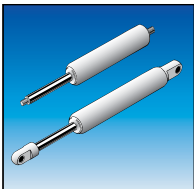
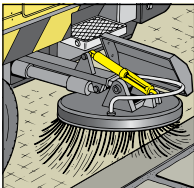

Gas Springs



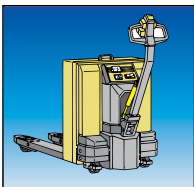
**Functioning, Instructions
and Safety Precautions**

**Pages 06.003.00
- 06.016.00**



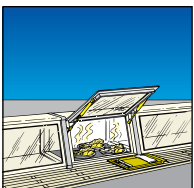
**Push Type Gas Springs
Gas Springs with Floating Piston**

**Pages 06.017.00
- 06.032.00**



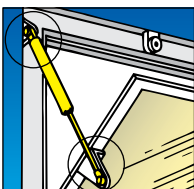
**Pull Type Gas Springs
Locking Gas Springs**

**Pages 06.033.00
- 06.044.00**



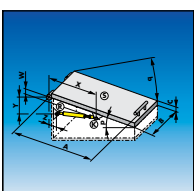
**Stainless Steel Gas Springs
Variable Speed Gas Springs/
Double Cylinder Gas Springs**

**Pages 06.045.00
- 06.060.00**



**End Fittings
Mounting Brackets**

**Pages 06.061.00
- 06.068.00**



**Calculation and Selection
Advisory Service**

**Pages 06.069.00
- 06.088.00**

State 01/2016

High-Performance Gas Springs

Main Functions and Use

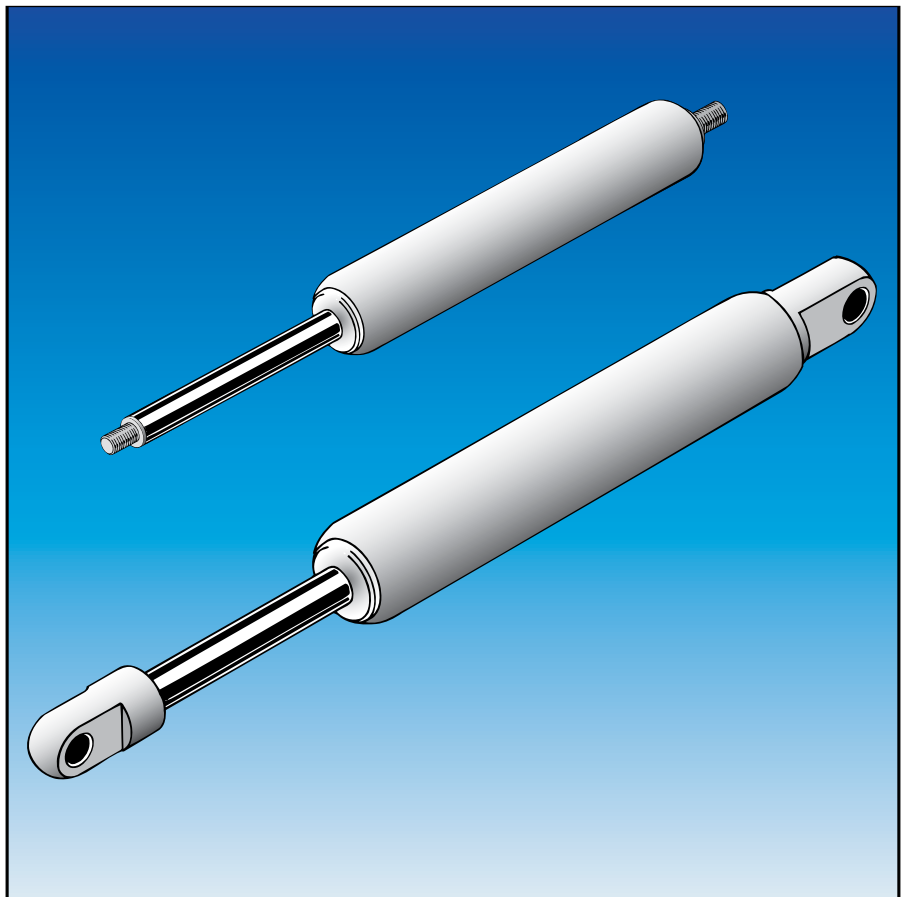
DICTATOR high-performance gas springs lift your loads - always smoothly and effortlessly, without jolt. The variety of applications is as numerous as our models. For that reason DICTATOR has no fix table of types and only some frequently ordered gas springs are available from stock.

We manufacture **your gas spring for your particular application - also single units** or small quantities.

As a counterweight, or to assist movement DICTATOR high-performance gas springs are ideally suited to a wide variety of applications. They give controlled movement smoothly and effortlessly.

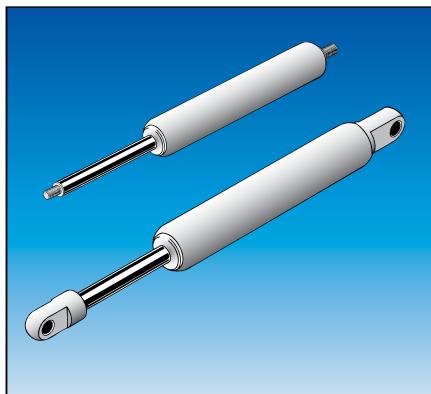
In gas springs a pressurised **nitrogen gas** acts upon the piston rod. In addition oil dampens hard movements and the final positions. Special low friction seals give very long life and an exceptional performance.

You have the application. **We** have the gas springs. Over the next pages, we'll explain the different types of DICTATOR gas springs available, their capabilities and range of applications.



Technical Data

| | |
|------------------------------|--|
| Force | nitrogen (N) non-flammable (up to 10 000 N) |
| Damping fluid | hydraulic fluid (mineral oil or silicon oil), biological oil |
| Operating temperatures | -10 °C (with special oil -30 °C) to +80 °C |
| Number of strokes) | max. 6 strokes per minute |
| Cylinder (Ø 10 to 65 mm) | steel tube (zinc-plated, lacquered, stainless steel) |
| Piston rod (Ø 3 to 30 mm) | hard chrome plated steel or burnished stainless steel |
| Force range | depending on diameter and length (up to 10 000 N) |
| Length of stroke / Tolerance | from 10 mm to 1000 mm (tolerance ± 2 mm) |

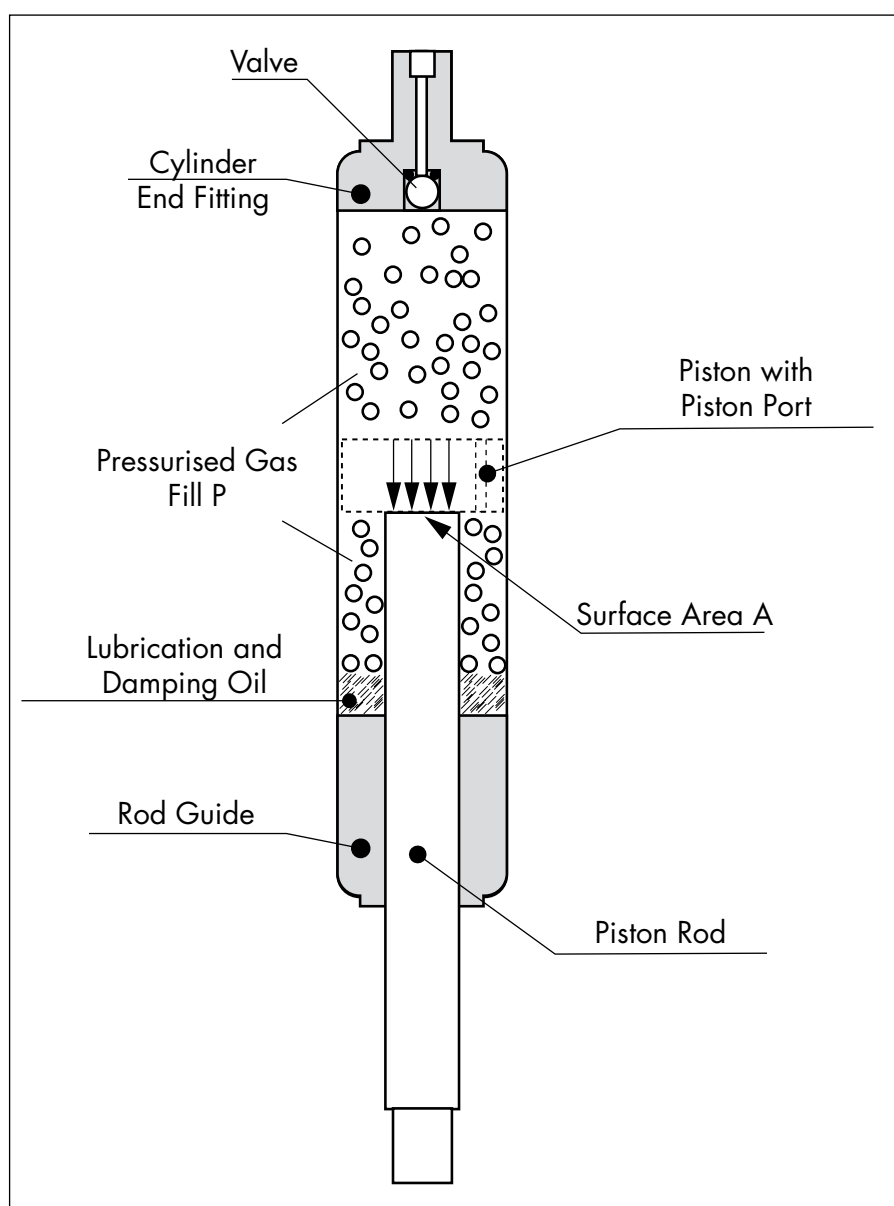


Basic Principle

In this section you will find a detailed explanation concerning the functioning of the different types of gas springs. All gas springs work on the same basic principle:

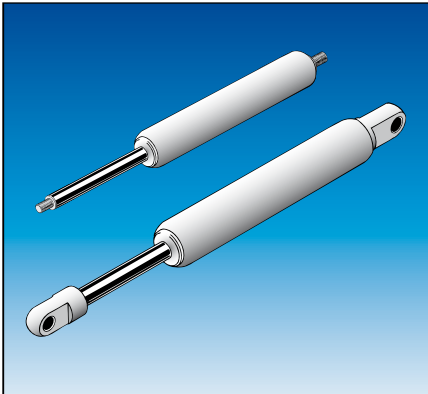
Gas springs are filled with nitrogen gas to a suitable pressure. This pressure is equal on both sides of the piston. The piston rod always extends because the surface area of the piston with the piston rod attached is smaller than the surface area of the other side of the piston with no piston rod attached.

The resultant force F in Newtons [N] can be calculated by multiplying the gas pressure P [bar] by the surface area A of the piston rod [mm²]: $F = P \times A$



Further details concerning the functioning and variety of uses of push type gas springs, pull type gas springs, locking gas springs, adjustable gas springs and double cylinder gas springs can be found on the following pages.

Please observe the safety precautions on page 06.013.00!

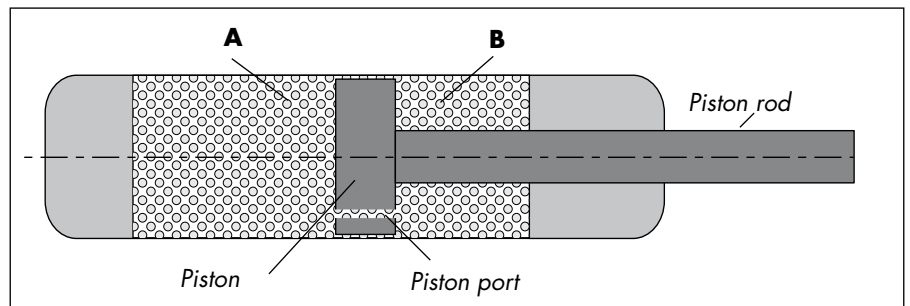


Push Type Gas Springs

In this section you will find a detailed explanation concerning the functioning of the different types of gas springs. All gas springs work on the same basic principle (see previous page): the gas pressure acting on the inside surface area of the piston rod forces the piston rod outwards of the cylinder.

The resultant force F in Newton [N] can be calculated by multiplying the internal pressure P [bar] by the surface area A of the piston rod [mm²]: $F = P \times A$

Push Type Gas Springs



As mentioned on the previous page, gas springs contain highly pressurised nitrogen. The pressure is the same on both sides of the piston. The piston port enables the gas pressure to equalise on both sides of the piston (volume A and volume B) when the piston rod is moved.

Additionally the piston port controls the extending speed of the piston rod by restricting the gas flow. A valve can also be integrated inside the piston in order to restrict the direction of this damping effect.

When ordering your gas spring (see pages 06.017.00 - 06.058.00) you can choose between four types of damping:

Code 0 = without damping

Code 1 = damping on extending stroke

Code 2 = damping on compression stroke

Code 3 = damping on both extending and compression strokes

The cylinder also contains oil to lubricate the piston rod seal. This oil must also flow through the port before the piston rod fully extends. This creates the final damping zone for the last 1 to 2 cm. If you need a longer final damping zone, our factory can supply a larger quantity of oil. Contact our technical advisory service for details.

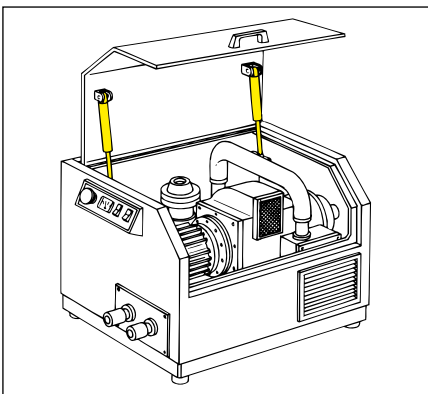
Please note: An oil chamber should be included in the gas spring specification if the gas spring operation is not vertical (near vertical with the piston rod pointing downwards). Please read the description on page 06.010.00.

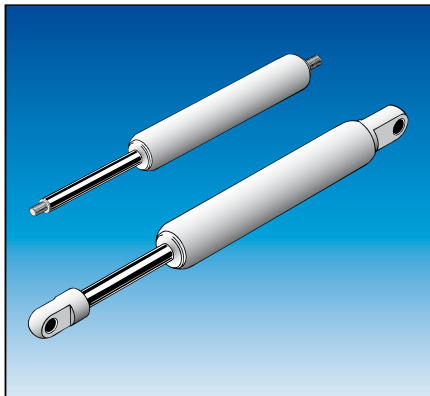
Push-type gas springs are used on a variety of applications. They usually serve as a counter weight on flaps, hatches, lids etc.

Please take advantage of our Advisory Service. Our computer gas spring calculation will calculate the specification of an ideal gas spring and its fixing points that give the required operating characteristics, e.g. minimum need of hand force.

We can also advise you on any special requirements as our product range contains many special characteristics which are explained on the following pages.

Technical data and measurements can be found starting on page 06.017.00.

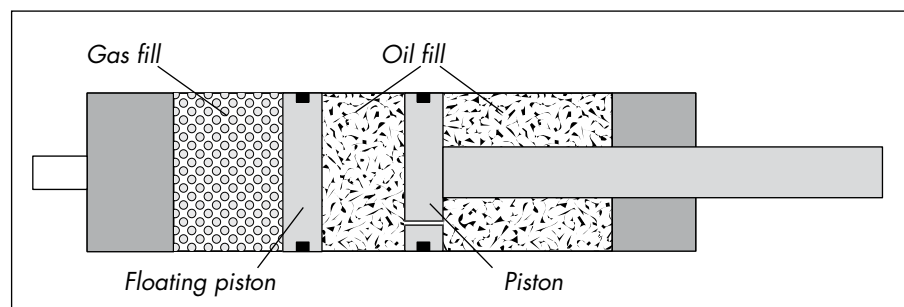
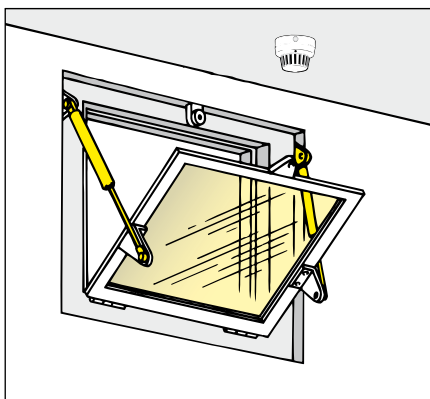




Gas Springs with Floating Piston and Pull Type Gas Springs

Gas springs with floating piston have a second sealed piston additionally to the main piston which is attached to the piston rod. This floating piston separates the pressurised gas section from the oil or empty volume section. It moves and transfers the pressure of the gas to the oil in the front part of the cylinder.

Gas Springs with Floating Piston

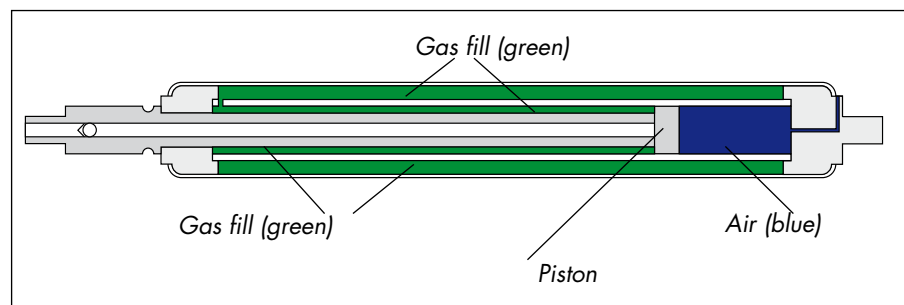
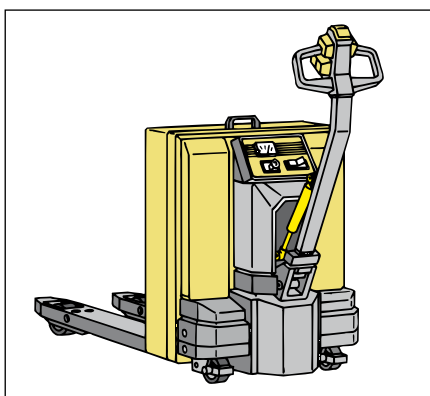


Inside gas springs with floating piston the section containing the normal piston is filled with oil. The small port in the piston causes the piston rod to move slowly. The floating piston separates the pressurised gas from the section containing the piston.

A floating piston is particularly advantageous if you require an exceptionally gentle movement as on smoke ventilators, sensitive visual appliances or precision machines.

Technical data and measurements can be found starting on page 06.029.00.

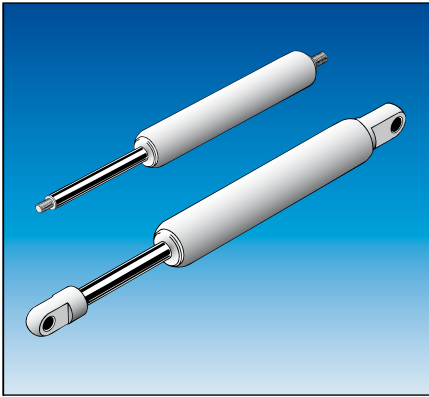
Pull Type Gas Springs



The operating direction of pull type gas springs is opposite to the one of push type gas springs. The pressure of the nitrogen in the gas spring is higher than the one of the ambient air, which may enter the gas spring by a boring. The nitrogen acts from the inside against the piston, thus pulling the piston rod into the cylinder. The air is pushed out of the cylinder. The section with the nitrogen is sealed against the area where the ambient air entered, so that the nitrogen cannot escape.

Usually you opt for this type of gas spring when it is not possible to use push type gas springs.

Technical data and measurements can be found starting on page 06.033.00.



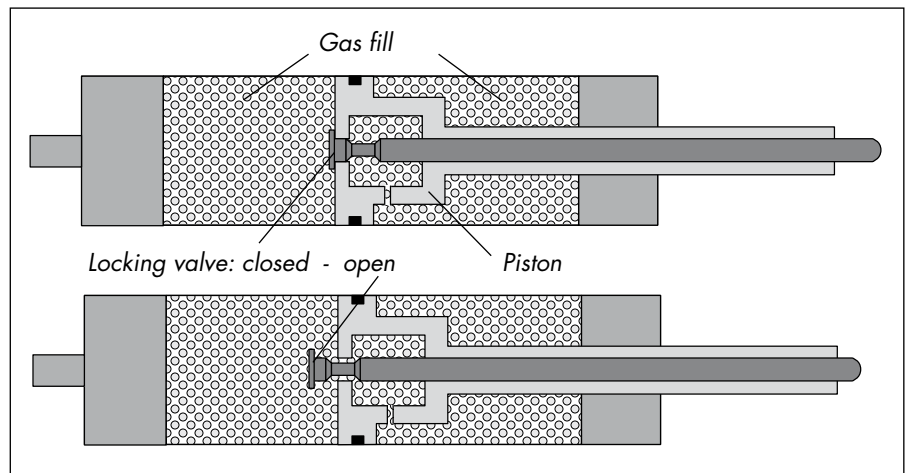
Locking Gas Springs

In locking gas springs the port in the piston is closed by a valve which is opened by a release pin located inside the piston rod. The piston rod can only move if the locking mechanism is disengaged.

Cushioned locking gas springs compress slightly when a load is applied without disengaging the locking feature, as the gas compresses in both directions.

Locking gas springs are used to lock levers and flaps in various positions. They should balance out the weight of the flap when released.

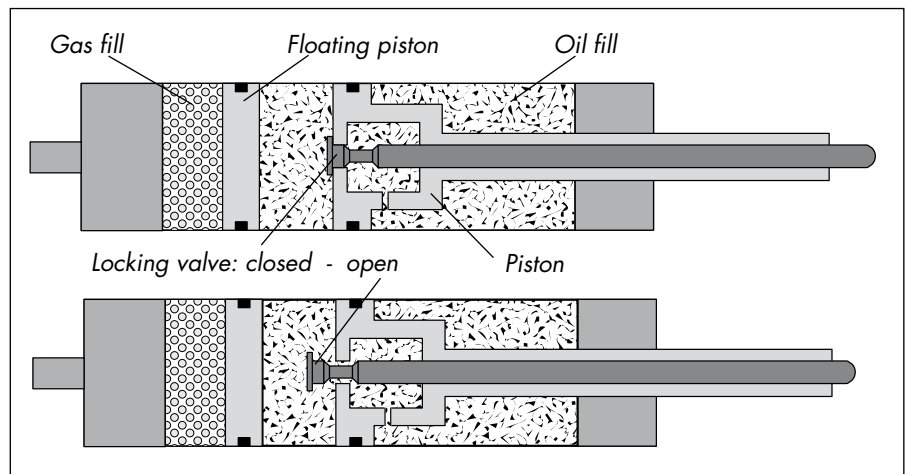
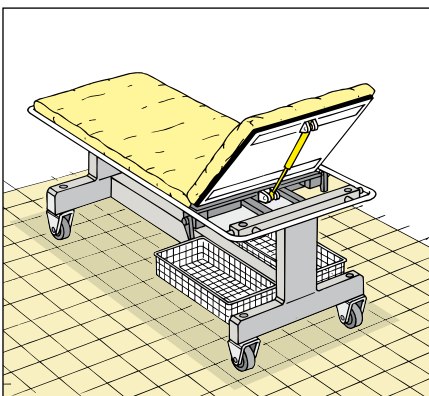
Cushioned Locking Gas Springs



The locking valve in the piston prevents the gas from flowing through until the release pin in the piston rod is pushed.

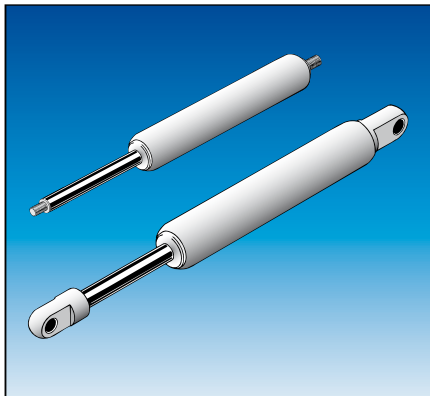
Technical data and measurements can be found on page 06.041.00.

Rigid Locking Gas Springs



In rigid locking gas springs the piston with the locking valve is situated in the oil compartment. The pressurised gas exerts pressure on the floating piston.

Technical data and measurements can be found on page 06.042.00.



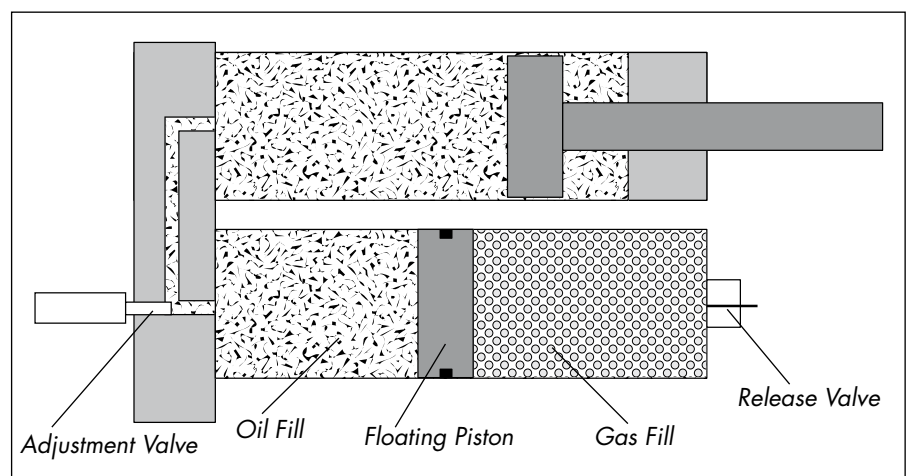
Double Cylinder Gas Springs

DICTATOR double cylinder gas springs consist of two cylinders connected by an adjustable valve. This enables you to reduce the extending speed and control it exactly.

The pressurised gas is sealed from the oil compartment by a floating piston. A valve at the front end of the gas cylinder enables you to release gas for reduced gas spring force.

Double cylinder gas springs are used in applications where a slow and adjustable extending speed is required. They can be used to automatically open folding doors in fire station buildings, for example.

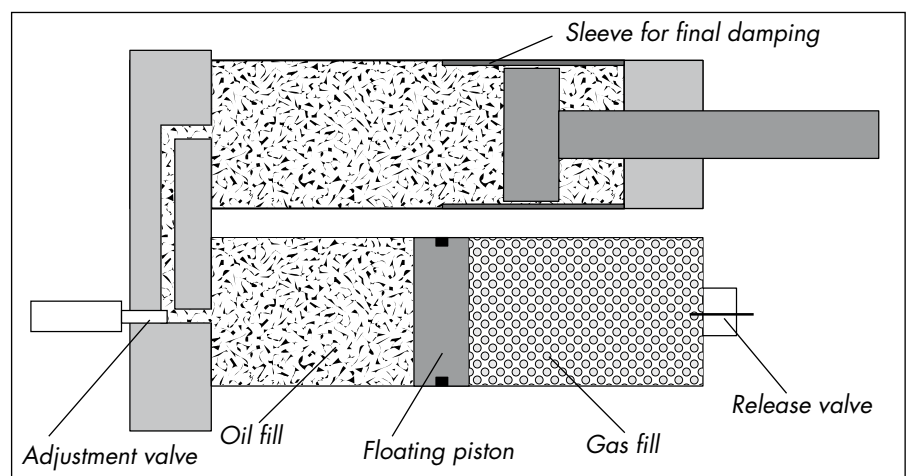
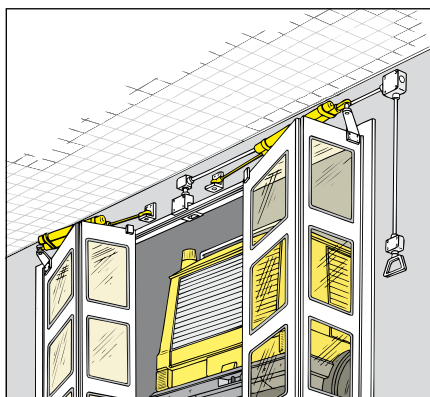
Double Cylinder Gas Springs without Final Damping



Double cylinders without final damping are more cost-effective. The piston rod remains at the same speed over the whole distance.

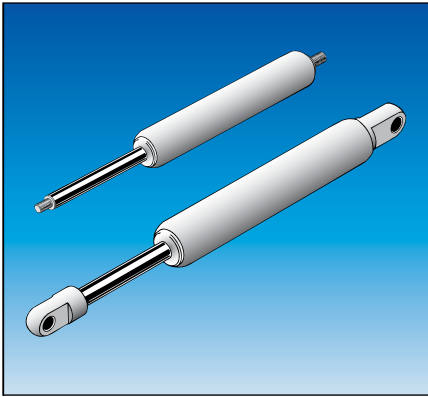
Technical data and measurements can be found on page 06.060.00.

Double Cylinder Gas Springs with Final Damping



Double cylinders with final damping do not only push the piston rod out with the speed set by the adjustment valve, but they also move it slowly at the end of the motion. This can prevent doors from crashing together for example.

Technical data and measurements can be found on page 06.060.00.



Additional Options

This section provides information on additional options which enable you to employ gas springs in certain applications, or simply make them much easier to use.

The additional options suitable for each gas spring can be found in the data pages corresponding to each type of gas spring (starting on page 06.017.00).

Please pay attention to details concerning the different lengths of gas springs as some additional options increase the minimum length of the cylinder.

Temperature, Corrosion

Gas springs are filled with nitrogen gas and hydraulic oil at approx. **20 °C**. Internal pressure and extending force decrease in low temperatures and increase in high temperatures. The force of the gas spring varies by approx. **1 %** for every **3 °C** difference in the filling temperature.

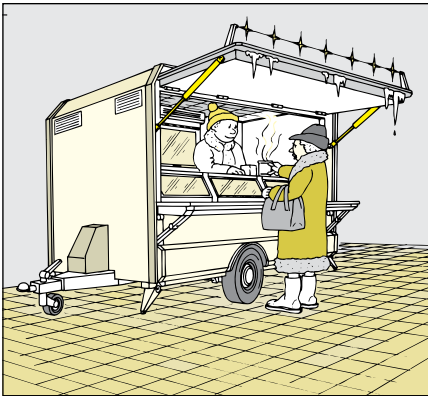
DICTATOR gas springs are designed for temperatures between **minus 10 °C and plus 80 °C**. DICTATOR gas springs can also be used from **minus 30 °C** if they have **special seals** and **special hydraulic oil**.

The seals can no longer be guaranteed to function perfectly in temperatures **above 80 °C**, so avoid using them near ovens, fire, heating and sun radiation behind glass.

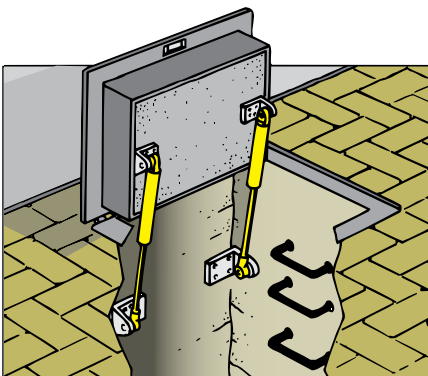
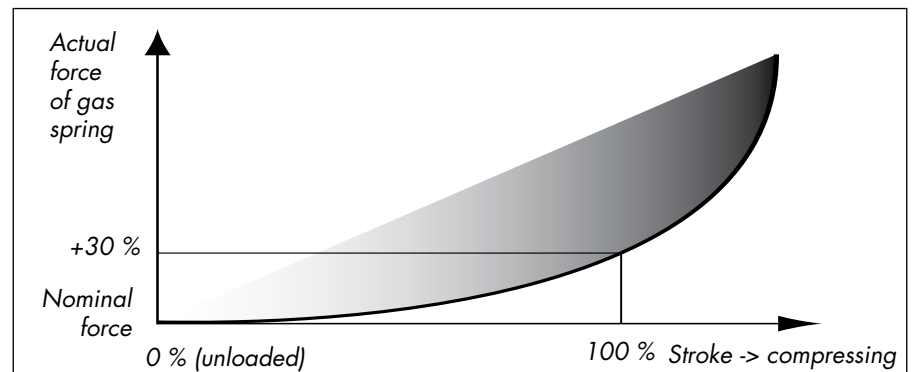
Gas springs heat up when operating **quickly** and **frequently**, even at normal room temperature. So make sure they are not operated more than approx. 6 times per minute.

We are always prepared to carry out tests and advise you if you have an application with high stroke rates. We however recommend that you make an additional test of your application yourself.

If you intend to use gas springs outside, or in humid or aggressive conditions, we recommend our **stainless steel** gas springs. Details can be found starting on page 06.045.00.

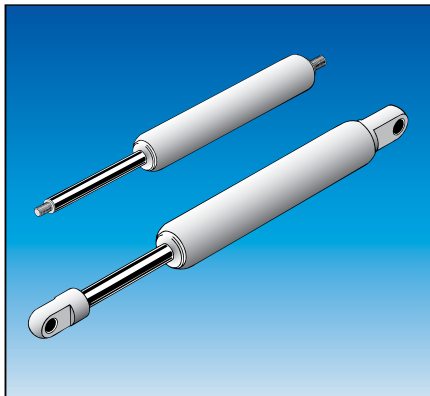


Progressivity



When the piston rod is pushed inside the cylinder there is less space available for the gas in the cylinder because the volume of the piston rod reduces the remaining volume inside which is occupied by the gas. Therefore, the gas pressure increases as the gas spring is compressed. This is called "progressivity of the gas spring". The increase in force usually amounts to approx. 30 % when the piston rod is completely compressed.

On request we can manufacture gas springs for you with a higher or lower progressivity to enable heavy hatchways to be lifted effortlessly.

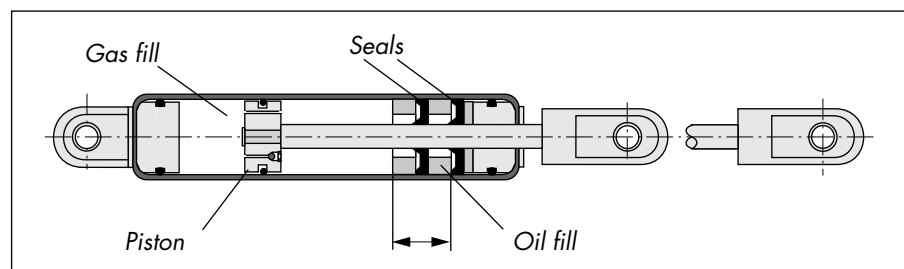
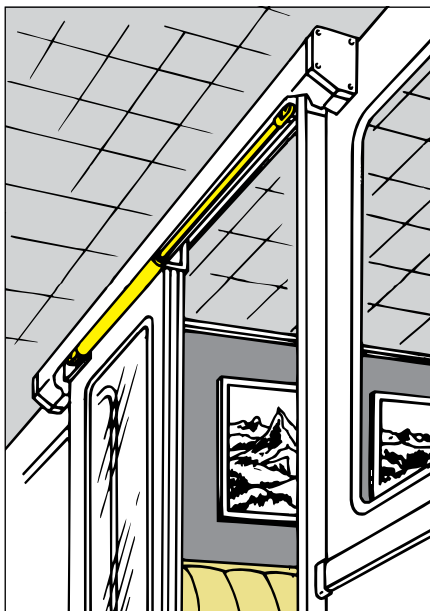


Oil Chamber and Valve

These accessories enable DICTATOR gas springs to be used in conditions where normal gas springs would have little durability, or could only be adjusted to different forces at high cost.

Oil chambers (order code 4) and valves (order code 5) are available for most DICTATOR gas spring models. You will find further information in the detailed description of each type of gas spring starting on page 06.017.00.

Oil Chamber (4)



Virtually all DICTATOR gas springs are available with an additional oil chamber. This prevents the seal on the piston rod from drying out and failing. The oil also ensures easy sliding of the piston rod and reduces friction.

An oil chamber is always necessary when the gas spring is installed horizontally or when its normal position deviates by more than 30° from the vertical position. It is not necessary when the piston rod shows vertically down because then the oil in the cylinder always has direct contact to the seal anyway.

Please be aware that gas springs containing an oil chamber need a slightly longer cylinder. Exact additional measurements can be found on the pages concerning the individual models starting on page 06.017.00.

Valve (5)

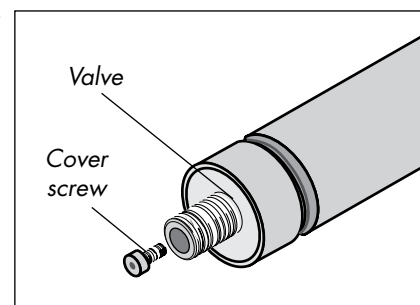
DICTATOR gas springs fitted with a valve allow you to decrease the gas pressure and reduce the extending force yourself.

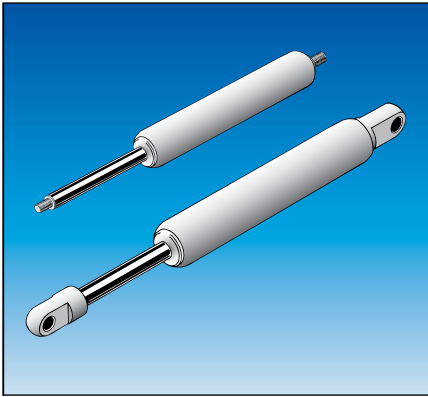
It is best to order a gas spring with a valve if you are unsure of the exact force required or when you want to use gas springs of one batch to balance out different weights e.g. on different windows.

Gas springs fitted with a valve are also ideal when trying to find out the necessary force on a sample application. When you have adjusted to the force required, you can then return the gas spring to us. We will measure the exact force and produce the batch for you with cost-effective gas springs (without the valves) which match the required force.

In the detailed description of each gas spring in this brochure (beginning on page 06.017.00) we specify which gas spring models are available with valve.

Instructions for handling the valve are given on the following page 06.011.00 =>





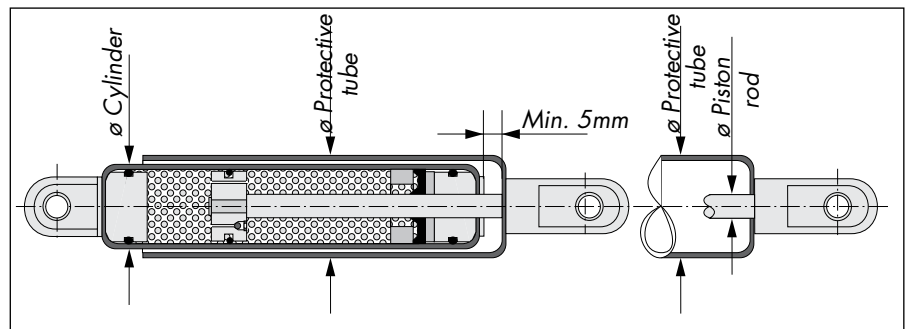
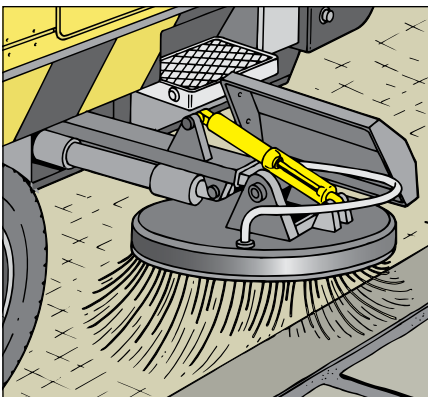
Protective Tube

This accessory enables DICTATOR gas springs to be used even in particularly dirty or rough conditions e.g. on road sweepers and sand blast cabins.

If necessary an additional protective tube (double protective tube) can be fitted over the first protective tube.

Protective tubes (order code 6 or 9 for stainless steel) and double protective tubes (order code 6-6 or 9-9 for stainless steel) are available for most DICTATOR gas springs. Details can be found on pages 06.017.00 - 06.058.00 further back in this catalogue.

Protective Tube (6) or (9)



We recommend you order a protective tube when the gas spring is exposed to a high level of contamination. It also protects the piston rod from mechanical damage and therefore increases the operational life of all gas springs. Scratches, dust, dirt, paint or other damages to the surface of the piston rod cause the gas spring to wear prematurely and fail. The protection tube of AISI 304 stainless steel has the order code 9.

Please remember that gas springs have a 5 mm longer measurement per protective tube. Exact measurements can be found on pages 06.017.00 - 06.058.00.

Handling the Valve

Using an Allan key, remove the socket set screw in the cylinder end fitting. Be careful not to loose the o-ring on this screw. (Some gas springs have a valve without this socket set screw).

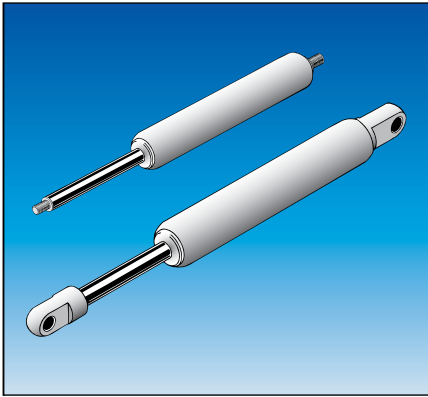
Now place a pin (2,5 mm diameter; approx. 3/32") in the available hole. You could also simply use a nail with a blunt point. Hit the pin shortly with a small hammer (7 ounces/ 200 g). You should test the function of the gas spring(s) in your application after one or maximum 5 strikes.

If you reduce the pressure too much we can refill the gas spring in our factory and in other DICTATOR branches for a small charge.

Important: If the pressure has been reduced to 0, please make sure to screw a nut or eyelet on the piston rod in order to prevent the piston rod from disappearing completely inside the cylinder tube.

Attention: High gas pressure!

Protective glasses must be worn when unscrewing the socket set screw and releasing the pressure. Should the release valve be damaged the socket set screw may be under **pressure** and once unscrewed the gas pressure could cause it to fly off suddenly. The **oil** in the cylinder could also spurt out. Therefore always hold the end of the gas spring with the valve facing upwards and away from you.



Additional Helical Spring and Biological Oil

DICTATOR gas springs are equipped with reliable seals which allow for a particularly long life, without the gas pressure decreasing prematurely.

The pressurised gas inside the gas spring pushes the seal hard against the piston rod. This causes friction which considerably reduces the force of the gas spring, particularly when it starts moving again after a long static period.

This slip-stick effect can be reduced by using an oil chamber with hydraulic or biological oil (see page 06.010.00) and/or an additional helical spring.

Additional Helical Spring

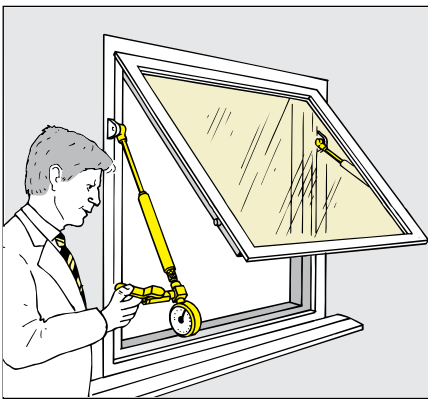
(7)

We recommend you order a DICTATOR gas spring with an additional helical spring if you want to automatically open a flap after releasing it. These spiral springs successfully overcome friction caused at the beginning, even after long rest periods.

The helical spring can be installed inside the gas spring cylinder or on the piston rod. Please use our Advisory Service to help select the most suitable products.

We will be happy to send you data regarding all available DICTATOR gas springs with helical springs on request.

These gas springs are most often used in automatically opening hatches and windows for emergency escape and smoke ventilation.



Biological Oil

(8)

Environmentally friendly biological oil is based on rape seed oil and enables gas springs with damping to operate in areas where the use of mineral oil or synthetic oil based on silicone is not permitted e.g. in the food industry, in machines and factories which manufacture chemicals or paint and in the pharmaceutical industry.

DICTATOR gas springs and dampers which utilise biological oil have been subjected to extensive testing even in very high and very low temperatures.

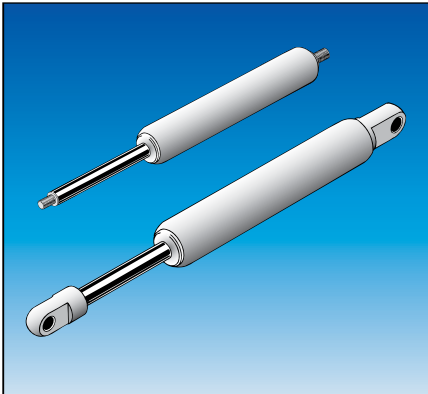
We will be happy to send you detailed information regarding each type of oil on request.

These gas springs can be used from plus 60 °C (140 °F) to approx. minus 20 °C (minus 4 °F). When using them in extreme temperatures, please take note of the advice given regarding change in pressure on page 06.009.00.

Details concerning DICTATOR stainless steel gas springs (available with biological oil) can be found amongst the technical data on pages 06.045.00 - 06.058.00.

If required, the gas springs can also be furnished with FDA conform oil. This has to be indicated in addition to the code number 8.





Safety Precautions

DICTATOR gas springs are distinguished by high quality and durability. Used in appropriate designed applications, DICTATOR gas springs are maintenance free and safe.

If you follow the advice below, you will not only assure an adequate level of safety, your gas springs are also likely to last longer.

1. Danger: High Pressure!

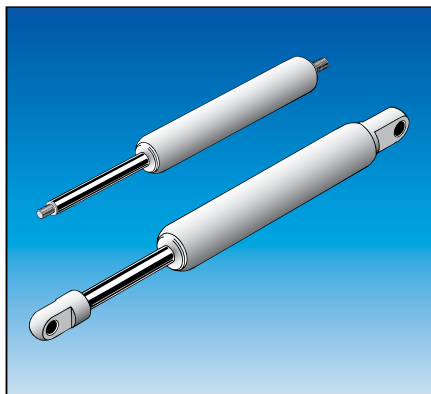
**Gas springs are filled with high pressure nitrogen.
They must not be opened or damaged under any circumstances.**

2. You Must Not...

- ... deform, weld, cut, saw, mill, drill, paint or carry out anything else of a similar nature on the gas spring or its parts.
- ... bend the gas cylinder and/or piston rod.
- ... twist or bend the piston rod against the cylinder.
- ... heat above 100 °C or burn the gas spring.
- ... fix the gas spring by other means than the approved DICTATOR end fittings. Secure all fittings tightly and ensure they are not subject to lateral or twisting forces.
- ... use gas springs as a mechanical stop (exceptions are stated in our Technical Instructions on page 06.015.00).
- ... exert a load on the gas spring in a pulling direction when it is fully extended or in a pushing direction when it is completely compressed.
- ... expose push-type gas springs to a pulling load or pull-type gas springs to a load in pushing direction.
- ... throw the gas spring, let it fall, or use it as a hitting implement.
- ... let children or other people who do not understand these instructions, have access to gas springs. When installed gas springs should be covered or otherwise protected against unauthorised removal, modification and/or damage.

3. Long Operational Life

- Gas springs must be protected from any possible damage during transport, storage and use. Please follow all instructions above.
- They must be kept at the correct storage temperature from minus 40 °C to plus 90 °C and working temperature minus 20 °C to plus 80 °C.
- They must be stored with the piston rod facing downwards.
- The piston rod must not be damaged (e.g. by scratching, welding beads etc.) or by coming into contact with paint, dirt, acid, glue, adhesive or aggressive substances.
- In the position in which the gas spring remains most of the time, the piston rod should point straight down (with pull-type gas springs it should point upwards). If it deviates by more than 30° you should order a gas spring with an oil chamber.



Installation, Releasing Pressure, Disposal

DICTATOR gas springs have continuously proven their reliability and long life over the years. Just a few small points should be taken into account when designing gas spring applications and when installing or deinstalling gas springs.

By ignoring the following points, any form of guarantee is void.

4. Installation requires ...

- ... all mounting devices should be capable of safely functioning at twice the force of the gas spring without failing.
- ... objects moved by the gas spring must not cause any danger (e.g. by falling down) if the gas spring does not function correctly, or even not function at all (e.g. due to loss of gas).
- ... objects which are moved by the gas spring should not be a danger. Protect all edges against crushing and cutting (for example with safety covers).
- ... the gas spring must only be operated by axial forces. Lateral forces must be prevented by fitting external guides to the objects to be moved by the gas springs.
- ... no tension should exist on the mounting parts (eyelets and forked bolts should be able to move freely, but be secured). Use a ball and socket joint if necessary.
- ... the piston rod should never be able to totally extend or contract: approx. 1/8" (5 mm) should always remain free in both final positions.
- ... damages caused maliciously or unintentionally must be prevented. Fit a well-designed protective casing and apply clear warning signs.

5. Releasing Pressure and Destroying Gas Springs

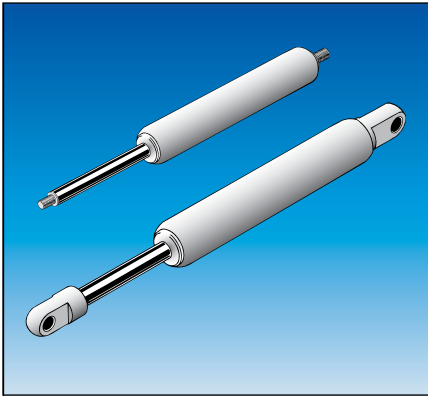
- should only be carried out according to our special instructions.
- appropriate protective glasses must always be worn.
- If necessary our Central Customer Service Department can take care of this, but only if the gas springs were manufactured by us.

6. All Importers ...

- who import gas springs into other countries must make sure that:
- ... these safety points are included with all gas springs and are documented in a legible and understandable fashion and in all languages of the country into which they are being imported.
 - ... localised labels on the products include all sufficient warning points.
 - ... legal regulations are pointed out to the customers.

7. All Customers ...

buying gas springs are responsible for making sure these safety points are easily accessible, understandable, and well-known to all people coming into contact with gas springs. Suitable dimensioned panels and corresponding warning signs and labels must be applied to finished equipment.



Technical Regulations

Please observe the following regulations before beginning installation, construction or storage:

1. If push or pull type gas springs or dampers are used in situations where a failure of the product could cause damage to property or even personal injury, additional safety elements must be installed. The installation and removal of push or pull type gas springs must be carried out in accordance with accident prevention regulations. Only use DICTATOR products for applications in the aviation, space travel and the shipping industry after obtaining written authorisation from DICTATOR Technik GmbH.

2. Mounting and storing: point push type gas springs and damper piston rods downwards, pull type gas springs point upwards. Loss of pressure owing to long storage is unlikely, but we do recommend storage period to be limited to one year. There may be a sticking effect (slip stick) when the spring is operated the first time after a long static period. This could damage the sealing system. Therefore it is recommended to operate gas springs at least once every three months.

Before installing springs, remove plastic sleeves.

3. Gas springs and dampers, like most moving parts, will show signs of wear after lengthy periods of use. When wear signs are detected, replace the products. Their life and durability will increase when protected against corrosion. Small quantities of hydraulic fluid may leak from gas springs and dampers. Never allow this fluid to contaminate food, water or seep through the soil. An alternative to hydraulic oil is biological oil. DICTATOR offers an extensive range of gas springs and dampers filled with biological oil (see page 06.012.00).

4. Do not attempt to fill or refill a gas spring. Filling and refilling requires specialist equipment and training. Contact our Technical Department for more information.

5. Do not open - High pressure! Gas springs must not be heated above 80 °C.

6. All links need to move freely, so prevent a stiff and rigid installation. Make allowance for play in the joints. Lubricating the links will reduce friction and increase the life of the end fittings.

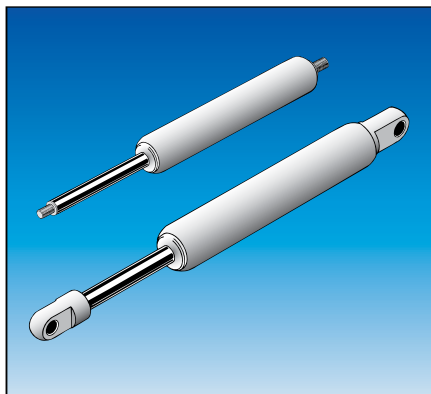
7. Secure threaded end fittings (eyelets etc.) properly. Ensure mountings are fitted properly (threaded parts lie face-up) before installing the gas spring. If vibration should occur, prevent end fittings from unscrewing by using suitable thread lock.

8. Avoid deflection of the piston rod. Long products with long strokes need additional support using guides or additional bearings. Gas springs and dampers have to be protected against sagging, bending, deflection and breakage.

9. Prevent gas springs from deflecting by avoiding transverse and torsional forces, they should only be loaded axially. If other attachments and components should fail, you should also prevent them from causing such transverse/torsional forces.

10. Never allow push type gas springs to be under pulling loads and pull type gas springs under pushing loads. This also applies when installing them in combination with other (hydraulic) cylinders.

11. Gas springs can only be used as a mechanical stop if the force exerted by the application does not exceed the rated force by 30 % in any situation. Fit additional mechanical stops to limit the extended and compressed lengths of the gas springs or dampers to within 5 mm of their maximum closed and opened lengths. Gas springs must never be stretched or compressed beyond the maximum length of their stroke! This would cause dangerous situations in which serious injuries or death could occur!



Technical Regulations, cont.

12. Gas springs must only be used within a temperature range from -20 °C to +80 °C. Please notify us if you plan to use them below 0 °C. The pulling and pushing force of gas springs also changes when the temperature is varied, as does the oil viscosity and the damping quality (see page 06.009.00 for details).

13. Mechanical impact damage, corrosion and paint deposits on the piston rod will damage the seal and cause gas springs and dampers to fail. Do not damage or deform the cylinder. All changes carried out by a third party invalidate the guarantee.

14. Pull type gas springs are open to atmosphere. Avoid dust or other materials entering the spring through the hole in the cylinder base plate. Mount pull type gas springs with the piston rod upwards. Do not use in enclosed applications. Ensure adequate ventilation to avoid condensation owing to temperature changes.

15. The piston rod in the locking gas spring is a hollow rod which contains a release pin. Foreign substances like dirt or detergent must be prevented from entering the piston rod port as they can lead to the piston rod corroding and the release pin becoming seized. Locking gas springs should be installed with the piston rod underneath. If locking gas springs are going to be installed in areas where they will come into contact with detergent (e.g. hospital beds) this should be indicated in your order. The maximum number of release operations is approx. 30000.

Locking forces are indicated when the piston rod is in a compressed position.

Caution: The gas spring can bend under a high locking force, when the piston rod is extended. This could be avoided by external guidances.

16. We cannot guarantee application proposals or drawings as there may be additional aspects of the application we cannot take into account. Friction coefficient and/or acceleration can only be estimated very roughly. Hence, exercise caution when mounting gas springs.

17. The installation and application of push type and pull type gas springs should be tested by the user under conditions where the product will be applied because these conditions vary and not all parameters can be simulated or tested by DICTATOR. It should be indicated whether the products will be used under normal conditions (natural surroundings = air, 20 °C) or whether foreign substances affect them (e.g. steam hotter than 80 °C, different chemicals, detergents).

18. Maximum speed of the piston should not exceed approx. 300 mm/s when being installed. Caution: Fast operation rates will lead to excessive heat build-up inside the gas spring with subsequent internal seal damage. High acceleration or velocities during extending or compressing must not lead to overloading the products.

Operational life depends to a very high degree on the type of installation and the surroundings. Our Technical Department will gladly give more detailed information.

19. Length tolerance of gas springs with GZ-GZ end fittings: +/- 2 mm.

20. The tolerance for pushing and pulling forces generally amounts to:
Minimum +/- 3 Newtons or +/- 5 % of the rated force; Maximum +/- 10 % of the rated force (20 °C). Exact values can be found in our Examination Statement. The rated force is usually measured 5 mm before the end of an extending stroke (in pull-type gas springs it is measured 5 mm before the end of a retracting stroke). The release force in locking gas springs to push the release pin is approx. 18 % of the rated force F1 of the gas spring.

21. Disposal: Gas springs and dampers contain very high pressure. They must not be opened or heated. Only open the products when written instructions are received from DICTATOR Technik GmbH. All products also contain oil. This has to be disposed of according to the local regulations.

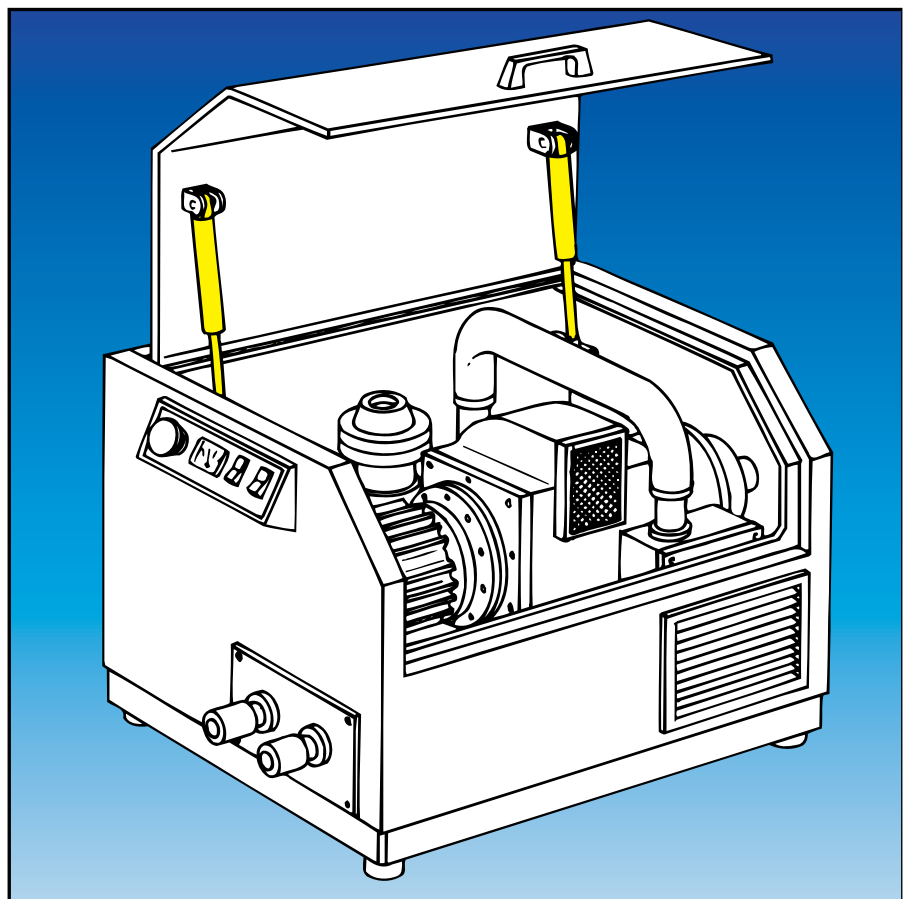
Push Type Gas Springs

DICTATOR high-performance push type gas springs make life easier by lifting loads smoothly and effortlessly. We have a vast product range with many potential applications. We manufacture your gas spring according to your **individual application requirements** - either as a **single unit**, in small or large batches.

DICTATOR high-performance gas springs can be used in all applications where the movement or keeping open of certain parts requires support or as a counter weight.

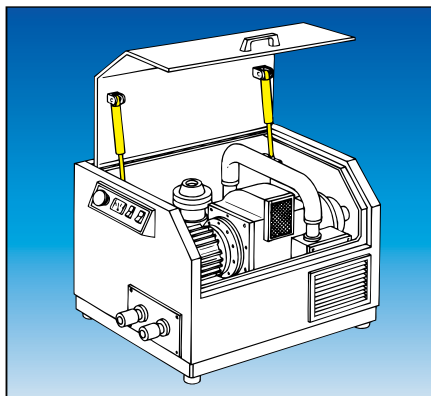
Possible applications for push type gas springs are covering guards for machines, windows also for smoke ventilation, hatches in the floor or roof, flaps in vehicles, as counter weights or overload safety devices in hoists for scaffolds, in medical equipment and many other applications.

As well as high quality, DICTATOR push type gas springs also offer numerous additional features such as valve, oil chamber, protective tubes, or biological oil, which all considerably increase application possibilities.



Technical Data

| | |
|---------------------------|---|
| Piston rod diameter | 3, 4, 6, 8, 10, 14, 20, 25, 30 mm |
| Cylinder diameter | 10, 12, 15, 19, 23, 28, 40, 55, 65 mm |
| Force | 10 N - 10000 N |
| Stroke length | 10 mm - 1000 mm |
| Operating temperature | -10 °C (with special oil -30 °C) to +80 °C |
| Change in pressure | 0,37 % per 1 °C: first filling at approx. 18° - 20 °C |
| Gas | nitrogen (N), (non-flammable) |
| Maximum number of strokes | 6 strokes per minute |



Summary of Push Type Gas Springs

DICTATOR industrial push type gas springs are usually manufactured according to your requirements. The table below gives you a short summary of the range of push type gas springs available. The normal **progressivity of 30 - 40 %** (please see page 06.009.00) is obtained by adding the given **fixed measurements** to the stroke, which gives the total length. If a higher progressivity is accepted, the fixed measurements can slightly be decreased.

You will find information about additional options below. More detailed data concerning each individual diameter range can be found on the following pages, which will help you choose the appropriate gas spring. Alternatively you always can use our Advisory Service.

Technical Data

| Ø Piston rod | 3 | 4 | 6 | 8 | 10 | 14 | 20 | 25 | 30 |
|-----------------------|----------------|----------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------|------------|
| Ø Cylinder | 10 | 12 | 15 | 19 | 23 | 28 | 40 | 55 | 65 |
| Min. stroke (mm) | 10 | 10 | 20 | 40 | 40 | 50 | 50 | 100 | 100 |
| Max. stroke (mm) | 80 | 200 | 300 | 500 | 700 | 700 | 600 | 1000 | 1000 |
| Damping | 0, 1 | 0, 1 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 1 | 1 |
| Min. force | 10/15 N | 10 N | 40 N | 80 N | 100 N | 150 N | 300 N | 500 N | 750 N |
| Max. force | 100N | 180 N | 400 N | 700 N | 1200 N | 2500 N | 5000 N | 7500 N | 10000 N |
| Comp. L (GZ-GZ) * | ext. L-S | ext. L-S | ext. L-S | ext. L-S | ext. L-S | ext. L-S | ext. L-S | ext. L-S | ext. L-S |
| Ext. L (GZ-GZ) * | 2x S + 32 | 2x S + 32 | 2x S + 30 | 2x S + 45 | 2x S + 45 | 2x S + 46 | 2x S + 100 | 2x S + 140 | 2x S + 160 |
| End fittings | GZ, A, G WG | GZ, A, G WG | GZ, A, G WG, KGA, GK | GZ, A, G WG, KGA, GK | GZ, A, G WG, KGA, GK | GZ, A, G WG, KGA, GK | GZ, A, G WG, KGA, GK | GZ, G - | GZ, G - |
| Oil chamber (4) * | n/a | n/a | L + 15 | L + 15 | L + 15 | L + 15 | L + 15 | n/a | n/a |
| Valve (5) | option | option | option | option | option | option | option | standard | standard |
| Protective tube (6) * | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 |
| Helical spring (7) * | n/a | n/a | n/a | n/a | L + 30 | n/a | n/a | n/a | n/a |
| Ø Protective tube | 12 | 15 | 19 | 23 | 28 | 32 | 45 | 60 | 70 |

* Stroke (S) or length (L) + additional length in mm [Example: 8-19 range; stroke 50; ext. L = 2 x 50 + 45 = 145 mm]

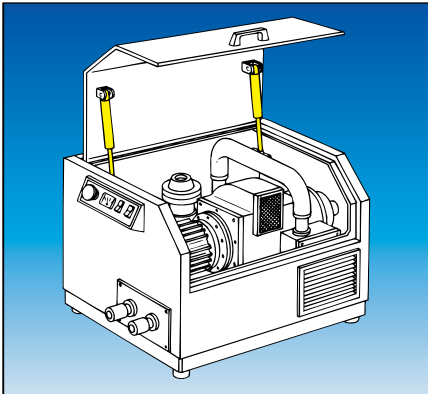
Additional Options

In push type gas springs the piston rod should ideally point downwards in a vertical position. If this is not possible, please order an oil chamber with your gas spring. The oil chamber ensures the seal is always surrounded by oil and cannot become porous. For **oil chamber** use **code 4**. (The total length increases by 15 mm.) (06.010.00)

If you are not entirely sure which pressure you require, it is best to order a valve with your gas spring (or begin with a valve if you are ordering a large number of gas springs). By using a valve pressure can be released on site, until the required force is reached. Should you release too much pressure, we can refill the gas spring for you. A valve can save you time and money. For **valve** use **code 5** (see pages 06.010.00 and 06.011.00).

If your gas spring will be exposed to dirt, paint, other such hazards, or if there is danger of mechanical damage, please order a protective tube with your gas spring. The protective tube slides over the cylinder and piston rod and prevents damages. The gas spring can also be supplied with 2 protective tubes on request. The **protective tube** has **code no. 6**. (The total length increases by 5 mm per protective tube). (Please also see page 06.011.00).

Gas springs in the 10-23 diameter range can be supplied with a built in helical spring on request. This is recommended for gas springs which are very rarely used, e.g. on windows with smoke vents. The **helical spring** has **code no. 7** (The total length increases by 30 mm). (Please also see page 06.012.00).



D 3-10 Push Type Gas Springs Force 10 N - 100 N

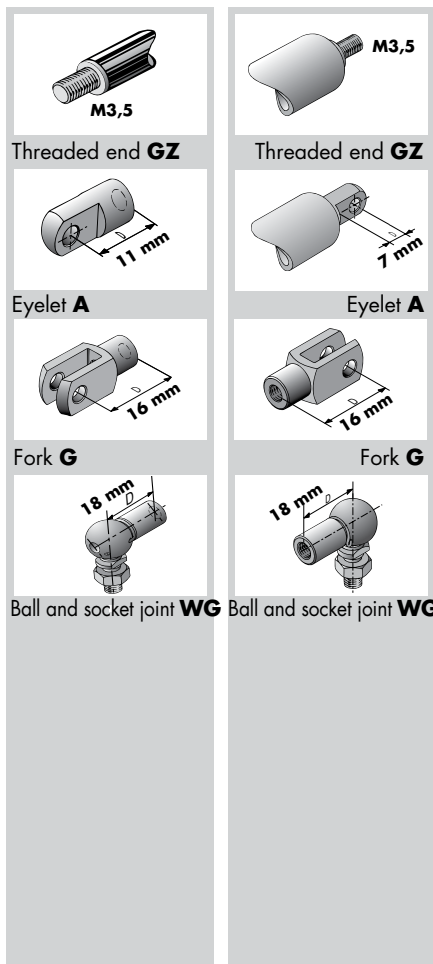
The smallest gas springs we supply have a 3 mm diameter piston rod and 10 mm diameter cylinder. These have **extremely low forces**: 10 N without damping, 15 N with damping! D 3-10 gas springs are available with a valve. The piston rod on these gas springs is made from stainless steel (AISI 303) and the cylinder from brass.

Just like the slightly larger D 4-12 gas springs, those in the D 3-10 range can also be used in precise mechanical, optical, or even medical equipment.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping for 3-10 range

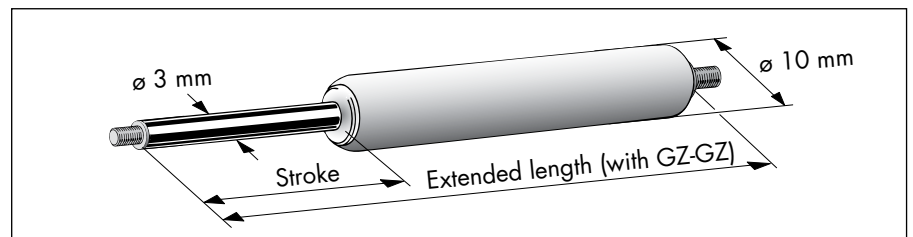
0 = without damping

1 = damping on extending stroke

Determining Your D 3-10 Gas Springs

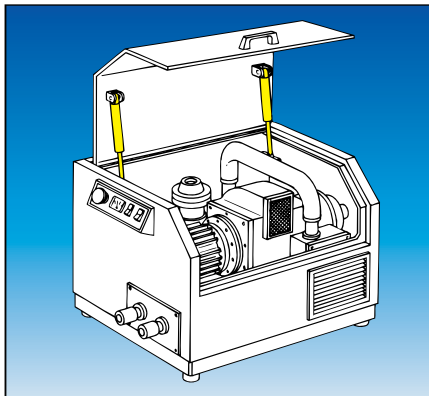
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length.



| | Type D | See page |
|---|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="3 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 3. Stroke (10 - 80 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0 and 1) | | |
| 5. Force (10/15 - 100 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 32 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Valve (5) | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.011.00 |

Additional details:



D 4-12 Push Type Gas Springs Force 10 N - 180 N

The second smallest gas springs available have a 4 mm piston rod diameter and 12 mm cylinder diameter. These have **extremely low forces**. 4-12 gas springs are also available with a valve.

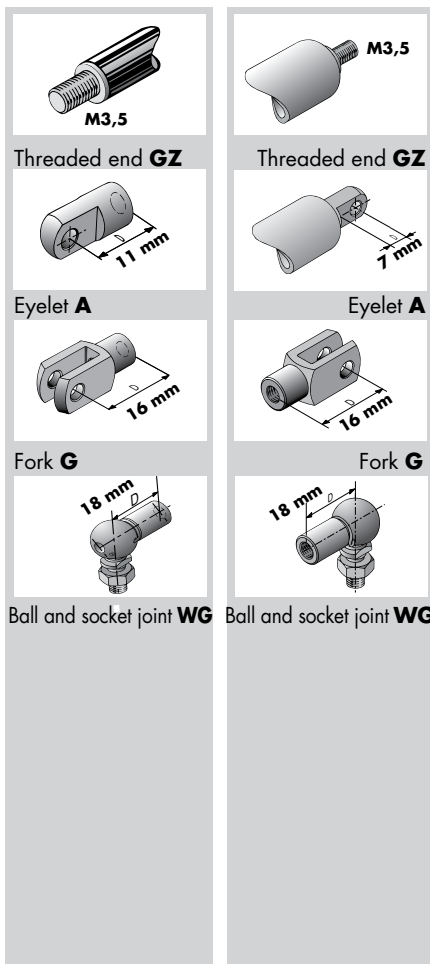
The piston rod is made from stainless steel (AISI 303).

D 4-12 gas springs are mainly used in precise mechanical and medical equipment (e.g. the plastic covers in photocopiers).

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping for 4-12 range

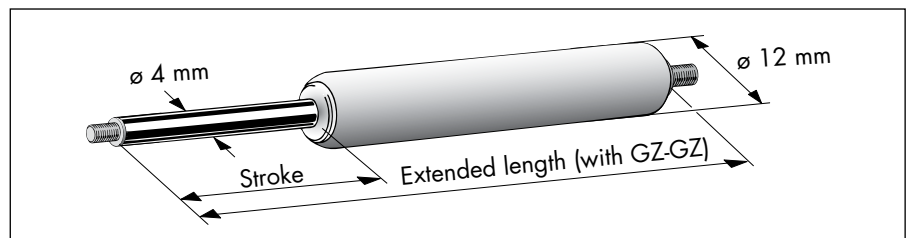
0 = without damping

1 = damping on extending stroke

Determining Your D 4-12 Gas Spring

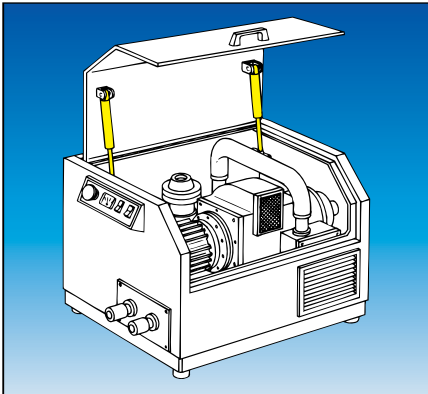
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length.



| | Type D | See page |
|---|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="4 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="12 mm"/> | 06.082.00 |
| 3. Stroke (10 - 200 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0 and 1) | | |
| 5. Force (10 - 180 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 32 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Valve (5) | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.011.00 |

Additional details:



D 6-15 Push Type Gas Springs Force 40 N - 400 N

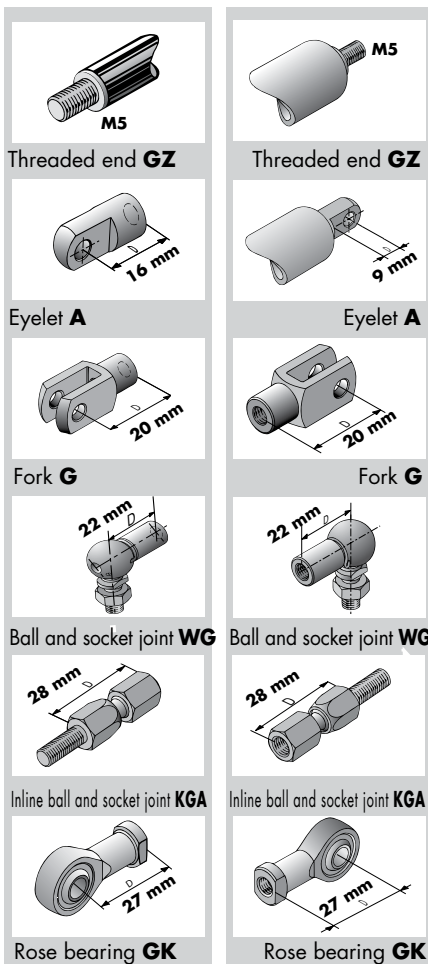
The gas springs available in the next size up have a 6 mm piston rod diameter and 15 mm cylinder diameter. In spite of their small dimensions and possibility of **extremely low forces**, D 6-15 gas springs are available with a large variety of fittings and additional functions.

D 6-15 gas springs are mainly used in the construction of gadgets and devices, and in machine construction.

End Fittings

On piston rod

On cylinder



Exact measurement drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

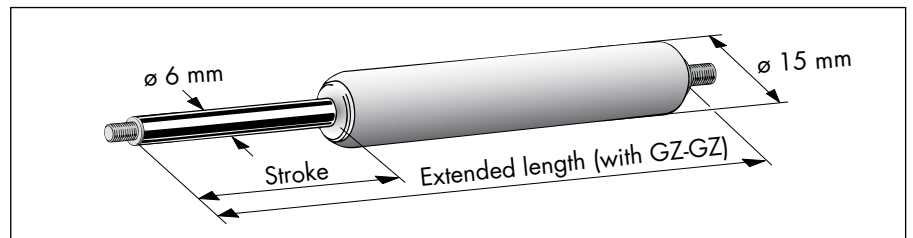
Types of damping for 6-15 range

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your D 6-15 Gas Spring

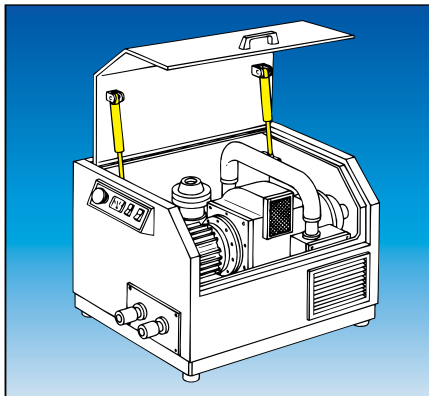
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length.



| | Type D | See page |
|--|--|------------------------|
| 1. Piston rod diameter: | <input type="text"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text"/> | 06.082.00 |
| 3. Stroke (20 - 300 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (40 - 400 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 30 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) | 06.010.00 |
| | <input type="checkbox"/> Valve (5) | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.011.00 |

Additional details:



D 8-19 Push Type Gas Springs Force 80 N - 700 N

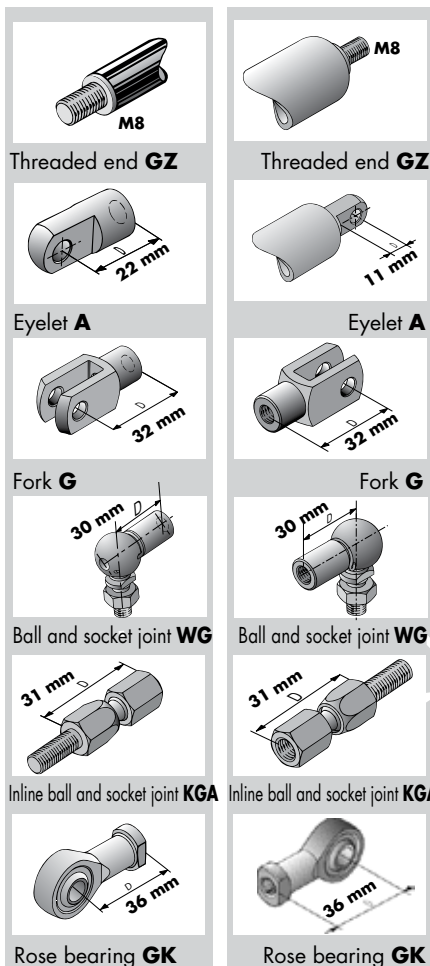
Gas springs with an 8 mm piston rod diameter and 19 mm cylinder diameter and those in the next size up (10-23 range) are the most frequently used gas springs. Both ranges have the same end fittings (identical measurements). Different mounting devices are available. (Please see page 06.065.00 et sqq.).

D 8-19 gas springs are frequently used in machine and building construction (e.g. in smoke extraction installations).

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

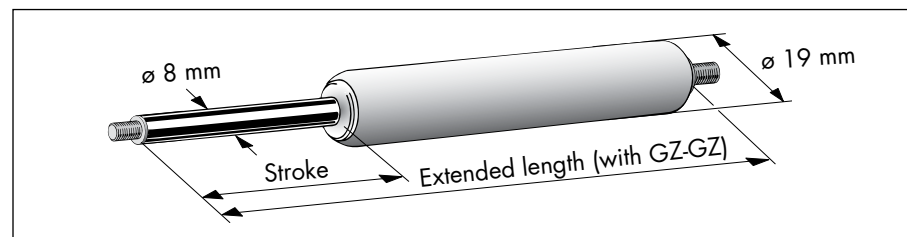
Types of damping for 8-19 range

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your D 8-19 Gas Spring

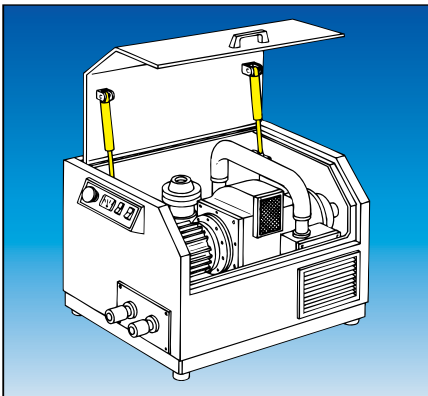
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type D | See page |
|---|--|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="8 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="19 mm"/> | 06.082.00 |
| 3. Stroke (40 - 500 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (80 - 700 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 45 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) <input type="checkbox"/> Valve (5) <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 06.010.00 06.011.00 |

Additional details:



D 10-23 Push Type Gas Springs Force 100 N - 1200 N

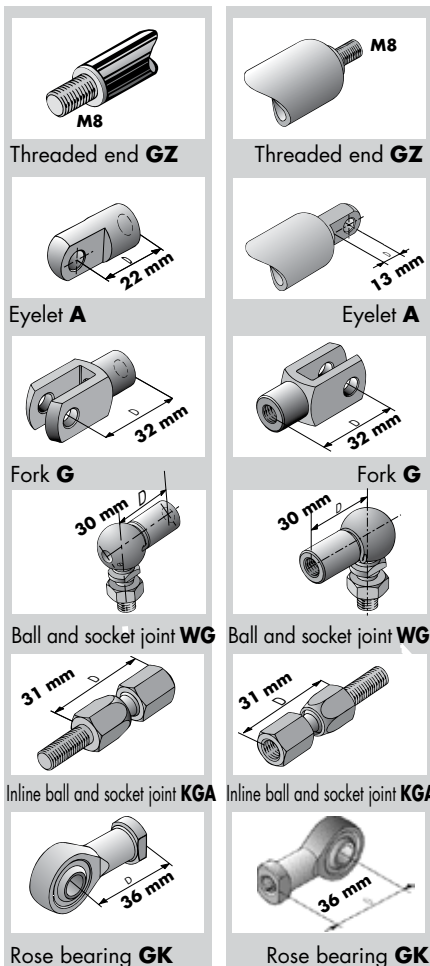
Gas springs with a 10 mm piston rod diameter and 23 mm cylinder diameter are middle-of-the-range gas springs which offer the **largest and most diverse area of application**. They are available with **forces up to 1200 N**. The measurements of the end fittings are the same as those for the D 8-19 range. A variety of **mounting brackets** is available in both ranges (please see page 06.065.00 et sqq.).

D 10-23 gas springs are frequently used in machine and building construction (e.g in smoke extraction installations).

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

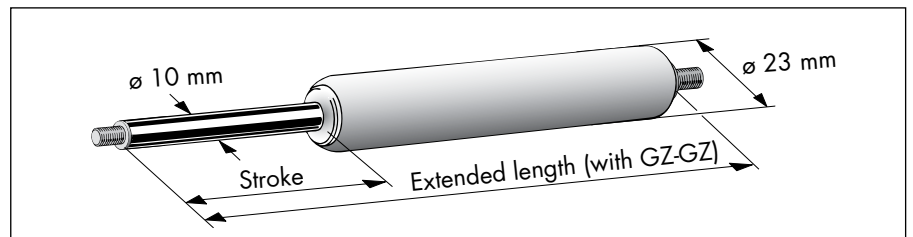
Types of damping for 10-23 range

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your D 10-23 Gas Spring

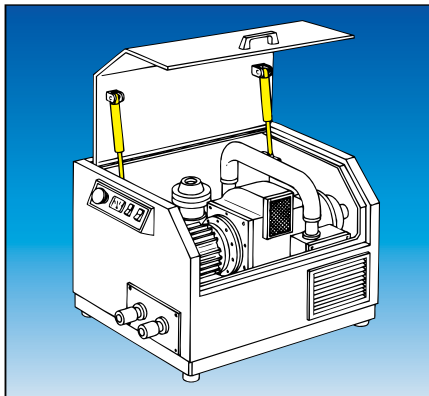
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type D | See page |
|---|--|--|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="23 mm"/> | 06.082.00 |
| 3. Stroke (40 - 700 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (100 - 1200 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 45 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) <input type="checkbox"/> Valve (5) <input type="checkbox"/> Protective tube (6) (+ 5 mm) <input type="checkbox"/> Helical spring (7) (+ 30 mm) | 06.010.00 06.010.00 06.011.00 06.012.00 |

Additional details: _____



D 14-28 Push Type Gas Springs Force 150 N - 2500 N

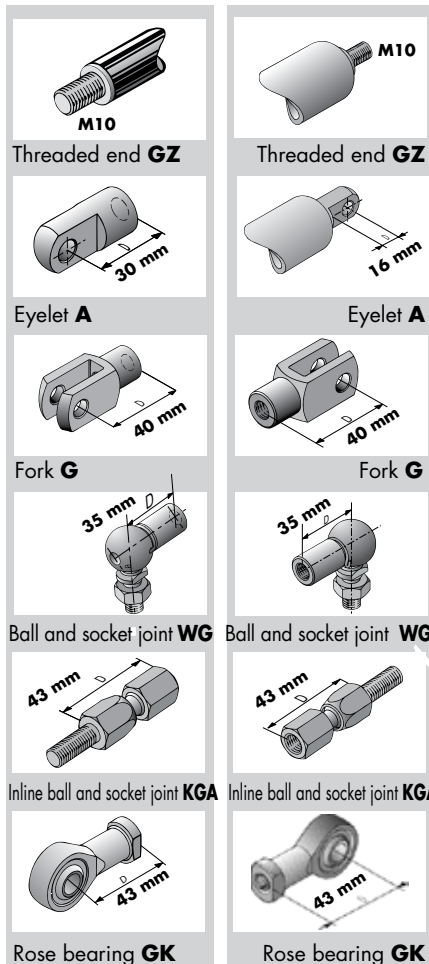
In spite of their relatively small measurements gas springs with a 14 mm piston rod diameter and 28 mm cylinder diameter allow for more than double the **force** as D 10-23 gas springs. The stroke lengths reach up to 700 mm. For longer strokes a rod guide should be installed to prevent the piston rod from bending. Mounting devices for D 14-28 gas springs can be found on pages 06.067.00 - 06.068.00.

D 14-28 gas springs are mainly used on heavy skylight windows, machine guards, trap doors and sports equipment (i.e. basketball baskets).

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

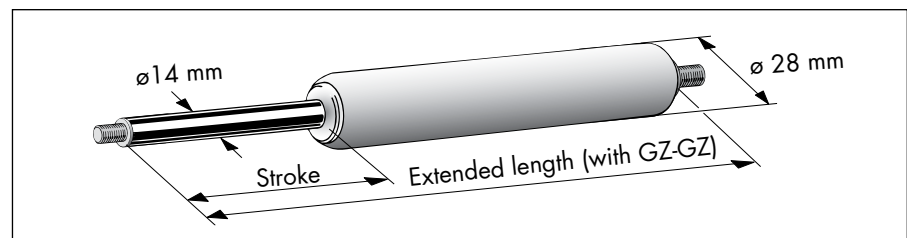
Types of damping for 14-28 range

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your D 14-28 Gas Spring

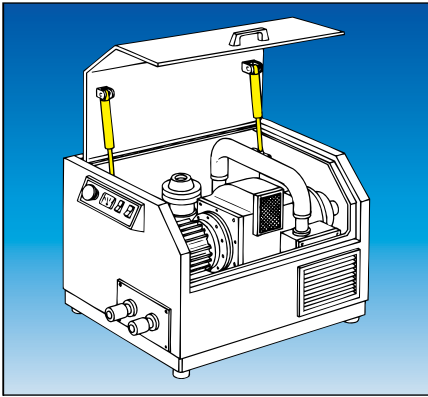
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type D | See page |
|---|--|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="14 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 3. Stroke (50 - 700 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (150 - 2500 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 46 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fittings (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fittings (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) <input type="checkbox"/> Valve (5) <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 06.010.00 06.011.00 |

Additional details:



D 20-40 Push Type Gas Springs Force 300 N - 5000 N

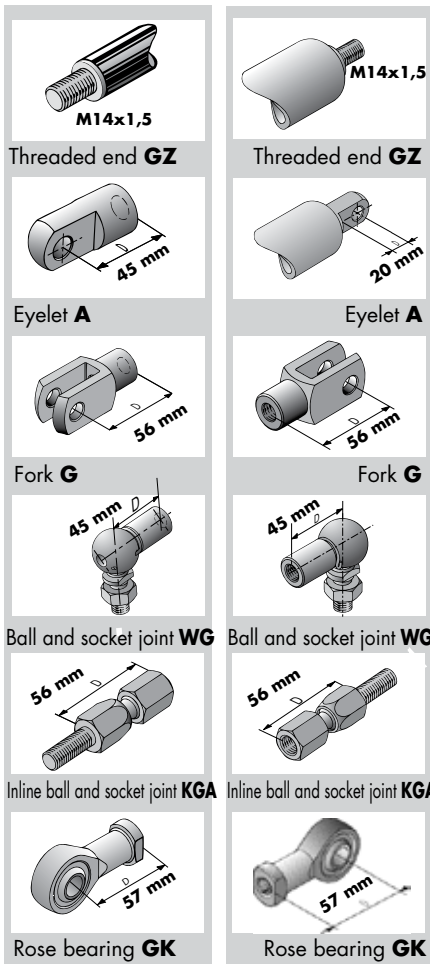
Gas springs with a 20 mm piston rod diameter and 40 mm cylinder diameter are the largest range for which **all end fittings and additional options** are available, even though they can have a **very large force up to 5000 N**.

D 20-40 gas springs are used on very heavy applications, e.g. grids fit for traffic.

End Fittings

On piston rod

On cylinder



Exact measurement drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

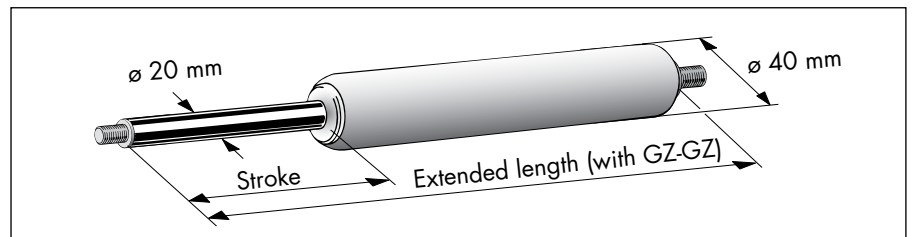
Types of damping for 20-40 range

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your D 20-40 Gas Spring

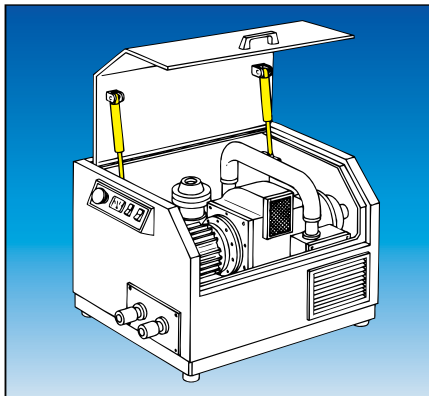
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type D | See page |
|--|--|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="20 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="40 mm"/> | 06.082.00 |
| 3. Stroke (50 - 600 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (300 - 5000 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 100 mm + measurement D of end fittings + measurement of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) <input type="checkbox"/> Valve (5) <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 06.010.00 06.011.00 |

Additional details:



D 25-55 Push Type Gas Springs Force 500 N - 7500 N

Gas springs with a 25 mm piston rod diameter and 55 mm cylinder diameter are the **second largest** range. They can achieve **forces up to 7500 N**. All D 25-55 gas springs are supplied with a valve as standard - it does not need to be ordered separately. Due to the high force only threaded ends and forks are available as end fittings.

D 25-55 gas springs are also available with a lateral valve with an outside thread (M10 x 1) on request. This lateral valve permits to release pressure even when the gas spring is installed.

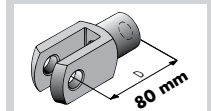
D 25-55 gas springs are used in the automotive industry for example.

End Fittings

On piston rod

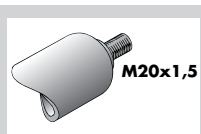


Threaded end **GZ**

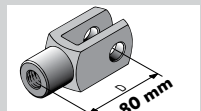


Fork **G**

On cylinder



Threaded end **GZ**

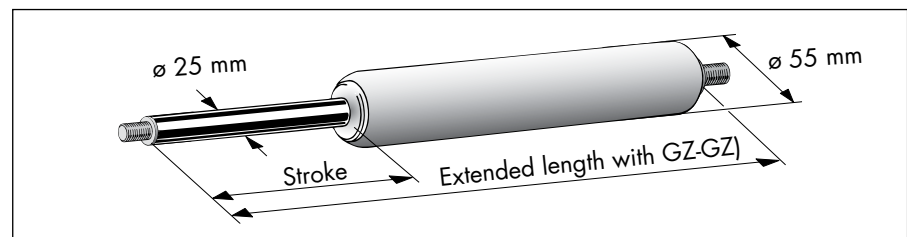


Fork **G**

Determining Your D 25-55 Gas Spring

With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



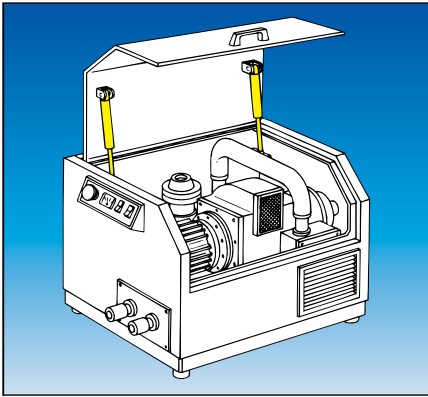
| | Type D | See page |
|--|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="25 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="55 mm"/> | 06.082.00 |
| 3. Stroke (100 - 1000 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="1"/> | 06.005.00 06.083.00 |
| (only damping type 1 possible) | | |
| 5. Force (500 - 7500 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2 x stroke + 140 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Lateral valve | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 |

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping for 25-55 range

1 = damping on extending stroke

Additional details:



D 30-65 Push Type Gas Springs Force 750 N - 10000 N

Gas springs with a 30 mm piston rod diameter and 65 mm cylinder diameter are the **largest range available**. They can reach forces up to 10000 N. All D 30-65 gas springs are supplied with a valve as standard - it does not need to be ordered separately. Due to the high force, only threaded ends and forks are available as end fittings.

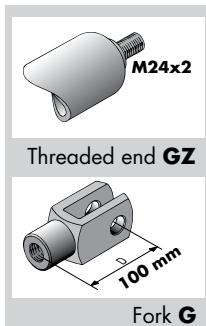
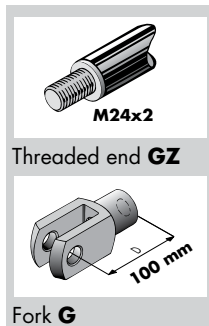
D 30-65 gas springs are also available with a lateral valve with an outside thread (M10 x 1) on request. This lateral valve permits to release pressure even when the gas spring is installed.

D 30-65 gas springs are mainly used in the automotive and materials handling industries.

End Fittings

On piston rod

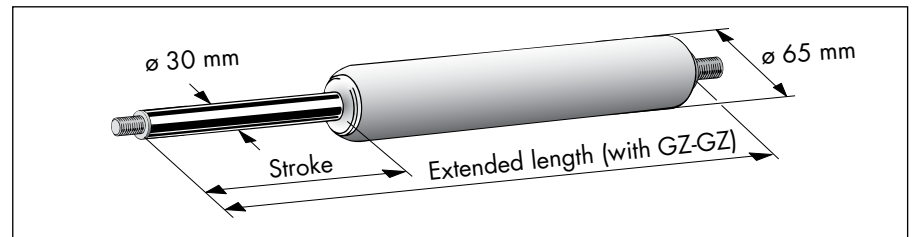
On cylinder



Determining Your D 30-65 Gas Spring

With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



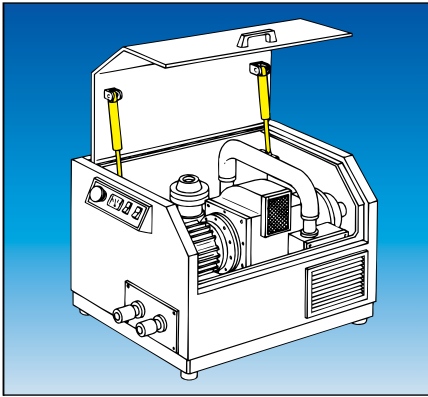
| | Type D | See page |
|---|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="30 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="65 mm"/> | 06.082.00 |
| 3. Stroke (100 - 1000 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="1"/> | 06.005.00 06.083.00 |
| (only damping type 1 possible) | | |
| 5. Force (750 - 10000 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 160 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Lateral valve | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 |

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping for 30-65 range

1 = damping on extending stroke

Additional details:

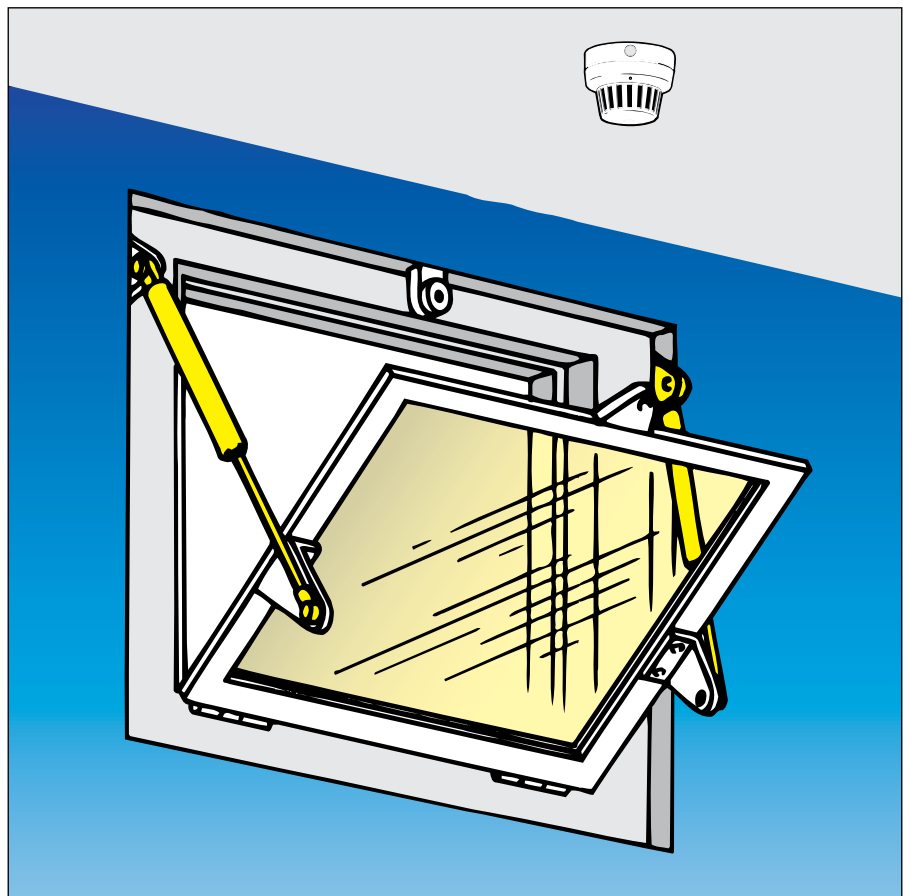


Gas Springs with Floating Piston

Push type gas springs are usually selected with damping on the extending stroke so they prevent hinges etc. from wearing as quickly. However in some cases this is not enough. DICTATOR offers **push type gas springs with a floating piston**. This allows for an **extra slow and controlled movement while the piston rod is extending**. The extending speed can also be greatly reduced.

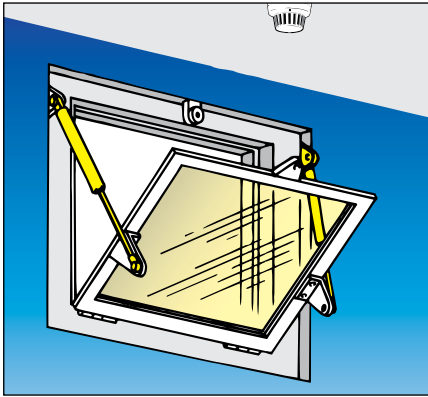
Gas springs with floating piston are available in 3 diameter ranges. We manufacture the gas spring according to your individual application requirements - either as a single unit, in small or large batches. In addition to the normal details given when ordering (as in push type gas springs) please also specify the required piston rod extension time.

Examples where push type gas springs are used: glass flaps, windows and sensitive medical equipment.



Technical Data

| | |
|---------------------------|--------------------------------|
| Piston rod diameter | 8, 10, 14 mm |
| Cylinder diameter | 19, 23, 28 mm |
| Forces | 80 N - 2500 N |
| Stroke lengths | 100 mm - 300 mm |
| Extending speed | min. 0.02 m/s |
| Operating temperature | -10 °C to +80 °C |
| Gas | nitrogen (N), (non-flammable!) |
| Maximum number of strokes | 6 strokes per min |



Summary of Gas Springs with Floating Piston

DICTATOR industrial push type gas springs are usually manufactured according to your requirements. The following table gives you a short summary of push type gas springs with floating piston available.

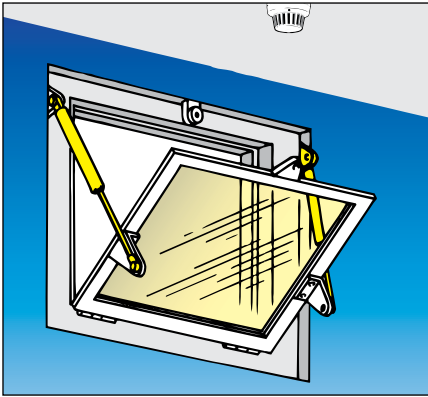
Information of possible additional options for gas springs with floating piston can be found at the bottom of this page. Detailed data concerning each individual diameter range, which will help you when selecting your gas spring, can be found on the following pages. Or just ask our advisory service.

Technical Data

| Ø Piston rod | 8 | 10 | 14 |
|--|-------------------------|-------------------------|-------------------------|
| Ø Cylinder | 19 | 23 | 28 |
| Min. stroke S (mm) | 100 | 100 | 100 |
| Max. stroke S (mm) | 300 | 300 | 300 |
| Damping | 1, 2, 3 | 1, 2, 3 | 1, 2, 3 |
| Min. force | 80 N | 100 N | 250 N |
| Max. force | 700 N | 1200 N | 2500 N |
| L comp. (GZ-GZ) * | Lext. - S | Lext. - S | Lext. - S |
| L ext. (GZ-GZ) * | 3x S + 60 | 3x S + 60 | 3x S + 60 |
| Min. extension speed | 0,02 m/sec. | 0,02 m/sec. | 0,02 m/sec. |
| End fittings | GZ, A, G WG, KGA, GK | GZ, A, G WG, KGA, GK | GZ, A, G WG, KGA, GK |
| Protective tube (6) * | L + 5 | L + 5 | L + 5 |
| * Stroke (S) and given length (L) + additional lengths in mm [Example: 8-19 range; stroke 100; L ext. = 3 x 100 + 60 = 360 mm] | | | |

Additional Options

Please order a protective tube if the gas spring will be exposed to dirt, paint or other such hazards, and if there is danger of mechanical damage. The protective tube slides over the cylinder and piston rod and prevents the piston rod from damage. The gas spring can also be supplied with 2 protective tubes on request. The **protective tube** has **code no. 6**. (the total length increases by 5 mm per protective tube.) (Please also see page 06.011.00).



DT 8-19 and DT 10-23 Push Type Gas Springs with Floating Piston, Force 80 N - 1200 N

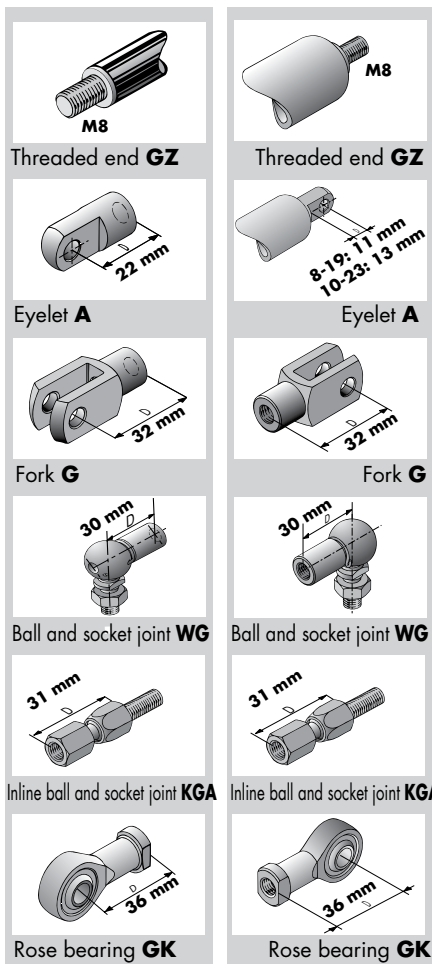
DT 8-19 and DT 10-23 gas springs with floating piston simply differ by the diameter of the piston rod and cylinder, as well as the corresponding force. The measurements of available end fittings are identical. Compared to normal push type gas springs in this diameter range the cylinder is considerably longer. (Please also see page 06.006.00). **Mounting devices** for DT 8-19 and DT 10-23 gas springs with floating piston can be found on pages 06.065.00 - 06.068.00.

DT 8-19 and DT 10-23 gas springs with floating piston can be used in smoke evacuation installations for example.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found beginning on page 06.061.00.

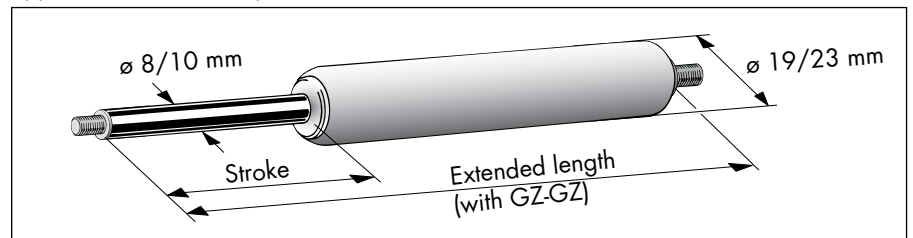
Types of damping

- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DT 8-19 and DT 10-23 Gas Spring with Floating Piston

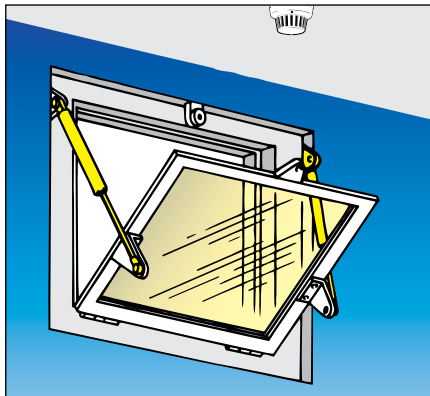
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type DT | See page |
|--|----------------------|------------------------|
| 1. Piston rod diameter (8 or 10 mm): | <input type="text"/> | 06.082.00 |
| 2. Cylinder diameter (19 or 23 mm): | <input type="text"/> | 06.082.00 |
| 3. Stroke (100 - 300 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping (1, 2, 3): | <input type="text"/> | 06.005.00 06.083.00 |
| 5. Extending speed (m/sec.): | <input type="text"/> | 06.006.00 |
| 6. Force (DT 8-19 : 80 - 700 N/ DT 10-23 : 100 - 1200 N): | <input type="text"/> | 06.083.00 |
| 7. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 8. Extended length (total length): (min. 3 x stroke + 60 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 9. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 11. Additional options: <input type="checkbox"/> Protective tube (6) (+ 5 mm) | | 06.011.00 |

Additional details:



**DT 14-28 Push Type Gas Springs with Floating Piston
Force 250 N - 2500 N**

In spite of their relatively small measurements, gas springs with floating piston with 14 mm piston rod diameter and 28 mm cylinder diameter allow for more than double the amount of force than those in the DT 10-23 range.

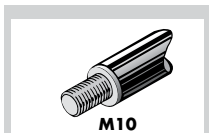
Mounting devices for DT 14-28 gas springs with floating piston can be found on pages 06.067.00 and 06.068.00.

DT 14-18 gas springs with floating piston are used in controlled machine elements, revolving and folding doors.

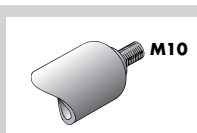
End Fittings

On piston rod

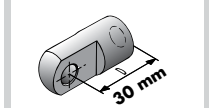
On cylinder



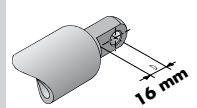
Threaded end **GZ**



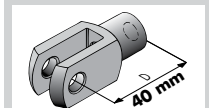
Threaded end **GZ**



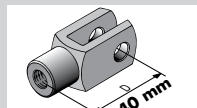
Eyelet **A**



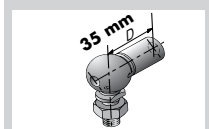
Eyelet **A**



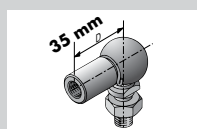
Fork **G**



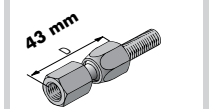
Fork **G**



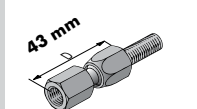
Ball and socket joint **WG**



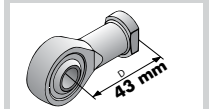
Ball and socket joint **WG**



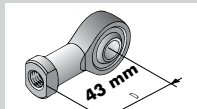
Inline ball and socket joint **KGA**



Inline ball and socket joint **KGA**



Rose bearing **GK**



Rose bearing **GK**

Exact dimensioned drawings for the above end fittings can be found beginning on page 06.061.00.

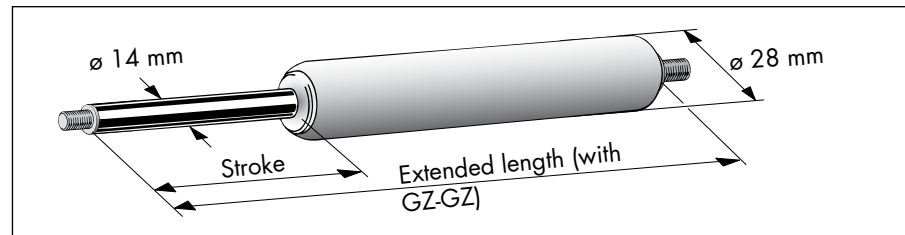
Types of damping

- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DT 14-28 Gas Spring with Floating Piston

With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type DT | See page |
|---|------------------------------------|------------------------|
| 1. Piston rod diameter: | <input type="text" value="14 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 3. Stroke (100 - 300 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping (1, 2, 3): | <input type="text"/> | 06.005.00 06.083.00 |
| 5. Extending speed (m/sec.): | <input type="text"/> | 06.006.00 |
| 6. Force (250 - 2500N): | <input type="text"/> | 06.083.00 |
| 7. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 8. Extended length (total length): (min. 3 x stroke + 60 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 9. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 11. Additional options: <input type="checkbox"/> Protective tube (6) (+ 5 mm) | | 06.011.00 |

Additional details:

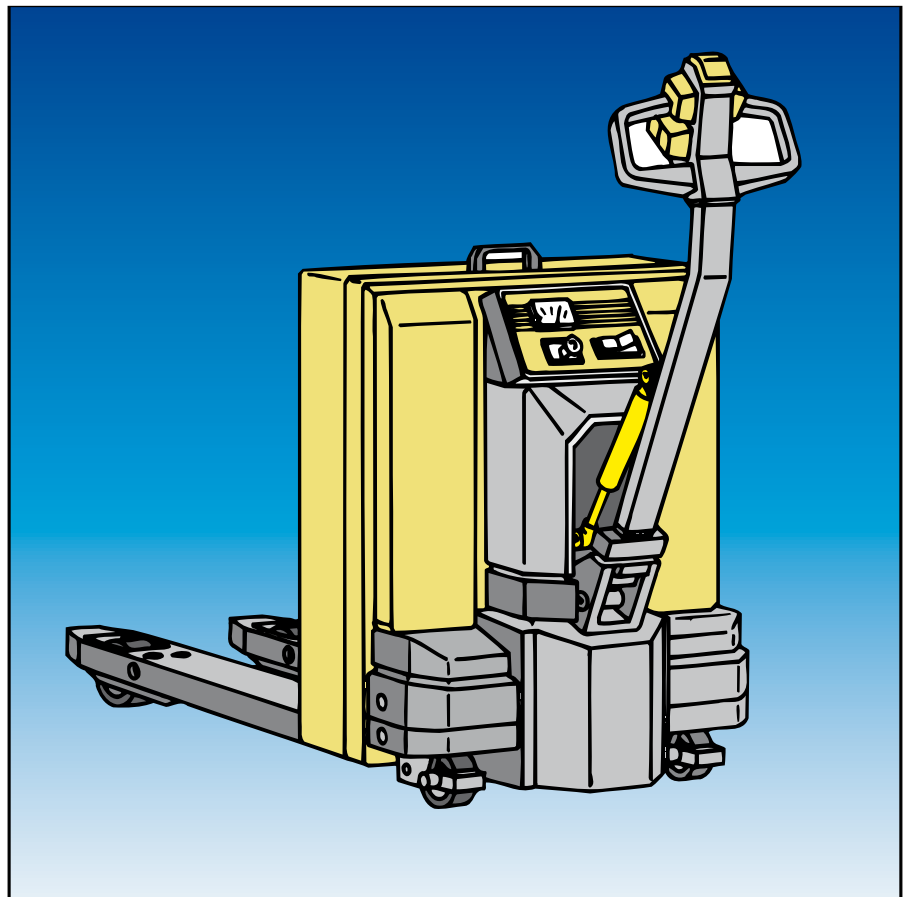
Pull Type Gas Springs

DICTATOR pull type gas springs are the answer to your problems if you are unable to use normal push type gas springs due to a lack of space. They work in the opposite way to push type gas springs as the **gas pressure inside the cylinder causes the piston rod to retract inwards**.

Depending on how they are installed, pull type gas springs either open or close flaps, windows and hatchways. **In the example opposite**, the pull type gas spring always pulls the fork lift truck shaft into a vertical position.

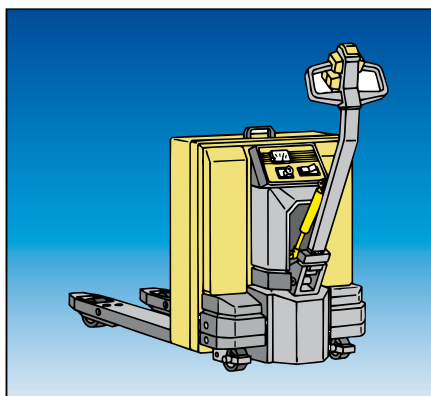
In the same way as with push type gas springs, we manufacture your pull type gas spring according to your **individual application requirements** - as a **single unit**, in small or large batches.

Along with their different function pull type gas springs differ from normal push type gas springs by their longer length and larger cylinder diameter, although they have the same piston rod diameter.



Technical Data

| | |
|---------------------------|--|
| Piston rod diameter | 6, 10, 28 mm |
| Cylinder diameter | 19, 28, 40 mm |
| Pulling force | 30 N - 5000 N |
| Stroke length | 10 mm - 600 mm |
| Operating temperature | -10 °C (with special oil -30 °C) to +80 °C |
| Change in pressure | 0.37 % per 1 °C (first filling at approx. 18° - 20 °C) |
| Gas | nitrogen (N), (non-flammable) |
| Maximum number of strokes | 6 strokes per minute |



Summary of Pull Type Gas Springs

DICTATOR pull type gas springs are usually manufactured according to your individual requirements. The following table gives you a short summary of pull type gas springs available.

Information concerning possible additional options for pull type gas springs can be found at the bottom of this page. Detailed data concerning each individual diameter range, which will help you when selecting your gas spring, can be found on the following pages. Or let us advise you!

Technical Data

| | | | | |
|------------------------------|--------------------|--------------------|--------------------|--------------------|
| Ø Piston rod | 6 | 10 | 10 | 28 |
| Ø Cylinder | 19 | 28 | 40 | 40 |
| Min. stroke S (mm) | 30 | 20 | 10 | 50 |
| Max. stroke S (mm) | 300 | 600 | 590 | 700 |
| Damping | 0 | 0 | 0 | 0 |
| Min. force | 30 N | 150 N | 200 N | 500 N |
| Max. force | 330 N | 1200 N | 2000 N | 5000 N |
| Comp. L (GZ-GZ) * | L ext.- S (stroke) | L ext.- S | L ext.- S | L ext.- S |
| Ext. L (GZ-GZ) * | 2 x S + 100 | 2 x S + 100 | 2 x S + 150 | 2.5 x S + 125 |
| End fittings | GZ, A, G WG, GK | GZ, A, G WG, GK | GZ, A, G WG, GK | GZ, A, G WG, GK |
| Oil chamber (4) * | L + 20 | L + 20 | L + 20 | no |
| Valve (5) | standard | standard | standard | standard |
| Protective tube (6) * | L + 5 | L + 5 | L + 5 | L + 5 |

* All dimensions in mm. S = stroke, L = length, comp. = compressed, ext = extended
Example: 10-28 range; stroke 50; extended L = 2 x 50 + 100 = 200 mm]

Progression: Normally pull type gas springs have a slightly lower progression than the push type gas springs. By default it is approx. 20 %. If in your case the progression should be an important determining factor, please contact our technical department.

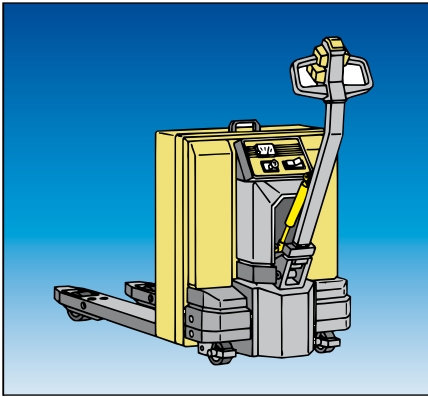
Additional Options

In pull type gas springs the piston rod should ideally point upwards in a vertical position. If this is not possible, please order your gas spring with an oil chamber (ATTENTION: observe the maximum force for oil chambers!). This ensures the seal is always covered by oil and does not become porous quickly. The **oil chamber** has **code no. 4**. (The total length increases by 20 or 30 mm.) (Please see page 06.010.00).

If your gas spring is going to be exposed to dirt, paint or other such hazards, and if there is danger of mechanical damage, please order a protective tube with your gas spring. The protective tube slides over the cylinder and piston rod and prevents damages. The **protective tube** has **code no. 6**. (The total length increases by 5 mm). (Please also see page 06.011.00).

Special Solutions

There are also available special models of the 10-28 series pull type gas springs, when they have to meet particularly high requirements regarding the service life, when they require damping when the piston rod is extending and/or entering or when it is not possible to mount them with the piston rod pointing up. These pull type gas springs are longer than the normal pull type ones (stroke x 3 + 65 mm). Please ask us, if you require such gas springs.



Z 6-19 Pull Type Gas Springs Force 30 N - 330 N

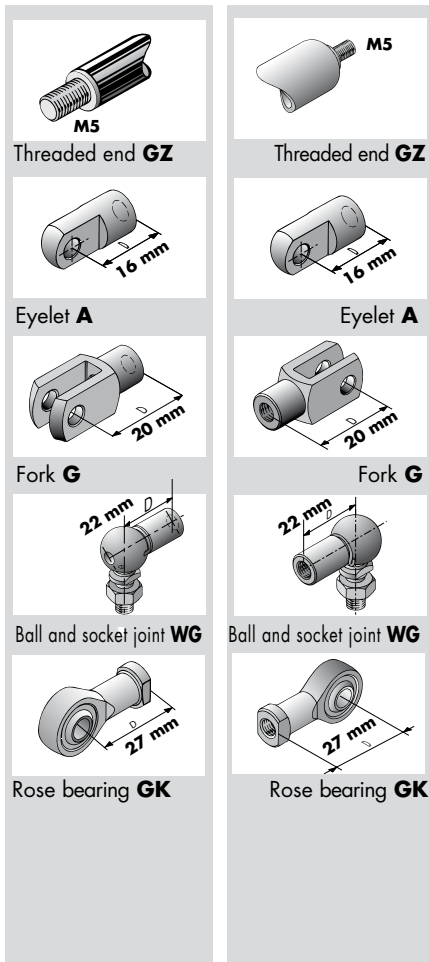
The smallest pull type gas springs are produced with a 6 mm piston rod diameter and 19 mm cylinder diameter. Please be aware that in contrast to push type gas springs, pull type gas springs should generally be installed with the piston rod pointing upwards. Z 6-19 pull type gas springs are **supplied with a valve** on the piston rod **as standard**.

With Z 6-19 pull type gas springs the eyelet is screwed onto the cylinder. End fittings from the 6-15 range are generally used. (Please see end fittings beginning on page 06.061.00).

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

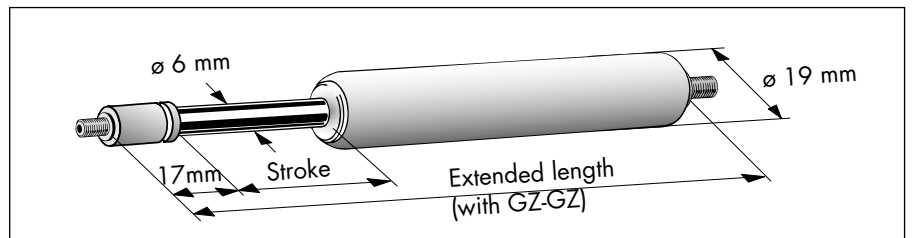
Types of damping for Z 6-19 range

0 = without damping

Determining Your Z 6-19 Pull Type Gas Spring

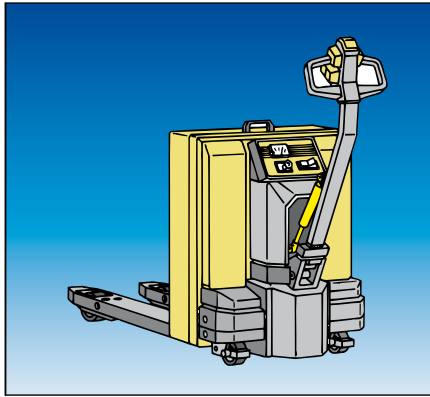
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type Z | See page |
|--|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="6 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="19 mm"/> | 06.082.00 |
| 3. Stroke (30 - 300 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (30 - 330 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2 x stroke + 100 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (total length + 20 mm) | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (total length + 5 mm) | 06.011.00 |

Additional details:



Z 10-28 Pull Type Gas Springs Force 150 N - 1200 N

Most pull type gas springs are manufactured with a 10 mm piston rod diameter and 28 mm cylinder diameter. Please be aware that in contrast to push type gas springs, pull type gas springs should generally be installed with the piston rod pointing upwards.

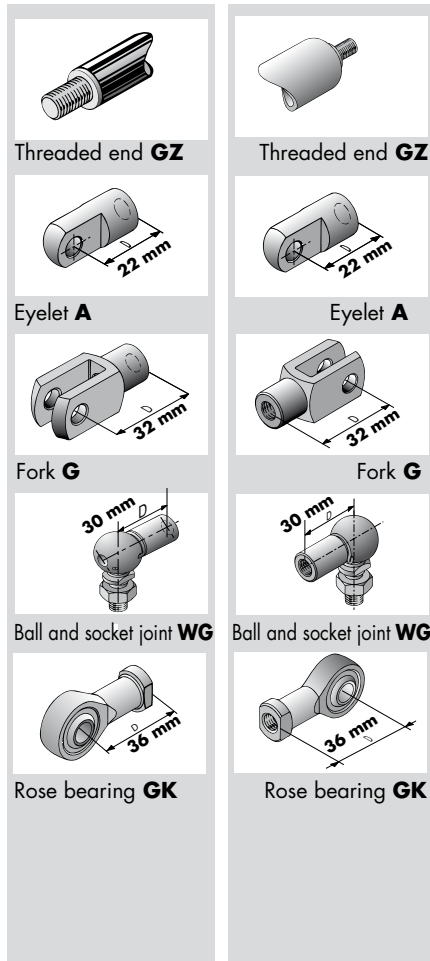
All Z 10-28 pull type gas springs are equipped as **standard with a valve** on the piston rod.

On demand, a longer version of the Z 10-28 pull type gas springs is available which is suitable for high service performances, differing mounting positions and damping types.

End Fittings

On piston rod

On cylinder

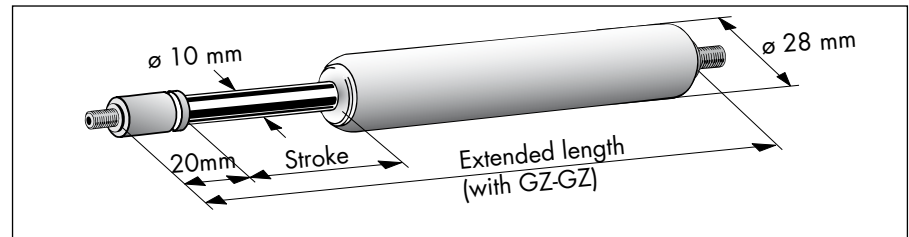


Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Determining Your Z 10-28 Pull Type Gas Spring

With help of the following table you can easily find the correct pull type gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.

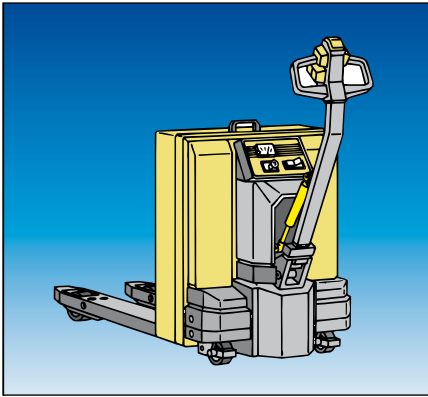


| | Type Z | See page |
|--|---|------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 3. Stroke (20 - 600 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (150 - 1200 N): (maximum force with oil chamber: 600 N) | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2 x stroke + 100 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (total length + 20 mm) | 06.010.00 |
| | <input type="checkbox"/> Protective tube (6) (total length + 5 mm) | 06.011.00 |

Types of damping for 10-28 range

0 = without damping

Additional details:



Z 10-40 Pull Type Gas Springs Force 200 N - 2000 N

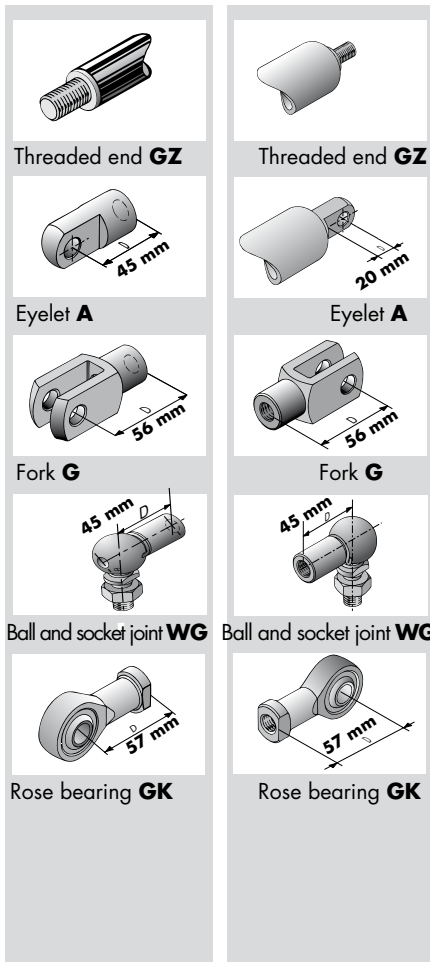
For forces from 200 N - 2000 N we supply pull type gas springs with a piston rod diameter of 10 mm and cylinder diameter of 40 mm. Please be aware that in contrast to push type gas springs, pull type gas springs should generally be installed with the piston rod pointing upwards.

Z 10-40 pull type gas springs are supplied with a valve on the piston rod as standard. A thread-adapter is attached to the piston rod in the Z 10-40 range. End fittings from the 20-40 range are generally attached to this thread on the piston rod as well as on the cylinder.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

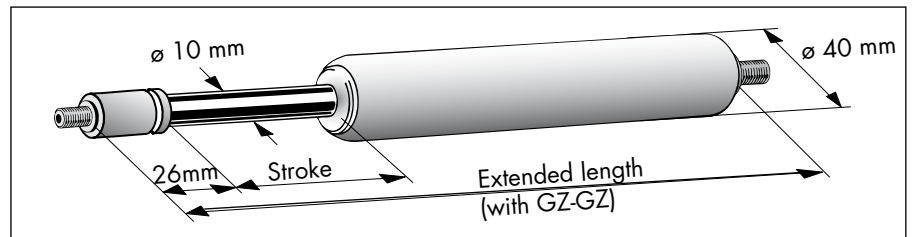
Types of damping for range Z 10-40

0 = without damping

Determining Your Z 10-40 Pull Type Gas Spring

With help of the following table you can easily find the correct pull type gas spring if you already know the necessary stroke and end fittings.

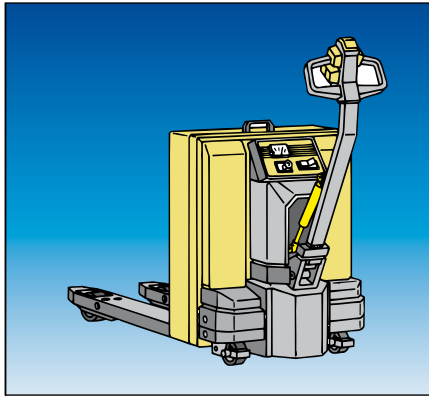
If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type Z | See page |
|---|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="40 mm"/> | 06.082.00 |
| 3. Stroke (10 - 590 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (200 - 2000 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2 x stroke + 150 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber* (4) (total length + 20 mm) <input type="checkbox"/> Protective tube (6) (total length + 5 mm) | 06.010.00 06.011.00 |

* maximum force with oil chamber: 1500 N

Additional details:



Z 28-40 Pull Type Gas Springs Force 500 N - 5000 N

The highest pulling forces can be reached with Z 28-40 gas springs with a 28 mm piston rod diameter and 40 mm cylinder diameter. Please be aware that in contrast to push type gas springs, pull type gas springs should generally be installed with the piston rod pointing upwards.

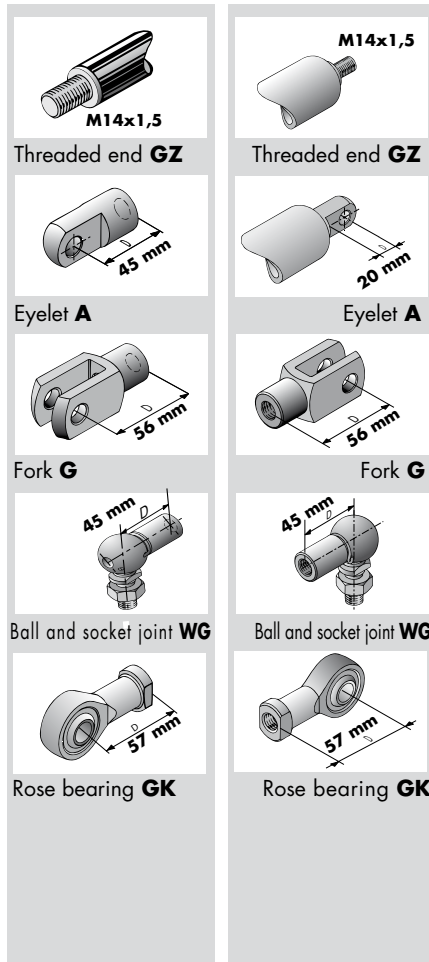
Z 28-40 pull type gas springs are supplied with a valve on the piston rod as standard.

Z 28-40 pull type gas springs have an M14x1.5 thread on both ends. End fittings from the 20-40 range are generally used on the piston rod as well as on the cylinder.

End Fittings

On piston rod

On cylinder

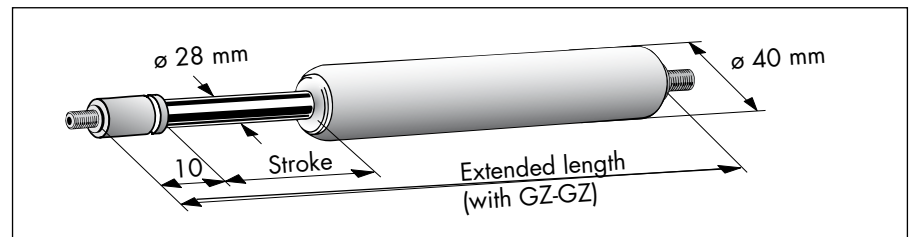


Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Determining Your Z 28-40 Pull Type Gas Spring

With help of the following table you can easily find the correct pull type gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type Z | See page |
|--|------------------------------------|------------------------|
| 1. Piston rod diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="40 mm"/> | 06.082.00 |
| 3. Stroke (50 - 700 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (500 - 5000 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2,5 x stroke + 125 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: <input type="checkbox"/> Protective tube (6) (total length + 5 mm) | | 06.010.00 |

Types of damping for Z 28-40 range

0 = without damping

Additional details:

Locking Gas Springs

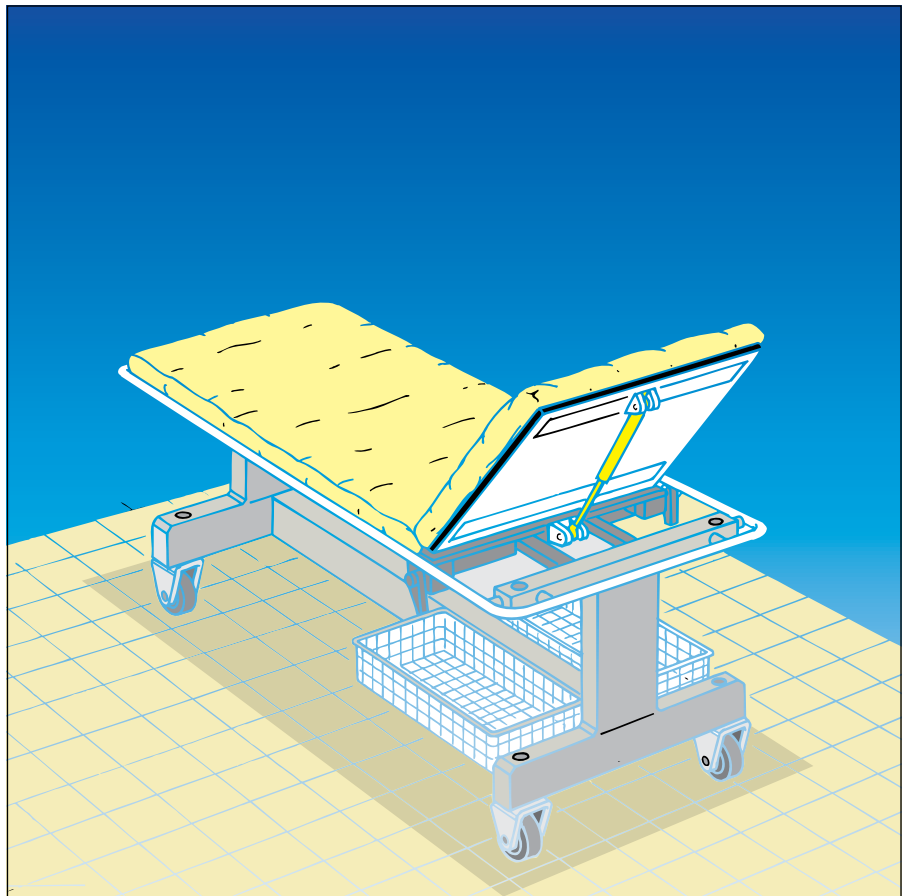
DICTATOR high-performance push type gas springs with additional **locking** raise objects, hold them in any position desired, and then release them again.

The locking push type gas springs are available in two types of locking. With **cushioned locking** the piston rod gives a little in the locked position so the object can recoil. These are easier to manufacture technically and are therefore the more economic variety. If the object needs to remain in a fixed position e.g. hospital beds that tilt, then gas springs with **rigid locking** must be used.

The locking is **released by a pin at the front of the piston rod**. Releasing devices can be found on pages 06.043.00 and 06.044.00.

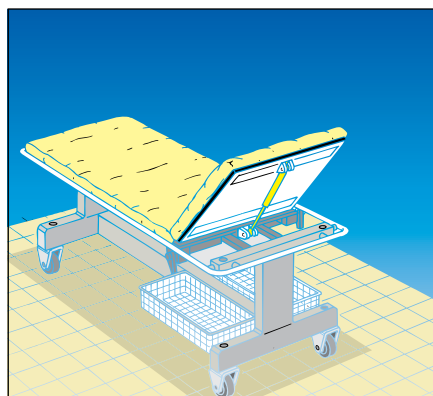
Other than the hospital bed shown in the drawing, further **examples** of where **locking push type gas springs** are used include aeroplane seats and drawing boards etc.

DICTATOR locking push type gas springs can also be supplied with numerous additional options such as a valve, biological oil, protective tube and oil chamber.



Technical Data

| | |
|------------------------------------|--|
| Piston rod diameter | 10 mm |
| Cylinder diameter | 23, 28 mm |
| Force | 150 N - 1200 N |
| Stroke length | 20 mm - 500 mm |
| Locking force in pushing direction | approx. 5 to 6 times the force (50 times on request) |
| Locking force in pulling direction | 0 - approx. 5 times the pushing force |
| Release distance of pin | 1 - 4 mm, depending on design and release pin |
| Release force | approx. 18 % of gas spring rated force |



Summary of Locking Gas Springs

DICTATOR industrial push type gas springs are manufactured according to your individual requirements. The table below gives you a short summary of the range of push type locking gas springs available.

You should always choose the range with the larger cylinder diameter if you require the smallest possible progressivity (see page 06.009.00).

Information concerning possible additional options can be found at the bottom of this page. Detailed data concerning locking gas springs can be found on the following pages, which will help you choose the necessary gas spring. Alternatively you can ask our advice.

Technical Data

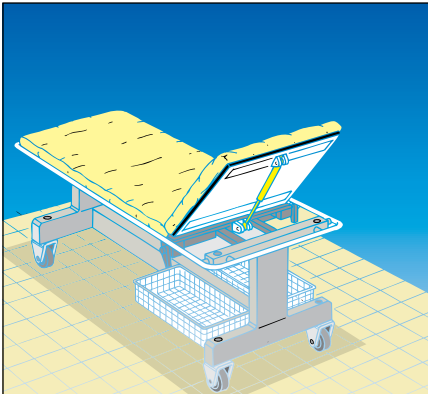
| Locking | Cushioned | | Rigid | |
|---|-------------------------|----|-------------------------|----|
| | 10 | 10 | 10 | 10 |
| ∅ Piston rod | 10 | 10 | 10 | 10 |
| ∅ Cylinder | 23 | 28 | 23 | 28 |
| Min. stroke S (mm) | 20 | | 20 | |
| Max. stroke S (mm) | 500 | | 500 | |
| Damping | 0, 3 | | 0, 3 | |
| Min. force | 150 N | | 150 N | |
| Max. force | 1200 N | | 1200 N | |
| Comp. L (GZ-GZ) * | ext. L - S | | ext. L - S | |
| Ext. L (GZ-GZ) * | 2 x S + 90 | | 2.5 x S + 90 | |
| Piston rod end fittings | GZ M10x1 | | GZ M10x1 | |
| Cylinder end fittings | GZ, A, G WG, KGA, GK | | GZ, A, G WG, KGA, GK | |
| Oil chamber (4) | L + 15 | | - | |
| Valve (5) | option | | option | |
| Protective tube (6) * | L + 5 | | L + 5 | |
| * Stroke (S) or lengths (L) + additional lengths in mm [Example: StB 10-23 range; stroke 50; ext. L = 2.5 x 50 + 90 = 215 mm] | | | | |

Additional Fittings

The piston rod of cushioned locking gas springs should ideally also point downwards in a vertical position. If this is not possible, please order an oil chamber with your gas spring. The oil chamber ensures the seal is always surrounded by oil and therefore cannot become porous. However, this feature is only necessary for cushioned locking gas springs. The **oil chamber** has **code no. 4** (The total length increases by 15 mm/0.59 in. Please also see page 06.010.00).

If you are not entirely sure which pressure you require, it is best to order a valve with your gas spring (or begin with a valve if you are ordering a large number of gas springs). By using a valve pressure can be released on site, until the required force is reached. A valve can therefore save you time and money. Should you release too much pressure, we can refill the gas spring for you. The **valve** has **code no. 5** (please also see page 06.010.00 und 06.011.00).

If your gas spring is going to be used in a dirty and dusty environment, or if there is danger of mechanical damage, please order a protective tube with your gas spring. The protective tube slides over the cylinder and piston rod and prevents damages of the rod. The gas spring can also be supplied with 2 protective tubes on request. The **protective tube** has **code no. 6**. The total length increases by 5 mm per protective tube. (Please also see page 06.011.00).



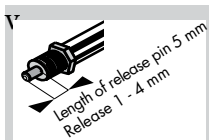
FB 10-23 and FB 10-28 Cushioned Locking Gas Springs

Cushioned locking gas springs are the more economic type of locking gas springs. You can always use them if the positioning has not to be exact and e.g. the flap may recoil a bit in the locked position. They should also be installed in applications where after locking the gas spring exists the possibility that someone pulls or pushes it.

There are several different **release devices** for the threaded ends with release pin. You will find them on page 06.043.00.

End Fittings

On piston rod

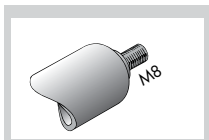


Threaded end **GZ**
M10x1

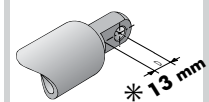
See page
06.043.00
for release devices

* Eyelet **A**
10-28 series: **16 mm**

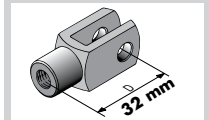
On cylinder



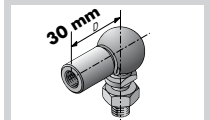
Threaded end **GZ**



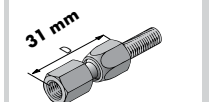
Eyelet **A** 10-23 series



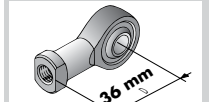
Fork **G**



Ball and socket joint **WG**



Inline ball and socket joint **KGA**



Rose bearing **GK**

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping for cushioned locking gas springs

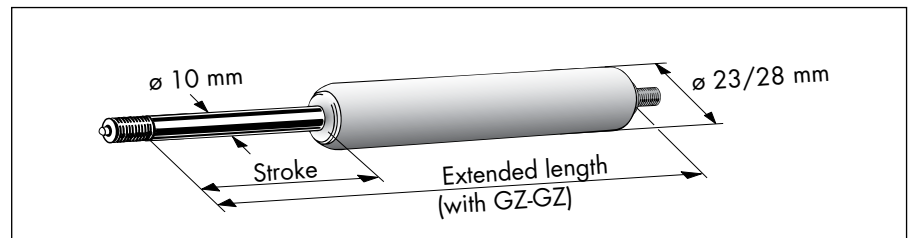
0 = without damping

3 = damping on both extending and compression strokes

Determining Your Cushioned Locking Gas Spring

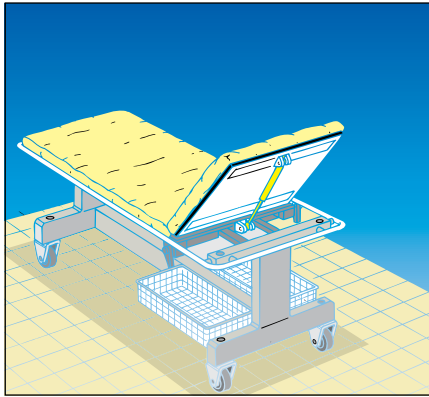
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example an eyelet on the cylinder, then simply add measurement D given in the drawings of the end fittings to the extended length to achieve the total length.



| | Type FB | See page |
|--|--|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter (23 or 28 mm): | <input type="text"/> | 06.082.00 |
| 3. Stroke (20 - 500 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0 and 3) | | |
| 5. Force (150 - 1200 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 90 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (M10x1 threaded ends): | <input type="text" value="GZ"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) <input type="checkbox"/> Valve (5) <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 06.010.00 06.011.00 |

Additional details: e.g. shorter release pin



StB 10-23 and StB 10-28 Rigid Locking Gas Springs

Rigid locking gas springs are the more **elaborate design** of locking gas springs to manufacture. The piston rod does not move once in the locked position. The object is fixed in the exact position required and cannot rebound when a load is added e.g hospital beds cannot tilt any further when locked. As a **special design** the 10-28 rigid locking gas springs can also be supplied with up to **50 times the locking force in the force direction** (max. 7500 N). This model is recommended e.g. for hospital beds.

There are several different **release devices** for the threaded ends with release pin. They can be found on the following page.

End Fittings

On piston rod On cylinder

| | |
|---|----------------------------------|
| <p>Length of release pin 5 mm Release 1 - 4 mm</p> <p>Threaded end GZ M10x1</p> <p>See page 06.043.00 for release devices</p> <p>* Eyelet A 10-28 series: 16 mm</p> | <p>Threaded end GZ M8</p> |
| <p>* Eyelet A 10-23 series</p> | <p>* 13 mm</p> |
| <p>Fork G</p> | <p>32 mm</p> |
| <p>Ball and socket joint WG</p> | <p>30 mm</p> |
| <p>Inline ball and socket joint KGA</p> | <p>31 mm</p> |
| <p>Rose bearing GK</p> | <p>36 mm</p> |

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

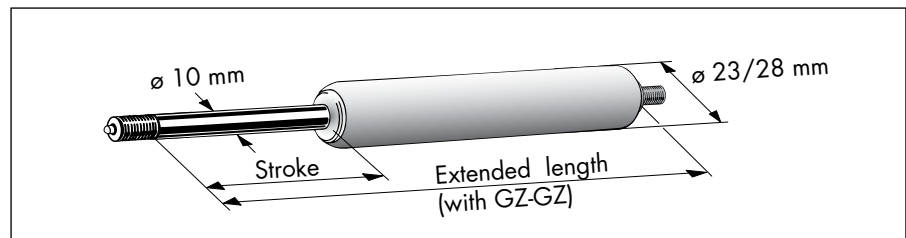
Types of damping for rigid locking gas springs

0 = without damping
3 = damping on both extending and compression strokes

Determining Your Rigid Locking Gas Spring

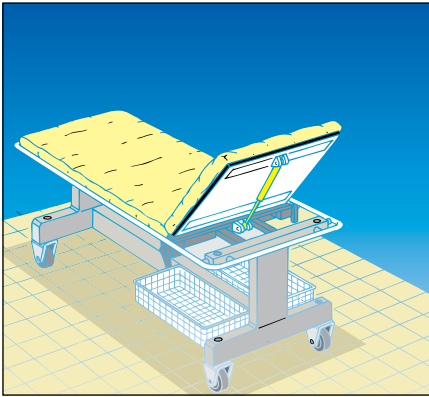
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example an eyelet on the cylinder, then simply add measurement D given in the drawings of the end fittings to the extended length to achieve the total length.



| | Type StB | See page |
|--|---|------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter (23 or 28 mm): | <input type="text"/> | 06.082.00 |
| 3. Stroke (20 - 500 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0 and 3) | | |
| 5. Force (150 - 1200 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= length extended - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2.5 x stroke + 90 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (M10x1 threaded ends): | <input type="text" value="GZ"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Valve (5) <input type="checkbox"/> Protective tube (6) (+ 5 mm) | 06.010.00 06.011.00 |

Additional details: e.g. up to 50 times the locking force in the force direction



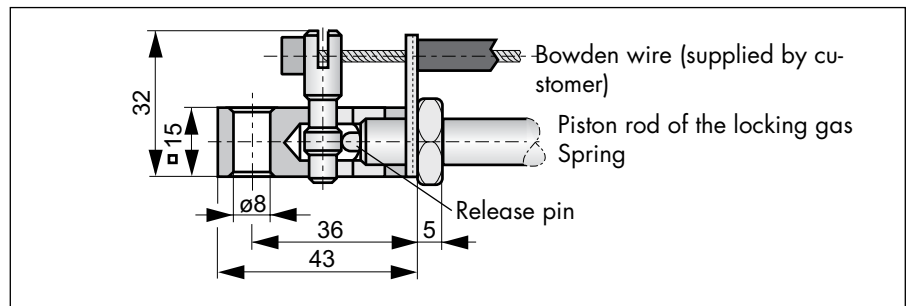
Release Devices For Locking Gas Springs

In locking gas springs the lock is released by pushing the release pin into the front of the piston rod so the piston rod can extend and retract. The pin is usually relatively hard to reach once installed so DICTATOR offers different release devices.

The release pin is 5 mm long. To release the locking the pin needs to be pushed in by 1 mm (in some cases 2 - 4 mm).

The force needed to activate the release pin depends on how much pressure is inside the gas spring and which release device is chosen.

Release Device with Bowden Wire



We recommend the release device with Bowden wire if it cannot be released close to the gas spring, only further away e.g. in aeroplane seats where it works on the side rest of the seat.

Release force: approx. 18 % of the rated force of the gas spring

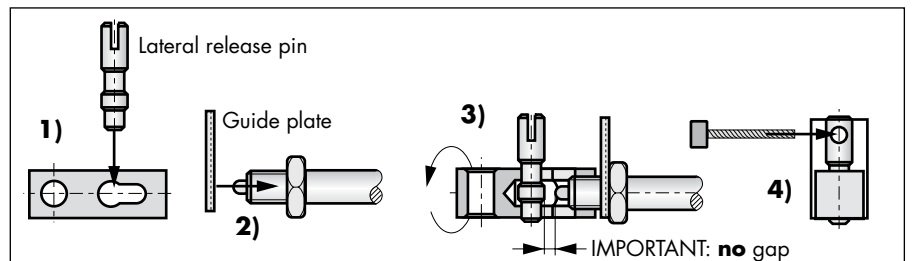
Material

The release device with Bowden wire is made of the following materials:

| | |
|--------------------------|-------------------------------|
| Eyelet with release head | Aluminium ALCuMgPb |
| Lateral release fork | Free cutting steel 9 SMnPb36K |
| Guide plate | 1 mm sheet steel |

Installation

We recommend Bowden wires used on bicycles, \varnothing 2 mm, with plastic covering.



The release device for Bowden wire is screwed to the threaded end on the piston rod. The Bowden wire itself is not supplied as the required length of the rope is always different.

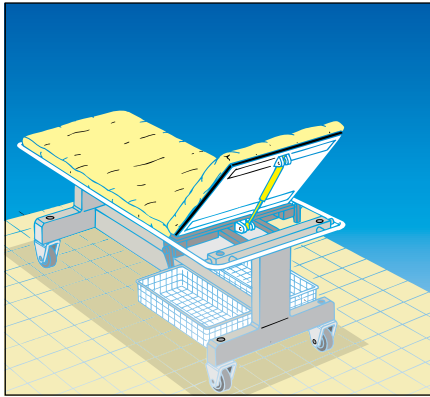
Mounting of the release device for Bowden wires:

- 1) Insert the lateral release fork into the hole of the eyelet until it appears on the surface.
- 2) Slide the guide plate over the piston rod towards the nut.
- 3) Screw the eyelet with release head onto the piston rod. Please make sure the release pin is completely released so that it is not moved at all. Also check that no gap remains either (see diagram 3).
- 4) Thread the rope through the hole in the release fork and pull it through completely. From the opposite side pull the plastic covering of the Bowden wire on the rope up to the guide plate.

Order Information

Releasing device for Bowden wire

part no. 205238



Release Devices For Locking Gas Springs, cont.

Besides the release device with Bowden wire DICTATOR offers the following possibilities to release the locking:

- You should opt for the release device with operating arm, if the device can be placed directly beside the gas spring, e.g. on lifting tables or operating tables.
- Hydraulic release device: It needs much less force for releasing the locking than the other two devices.

Release Device with Operating Arm

Eyelet with release head aluminium ALCuMgPb
 Operating arm C35K
 Head of arm plastics

Release force:
 approx. 18 % of the rated force of the gas spring

The release device is supplied completely with arm. In case you need a **different length of arm**, please contact us.

Hydraulic Release Device

Release force:
 approx. 4 % of the rated force of the gas spring
 Operating distance: approx. 17 mm

Attention: total length of the gas spring increases by 5 mm.

Eyelet with release head: aluminium
 Tube: polyamide PA, black

Release force:
 approx. 4 % of the rated force of the gas spring
 Operating distance: approx. 17 mm

Attention: total length of the gas spring increases by 5 mm.

Installation

The release devices are screwed completely to the threaded end on the piston rod. Please make sure the release pin is completely released when locked (that it is not moved at all), but that there is also no gap at all.

Order Information

| | |
|---------------------------------------|---------------------|
| Release device with operating arm | part no. 205239 |
| Hydraulic release device, 150 mm tube | part no. 205248-150 |
| Hydraulic release device, 230 mm tube | part no. 205248-230 |

Stainless Steel Gas Springs

Many gas springs are used either outside or in the food or medical sector. These places have great demand on the durability of surfaces. This poses no problem for DICTATOR **stainless steel gas springs** which are available in AISI 304 and mostly also AISI 316.

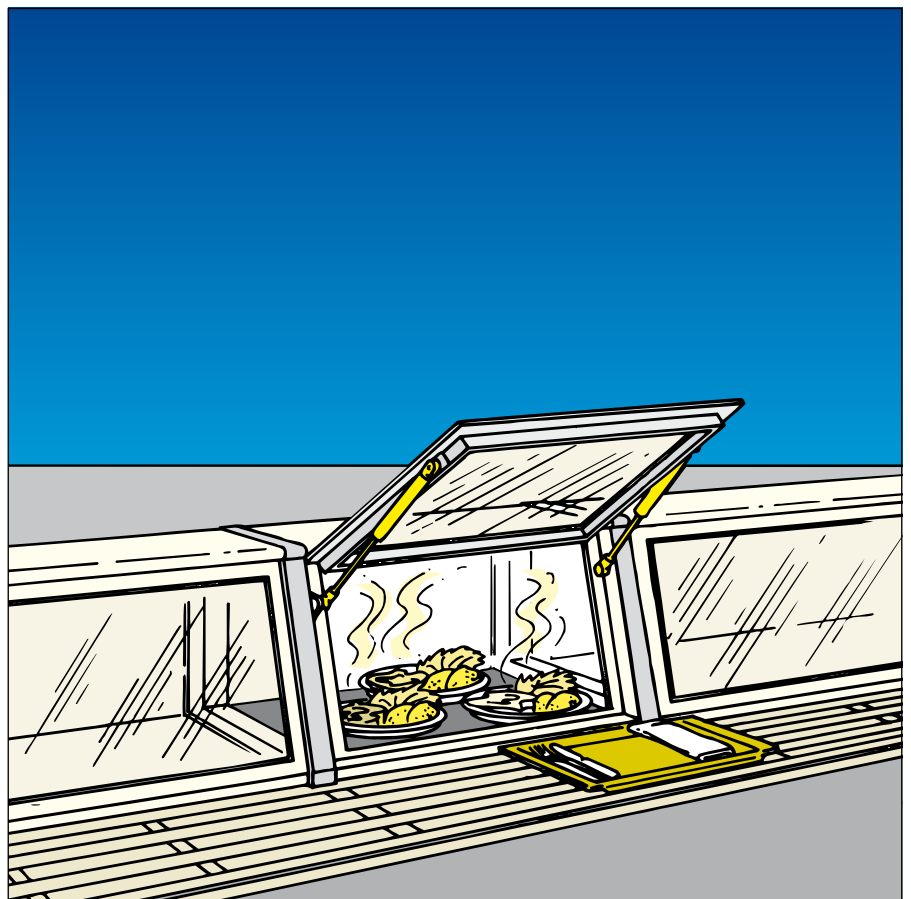
The gas springs can also be manufactured with a **bio-degradable oil** (plant oil) to grease the seals instead of the normal oil. If they are going to be used in areas containing food, they can be provided with a special **FDA compliant oil**.

All **gas springs in AISI 316** are manufactured with an additional **wiper with greasing function** to give extra protection against aggressive environments.

Recent technical improvements allow the **same maximum pressure** as normal gas springs.

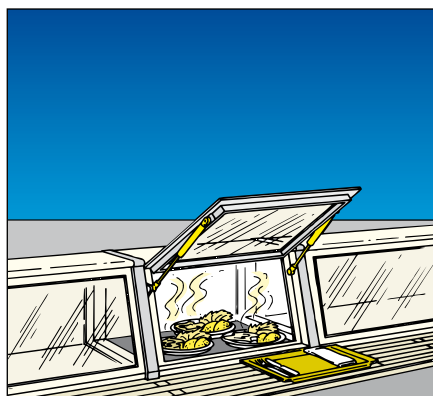
Gas springs made **entirely from stainless steel** (including inner metal components) have especially been designed for use in the medical industry. Their delivery condition is **anti-magnetic**.

By default, all stainless steel gas springs are supplied with a valve.



Technical Data

| | |
|-----------------------------|--|
| Stainless steel gas springs | push type, locking, pull type |
| Material | AISI 304 and AISI 316, exact data on demand |
| Pushing / Pulling forces | 10 N - 5000 N / 30 N - 5000 N |
| Operating temperature | -10 °C (with special oil -30 °C) to +80 °C |
| Change in pressure | 0,37 % per 1 °C: (first filling at approx. 18° - 20 °C) |
| Gas | nitrogen (N), non flammable! |
| Maximum number of strokes | 6 strokes per minute |
| IMPORTANT NOTE | combination maximum pressure/stroke always to be checked |



Summary of Stainless Steel Gas Springs

A large number of DICTATOR gas springs can also be manufactured in stainless steel. The following table gives you a short summary of all gas spring ranges available in stainless steel (AISI 304 and/or AISI 316).

All stainless steel gas springs are produced with a **valve as standard**. This allows you to release pressure later without any problems. Should you accidentally release too much pressure, we can refill the gas spring for you.

The available end fittings in AISI 303 or AISI 316L are also listed in the table. However, please be aware that gas springs with **stainless steel ball and socket joints** may have a **lower maximum pressure** than shown in the table.

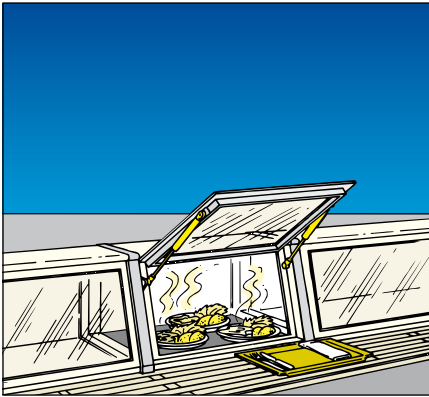
Technical Data

| Type of stainless steel gas spring | Push Type Gas Springs | | | | | | |
|------------------------------------|-------------------------------------|-------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|
| Ø Piston rod | 3 | 4 | 6 | 8 | 10 | 14 | 20 |
| Ø Cylinder | 10 | 12 | 15 | 19 | 23 | 28 | 40 |
| Material | AISI 316 | AISI 316 | AISI 304/316 | AISI 304/316 | AISI 304/316 | AISI 304/316 | AISI 304/316 |
| Min. stroke S (mm) | 10 | 10 | 20 | 40 | 40 | 50 | 70 |
| Max. stroke S (mm) | 80 | 200 | 200 | 500 | 700 | 700 | 500 |
| Damping | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 | 0, 1, 2, 3 |
| Min. force (N) | 10 | 10 | 40 | 80 | 100 | 150 | 300 |
| Max. force (N) | 100 | 180 | 400 | 700 | 1200 | 2500 | 5000 |
| Comp. L (GZ-GZ)** | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke |
| Ext. L (GZ-GZ)** | 2x S + 32 | 2x S + 32 | 2x S + 55 | 2x S + 70 | 2x S + 70 | 2x S + 107 | 2x S + 138 |
| End fittings | GZ, A, G, WG | GZ, A, G, WG | GZ, A, G, WG | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* |
| Oil chamber (4)** | - | - | L + 15 | L + 15 | L + 15 | L + 15 | - |
| Protective tube (9)** | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 | L + 5 |
| Plant oil (8) | yes | yes | yes | yes | yes | yes | yes |
| Type of stainless steel gas spring | Locking Gas Springs cushioned rigid | | Pull Type Gas Springs | | | | |
| Ø Piston rod | 10 | 10 | 6 | 10 | 10 | 28 | |
| Ø Cylinder | 23/28 | 23/28 | 19 | 28 | 40 | 40 | |
| Material | AISI 304/316 | AISI 304/316 | AISI 304/316 | AISI 304/316 | AISI 304/316 | AISI 304/316 | |
| Min. stroke S (mm) | 20 | 20 | 30 | 20 | 40 | 50 | |
| Max. stroke S (mm) | 500 | 500 | 300 | 600 | 490 | 600 | |
| Damping | 0, 3 | 0, 3 | 0 | 0 | 0 | 0 | |
| Min. force (N) | 150 | 150 | 30 | 150 | 200 | 500 | |
| Max. force (N) | 1200 | 1200 | 330 | 1200 | 2000 | 5000 | |
| Comp. L (GZ-GZ)* * | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke | ext. L - stroke | |
| Ext. L (GZ-GZ)** | 2x S + 90 | 2.5x S + 90 | 2x S + 100 | 2x S + 100 | 2x S + 150 | 2.5x S + 125 | |
| End fittings | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | GZ, A, G, WG, GK* | |
| Oil chamber (4)** | L + 15 | nein | yes | L + 20 | yes | no | |
| Protective tube (9)** | L + 5 | L + 5 | L + 2 | L + 2 | L + 2 | L + 2 | |
| Plant oil (8) | yes | yes | yes | yes | yes | yes | |

* GK available only in AISI 304

** All measurements (length L) in mm [Example: DV 8-19 range; stroke 50; ext. L = 2 x 50 + 65 = 165 mm]

Gas springs used in environmentally protected conditions should be ordered with **biological oil (code no. 8)**. However, when using them in areas containing food, you have to indicate in your order that you need an **oil with FDA approval**. Information concerning oil chambers and protective tubes can be found on pages 06.010.00 and 06.011.00.



Stainless Steel Push Type Gas Springs in AISI 316 Series DV4 3-10, Force 10 N - 100 N

The smallest stainless steel gas springs available have a 3 mm diameter piston rod and 10 mm cylinder diameter. The gas springs of this series are manufactured only in AISI 316.

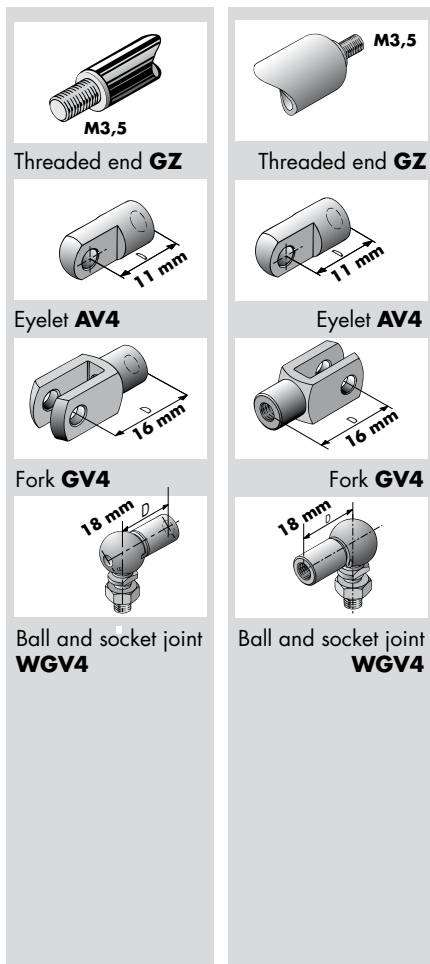
All stainless steel gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact measurement drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

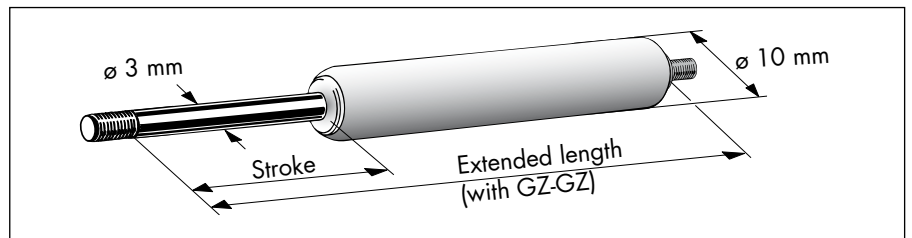
Types of damping

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DV4 3-10 Gas Spring

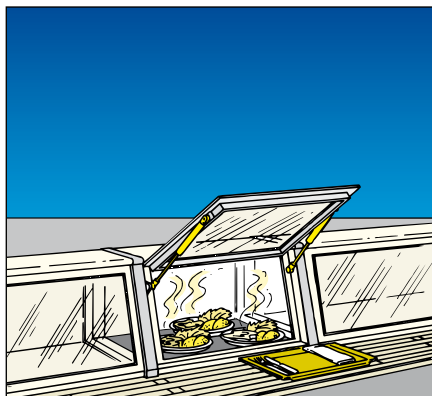
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type DV4 | See page |
|--|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="3 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 3. Stroke (10 - 80 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (10 - 100 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= length extended - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 32 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Protective tube (9) (+ 5 mm) <input type="checkbox"/> Biological oil (8) | 06.011.00 06.012.00 |

Additional details:



Stainless Steel Push Type Gas Springs in AISI 316 Series DV 4-12, Force 10 N - 180 N

The second smallest series of stainless steel gas springs have a 4 mm diameter piston rod and 12 mm cylinder diameter. The gas springs of this series are manufactured only in AISI 316.

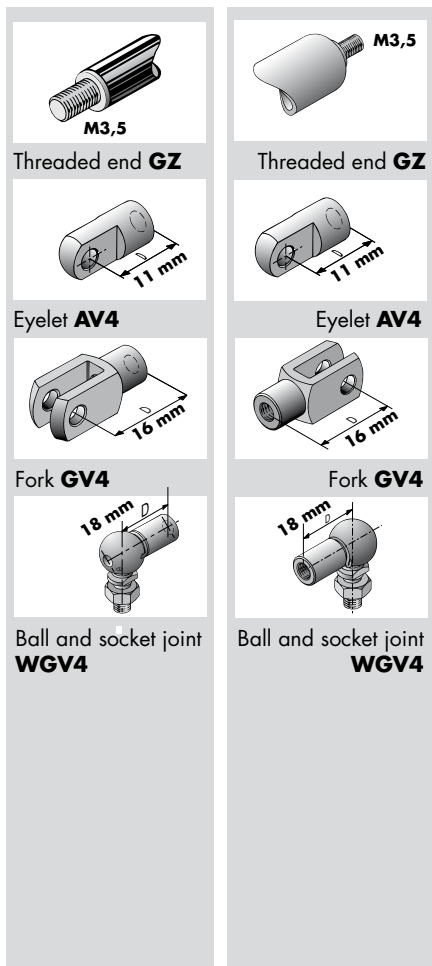
All stainless steel gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact measurement drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

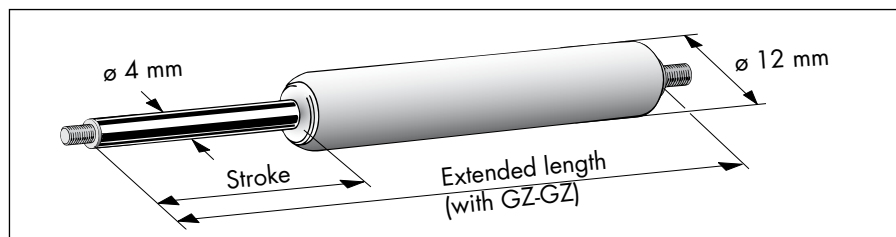
Types of damping

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DV4 4-12 Gas Spring

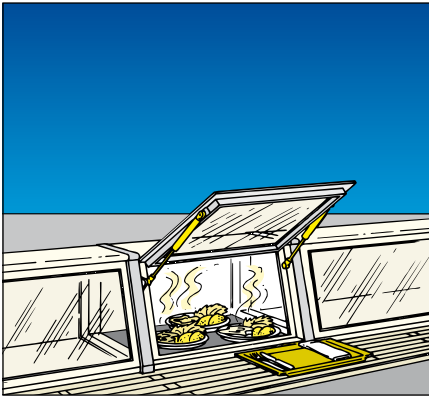
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type DV4 | See page |
|---|--|-----------|
| 1. Piston rod diameter: | <input type="text" value="4 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="12 mm"/> | 06.082.00 |
| 3. Stroke (10 - 200 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 |
| | (choice between damping types 0, 1, 2, 3) | 06.083.00 |
| 5. Force (10 - 180 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= length extended - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| | (min. 2 x stroke + 32 mm + measurement D of end fittings + measurements of additional options) | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Protective tube (9) (+ 5 mm) | 06.011.00 |
| | <input type="checkbox"/> Biological oil (8) | 06.012.00 |

Additional details:



Stainless Steel Push Type Gas Springs in AISI 304 or 316 Series DV 6-15 and DV4 6-15, Force 40 N - 400 N

The steel gas springs of the 6-15 series have a 6 mm diameter piston rod and 15 mm cylinder diameter. With a force of 40 N to 400 N they cover almost all requirements in the lower pressure range. They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

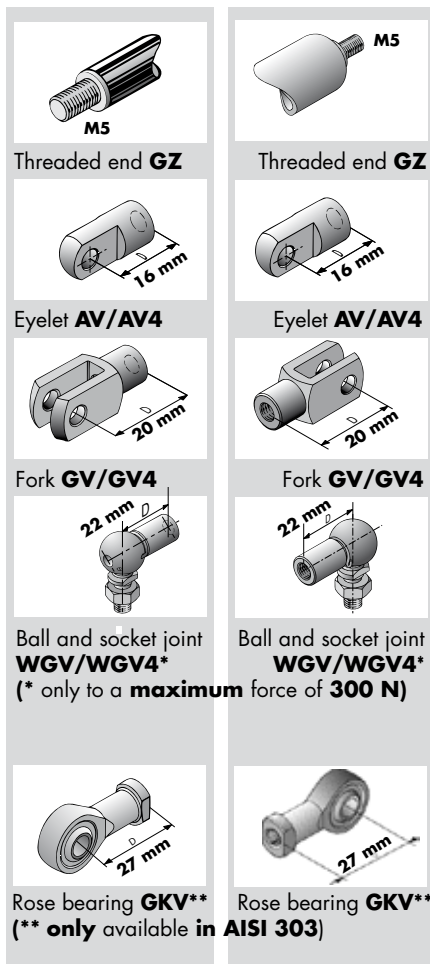
All stainless steel gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact measurement drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

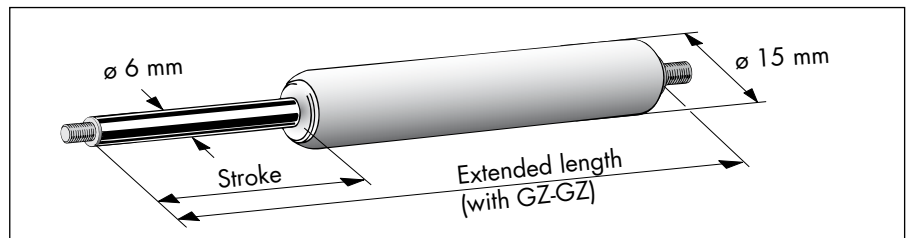
Types of damping

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DV/DV4 6-15 Gas Spring

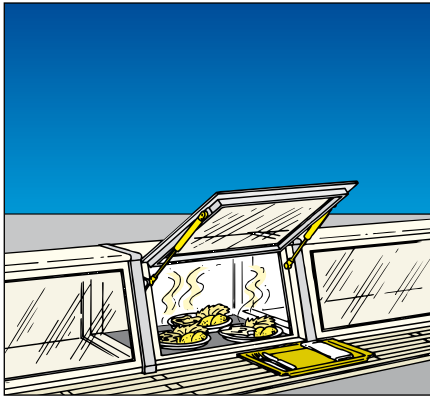
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type DV or DV4 | See page |
|---|---|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="6 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="15 mm"/> | 06.082.00 |
| 3. Stroke (20 - 200 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 |
| | (choice between damping types 0, 1, 2, 3) | 06.083.00 |
| 5. Force (40 - 400 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= length extended - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| | (min. 2 x stroke + 55 mm + measurement D of end fittings + measurements of additional options) | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (+ 15 mm) <input type="checkbox"/> Protective tube (9) (+ 5 mm) <input type="checkbox"/> Biological oil (8) | 06.010.00 06.011.00 06.012.00 |

Additional details:



Stainless Steel Push Type Gas Springs in AISI 304 or 316 Series DV 8-19/10-23 and DV4 8-19/10-23, Force 80 N - 1200 N

DV/DV4 8-19 and 10-23 stainless steel gas springs are the most frequently used gas springs. Both ranges have the **same end fittings** (identical measurements).

They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

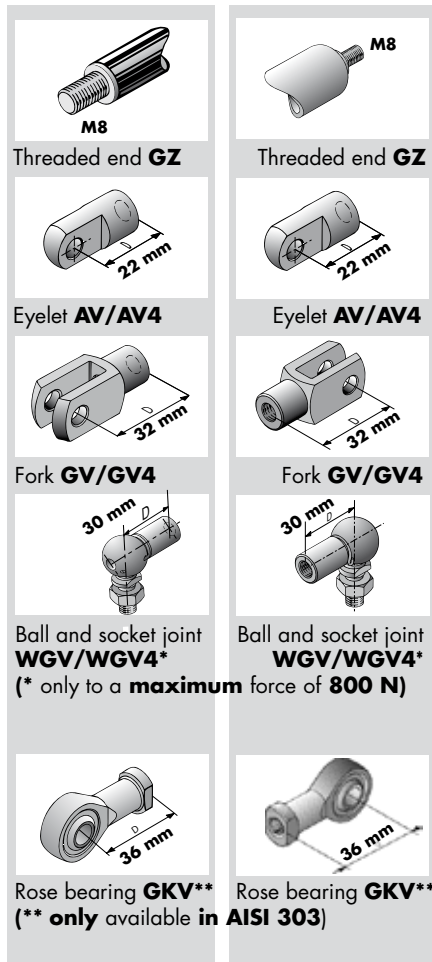
All stainless steel gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

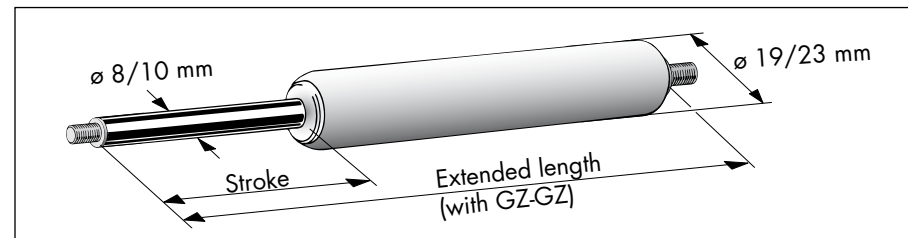
Types of damping

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DV/DV4 8-19 and 10-23 Push Type Gas Spring

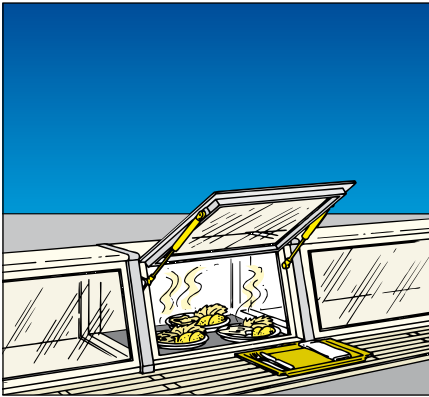
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type DV or DV4 | See page |
|---|----------------------|------------------------|
| 1. Piston rod diameter: (8 or 10 mm) | <input type="text"/> | 06.082.00 |
| 2. Cylinder diameter: (19 or 23 mm) | <input type="text"/> | 06.082.00 |
| 3. Stroke (40 - 500 mm / 700 mm only with DV/DV4 10-23): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: (choice between types 0, 1, 2, 3) | <input type="text"/> | 06.005.00 06.083.00 |
| 5. Force: (DV/DV4 8-19: 80 - 700 N) (DV/DV4 10-23: 100 - 1200 N) | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2 x stroke + 70 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | | |
| <input type="checkbox"/> Oil chamber (4) (total length + 15 mm) | | 06.010.00 |
| <input type="checkbox"/> Protective tube (9) (total length + 5 mm) | | 06.011.00 |
| <input type="checkbox"/> Biological oil (8) | | 06.012.00 |

Additional details:



Stainless Steel Push Type Gas Springs in AISI 304 or 316 Series DV 14-28 and DV4 14-28, Force 150 N - 2500 N

In spite of their relatively small measurements, the gas springs with a 14 mm piston rod diameter and 28 mm cylinder diameter allow for more than **double the force of the DV/DV4 10-23** gas springs. The **stroke lengths reach up to 700 mm**.

They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

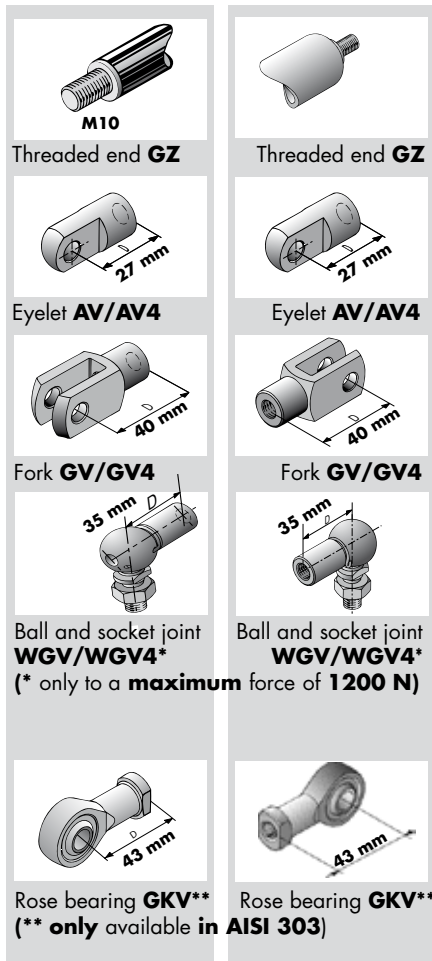
All stainless steel gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

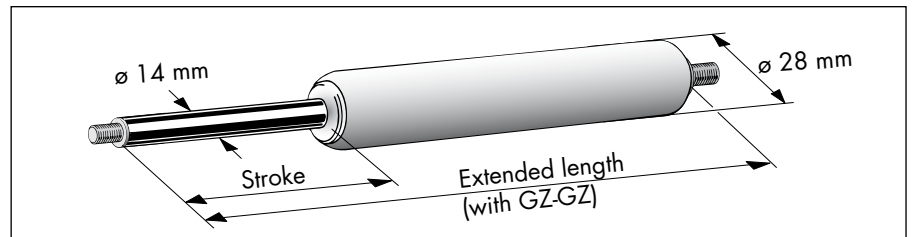
On cylinder



Determining Your DV/DV4 14-28 Push Type Gas Spring

With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



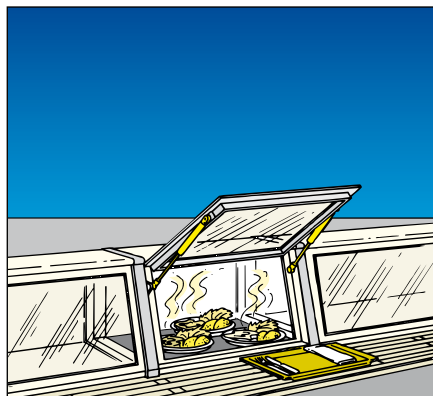
| | Type DV or DV4 | See page |
|---|---|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="14 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 3. Stroke (50 - 700 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | | |
| 5. Force (150 - 2500 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 107 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (total length + 15 mm) <input type="checkbox"/> Protective tube (9) (total length + 5 mm) <input type="checkbox"/> Biological oil (8) | 06.010.00 06.011.00 06.012.00 |

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Additional details:



Stainless Steel Push Type Gas Springs in AISI 304 or 316 Series DV 20-40 and DV4 20-40, Force 300 N - 5000 N

Gas springs with a 20 mm piston rod diameter and 40 mm cylinder diameter are the largest gas springs available in stainless steel.

They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

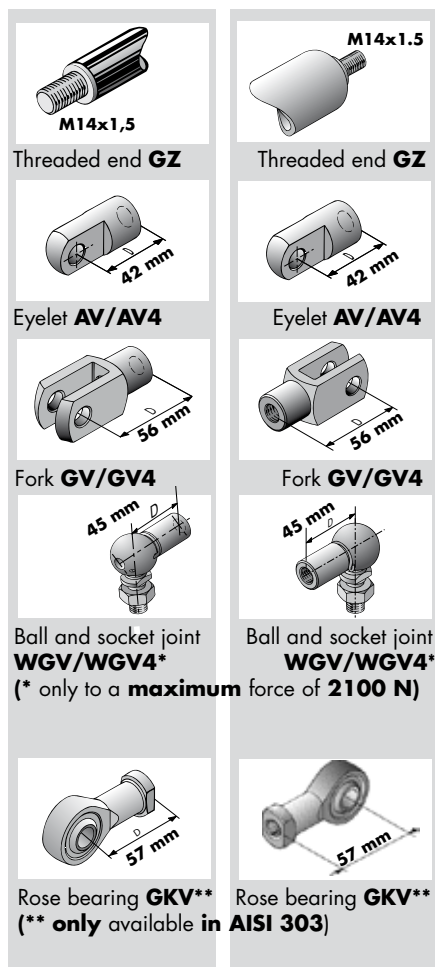
All stainless steel gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

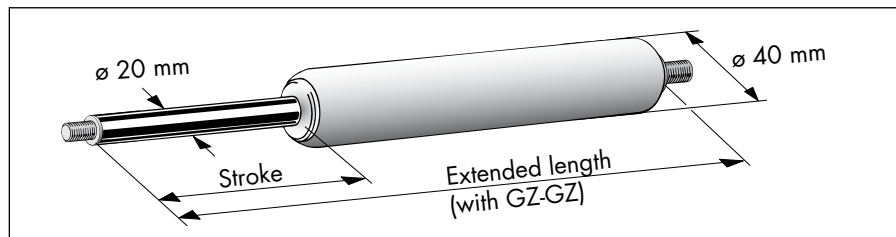
Types of damping

- 0 = without damping
- 1 = damping on extending stroke
- 2 = damping on compression stroke
- 3 = damping on both extending and compression strokes

Determining Your DV/DV4 20-40 Push Type Gas Spring

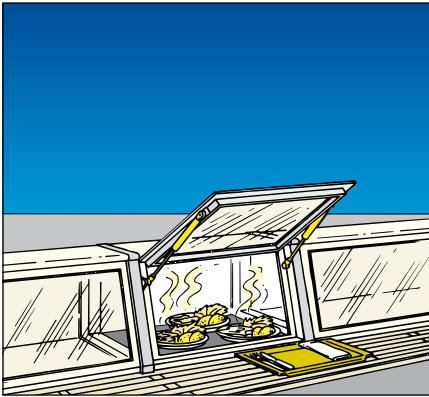
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| Type DV or DV4 | See page |
|---|------------------------|
| 1. Piston rod diameter: <input type="text" value="20 mm"/> | 06.082.00 |
| 2. Cylinder diameter: <input type="text" value="40 mm"/> | 06.082.00 |
| 3. Stroke (70 - 500 mm): <input type="text"/> | 06.082.00 |
| 4. Type of damping: <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 1, 2, 3) | |
| 5. Force (300 - 5000 N): <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 138 mm + measurement D of end fittings + measurements of additional options) | |
| 8. Piston rod end fitting (see drawing for symbol): <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): <input type="text"/> | 06.061.00 |
| 10. Additional options: <input type="checkbox"/> Protective tube (9) (total length + 5 mm) | 06.011.00 |
| <input type="checkbox"/> Biological oil (8) | 06.012.00 |

Additional details:



Locking Push Type Gas Springs in AISI 304 or AISI 316 Series FBV/FBV4 10-23 and FBV/FBV4 10-28

All locking gas springs are also available in stainless steel. Additional information concerning cushioned locking gas springs can be found with the details of normal locking gas springs. They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

All stainless steel gas springs are supplied **with a valve as standard**.

Stainless steel releasing devices are not available yet. Please ask for details if necessary.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

Threaded end **GZ M10x1**

(* max. 800 N)

(**only in AISI 303)

On cylinder

Threaded end **GZ M8**

Eyelet **AV**

Eyelet **AV4**

Fork **GV/GV4**

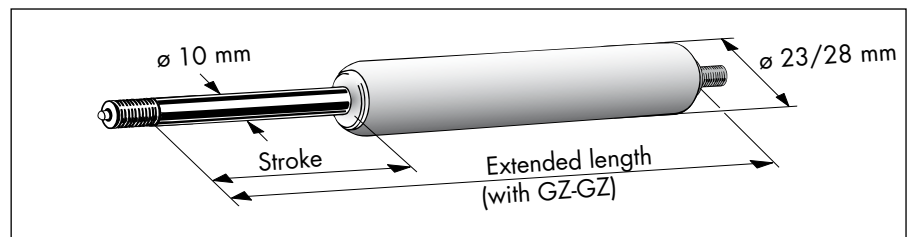
Ball and socket joint **WGV/WGV4***

Rose bearing **GKV****

Determining Your Cushioned Locking Gas Spring FBV/FBV4

With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the cylinder, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



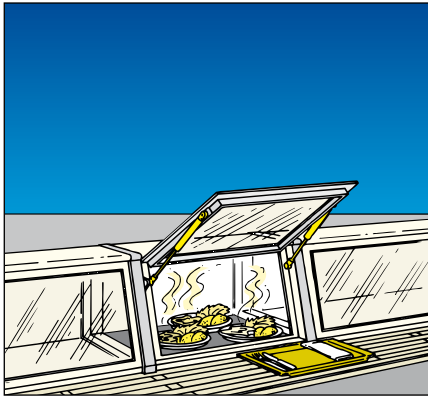
| | Type FBV or FBV4 | See page |
|--|---|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter (23 or 28mm): | <input type="text"/> | 06.082.00 |
| 3. Stroke (20 - 500 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0, 3) | | |
| 5. Force (150 - 1200 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2 x stroke + 90 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (threaded end M10x1): | <input type="text" value="GZ"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (total length + 15 mm) <input type="checkbox"/> Protective tube (9) (total length + 5 mm) <input type="checkbox"/> Biological oil (8) | 06.010.00 06.011.00 06.012.00 |

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

Types of damping

0 = without damping
3 = with damping on both extending and compression strokes

Additional details: _____



Locking Push Type Gas Springs in AISI 304 or AISI 316 Series StBV/StBV4 10-23 and StBV/StBV4 10-28

All locking gas springs are also available in stainless steel. Additional information concerning rigid locking gas springs can be found with details of normal locking gas springs. They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

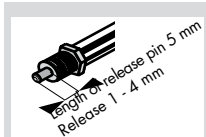
All stainless steel gas springs are supplied **with a valve as standard**.

Stainless steel releasing devices are not available yet. Please ask for details if necessary.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

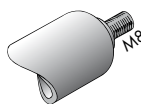
End Fittings

On piston rod

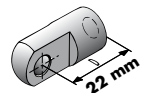


Threaded end **GZ**
M10x1

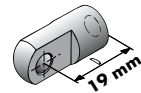
On cylinder



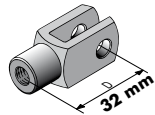
Threaded end **GZ**



Eyelet **AV**



Eyelet **AV4**



Fork **GV/GV4**



Ball and socket joint
WGV/WGV4*



Rose bearing **GKV****

(* max. 800 N)

(**only in AISI 303)

Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

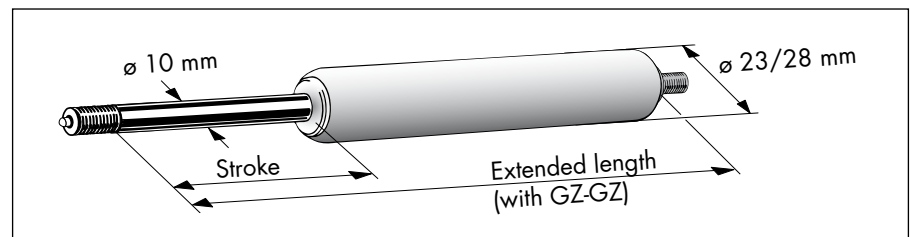
Types of damping

- 0 = without damping
- 3 = damping on both extending and compression strokes

Determining Your Rigid Locking Gas Spring StBV/StBV4

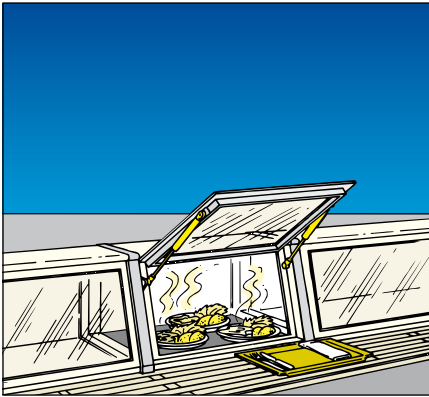
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a gas spring not only with threaded ends, but also, for example, an eyelet on the cylinder, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type StBV or StBV4 | See page |
|--|---|------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter (23 or 28mm): | <input type="text"/> | 06.082.00 |
| 3. Stroke (20 - 500 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text"/> | 06.005.00 06.083.00 |
| (choice between damping types 0 , 3) | | |
| 5. Force (150 - 1200 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| (min. 2.5 x stroke + 90 mm + measurement D of end fittings + measurements of additional options) | | |
| 8. Piston rod end fitting (threaded end M10x1): | <input type="text" value="GZ"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Protective tube (9) (total length + 5 mm) | 06.011.00 |
| | <input type="checkbox"/> Biological oil (8) | 06.012.00 |

Additional details:



Stainless Steel Pull Type Gas Springs in AISI 304 or 316 Series ZV 6-19 and ZV4 6-19, Force 30 N - 330 N

Same as the push type gas springs also the pull type gas springs are made of stainless steel. They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

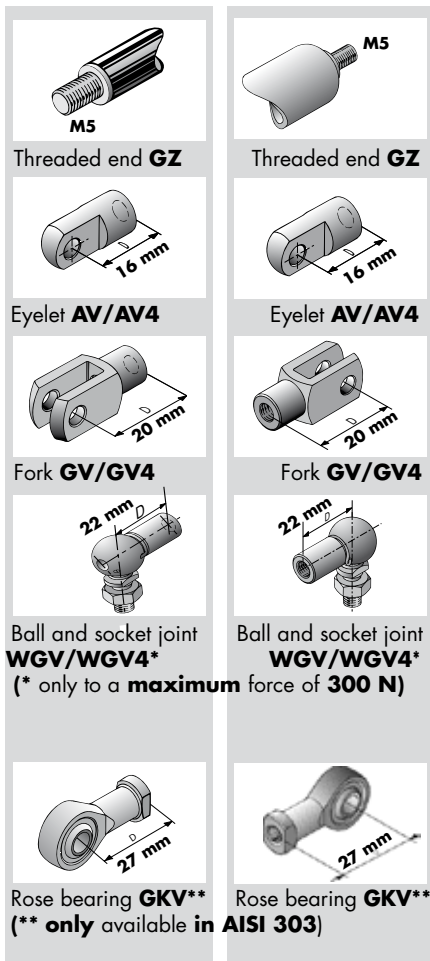
All stainless steel pull type gas springs are supplied **with a valve as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

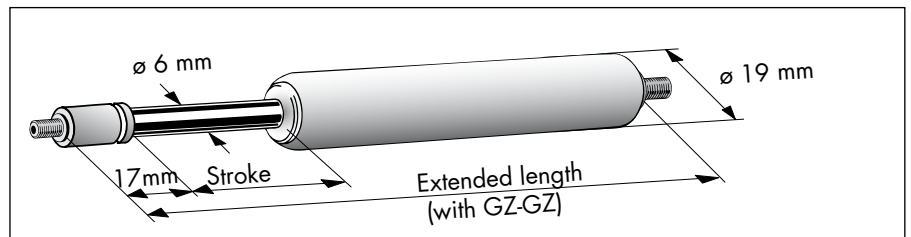
Types of damping

0 = without damping

Determining Your ZV/ZV4 6-19 Pull Type Gas Spring

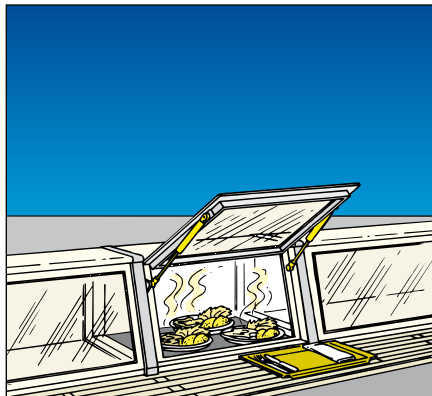
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| Type ZV or ZV4 | See page |
|--|------------------------|
| 1. Piston rod diameter: <input type="text" value="6 mm"/> | 06.082.00 |
| 2. Cylinder diameter: <input type="text" value="19 mm"/> | 06.082.00 |
| 3. Stroke (30 - 300 mm): <input type="text"/> | 06.082.00 |
| 4. Type of damping: <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (30 - 330 N): <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): <input type="text"/> (min. 2 x stroke + 100 mm + measurement D of end fittings + measurements of additional options) | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): <input type="text"/> | 06.061.00 |
| 10. Additional options: <input type="checkbox"/> Oil chamber (4) | 06.010.00 |
| <input type="checkbox"/> Protective tube (9) (total length + 2 mm) | 06.011.00 |
| <input type="checkbox"/> Biological oil (8) | 06.012.00 |

Additional details:



Stainless Steel Pull Type Gas Springs in AISI 304 or 316 Series ZV 10-28 and ZV4 10-28, Force 150 N - 1200 N

The most frequently used stainless steel pull type gas springs have a 10 mm piston rod and 28 mm cylinder diameter. They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4).

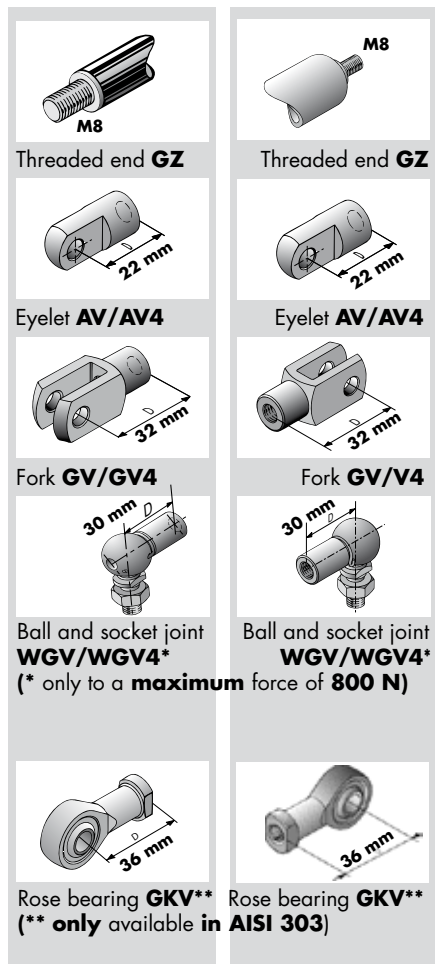
All stainless steel pull type gas springs are supplied **with a valve** on the piston rod **as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

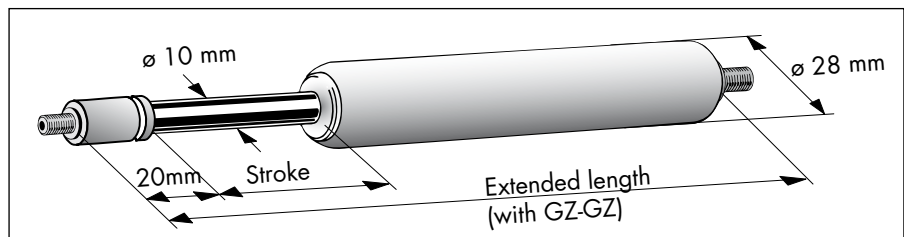
Types of damping

0 = without damping

Determining Your ZV/ZV4 10-28 Pull Type Gas Spring

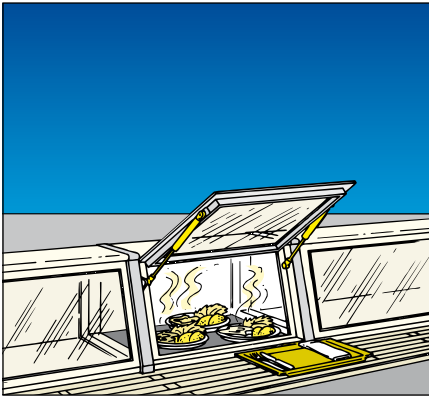
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type ZV or ZV4 | See page |
|---|--|-------------------------------------|
| 1. Piston rod diameter: | <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 3. Stroke (20 - 600 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (150 - 1200 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2 x stroke + 100 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Oil chamber (4) (total length + 20 mm) <input type="checkbox"/> Protective tube (9) (total length + 2 mm) <input type="checkbox"/> Biological oil (8) | 06.010.00 06.011.00 06.012.00 |

Additional details:



Stainless Steel Pull Type Gas Springs in AISI 304 or 316 Series ZV 10-40 and ZV4 10-40, Force 200 N - 2000 N

Pull type gas springs for forces from 200 N to 2000 N are available with a 10 mm piston rod diameter and 40 mm cylinder diameter. They can be manufactured either in AISI 304 (DV) or AISI 316 (DV4). All stainless steel pull type gas springs are supplied **with a valve** on the piston rod **as standard**.

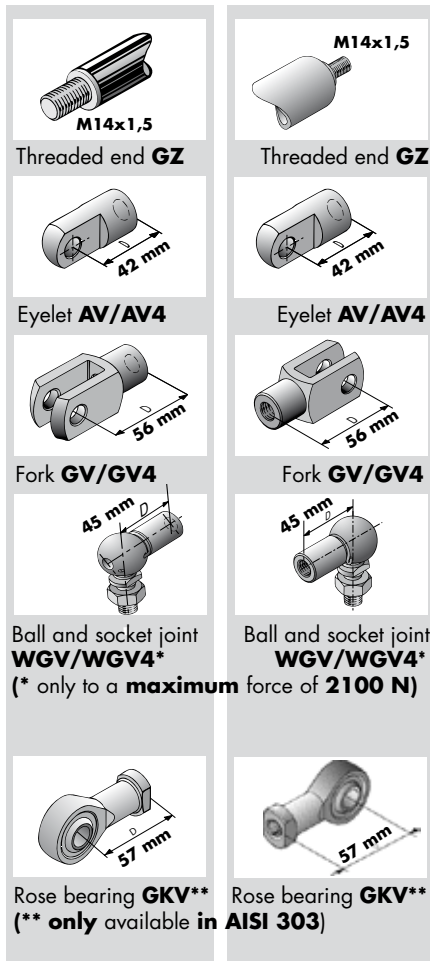
A thread-adapter is attached to the piston rod of the ZV/ZV4 10-40 range. End fittings of the 20-40 range are generally used both on the piston rod and on the cylinder.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

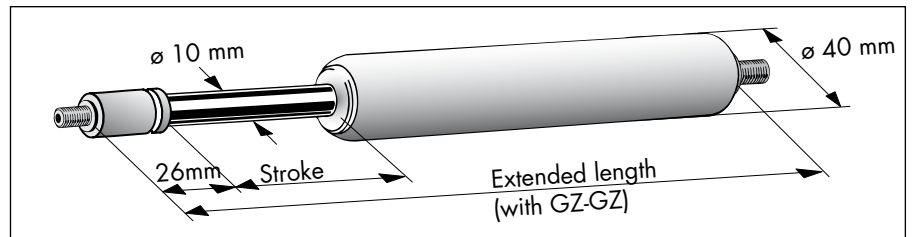
Types of damping

0 = without damping

Determining Your ZV/ZV4 10-40 Pull Type Gas Spring

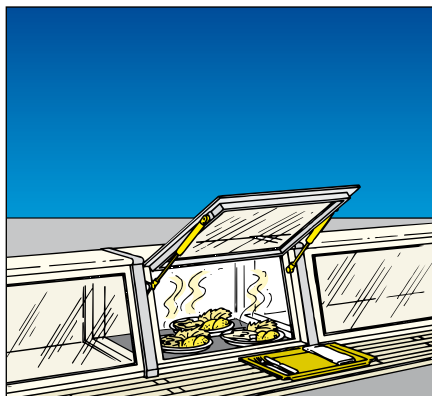
With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| Type ZV or ZV4 | See page |
|--|------------------------|
| 1. Piston rod diameter: <input type="text" value="10 mm"/> | 06.082.00 |
| 2. Cylinder diameter: <input type="text" value="40 mm"/> | 06.082.00 |
| 3. Stroke (40 - 490 mm): <input type="text"/> | 06.082.00 |
| 4. Type of damping: <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (200 - 2000 N): <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): <input type="text"/> (min. 2 x stroke + 150 mm + measurement D of end fittings + measurements of additional options) | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): <input type="text"/> | 06.061.00 |
| 10. Additional options: <input type="checkbox"/> Oil chamber (4) | 06.010.00 |
| <input type="checkbox"/> Protective tube (9) (total length + 2 mm) | 06.011.00 |
| <input type="checkbox"/> Biological oil (8) | 06.012.00 |

Additional details:



Stainless Steel Pull Type Gas Springs in AISI 304 or 316 Series ZV 28-40 and ZV4 28-40, Force 500 N - 5000 N

The highest pulling force can be achieved with the ZV 28-40 or ZV4 28-40 range. They have a 28 mm piston rod diameter and 40 mm cylinder diameter. ZV/ZV4 28-40 pull type gas springs have a M14x1.5 thread on both ends. Therefore, end fittings of the 20-40 range are generally used on the piston rod and on the cylinder.

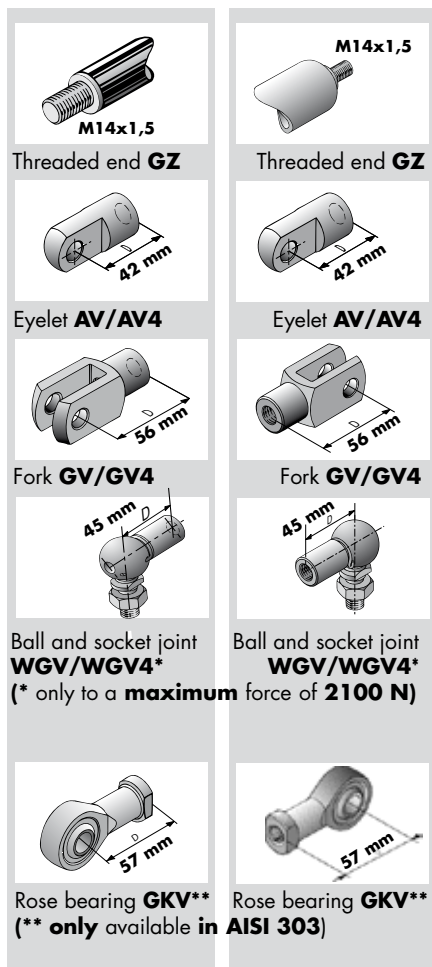
All stainless steel pull type gas springs are supplied **with a valve** on the piston rod **as standard**.

IMPORTANT NOTE: In case you choose the maximum pressure together with the maximum stroke length, we strongly recommend you let us check if, with regard to the danger of buckling, this gas spring is suitable for your application.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

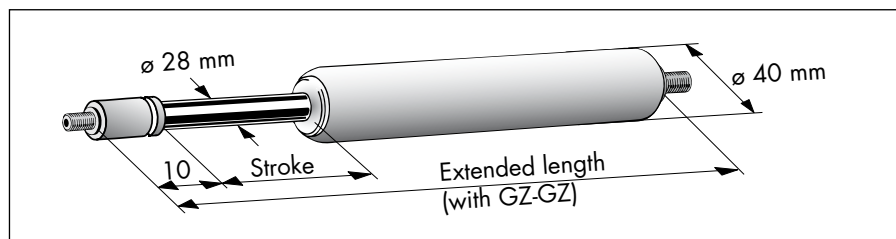
Types of damping

0 = without damping

Determining Your ZV/ZV4 28-40 Pull Type Gas Spring

With help of the following table you can easily find the correct gas spring if you already know the necessary stroke and end fittings.

If you require a pull type gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length. The same applies for additional options.



| | Type ZV or ZV4 | See page |
|---|--|------------------------|
| 1. Piston rod diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="40 mm"/> | 06.082.00 |
| 3. Stroke (50 - 600 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="0"/> | 06.005.00 06.083.00 |
| 5. Force (500 - 5000 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): (min. 2.5 x stroke + 125 mm + measurement D of end fittings + measurements of additional options) | <input type="text"/> | 06.084.00 |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Additional options: | <input type="checkbox"/> Protective tube (9) (total length + 2 mm) | 06.011.00 |
| | <input type="checkbox"/> Biological oil (8) | 06.012.00 |

Additional details:

Variable Speed Gas Springs

Push Type Gas Springs with Speed Control Facility

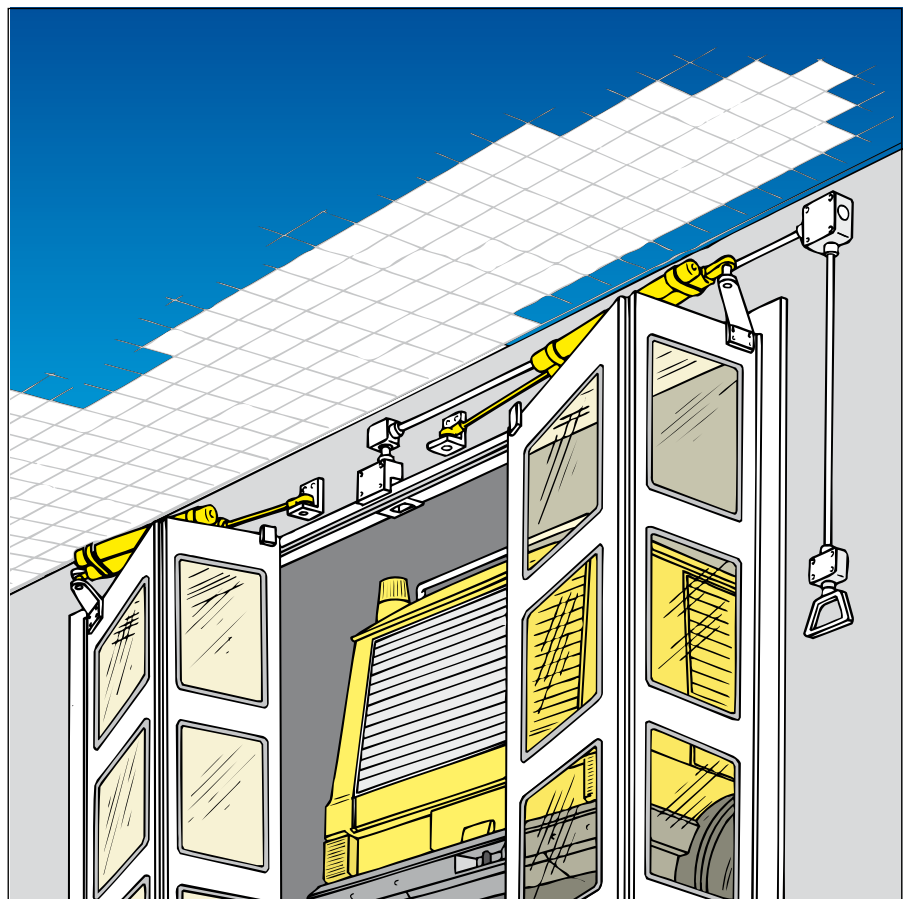
DICTATOR offers **the double cylinder gas spring** for use in situations where the **extending speed** of the push type gas spring needs to be **adjustable**.

For example, when folding doors in a Fire Station open, an appropriate piston rod extending speed is required.

The double cylinder combines the gas spring system with that of a hydraulic damper. The two cylinders are joined together by a connector with an integrated hydraulic valve.

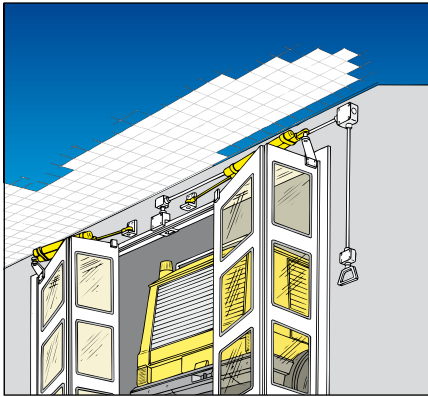
The extending speed can be adjusted by the adjusting screw at any time.

The double cylinder is also available with **final damping** so the movement before the final position can once again be slowed gently (important with high extending speed). This prevents the leaves of folding doors from crashing together.



Technical Data

| | |
|---------------------------|---|
| Piston rod diameter | 14 mm |
| Cylinder diameter | 28 mm |
| Force | 150 N - 1000 N |
| Stroke length | 100 mm - 700 mm |
| Extending speed | adjustable between 0.1 - 0.4 m/sec. |
| Final damping | 50 - 100 mm (please indicate when ordering) |
| Operating temperature | -10 °C to +80 °C |
| Maximum number of strokes | 6 strokes per min |



DICTATOR SEH Variable Speed Gas Springs

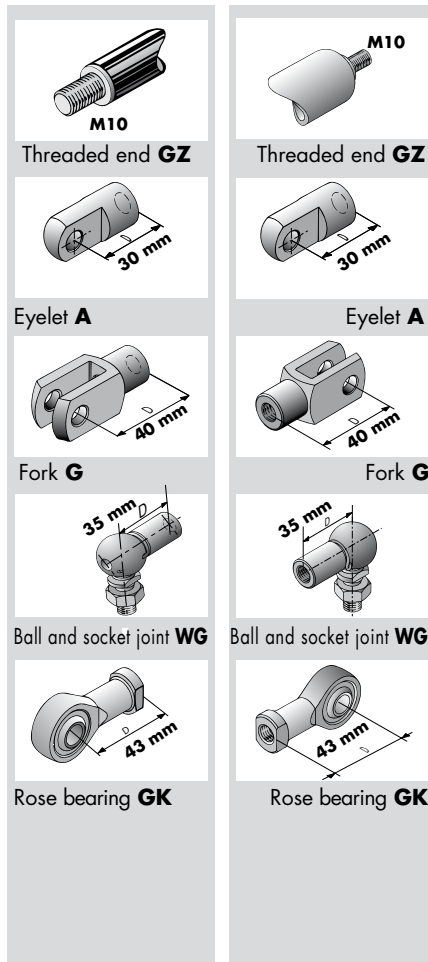
DICTATOR variable speed gas springs are usually used on folding doors, for which we offer a standard design (see below). All other double cylinders are however manufactured according to your requirements, just as with other DICTATOR gas springs.

When ordering your variable speed gas spring, please make sure you inform us whether you require final damping or not. The standard final damping is 100 mm, i.e. on the last 100 mm the piston rod extends more slowly. On demand also a shorter final damping between 50 mm and 90 mm is possible.

End Fittings

On piston rod

On cylinder



Exact dimensioned drawings for the above end fittings can be found on pages 06.061.00 - 06.064.00.

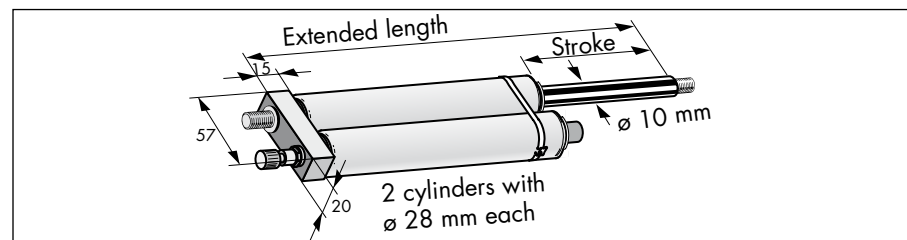
Type of damping for SEH

1 = damping on extending stroke

Determining Your SEH Variable Speed Gas Spring

With help of the following table you can easily find the correct variable speed gas spring if you already know the necessary stroke and end fittings.

If you require a variable speed gas spring not only with threaded ends, but also, for example, an eyelet on the piston rod or both ends, then simply add the measurement D given in the drawings of the end fittings to the extended length to achieve the total length.



| | Type SEH | See page |
|--|------------------------------------|-----------|
| 1. Piston rod diameter: | <input type="text" value="14 mm"/> | 06.082.00 |
| 2. Cylinder diameter: | <input type="text" value="28 mm"/> | 06.082.00 |
| 3. Stroke (100 mm - 700 mm): | <input type="text"/> | 06.082.00 |
| 4. Type of damping: | <input type="text" value="1"/> | 06.005.00 |
| 5. Force (150 N - 1000 N): | <input type="text"/> | 06.083.00 |
| 6. Compressed length (= extended length - stroke): | <input type="text"/> | 06.084.00 |
| 7. Extended length (total length): | <input type="text"/> | 06.084.00 |
| a) without final damping min. 2 x stroke + 80 mm + measurement D of end fittings | | |
| b) with final damping min. 2 x stroke + 105 mm + measurement D of end fittings | | |
| 8. Piston rod end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 9. Cylinder end fitting (see drawing for symbol): | <input type="text"/> | 06.061.00 |
| 10. Final damping (with - indicate length/ without): | <input type="text"/> | 06.008.00 |
| (Standard final damping: 100 mm!) | | |

Additional details:

Gas Spring End Fittings

DICTATOR gas springs are available with a variety of fittings to allow for optimal installation.

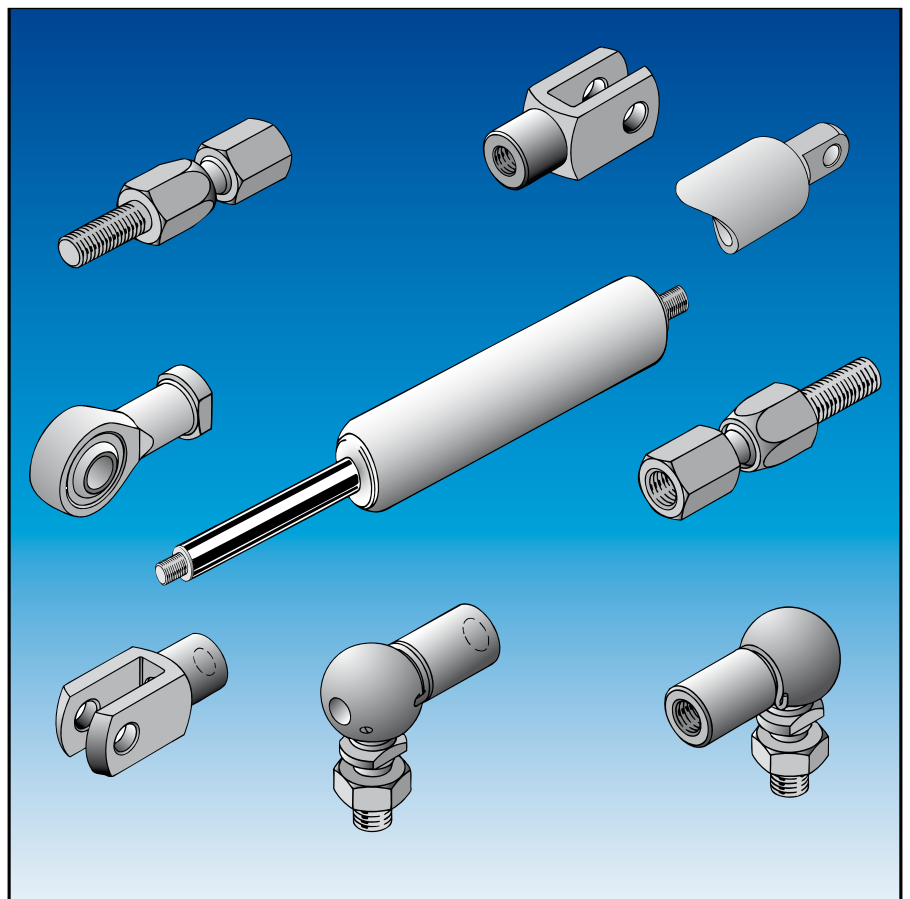
When selecting end fittings it is important to remember that **gas springs must never be mounted rigidly**.

We have listed the available end fittings with the respective gas springs. On the following pages you will find all measurements for these end fittings, as well as those for a few extra end fittings. Please contact us if you would need or prefer other end fitting models.

Apart from a few exceptions the dimensions of the end fittings in AISI 303 and 316L are identical with those in steel or aluminium.

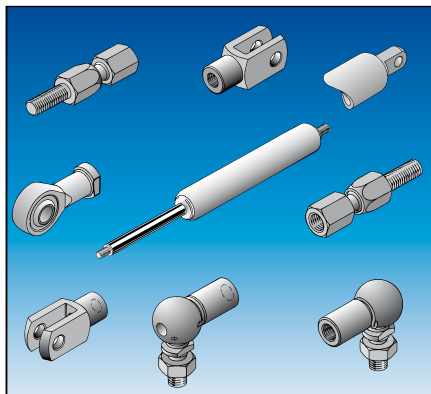
The eyelet on gas springs with **A-A end fittings is pressed into the cylinder**. Therefore measurement D of this eyelet is shorter than that of the eyelet that is screwed onto the piston rod. Should you require eyelets to be screwed onto both ends, please order the eyelet on the cylinder as „GZA“.

All other **end fittings are screwed** onto the thread of either the piston rod or cylinder.



Technical Data

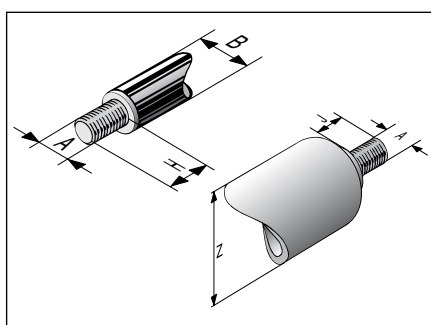
| | |
|-----------------------|--------------------------------------|
| Material | steel, aluminium, AISI 303, 316L |
| | AISI 303 = 1.4305 |
| | AISI 316L = 1.4404 |
| Maximum force allowed | see information pages on gas springs |



Gas Spring End Fittings Dimensioned Drawings

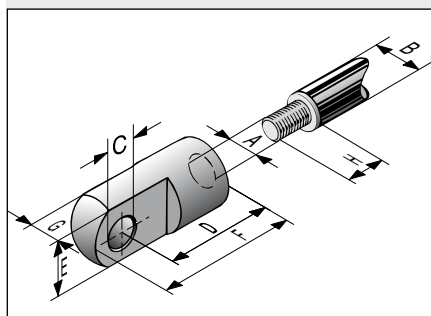
There is a multitude of end fittings for DICTATOR gas springs, but the most frequently used end fitting is the eyelet. We also offer mounting devices for this end fitting.

If you order a gas spring with an A-A end fitting it usually comes with the eyelet pressed into the cylinder. (Please see details concerning individual types of gas springs). However, if you need a gas spring with an eyelet screwed onto both ends, please order the gas spring with the **GZA** end fitting on the cylinder.



Threaded end (GZ)

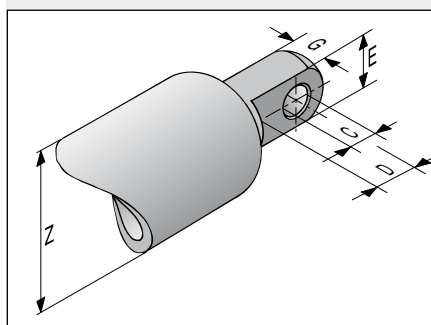
| | 3-10 | 4-12 | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 | 25-55 | 30-65 |
|---|------|------|------|------|-------|-------|---------|----------|-------|
| A | M3,5 | M3,5 | M5 | M8 | M8 | M10 | M14x1,5 | M 20x1,5 | M24x2 |
| B | Ø3 | Ø4 | Ø6 | Ø8 | Ø10 | Ø14 | Ø20 | Ø25 | Ø30 |
| H | 5 | 5 | 6,5 | 10 | 10 | 10 | 15 | 30 | 40 |
| J | 5 | 5 | 8 | 12 | 12 | 12 | 15 | 30 | 40 |
| Z | Ø10 | Ø12 | Ø15 | Ø19 | Ø23 | Ø28 | Ø40 | Ø55 | Ø65 |



Eyelet with inner-thread for the piston rod (A) - to be screwed on

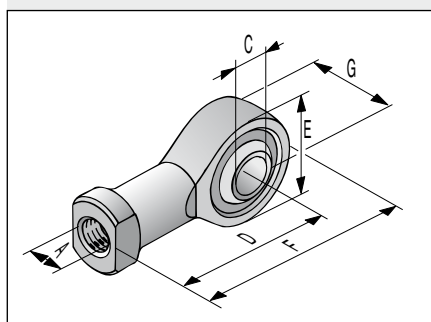
| | 3-10 | 4-12 | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 |
|---|------|------|------|------|-------|----------|----------|
| A | M3,5 | M3,5 | M5 | M8 | M8 | M10 | M14x1,5 |
| B | Ø3 | Ø4 | Ø6 | Ø8 | Ø10 | Ø14 | Ø20 |
| C | Ø4,1 | Ø4,1 | Ø6 | Ø8 | Ø8 | Ø8 | Ø14 |
| D | 11 | 11 | 16 | 22 | 22 | 30 (27*) | 45 (42*) |
| E | 8 | 8 | 10 | 14 | 14 | 18 | 25 |
| F | 16 | 16 | 22 | 32 | 32 | 40 (37*) | 58 (55*) |
| G | 4 | 4 | 6 | 10 | 10 | 10 | 14 |
| H | 5 | 5 | 6,5 | 10 | 10 | 10 | 15 |

* with eyelets in AISI 303/316L



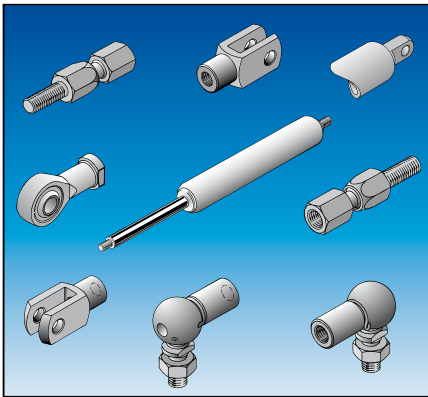
Eyelet on cylinder (A) - pressed into cylinder

| | 3-10 | 4-12 | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 |
|---|------|------|------|------|-------|-------|-------|
| C | Ø4 | Ø4 | Ø6 | Ø8 | Ø8 | Ø8 | Ø14 |
| D | 7 | 7 | 9 | 11 | 13 | 16 | 20 |
| E | 8 | 8 | 10 | 14 | 18 | 20 | 32 |
| G | 4 | 4 | 6 | 10 | 10 | 10 | 14 |
| Z | Ø10 | Ø12 | Ø15 | Ø19 | Ø23 | Ø28 | Ø40 |



Rose bearing (GK) - for piston rod and cylinder

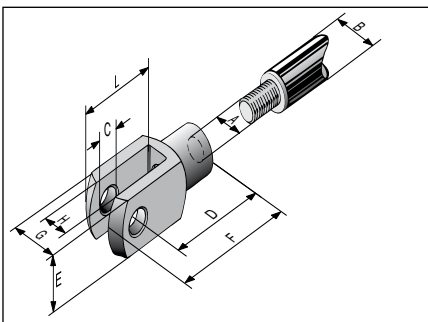
| | 6-15 | 8-19 | 10-23 | 14-28 | 14-28 | 20-40 |
|-----------------|--------|--------|--------|--------|---------|---------|
| Steel | 205800 | 205801 | 205801 | 205802 | 205802S | 205803 |
| AISI 303 | | 205811 | 205811 | 205812 | | 205806 |
| A | M5 | M8 | M8 | M10 | M10 | M14x1,5 |
| C | 5 | 8 | 8 | 10 | 10 | 14 |
| D | 27 | 36 | 36 | 43 | 43 | 57 |
| E | 18 | 24 | 24 | 28 | 28 | 36 |
| F | 36 | 48 | 48 | 57 | 57 | 75 |
| G | 8 | 8 | 8 | 14 | 9 | 19 |



Gas Spring End Fittings Dimensioned Drawings cont.

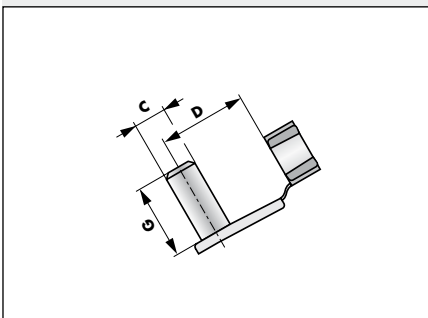
If you are planning to use the **fork (G)** as an end fitting, we recommend you also use the **ES pin** which makes the fitting quicker and easier. It is simply clipped onto the neck of the fork and saves you having to fasten a pin through a safety ring or key. It is available for all ranges, except 25-55 and 30-65.

If the gas spring **cannot be installed precisely**, you should use a **ball and socket joint** or **inline ball and socket joint** at least on one side. However, you must make sure when installing the gas spring that it does not tilt or twist.



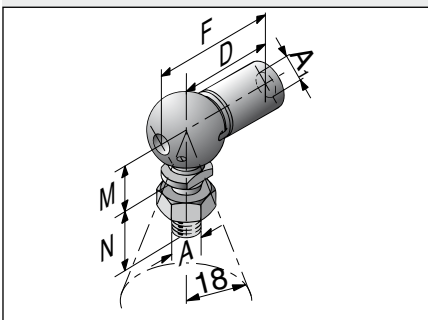
Fork (G) DIN 71752 - for piston rod and cylinder

| | 3-10 | 4-12 | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 | 25-55 | 30-65 |
|---|------|------|------|------|-------|-------|---------|---------|-------|
| A | M3,5 | M3,5 | M5 | M8 | M8 | M10 | M14x1,5 | M20x1,5 | M24x2 |
| B | Ø3 | Ø4 | Ø6 | Ø8 | Ø10 | Ø14 | Ø20 | Ø25 | Ø30 |
| C | Ø4 | Ø4 | Ø5 | Ø8 | Ø8 | Ø10 | Ø14 | Ø20 | Ø25 |
| D | 16 | 16 | 20 | 32 | 32 | 40 | 56 | 80 | 100 |
| E | 8 | 8 | 10 | 16 | 16 | 20 | 27 | 40 | 50 |
| F | 21 | 21 | 26 | 42 | 42 | 52 | 72 | 105 | 132 |
| G | 8 | 8 | 10 | 16 | 16 | 20 | 27 | 40 | 50 |
| H | 4 | 4 | 5 | 8 | 8 | 10 | 14 | 20 | 25 |
| L | 13 | 13 | 16 | 25 | 25 | 32 | 44 | | |



ES-pin for fixing fork

| | 3-10 | 4-12 | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 |
|---|------|------|------|------|-------|-------|-------|
| C | Ø4 | Ø4 | Ø5 | Ø8 | Ø8 | Ø10 | Ø14 |
| D | 11 | 11 | 14 | 22 | 22 | 28 | 38 |
| G | 9,5 | 9,5 | 12 | 19 | 19 | 23 | 31 |

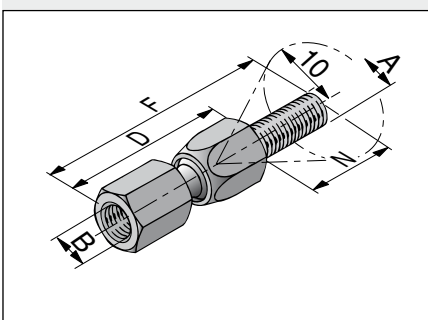


Ball and socket joint (WG) DIN 71802 - for piston rod and cylinder

| | 3-10 | 4-12 | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 |
|-------------------|---------|---------|------|------|-------|-------|---------|
| A ₁ /A | M3,5/M4 | M3,5/M4 | M5 | M8 | M8 | M10 | M14x1,5 |
| D | 18 | 18 | 22 | 30 | 30 | 35 | 45 |
| F | 24 | 24 | 28 | 39 | 39 | 46 | 60 |
| M | 9 | 9 | 9 | 13 | 13 | 16 | 20 |
| N | 10,3 | 10,3 | 10 | 16 | 16 | 19 | 28 |

Ball and socket joint (WGK) DIN 71802 - for piston rod and cylinder:

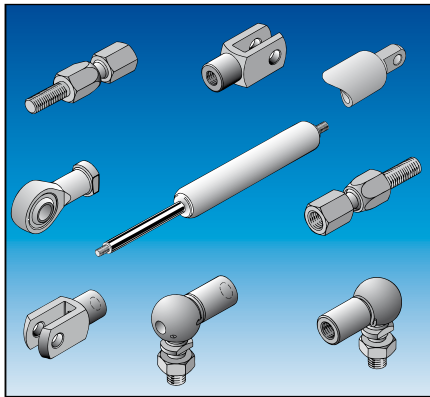
Short type for the diameter ranges 8-19 and 10-23: D = 18 (for all other dimensions see table for the standard type WG) **Maximum pressure 650 N**



Inline ball and socket joint (KGA) to be screwed on* (not for pulling forces!)

| | 6-15 | 8-19 | 10-23 | 14-28 | 20-40 |
|---|------|------|-------|-------|---------|
| A | M8 | M8 | M8 | M10 | M14x1,5 |
| B | M5 | M8 | M8 | M10 | M14x1,5 |
| D | 28 | 31 | 31 | 43 | 56 |
| F | 63 | 66 | 66 | 68 | 96 |
| N | 35 | 35 | 35 | 25 | 40 |

*When ordering a large batch, the ball of the ball and socket joint can be directly threaded onto the piston rod. This reduces the corresponding measurement D. Please ask on request.

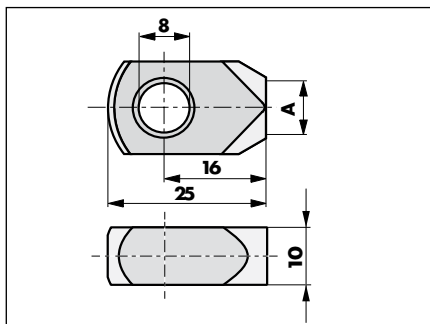


**Gas Spring End Fittings
Dimensioned Drawings** cont.

Two special eyelets are available along with the standard eyelets for the 6-15, 8-19 and 10-23 ranges:

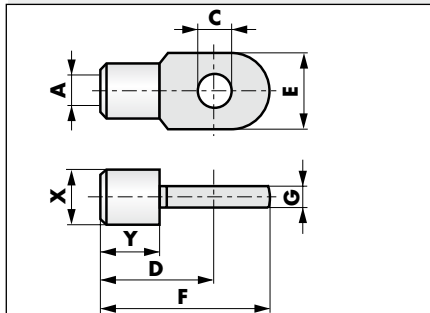
The ALK eyelet can be used when the total length of the gas spring needs to be as short as possible. It is shorter than the normal eyelet.

The ASL eyelet is intended for situations where the seat to which the eyelet needs to be attached is very small. At just 5 mm, it is only half as wide as normal eyelets.



ALK eyelet (short) - to be screwed on

| Part no. | 6-15 0615ALK | 8-19/10-23 0819ALK |
|----------|-----------------|-----------------------|
| A | M5 | M8 |



ASL eyelet (slim) - to be screwed on

| Part no. | 6-15 0615ASL | 8-19/10-23 0819ASL |
|----------|-----------------|-----------------------|
| A | M5 | M8 |
| C | Ø6,1 | Ø8,1 |
| D | 20 | 30 |
| E | 12 | 18 |
| F | 26 | 39 |
| G | 3 | 5 |
| X | 12 | 13 |
| Y | 9 | 14 |

Mounting Brackets for Gas Springs

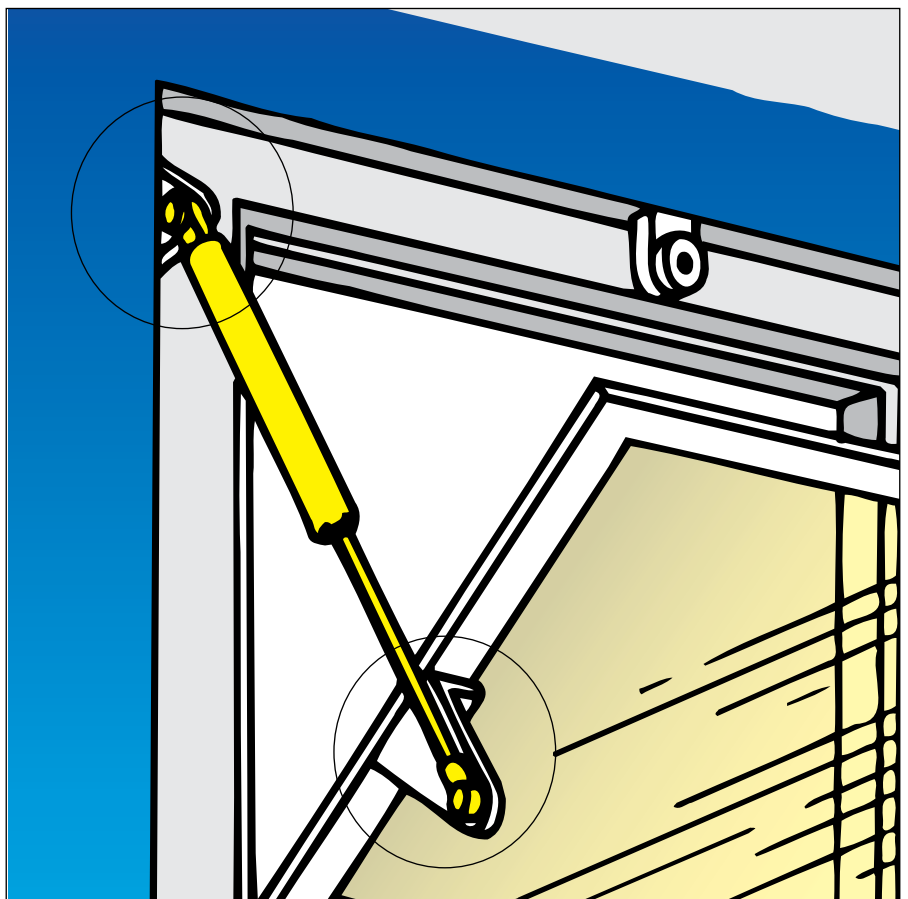
Gas springs must be **securely fitted**. Different mounting brackets are required depending on where and the position in which the gas spring is fitted and the type of end fittings used.

DICTATOR offers mounting brackets for push type gas springs in the 8-19, 10-23 and 14-28 ranges, as well as a limited selection in the 6-15 range. When choosing the mounting bracket, please pay attention to the maximum force allowed for the selected mounting bracket.

When selecting a suitable bracket, the following important points must be taken into consideration:

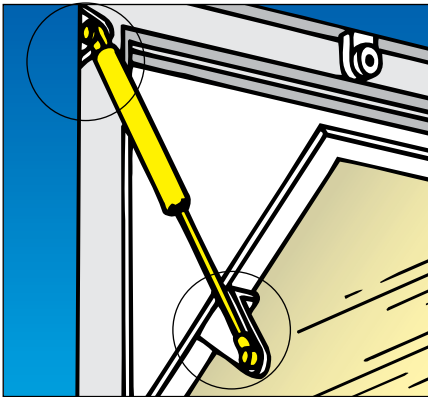
- Position of gas spring,
- End fittings on gas spring,
- Maximum force allowed.

We will be happy to advise you!



Technical Data

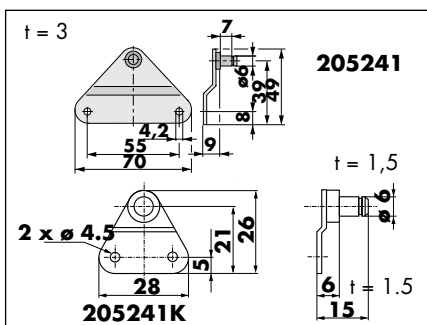
| | |
|--------------------------|---------------------------------------|
| Material | zinc.plated steel, AISI 304, AISI 316 |
| Gas spring force allowed | up to max. 2500 N |



Mounting Brackets for Gas Springs in the 6-15, 8-19, 10-23 Ranges

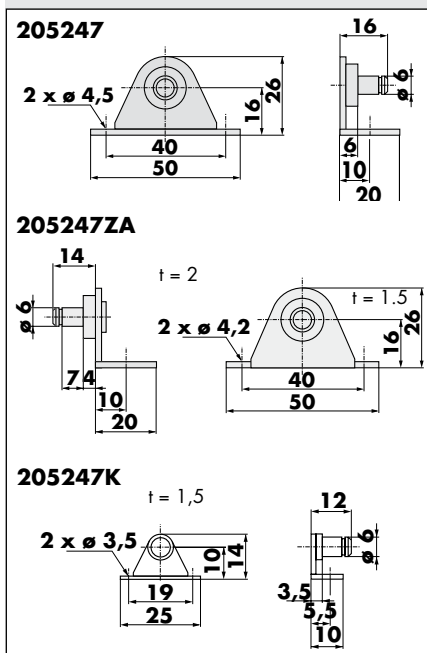
First you will find the brackets for the smaller gas spring ranges. There are also indicated possible counterparts.

Which brackets to choose depends mainly on the mounting position.



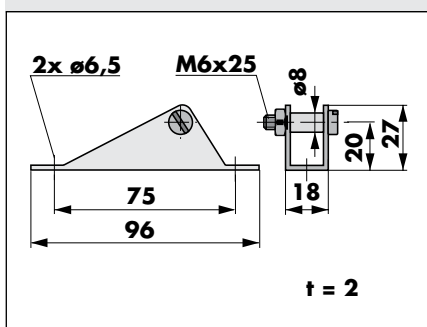
Mounting bracket part nos. 205241, 205241K

| | |
|-------------------------|---|
| Type of mounting | lateral |
| Gas spring range | 6-15 |
| Gas spring end fittings | 6-15 eyelet |
| Max. gas spring force | 205241: 350 N, 205241K: 130 N |
| Max. force on bracket | 205241: 500 N, 205241K: 180 N |
| Possible counterparts | part nos. 205244, 205247, 205247ZA, 205247K |



Mounting bracket part nos. 205247, 205247K, 205247ZA

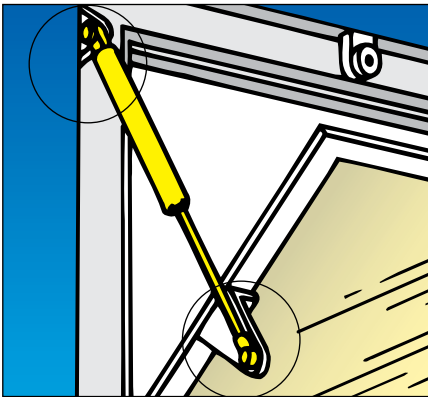
| | |
|-------------------------|--|
| Type of mounting | frontal |
| Gas spring ranges | 6-15 |
| Gas spring end fittings | 6-15 eyelet |
| Max. gas spring force | 205247: 370 N 205247K: 130 N 205247ZA: 300 N |
| Max. force on bracket | 205247: 500 N 205247K: 180 N 205247ZA: 400 N |
| Possible counterparts | part nos. 205241, 205241K |



Mounting bracket part no. 205244

| | |
|-------------------------|---|
| Type of mounting | frontal |
| Gas spring range | 6-15 (conditional - see warning*), 8-19, 10-23 |
| Gas spring end fittings | 6-15, 8-19/10-23 eyelets, rose bearing no. 205801 |
| Max. gas spring force | 1200 N, max. force on mounting: 1800 N |
| Possible counterparts | part no. 205241, 205242, 205243 |

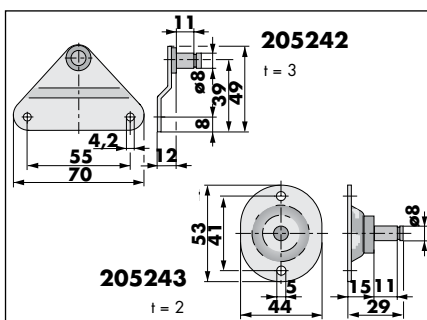
***Attention:** when used for type 6-15 eyelets the tube ø 8 mm of the M6x25 screw must be removed.



Mounting Brackets for Gas Springs in the 8-19, 10-23, 14-28 Ranges

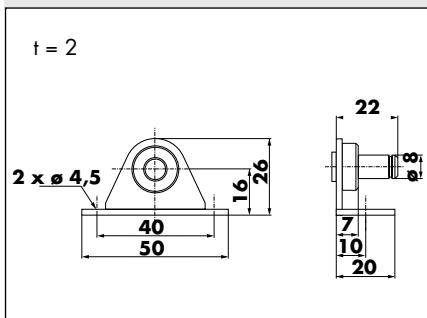
The brackets indicated below are intended mostly for the 8-19 and 10-23 gas spring ranges.

Brackets for gas springs with a pressure of up to 2500 N can be found on the next page.



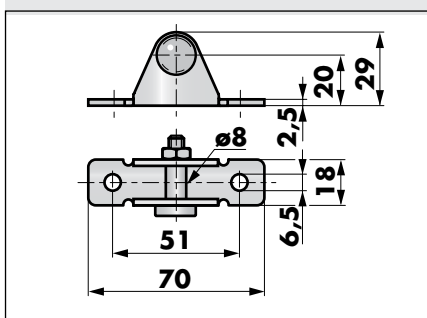
Mounting bracket part nos. 205242, 205243

| | |
|-------------------------|---|
| Type of mounting | lateral |
| Gas spring ranges | 8-19, 10-23 |
| Gas spring end fittings | 8-19/10-23 eyelets and rose bearing no. 205801 |
| Max. gas spring force | 850 N |
| Max. force on bracket | 1200 N |
| Possible counterparts | part nos. 205244, 205246, 205197, 205276, 205276K |



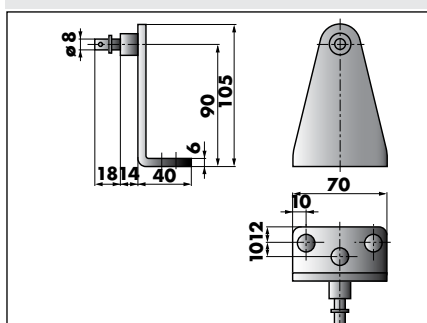
Mounting bracket part no. 205276K

| | |
|-------------------------|---|
| Type of mounting | frontal |
| Gas spring ranges | 8-19, 10-23 |
| Gas spring end fittings | 8-19/10-23 eyelets and rose bearing no. 205801 |
| Max. gas spring force | 850 N |
| Max. force on bracket | 1200 N |
| Possible counterparts | part nos. 205244, 205246, 205197, 205276, 205276K |



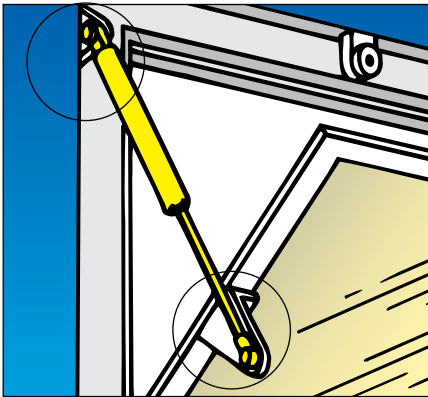
Mounting bracket part no. 205246

| | |
|-------------------------|---|
| Type of mounting | frontal |
| Gas spring range | 8-19, 10-23 |
| Gas spring end fittings | 8-19/10-23 eyelets, rose bearing no. 205801 |
| Max. gas spring force | 1200 N |
| Max. force on bracket | 1800 N |
| Possible counterparts | part nos. 205242, 205243 |



Mounting bracket part no. 205196

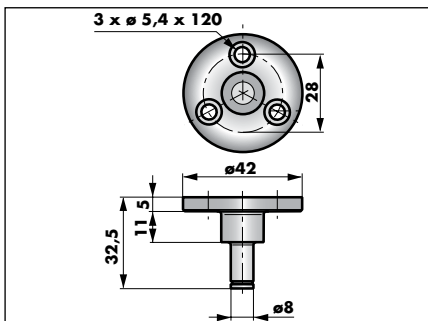
| | |
|-------------------------|----------------------------------|
| Type of mounting | frontal |
| Gas spring range | 8-19, 10-23, 14-28 |
| Gas spring end fittings | 8-19/10-23/14-28 eyelets |
| Max. gas spring force | 1000 N |
| Possible counterparts | part nos. 205246, 205197, 205244 |



Mounting Brackets for Gas Springs in the 8-19,10-23,14-28 Ranges, cont.

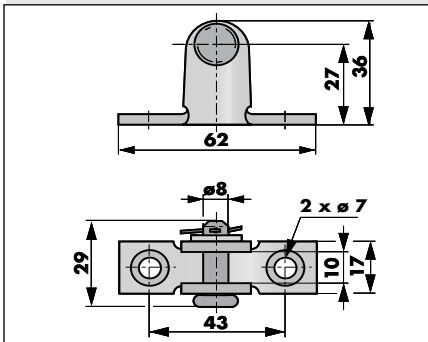
For **gas springs up to a force of 2500 N** are intended the brackets shown below which are made of zinc-plated steel.

The brackets made of AISI 304 and AISI 316 can only be used for gas springs with a maximum pressure of 1000 N.



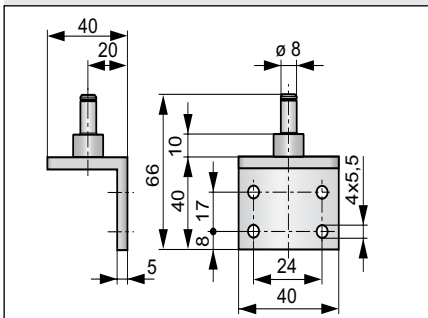
Mounting bracket part no. 205261 of AISI 304: 205281

| | |
|-------------------------|---|
| Type of mounting | lateral |
| Gas spring ranges | 8-19, 10-23, 14-28 |
| Gas spring end fittings | 8-19/10-23/14-28 eyelets, rose bearing no. 205801 |
| Max. gas spring force | 2500 N; 1000 N with AISI 304 |
| Possible counterpart | part nos. 205197, 205246 |



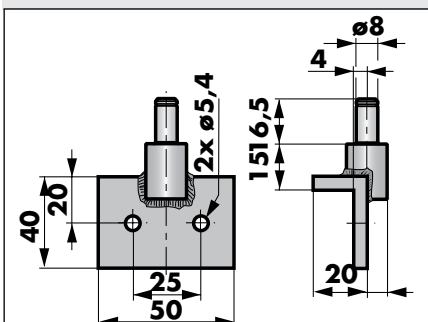
Mounting bracket part no. 205197, of AISI 304: 205249, of AISI 316: 205455

| | |
|-------------------------|--|
| Type of mounting | frontal |
| Gas spring range | 8-19, 10-23, 14-28 (8-19, 10-23) |
| Gas spring end fittings | 8-19/10-23/14-28 eyelets, rose bearing no. 205801 (8-19/10-23) |
| Max. gas spring force | 2500 N; 1000 N with AISI 304 and AISI 316 |
| Possible counterparts | nos. 205242 - 243, 205261 - 263, 205282, 205456 |



Mounting bracket part no. 205262, of AISI 304: 205282, of AISI 316: 205456

| | |
|-------------------------|---|
| Type of mounting | frontal |
| Gas spring ranges | 8-19, 10-23, 14-28 |
| Gas spring end fittings | 8-19/10-23/14-28 eyelets, rose bearing no. 205801 |
| Max. gas spring force | 2500 N; 1000 N with AISI 304 and AISI 316 |
| Possible counterpart | part nos. 205197, 205249, 205455, 205246 |



Mounting bracket part no. 205263

| | |
|-------------------------|---|
| Type of mounting | frontal |
| Gas spring ranges | 8-19, 10-23, 14-28 |
| Gas spring end fittings | 8-19/10-23/14-28 eyelets, rose bearing no. 205801 |
| Max. gas spring force | 2500 N |
| Possible counterpart | part nos. 205197, 205246 |

Advice for Calculating and Selecting the Right Gas Spring

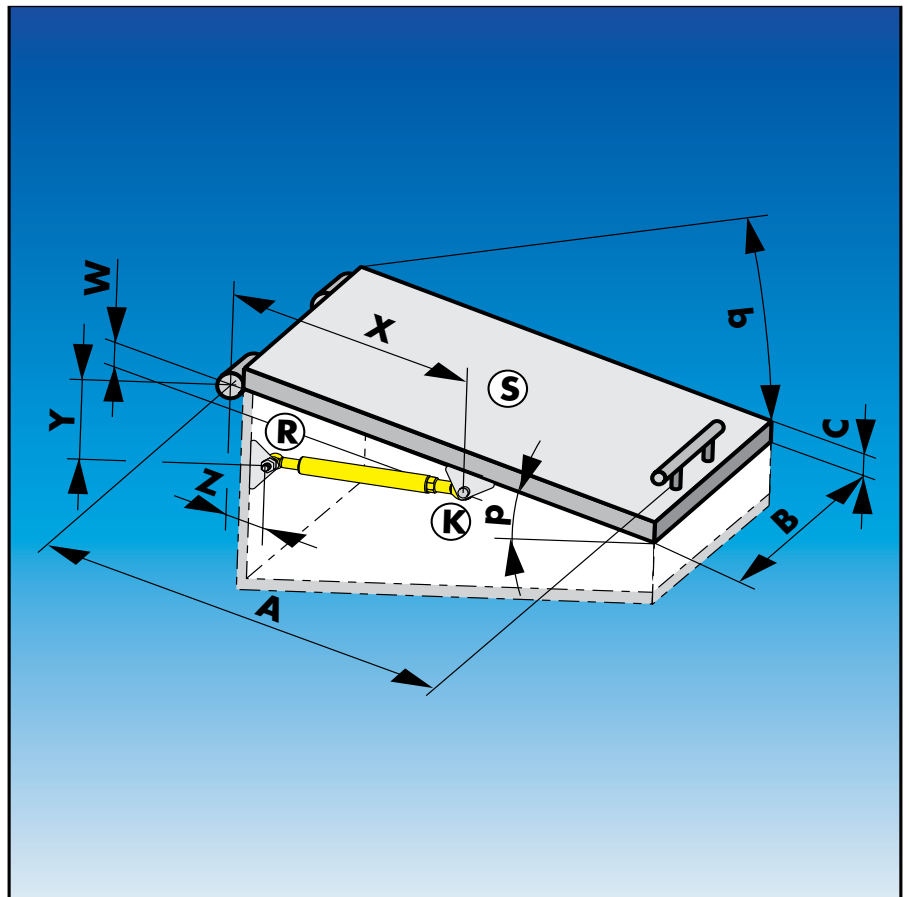
DICTATOR can offer you the perfect gas spring for every application, because there are endless variations.

After reading the following descriptions you will be able to:

- choose the type of **gas spring** required,
- clarify the **function** of the gas spring - to keep open, keep closed, or automatically open,
- find the optimum **fixing points** and the stroke,
- calculate the required **spring force**,
- determine the technical **qualities**.

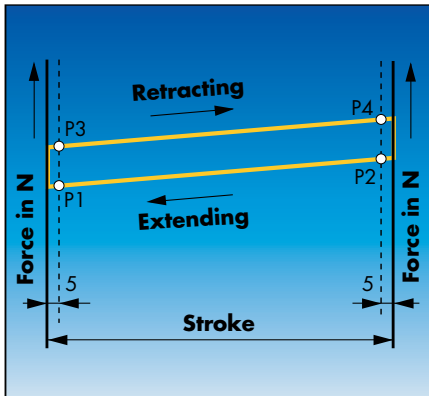
With these values you will then be able to quickly find the right gas spring on the previous pages.

Our highly experienced DICTATOR advisors will be glad to help you should you have any queries. You will find check lists on pages 06.085.00 - 06.088.00.



Details Required

| | |
|--------------------------|--|
| Function | should it open with no assistance, assist or hold open |
| Requirements | speed and frequency of movement |
| Flap measurements | length A, width B, thickness C |
| Flap position | closed or open |
| Flap weight | in Newtons (1 N = 0.1 kp), centre of gravity |
| Fixing possibilities | on the flap and on the frame/housing |
| Fittings | suitable means of fixing |
| Environmental conditions | temperature, dirt, dampness etc. |



A. Choosing the Right Type of Gas Spring

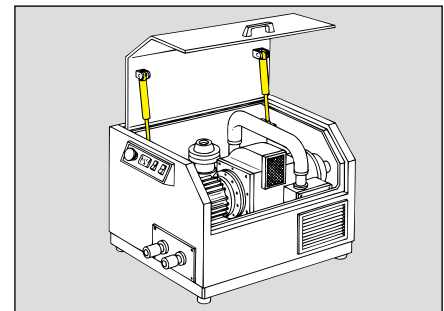
Depending on the application, firstly choose the type of gas spring which best fulfills the required functions of your application: pushing, pulling, damping, holding etc.

Detailed descriptions of all varieties of gas springs can be found on pages 06.003.00 - 06.012.00. Technical data can be found on pages 06.017.00 - 06.058.00.

Push Type Gas Springs

Push type gas springs are most commonly used as a counterweight or for supporting moveable components e.g. on hatches, flaps, windows, swivel arms and various other swinging or pushable elements.

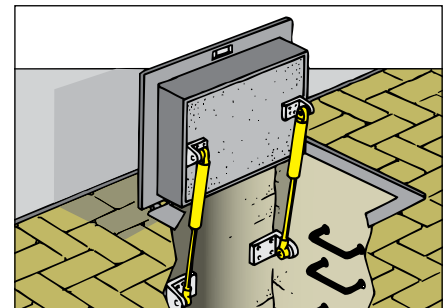
The basic function is explained on page 06.005.00 and technical data can be found on pages 06.017.00 - 06.027.00.



Progressive Gas Springs

Progressive gas springs are always used when particularly heavy hatchways need to be opened by hand.

The basic function is explained on page 06.009.00 and technical data for push-type gas springs can be found on pages 06.017.00 - 06.027.00. You should also indicate the required progressivity when ordering. We recommend you contact our Advisory Service before ordering.

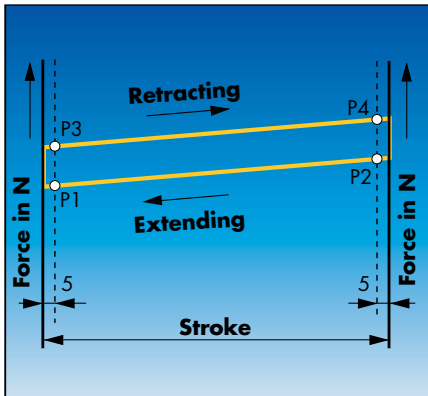


Gas Springs with Floating Piston

Gas springs fitted with a floating piston are used when the piston must extend and retract very slowly e.g. on sensitive window applications.

The basic function is explained on page 06.006.00 and technical data can be found on pages 06.029.00 - 06.032.00.





Choosing the Right Type of Gas Spring, cont.

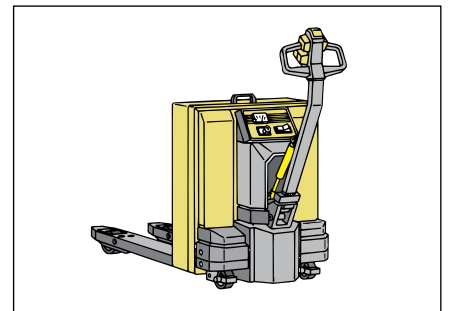
For every type of DICTATOR gas spring you will find a number of accessories available. Our competent advisors specialise in producing the exact gas spring your application requires.

Should you need a gas spring which you cannot find here, we will select the correct model from our large selection and modify it if necessary.

Pull Type Gas Springs

Pull type gas springs are mainly used in cases where a counterweight can only be achieved by a gas spring which is fitted above the moving element e.g. on a fork lift truck shaft.

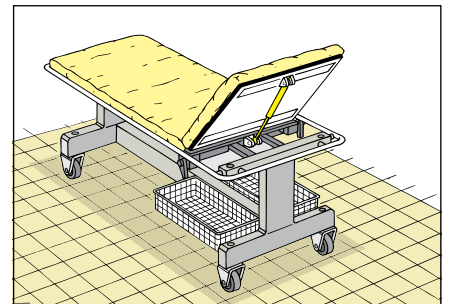
The basic function is explained on page 06.006.00 and technical data can be found on pages 06.033.00 - 06.038.00.



Locking Gas Springs

Locking gas springs are used when an object must be held or locked in any possible position. Rigid locking is used when an exact position is necessary. Cushioned locking compresses slightly when loaded e.g. in comfortable office chairs.

The basic function is explained on page 06.007.00 and technical data can be found on pages 06.039.00 - 06.044.00.

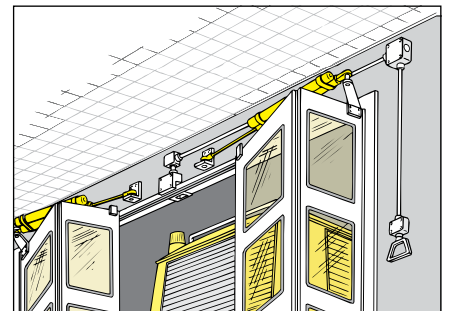


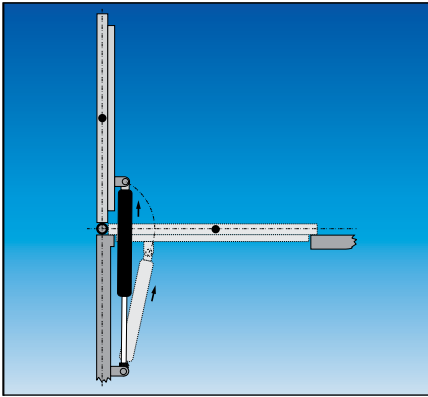
Variable Speed Gas Springs

Variable speed gas springs are used when the pushing speed needs to be adjustable. They can for example open folding doors smoothly and safely.

The final damping feature prevents the door leaves from bumping against each other loudly.

The basic function is explained on page 06.008.00 and technical data can be found on pages 06.059.00 - 06.060.00.





B. Function and Task of Your Gas Spring

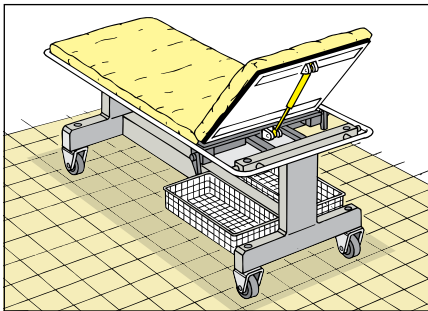
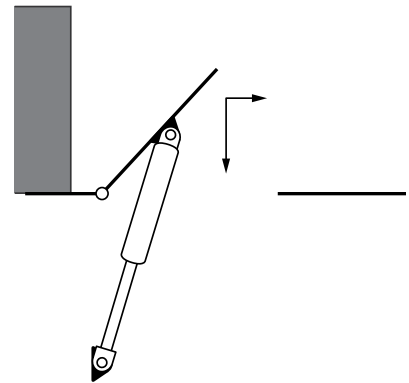
According to the function you require you will obtain different results relating to the installation and the following calculations concerning gas spring forces.

Firstly you should decide whether the gas spring needs to open a flap or hatch auto-matically **or** just support a manual opening. Depending on the weight of the flap or hatch you need to calculate the horizontal position and several further positions. The gas spring might even close actively.

1. Opening-Assistance

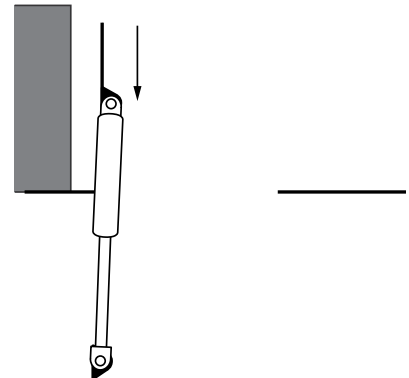
1. The panel is lifted against the force of gravity (indicated by the arrows) with help of the gas spring.

Warning: We recommend you install a final stopping device on the panel so that the gas spring cannot totally extend; the gas spring must never serve as the final stopping device.



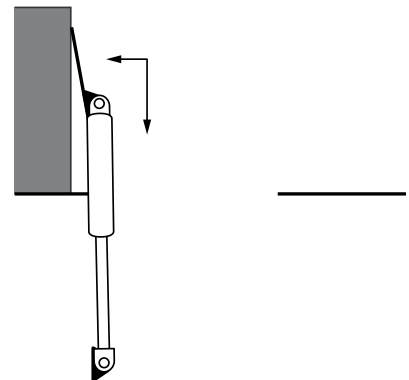
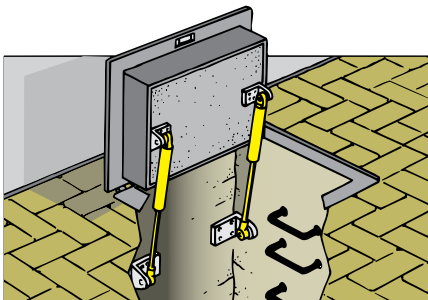
2. When the panel is vertical, gravity no longer works in the direction of closing. The gas spring force should not be too large at this point as this would make it impossible to close by hand.

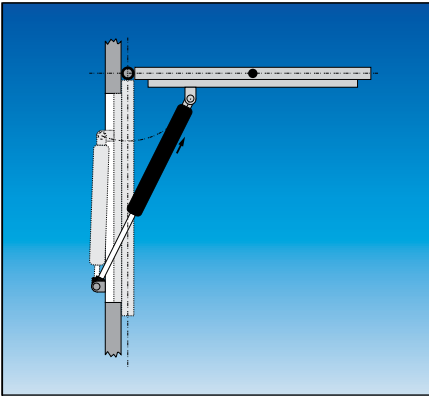
When choosing the fixing points it is important that neither the cylinder nor the piston rod hits the frame. The panel must have a separate end stop.



3. The force of gravity now even works in the opposite direction (opening). In this position the gas spring probably would touch the frame anyway.

Warning: Please contact our Advisory Service if you want (and are able) to choose the fixing points so that the dead centre can be crossed (and the gas spring does not touch the frame). You must then install the gas spring (with long holes in the fixing bracket if necessary) so that the dead centre of the flap **never** exerts a pulling force on the gas spring as this would destroy the cylinder. The high pressure inside may cause serious injury!



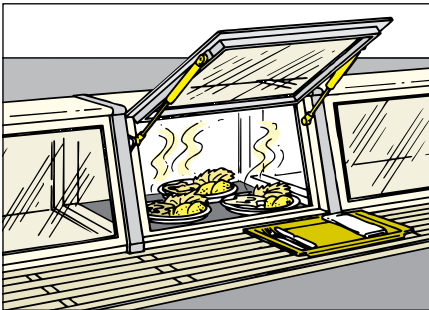


Function and Task of Your Gas Spring, cont.

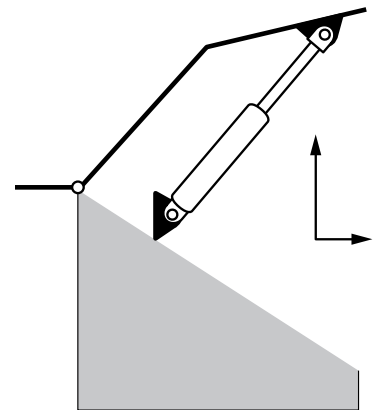
Gas springs are ideal for holding flaps and hoods. They can be dimensioned and positioned so that the gravity forces are completely equalised in the required opening position.

Depending on how the fixing points are chosen the gas spring can either support the closing of the flap from a certain position on (see centre diagram). This means the hood is actively closed. Or the gas spring opens the flap automatically once it has been unlocked.

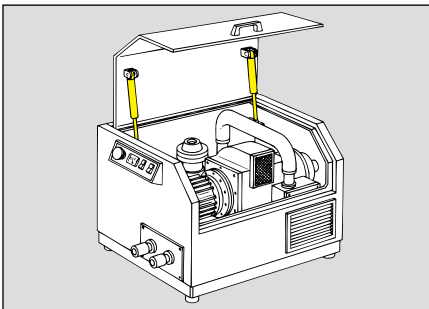
2. Keeping Open/Closed



A lid should not lift by itself but should be opened by hand with as little force as possible. Therefore the operating force of the gas spring in the closed position has to be slightly lower than the weight of the hatch. In the opened position the gas spring must have enough force to bear the weight of the flap - or you use a locking gas spring (e.g. in hospital beds).

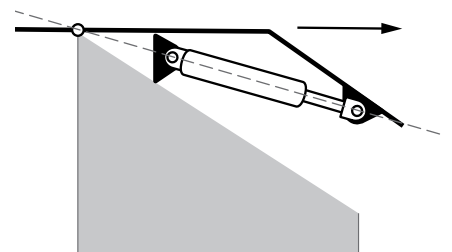


The hood is opened and kept open by the gas spring.

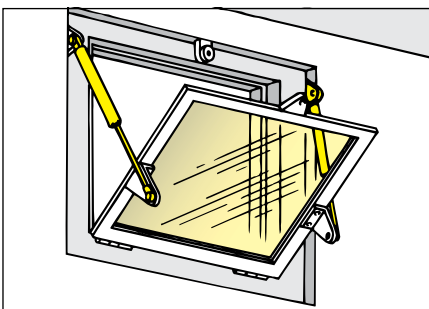


An alternative would be to choose the fixing points so that the gas spring operates in the closed position even in closing direction.

Please observe the motion of the hood in the diagram on the right. The centre diagram shows the position when the dead centre is crossed in the closing direction. From that point the gas spring operates downwards in closing direction.

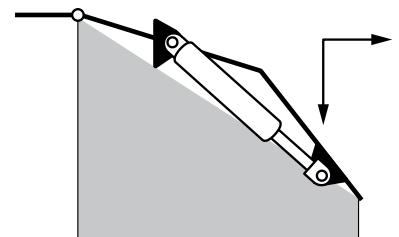


The hood is closed against the force of the spring and reaches the dead centre in this position (smallest stroke).

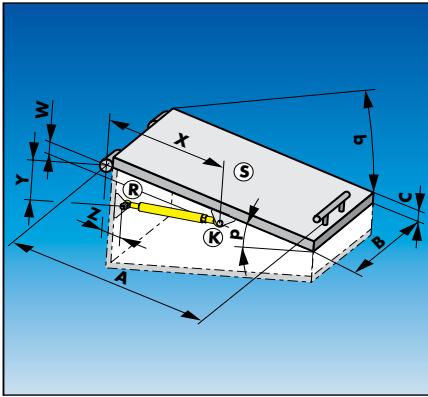


A window (e.g. for smoke evacuation or emergency exit) should open itself and remain open without an additional force.

The fixing points should be chosen so that the operating force of the gas spring is larger than the weight of the window (in the closed position of the window).



The vertical operating direction has reversed so that the hood is now kept closed by the gas spring.



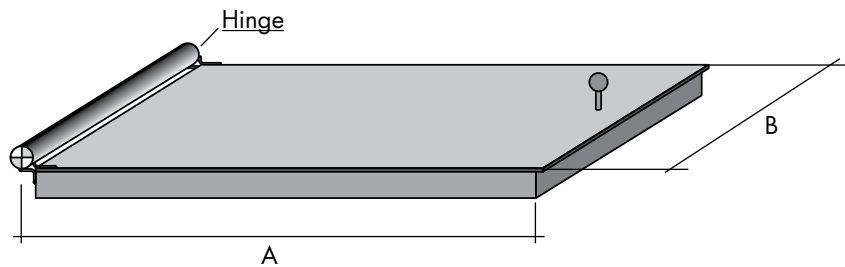
C. Fixing Points and Length of Gas Spring

Correct fixing points are most important for an effectively working gas spring. When the gas spring is correctly measured and fitted in its optimum position, the gas spring will operate correctly.

By following the instructions below you will be able to find the suitable fixing points, the length of the gas spring, as well as the **direction of the effective force**. The latter will allow the gas spring to function in the way you selected on the previous pages.

1. Panel Measurements

The first step when identifying the fixing points is to measure the panel. This example shows a panel in its closed position.



Please make a note of

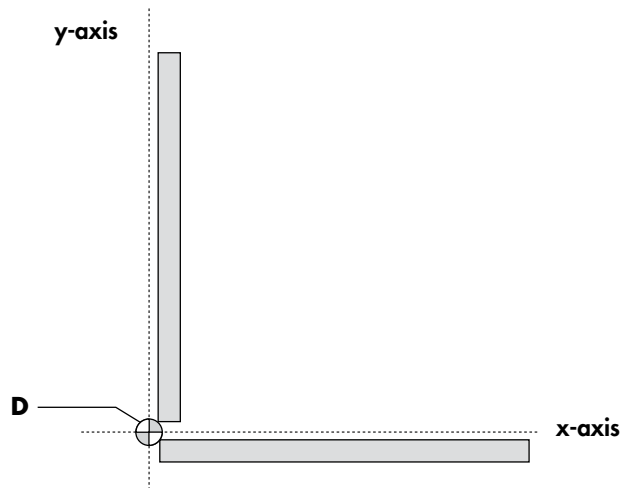
Measurement A _____

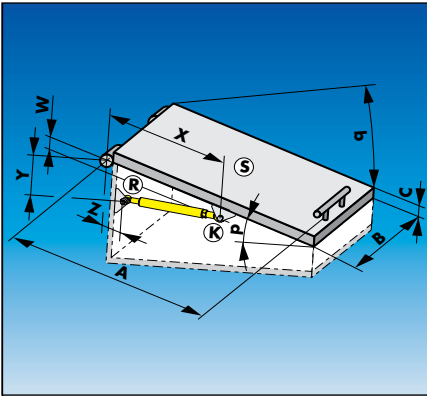
Measurement B _____

2. Coordinate Axis

Firstly draw the flap to scale, schematically in the open and closed position. **Pivot point D** on the flap always serves as the reference point for all following measurements. This is usually the centre of the hinge.

Draw a coordinate axis through the centre of pivot point D. The axis are labelled **x-axis** and **y-axis**. They always run parallel to the closed or open flap.





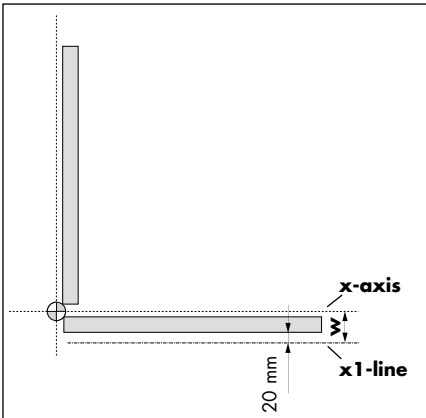
Fixing Points and Length of Gas Spring, cont.

By now following these steps you will firstly locate fixing point **R** on the frame, and then the fixing to the flap. You must then check whether we are able to manufacture the resulting lengths (gas spring compressed - gas spring extended) (see table on page 06.077.00).

It may be necessary to move points R and K. If this is the case, you must begin with step C.3 again. By following our advice you should easily manage to do this - possibly even on the first attempt.

3. Fixing point R

Fixing point **R** on the frame is determined by both distances Y and Z. Measurement **w** is the first estimate which you need to calculate. This is particularly important when the flap is very thick or it has an angled shape, or when there is a large distance between the hinge and flap.

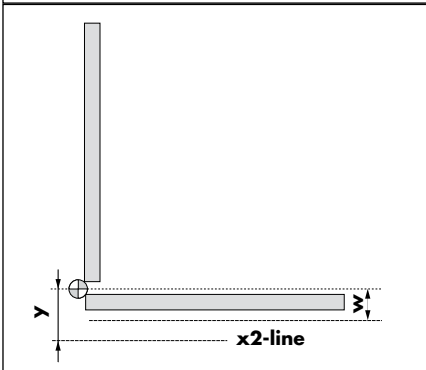


Draw a line (x1) parallel to the flap 20 mm from the bottom edge of the flap. The distance between this line and the x-axis is measurement **w**.

The distance between the bottom edge of the flap and the x1-line is determined by the mounting bracket you want to fix to the flap.

The most frequently used mounting device (order no. 205244) requires the 20 mm mentioned above. Measurements are always given to the middle of the pin. Please see page 06.065.00 et sqq. for further details and other mounting brackets.

Please make a note of **measurement w**: _____ **mm**

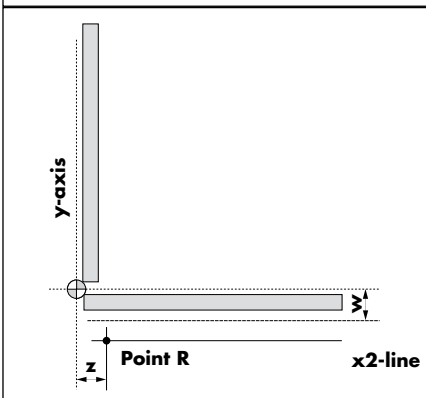


Now draw another line parallel to the x-axis, line **x2**.

The distance between the **x2** line and the x-axis is **y**. Distance **y** can be determined by the following criteria:

- Measurement **y** should be between 0 and 100 mm longer than measurement **w**.
- On a lighter flap (up to 20 kp) **y** can be equal to **w**.
- On a heavier flap **y** should be as long as possible ($w + 100$).

Please make a note of **measurement y**: _____ **mm**



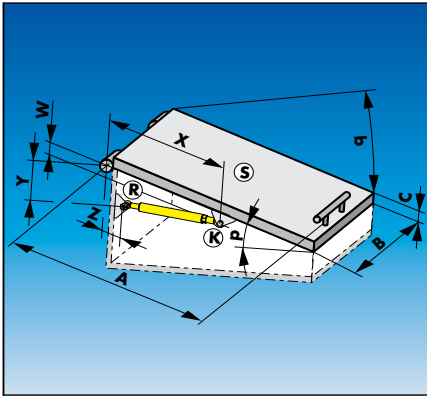
Fixing point R can be found on line **x2** at a distance **z** from the **y-axis**.

Distance **z** can be determined by the following criteria:

- Measurement **z** should be at least as long as measurement **w**.
*However **z** should not be any longer than three times the length w.*
- **z** should not be longer than **w**, particularly on heavy flaps over 20 kg
- Opening greater than 90° is allowed on lighter flaps with a large measurement **z**.

WARNING: If **z** is smaller than **w** there is a danger that once it is fitted the gas spring could touch the open flap and get bent.

Please make a note of **measurement z**: _____ **mm**



Fixing Points and Length of Gas Spring, cont.

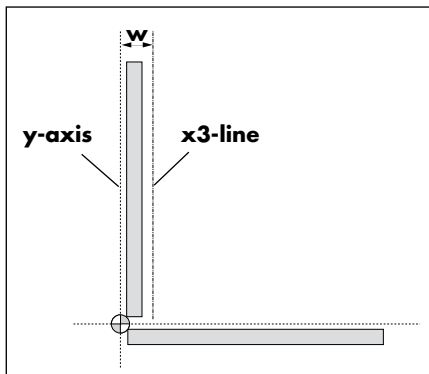
Once you have worked out where to fix the gas spring to the frame (**point R**) according to the instructions on the previous page, you must then find a suitable **point K** on the **flap**. This should cause no problem if you follow the advice given below.

We are always ready to answer any questions you may have, and advise you if your application does not look the way it should. Our motto: **Making it easy for you!**

4. Helping Point K_{open}

Firstly you need to establish point **K** on the **opened flap**: K_{open}

To do this you need the **scale drawing** and the established x- and y-axis, as well as the **flap size A** and measurement **w**.



Firstly draw a line (**x-3**) parallel to the flap in its open position at a distance **w** to the y-axis (see page 06.075.00 for measurement **w**).

The flap can be drawn at any opening angle - it does not have to be completely open as in the diagram. The **y-axis** always runs parallel to the flap and the **x3-line** at distance **w**.

On bent or angled-shaped flaps and bonnets always draw the **y-axis** parallel to the surface of the flap onto which the mounting bracket will be fixed.

| | | |
|-------------------------|------|------|
| Extended length: | 200 | [mm] |
| | 300 | [mm] |
| | 400 | [mm] |
| | 500 | [mm] |
| | 600 | [mm] |
| | 700 | [mm] |
| | 800 | [mm] |
| | 900 | [mm] |
| | 1000 | [mm] |
| | 1100 | [mm] |
| | 1200 | [mm] |

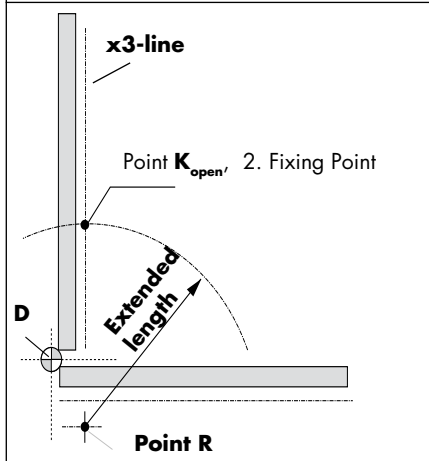
Now choose a gas spring length from the table on the left, taking into account:

- The extended length of the gas spring should correspond to approx. $\frac{2}{3}$ of the flap measurement **A** (see page 06.074.00 for measurement **A**).

Example: If flap measurement A is 1200 mm, choose a gas spring whose extended length is approx. 800 mm.

If the value is between two values in the table, choose the higher one. Please contact our Advisory Service if your flap is over 1800 mm. This table can be used for the following gas spring ranges: 8 - 19, 10 - 23, 14 - 28, 20 - 40.

Please make a note of the chosen **extended length:** _____ **mm**



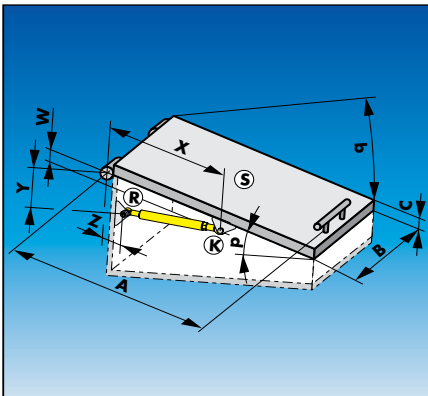
Now draw a circle around point **R** determined by measurements y and z.

The radius of this circle is the extended length you have chosen above. The point where the circle cuts across the **x3-line** is point K_{open} .

You have now worked out **where to fix the gas spring to the flap**.

By following the instructions on the next page you will be able to label point K when the flap is closed. With the help of another table you will then be able to work out whether the resulting compressed length of the gas spring is possible with the extended length of the gas spring you have chosen above. With a very short cylinder only a short compressed length is possible, but not a larger stroke.

Even if this may sound complicated, you will find you have no problems working anything out if you follow our advice step by step.



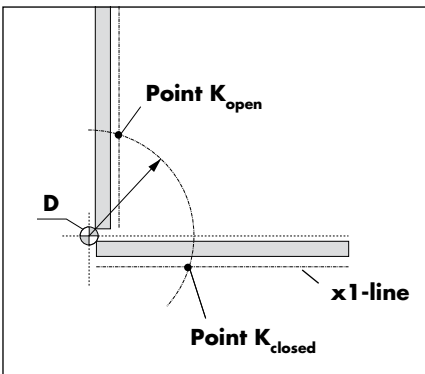
Fixing Points and Length of Gas Spring, cont.

Now check whether your chosen gas spring length is also correct for your application. This gas spring must fit in both open (distance $R-K_{open}$) and closed positions of the flap.

In the following steps you will work out and check whether your chosen gas spring is possible even when compressed i.e. when the flap is completely closed.

5. Fixing Point K_{closed}

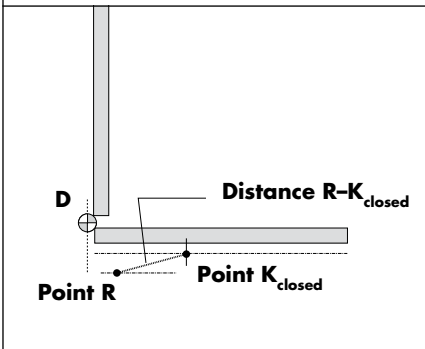
Fixing point (K) on the flap always experiences the same circle as the flap itself experiences when it is opened or closed. You have already worked out the position of the fixing point in the open position: K_{open} .



Now work out point K_{closed} . This is the point on the flap where the gas spring fitting is located when the flap is closed.

Firstly take the radius from pivot point D to point K_{open} with the compasses. Now draw a circle around pivot point D (in the middle of the hinge).

The point where the arc crosses line „x1“ is point K_{closed} . This is where the gas spring fitting is located at the flap when it is completely closed.



Checking the Gas Spring Length

Measure the distance between both fixing points R and K_{closed} . This is the length of the gas spring when the flap is completely closed.

Please make a note of distance $R - K_{closed}$: _____ mm

Compare this value in the table on the left with the extended length of the gas spring you chose on the previous page.

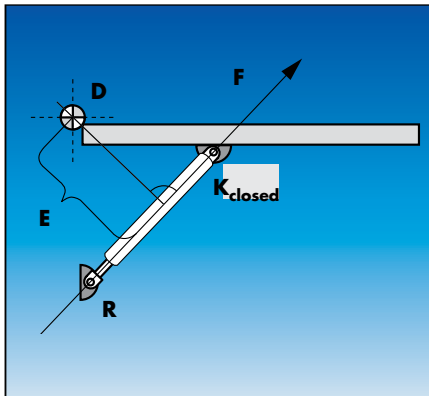
Example: on the previous page (06.076.00) you chose a gas spring whose extended length was 800 mm on a flap with a measurement A of 1200 mm. The table on the left shows that measurement $R-K_{closed}$ must not be smaller than 450 mm (L_e).

Analysing the Checking

- If measurement $R-K_{closed}$ is **longer** than the compressed length of your chosen gas spring, this gas spring is suitable for your application. You can now continue to the next page and calculate the necessary gas spring force.
- If measurement $R-K_{closed}$ is **shorter** than the compressed length of your chosen gas spring, you need to choose a gas spring from the table which has a longer stroke. If this is the case, you need to begin the calculations again, starting with establishing fixing point K_{open} (see page 06.076.00).
- If the gas spring is **too long** (extended length over 1200 mm) there is a danger that it will snap under load. In this case measurement y must be reduced. Mark point R nearer the bottom of the flap (see page 06.075.00) and re-calculate the fixing point.

| La | Le | Stroke |
|------|-----|--------|
| 200 | 150 | 50 |
| 300 | 200 | 100 |
| 400 | 250 | 150 |
| 500 | 300 | 200 |
| 600 | 350 | 250 |
| 700 | 400 | 300 |
| 800 | 450 | 350 |
| 900 | 500 | 400 |
| 1000 | 550 | 450 |
| 1100 | 600 | 500 |

La = Extended length \hat{z} $R-K_{open}$
 Le = Compressed length $R-K_{closed}$



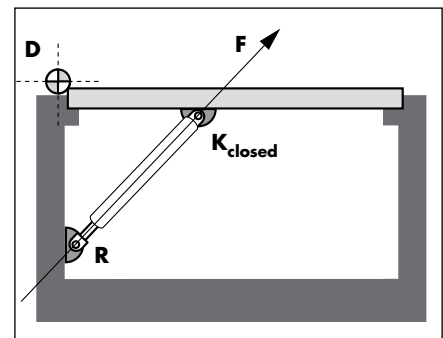
D. Calculating the Gas Spring Force

Every gas spring exerts a particular force on the piston rod. The part of this force which is effective after installation depends on the fixing points. These decide the direction in which the gas spring operates on the flap.

The more accurately you calculate the necessary force, the more your desired function can be guaranteed as DICTATOR will adjust the force exactly according to your order (see page 06.016.00 for tolerances).

1. Direction of Operation

For calculating the force relations you need another scale drawing. As you did in the previous section, insert axis **x** and **y** as well as points **R** and **K_{closed}**. Your gas spring will be fixed to these two points so that the **direction of operation** of the gas spring runs through both these points. Now draw the direction of operation of the gas spring **F** in your diagram.

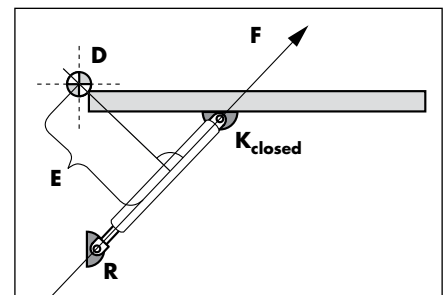


2. Operating Arm

Now draw a perpendicular line, vertical to the operation line, starting from the pivot point of the flap **D**.

The length of the perpendicular line is operating arm **E**.

With the operating arm **E** and gas spring force **F** (see page 06.077.00) calculate the **effective moment** of the gas spring: **F x E**.



In this and following calculations, use **m** (1 meter = 1000 mm) as a measurement unit for the length and **N** (1 Newton = 0,1 kp = 0.2248 lbf) for the force.

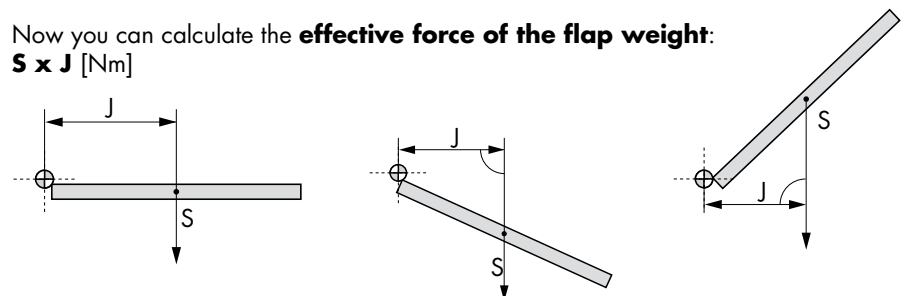
Please make a note of the **effective moment** of the gas spring: _____ **Nm**

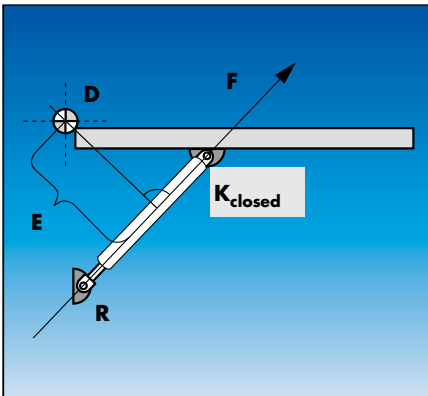
3. Weight

Now calculate the effective force of the weight of the flap. Draw the force direction of the centre of gravity of the flap (weight of the flap vertical to the centre of the earth). To make it easier to calculate the weight you can take **1 kg weight** to mean **approx. 1 kp (= 10 N) of gravity**.

Starting from the gravitational line draw a perpendicular line at right angles to pivot point D. The length of the perpendicular line is **operating arm J**.

Now you can calculate the **effective force of the flap weight**: **S x J [Nm]**





Calculating the Gas Spring Force, cont.

Now you need to decide on the function of your gas spring: the gas spring should either simply support the opening or automatically open the flap (please see advice given on page O6.072.00).

In the first case the flap is usually lifted to an upwards opening or a vertical position, where it remains open without assistance.

In the second case the flap must be locked in the closed position. When released it is opened automatically by the gas spring - e.g. on smoke ventilator skylights or windows.

4. Force Relation

The relation of the effective moments determines how the flap will operate:

- When the gas spring moment is equal to the gravity moment, the flap should theoretically stay in this position.

$$\mathbf{F \cdot E = S \cdot J} \quad \text{the corresponding gas spring force is : } \mathbf{F = \frac{S \cdot J}{E}}$$

In reality there are two variations to the above:

- Gas spring assists with opening, flap closes slowly by its own weight:

$$\mathbf{F < \frac{S \cdot J}{E}}$$

- Gas spring opens the flap automatically (after being unlocked):

$$\mathbf{F > \frac{S \cdot J}{E}}$$

5. Gas Spring Force

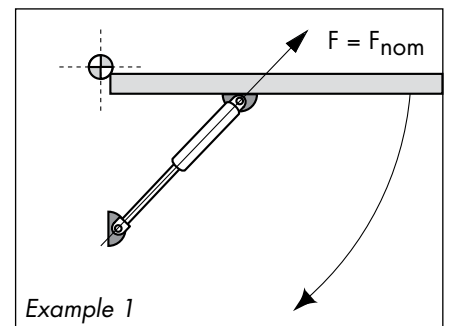
The gas spring force which has to be included in your order is always measured in its extended position (F_a). This means you need to consider the gas spring progressivity when you have calculated its force in the compressed position.

Progressivity is explained on page O6.009.00. It accounts for approx. 30 % in normal push type gas springs: $\mathbf{F_e = F_{nom} \cdot 1.33}$

Two examples make this connection clearer. It is taken that weight S in a horizontal position is balanced out by the gas spring.

- 1) With an extended gas spring the flap is kept in a horizontal position.

The spring force F_{nom} to be ordered can be found directly from your calculation results: $\mathbf{F_{nom} = F}$

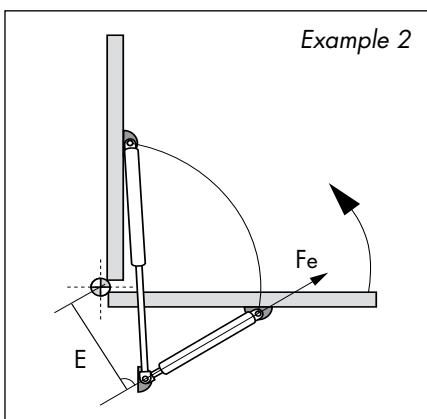


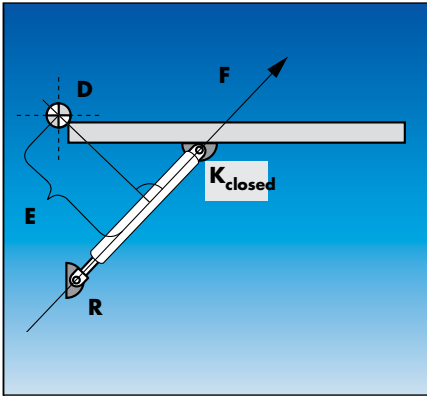
- 2) With a compressed gas spring the flap weight in a horizontal position is balanced out by the gas spring force: $\mathbf{F = S \cdot J / E}$.

This is however the force F_e , that is 30 % higher than F_{nom} .

The spring force F_{nom} which you need to order must be 30 % less than the calculated force F : $\mathbf{F_{nom} = F / 1.33}$

Warning: The calculation only takes into account one gas spring force. You must always divide the result F by the number of gas springs you want to use per flap in order to obtain the gas spring force you need to order.





Calculating the Gas Spring Force, cont.

To enable your calculations to lead to a satisfactory function and easy handling of the flap, you need to work out the hand force: you need to either support the gas spring whilst the flap is opening, or, if the gas spring automatically opens it, you should be able to push the flap down by hand with an acceptable hand force.

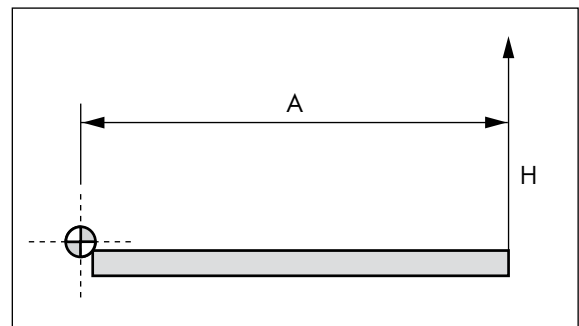
These hand forces vary depending on the position of the flap and must therefore be calculated for all opening angles (e.g. every 10°).

5. Hand Force

The hand force needed to open the flap effects - just like the gas spring force and the gravitational force - a pivot moment.

This can be calculated from the hand force **H** and distance **A** from the position of the handle and flap pivot point D:

$$H \cdot A$$



6. Relation of all Forces

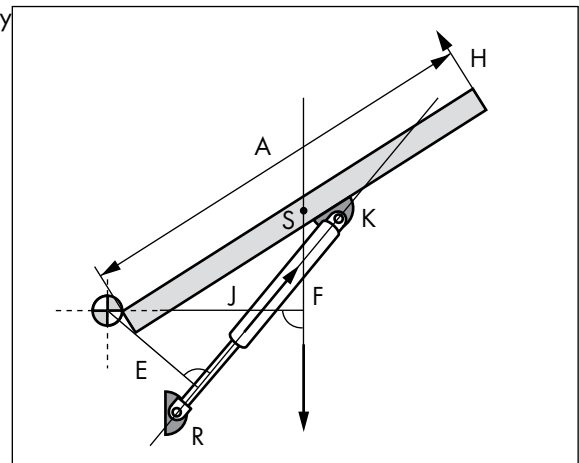
The flap remains where it is when all forces are equal: the forces which work above (gas spring force and hand force) and the gravitational force which always works below. All forces must be multiplied by their respective operating arm (distance from flap pivot).

By re-arranging the basic formula you can calculate the necessary hand force **H**:

$$(H \cdot A) + (F \cdot E) = S \cdot J$$

$$H \cdot A = (S \cdot J) - (F \cdot E)$$

$$H = \frac{(S \cdot J) - (F \cdot E)}{A}$$

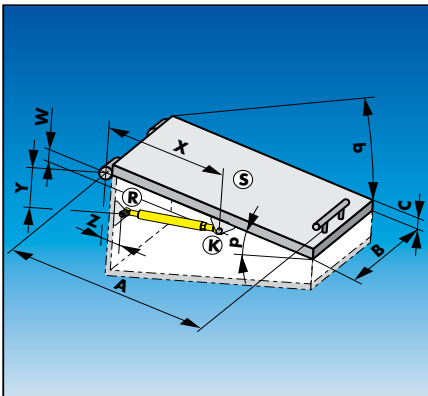


The result of this calculation can either be positive (+) or negative (-):

- positive **H** †‡ flap must be lifted by hand
- negative **H** †‡ flap must be pushed down by hand

It is particularly important with heavy flaps to work out the hand force for different positions of the flap, even if the gas spring force is equal to the weight of the flap in a horizontal position (**F · E = S · J**).

In some situations the force relations are so unsuitable that with certain opening angles the hand forces are too large. Our Advisory Service can help you with this.



Calculating the Gas Spring Force, cont.

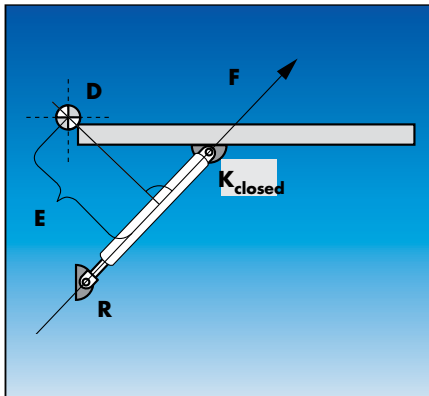
The following table gives you a summary of all the symbols and terms used in the previous pages (also see diagram on left).

Please be aware that in all formulae the length must be given in **meters** [m]. If you have measured this in mm you need to divide this value by 1000: 1000 mm = 1 m (**1 mm = 0.001 m**)

The force in **Newton** [N] can be calculated from the common weight (mostly in kg): 1 kg = approx. 1 kp = approx. 10 N (**1 N = 0.1 kp**)

7. Key

| | | | |
|---|---|--|------|
| A | = | Flap length | [m] |
| B | = | Flap width | [m] |
| C | = | Flap thickness | [m] |
| D | = | Pivot point | |
| E | = | Gas spring operating arm | [m] |
| F | = | Gas spring force | [N] |
| G | = | Weight | [N] |
| H | = | Hand force | [N] |
| I | = | - | |
| J | = | Gravitational operating arm | [m] |
| K | = | Position where gas spring is fixed to flap | |
| L | = | La / Le (gas spring lengths) | [mm] |
| M | = | - | |
| N | = | Newton (1 kp = ca. 10 N) | [N] |
| O | = | - | |
| P | = | Diagram points P1, P2, P3, P4 | |
| p | = | Angle of closed flap | [°] |
| q | = | Opening angle | [°] |
| R | = | Position where gas spring is fixed to frame | |
| S | = | Gravity | [N] |
| T | = | Distance of gravitational force - pivot | [m] |
| U | = | - | |
| V | = | - | |
| W | = | Distance D to K _{closed} vertical | [m] |
| X | = | Distance D to K _{closed} horizontal | [m] |
| Y | = | Distance D to R vertical | [m] |
| Z | = | Distance D to R horizontal | [m] |
| | | | |



E. Determining the Gas Spring's Characteristics

Before ordering **your** gas spring(s) you should once more check all details according to the following points.

The order in which the following points are listed also corresponds to the special DICTATOR **part number** and the details on the technical information pages (pages 06.019.00 - 06.058.00).

To make it easier for you to order your gas spring you simply need to insert the values of your chosen **gas spring model** in the empty boxes on the **information page** (pages 06.019.00 - 06.058.00) and fax the page to us.

1. Piston Rod (Ø)

The correct diameter of the gas spring piston rod is calculated from the necessary gas spring force. The force **F_{nom}** (= force with extended piston) which you calculated on page 06.079.00 should be approximately in the **middle of the force range** for that gas spring range. These force ranges are given on every information page (pages 06.019.00 - 06.058.00) directly below the description for each gas spring range.

Please also make sure that very thin piston rods only allow for short stroke movements to prevent them from snapping. Please order a gas spring from a larger range if you require a larger stroke movement. The first number in the range description is also the piston rod diameter in mm.

2. Cylinder (Ø)

The cylinder diameter is usually given for each gas spring range (found on pages 06.019.00 - 06.058.00). It follows automatically from the piston rod diameter selected above. The cylinder diameter is the second number in the range description.

If you require a gas spring with as little progressivity as possible (increase of the force when piston rod is compressed), a larger (longer or thicker) cylinder can be used. Please ask our Advisory Service if you have such an application.

3. Stroke

On pages 06.076.00 and 06.077.00 you calculated both the extended and compressed lengths. From this you can work out the necessary stroke **H**:

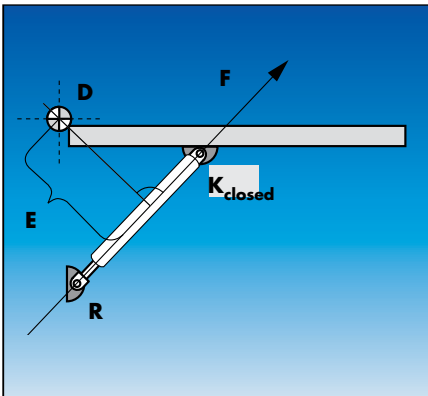
$$H = L_a - L_e$$

L_a = Length extended = Distance **R** to **K_{open}**

L_e = Length compressed = Distance **R** to **K_{closed}**

If possible you should optimise the fixing points so there are no very short and no very long stroke movements:

- the **shorter** the stroke, the larger the gas spring force needs to be i.e you need to select a larger (more expensive) range;
- the **longer** the stroke, the greater the danger of the piston rod bending. In extreme cases the fixing on the piston rod (and sometimes also the front end of the cylinder) needs an additional external guide to prevent lateral yielding.



Determining the Gas Spring's Characteristics, cont.

An advantage gas springs have over other springs is that along with the low increase in force, the **movement** can also be successfully **controlled** (by being damped). For this you need to choose a suitable type of damping.

The stroke lengths do not need to and should not always be completely used.

Please take note that when installing gas springs the fixing points should lie so far apart from each other that the gas spring can easily be installed and removed while the gas spring completely extended. The spring should never be pulled apart by force.

4. Type of Damping

The movement of the piston rod can be controlled by the integrated damping. The gas then flows through a small **port** in the rod (see diagram on page 06.004.00).

The different types of damping available are: on compression, on extending, on compression and extending stroke, and without damping. Each type of damping has its own number which appears in the **part number**. The information pages (pages 06.019.00 - 06.058.00) indicate which type of damping is possible for the corresponding series.

- 0** = without damping
- 1** = damping on extending stroke
- 2** = damping on compression stroke
- 3** = damping on both extending and compression strokes

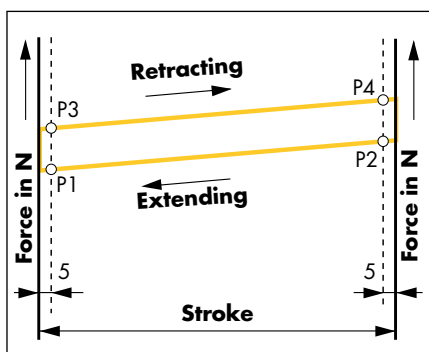
Towards the end of the extending movement (only if the piston rod is underneath) the oil must move through the piston port, through which the extending speed is slowed down once again - approx. 1 - 2 cm before the piston rod is fully extended. This **final damping** can also be adjusted for a longer final damping by additional quantities of oil. However, due to the fact that this causes the progressivity to change, you should consult our Advisory Service if you prefer that feature.

5. Gas Spring - Force Rating

DICTATOR can produce all gas springs with the force that you may require for your application. Please check your results on page 06.079.00 with the formulae for the hand force on page 06.080.00 and write down the force rating **F_{nom}** on the order form.

The range of forces for each range can be found on the information pages.

Although DICTATOR gas springs are manufactured with a special particularly low friction durable seal, a certain amount of friction cannot be avoided. The diagram on the left shows the force range:

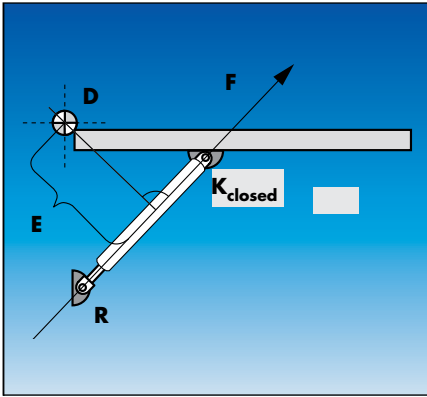


P1 The force (**F_{nom}**) given on the label and order description is the **extending force**, reached approx. 5 mm before full extension.

P2 When the piston rod is completely compressed, the gas spring force is greater due to the progressivity value (normally approx. 30 %) because the gas volume in the cylinder is less when the piston rod is compressed (see page 06.009.00).

P3 The force needed to **compress** the piston rod is greater than the extending force due to friction caused by the seal.

P4 The further the piston rod retracts, the more the gas is compressed and the more the extending force increases. For safety reasons separate stopping devices need to be placed approx. 5 mm from the final stroke position (once the gas spring has been installed).



Determining the Gas Spring's Characteristics, cont.

The **lengths** calculated on page 06.077.00 represent the distances between the fixing points. These lengths include the end fittings and should be written on the order information on the information pages 06.019.00 - 06.058.00.

When checking whether the lengths you have worked out are possible, you should take into consideration the minimum length of the **internal parts** and **measurement D** of both end fittings: **D_K** (on piston rod), **D_Z** (on cylinder)

Measurements D can be found on the gas spring information pages and on pages 06.062.00 - 06.064.00.

6. Compressed Length

The compressed length L_e is the distance between point **R** and point **K_{closed}** in your calculations on page 06.077.00. This length must be long enough for the stroke and other components (including end fittings):

$$L_e \geq \text{stroke} + \text{length of all components}$$

7. Extended Length

The extended length L_a is the distance between point **R** and **K_{open}** in your calculations on page 06.076.00. This length must be long enough to include two strokes and all parts (including end fittings):

$$L_a \geq (2 \times \text{stroke}) + \text{length of all components}$$

The lengths of the internal components can be found in point 7 on the information pages concerning each individual gas spring range (pages 06.019.00 - 06.058.00).

8. Piston Rod End Fittings

In order to fix the piston rod, choose an end fitting which is most suitable for the intended swinging movement. Please see gas spring information pages (pages 06.019.00 - 06.058.00) for available end fittings. It is important that no lateral forces act on the piston rod as these could cause the piston rod to snap.

Although rose bearings are slightly more expensive and longer than simple eyelets, they can however prevent a lateral load on the piston rod if the pins are slightly slanted.

9. Cylinder End Fittings

The above recommendations can also be used when choosing components to connect the cylinder.

10. Additional Options

All additional options available for each gas spring range are listed in the information pages (pages 06.018.00 - 06.058.00) They are labelled with order codes 4 to 8. Technical details can be found on pages 06.010.00 - 06.012.00.

- **4** An **oil chamber** is necessary when push type gas springs cannot be installed with the piston rod vertically underneath (max. difference of 35°). An oil chamber prevents the seal from drying out, increases the life of the gas spring and reduces friction.
- **5** A **valve** can be an advantage when the necessary pressure cannot be determined in advance e.g. in a sample or individual piece. The valve can be found axially in the bottom part of the cylinder and is secured with a hexagon socket screw with o-ring. Protective glasses must be worn when releasing gas.
- **6** A **protective tube** should be ordered if the gas spring is to be exposed to dirt, paint and other such hazards. It also protects the piston rod from mechanical damages and increases its life.
- **7** An additional **helical spring** (in the cylinder or on the piston rod) ensures that smoke vents on windows open automatically, even after long rest periods.
- **8** Environmentally friendly **biological oil** enables gas springs to be used in areas containing food.

Advisory Service

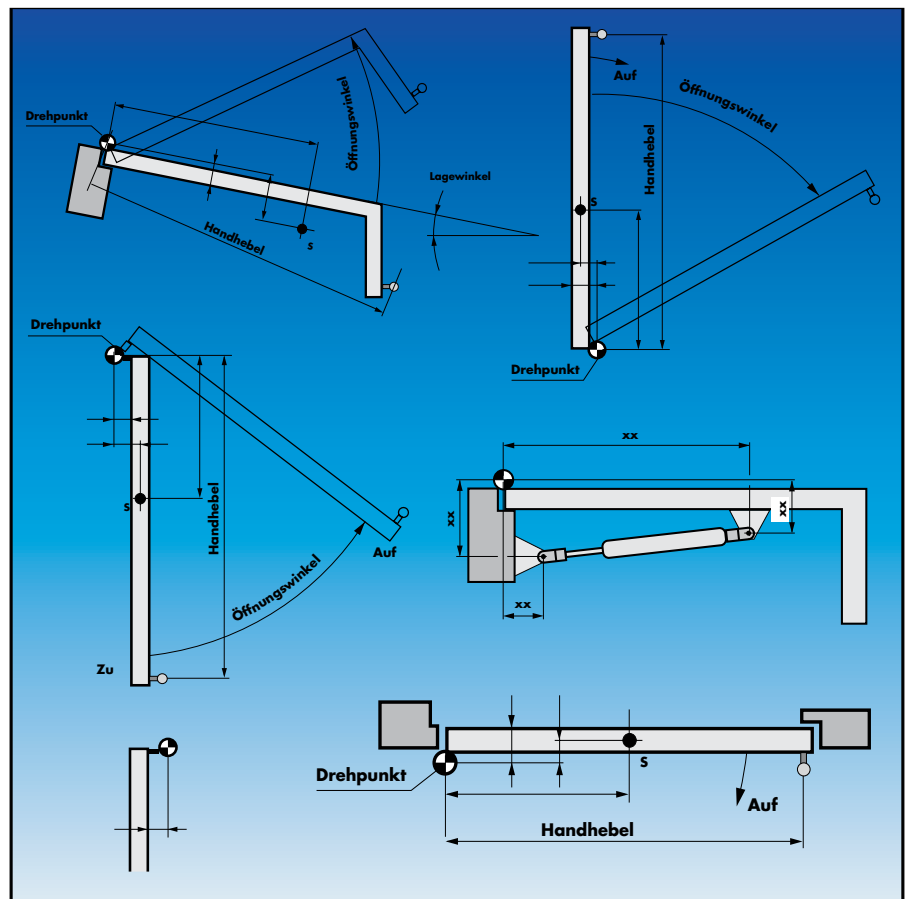
Optimum Fixing with Calculation Programme

You can guarantee your gas spring application will be **successful** with the help of the DICTATOR Advisory Service. With minimal time and money.

With the help of a special **software programme for calculating the resulting forces**, DICTATOR engineers can work out optimum fixing points for you.

This also controls the **hand forces for all flap positions** and saves you carrying out time consuming calculations. This is particularly important when the hand force can become far too large if the gas spring is falsely **positioned** in heavy flaps or hatchways.

By stating your requirements clearly, misunderstandings and unnecessary expenditure can be avoided. We therefore request you to fill out the application **questionnaire** on the following pages and fax it to our technicians. If possible please enclose **sketches** of the exact installation situation.



Details Required

| | |
|--------------------------|--|
| Function | should it open with no assistance, assist or hold open |
| Requirements | speed and frequency of movement |
| Flap measurements | length A, width B, thickness C |
| Flap position | closed and open |
| Flap weight | in Newton (1 N = 0.1 kp), centre of gravity |
| Fixing possibilities | on the flap and frame/housing |
| Fittings | suitable means of fixing |
| Environmental conditions | temperature, dirt, dampness etc. |

A. Closed Lid in Horizontal Position

Customer Address

Company :

Road :

Post code/town:

Tel. :

Fax :

Email :

Contact:

Date :

Data

Weight [kg] :

Centre of gravity [mm] T :

Centre of gravity [mm] B :

Handle distance [mm] A :

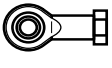









Inclination of the roof [degrees] α :

Opening angle [degrees] q :

Distance to lower side U :

Number of gas springs :

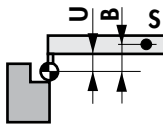
End fittings: K = on piston rod, R = on cylinder. Please complete!

| | | | | |
|--|--|--|--|--|
|  <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |
|  <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |  <input type="checkbox"/> |

Please tick off your application and insert the required dimensions. Several letters can be ticked if necessary.

(A) Flap mounted horizontally opening **upwards**.

(B) Flap mounted above pivot point.

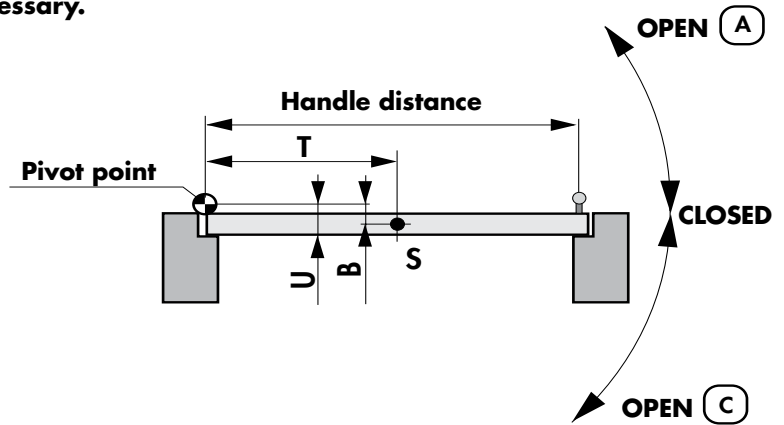
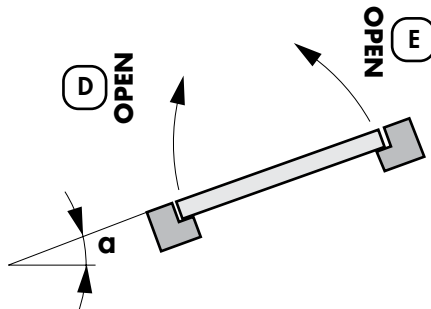


(C) Flap mounted horizontally, opening **downwards**.

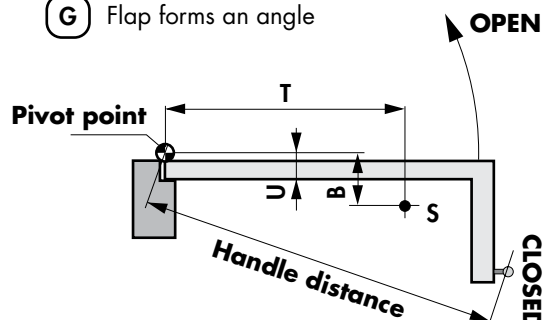
(D) Flap inclining, hinges **at top**.

(E) Flap inclining, hinges **at bottom**.

(F) Flap inclining, hinges **on the side**.



(G) Flap forms an angle



B. Closed Flap in Vertical Position

Customer Address

Company : _____

Road : _____

Post code/town: _____

Tel. : _____

Fax : _____

Email : _____

Contact: _____

Date : _____

Data

Weight [kg] : _____

Centre of gravity [mm] T : _____

Centre of gravity [mm] B : _____

Operating arm [mm] A : _____






Roof slope [degrees] α : _____

Opening angle [degrees] q : _____

Distance to lower side U : _____

Number of gas springs : _____

End fittings: K = on piston rod, R = on cylinder. Please complete!

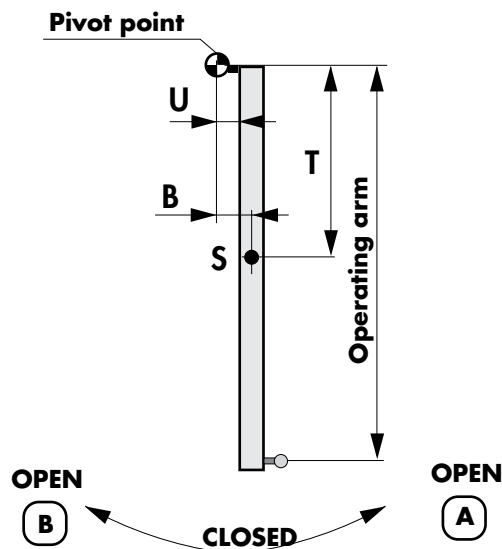
| | | | | | | | | | |
|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|
|  <input type="checkbox"/> | <input type="checkbox"/> |  <input type="checkbox"/> | <input type="checkbox"/> |  <input type="checkbox"/> | <input type="checkbox"/> |  <input type="checkbox"/> | <input type="checkbox"/> |  <input type="checkbox"/> | <input type="checkbox"/> |
| Rose bearing <input type="checkbox"/> | | Fork <input type="checkbox"/> | | Eyelet <input type="checkbox"/> | | Ball and socket joint <input type="checkbox"/> | | Threaded end <input type="checkbox"/> | |

Please tick off your application and insert the required dimensions.

A B C D

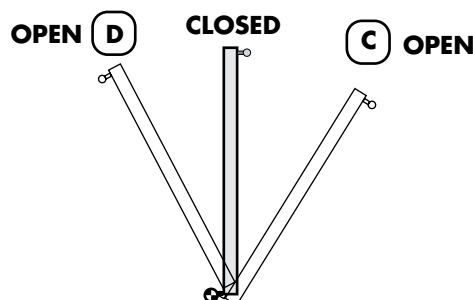
Pivot at top

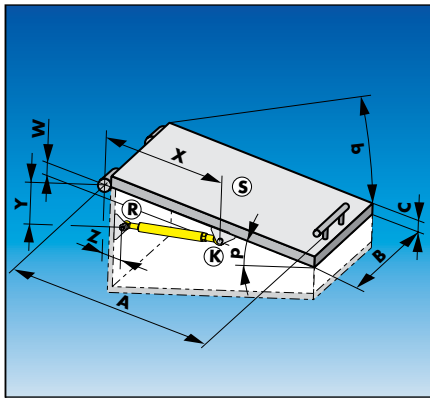
- A Flap mounted vertically, opening angle to the right.
- B Flap mounted vertically, opening angle to the left.



Pivot at bottom

- C Flap mounted vertically, opening angle to the right.
- D Flap mounted vertically, opening angle to the left.





C. Advice Result

The more information you can provide us with, the more exact our calculation results can be. Please make sure that handwriting is clear and large enough when faxing to avoid misinterpretation.

As well as the exact flap measurements, we also need details concerning the surroundings, particularly possibilities for fixing the fittings.

Along with the weight of the flap, position of the centre of gravity is also important. If you do not know this, please supply us with the exact shape and material of the flap.

1. Print-Out

| Non-binding mounting proposal | |
|-------------------------------|--------------|
| Mounting dimensions | |
| Lever of frame | RH = 80mm |
| Support of frame | RA = 140mm |
| Mounting brackets | |
| Frame | R = 205242 |
| Flap | K = 205246 |
| Data of the flap | |
| Weight | = 22.00kg |
| Hand lever | HH = 970,0mm |
| Centre of gravity | SH = 506,0mm |
| Centre of gravity | SA = 20,0mm |
| Opening angle | = 90° |

The gas spring has been calculated according to the data given here. Please have a close look if they are correct.

| Calculated gas spring type | | |
|----------------------------|-------------------------------------|---------------------------|
| Push type gas spring | <input checked="" type="checkbox"/> | Gas spring from stock yes |
| Pull type gas spring | <input type="checkbox"/> | Finish zinc-plated |
| Number | <input type="text" value="2"/> | |

Type **10 - 23 - 250 - 1 / 200N - 359 - 609 - A - A - 5 - - -**

Maximum force of the gas spring at 20 °C 259N

Please check if your construction will stand this force.

2. Part Number

Example Ref.*: -10-23-250-1/200N-359-609 - A - A - 4/5/6/7/8

- Ø Piston rod _____
- Ø Cylinder _____
- Stroke length [mm] _____
- Damping (0,1,2 or 3) _____
- Extension force [N] (in position P1) _____
- Compressed length (incl. measurement D of end fittings) _____
- Extended length (incl. measurement D of end fittings) _____
- Piston rod end fitting _____
- Cylinder end fitting _____
- Additional fittings: _____ oil chamber [Code 4], valve [Code 5],
 _____ protective tube [Code 6], additional helical spring [Code 7],
 _____ oil fill with biological oil [Code 8]

*In addition to this part number, please also specify the type of gas spring:
D = push type, **DT** = with floating piston, **FB** = cushioned locking, **StB** = rigid locking,
SEH = variable speed, **V** = AISI 304, **V4** = AISI 316, **Z** = pull type gas spring