UNIQUE STANDARD RANGE

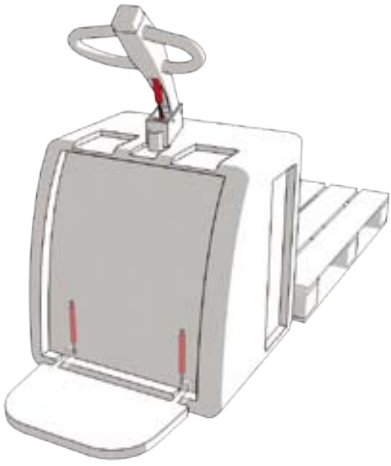
Our standard range of gas springs comprises of 770 different items that can be combined with some hundred end fittings and accessories.

The standard range and end fittings for conventional gas springs can be found on pages 161–190.

Our standard range of lockable gas springs and accessories can be found on pages 194–197.

We are also able to offer custom gas springs manufactured to your specific requirements. More information about the custom variants we produce can be found on pages 159 and 193.

You can also visit our website, www.lesjoforsab.com, which features all the latest product news.



FIELDS OF APPLICATION

Lesjöfors gas springs are usually used for lifting and unloading, but their special spring and dampening characteristics mean that the number of applications in which they may be used is quite extensive.

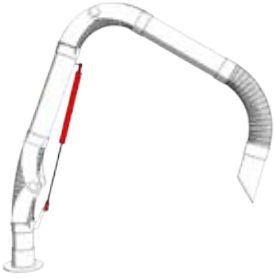
Typical areas of use include controlled opening and closing of doors and hoods. But they can be equally adept at controlling complete equipment such as ventilation apertures, chairs, beds, windows, tools and machinery.

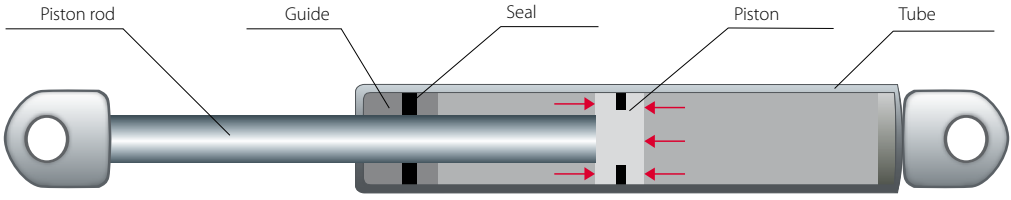
Even heavy items can be lifted by hand with the help of a gas spring.

TECHNICAL INFORMATION

The main components of a gas spring are a tube, a piston rod with piston head, a seal and a guide. The tube is filled with compressed nitrogen gas, which applies equal pressure on both sides of the piston. The surface of the piston rod side of the piston is smaller than on the opposing side, producing a pushing force.

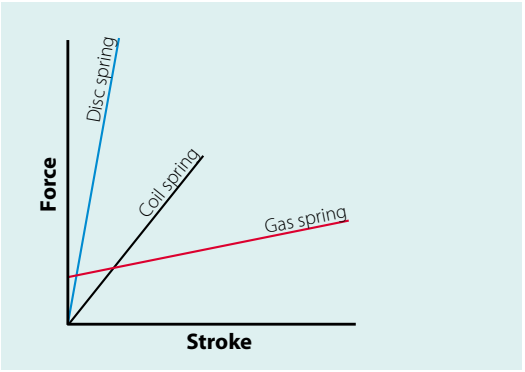
In simple terms, the magnitude of the driving force is determined by the cross-sectional area of the product's piston rod and the internal pressure inside the tube.





Spring characteristics

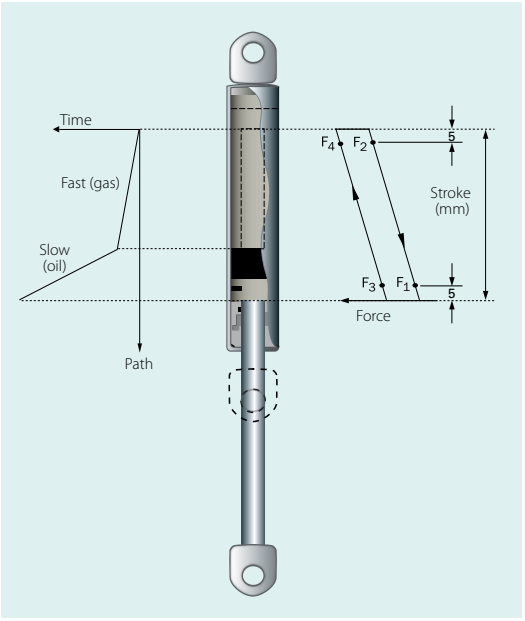
In contrast to most other types of spring, gas springs have a built-in pre-tension force and a flat spring characteristic. This means that there is only a small difference in force between full extension and full compression.



As the piston rod is pressed into the tube, volume reduces and pressure increases. This causes pushing force to increase. In conventional gas springs, this increase is normally around 30% at full compression.

The diagram below illustrates, in simple terms, forces F3, F4, F2 and F1 along the stroke when the gas spring is fully compressed and then released.

F1 indicates the force just before full extension. It is this static F1 force we refer to when we talk about the force of a gas spring. The difference between force pairs F3/F1 and F4/F2 varies according to the amount of friction.



Hydraulic damping

The pushing spring movement is slow and controlled. It is reliant on the gas flow between the piston sides being allowed to pass through channels in the piston during the stroke.

Conventional gas springs use 'hydraulic damping', which involves a small amount of oil slowing down the speed of the stroke immediately before the spring reaches full extension. This imbues the movement with a braking character at the end position (provided that the piston rod is in the downward direction).

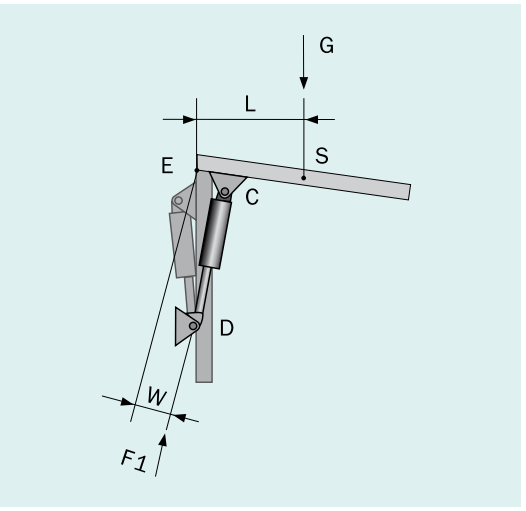
Which gas spring should I choose for my application?

Using a software package developed in-house, Lesjöfors is able to simulate any type of application imaginable, enabling us to quickly help calculate the force requirement for your particular design. Contact your local representative for professional advice.

In simpler cases, the required spring force may be calculated by entering relevant values into the following formula:

$$F1 = \frac{G \times L}{W \times n} + 10 - 15\% \text{ margin of error}$$

F1 = Gas spring force in Newtons
G = Gravitational pull in Newtons of the moving part
C = Connection point on the moving part
D = Connection point on the fixed part
E = Swivel point
S = Centre of gravity
L = Horizontal distance from E to S in open position
W = Smallest distance to E
n = Number of gas springs



Force tolerances

Tolerances when charging with gas and other factors mean that there may be variations in the force exerted by gas springs with the same nominal F1 value. The tolerances in the table below are excessive; the actual forces are usually very close to the nominal specification.

Force tolerance (N)	
F1 ≤ 100	± 10
100 < F1 ≤ 200	± 20
200 < F1 ≤ 600	± 30
600 < F1 ≤1200	± 50
F1 >1200	± 100

The nominal F1 values apply at 20 °C, which is the temperature at which gas charging is carried out.

Note that if the ambient temperature rises or falls, the force of the gas spring rises or falls depending on pressure changes in the tube.

As a rule of thumb, gas spring force increases by approximately 3.5% per 10 °C temperature increase and reduces accordingly when the temperature falls.

Working life of the gas spring

Lejsjöfors gas springs are generally permitted to have a maximum force loss of 10% after 40000 oscillations at a max of five oscillations per minute at room temperature and in ideal fitting circumstances.

However, it must be remembered that gas springs have a shelf life as the sealing material ages and wears out.

There are several factors that affect gas spring lifespan in an application.

External factors such as temperature changes and other physical environmenal influences can affect seal aging and wear and thereby speed up the process of force loss.

In addition, fitting also plays a significant role. If, for a majority of its operational life, a gas spring has its piston rod pointing downwards, the seals and the piston rod will be kept lubricated with oil, thus minimising wear and leakage. A gas spring will also last longer if it is fitted free from vibrations and in such a way that no lateral forces can be produced.

A good rule for a designer is to always choose a gas spring with the largest possible tube volume for the amount of force required.

CUSTOM RANGE

Lesjöfors has decades of experience of choosing the right gas spring for various requirements. This means that we can be a one-stop partner who can be on board right from the design stage. If our huge standard range does not cover a specific force or otherwise does not satisfy a specific requirement you have, we offer the following custom variants.

Length and force

The gas springs and accessories that form part of Lesjöfors' standard stock are manufactured to standardised strokes, total lengths and forces. We can also supply springs with other dimensions and forces upon request, within the technichal limitations.

Movement and damping

We can also adapt pushing speed and oil volume, which means that we can tailor movement patterns and damping to your requirements.

Tube colour and finish

Except for our stainless steel range, the tube of our gas springs is painted in black RAL9005 and the piston rod finished in black nitrite. However, the piston rod may also be finished in chrome, and the tube may be painted any colour you choose.

Connectors

The catalogue range includes threaded connectors or welded loops that have been generally adopted by the market. However, we can produce gas springs with alternative connector types or offer custom end fittings if necessary.

Other product types

Lesjöfors can also supply the following products that are based on conventional gas spring design but do not appear in the standard range:

Gas spring with dynamic damping

A longitudinal groove on the inside of the tube controls stroke speed and can be adapted for various movement requirements. One advantage with dynamic damping is that braking can be achieved without the piston rod pointing downwards.

Damper

In this product, the tube is filled with oil and can, for example, be used to slow down a falling hatch or other components that must be dampened during movement.

GAS SPRINGS

General information

USER ADVICE

1. A gas spring is a pressure vessel. Never try to open one without following the instructions in the section entitled "Recycling". Never expose a gas spring to excessive heat or naked flames.

2. To ensure the optimal function and lifespan, conventional gas springs should be fitted so that the piston rod always, or as frequently as possible, points downwards during use. If the piston rod is down at the end of the stroke, the hydraulic damping is used to the full.

3. Gas springs must not, under any circumstances, be exposed to damaging external influences or violent handling. Lesjöfors accepts no warranty or return liability for the following:

a. Visible damage to the piston rod, including minor scratching, paint dust, bending or similar. This may damage seal function.

b. A damaged tube. This may mean that functionality has been jeopardised and may pose direct safety risks. Never try to use a gas spring that exhibits tiny dents or bends on its tube. Take it out of use and follow the instructions in the section entitled "Recycling".

c. Gas springs where either the warning text, manufacturing date or part number has been removed by external action.

4. Our gas springs are designed for ambient temperatures of between -30 and +80°C. If possible, avoid intensive use at the extremes of this temperature range. Reducing/increasing ambient temperature also means a reduction/increase in gas spring force.

5. Gas springs are designed to handle axial loads. Avoid radial forces (lateral forces). Choose as big a cross section as possible.

6. We always recommend the use of external end stops in the application. Do not exert any external force during the stroke.

7. Do not lubricate the piston rod with grease or oil, and do not expose the gas spring to oils or solvents.

8. Avoid using non-stainless gas springs in corrosive environments.

9. Do not expose the piston rod to dirt and dust.

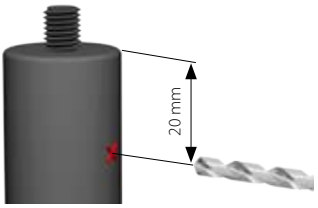
10. Long periods of storage may cause the sealing material to age. If storage is necessary, we recommend you adopt a "first in – first out" policy. If a gas spring has been unused for a long period of time, it may require a little more force to press the piston rod in when operated for the first time. This is normal and does not have a negative impact on future use.

If all these points are taken into account, you will have gone some way towards safe and well-functioning use of gas springs. However, Lesjöfors cannot be held liable for the performance or safety of the final application.

RECYCLING

The majority of a gas spring is made of metal and therefore can be recycled. If you are going to dispose of a gas spring yourself, e.g. if it has been damaged or has otherwise become unusable, bear in mind the following:

1. Depressurise the gas spring by drilling a 3 mm hole 20 mm from the tube end with it fixed in the vertical position and the piston rod down and in max extended position. NB Wear protective goggles, protective clothing and ear defenders when doing this as the spring will make a noise when pierced and you may be exposed to small amounts of oil and metal fragments. See diagram.



Nitrogen is an inert gas and is neither explosive nor toxic.

2. Drain the oil through the drilled hole by pressing in and pulling out the piston rod repeatedly if necessary. Recycle the waste oil in accordance with local regulations.

3. The gas spring can now be taken to a metal recycling centre in accordance with local regulations.