

# Industrial Gas Springs – Push Type

## Lifting and lowering for smart people

**Anyone who wants to lift or lower loads with control and without excessive strength relies on the industrial gas push type springs from ACE. These maintenance-free, ready-to-install machine elements, which are available from stock, support sheer muscle power and reliably open and hold.**

Available with body diameters of 8 to 70 mm and forces from 10 to 13,000 N, ACE gas push type springs are characterised by a huge variety and maximum service life. The first is achieved thanks to the number of available connections and fittings for simple attachment and the latter with high quality design and materials. Whether they are made of steel or stainless steel, these components make any work easier and also make a particularly good impression visually in every branch.

Ready-to-install and universally applicable

Modular end fittings and mounting brackets

Calculation program for individual design

No own construction costs

Maintenance-free

Available with valve ex stock



## Function of a Gas Spring – Push Type

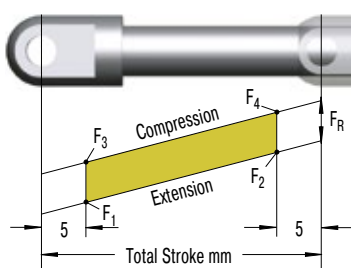
ACE gas springs are individually filled to a predetermined pressure to suit a customer's requirement (extension Force  $F_1$ ). The cross-sectional area of the piston rod and filling pressure determines the extension force.

During the compression of the piston rod, nitrogen flows through an orifice in the piston from the full bore side of the piston to the annulus. The nitrogen is compressed by the volume of the piston rod. As the piston rod is compressed the pressure increases, so increasing the reaction force (progression). The force depends on the proportional relationship between the piston rod and the inner tube diameter, which is approximately linear.

### Calculation Principles

#### Force-Stroke Characteristics of Gas Spring (Push Type)

Free calculation service see page 168!



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

$F_2$  = force in the complete compressed position

When compressing the piston rod, there is an additional friction force caused by the contact pressure of the seals (this **only** occurs **during the compression stroke**):

$F_3$  = force at the beginning of the compression stroke

$F_4$  = force at the end of the compression stroke

#### Gas Springs (Push Type)

Type	Progression approx. %	<sup>1</sup> Friction $F_R$ approx. in N
GS-8	28	10
GS-10	20	10
GS-12	25	20
GS-15	27	20
GS-19	26 - 39 <sup>2</sup>	30
GS-22	30 - 40 <sup>2</sup>	30
GS-28	58 - 67 <sup>2</sup>	40
GS-40	37 - 49 <sup>2</sup>	50
GS-70	25	50

<sup>1</sup> Depending on the filling force

<sup>2</sup> 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 temperature:** 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 – Push Type



### GS-8 to GS-70

Valve Technology

**Individual stroke length and extension forces**

Hoods, Shutters, Machine housing, Conveyor systems

Page 130



### GS-8-V4A to GS-40-VA

Valve Technology, Stainless Steel

**With food grade oil according to FDA approval**

Hoods, Shutters, Machine housing, Conveyor systems

Page 140



### GST-40 Tandem

Valve Technology

**Optimised dual force for heavy flaps and wide angle applications**

Hoods, Shutters, Machine housing, Conveyor systems

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## GS-8 to GS-70

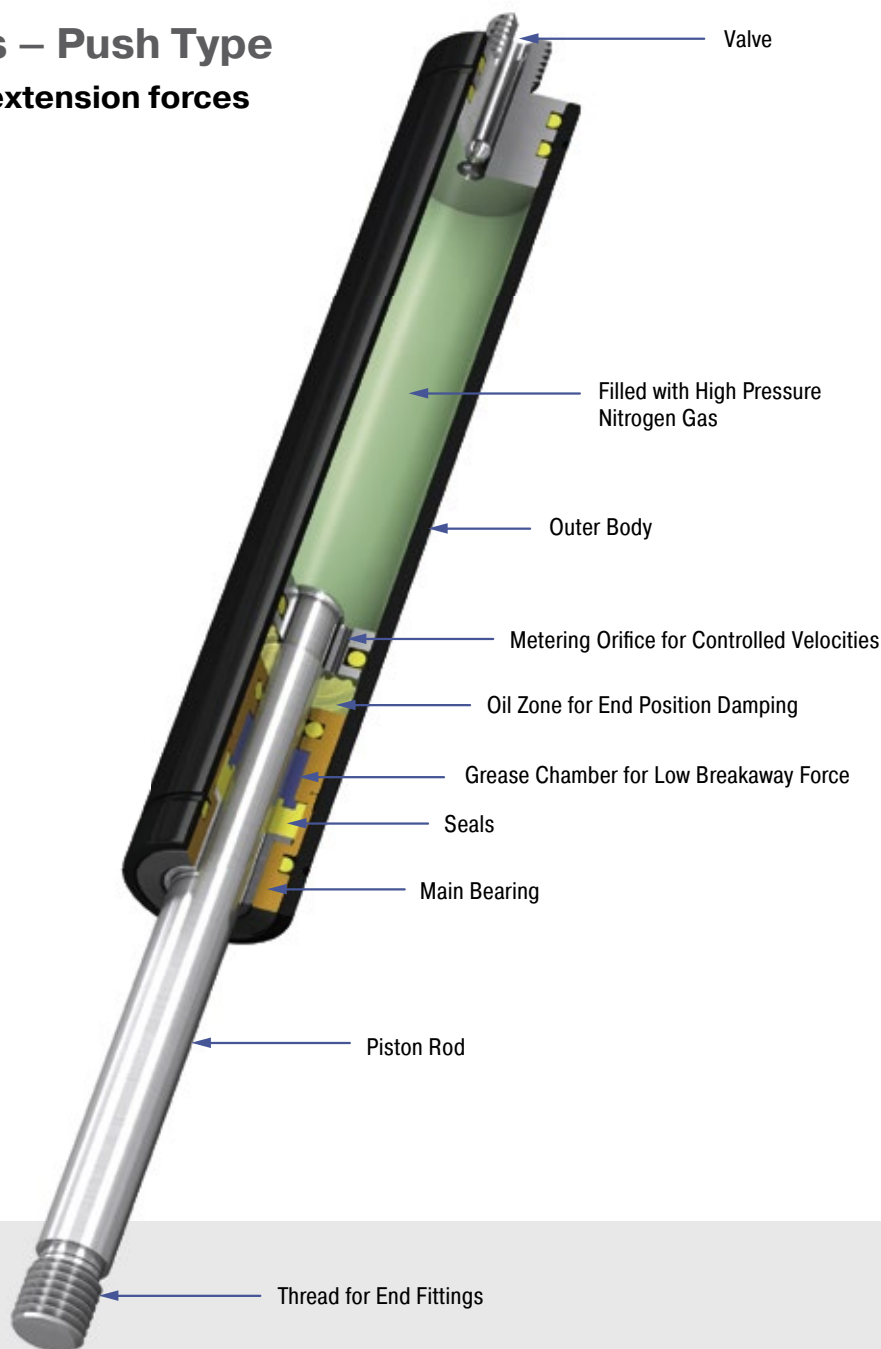
### Industrial Gas Springs – Push Type

#### Individual stroke length and extension forces

Universal and tailor made: ACE industrial gas push type springs of the NEWTONLINE family offer perfect support of muscle power with forces from 10 to 13,000 N with body diameter of 8 to 70 mm. With their high quality features the NEWTONLINE gas springs form the industry standard. These durable and sealed systems are ready for installation, maintenance-free and filled with pressurised nitrogen gas.

They are supplied filled according to individual customer pressure requirements and maybe adjusted later by use of the inbuilt valve. The free of charge ACE calculation service designs the gas springs with mounting points specifically for the particular application. A variety of additional components makes assembly even easier and allows universal application of the gas springs.

ACE industrial gas push type springs are used in industrial applications, mechanical engineering and medical technology as well as in the electronics, automobile and furniture industries.



#### Technical Data

**Force range:** 10 N to 13,000 N

**Piston rod diameter:** Ø 3 mm to Ø 30 mm

**Progression:** Approx. 20 % to 67 %  
(depending on size and stroke)

**Lifetime:** Approx. 10,000 m

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

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

**Operating fluid:** Nitrogen gas and oil

**Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 5 mm to 70 mm (depending on the stroke)

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

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

**Note:** Increased break-away force if unit has not moved for some time.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

**On request:** Special oils and other special options. Alternative accessories. Different end position damping and extension speed.

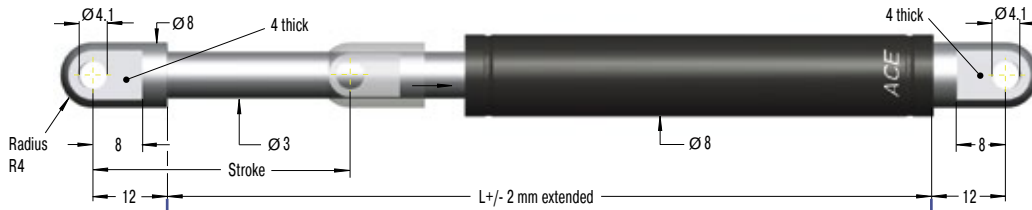
Valve Technology, Force range 10 N to 100 N (compressed up to 130 N)

### End Fitting

### Standard Dimensions

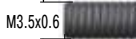
### End Fitting

**A3,5**



**Eye A3,5**  
max. force 370 N

**B3,5**

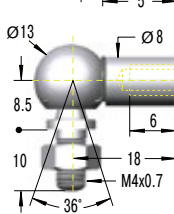


### Performance and Dimensions

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-8-20	20	72	100
GS-8-30	30	92	100
GS-8-40	40	112	100
GS-8-50	50	132	100
GS-8-60	60	152	100
GS-8-80	80	192	100

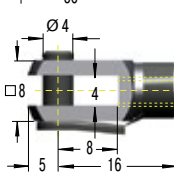
**Stud Thread B3,5**

**C3,5**



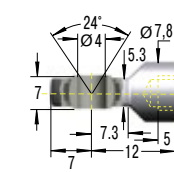
**Angle Ball Joint C3,5**  
max. force 370 N

**D3,5**



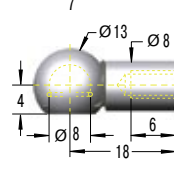
**Clevis Fork D3,5**  
max. force 370 N

**E3,5**



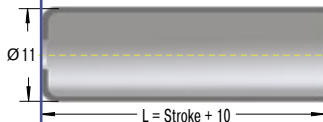
**Swivel Eye E3,5**  
max. force 370 N

**G3,5**



**Ball Socket G3,5**  
max. force 370 N

**Rod Shroud W3,5-8**

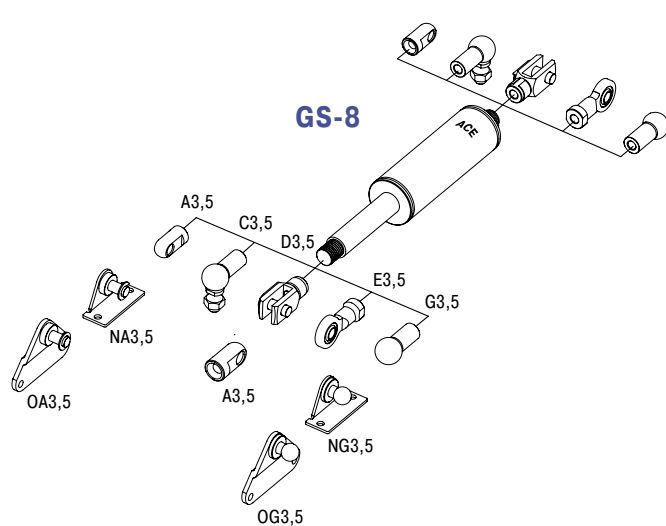


### Ordering Example

**GS-8-30-AC-30**

Type (Push Type) \_\_\_\_\_  
 Body Ø (8 mm) \_\_\_\_\_  
 Stroke (30 mm) \_\_\_\_\_  
 Piston Rod End Fitting A3,5 \_\_\_\_\_  
 Body End Fitting C3,5 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 30 N \_\_\_\_\_

Mounting accessories see from page 194.



### Technical Data

**Force range:** 10 N to 100 N (compressed up to 130 N)

**Progression:** Approx. 28 %

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

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

**Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 5 mm (depending on the stroke)

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

**Note:** Increased break-away force if unit has not moved for some time.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

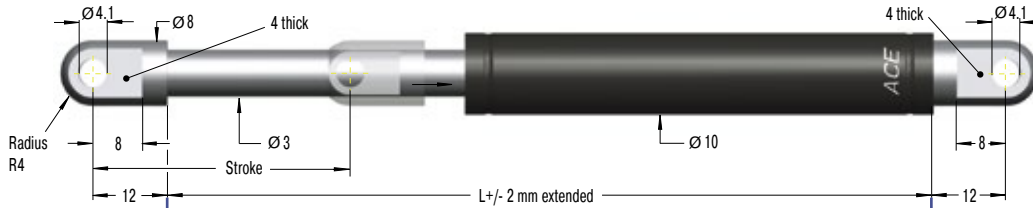
Valve Technology, Force range 10 N to 100 N (compressed up to 120 N)

End Fitting

Standard Dimensions

End Fitting

A3,5



Eye A3,5  
max. force 370 N

B3,5

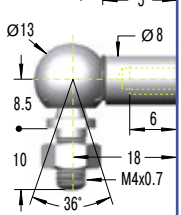


Performance and Dimensions

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-10-20	20	72	100
GS-10-30	30	92	100
GS-10-40	40	112	100
GS-10-50	50	132	100
GS-10-60	60	152	100
GS-10-80	80	192	100

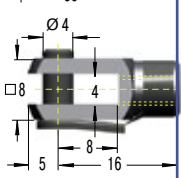
Stud Thread B3,5

C3,5



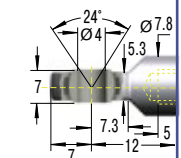
Angle Ball Joint C3,5  
max. force 370 N

D3,5



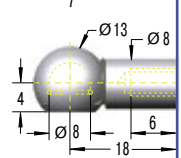
Clevis Fork D3,5  
max. force 370 N

E3,5



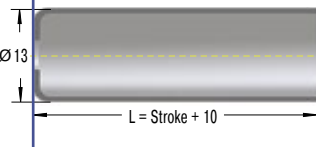
Swivel Eye E3,5  
max. force 370 N

G3,5



Ball Socket G3,5  
max. force 370 N

Rod Shroud W3,5-10

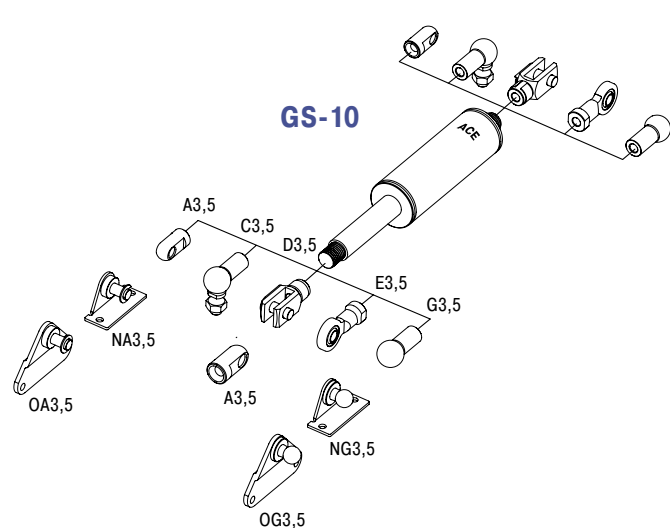


Ordering Example

GS-10-80-AC-60

Type (Push Type) \_\_\_\_\_  
 Body Ø (10 mm) \_\_\_\_\_  
 Stroke (80 mm) \_\_\_\_\_  
 Piston Rod End Fitting A3,5 \_\_\_\_\_  
 Body End Fitting C3,5 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 60 N \_\_\_\_\_

Mounting accessories see from page 194.



Technical Data

**Force range:** 10 N to 100 N (compressed up to 120 N)

**Progression:** Approx. 28 %

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

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

**Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 5 mm (depending on the stroke)

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

**Note:** Increased break-away force if unit has not moved for some time.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

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

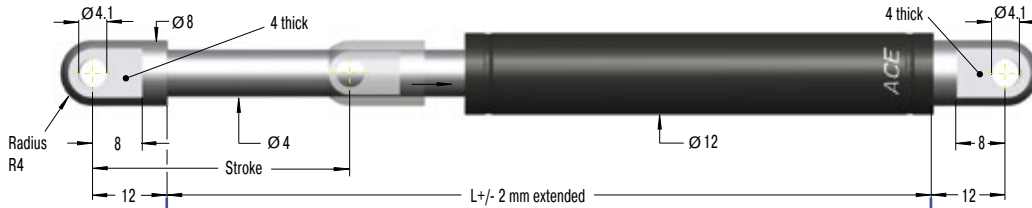
Valve Technology, Force range 15 N to 180 N (compressed up to 225 N)

### End Fitting

### Standard Dimensions

### End Fitting

A3,5



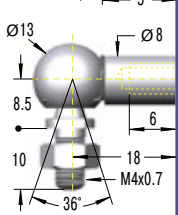
Eye A3,5  
max. force 370 N

B3,5



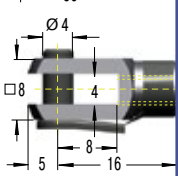
Stud Thread B3,5

C3,5



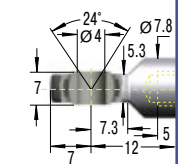
Angle Ball Joint C3,5  
max. force 370 N

D3,5



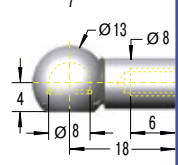
Clevis Fork D3,5  
max. force 370 N

E3,5



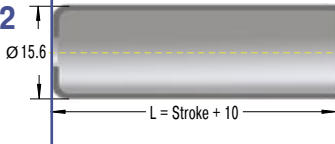
Swivel Eye E3,5  
max. force 370 N

G3,5



Ball Socket G3,5  
max. force 370 N

Rod Shroud W3,5-12



### Performance and Dimensions

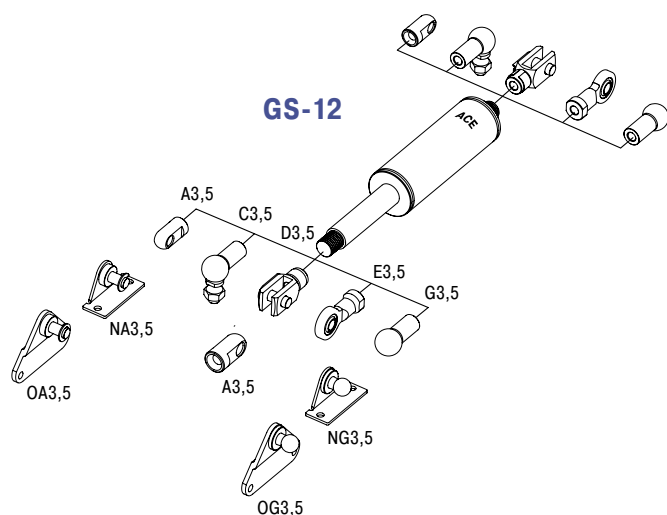
TYPES	Stroke mm	L extended mm	Force Range max. N
GS-12-20	20	72	180
GS-12-30	30	92	180
GS-12-40	40	112	180
GS-12-50	50	132	180
GS-12-60	60	152	180
GS-12-80	80	192	150
GS-12-100	100	232	150
GS-12-120	120	272	120
GS-12-150	150	332	100

### Ordering Example

GS-12-100-AA-30

Type (Push Type) \_\_\_\_\_  
 Body Ø (12 mm) \_\_\_\_\_  
 Stroke (100 mm) \_\_\_\_\_  
 Piston Rod End Fitting A3,5 \_\_\_\_\_  
 Body End Fitting A3,5 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 30 N \_\_\_\_\_

Mounting accessories see from page 194.



### Technical Data

**Force range:** 15 N to 180 N (compressed up to 225 N)

**Progression:** Approx. 25 %

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

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

**Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 10 mm (depending on the stroke)

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

**Note:** Increased break-away force if unit has not moved for some time.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

Valve Technology, Force range 40 N to 400 N (compressed up to 500 N)

End Fitting

Standard Dimensions

End Fitting

**A5**

Radius R5

Stroke

6 thick

Ø 6.1

Ø 10

Ø 6

Ø 15.6

L +/- 2 mm extended

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-15-20	20	67	400
GS-15-40	40	107	400
GS-15-50	50	127	400
GS-15-60	60	147	400
GS-15-80	80	187	400
GS-15-100	100	227	400
GS-15-120	120	267	400
GS-15-150	150	327	400
GS-15-200	200	427	400

**B5**

M5x0.8

5

**C5**

Ø 13

8

10

22

M5x0.8

36°

**D5**

Ø 5

10

5

20

**E5**

24°

Ø 6

4.5

12

30

12

**F5**

M5x0.8

45°

AF13

Ø 8

10

**G5**

Ø 13

4.5

Ø 8

12

22

**Ordering Example**

**GS-15-150-AC-150**

Type (Push Type) \_\_\_\_\_

Body Ø (15.6 mm) \_\_\_\_\_

Stroke (150 mm) \_\_\_\_\_

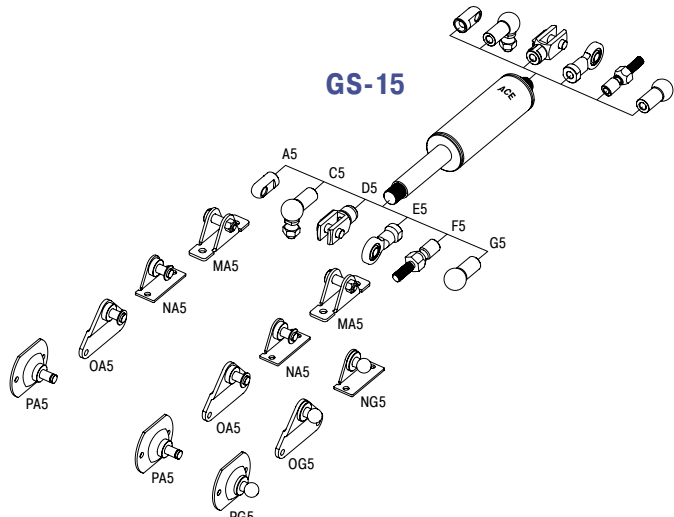
Piston Rod End Fitting A5 \_\_\_\_\_

Body End Fitting C5 \_\_\_\_\_

Nominal Force F<sub>1</sub> 150 N \_\_\_\_\_

**Mounting accessories see from page 194.**

**Adjuster Knob DE-GAS-5**  
See page 171.



Technical Data

- Force range:** 40 N to 400 N (compressed up to 500 N)
- Progression:** Approx. 27 %
- Operating temperature range:** -20 °C to +80 °C
- Material:** Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
- Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 10 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Increased break-away force if unit has not moved for some time.
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

Issue 08.2016 – Specifications subject to change

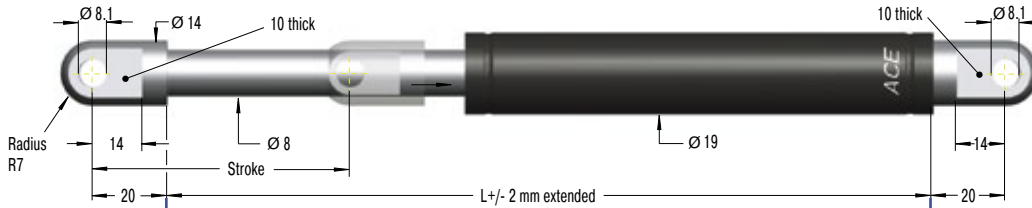
Valve Technology, Force range 50 N to 700 N (compressed up to 970 N)

### End Fitting

### Standard Dimensions

### End Fitting

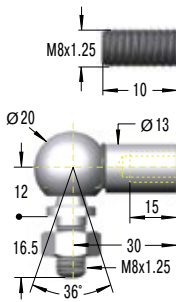
**A8**



**Eye A8**  
max. force 3,000 N

**B8**

**C8**



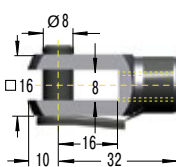
### Performance and Dimensions

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-19-50	50	164	700
GS-19-100	100	264	700
GS-19-150	150	364	700
GS-19-200	200	464	700
GS-19-250	250	564	700
GS-19-300	300	664	700

**Stud Thread B8**

**Angle Ball Joint C8**  
max. force 1,200 N

**D8**



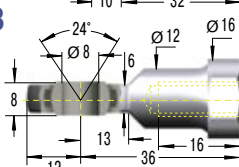
### Ordering Example

**GS-19-150-AC-600**

Type (Push Type) \_\_\_\_\_  
 Body Ø (19 mm) \_\_\_\_\_  
 Stroke (150 mm) \_\_\_\_\_  
 Piston Rod End Fitting A8 \_\_\_\_\_  
 Body End Fitting C8 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 600 N \_\_\_\_\_

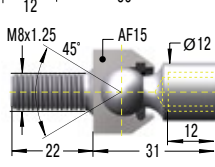
**Clevis Fork D8**  
max. force 3,000 N

**E8**



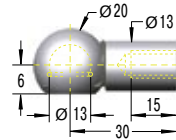
**Swivel Eye E8**  
max. force 3,000 N

**F8**



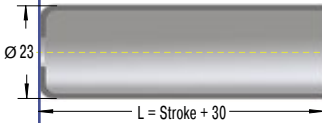
**Inline Ball Joint F8**  
max. force 1,200 N

**G8**



**Ball Socket G8**  
max. force 1,200 N

**Rod Shroud W8-19**



Mounting accessories see from page 194.

**Adjuster Knob DE-GAS-8**  
See page 171.

### Technical Data

**Force range:** 50 N to 700 N (compressed up to 970 N)

**Progression:** Approx. 26 % to 39 %

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

**Material:** Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel

**Mounting:** In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

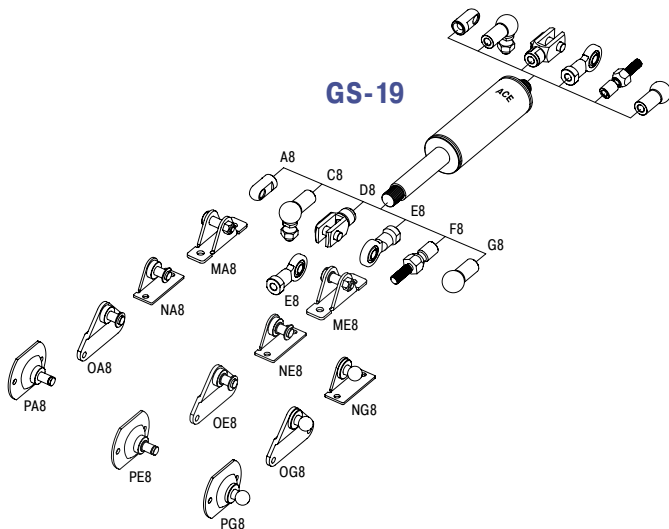
**End position damping length:** Approx. 20 mm to 60 mm (depending on the stroke)

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

**Note:** Integrated grease chamber reduces friction and wear and optimises lubrication.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.





Valve Technology, Force range 80 N to 1,300 N (compressed up to 1,820 N)

End Fitting

Standard Dimensions

End Fitting

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-22-50	50	164	1,300
GS-22-100	100	264	1,300
GS-22-150	150	364	1,300
GS-22-200	200	464	1,300
GS-22-250	250	564	1,300
GS-22-300	300	664	1,300
GS-22-350	350	764	1,300
GS-22-400	400	864	1,300
GS-22-450	450	964	1,300
GS-22-500	500	1,064	1,300
GS-22-550	550	1,164	1,300
GS-22-600	600	1,264	1,300
GS-22-650	650	1,364	1,300
GS-22-700	700	1,464	1,300

**Ordering Example**

GS-22-150-AE-800

Type (Push Type) \_\_\_\_\_

Body Ø (23 mm) \_\_\_\_\_

Stroke (150 mm) \_\_\_\_\_

Piston Rod End Fitting A8 \_\_\_\_\_

Body End Fitting E8 \_\_\_\_\_

Nominal Force F<sub>1</sub> 800 N \_\_\_\_\_

**Eye A8**  
max. force 3,000 N

**Stud Thread B8**

**Angle Ball Joint C8**  
max. force 1,200 N

**Clevis Fork D8**  
max. force 3,000 N

**Swivel Eye E8**  
max. force 3,000 N

**Inline Ball Joint F8**  
max. force 1,200 N

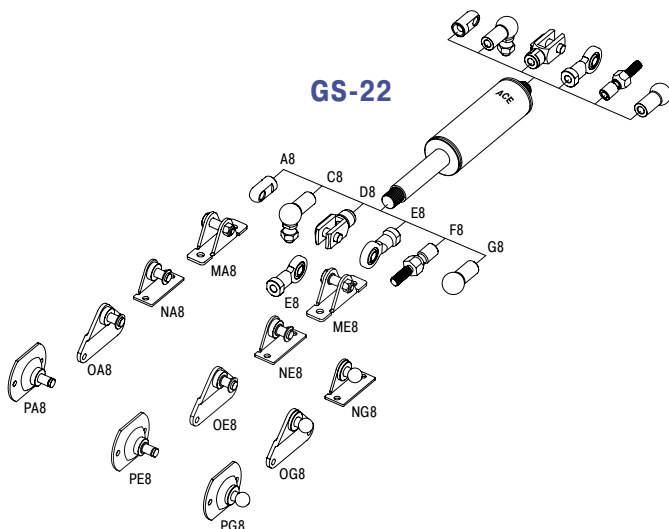
**Ball Socket G8**  
max. force 1,200 N

**Adjuster Knob DE-GAS-8**  
See page 171.

Mounting accessories see from page 194.

Technical Data

- Force range:** 80 N to 1,300 N (compressed up to 1,820 N)
- Progression:** Approx. 30 % to 40 %
- Operating temperature range:** -20 °C to +80 °C
- Material:** Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel
- Mounting:** In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 20 mm to 70 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Integrated grease chamber reduces friction and wear and optimises lubrication.
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

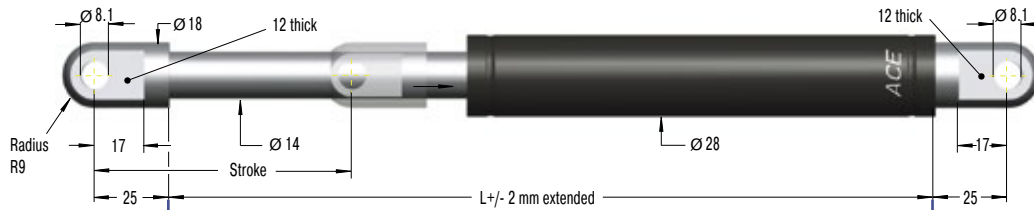


Valve Technology, Force range 150 N to 2,500 N (compressed up to 4,175 N)

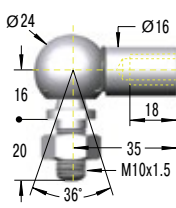
### End Fitting

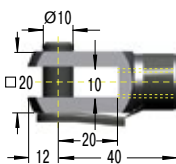
### Standard Dimensions

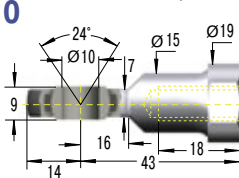
### End Fitting

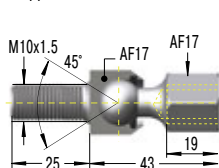
**A10**

**Eye A10**  
max. force 10,000 N

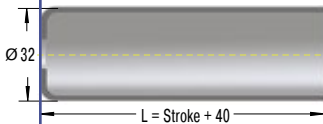
**B10**

**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

**F10**

**Inline Ball Joint F10**  
max. force 1,800 N

**Rod Shroud W10-28**


### Performance and Dimensions

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-28-100	100	262	2,500
GS-28-150	150	362	2,500
GS-28-200	200	462	2,500
GS-28-250	250	562	2,500
GS-28-300	300	662	2,500
GS-28-350	350	762	2,500
GS-28-400	400	862	2,500
GS-28-450	450	962	2,500
GS-28-500	500	1,062	2,500
GS-28-550	550	1,162	2,500
GS-28-600	600	1,262	2,500
GS-28-650	650	1,362	2,500
GS-28-700	700	1,462	2,500
GS-28-750	750	1,562	2,500

### Ordering Example

**GS-28-150-EE-1200**

Type (Push Type) \_\_\_\_\_  
 Body Ø (28 mm) \_\_\_\_\_  
 Stroke (150 mm) \_\_\_\_\_  
 Piston Rod End Fitting E10 \_\_\_\_\_  
 Body End Fitting E10 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 1200 N \_\_\_\_\_

Mounting accessories see from page 194.

**Adjuster Knob**  
**DE-GAS-10**

See page 171.

### Technical Data

**Force range:** 150 N to 2,500 N (compressed up to 4,175 N)

**Progression:** Approx. 58 % to 67 %

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

**Material:** Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel

**Mounting:** In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

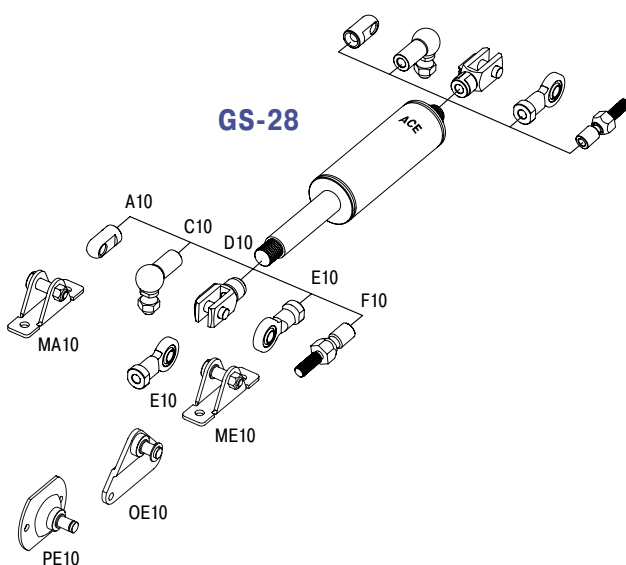
**End position damping length:** Approx. 30 mm to 70 mm (depending on the stroke)

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

**Note:** Integrated grease chamber reduces friction and wear and optimises lubrication.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.



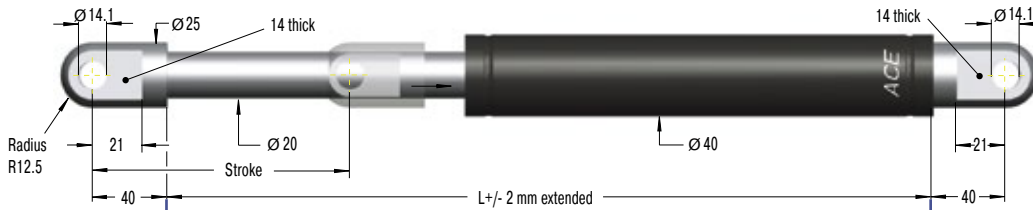
Valve Technology, Force range 500 N to 5,000 N (compressed up to 7,450 N)

End Fitting

Standard Dimensions

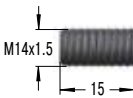
End Fitting

A14



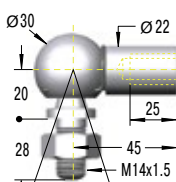
Eye A14  
max. force 10,000 N

B14



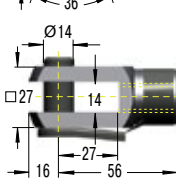
Stud Thread B14

C14



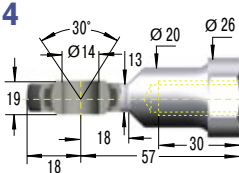
Angle Ball Joint C14  
max. force 3,200 N

D14



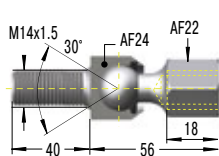
Clevis Fork D14  
max. force 10,000 N

E14



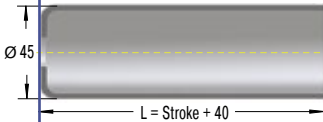
Swivel Eye E14  
max. force 10,000 N

F14



Inline Ball Joint F14  
max. force 3,200 N

Rod Shroud W14-40



Performance and Dimensions

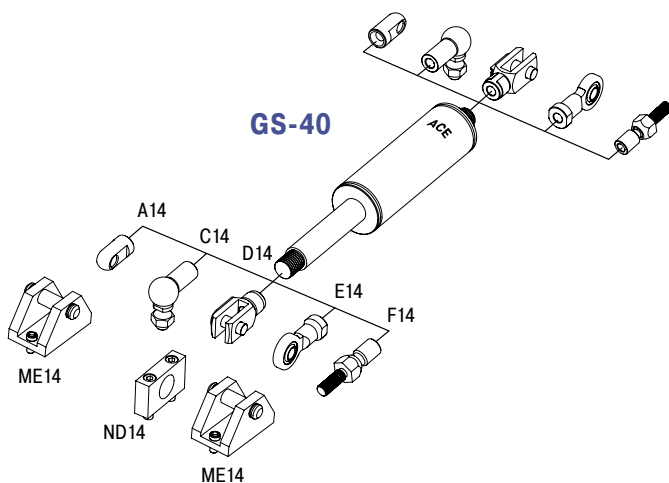
TYPES	Stroke mm	L extended mm	Force Range max. N
GS-40-100	100	317	5,000
GS-40-150	150	417	5,000
GS-40-200	200	517	5,000
GS-40-250	250	617	5,000
GS-40-300	300	717	5,000
GS-40-400	400	917	5,000
GS-40-500	500	1,117	5,000
GS-40-600	600	1,317	5,000
GS-40-800	800	1,717	5,000
GS-40-1000	1,000	2,117	5,000

Ordering Example

GS-40-150-DD-3500

Type (Push Type) \_\_\_\_\_  
 Body Ø (40 mm) \_\_\_\_\_  
 Stroke (150 mm) \_\_\_\_\_  
 Piston Rod End Fitting D14 \_\_\_\_\_  
 Body End Fitting D14 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 3500 N \_\_\_\_\_

Mounting accessories see from page 194.



Technical Data

**Force range:** 500 N to 5,000 N (compressed up to 7,450 N)

**Progression:** Approx. 37 % to 49 %

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

**Material:** Outer body: Steel coated with UV paint; Piston rod: Steel with wear-resistant coating; End fittings: Zinc plated steel

**Mounting:** In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 30 mm to 70 mm (depending on the stroke)

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

**Note:** Integrated grease chamber reduces friction and wear and optimises lubrication.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.

Adjuster Knob  
DE-GAS-14

See page 171.

Valve Technology, Force range 2,000 N to 13,000 N (compressed up to 16,250 N)

### End Fitting

### Standard Dimensions

### End Fitting

**B24** Stud Thread **B24**

**D24** Clevis Fork **D24**  
max. force 50,000 N

**E24** Swivel Eye **E24**  
max. force 50,000 N

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-70-100	100	320	13,000
GS-70-200	200	520	13,000
GS-70-300	300	720	13,000
GS-70-400	400	920	13,000
GS-70-500	500	1,120	13,000
GS-70-600	600	1,320	13,000
GS-70-700	700	1,520	13,000
GS-70-800	800	1,720	13,000

**Ordering Example** **GS-70-200-EE-8000**

Type (Push Type) \_\_\_\_\_  
 Body Ø (70 mm) \_\_\_\_\_  
 Stroke (200 mm) \_\_\_\_\_  
 Piston Rod End Fitting E24 \_\_\_\_\_  
 Body End Fitting E24 \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 8000 N \_\_\_\_\_

**End Fitting Details:**

- B24:** M24x2 thread, 35mm length.
- D24:** Clevis Fork, max. force 50,000 N, 100mm length.
- E24:** Swivel Eye, max. force 50,000 N, 94mm length.

**Stroke and Dimensions:** Stroke is 30mm. Total length is L +/- 2mm extended. Body diameter is 70mm.

**Rod Shroud W24-70:** Diameter 80mm, Length L = Stroke + 130.

Mounting accessories see from page 194.

### Technical Data

**Force range:** 2,000 N to 13,000 N (compressed up to 16,250 N)

**Progression:** Approx. 25 %

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

**Material:** Outer body: Coated steel; Piston rod: Hard chrome plated steel; End fittings: Zinc plated steel

**Mounting:** In any position. Hint: We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

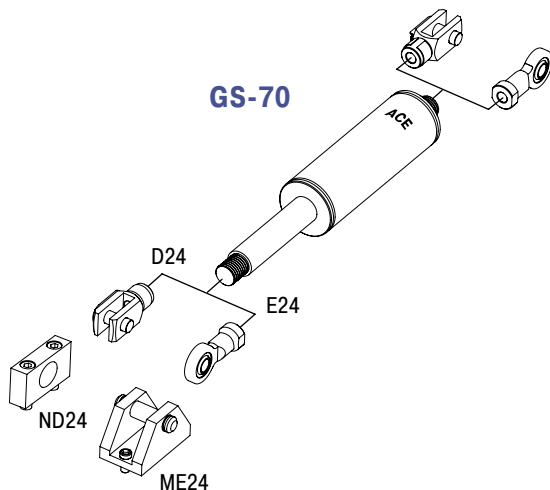
**End position damping length:** Approx. 10 mm to 20 mm (depending on the stroke)

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

**Note:** Increased break-away force if unit has not moved for some time.

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

**Safety instructions:** Gas springs (push type) should not be installed under pre-tension.



## GS-8-V4A to GS-40-VA

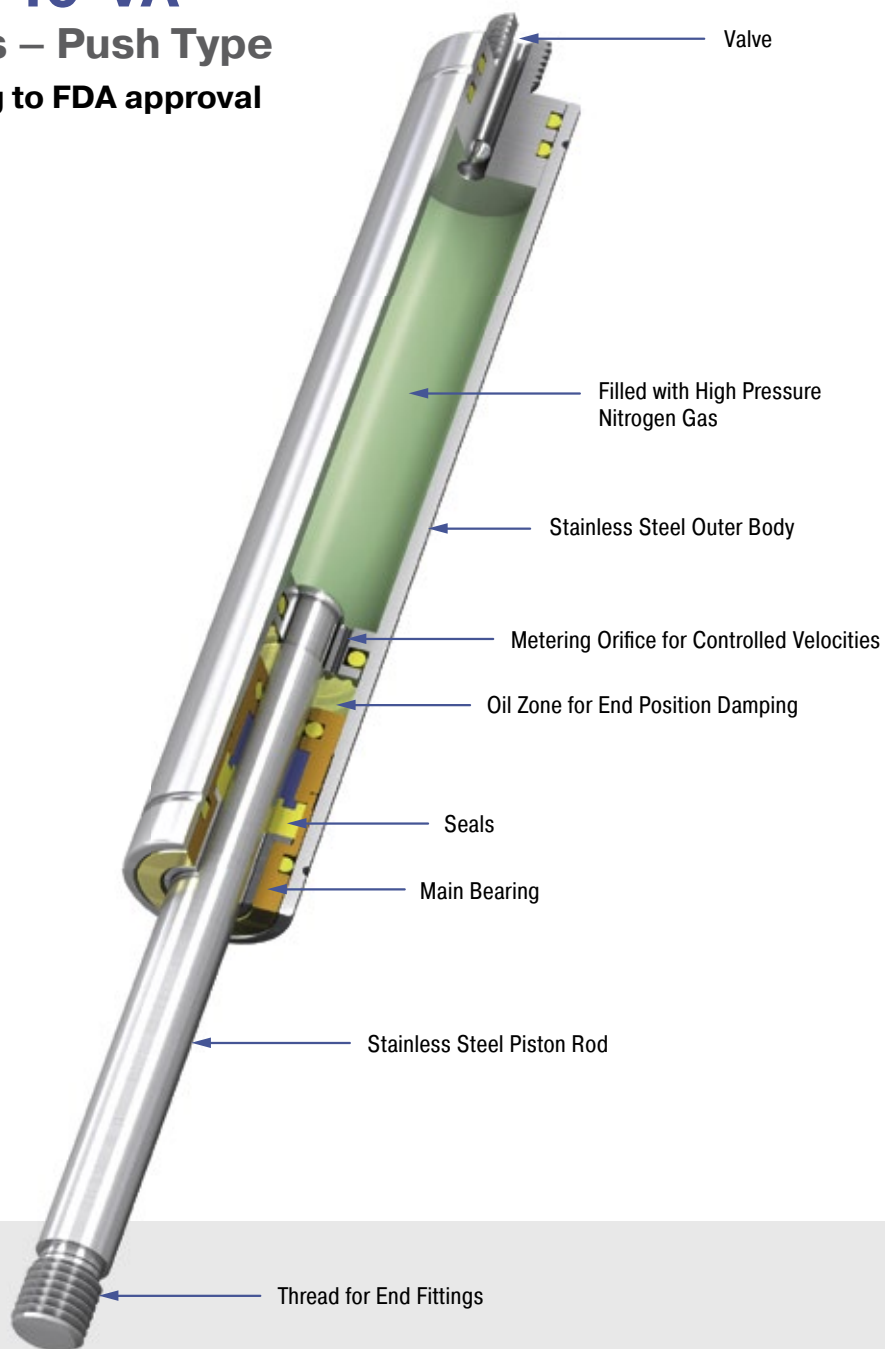
### Industrial Gas Springs – Push Type

With food grade oil according to FDA approval

Protection against corrosion and superior optics for even more sophisticated requirements: Based on ACE's industrial gas push type springs GS-8 to 40 made of steel, these models combine all advantages of stainless steel: they look great and are rust free. They are filled with food-grade oil as standard, which conforms to the requirements of FDA 21 CFR 178.3570.

These ACE gas push type springs do not only look good, they also are available in various stroke lengths and possible extension forces. A comprehensive range of accessories in stainless steel guarantees easy assembly and a broad range of uses.

ACE industrial gas pressure springs made of stainless steel are used in the automotive sector, in industrial applications, mechanical engineering and medical cleanroom technology as well as in the food, electronics and shipbuilding industries.



#### Technical Data

**Force range:** 10 N to 5,000 N

**Piston rod diameter:** Ø 3 mm to Ø 20 mm

**Progression:** Approx. 12 % to 40 %  
(depending on size and stroke)

**Lifetime:** Approx. 10.000 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 and HLP oil according to DIN 51524, part 2

**Mounting:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 5 mm to 30 mm (depending on the stroke)

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

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

**Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry

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

**Safety instructions:** Gas pressure springs should not be installed under pre-tension.

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

Valve Technology, Stainless Steel, Force range 10 N to 100 N (compressed up to 130 N)

### End Fitting

### Standard Dimensions

### End Fitting

**B3,5** Stud Thread **B3,5**

**A3,5-V4A** Eye **A3,5-V4A** max. force 370 N

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

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

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

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

Performance and Dimensions			
TYPES	Stroke mm	L extended mm	Force Range max. N
GS-8-20-V4A	20	72	100
GS-8-30-V4A	30	92	100
GS-8-40-V4A	40	112	100
GS-8-50-V4A	50	132	100
GS-8-60-V4A	60	152	100
GS-8-80-V4A	80	192	100

**Ordering Example** **GS-8-30-AC-30-V4A**

Type (Push Type) \_\_\_\_\_

Body Ø (8 mm) \_\_\_\_\_

Stroke (30 mm) \_\_\_\_\_

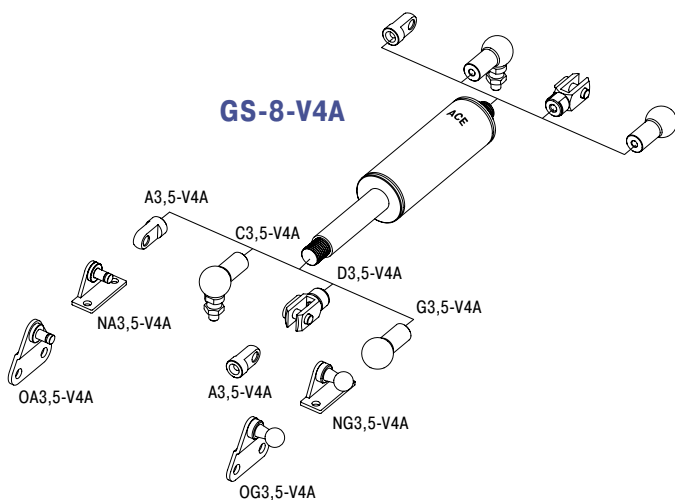
Piston Rod End Fitting A3,5-V4A \_\_\_\_\_

Body End Fitting C3,5-V4A \_\_\_\_\_

Nominal Force F<sub>1</sub> 30 N \_\_\_\_\_

Material (1.4404/1.4571, AISI 316L/316Ti, V4A) \_\_\_\_\_

Mounting accessories see from page 202.



### Technical Data

**Force range:** 10 N to 100 N (compressed up to 130 N)

**Progression:** Approx. 27 %

**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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 5 mm (depending on the stroke)

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

**Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry

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

**Safety instructions:** Gas pressure springs should not be installed under pre-tension.

Valve Technology, Stainless Steel, Force range 10 N to 100 N (compressed up to 115 N)

End Fitting

Standard Dimensions

End Fitting

**B3,5**

**A3,5-V4A**

**C3,5-V4A**

**D3,5-V4A**

**G3,5-V4A**

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-10-20-V4A	20	72	100
GS-10-30-V4A	30	92	100
GS-10-40-V4A	40	112	100
GS-10-50-V4A	50	132	100
GS-10-60-V4A	60	152	100
GS-10-80-V4A	80	192	100

**Ordering Example**

GS-10-30-AC-30-V4A

Type (Push Type) \_\_\_\_\_

Body Ø (10 mm) \_\_\_\_\_

Stroke (30 mm) \_\_\_\_\_

Piston Rod End Fitting A3,5-V4A \_\_\_\_\_

Body End Fitting C3,5-V4A \_\_\_\_\_

Nominal Force F<sub>1</sub> 30 N \_\_\_\_\_

Material (1.4404/1.4571, AISI 316L/316Ti, V4A) \_\_\_\_\_

Stud Thread **B3,5**

Eye **A3,5-V4A**  
max. force 370 N

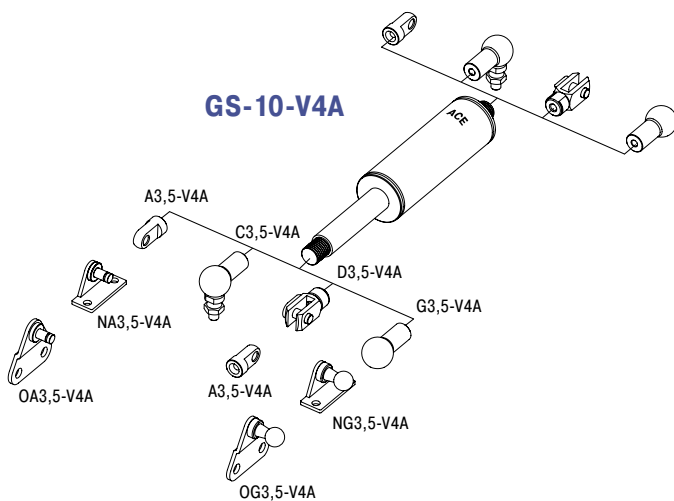
Angle Ball Joint **C3,5-V4A**  
max. force 370 N

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

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

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

Mounting accessories see from page 202.



Technical Data

- Force range:** 10 N to 100 N (compressed up to 115 N)
- Progression:** Approx. 12 %
- 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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 5 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas pressure springs should not be installed under pre-tension.

Issue 08.2016 – Specifications subject to change

Valve Technology, Stainless Steel, Force range 15 N to 180 N (compressed up to 212 N)

### End Fitting

### Standard Dimensions

### End Fitting

**B3,5**

M3.5x0.6

Ø 4

Stroke

Ø 12

5

L +/- 2 mm extended

5

#### Performance and Dimensions

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-12-20-V4A	20	72	180
GS-12-30-V4A	30	92	180
GS-12-40-V4A	40	112	180
GS-12-50-V4A	50	132	180
GS-12-60-V4A	60	152	180
GS-12-80-V4A	80	192	150
GS-12-100-V4A	100	232	150
GS-12-120-V4A	120	272	120
GS-12-150-V4A	150	332	100

**Stud Thread B3,5**

**Eye A3,5-V4A**  
max. force 370 N

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

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

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

#### Ordering Example

**GS-12-100-AA-30-V4A**

Type (Push Type) \_\_\_\_\_

Body Ø (12 mm) \_\_\_\_\_

Stroke (100 mm) \_\_\_\_\_

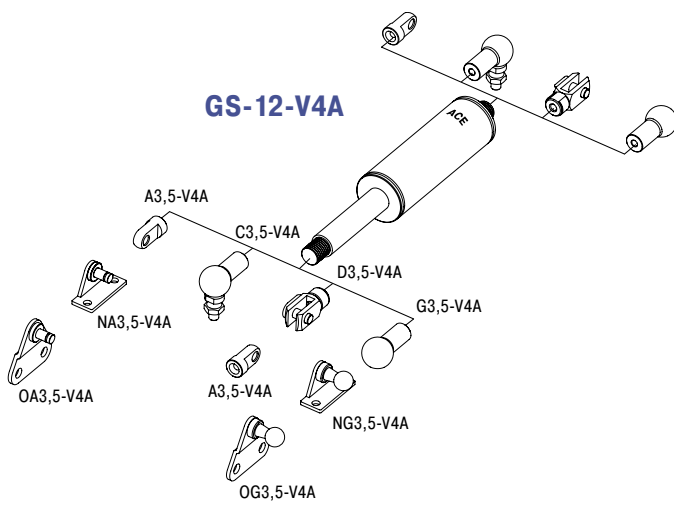
Piston Rod End Fitting A3,5-V4A \_\_\_\_\_

Body End Fitting A3,5-V4A \_\_\_\_\_

Nominal Force F<sub>1</sub> 30 N \_\_\_\_\_

Material (1.4404/1.4571, AISI 316L/316Ti, V4A) \_\_\_\_\_

**Mounting accessories see from page 202.**



### Technical Data

- Force range:** 15 N to 180 N (compressed up to 212 N)
- Progression:** Approx. 18 %
- 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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 10 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas pressure springs should not be installed under pre-tension.

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



Valve Technology, Stainless Steel, Force range 40 N to 400 N (compressed up to 535 N)

End Fitting

Standard Dimensions

End Fitting

**B5**

**A5-VA**

**C5-VA**

**D5-VA**

**E5-VA**

**G5-VA**

**Rod Shroud W5-15-VA**

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-15-20-VA	20	74	400
GS-15-40-VA	40	114	400
GS-15-50-VA	50	134	400
GS-15-60-VA	60	154	400
GS-15-80-VA	80	194	400
GS-15-100-VA	100	234	400
GS-15-120-VA	120	274	400
GS-15-150-VA	150	334	400

**Ordering Example**

**GS-15-150-AC-150-VA**

Type (Push Type) \_\_\_\_\_

Body Ø (15.6 mm) \_\_\_\_\_

Stroke (150 mm) \_\_\_\_\_

Piston Rod End Fitting A5-VA \_\_\_\_\_

Body End Fitting C5-VA \_\_\_\_\_

Nominal Force F<sub>1</sub> 150 N \_\_\_\_\_

Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

**Stud Thread B5**

**Eye A5-VA**  
max. force 490 N

**Angle Ball Joint C5-VA**  
max. force 430 N

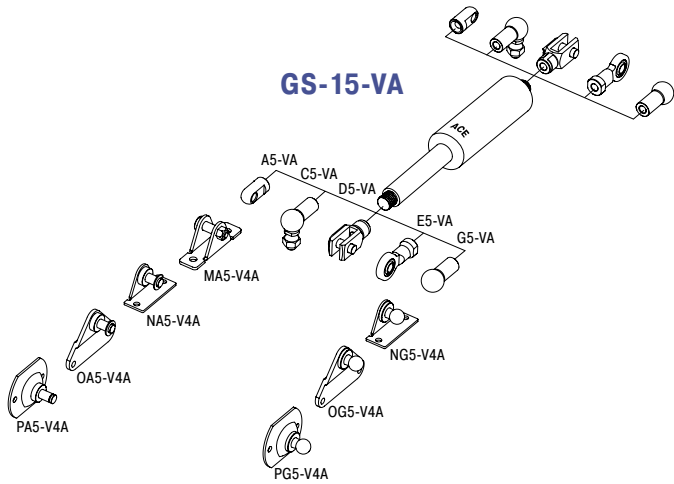
**Clevis Fork D5-VA**  
max. force 490 N

**Swivel Eye E5-VA**  
max. force 490 N

**Ball Socket G5-VA**  
max. force 430 N

**Adjuster Knob DE-GAS-5**  
See page 171.

**Mounting accessories see from page 202.**



Technical Data

- Force range:** 40 N to 400 N (compressed up to 535 N)
- Progression:** Approx. 34 %
- 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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 20 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas pressure springs should not be installed under pre-tension.

Issue 08.2016 – Specifications subject to change

Valve Technology, Stainless Steel, Force range 50 N to 700 N (compressed up to 930 N)

### End Fitting

### Standard Dimensions

### End Fitting

**B8**

M8x1.25

Ø 8

Stroke

Ø 19

10

L +/- 2 mm extended

**A8-VA**

Ø 14

8.1

Radius R7

11.5

10

19

**C8-VA**

Ø 20

Ø 13

12

15

16.5

30

M8x1.25

36°

**D8-VA**

Ø 8

22

16

8

16

32

**E8-VA**

24°

Ø 8

6

Ø 12

Ø 16

12

13

36

16

**G8-VA**

Ø 20

Ø 13

6

Ø 13

15

30

**Rod Shroud W8-19-VA**

Ø 23

L = Stroke + 30

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-19-50-VA	50	164	700
GS-19-100-VA	100	264	700
GS-19-150-VA	150	364	700
GS-19-200-VA	200	464	700
GS-19-250-VA	250	564	700
GS-19-300-VA	300	664	700

**Ordering Example**

GS-19-150-AC-600-VA

Type (Push Type) \_\_\_\_\_

Body Ø (19 mm) \_\_\_\_\_

Stroke (150 mm) \_\_\_\_\_

Piston Rod End Fitting A8-VA \_\_\_\_\_

Body End Fitting C8-VA \_\_\_\_\_

Nominal Force F<sub>1</sub> 600 N \_\_\_\_\_

Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

**Stud Thread B8**

**Eye A8-VA**  
max. force 1,560 N

**Angle Ball Joint C8-VA**  
max. force 1,140 N

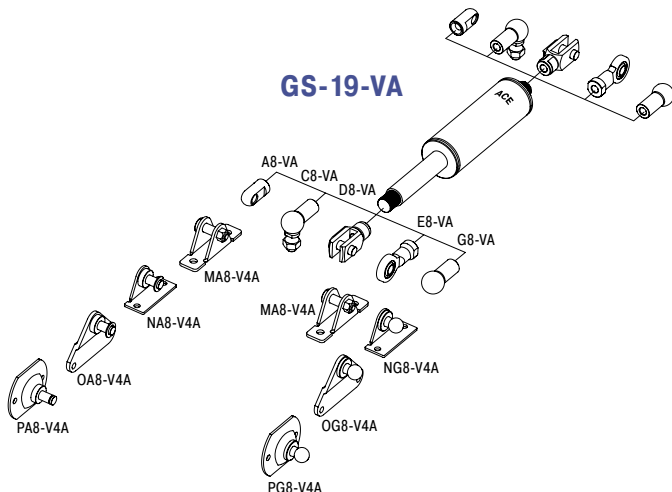
**Clevis Fork D8-VA**  
max. force 1,560 N

**Swivel Eye E8-VA**  
max. force 1,560 N

**Ball Socket G8-VA**  
max. force 1,140 N

**Adjuster Knob DE-GAS-8**  
See page 171.

**Mounting accessories see from page 202.**



### Technical Data

**Force range:** 50 N to 700 N (compressed up to 930 N)

**Progression:** Approx. 33 %

**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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 20 mm (depending on the stroke)

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

**Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry

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

**Safety instructions:** Gas pressure springs should not be installed under pre-tension.

End Fitting

Standard Dimensions

End Fitting

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-22-50-VA	50	164	1,200
GS-22-100-VA	100	264	1,200
GS-22-150-VA	150	364	1,200
GS-22-200-VA	200	464	1,200
GS-22-250-VA	250	564	1,200
GS-22-300-VA	300	664	1,200
GS-22-350-VA	350	764	1,200
GS-22-400-VA	400	864	1,200
GS-22-450-VA	450	964	1,200
GS-22-500-VA	500	1,064	1,200
GS-22-550-VA	550	1,164	1,200
GS-22-600-VA	600	1,264	1,200
GS-22-650-VA	650	1,364	1,200
GS-22-700-VA	700	1,464	1,200

**Ordering Example**

GS-22-150-AE-800-VA

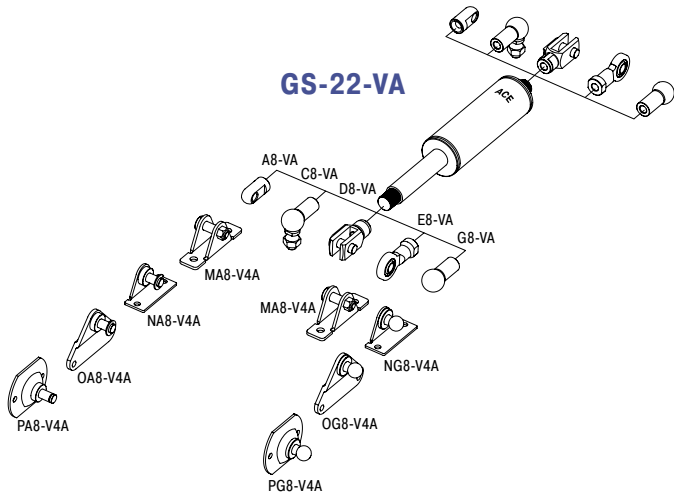
Type (Push Type) \_\_\_\_\_  
 Body Ø (23 mm) \_\_\_\_\_  
 Stroke (150 mm) \_\_\_\_\_  
 Piston Rod End Fitting A8-VA \_\_\_\_\_  
 Body End Fitting E8-VA \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 800 N \_\_\_\_\_  
 Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

**Mounting accessories see from page 202.**

**Adjuster Knob DE-GAS-8**  
See page 171.

**End Fitting Options:**  
 Stud Thread B8  
 Eye A8-VA max. force 1,560 N  
 Angle Ball Joint C8-VA max. force 1,140 N  
 Clevis Fork D8-VA max. force 1,560 N  
 Swivel Eye E8-VA max. force 1,560 N  
 Ball Socket G8-VA max. force 1,140 N

**Rod Shroud W8-22-VA**  
L = Stroke + 30



Technical Data

- Force range:** 100 N to 1,200 N (compressed up to 1,585 N)
- Progression:** Approx. 32 %
- 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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 20 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas pressure springs should not be installed under pre-tension.

Issue 08.2016 – Specifications subject to change

Valve Technology, Stainless Steel, Force range 150 N to 2,500 N (compressed up to 3,800 N)

### End Fitting

### Standard Dimensions

### End Fitting

**B10**

**A10-VA**

**C10-VA**

**D10-VA**

**E10-VA**

**Rod Shroud W10-28-VA**

**Stud Thread B10**

**Eye A10-VA**  
max. force 3,800 N

**Angle Ball Joint C10-VA**  
max. force 1,750 N

**Clevis Fork D10-VA**  
max. force 3,800 N

**Swivel Eye E10-VA**  
max. force 3,800 N

**Adjuster Knob DE-GAS-10**  
See page 171.

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-28-100-VA	100	262	2,500
GS-28-150-VA	150	362	2,500
GS-28-200-VA	200	462	2,500
GS-28-250-VA	250	562	2,500
GS-28-300-VA	300	662	2,500
GS-28-350-VA	350	762	2,500
GS-28-400-VA	400	862	2,500
GS-28-450-VA	450	962	2,500
GS-28-500-VA	500	1,062	2,500
GS-28-550-VA	550	1,162	2,500
GS-28-600-VA	600	1,262	2,500
GS-28-650-VA	650	1,362	2,500

**Ordering Example**

**GS-28-150-EE-1200-VA**

Type (Push Type) \_\_\_\_\_

Body Ø (28 mm) \_\_\_\_\_

Stroke (150 mm) \_\_\_\_\_

Piston Rod End Fitting E10-VA \_\_\_\_\_

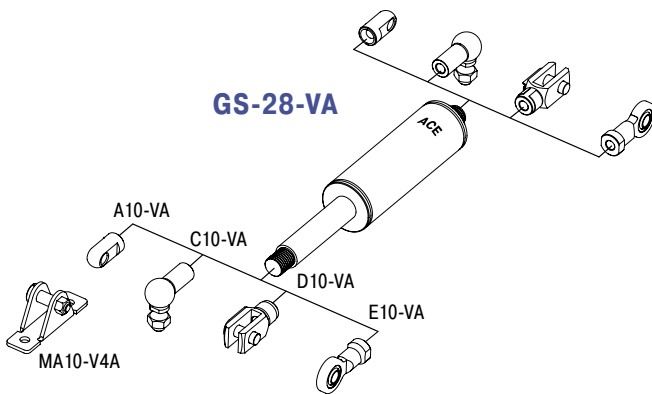
Body End Fitting E10-VA \_\_\_\_\_

Nominal Force F<sub>1</sub> 1200 N \_\_\_\_\_

Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

Mounting accessories see from page 202.

### GS-28-VA



### Technical Data

**Force range:** 150 N to 2,500 N (compressed up to 3,800 N)

**Progression:** Approx. 52 %

**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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.

**End position damping length:** Approx. 20 mm (depending on the stroke)

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

**Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry

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

**Safety instructions:** Gas pressure springs should not be installed under pre-tension.

End Fitting

Standard Dimensions

End Fitting

**B14** Stud Thread B14

**A14-VA** Eye A14-VA max. force 7,000 N

**C14-VA** Angle Ball Joint C14-VA max. force 3,200 N

**D14-VA** Clevis Fork D14-VA max. force 7,000 N

**E14-VA** Swivel Eye E14-VA max. force 7,000 N

**W14-40-VA** Rod Shroud

**Adjuster Knob DE-GAS-14** See page 171.

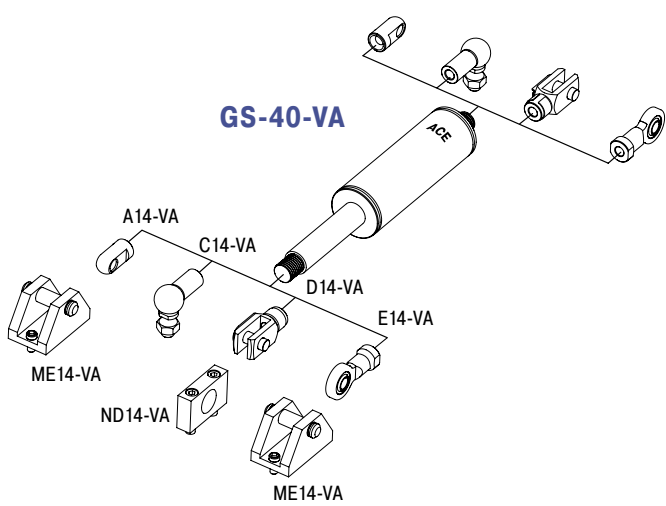
**Ordering Example** **GS-40-150-DD-3500-VA**

Type (Push Type) \_\_\_\_\_  
 Body Ø (40 mm) \_\_\_\_\_  
 Stroke (150 mm) \_\_\_\_\_  
 Piston Rod End Fitting D14-VA \_\_\_\_\_  
 Body End Fitting D14-VA \_\_\_\_\_  
 Nominal Force F<sub>1</sub> 3500 N \_\_\_\_\_  
 Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

**Performance and Dimensions**

TYPES	Stroke mm	L extended mm	Force Range max. N
GS-40-100-VA	100	317	5,000
GS-40-150-VA	150	417	5,000
GS-40-200-VA	200	517	5,000
GS-40-300-VA	300	717	5,000
GS-40-400-VA	400	917	5,000
GS-40-500-VA	500	1,117	5,000
GS-40-600-VA	600	1,317	5,000

**Mounting accessories see from page 202.**



Technical Data

- Force range:** 500 N to 5,000 N (compressed up to 7,000 N)
- Progression:** Approx. 40 %
- 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:** We recommend mounting with piston rod downwards to take advantage of the built-in end position damping.
- End position damping length:** Approx. 30 mm (depending on the stroke)
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** Special oil according to FDA 21 CFR 178.3570 of the food industry
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.
- Safety instructions:** Gas pressure springs should not be installed under pre-tension.

**Further Stainless Steel Gas Springs (Push Type), V4A**

<b>Performance</b>			
TYPES	Stroke mm	L extended mm	Dimensions see Page
GS-15-20-V4A	20	74	144
GS-15-40-V4A	40	114	144
GS-15-50-V4A	50	134	144
GS-15-60-V4A	60	154	144
GS-15-80-V4A	80	194	144
GS-15-100-V4A	100	234	144
GS-15-120-V4A	120	274	144
GS-15-150-V4A	150	334	144
GS-19-50-V4A	50	164	145
GS-19-100-V4A	100	264	145
GS-19-150-V4A	150	364	145
GS-19-200-V4A	200	464	145
GS-19-250-V4A	250	564	145
GS-19-300-V4A	300	664	145
GS-22-50-V4A	50	164	146
GS-22-100-V4A	100	264	146
GS-22-150-V4A	150	364	146
GS-22-200-V4A	200	464	146
GS-22-250-V4A	250	564	146
GS-22-300-V4A	300	664	146
GS-22-350-V4A	350	764	146
GS-22-400-V4A	400	864	146
GS-22-450-V4A	450	964	146
GS-22-500-V4A	500	1,064	146
GS-22-550-V4A	550	1,164	146
GS-22-600-V4A	600	1,264	146
GS-22-650-V4A	650	1,364	146
GS-22-700-V4A	700	1,464	146
GS-28-100-V4A	100	262	147
GS-28-150-V4A	150	362	147
GS-28-200-V4A	200	462	147
GS-28-250-V4A	250	562	147
GS-28-300-V4A	300	662	147
GS-28-350-V4A	350	762	147
GS-28-400-V4A	400	862	147
GS-28-450-V4A	450	962	147
GS-28-500-V4A	500	1,062	147
GS-28-550-V4A	550	1,162	147
GS-28-600-V4A	600	1,262	147
GS-28-650-V4A	650	1,362	147
GS-40-100-V4A	100	317	148
GS-40-150-V4A	150	417	148
GS-40-200-V4A	200	517	148
GS-40-300-V4A	300	717	148
GS-40-400-V4A	400	917	148
GS-40-500-V4A	500	1,117	148
GS-40-600-V4A	600	1,317	148

**Further Stainless Steel Accessories, V4A**

<b>End Fittings</b>		<b>End Fittings</b>	
TYPES	Dimensions see Page	TYPES	Dimensions see Page
A5-V4A	204	A10-V4A	206
C5-V4A	204	C10-V4A	206
D5-V4A	204	D10-V4A	206
E5-V4A	204	E10-V4A	206
G5-V4A	204	A14-V4A	206
A8-V4A	205	C14-V4A	206
C8-V4A	205	D14-V4A	206
D8-V4A	205	E14-V4A	206
E8-V4A	205		
G8-V4A	206		

# GST-40 Tandem

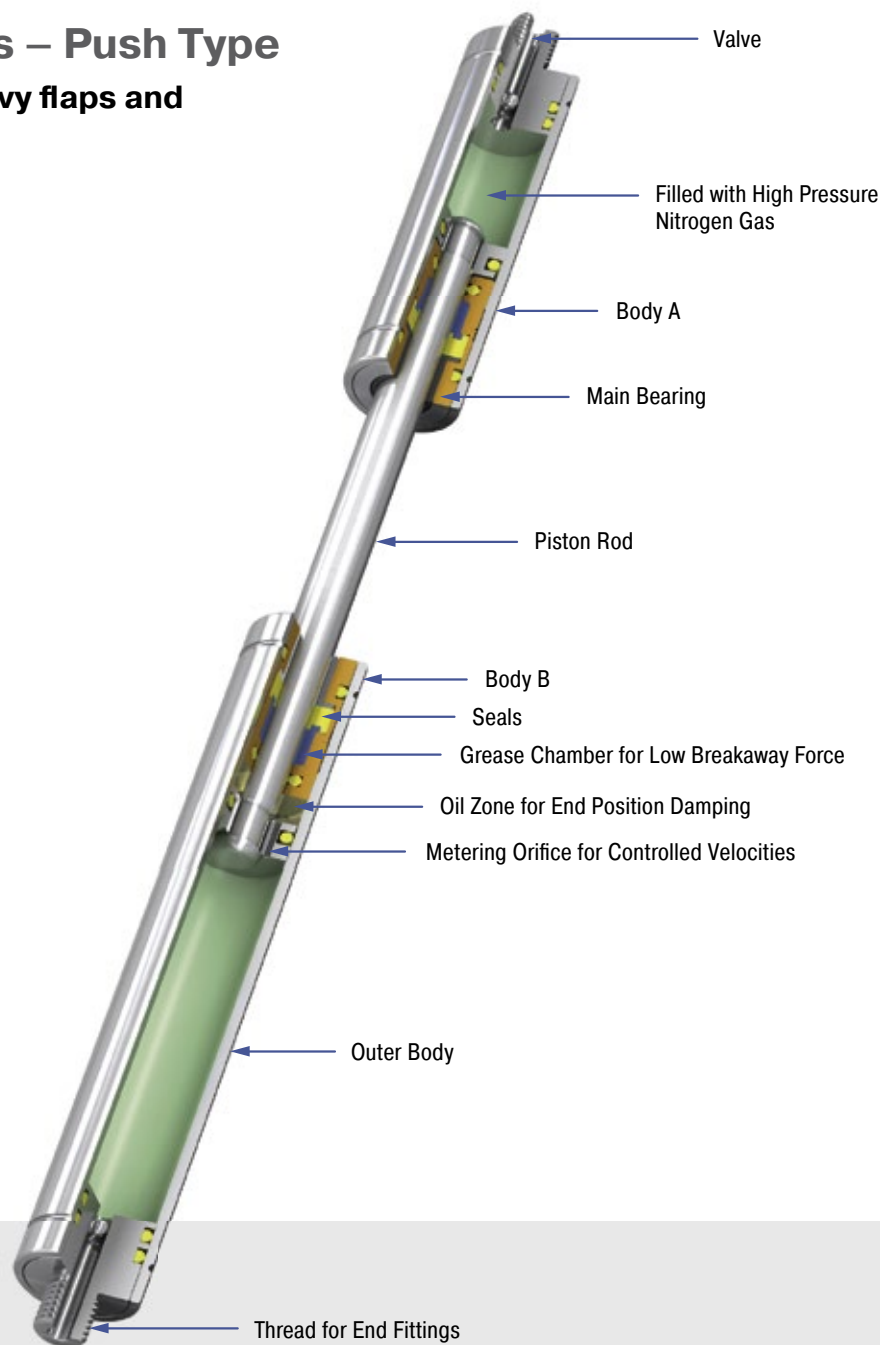
## Industrial Gas Springs – Push Type

### Optimised dual force for heavy flaps and wide angle applications

Cover two differing force ranges: Tandem push type gas springs by ACE are maintenance-free and ready-to-install with two pressure tubes with different extension forces and progression curves. With this type of gas spring you cover the different force ranges between the start and end of an application. These force ranges are adjusted and compliment each other, designed individually for the relevant application by the free of charge ACE calculation service, then are specifically manufactured adjusted precisely to the required dynamics of the application.

The customer specific systems, for which there are many fitting parts, are specifically suitable for heavy loads with large opening angle and can also be delivered in stainless steel versions.

Tandem push type gas springs from ACE are used in industrial applications such as in mechanical engineering, in the automobile, electronics and furniture industries, but also in medical technology as well as for service hatches.



### Technical Data

**Force range:** 300 N to 5,000 N

**Piston rod diameter:** Ø 20 mm

**Progression:** According to calculation relating to your application.

**Lifetime:** Approx. 10,000 m

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

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

**Operating fluid:** Nitrogen gas and oil

**Mounting:** In any position. Please adopt the mounting points determined by ACE.

**End position damping length:** Application-specific end position damping and extension speed.

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

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

**Note:** These gas springs are tailored to the relevant application and are therefore not available ex stock.

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

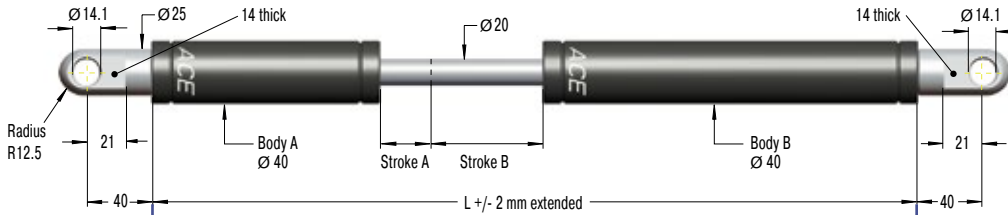
**On request:** Special oils and other special options. Alternative accessories. Material 1.4301/1.4305, AISI 304/303 (V2A) and 1.4404/1.4571, AISI 316L/316Ti (V4A).

### End Fitting

### Standard Dimensions

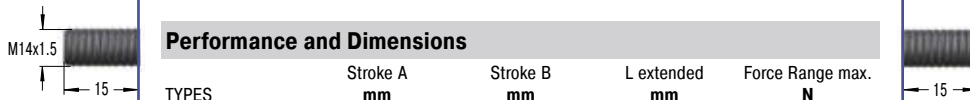
### End Fitting

A14



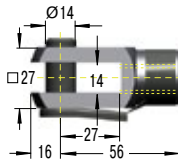
Eye A14  
max. force 10,000 N

B14



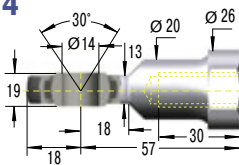
Stud Thread B14

D14



Clevis Fork D14  
max. force 10,000 N

E14



Swivel Eye E14  
max. force 10,000 N

### Performance and Dimensions

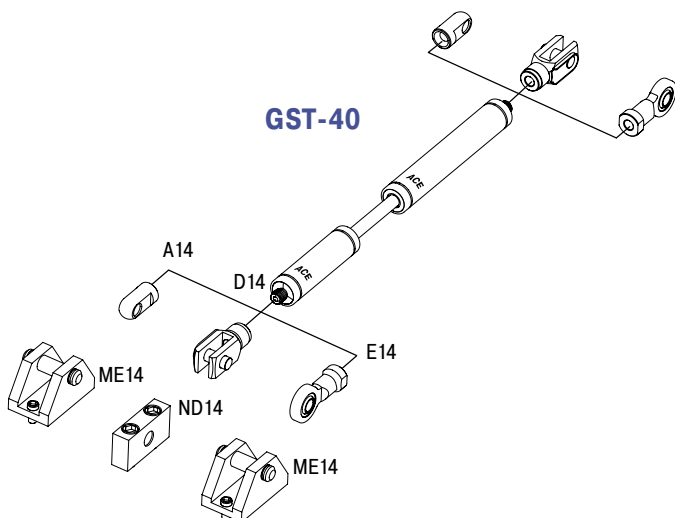
TYPES	Stroke A mm	Stroke B mm	L extended mm	Force Range max. N
GST-40-50-100	50	100	485	5,000
GST-40-50-150	50	150	585	5,000
GST-40-50-200	50	200	685	5,000
GST-40-70-250	70	250	825	5,000
GST-40-70-300	70	300	925	5,000
GST-40-70-350	70	350	1,025	5,000
GST-40-70-400	70	400	1,125	5,000

### Ordering Example

**GST-40-50-150-AD-900N-2500N**

- Type (Tandem Gas Spring) \_\_\_\_\_
- Body Ø (40 mm) \_\_\_\_\_
- Stroke A (50 mm) \_\_\_\_\_
- Stroke B (150 mm) \_\_\_\_\_
- Body A End Fitting, A14 \_\_\_\_\_
- Body B End Fitting, D14 \_\_\_\_\_
- Nominal Force Body A, 900 N \_\_\_\_\_
- Nominal Force Body B, 2500 N \_\_\_\_\_

Mounting accessories see from page 194.



### Technical Data

- Progression:** According to calculation relating to your application.
- Operating temperature range:** -20 °C to +80 °C
- Material:** Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating
- Mounting:** In any position. Please adopt the mounting points determined by ACE.
- End position damping length:** Application-specific end position damping and extension speed.
- Positive stop:** External positive stop at the end of stroke provided by the customer.
- Note:** These gas springs are tailored to the relevant application and are therefore not available ex stock.
- End fittings:** They are interchangeable and must be positively secured by the customer to prevent unscrewing.

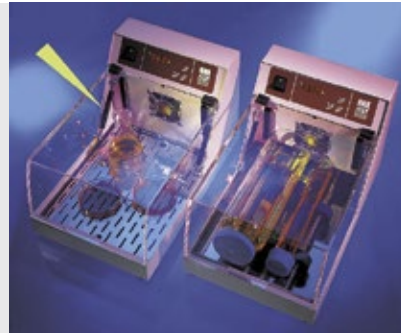


## Application Examples

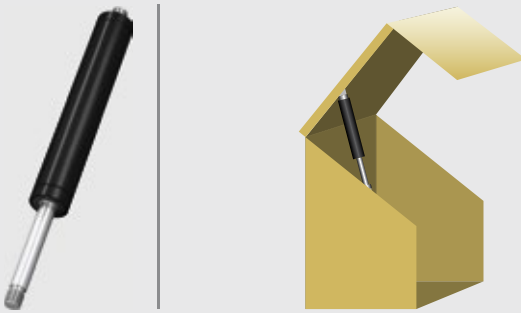
### GS-12

### Safe opening and closing

ACE industrial gas springs (push type) protect samples in an incubator, which is used for chemical and biochemical applications. The plexiglass hood, under which may be found valuable laboratory goods, is securely held open by two maintenance-free, ready-to-install ACE industrial gas springs (push type) of the type GS-12-60-AA-X . With an end-position damping of 5 mm and an extension force of 10 to 180 N, they help to handle the forces generated. The hood is always easily opened and remains in this position. It also remains securely shut when the incubator is in operation.



Very small ACE industrial gas springs (push type) enable careful opening and closing movements of a mini-incubator hood, under which may be found laboratory products  
GFL Gesellschaft für Labortechnik mbH, 30938 Burgwedel, Germany



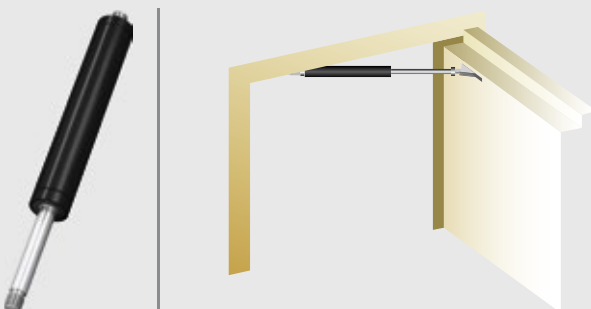
### GS-19

### Doors open and close safely

ACE industrial gas springs make opening and closing doors of rescue helicopters easier. The maintenance-free, sealed systems are installed in the access doors of helicopters of the type EC 135. There, they allow the crew to enter or exit the helicopter quickly, thus contributing to enhanced safety. The GS-19-300-CC gas springs provide a defined retraction speed and secure engagement of the door lock. The integrated end position damper allows gentle closing of the door and saves wear and tear on the valuable, lightweight material.



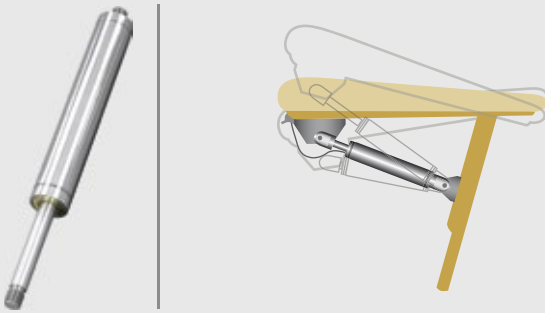
Industrial gas springs: For safe entry and exit



**GS-22-VA**

**Made-to-measure stainless steel gas springs**

A special hygiene and toilet chair, designed for children and young people with disabilities, must be firmly lockable in the sit and tilt positions. The practical aid thereby provided for relatives and carers can be attributed to two lockable ACE industrial gas springs (push type) which were especially developed and manufactured for this application and operate on the basis of the so-called tilt-in-space function. This allows the chair to be tilted forwards and backwards and provides significantly more convenience for users and patients. In order to meet all hygiene requirements, the gas springs are constructed in stainless steel.

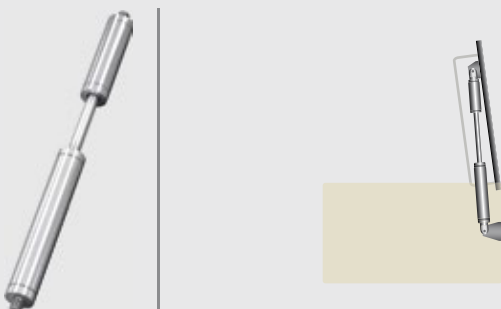


With inclination angles of 15 degrees to the front and rear, the ACE stainless steel gas springs facilitate the work of nurses  
Rifton Equipment, Rifton, New York 12471, USA

**GST-40**

**Tandemly-operated large flaps securely under control**

Underground distribution systems are visually advantageous. To facilitate their servicing, the heavy covers of the often large supply systems are brought back to the surface with the help of ACE industrial tandem gas springs (push type). This is quite easily achieved thanks to the use of two pressure pipes, the result of which is two different force ranges. This means fitters must not endure laborious bending and a downward passage into the system of channels. In addition to these advantages, the springs benefit from their long service life and their capacity to be used, as stainless steel variants, in even the most hygienically-sensitive areas.



ACE industrial tandem gas springs (push type) enable easy maintenance of supply boxes by making the heavy flaps easier to operate  
Langmatz GmbH, 82467 Garmisch-Partenkirchen, Germany

Issue 08.2016 – Specifications subject to change

## 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

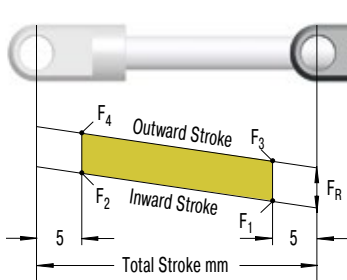
Gas pull type springs work based on the reverse principle of a gas push type spring. They are also individually filled according to customer request to a certain pressure (extension force  $F_1$ ). However, the piston rod here is pulled inwards by the gas pressure in the cylinder. The higher the pressure, 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. %	<sup>1</sup> Friction $F_R$ approx. in N
GZ-15	23	55 - 140
GZ-19	10	20 - 40
GZ-28	20	100 - 200
GZ-40	40	

<sup>1</sup> Depending on the filling force  
<sup>2</sup> 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 temperature:** 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

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

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### GZ-15-V4A to GZ-40-VA

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

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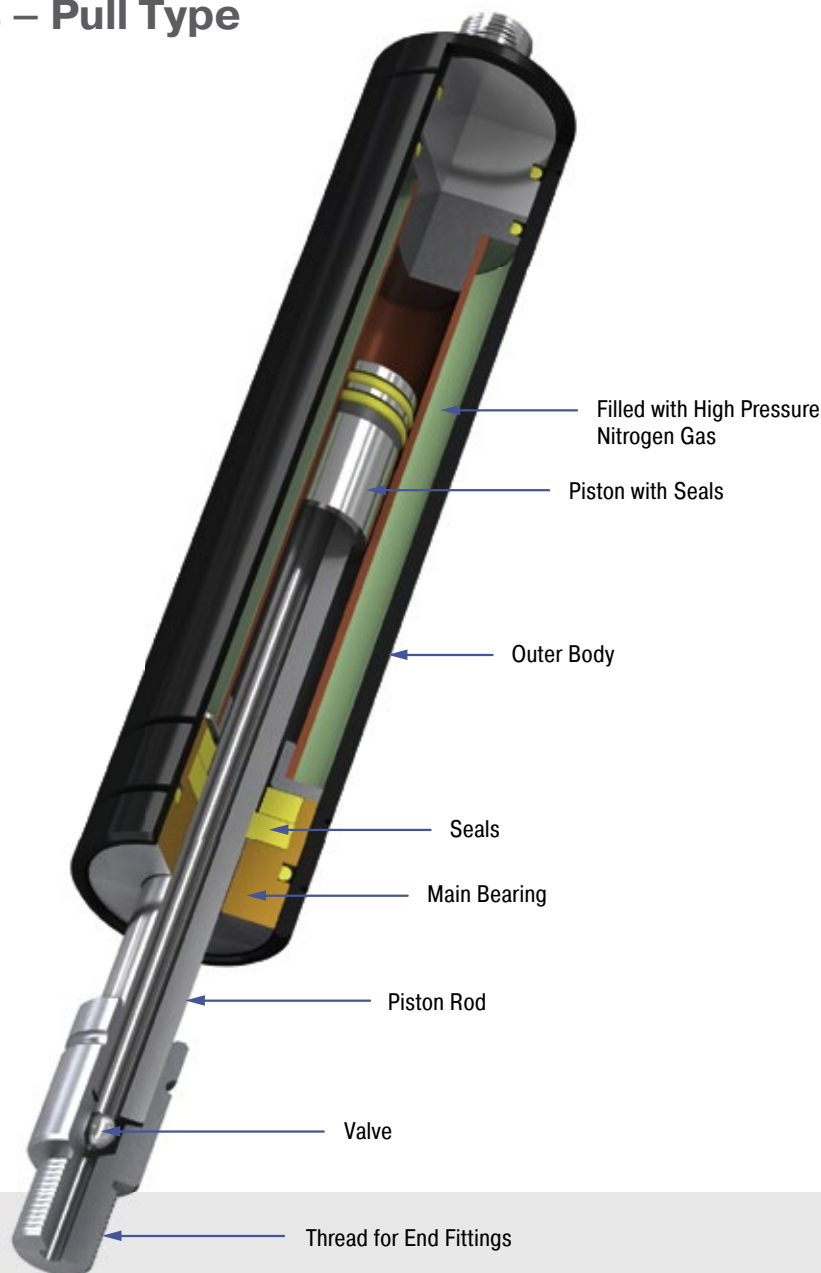
## GZ-15 to GZ-40 Industrial Gas Springs – Pull Type

### 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, ACE's 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.

Valve Technology, Traction force range 50 N to 150 N (extended up to 185 N)

### End Fitting

### Standard Dimensions

### End Fitting

**A3,5**

Radius R4

Stroke

**B3,5**

M3.5x0.6

**C3,5**

36°

**D3,5**

**E3,5**

**G3,5**

**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

**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<sub>1</sub> 150 N \_\_\_\_\_

**Eye A3,5**  
max. force 370 N

**Stud Thread B3,5**

**Angle Ball Joint C3,5**  
max. force 370 N

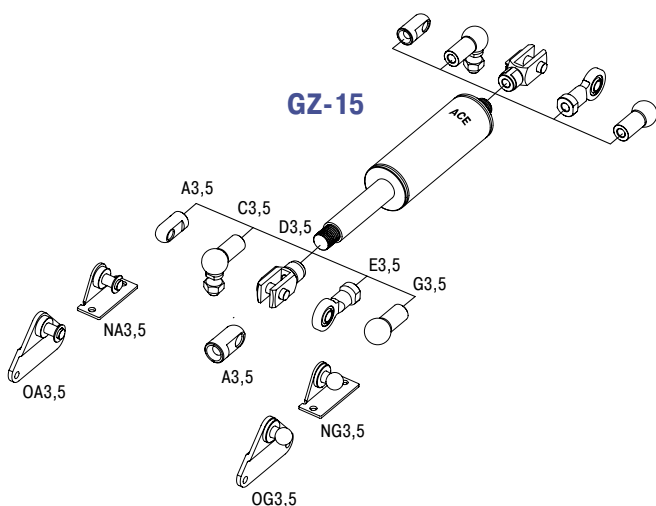
**Clevis Fork D3,5**  
max. force 370 N

**Swivel Eye E3,5**  
max. force 370 N

**Ball Socket G3,5**  
max. force 370 N

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

Mounting accessories see from page 194.



### 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.

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

End Fitting

Standard Dimensions

End Fitting

**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

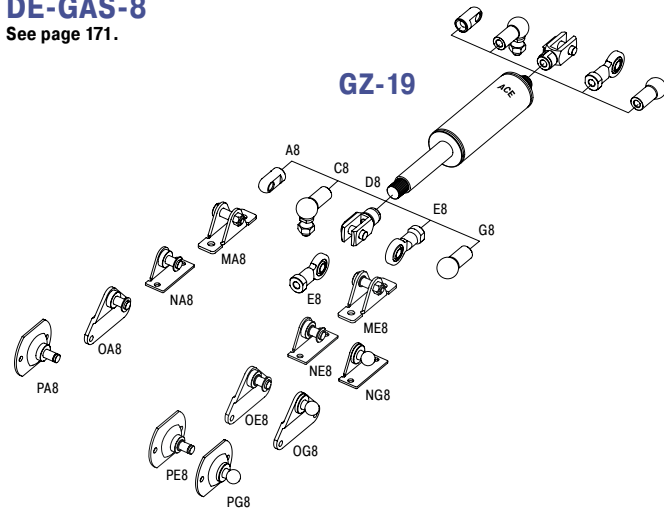
**Ordering Example**

**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<sub>1</sub> 250 N

**Mounting accessories see from page 194.**

**Adjuster Knob**  
**DE-GAS-8**  
See page 171.



**Technical Data**

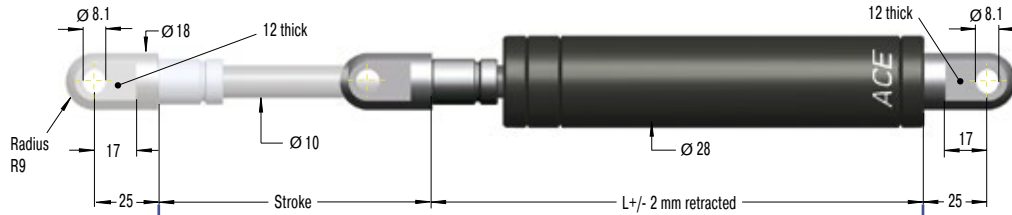
- Traction force range:** 40 N to 350 N (extended up to 448 N)
- Progression:** Approx. 21 % to 28 %
- Lifetime:** Approx. 2,000 m
- Operating temperature range:** -20 °C to +80 °C
- Material:** Outer body, End fittings: Zinc plated steel; Piston rod: Steel with wear-resistant coating
- Mounting:** With 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.

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

### End Fitting

### Standard Dimensions

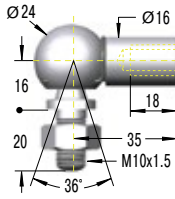
### End Fitting

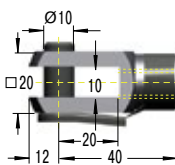
**A10**

**Eye A10**  
max. force 10,000 N

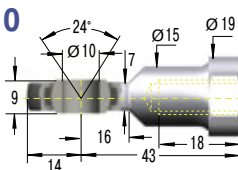
**B10**


### 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

**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

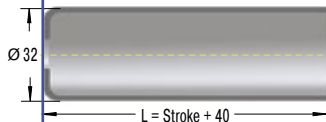
### Ordering Example

**GZ-28-150-EE-800**

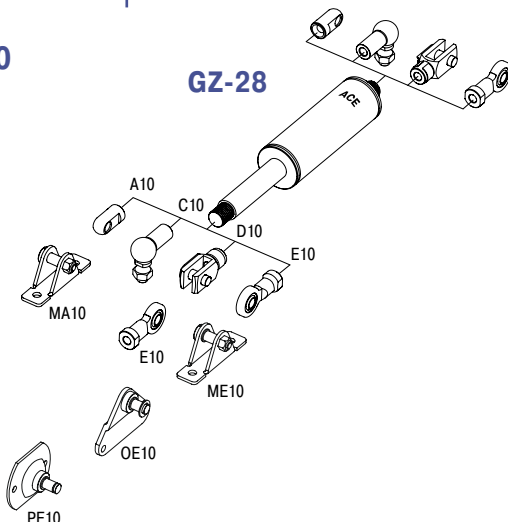
Type (Pull Type) \_\_\_\_\_  
 Body Ø (28 mm) \_\_\_\_\_  
 Stroke (150 mm) \_\_\_\_\_  
 Piston Rod End Fitting E10 \_\_\_\_\_  
 Body End Fitting E10 \_\_\_\_\_  
 Traction Force  $F_1$  800 N \_\_\_\_\_

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.

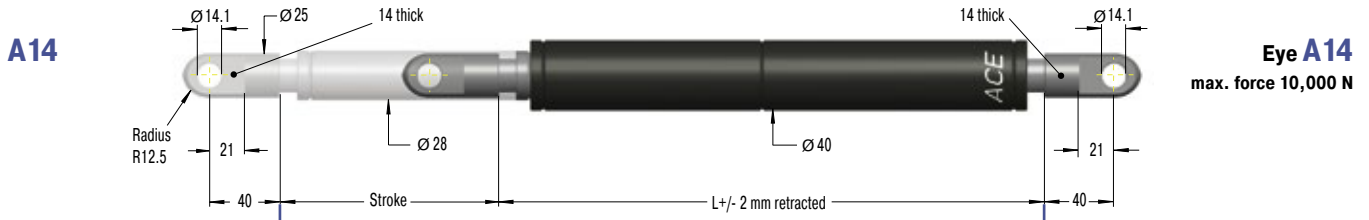


Valve Technology, Traction force range 500 N to 5,000 N (extended up to 7,000 N)

**End Fitting**

**Standard Dimensions**

**End Fitting**

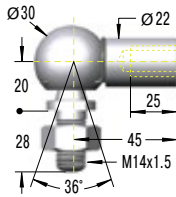


**B14**

**Stud Thread B14**

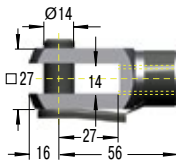
**C14**

**Angle Ball Joint C14**



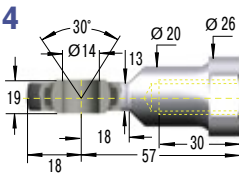
**D14**

**Clevis Fork D14**



**E14**

**Swivel Eye E14**



**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

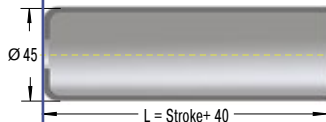
**Ordering Example**

**GZ-40-150-EE-800**

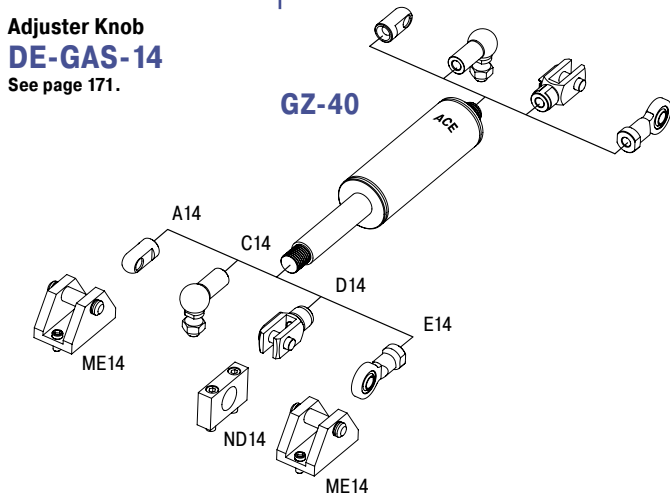
- Type (Pull Type) \_\_\_\_\_
- Body Ø (40 mm) \_\_\_\_\_
- Stroke (150 mm) \_\_\_\_\_
- Piston Rod End Fitting E14 \_\_\_\_\_
- Body End Fitting E14 \_\_\_\_\_
- Traction Force F<sub>1</sub> 800 N \_\_\_\_\_

Mounting accessories see from page 194.

**Rod Shroud W14-40**



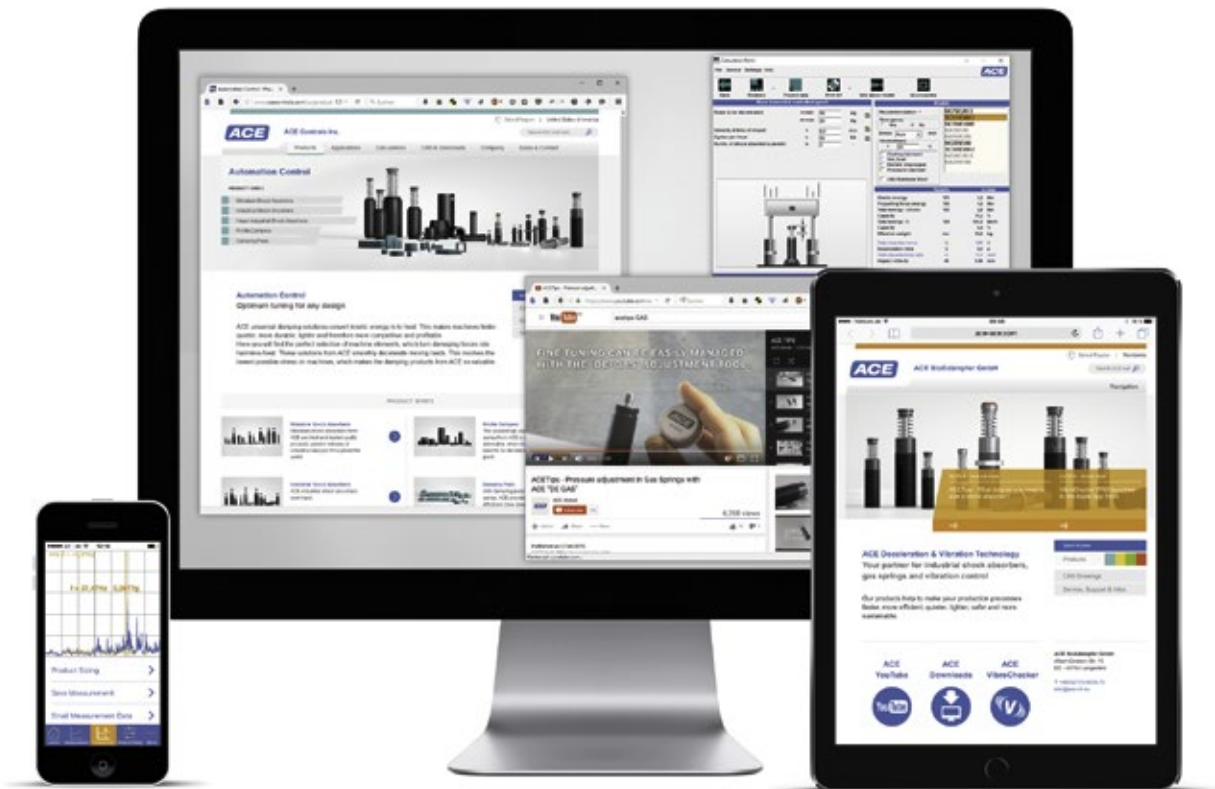
**Adjuster Knob DE-GAS-14**  
See page 171.



**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.

# 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](http://www.ace-ace.com)**

## GZ-15-V4A to GZ-40-VA

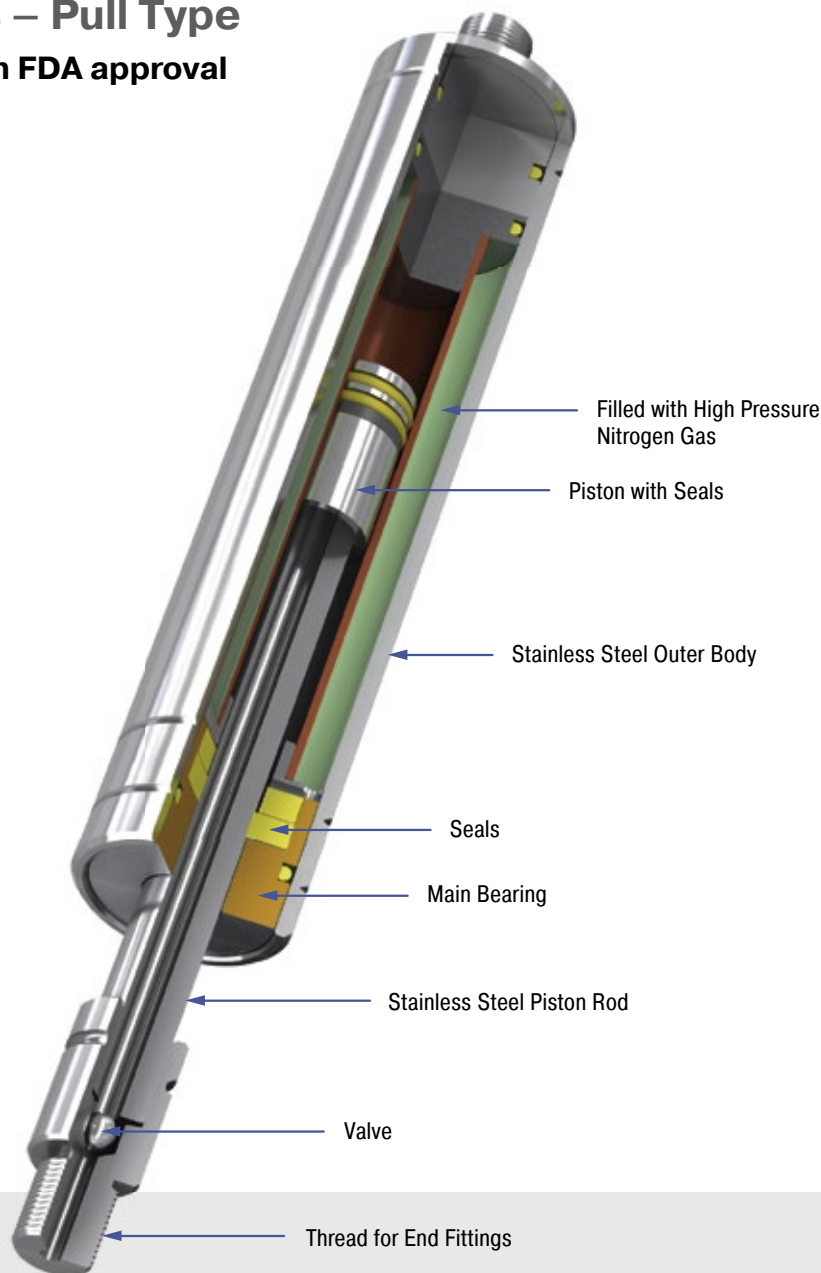
### Industrial Gas Springs – Pull Type

#### 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.

Valve Technology, Stainless Steel, Traction force range 50 N to 150 N (extended up to 185 N)

### End Fitting

### Standard Dimensions

### End Fitting

**B3,5**

**A3,5-V4A**

**C3,5-V4A**

**D3,5-V4A**

**G3,5-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

**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<sub>1</sub> 150 N \_\_\_\_\_

Material (1.4404/1.4571, AISI 316L/316Ti, V4A) \_\_\_\_\_

**Stud Thread B3,5**

**Eye A3,5-V4A**  
max. force 370 N

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

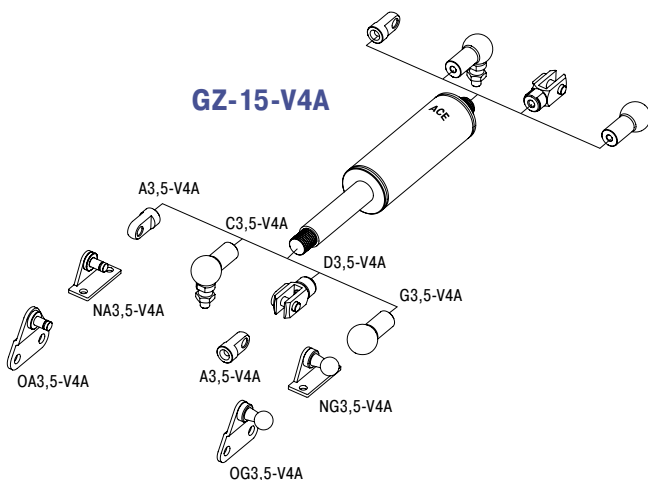
**Clevis Fork D3,5-V4A**  
max. force 370 N

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

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

Mounting accessories see from page 202.

### 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.

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

**D8-VA** Clevis Fork **D8-VA**  
max. force 1,560 N

**E8-VA** Swivel Eye **E8-VA**  
max. force 1,560 N

**G8-VA** Ball Socket **G8-VA**  
max. force 1,140 N

**W8-19-VA** Rod Shroud

**DE-GAS-8** Adjuster Knob  
See page 171.

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) \_\_\_\_\_

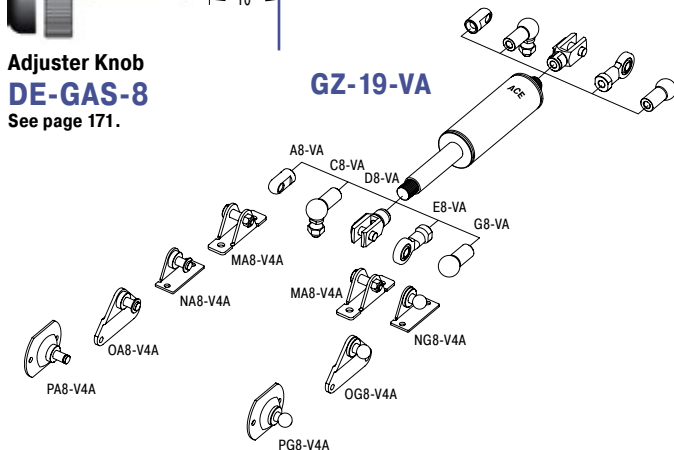
Piston Rod End Fitting A8-VA \_\_\_\_\_

Body End Fitting C8-VA \_\_\_\_\_

Traction Force  $F_1$  150 N \_\_\_\_\_

Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

**Mounting accessories see from page 202.**



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

Valve Technology, Stainless Steel, Traction force range 150 N to 1,200 N (ext. up to 1,460 N)

### 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

**Rod Shroud W10-28-VA**

**Adjuster Knob DE-GAS-10**  
See page 171.

### 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<sub>1</sub> 800 N \_\_\_\_\_

Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

Mounting accessories see from page 202.

### 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.

End Fitting

Standard Dimensions

End Fitting

**B14** Stud Thread B14

**A14-VA** Eye A14-VA max. force 7,000 N

**C14-VA** Angle Ball Joint C14-VA max. force 3,200 N

**D14-VA** Clevis Fork D14-VA max. force 7,000 N

**E14-VA** Swivel Eye E14-VA max. force 7,000 N

**Rod Shroud W14-40-VA** L = Stroke + 40

**Adjuster Knob DE-GAS-14** See page 171.

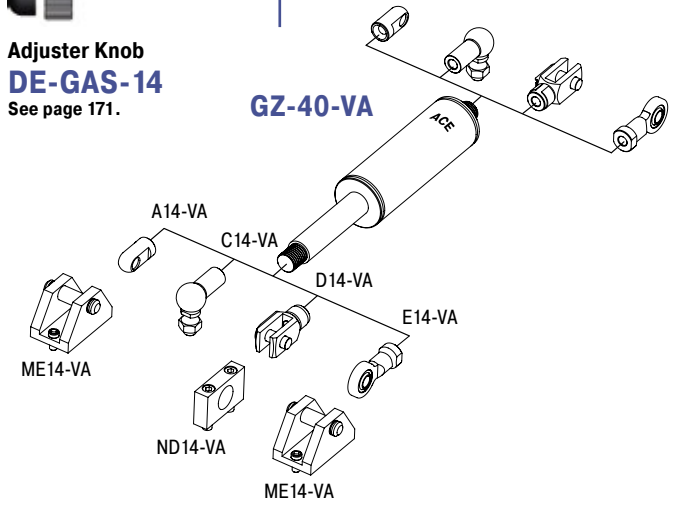
TYPES	Stroke mm	L retracted mm	Traction Force Range max. N
GZ-40-100-VA	100	250	5,000
GZ-40-150-VA	150	325	5,000
GZ-40-200-VA	200	400	5,000
GZ-40-250-VA	250	475	5,000
GZ-40-300-VA	300	550	5,000
GZ-40-400-VA	400	700	5,000
GZ-40-500-VA	500	850	5,000
GZ-40-600-VA	600	1,000	5,000

**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<sub>1</sub> 800 N \_\_\_\_\_  
 Material (1.4301/1.4305, AISI 304/303, VA) \_\_\_\_\_

**Mounting accessories see from page 202.**



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**

<b>Performance</b>			
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**

<b>End Fittings</b>		<b>End Fittings</b>	
TYPES	Dimensions see Page	TYPES	Dimensions see Page
A5-V4A	204	A10-V4A	206
C5-V4A	204	C10-V4A	206
D5-V4A	204	D10-V4A	206
E5-V4A	204	E10-V4A	206
G5-V4A	204	A14-V4A	207
A8-V4A	205	C14-V4A	207
C8-V4A	205	D14-V4A	207
D8-V4A	205	E14-V4A	207
E8-V4A	205		
G8-V4A	206		



## Free Calculation Offer for Industrial Gas Springs

### With all necessary information for installation

To obtain the optimum operation with minimal hand force, the gas spring must be properly sized and the mounting points have to be optimally placed.

**It is important to identify the following points:**

- gas spring size
- required gas spring stroke
- mounting points on flap and frame
- extended length of the gas spring
- required extension force
- hand forces throughout the complete movement on the flap

With our free calculation service you can eliminate the time-consuming calculation and send us your details by fax or e-mail. Just complete the information shown on the following page. Please attach a sketch of your application (a simple hand sketch is sufficient) in side view. Our application engineers will determine the optimum gas springs and mounting points and calculate the ideal situation to satisfy your requirements. You will receive a quotation showing the opening and closing forces and our recommended mounting points to suit your application.

**NEW!**  
 Also try our  
 Online Calculation Service:  
[www.ace-ace.com](http://www.ace-ace.com)

### Example of a Calculation Offer

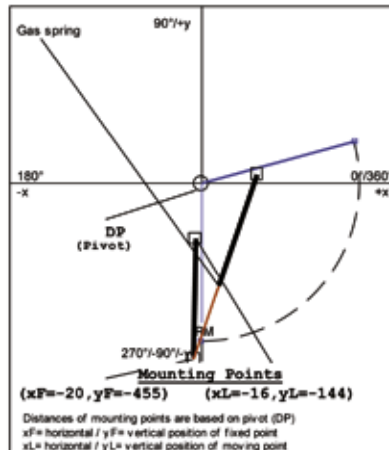
Input data		Identification data	
Start angle	$\alpha M$ : 270 °	Temperature	: 20 °C
Open angle	$\alpha$ : 105 °	Progression	: 42 %
Rd. ctr.grvty.	RM: 410 mm	Friction	: 30 N
Mass	m: 12 kg	Ext. length	: 504 mm
No. gas springs	n: 2		
Radius handforce	RRH: 820 mm		

**Required user hand-forces**

F1-F2/F3-F4=Hand forces for opening/closing  
 Angle [°]    F1-F2 [N]    F3-F4 [N]    Length [mm]

270	-13	-14	311
293	37	42	323
317	59	68	363
340	53	63	418
363	34	44	477
375	25	34	504

F1-F4 positive requires clockwise hand force  
 F1-F4 negative requires counter-clockwise hand force



### Input Data

Gas Spring Push type  Gas Spring Pull type

#### Gas spring fixing points

The fixed point of the frame and the moving point of the flap are critical for the optimum operation.

Therefore please attach a sketch of your application!  
(A few lines with their dimensions are sufficient)


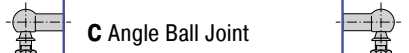

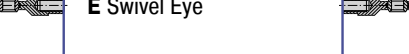


Moving mass\* m \_\_\_\_\_ kg  
 Number of gas springs in parallel\* n \_\_\_\_\_ pcs  
 Number of movements\* \_\_\_\_\_ /day  
 Ambient temperature T \_\_\_\_\_ °C

#### If not shown by the sketch:

Radius of centre of gravity  $R_M$  \_\_\_\_\_ mm  
 Radius of hand force  $R_H$  \_\_\_\_\_ mm  
 Starting angle  $\alpha_M$  \_\_\_\_\_ °  
 Opening angle  $\alpha$  \_\_\_\_\_ °

\* Compulsory information

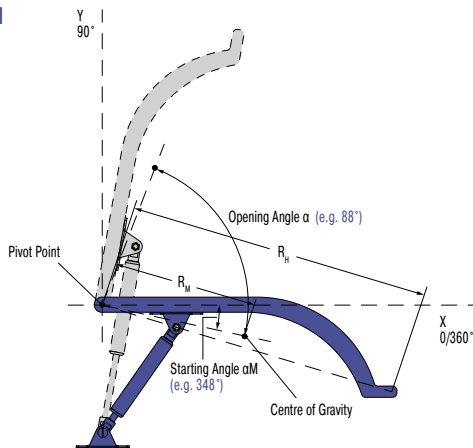
### Desired Mounting Fittings

End Fitting	End Fitting	End Fitting
<input type="checkbox"/> A		<input type="checkbox"/> A
<input type="checkbox"/> B	<b>B Stud Thread</b>	<input type="checkbox"/> B
<input type="checkbox"/> C		<input type="checkbox"/> C
<input type="checkbox"/> D		<input type="checkbox"/> D
<input type="checkbox"/> E		<input type="checkbox"/> E
<input type="checkbox"/> F		<input type="checkbox"/> F
<input type="checkbox"/> G		<input type="checkbox"/> G

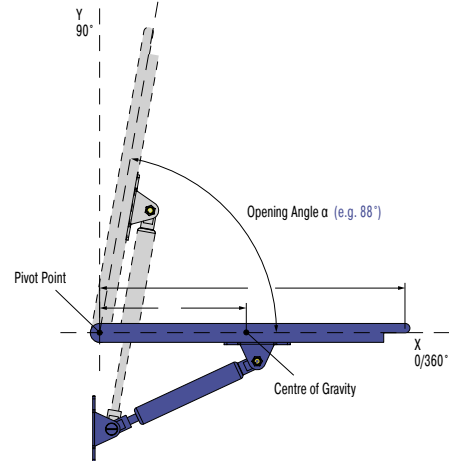
The end fittings are interchangeable

e.g. -CE: C = Angle Ball Joint, E = Swivel Eye

#### Hood



#### Flap



Please send us a sketch with dimensions of your application!  
Without this sketch we won't be able to calculate.

Comments	
Requirement per year	
Machine type / reference	

#### Sender

Company	Dept.
Address	Name
ZIP / City	Telephone
Internet	E-Mail

Please copy, complete and fax with attached sketch to: +49 (0)2173 - 9226-89

## Mounting and Safety Instructions

### Filling

Gas springs are filled with pure nitrogen gas. Nitrogen is an inert gas that does not burn or explode and is not poisonous. The internal pressure of gas springs can be up to 300 bar. Do not attempt to open or modify them!

### Gas springs are maintenance-free!

ACE gas springs will operate in surrounding temperatures from -20 °C to +80 °C.

We can equip our springs with special seals to withstand temperatures as low as -45 °C or as high as +200 °C.

Gas springs should not be placed over heat or in open fire!

ACE gas springs can be stored in any position. Pressure lost through long storage is not to be expected. There are no known negative values, but there may be a sticking effect the first time you compress a spring. This may require a higher initial force to operate the gas spring for the first time (initial breakaway force).

### Mounting

Gas springs should be installed with the piston rod downwards. This position ensures best damping quality. ACE gas springs include an integrated grease chamber which allows for alternative mounting opportunities.

The tolerance for the installation length is generally deemed to be  $\pm 2$  mm. If very high demands are placed on durability and stability, please avoid the combination of small diameter + long stroke + high force.

The filling tolerance is -20 N to 40 N or 5 % to 7 %. Depending on size and extension force the tolerances can differ.

### Life Time

Generally, ACE gas springs are tested to 70,000 to 100,000 complete strokes. This is equivalent to the seal lifetime (depending on model size) to a distance travelled of 10 km (lifetime of traction gas springs approx. 2 km). During these tests the gas spring must not lose more than 5 % of its pressure. Depending upon the application and operating environment, the service life of these gas springs may be much longer. In practise 500,000 strokes or more have been achieved on some applications.

### Disposal/Recycling

Please ask for our disposal recommendations.

## Warnings and Liability

All gas springs are marked with the part number, the production date and a warning sign "Do not open high pressure".

We are not responsible for any damages of any kind that arises due to goods that are not marked accordingly.

## Valve Actuation with ACE DE-GAS

### Simple, safe and reliable

#### De-gassing for controlled force reduction on valve gas springs

The reduction is made by screwing the DE-Gas on the male screwed end of the gas spring. The drain process is possible through light actuation of the push button. If too much nitrogen is discharged, the gas spring can be refilled by ACE.

#### Adjustment

1. Hold gas spring valve up.
2. Insert DE-GAS adjuster knob on thread of the valve.
3. Press the DE-GAS adjuster knob with light hand force until you can hear the nitrogen escaping. Press only briefly to avoid too much nitrogen being discharged.
4. After adjustment, remove the DE-GAS adjuster knob, mount the end fittings and test the gas spring in your application. If necessary repeat the procedure.

If you use 2 gas springs in parallel, both gas springs should have the same force to avoid bending forces or side load on the application. If necessary return to ACE to refill both gas springs to the same (average) force.

If too much nitrogen is discharged, the units can be returned to ACE for re-gassing.

You can also visit our Youtube channel at [www.youtube.com/user/acecontrolsglobal](http://www.youtube.com/user/acecontrolsglobal)  
Here, among other things you will find an ACETips-Video on the topic of DE-GAS!



DE-GAS

## Gas Spring Refilling Kit

### Flexible and easy to use

The ACE gas spring refilling kit offers you the opportunity to fill gas springs on location or adapt them individually. The refilling kit is equipped with all the parts you need to fill gas springs. Very precise filling of the gas springs is possible using the digital manometer. The table for determining the filling pressure of the gas springs is included with the case. The only thing missing from the delivery is the nitrogen.



The refilling kit contains all filling bells and adjuster knobs for the current ACE gas spring range.

Gas springs filled with the refilling kit must be measured on a calibrated measurement system by ACE for repeat production.

The refilling kit suits 200 bar nitrogen bottles with a thread of W24,32x1/14" (German standard). Other connections are available upon request.

Part number: **GS-FK-C**