

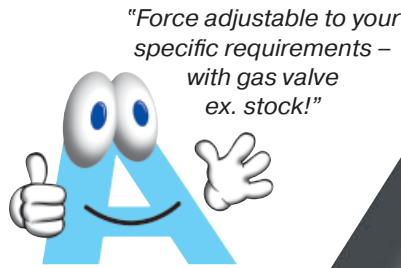
The ACE gas spring range includes push type and pull type (traction) gas springs all designed for the industrial environment.

ACE industrial gas springs are maintenance free and self-contained. They are available with body diameters from 8 mm up to 70 mm, and forces from 10 N up to 13 000 N ex. stock.

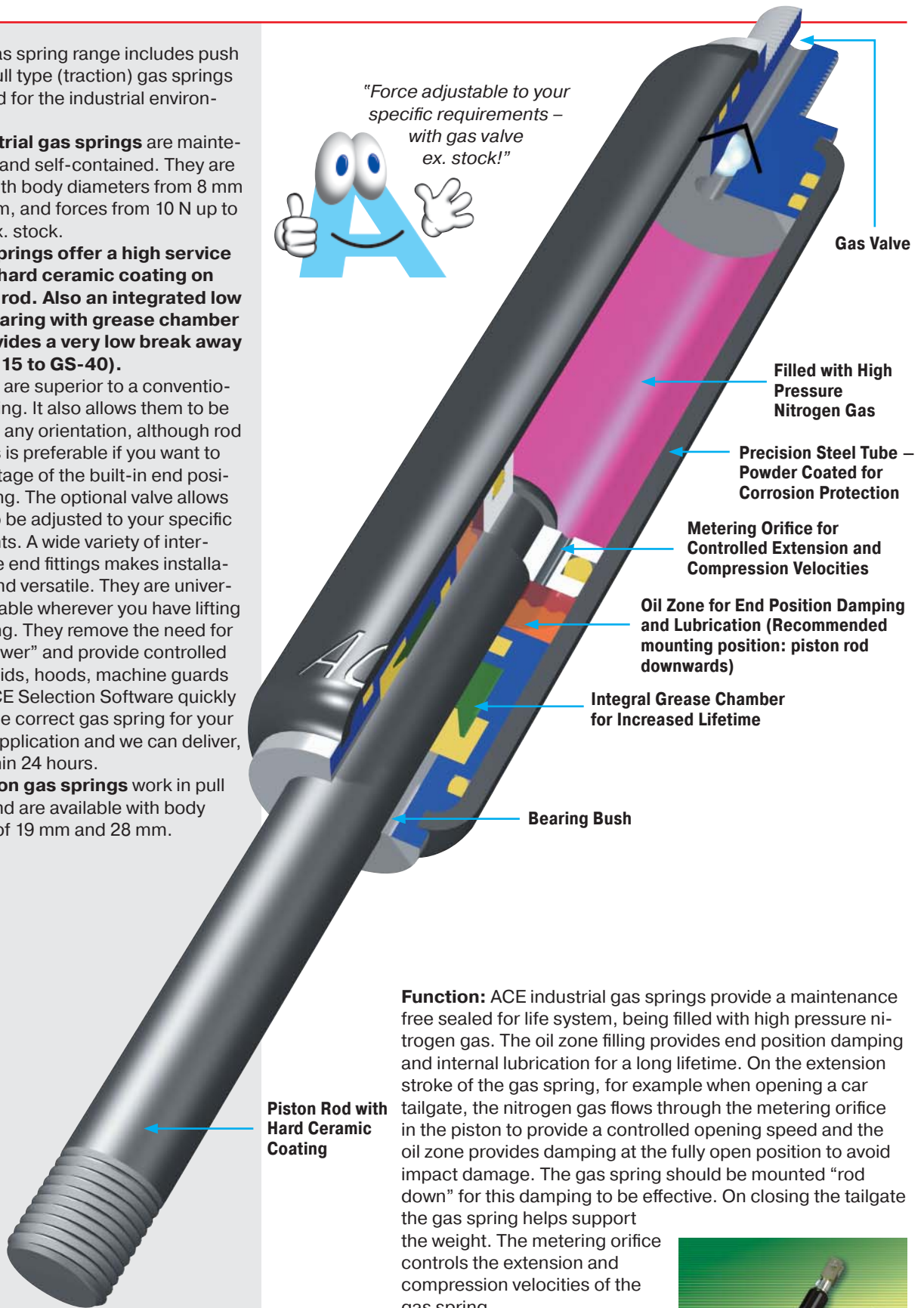
ACE gas springs offer a high service life with a hard ceramic coating on the piston rod. Also an integrated low friction bearing with grease chamber which provides a very low break away force (GS-15 to GS-40).

All of which are superior to a conventional gas spring. It also allows them to be mounted in any orientation, although rod downwards is preferable if you want to take advantage of the built-in end position damping. The optional valve allows the force to be adjusted to your specific requirements. A wide variety of interchangeable end fittings makes installation easy and versatile. They are universally applicable wherever you have lifting and lowering. They remove the need for "muscle power" and provide controlled motion for lids, hoods, machine guards etc. The ACE Selection Software quickly specifies the correct gas spring for your individual application and we can deliver, usually within 24 hours.

ACE traction gas springs work in pull direction and are available with body diameters of 19 mm and 28 mm.



"Force adjustable to your specific requirements – with gas valve ex. stock!"



Gas Valve

Filled with High Pressure Nitrogen Gas

Precision Steel Tube – Powder Coated for Corrosion Protection

Metering Orifice for Controlled Extension and Compression Velocities

Oil Zone for End Position Damping and Lubrication (Recommended mounting position: piston rod downwards)

Integral Grease Chamber for Increased Lifetime

Bearing Bush

Piston Rod with Hard Ceramic Coating

Function: ACE industrial gas springs provide a maintenance free sealed for life system, being filled with high pressure nitrogen gas. The oil zone filling provides end position damping and internal lubrication for a long lifetime. On the extension stroke of the gas spring, for example when opening a car tailgate, the nitrogen gas flows through the metering orifice in the piston to provide a controlled opening speed and the oil zone provides damping at the fully open position to avoid impact damage. The gas spring should be mounted "rod down" for this damping to be effective. On closing the tailgate the gas spring helps support the weight. The metering orifice controls the extension and compression velocities of the gas spring.

Operating fluid: Nitrogen gas and oil (for end damping)

Mounting: In any position

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

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.



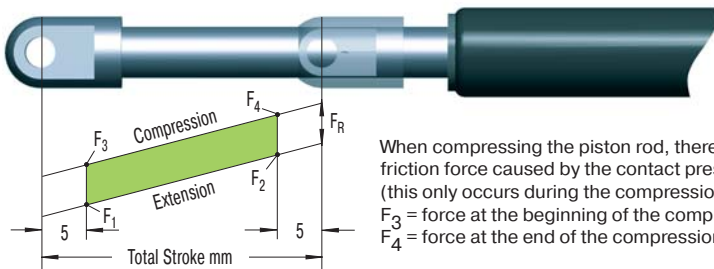
Gas springs are universally accepted, wherever you want to **push, pull, lift, lower, or position** covers, lids or other components by hand without using an external energy source.

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 $F = p \cdot A$. 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.

Gas Spring Force-Stroke Characteristics

Standard Gas Spring (Push Type)

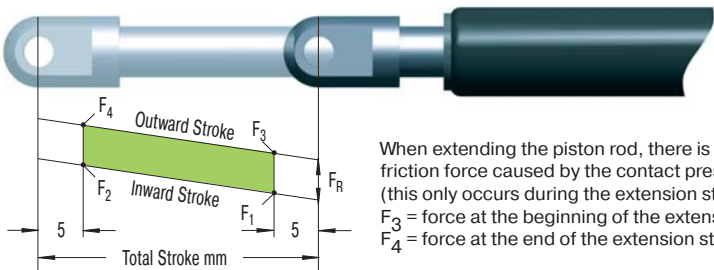


When compressing the piston rod, there is an additional friction force caused by the contact pressure of the seals (this only occurs during the compression stroke) F_R
 F_3 = force at the beginning of the compression stroke
 F_4 = force at the end of the compression stroke

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

Traction Gas Spring (Pull Type)



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_R
 F_3 = force at the beginning of the extension stroke
 F_4 = force at the end of the extension stroke

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

Type

Type	¹ Progression approx. %	² Friction F_R approx. in N
GS-8	28	10
GS-10	20	10
GS-12	25	20
GS-15	27	20
GS-19	36 - 42 ³	30
GS-22	39 - 50 ³	30
GS-28	60 - 95 ³	40
GS-40	47 - 53 ³	50
GS-70	25	50

Type

Type	¹ Progression approx. %	² Friction F_R approx. in N
GZ-19	10	20 - 40
GZ-28	20	100 - 200

¹ **The Progression** (the slope of the force line in the diagrams 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 Tolerance on F_1 Force: -20 N to +40 N or 5% to 7%

² Depending on the filling force.

³ Depending on the stroke.

Service Life

Filling tolerance: -20 N to +40 N or 5 % to 7 %

Effect of temperature: An increase in temperature of each 10 °C will increase force by approx. 3.4 %.

Temperature range: -20 °C to +80 °C (special seals from -45 °C to 200 °C)

Mounting: The gas springs should ideally be installed with the **piston rod pointing downwards** to use the end damping during the extension stroke to smoothly decelerate the motion of the gas spring. Some ACE gas springs have a uniquely designed front bearing with an integrated grease chamber allowing the gas spring to be mounted and operated in any position if required.

When fitting the gas springs ensure that the stroke is fully extended (GZ type fully compressed), this makes assembly and disassembly much easier. **Support the moving mass/flap during assembly or disassembly to prevent accidents. To avoid twisting or side loading, it is recommended that ball joints or other pivoted mounting attachments are used.** The mounting attachments must always be securely tightened onto the threaded studs of the gas spring.

ACE gas springs are maintenance-free. DO NOT oil or grease the piston rod!

The piston rod must be protected from any hits, scratches or dirt and especially paint. Damage to the surface finish of the piston rod will destroy the sealing system and cause loss of pressure. The outer body must not be deformed or mechanically damaged.

ACE gas springs can be stored in any position. Experience has shown that long storage periods do not result in loss of pressure. However you may experience some "stiction" requiring a higher effort to move the gas spring for the first time after a long storage period.

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 2 km up to 10 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.

Lifetime for traction gas spring see pages 132 and 133.

Adjustment Instructions Valve

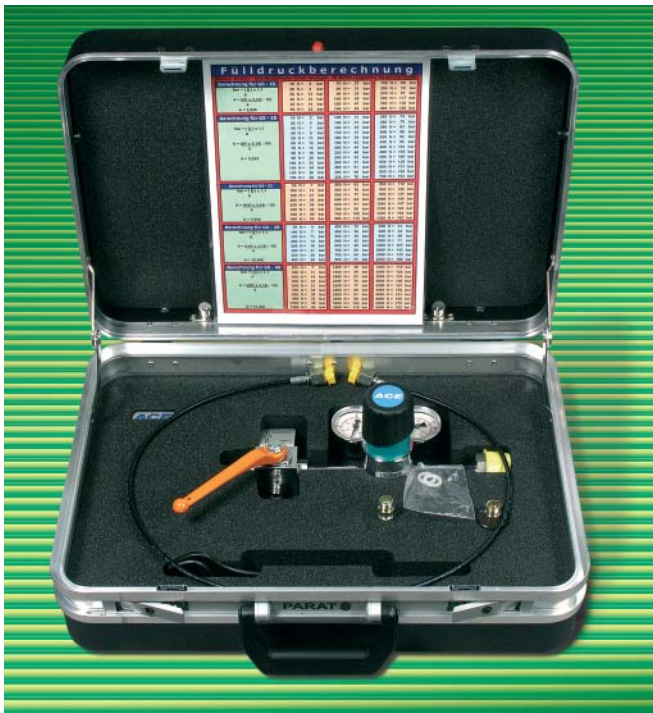


Adjustment Instruction

1. Hold gas spring piston rod down.
2. Remove any fitting attached to the body end of the gas spring (GZ version the piston rod).
3. Insert adjuster knob on thread end on the cylinder body (on GZ version thread end on the piston rod). When resistance is felt, proceed slowly and with caution. This opens the valve and you can hear the nitrogen escaping and reducing pressure. Turn back the adjusting knob immediately, to avoid too much nitrogen being discharged.
4. After adjustment, remove the 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.

Gas Spring Refilling Kit

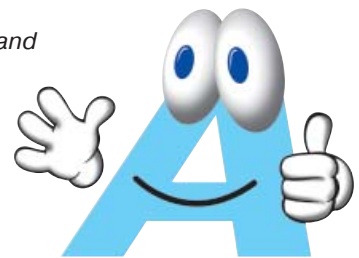


The **ACE gas spring refilling kit** gives the ability to fill, or adjust pressure (or force) of a Gas Spring on site. You gain independence and flexibility. The refilling kit includes all the parts necessary to fill your ACE gas springs on site. Only the high pressure nitrogen bottle is not included in the kit.

Gas spring refilling kit with one filling bell.
Please indicate the thread size.

Ordering Example: gas spring refilling kit GS-19
additional filling bell GZ-19

"Independence and flexibility!"



Available filling bells

- M3.5-8: GS- 8
- M3.5-10: GS-10
- M3.5-12: GS-12
- M5: GS-15
- M8: GS-19
- GS-22
- GZ-19
- M10: GS-28
- GZ-28
- M14: GS-40



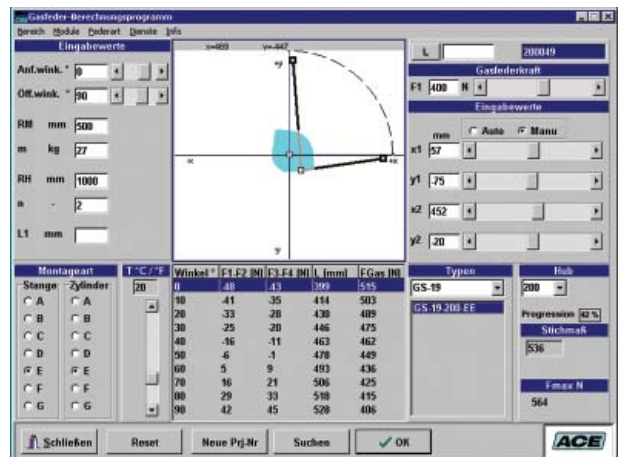
Calculation

To obtain the ideal selection to give the optimum operation for a gas spring it is important to identify the following points:

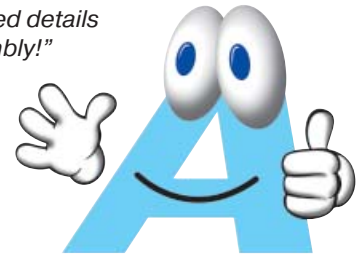
- gas spring size
- required gas spring stroke
- mounting points on flap and frame
- extended length of the gas spring
- required extension force
- hand forces throughout the complete movement on the flap

With our **free calculation service** you can eliminate the time-consuming calculation and fax us your details. Just complete the information shown on the calculation formulae page number 122. Please attach a sketch of your application (a simple hand sketch is sufficient) in side view. Our application engineers will determine the optimum 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.



"Calculation offer with all required details for assembly!"



Safety Instructions

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

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!

Disposal/Recycling:

Gas Springs consist mostly of metal and the metal could be recycled, but first the gas pressure must be removed. Please ask for our disposal recommendations which advise how to depressurize the gas springs and make them safe to recycle.

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.

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

Gas springs should not be exposed to tilting or side load forces during operation or whilst static (this can cause bending of the piston rod or early wear).

Gas springs are maintenance free. Do not grease or oil the piston rod.

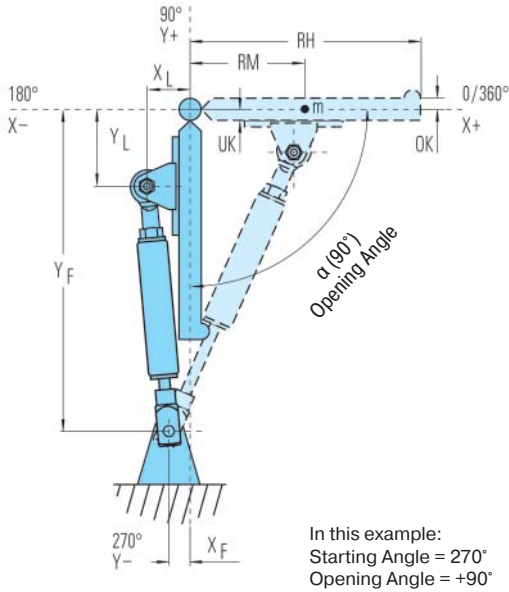
The piston rod must not be painted and should be protected against shocks, scratches and dirt. The cylinder should not be deformed as such damage would destroy the sealing system.

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).

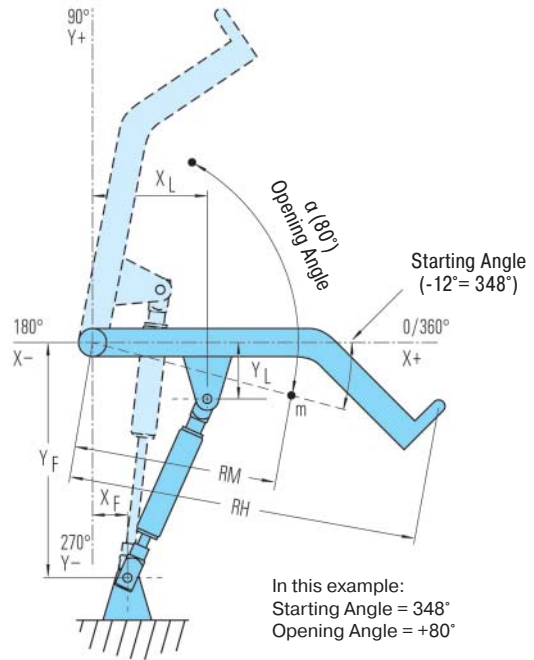
The tolerance for the installation length is generally deemed to be ± 2 mm. If very high demands are placed on durability and stability, please avoid the combination of small diameter + long stroke + high force.

The filling tolerance is -20 N to 40 N or 5 % to 7 %.

Case 1 (e.g. Flap)



Case 2 (e.g. Hood)



Push type

Pull type

Case 1

Case 2 (with attached sketch only)

Input Date

Gas Spring Fixing points

The fixed point X_F and Y_F of the frame and the moving point X_L and Y_L of the flap are critical for the optimum operation. **Therefore please attach a sketch of your application on separate paper (a few lines with their dimensions are sufficient)!**

Moving mass m _____ kg
No. 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 (0° to 360°) _____ °
Opening angle (-360° to $+360^\circ$) α _____ °
(- = downwards, + = upwards)
Dimensions of the flap: thickness _____ mm
Distance between flap and pivot:
Upper side $O_K =$ _____ mm, Lower side $U_K =$ _____ mm

Comments _____

Requirement per year _____
Machine type/reference _____

Sender

Co. _____
Address _____
Internet _____

Dept. _____
Name _____
Telephone _____ Fax _____
E-Mail _____

Please copy, complete and fax to ACE: Fax +49 - (0)2173 - 9226 - 89

Desired Mounting Fittings

End Fitting

End Fitting

- | | | |
|----------------------------|-------------------|----------------------------|
| <input type="checkbox"/> A | | <input type="checkbox"/> A |
| <input type="checkbox"/> B | Stud Thread | <input type="checkbox"/> B |
| <input type="checkbox"/> C | | <input type="checkbox"/> C |
| <input type="checkbox"/> D | Angle Ball Joint | <input type="checkbox"/> D |
| <input type="checkbox"/> E | | <input type="checkbox"/> E |
| <input type="checkbox"/> F | Clevis Fork | <input type="checkbox"/> F |
| <input type="checkbox"/> G | | <input type="checkbox"/> G |
| <input type="checkbox"/> H | Swivel Eye | <input type="checkbox"/> H |
| <input type="checkbox"/> I | | <input type="checkbox"/> I |
| <input type="checkbox"/> J | Inline Ball Joint | <input type="checkbox"/> J |
| <input type="checkbox"/> K | | <input type="checkbox"/> K |
| <input type="checkbox"/> L | Ball Socket | <input type="checkbox"/> L |

The end fittings are interchangeable.

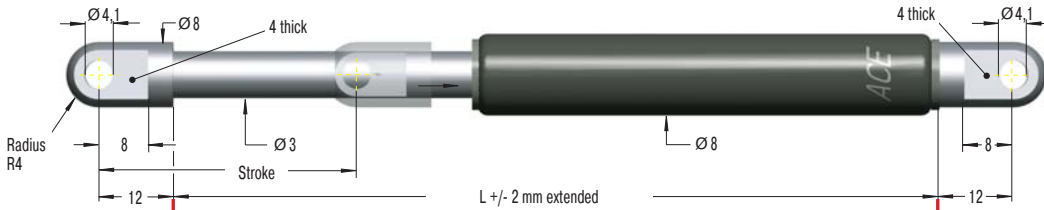
e.g.: -CE C = Angle Ball Joint, E = Swivel Eye

End Fitting

Standard Dimensions

End Fitting

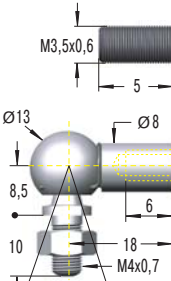
A3,5



Eye A3,5

B3,5

C3,5



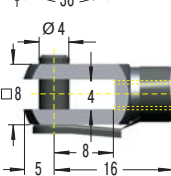
Dimensions

Type	Stroke mm	L extended
GS-8-20	20	72
GS-8-30	30	92
GS-8-40	40	112
GS-8-50	50	132
GS-8-60	60	152
GS-8-80	80	192

Stud Thread B3,5

Angle Ball Joint C3,5

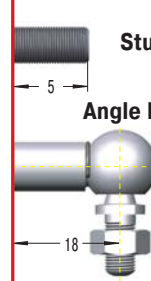
D3,5



Ordering Example

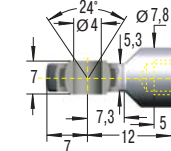
GS-8-30-AC-30

Type (Push Type) _____
 Body Ø (8 mm) _____
 Stroke (30 mm) _____
 Piston Rod End Fitting A3.5 _____
 Body End Fitting C3.5 _____
 Nominal Force F1 30 N _____

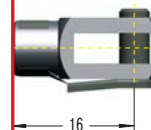


Clevis Fork D3,5

E3,5

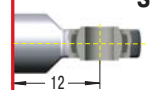
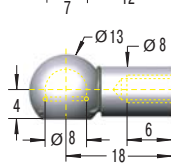


The end fittings are interchangeable.
For mounting accessories see page 141.



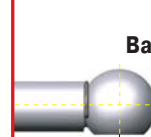
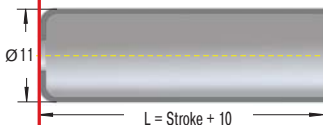
Swivel Eye E3,5

G3,5



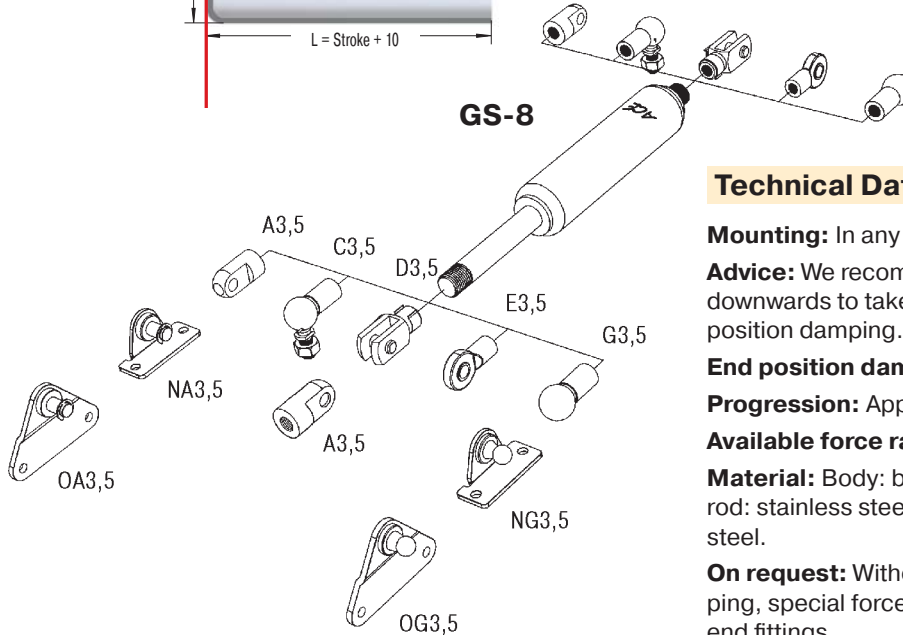
Ball Socket G3,5

W3,5-8
Rod Shroud



Adjuster Knob U3,5
See page 120.

GS-8



Technical Data

Mounting: In any position

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

End position damping length: Approx. 5 mm

Progression: Approx. 28%, F₂ max. 130 N

Available force range F₁ at 20 °C: 10 to 100 N

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.

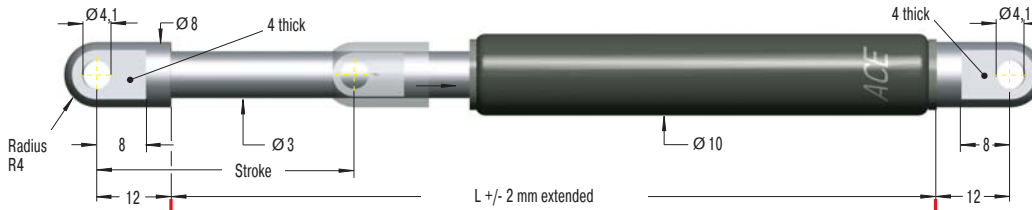
For mounting accessories see page 141.

End Fitting

Standard Dimensions

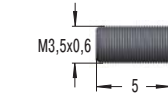
End Fitting

A3,5



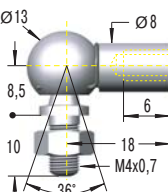
Eye A3,5

B3,5



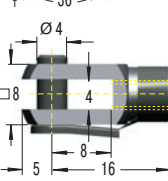
Stud Thread B3,5

C3,5



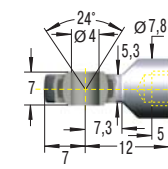
Angle Ball Joint C3,5

D3,5



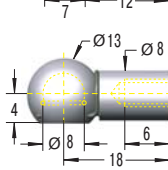
Clevis Fork D3,5

E3,5



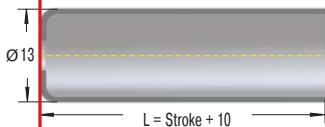
Swivel Eye E3,5

G3,5



Ball Socket G3,5

W3,5-10
Rod Shroud



Dimensions

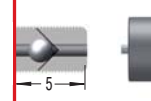
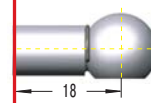
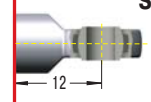
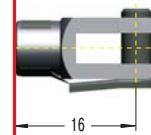
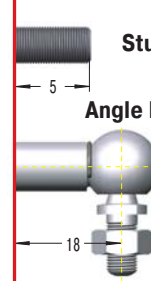
Type	Stroke mm	L extended
GS-10-20	20	72
GS-10-30	30	92
GS-10-40	40	112
GS-10-50	50	132
GS-10-60	60	152
GS-10-80	80	192

Ordering Example

GS-10-80-AC-60

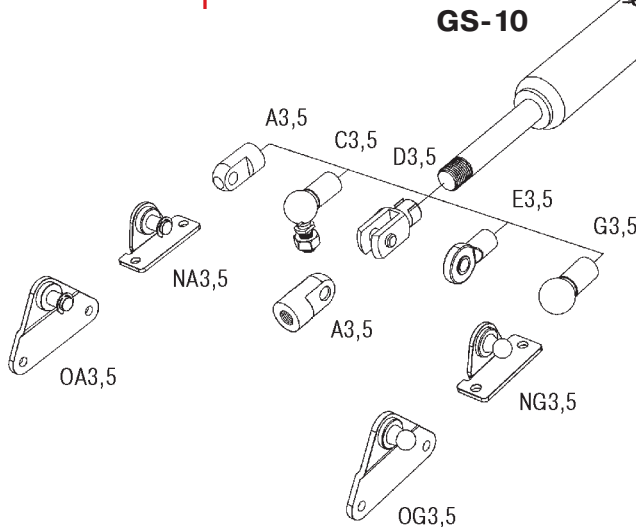
Type (Push Type) _____
 Body Ø (10 mm) _____
 Stroke (80 mm) _____
 Piston Rod End Fitting A3.5 _____
 Body End Fitting C3.5 _____
 Nominal Force F1 60 N _____

The end fittings are interchangeable.
For mounting accessories see page 141.



Adjuster Knob U3,5
See page 120.

GS-10



For mounting accessories see page 141.

Technical Data

Mounting: In any position

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

End position damping length: Approx. 5 mm

Progression: Approx. 20%, F2 max. 120 N

Available force range F1 at 20 °C: 10 to 100 N

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.

End Fitting

Standard Dimensions

End Fitting

A3,5 Eye **A3,5**

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

C3,5 Angle Ball Joint **C3,5**

D3,5 Clevis Fork **D3,5**

E3,5 Swivel Eye **E3,5**

G3,5 Ball Socket **G3,5**

W3,5-12 Rod Shroud
Ø15,6
L = Stroke + 10

Adjuster Knob U3,5
See page 120.

Dimensions

Type	Stroke mm	L extended	max. F1 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 (150mm) _____
 Piston Rod End Fitting A3.5 _____
 Body End Fitting A3.5 _____
 Nominal Force F1 30 N _____

**The end fittings are interchangeable.
For mounting accessories see page 141.**

Technical Data

Mounting: In any position

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

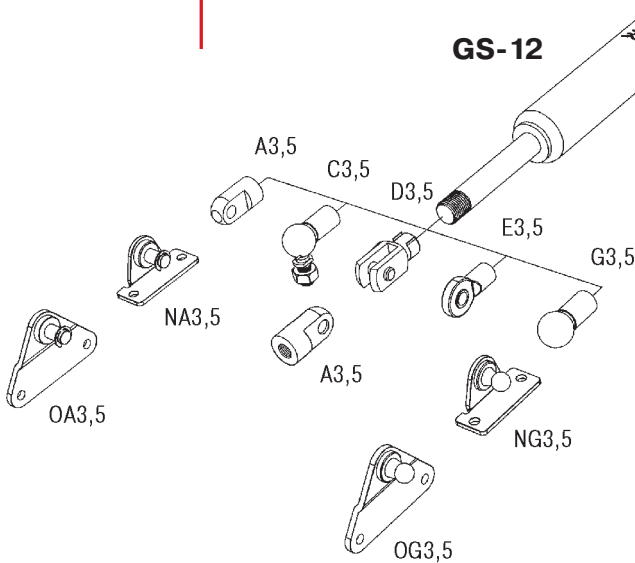
End position damping length: Approx. 10 mm

Progression: Approx. 25%, F2 max. 225 N

Available force range F1 at 20 °C: 10 to 180 N

Material: Body: black powder coated steel. Piston rod: stainless steel (1.4305). End fittings: zinc plated steel.

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings.



For mounting accessories see page 141.

End Fitting

Standard Dimensions

End Fitting

A5

Radius R5

Stroke

6 thick

Ø 6,1

Ø 10

Ø 6

Ø 15

10

16

16

Dimensions

Type	Stroke mm	L extended
GS-15-20	20	67
GS-15-40	40	107
GS-15-50	50	127
GS-15-60	60	147
GS-15-80	80	187
GS-15-100	100	227
GS-15-120	120	267
GS-15-150	150	327

Ordering Example **GS-15-150-AC-150**

Type (Push Type) _____

Body Ø (15 mm) _____

Stroke (150 mm) _____

Piston Rod End Fitting A5 _____

Body End Fitting C5 _____

Nominal Force F1 150 N _____

The end fittings are interchangeable.
For mounting accessories see page 141.

Eye A5

Stud Thread B5

Angle Ball Joint C5
(Max. permitted force 500 N)

Clevis Fork D5

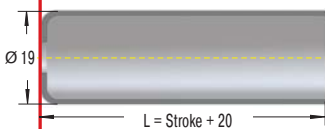
Swivel Eye E5

Inline Ball Joint F5

Ball Socket G5
(Max. permitted force 500 N)

Adjuster Knob U5
See page 120.

W5-15 Rod Shroud



GS-15



Technical Data

Mounting: In any position

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

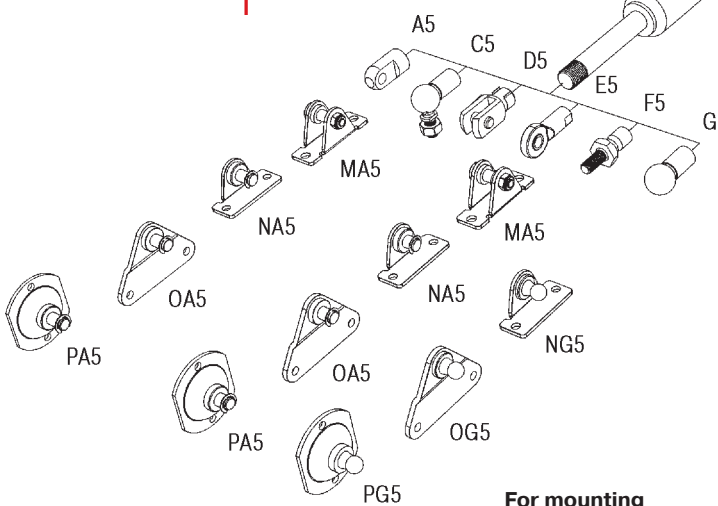
End position damping length: Approx. 10 mm

Progression: Approx. 27%, F2 max. 500 N

Available force range F1 at 20 °C: 20 to 400 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

On request: Without damping, increased damping action at end of travel, special force curves, special lengths, strokes alternative end fittings, stainless steel (see pages 134 to 139).



For mounting accessories see page 141.

End Fitting

Standard Dimensions

End Fitting

End Fitting **Eye A8**

B8 **Stud Thread B8**

C8 **Angle Ball Joint C8 (Max. permitted force 1200 N)**

D8 **Clevis Fork D8**

E8 **Swivel Eye E8**

F8 **Inline Ball Joint F8 (Max. permitted force 1200 N)**

G8 **Ball Socket G8 (Max. permitted force 1200 N)**

W8-19 Rod Shroud

GS-19

Adjuster Knob U8
See page 120.

Dimensions

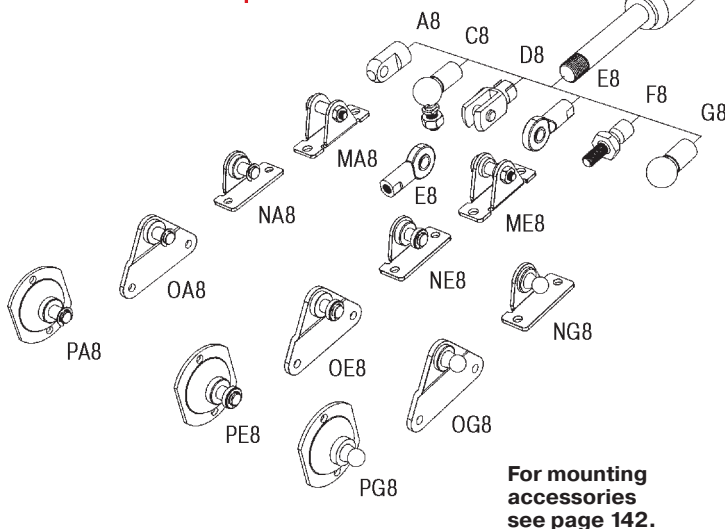
Type	Stroke mm	L extended
GS-19-50	50	164
GS-19-100	100	264
GS-19-150	150	364
GS-19-200	200	464
GS-19-250	250	564
GS-19-300	300	664

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 F1 600 N _____

The end fittings are interchangeable.
For mounting accessories see page 142.

Issue 9.2007 Specifications subject to change



Technical Data

Mounting: In any position

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

End position damping length: Strong end position damping approx. 20 to 60 mm (depending on the stroke) and slow extension speed.

Progression: Approx. 36-42%, F2 max. 995 N

Available force range F1 at 20 °C: 50 to 700 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

End Fitting

Standard Dimensions

End Fitting

A8

B8

C8

D8

E8

F8

G8

U8

Dimensions

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

Ordering Example

GS-22-150-AE-800

Type (Push Type) _____

Body Ø (22 mm) _____

Stroke (150 mm) _____

Piston Rod End Fitting A8 _____

Body End Fitting E8 _____

Nominal Force F1 800 N _____

The end fittings are interchangeable.
For mounting accessories see page 142.

Eye A8

Stud Thread B8

Angle Ball Joint C8
(Max. permitted force 1200 N)

Clevis Fork D8

Swivel Eye E8

Inline Ball Joint F8
(Max. permitted force 1200 N)

Ball Socket G8
(Max. permitted force 1200 N)

Adjuster Knob U8
See page 120.

W8-22 Rod Shroud

GS-22

Technical Data

Mounting: In any position

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

End position damping length: Strong end position damping approx. 20 to 70 mm (depending on the stroke) and slow extension speed.

Progression: approx. 39 to 50 %, F2 max. 1 950 N

Available force range F1 at 20 °C: 80 to 1 300 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

End Fitting

Standard Dimensions

End Fitting

A10

B10

C10

D10

E10

F10

W10-28
Rod Shroud

Dimensions

Type	Stroke mm	L extended
GS-28-100	100	262
GS-28-150	150	362
GS-28-200	200	462
GS-28-250	250	562
GS-28-300	300	662
GS-28-350	350	762
GS-28-400	400	862
GS-28-450	450	962
GS-28-500	500	1 062
GS-28-550	550	1 162
GS-28-600	600	1 262
GS-28-650	650	1 362
GS-28-700	700	1 462
GS-28-750	750	1 562

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 F1 1200 N _____ ↑

**The end fittings are interchangeable.
For mounting accessories see page 142.**

Eye A10

Stud Thread B10

Angle Ball Joint C10
(Max. permitted force 1800 N)

Clevis Fork D10

Swivel Eye E10

Inline Ball Joint F10
(Max. permitted force 1800 N)

Adjuster Knob U10
See page 120.

For mounting accessories see page 142.

Technical Data

Mounting: In any position

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

End position damping length: Strong end position damping approx. 30 to 70 mm (depending on the stroke) and slow extension speed.

Progression: Approx. 60 to 95%, F₂ max. 4875 N.

Available force range F₁ at 20 °C: 150 to 2500 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

End Fitting

Standard Dimensions

End Fitting

A14

B14

C14

D14

E14

F14

W14-40
Rod Shroud

Dimensions

Type	Stroke mm	L extended
GS-40-100	100	317
GS-40-150	150	417
GS-40-200	200	517
GS-40-300	300	717
GS-40-400	400	917
GS-40-500	500	1 117
GS-40-600	600	1 317
GS-40-800	800	1 717
GS-40-1000	1 000	2 117

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 F₁ 3500 N _____ ↑

The end fittings are interchangeable.
For mounting accessories see page 143.

Eye A14

Stud Thread B14

Angle Ball Joint C14
(Max. permitted force 3200 N)

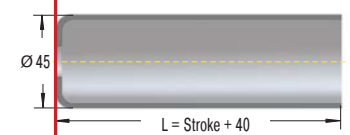
Clevis Fork D14

Swivel Eye E14

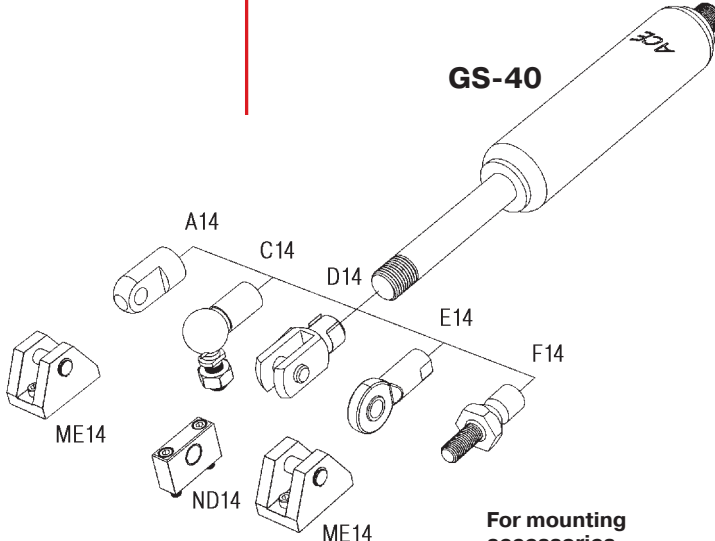
Inline Ball Joint F14
(Max. permitted force 3200 N)

Adjuster Knob U14
See page 120.

W14-40 Rod Shroud



GS-40



For mounting accessories see page 143.

Technical Data

Mounting: In any position

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

End position damping length: Strong end position damping approx. 30 to 70 mm (depending on the stroke) and slow extension speed.

Progression: Approx. 47 to 53 %, F₂ max. 7650 N.

Available force range F₁ at 20 °C: 500 to 5000 N

Material: Body: black powder coated steel. Piston rod: ceramic coated steel. End fittings: zinc plated steel.

On request: Without damping, standard length damping, special force curves, special lengths, alternative end fittings, stainless steel (see pages 134 to 139).

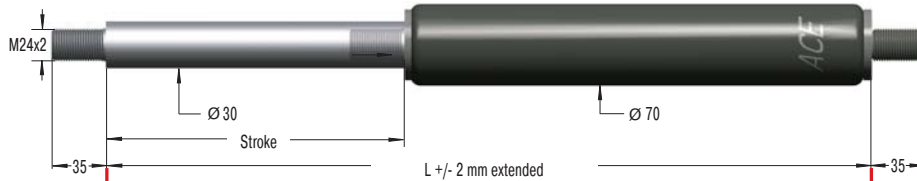
Issue 9.2007 Specifications subject to change

End Fitting

Standard Dimensions

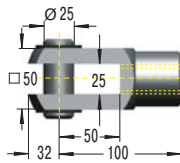
End Fitting

B24



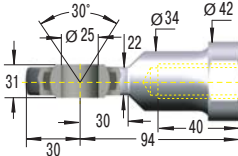
Stud Thread **B24**

D24



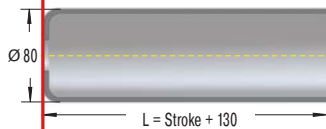
Clevis Fork **D24**

E24



Swivel Eye **E24**

W24-70
Rod Shroud



Dimensions

Type	Stroke mm	L extended
GS-70-100	100	320
GS-70-200	200	520
GS-70-300	300	720
GS-70-400	400	920
GS-70-500	500	1 120
GS-70-600	600	1 320
GS-70-700	700	1 520
GS-70-800	800	1 720

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 F₁ 8000 N _____

The end fittings are interchangeable.
 For mounting accessories see page 143.
 Standard gas spring with valve.

Technical Data

Mounting: In any position

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

End position damping length: Approx. 10 mm

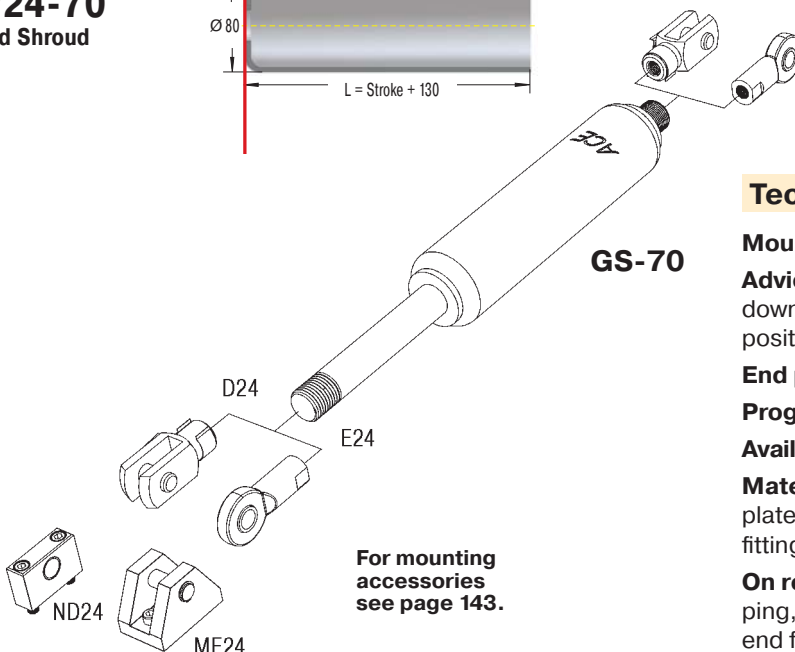
Progression: Approx. 25%, F₂ max. 16250 N

Available force range F₁ at 20 °C: 2000 N to 13000 N

Material: Body: black powder coated steel or zinc plated steel. Piston rod: hard chrome plated. End fittings: zinc plated steel.

On request: Without damping, extended length damping, special force curves, special lengths, alternative end fittings, stainless steel.

GS-70

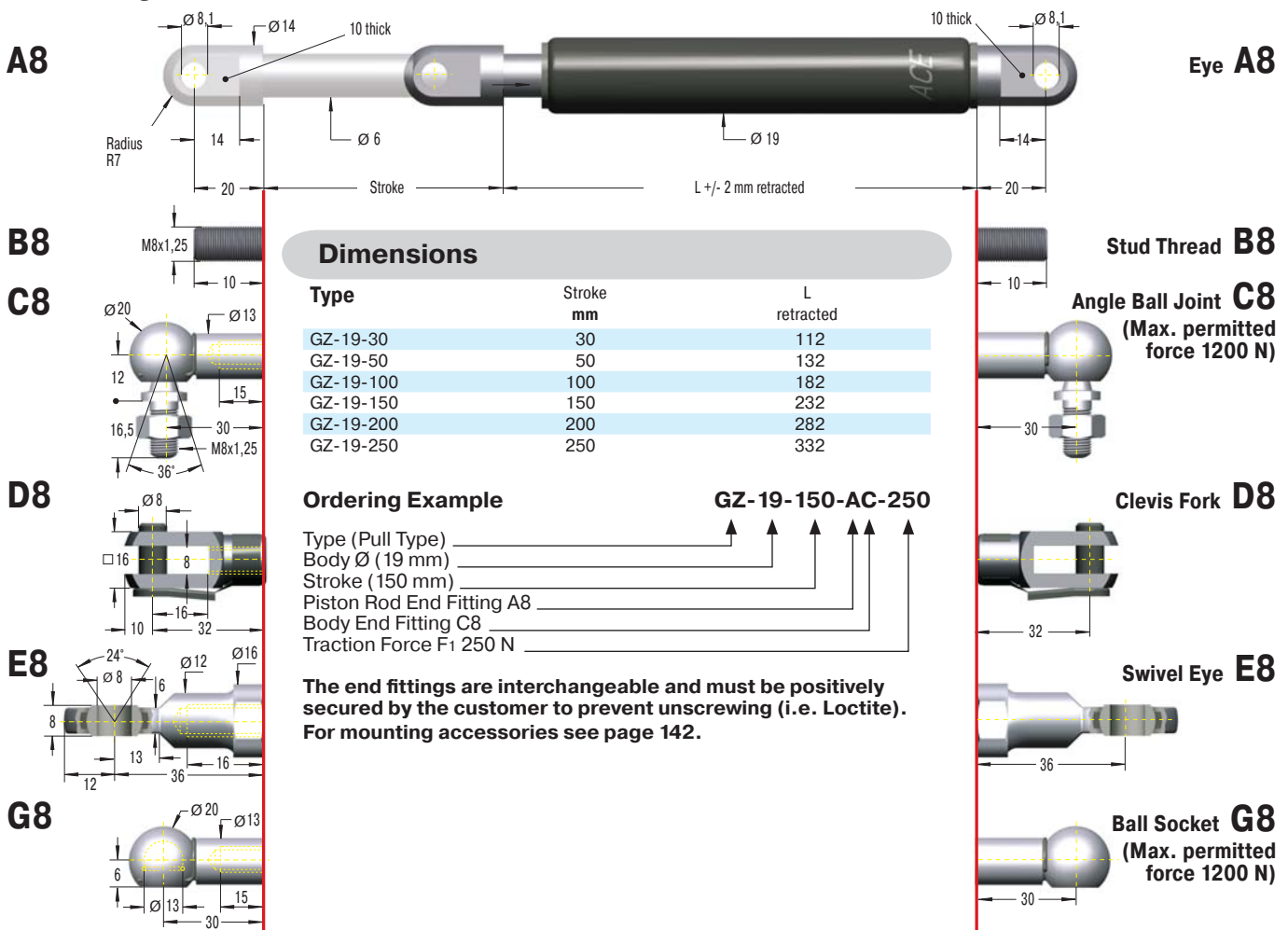


For mounting accessories see page 143.

End Fitting

Standard Dimensions

End Fitting



Dimensions

Type	Stroke mm	L retracted
GZ-19-30	30	112
GZ-19-50	50	132
GZ-19-100	100	182
GZ-19-150	150	232
GZ-19-200	200	282
GZ-19-250	250	332

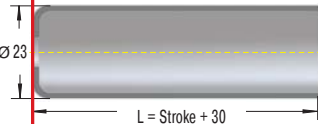
Ordering Example

GZ-19-150-AC-250

Type (Pull Type) _____
 Body \varnothing (19 mm) _____
 Stroke (150 mm) _____
 Piston Rod End Fitting A8 _____
 Body End Fitting C8 _____
 Traction Force F1 250 N _____

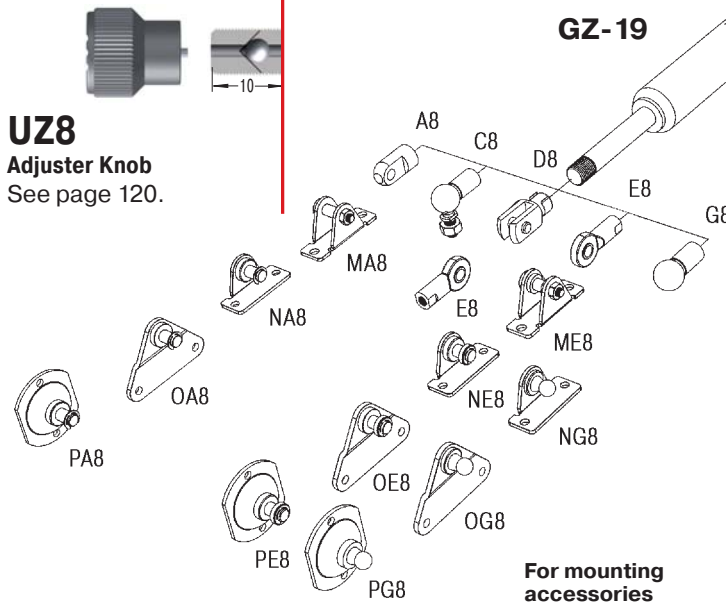
The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite). For mounting accessories see page 142.

WZ8-19 Rod Shroud



UZ8 Adjuster Knob

See page 120.



For mounting accessories see page 142.

Technical Data

- Mounting:** Can be mounted in any position. Install mechanical stop in extended position.
- End position damping length:** Without damping
- Progression:** Approx. 10%, F2 max. 330 N
- Note:** Lifetime approx. 2000 m
- Available traction force range F1 at 20 °C:** 30 to 300 N
- Material:** Body: black powder coated steel. End fittings: zinc plated steel. Piston rod: hard chrome plated.
- On request:** Special force curves, special lengths, alternative end fittings, stainless steel.

Issue 9.2007 Specifications subject to change

Traction (Pull) Forces 150 N to 1200 N
(when Piston Rod Extended up to 1440 N)

End Fitting

Standard Dimensions

End Fitting

A10

Radius R9

17

25

12 thick

Ø10

Stroke

Dimensions

Type	Stroke mm	L retracted
GZ-28-30	30	130
GZ-28-50	50	150
GZ-28-100	100	200
GZ-28-150	150	250
GZ-28-200	200	300
GZ-28-250	250	350
GZ-28-300	300	400
GZ-28-350	350	450
GZ-28-400	400	500
GZ-28-450	450	550
GZ-28-500	500	600
GZ-28-550	550	650
GZ-28-600	600	700
GZ-28-650	650	750

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 F1 800 N _____

Eye A10

Stud Thread B10

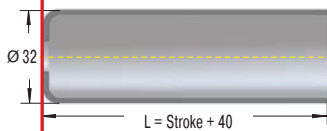
Angle Ball Joint C10
(Max. permitted force 1800 N)

Clevis Fork D10

Swivel Eye E10

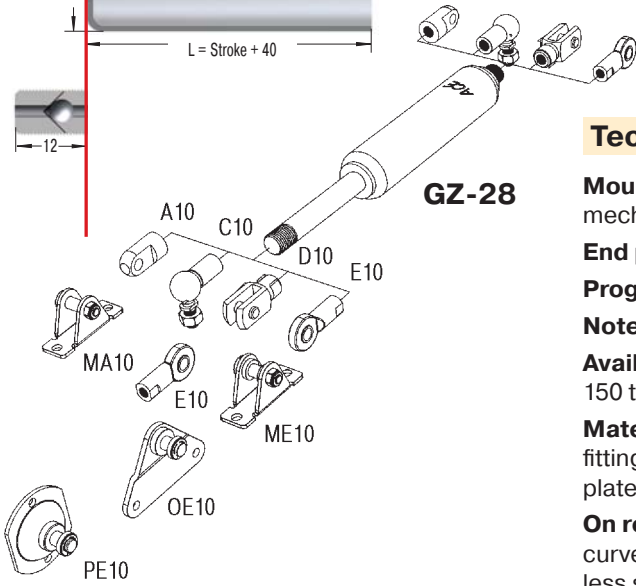
The end fittings are interchangeable and must be positively secured by the customer to prevent unscrewing (i.e. Loctite). For mounting accessories see page 142.

WZ10-28 Rod Shroud



UZ10 Adjuster Knob

See page 120.



For mounting accessories see page 142.

Technical Data

Mounting: Can be mounted in any position. Install mechanical stop in extended position.

End position damping length: Without damping

Progression: Approx. 20%, F₂ max. 1440 N.

Note: Lifetime approx. 2000 m

Available traction force range F₁ at 20 °C: 150 to 1200 N

Material: Body: black powder coated steel. End fittings: zinc plated steel. Piston rod: hard chrome plated.

On request: Increased traction force, special force curves, special lengths, alternative end fittings, stainless steel.

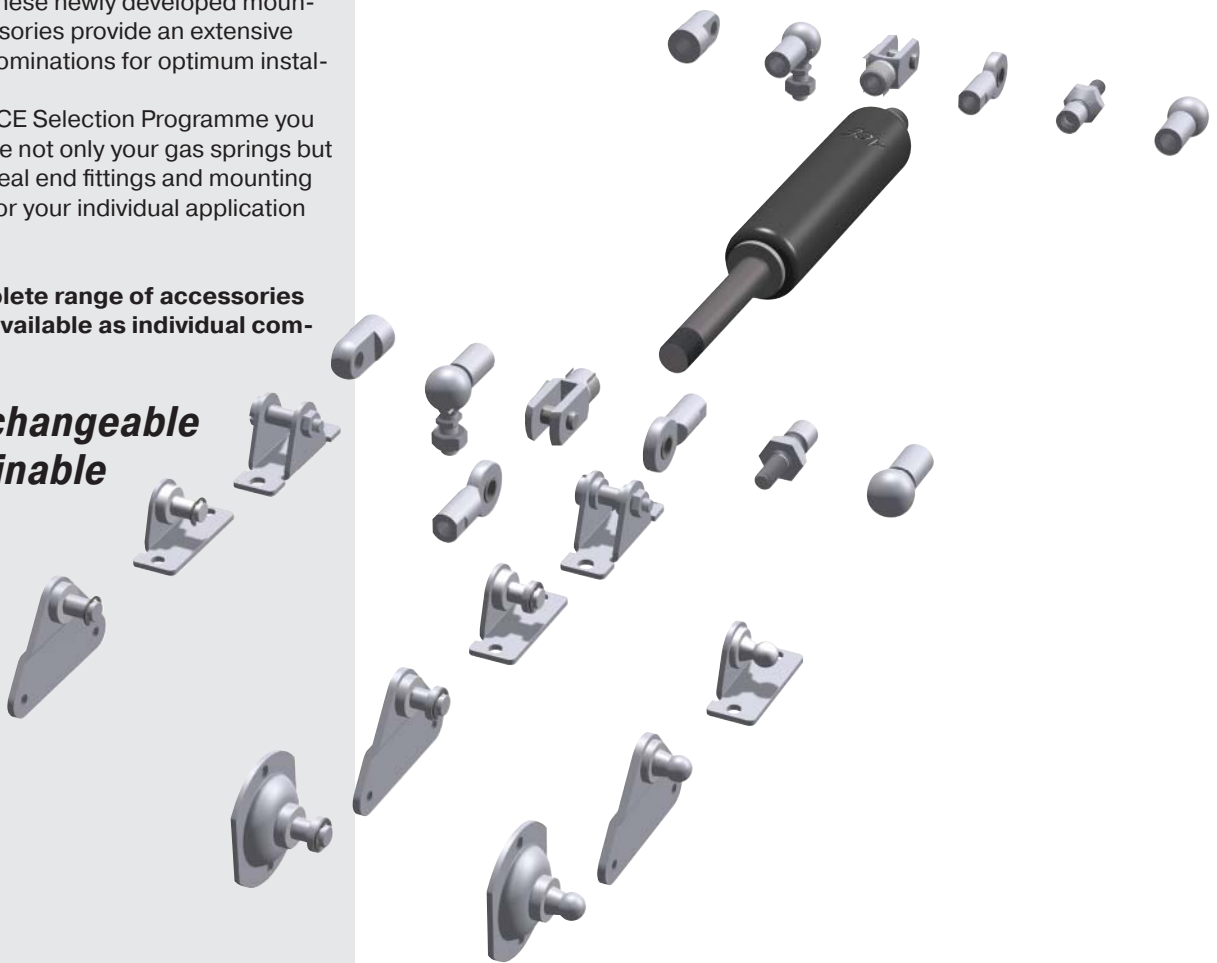
Just drill 4 holes – ACE does all the rest!

By taking advantage of the very extensive range of ACE end fittings and mounting brackets you can easily and simply install our gas springs and hydraulic dampers. You profit from the variety of DIN Standard end fittings such as swivel eyes, clevis forks, angle ball joints, inline ball joints, and complementary ball sockets. ACE also offers eye fittings made of wear resistant steel to meet the higher specification requirements found in industrial applications. With over 30 different types available these newly developed mounting accessories provide an extensive range of combinations for optimum installations.

With the ACE Selection Programme you can choose not only your gas springs but also the ideal end fittings and mounting brackets for your individual application example.

The complete range of accessories are also available as individual components.

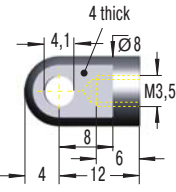
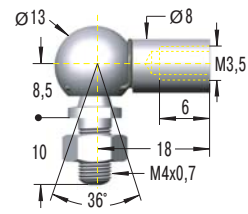
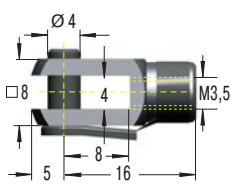
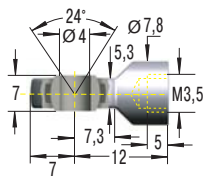
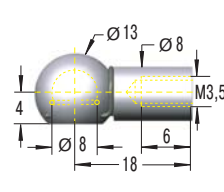
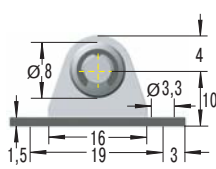
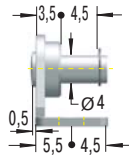
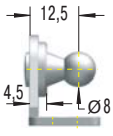
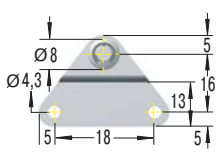
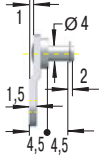

Interchangeable Combinable



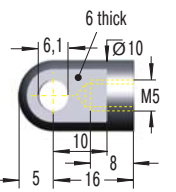
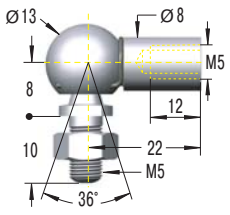
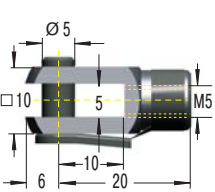
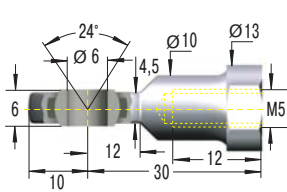
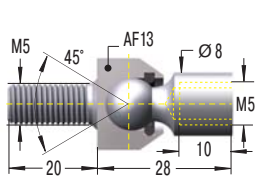
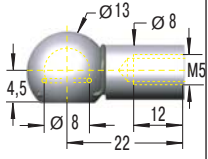
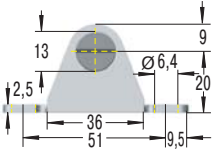
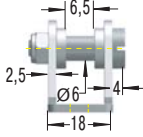
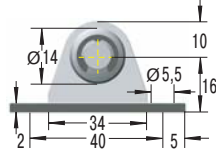
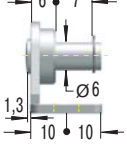
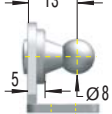
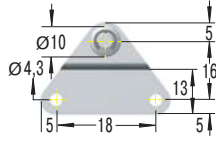
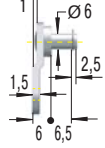
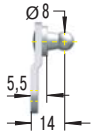
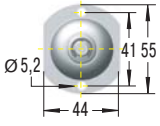
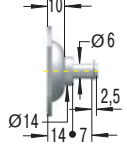
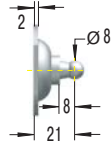
The wide range of mounting brackets available



Accessories M3.5x0.6 GS-8, GS-10, GS-12, HB-12

A3.5 Eye  <p>1 max. force 225 N</p>	C3.5 Angle Ball Joint DIN 71802  <p>1 max. force 225 N</p>	D3.5 Clevis Fork DIN 71752  <p>1 max. force 225 N</p>	E3.5 Swivel Eye DIN 648  <p>1 max. force 225 N</p>	G3.5 Ball Socket DIN 71805  <p>1 max. force 225 N</p>	
1 max. force 180 N 	NA3.5 	NG3.5 	1 max. force 180 N 	OA3.5 	OG3.5 

Accessories M5x0.8 GS-15, HB-15

A5 Eye  <p>1 max. force 800 N</p>	C5 Angle Ball Joint DIN 71802  <p>1 max. force 500 N</p>	D5 Clevis Fork DIN 71752  <p>1 max. force 800 N</p>	E5 Swivel Eye DIN 648  <p>1 max. force 800 N</p>	F5 Inline Ball Joint  <p>Attention! Must only be used with compression loads. 1 max. force 500 N</p>	
G5 Ball Socket DIN 71805  <p>1 max. force 500 N</p>	1 max. force 500 N 	MA5 	1 max. force 500 N 	NA5 	NG5 
1 max. force 180 N 	OA5 	OG5 	1 max. force 500 N 	PA5 	PG5 

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.

Accessories M8x1.25 GS-19, GS-22, GZ-19, HB-22, HB-28, HBS-28, DVC-32

<p>A8 Eye</p> <p>1 max. force 3 000 N</p>	<p>C8 Angle Ball Joint DIN 71802</p> <p>1 max. force 1 200 N</p>	<p>D8 Clevis Fork DIN 71752</p> <p>1 max. force 3 000 N</p>	<p>E8 Swivel Eye DIN 648</p> <p>1 max. force 3 000 N</p>	<p>F8 Inline Ball Joint</p> <p>Attention! Must only be used with compression loads.</p> <p>1 max. force 1 200 N</p>		
<p>G8 Ball Socket DIN 71805</p> <p>1 max. force 1 200 N</p>	<p>MA8 ME8</p>		<p>1 max. force 1 200 N NA8 NE8 NG8</p>			
<p>1 max. force 1 200 N</p>	<p>OA8</p>	<p>OE8</p>	<p>OG8</p>	<p>1 max. force 1 200 N PA8 PE8 PG8</p>		

Accessories M10x1.5 GS-28, GZ-28, HBS-35

<p>A10 Eye</p> <p>1 max. force 10 000 N</p>	<p>C10 Angle Ball Joint DIN 71802</p> <p>1 max. force 1 800 N</p>	<p>D10 Clevis Fork DIN 71752</p> <p>1 max. force 10 000 N</p>	<p>E10 Swivel Eye DIN 648</p> <p>1 max. force 10 000 N</p>	<p>F10 Inline Ball Joint</p> <p>Attention! Must only be used with compression loads.</p> <p>1 max. force 1 800 N</p>	
<p>1 max. force 1 800 N</p>	<p>MA10 ME10</p>		<p>1 max. force 1 200 N PA10 PE10</p>		
<p>1 max. force 1 200 N</p>	<p>OE10</p>	<p>1 max. force 1 200 N</p>			

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.

Issue 9.2007 Specifications subject to change

Accessories M14x1.5 GS-40, HB-40

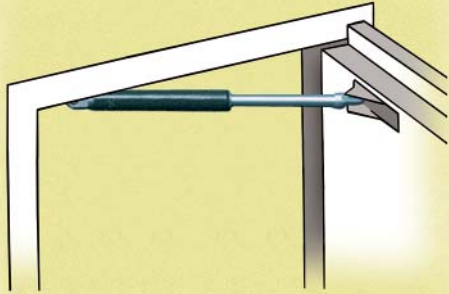
<p>A14 Eye</p> <p>1 max. force 10 000 N</p>	<p>C14 Angle Ball Joint DIN 71802</p> <p>1 max. force 3 200 N</p>	<p>D14 Clevis Fork DIN 71752</p> <p>1 max. force 10 000 N</p>	<p>E14 Swivel Eye DIN 648</p> <p>1 max. force 10 000 N</p>	<p>F14 Inline Ball Joint</p> <p>Attention! Must only be used with compression loads.</p> <p>1 max. force 3 200 N</p>
<p>ME14 1 max. force 10 000 N</p>		<p>ND14 1 max. force 10 000 N</p>		

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.

Accessories M24x2 GS-70, HB-70, HBS-70

<p>D24 Clevis Fork DIN 71752</p> <p>1 max. force 50 000 N</p>	<p>E24 Swivel Eye DIN 648</p> <p>1 max. force 50 000 N</p>		
<p>ME24 1 max. force 50 000 N</p>		<p>ND24 1 max. force 50 000 N</p>	

1 Attention! Max. static load in Newtons. Beware force increase during compression (progression) and observe max. force limit.



Doors open and close safely

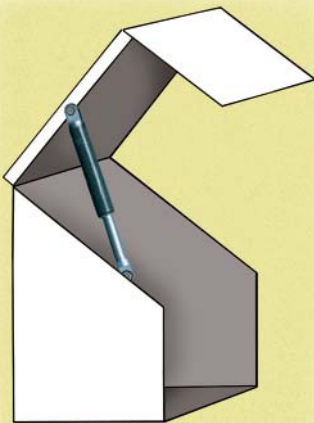
ACE industrial gas springs make opening and closing doors of rescue helicopters easier.

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 safety entry and exit



Protection under the hood

ACE industrial gas springs prevent injuries during maintenance work on harvesting machines.

The blades of corn pickers are arranged under plastic hoods, which assure proper material flow within the machine. For maintenance purposes, the hoods, weighing about 7 kg, must be lifted up. To protect maintenance personnel from injury by falling hoods, they are kept in the open position by industrial gas springs of the type **GS-22-250-DD**.

Another advantage they offer is their stability under rough operating conditions due to their ceramic hardness structure on the piston rod and the powder-coated housing.



Enhanced protection: Industrial gas springs secure heavy hoods