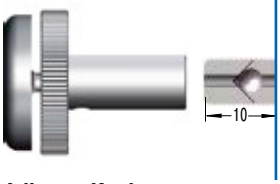


Ball Socket G8
max. force 1,200 N



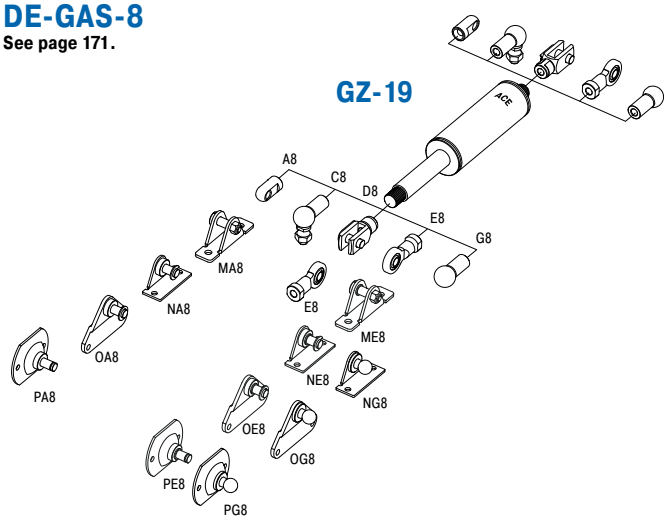
Rod Shroud W8-19





Adjuster Knob
DE-GAS-8
See page 171.

GZ-19



Technical Data

Traction force range: 40 N to 350 N (extended up to 448 N)

Progression: Approx. 21 % to 28 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

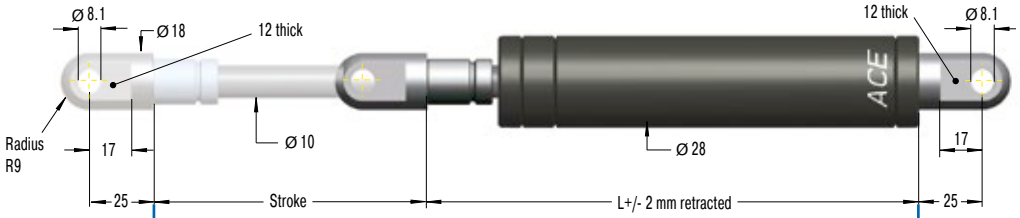
Issue 08.2016 – Specifications subject to change

End Fitting

Standard Dimensions

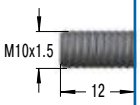
End Fitting

A10

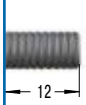


Eye A10
max. force 10,000 N

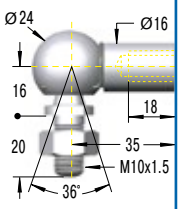
B10



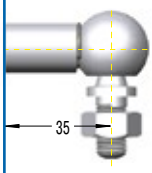
Stud Thread B10



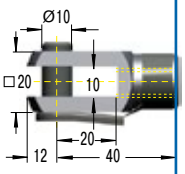
C10



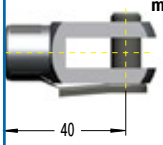
Angle Ball Joint C10
max. force 1,800 N



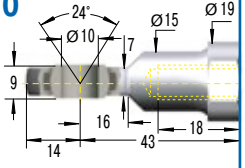
D10



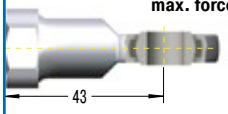
Clevis Fork D10
max. force 10,000 N



E10



Swivel Eye E10
max. force 10,000 N



Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-28-30	30	130	1,200
GZ-28-50	50	150	1,200
GZ-28-100	100	200	1,200
GZ-28-150	150	250	1,200
GZ-28-200	200	300	1,200
GZ-28-250	250	350	1,200
GZ-28-300	300	400	1,200
GZ-28-350	350	450	1,200
GZ-28-400	400	500	1,200
GZ-28-450	450	550	1,200
GZ-28-500	500	600	1,200
GZ-28-550	550	650	1,200
GZ-28-600	600	700	1,200
GZ-28-650	650	750	1,200

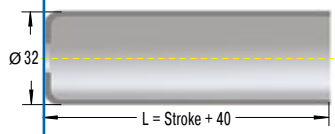
Ordering Example

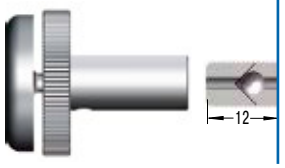
GZ-28-150-EE-800

- Type (Pull Type)
- Body Ø (28 mm)
- Stroke (150 mm)
- Piston Rod End Fitting E10
- Body End Fitting E10
- Traction Force F_1 800 N

Mounting accessories see from page 194.

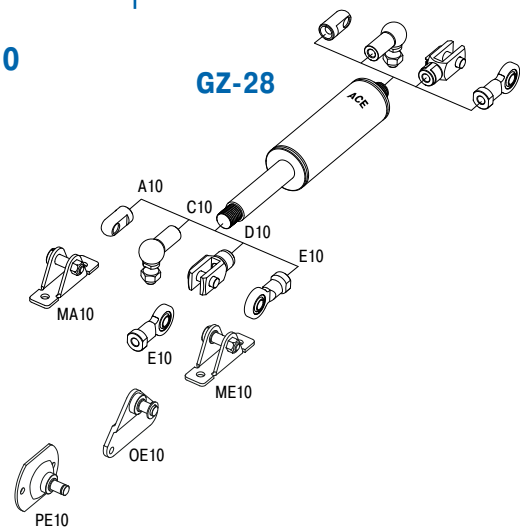
Rod Shroud W10-28





Adjuster Knob
DE-GAS-10
See page 171.

GZ-28



Technical Data

Traction force range: 150 N to 1,200 N (extended up to 1,440 N)

Progression: Approx. 20 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

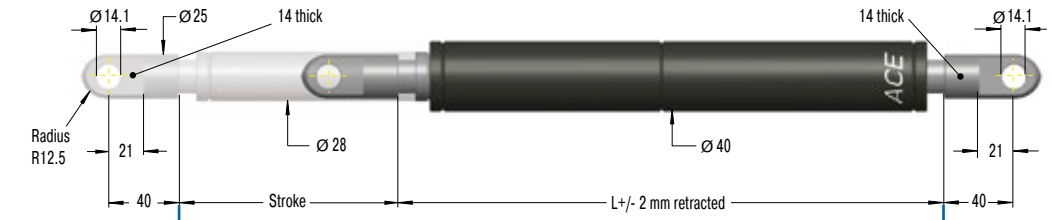
Issue 08.2016 – Specifications subject to change

Industrial Gas Springs – Pull Type GZ-40

Valve Technology, Traction force range 500 N to 5,000 N (extended up to 7,000 N)

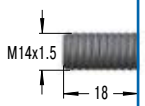
End Fitting | **Standard Dimensions** | **End Fitting**

A14



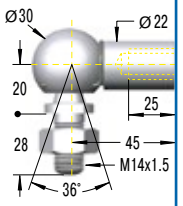
Eye A14
max. force 10,000 N

B14

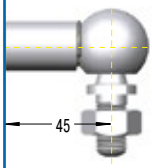


Stud Thread B14

C14



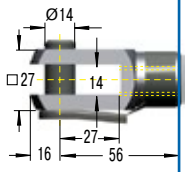
Angle Ball Joint C14
max. force 3,200 N



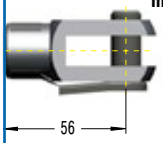
Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-40-100	100	250	5,000
GZ-40-150	150	325	5,000
GZ-40-200	200	400	5,000
GZ-40-250	250	475	5,000
GZ-40-300	300	550	5,000
GZ-40-400	400	700	5,000
GZ-40-500	500	850	5,000
GZ-40-600	600	1,000	5,000

D14



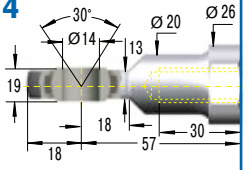
Clevis Fork D14
max. force 10,000 N



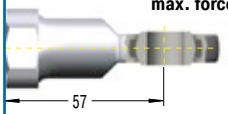
Ordering Example **GZ-40-150-EE-800**

Type (Pull Type)
Body Ø (40 mm)
Stroke (150 mm)
Piston Rod End Fitting E14
Body End Fitting E14
Traction Force F_1 800 N

E14

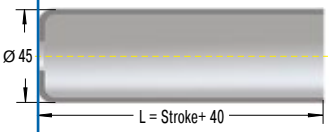


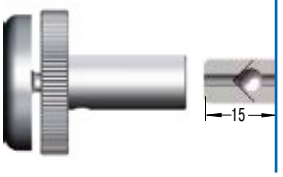
Swivel Eye E14
max. force 10,000 N



Mounting accessories see from page 194.

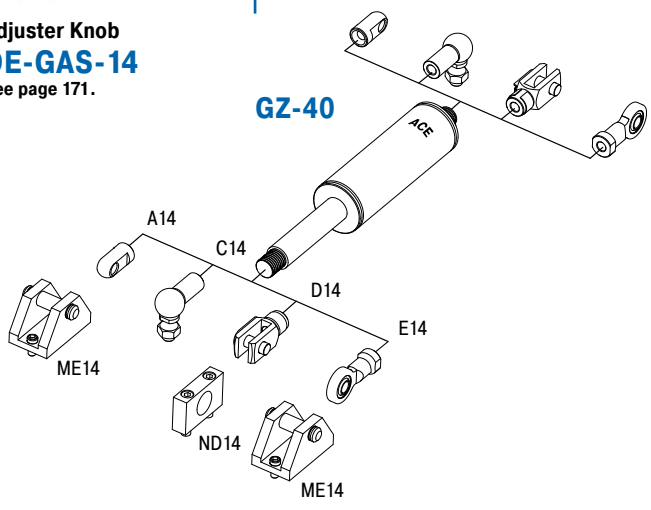
Rod Shroud W14-40





Adjuster Knob
DE-GAS-14
See page 171.

GZ-40



Technical Data

Traction force range: 500 N to 5,000 N (extended up to 7,000 N)

Progression: Approx. 40 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating

Mounting: With piston rod upwards.

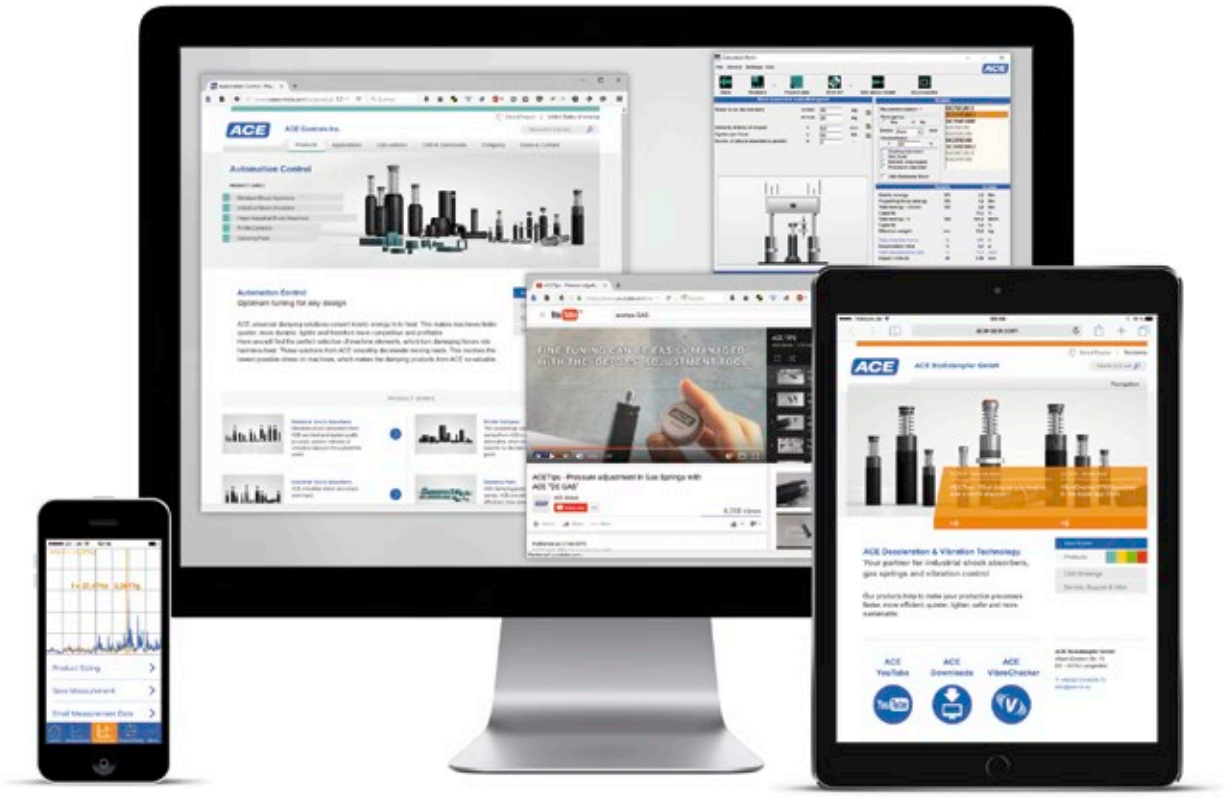
End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop at the end of stroke provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

Issue 08.2016 – Specifications subject to change

ACE Digital Tools



For more information about the calculation service see page 168!

Print catalogue? Everyone can.
ACE offers more:

- Downloads: Product information in many languages
- PC calculation software & online calculation service
- Extensive CAD component libraries
- ACE-YouTube-Channel with video tips
- VibroChecker – awarded free iPhone App

All information on our website: www.ace-ace.com

GZ-15-V4A to GZ-40-VA

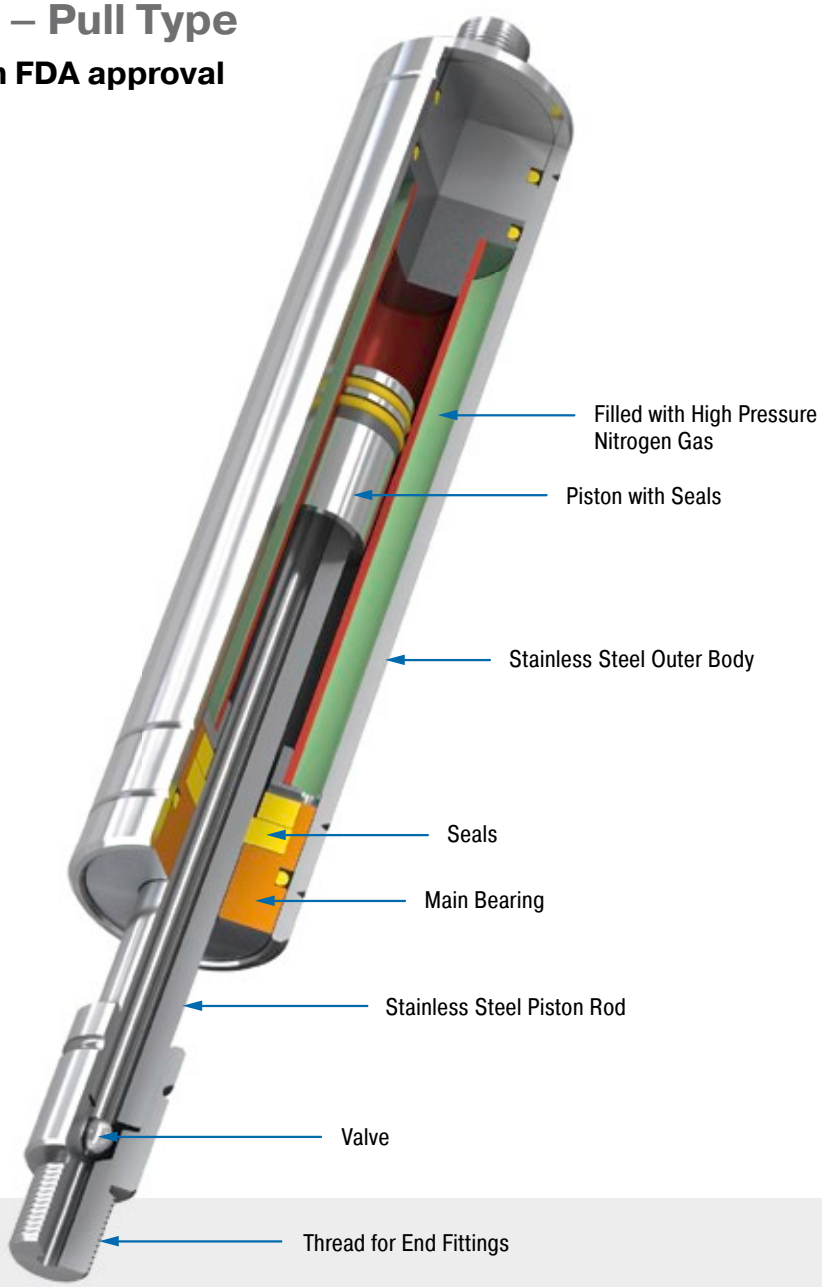
Industrial Gas Springs – Pull Type

Very low progression rate with FDA approval

Brilliant performance when things become tight: For specific use e.g. in tough surroundings or small spaces, the broad spectrum of ACE industrial pull type gas springs made of stainless steel with body diameters from 15 to 40 mm supplements the comprehensive programme of the ACE industrial pull type gas springs with valves.

This high quality design is rust free and is more robust against environmental impact compared with standard gas pull type springs. These stainless steel gas springs are also optically appealing, very durable and available, upon request, in many stroke lengths and are also possible in many extension forces in combination with the suitable stainless steel accessories.

ACE industrial push type springs made of stainless steel are used in industries such as the chemical and food industry, in automobiles, plant engineering and shipbuilding and also in medical, military, environmental and water supply technology.



Technical Data

Traction force range: 40 N to 5,000 N

Piston rod diameter: Ø 4 mm to Ø 28 mm

Progression: Approx. 11 % to 40 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303 and 1.4404/1.4571, AISI 316L/316Ti)

Operating fluid: Nitrogen gas

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop in the pulling direction provided by the customer.

Application field: Hoods, Shutters, Machine housing, Conveyor systems

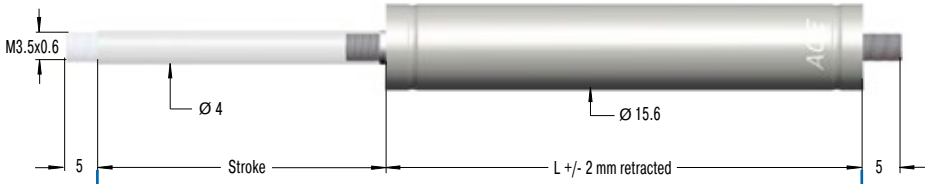
End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

On request: Special oils and other special options. Alternative accessories. Traction gas springs with end position damping also available on request. Other traction gas springs material 1.4404/1.4571, AISI 316L/316Ti (V4A) available on request.

Issue 08.2016 – Specifications subject to change

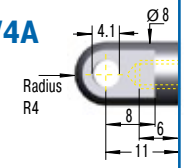
End Fitting — Standard Dimensions — End Fitting

B3,5



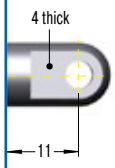
Stud Thread B3,5

A3,5-V4A



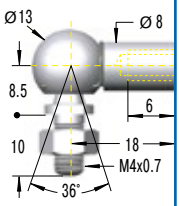
Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-15-20-V4A	20	87	150
GZ-15-40-V4A	40	107	150
GZ-15-50-V4A	50	117	150
GZ-15-60-V4A	60	127	150
GZ-15-80-V4A	80	147	150
GZ-15-100-V4A	100	167	150
GZ-15-120-V4A	120	187	150
GZ-15-150-V4A	150	217	150

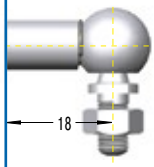


Eye A3,5-V4A
max. force 370 N

C3,5-V4A



Angle Ball Joint C3,5-V4A
max. force 370 N

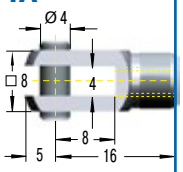


Ordering Example

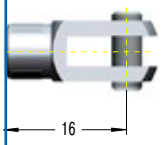
GZ-15-150-AC-150-V4A

- Type (Pull Type)
- Body Ø (15 mm)
- Stroke (150 mm)
- Piston Rod End Fitting A3,5-V4A
- Body End Fitting C3,5-V4A
- Traction Force F_1 150 N
- Material (1.4404/1.4571, AISI 316L/316Ti, V4A)

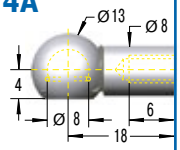
D3,5-V4A



Clevis Fork D3,5-V4A
max. force 370 N

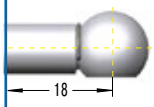


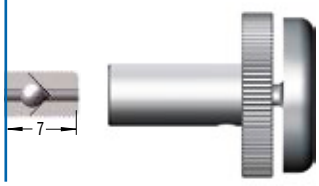
G3,5-V4A



Mounting accessories see from page 202.

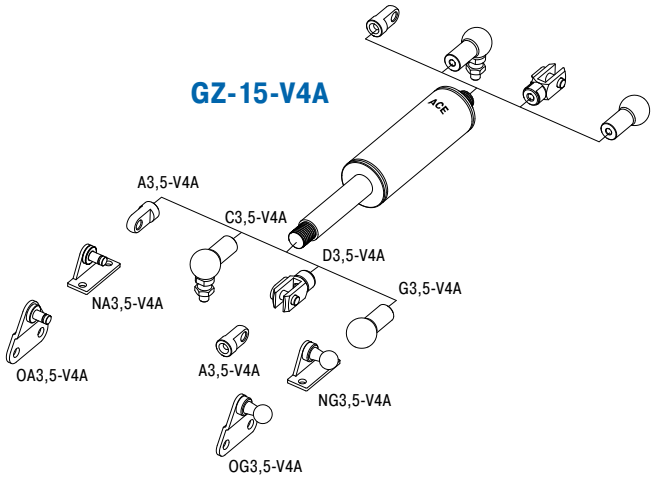
Ball Socket G3,5-V4A
max. force 370 N





Adjuster Knob
DE-GAS-3,5
See page 171.

GZ-15-V4A



Technical Data

Traction force range: 50 N to 150 N (extended up to 185 N)

Progression: Approx. 23 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, Piston rod, End fittings: Stainless steel (1.4404/1.4571, AISI 316L/316Ti)

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop in the pulling direction provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

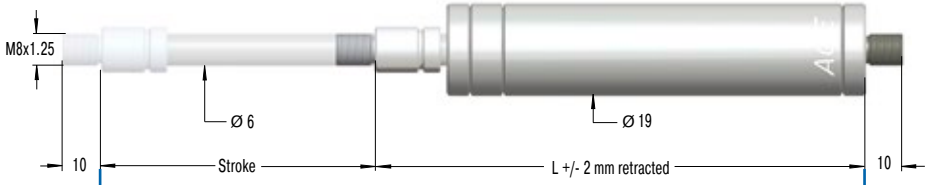
Issue 08.2016 – Specifications subject to change

End Fitting

Standard Dimensions

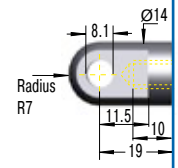
End Fitting

B8



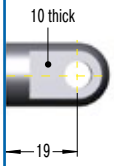
Stud Thread B8

A8-VA

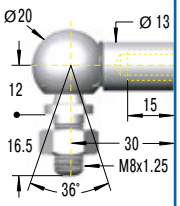


Eye A8-VA

max. force 1,560 N

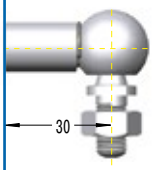


C8-VA



Angle Ball Joint C8-VA

max. force 1,140 N



Performance and Dimensions

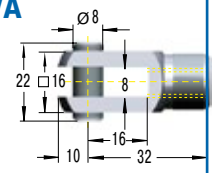
TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-19-30-VA	30	130	300
GZ-19-50-VA	50	150	300
GZ-19-100-VA	100	200	300
GZ-19-150-VA	150	250	300
GZ-19-200-VA	200	300	300
GZ-19-250-VA	250	350	300

Ordering Example

GZ-19-150-AC-150-VA

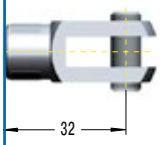
- Type (Pull Type)
- Body Ø (19 mm)
- Stroke (150 mm)
- Piston Rod End Fitting A8-VA
- Body End Fitting C8-VA
- Traction Force F_1 150 N
- Material (1.4301/1.4305, AISI 304/303, VA)

D8-VA

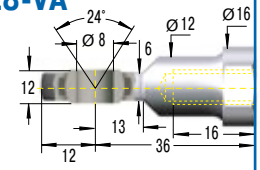


Clevis Fork D8-VA

max. force 1,560 N

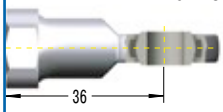


E8-VA



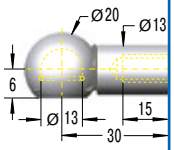
Swivel Eye E8-VA

max. force 1,560 N



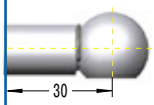
Mounting accessories see from page 202.

G8-VA

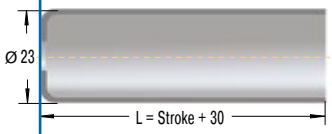


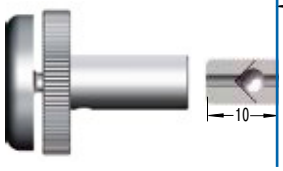
Ball Socket G8-VA

max. force 1,140 N



Rod Shroud W8-19-VA

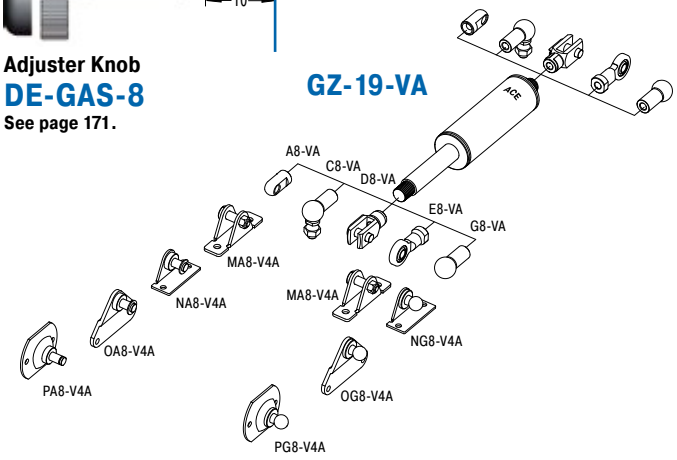




Adjuster Knob DE-GAS-8

See page 171.

GZ-19-VA



Technical Data

Traction force range: 40 N to 350 N (extended up to 448 N)

Progression: Approx. 21 % to 28 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

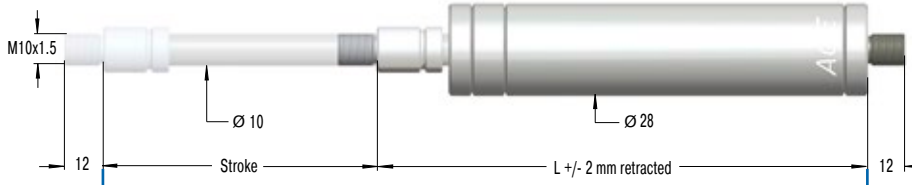
Positive stop: External positive stop in the pulling direction provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

Issue 08.2016 – Specifications subject to change

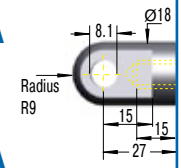
End Fitting — Standard Dimensions — End Fitting

B10



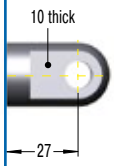
Stud Thread B10

A10-VA

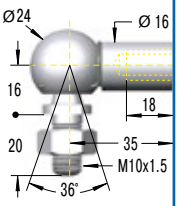


Eye A10-VA

max. force 3,800 N

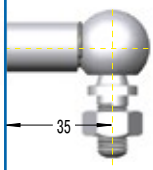


C10-VA

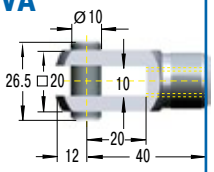


Angle Ball Joint C10-VA

max. force 1,750 N

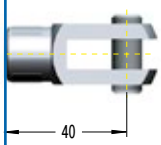


D10-VA

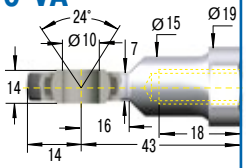


Clevis Fork D10-VA

max. force 3,800 N

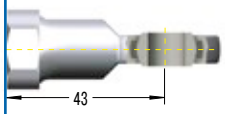


E10-VA



Swivel Eye E10-VA

max. force 3,800 N



Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-28-50-VA	50	165	1,200
GZ-28-100-VA	100	215	1,200
GZ-28-150-VA	150	265	1,200
GZ-28-200-VA	200	315	1,200
GZ-28-250-VA	250	365	1,200
GZ-28-300-VA	300	415	1,200
GZ-28-350-VA	350	465	1,200
GZ-28-400-VA	400	515	1,200
GZ-28-450-VA	450	565	1,200
GZ-28-500-VA	500	615	1,200
GZ-28-550-VA	550	665	1,200
GZ-28-600-VA	600	715	1,200

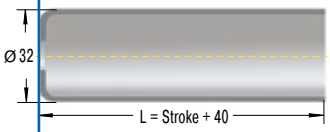
Ordering Example

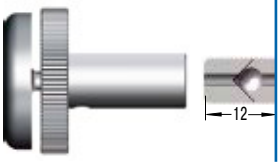
GZ-28-150-EE-800-VA

- Type (Pull Type)
- Body Ø (28 mm)
- Stroke (150 mm)
- Piston Rod End Fitting E10-VA
- Body End Fitting E10-VA
- Traction Force F_1 800 N
- Material (1.4301/1.4305, AISI 304/303, VA)

Mounting accessories see from page 202.

Rod Shroud W10-28-VA

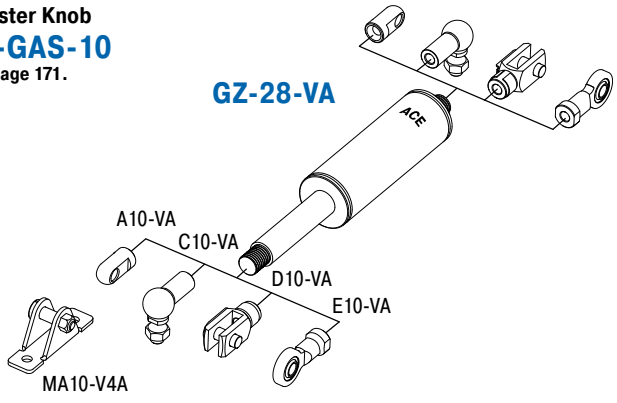




Adjuster Knob DE-GAS-10

See page 171.

GZ-28-VA



Technical Data

Traction force range: 150 N to 1,200 N (extended up to 1,460 N)

Progression: Approx. 22 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop in the pulling direction provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

Issue 08.2016 – Specifications subject to change

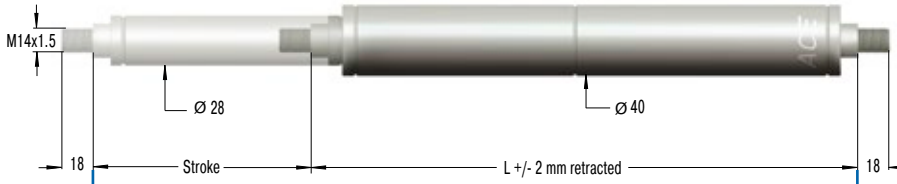
Valve Technology, Stainless Steel, Traction force range 500 N to 5,000 N (ext. up to 7,000 N)

End Fitting

Standard Dimensions

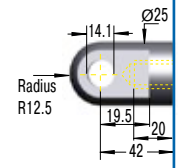
End Fitting

B14

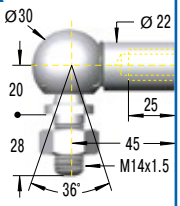


Stud Thread B14

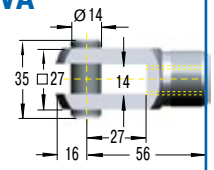
A14-VA



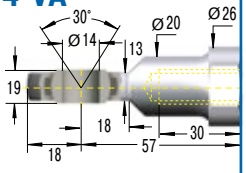
C14-VA



D14-VA



E14-VA



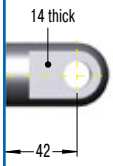
Performance and Dimensions

TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-40-100-VA	100	250	5,000
GZ-40-150-VA	150	325	5,000
GZ-40-200-VA	200	400	5,000
GZ-40-250-VA	250	475	5,000
GZ-40-300-VA	300	550	5,000
GZ-40-400-VA	400	700	5,000
GZ-40-500-VA	500	850	5,000
GZ-40-600-VA	600	1,000	5,000

Ordering Example GZ-40-150-EE-800-VA

- Type (Pull Type)
- Body Ø (40 mm)
- Stroke (150 mm)
- Piston Rod End Fitting E14-VA
- Body End Fitting E14-VA
- Traction Force F_1 800 N
- Material (1.4301/1.4305, AISI 304/303, VA)

Mounting accessories see from page 202.

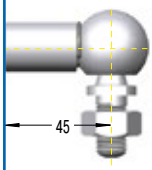


Eye A14-VA

max. force 7,000 N

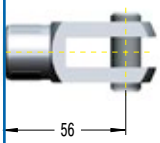
Angle Ball Joint C14-VA

max. force 3,200 N



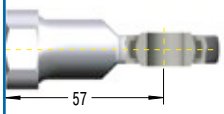
Clevis Fork D14-VA

max. force 7,000 N

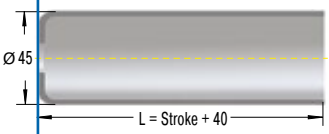


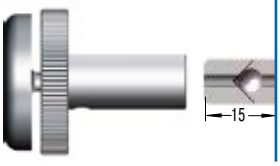
Swivel Eye E14-VA

max. force 7,000 N



Rod Shroud W14-40-VA

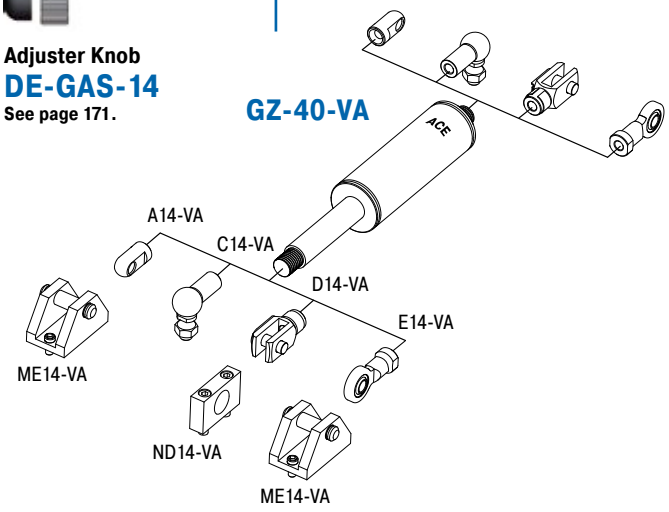




Adjuster Knob DE-GAS-14

See page 171.

GZ-40-VA



Technical Data

Traction force range: 500 N to 5,000 N (extended up to 7,000 N)

Progression: Approx. 40 %

Lifetime: Approx. 2,000 m

Operating temperature range: -20 °C to +80 °C

Material: Outer body, Piston rod, End fittings: Stainless steel (1.4301/1.4305, AISI 304/303)

Mounting: With piston rod upwards.

End position damping length: Without damping. For end position damping use damping material (e.g. TUBUS or SLAB).

Positive stop: External positive stop in the pulling direction provided by the customer.

End fittings: They are interchangeable and must be positively secured by the customer to prevent unscrewing.

Issue 08.2016 – Specifications subject to change

Further Stainless Steel Gas Springs (Pull Type), V4A

Performance			
TYPES	Stroke **mm**	L retracted **mm**	Dimensions see Page
GZ-19-30-V4A	30	130	164
GZ-19-50-V4A	50	150	164
GZ-19-150-V4A	150	250	164
GZ-19-200-V4A	200	300	164
GZ-19-250-V4A	250	350	164
GZ-28-50-V4A	50	165	165
GZ-28-100-V4A	100	215	165
GZ-28-150-V4A	150	265	165
GZ-28-200-V4A	200	315	165
GZ-28-250-V4A	250	365	165
GZ-28-300-V4A	300	415	165
GZ-28-350-V4A	350	465	165
GZ-28-400-V4A	400	515	165
GZ-28-450-V4A	450	565	165
GZ-28-500-V4A	500	615	165
GZ-28-550-V4A	550	665	165
GZ-28-600-V4A	600	715	165
GZ-40-100-V4A	100	250	166
GZ-40-150-V4A	150	325	166
GZ-40-200-V4A	200	400	166
GZ-40-250-V4A	250	475	166
GZ-40-300-V4A	300	550	166
GZ-40-400-V4A	400	700	166
GZ-40-500-V4A	500	850	166
GZ-40-600-V4A	600	1,000	166

Further Stainless Steel Accessories, V4A

End Fittings	
TYPES	Dimensions see Page
A5-V4A	204
C5-V4A	204
D5-V4A	204
E5-V4A	204
G5-V4A	204
A8-V4A	205
C8-V4A	205
D8-V4A	205
E8-V4A	205
G8-V4A	206

End Fittings	
TYPES	Dimensions see Page
A10-V4A	206
C10-V4A	206
D10-V4A	206
E10-V4A	206
A14-V4A	207
C14-V4A	207
D14-V4A	207
E14-V4A	207