LDA

Solutions for Life

Determining the correct gas spring

Guide to determining gas springs

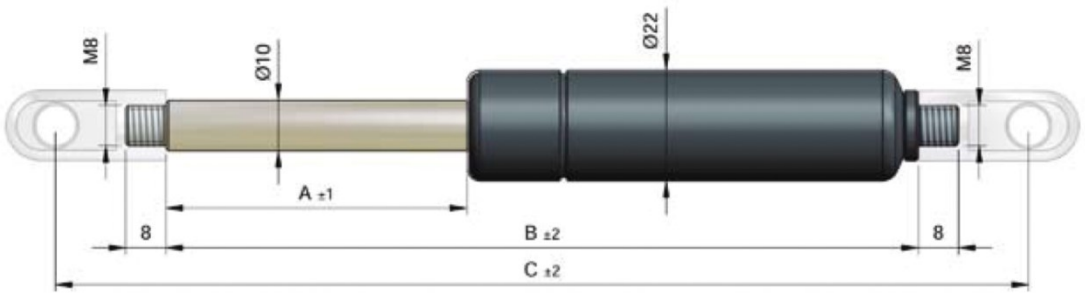
The two key questions
When integrating gas springs, there are two important factors:

How heavy is the item to be lifted? = Required force
Type of movement = Required stroke length

In general, the heavier the mass to be moved or the greater the distance needed to move, the larger the spring diameter needs to be.

Gas springs with diameter Rod — Body	Push force	Stroke length
3 mm 8 mm	10 tot 100N	10 tot 80 mm
3 mm 10 mm	10 tot 100N	10 tot 80 mm
4 mm 12 mm	10 tot 180 N	20 tot 200 mm
6 mm 15 mm	50 tot 400 N	20 tot 400 mm
8 mm 18 mm	100 tot 800 N	20 tot 600 mm
10 mm 22 mm	100 tot 1200 N	20 tot 800 mm
10 mm 28 mm	120 tot 1200 N	20 tot 800 mm
14 mm 28 mm	250 tot 2500 N	40 tot 1000 mm

Example of a gas spring type 10-22mm / 100-1200N / 20 to 800mm stroke length



Which gas spring is suitable for your application?

Standard gas spring type Lift:
The "Lift" type is the most well-known gas spring and is used as a counterbalance and speed controller for lifting, balancing, lowering, tilting, and braking hatches or valves.

Lockable gas springs Type Lift & Lock:
The Lift & Lock gas spring is a standard lift gas spring with an additional locking tube. Unlocking is done by aligning the locking tube with the gas spring through a push on the red ring.

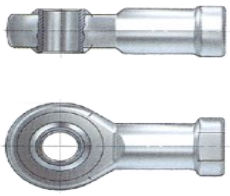
Gas tension springs type T-Lift:
The T-Lift or gas tension spring is the opposite of the lift gas spring. The rod of a gas tension spring is always retracted.

Stainless steel gas springs:
The Lift, T-Lift, and Stoplift types are available in stainless steel.

Stoplift Gas Springs:
This spring is capable of stopping in any desired position. The gas spring will not move until an additional force is applied.

Step-Stop gas springs:
The STEP-STOP gas spring has predefined stop positions. This gas spring stops at fixed set positions.

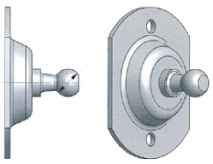
Endfitting Type



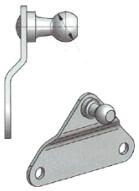
Rod end

clevis

Ball joint



Mounting plates



eye

Guidelines for correct use

- Mount a gas spring on both sides of a hatch to prevent lateral load.
- Always mount the gas springs with the **rod pointing down** to ensure that the rod's main seal is always well lubricated. This ensures that the oil is in the correct position and allows you to benefit from end-of-stroke damping.
- Always screw the end fittings fully onto the threaded ends. This avoids the risk of breaking the threaded ends during use.
- Use ball joints wherever possible as this **reduces the risk of lateral load** on the gas springs.
- For heavy hatches, it is recommended to **use a lockable gas spring** so the user can safely work underneath.

Things to avoid with gas springs:

- **Do not apply solvents to the rod** of the gas spring as this removes the lubrication from the piston rod and damages the seals, which can cause premature failure and loss of force.
- **Do not coat the gas spring rod with paint**, as this may lead to transfer onto the piston rod and the main seal of the gas spring, potentially causing failure.
- Absolutely **avoid scratching or damaging the rod**, as grooves or damage can cause oil and gas to leak out of the gas spring, leading to premature failure.
- Do not apply anything to the piston rod, as this may cause the main seal of the piston rod to fail during operation.
- **Never drill or heat gas springs**. A gas spring is filled under high pressure (+100 bar).With proper use and manufacturing according to our strict manufacturing and engineering procedures, gas springs are very safe.

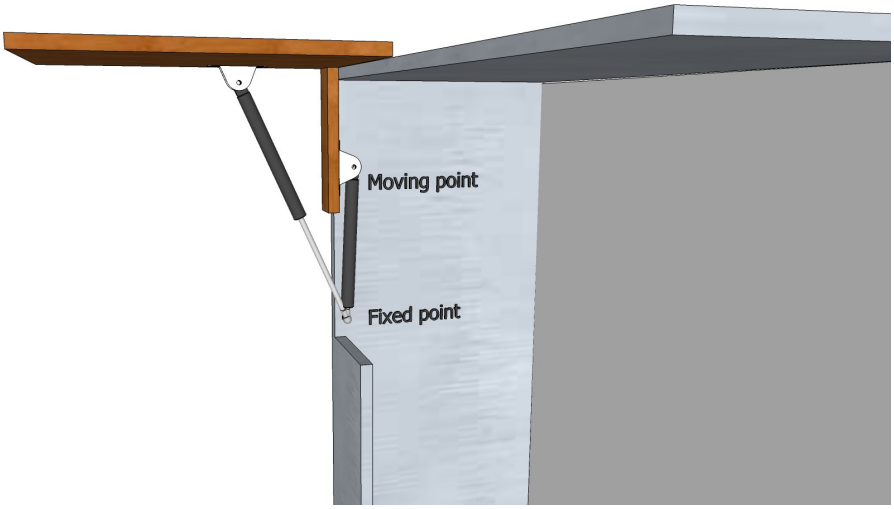
Mounting Position Terminology

A gas spring has two mounting points: a 'fixed' and a 'moving' mounting point.
As their names suggest, the fixed mounting point is stationary, while the moving mounting point travels in an arc.
For force and position determination, the process starts with the moving mounting point, which is generally located 1/3 of the length of the hatch from the hinge. This provides a very rough guideline for placing a gas spring. It also gives an indication of the size of the required spring.

Mounting Method

Push-up design

There are two different mounting orientations: the 'Push Up' and 'Flip Over' mounting. In both cases, the gas spring must always be mounted "rod down" in the fully closed position to ensure proper lubrication of the seal.



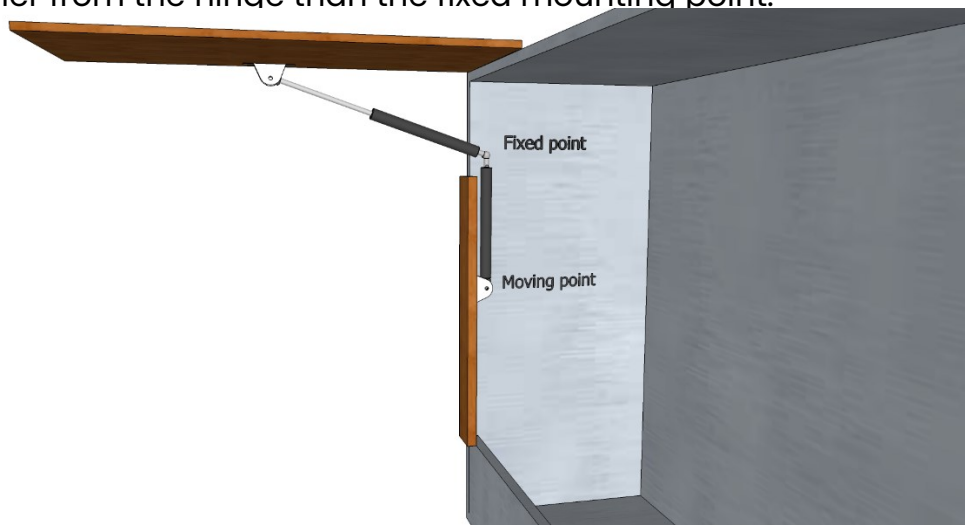
Properties of the Push Up design

In the Push Up design, the rod end of the gas spring is at the lowest point when closed and remains the lowest point when fully opened. The moving mounting point in this design is closer to the hinge than the fixed mounting point.

The main disadvantage of this mounting position is that the hinge points need to absorb a significant amount of force due to the leverage effect. The distance between the moving mounting point and the hinge point is much smaller than the distance between the fixed hinge point and the moving hinge point.
The great advantage of this mounting type and the downward orientation of the rod is that it provides good damping at the end of the stroke. This is because the oil is always on the rod side of the tube, so the damping will always occur at the same point in the lifting cycle.

Flip-over design

In this type of mounting, the rod end is at the lowest point when closed and rotates to the highest point when fully opened. The moving mounting point is also located farther from the hinge than the fixed mounting point.

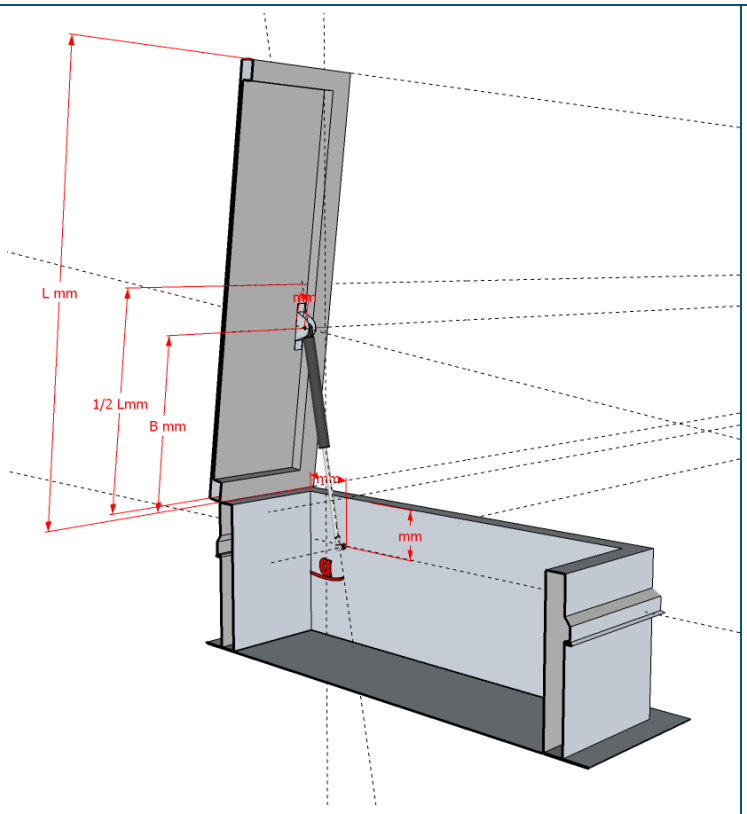


The main disadvantage of this mounting position is the lack of damping control throughout the entire stroke. At the beginning of the stroke, the oil is at the bottom on the rod side. When opening the hatch, the gas spring moves through its horizontal position, causing the oil to flow down towards the tube end.

During the flow of the oil, the piston will be delayed until the oil has passed. After this point, the speed will increase, and the end-of-stroke damping will occur. The advantage of this design is that it puts less strain on the hinges.

If you need support, do not hesitate to contact us.
Our professionals are ready to assist you with all your questions and concerns. Whether you need advice or help with specific issues, your satisfaction and success are very important to us, and we look forward to assisting you.

Necessary information for determining the force



Example:

G = Weight of the hatch = 20 kg
L = Length of the hatch = 900 mm
B = Hinge position on the hatch = 400 mm
α = Angle formed between gas spring and hatch = 15°
(see sine table) (15° = factor 0.25)
P = Progressivity of the chosen gas spring (see progressivity in product datasheet) (14/28 = 0.66)

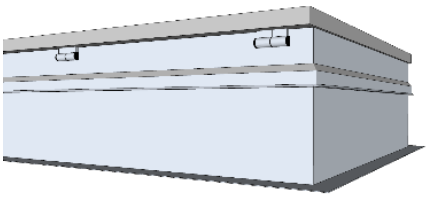
F1 = { (G x 1/2L) : (B x α) } x P x 9.81

F1 = {(20 x 450) : (400 x 0.26)} x 0.66 x 9.81 = 855 N

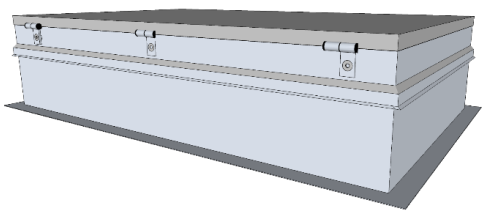
To be divided by the number of springs

Hinges have an influence on the placement and stroke of a gas spring!

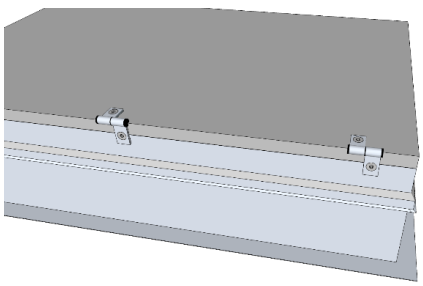
Center mounted



Under mounted



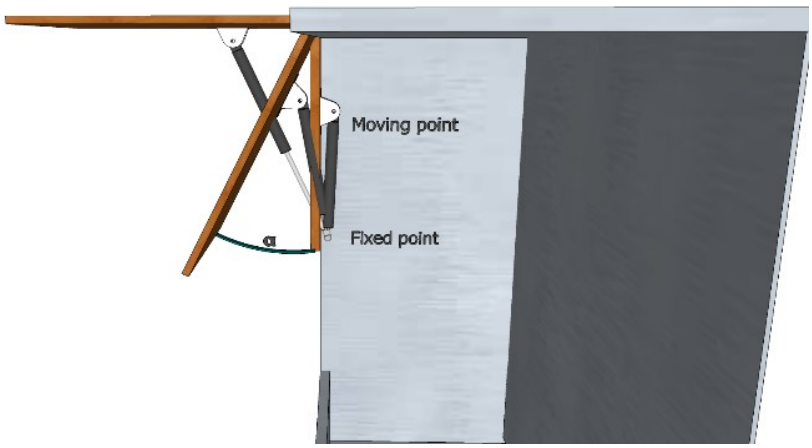
Overhead mounted



Other Considerations

Crossover

Crossover (α) is the point where the gas spring takes over the opening or where gravity controls the closing. This usually occurs between 10° and 30° of the closed hatch. In practice, factors such as friction of the internal parts, ambient temperature, hinges, and end fittings influence this point.



Self-Rise & Self-Close

Self-lifting is the angle at which the gas spring lifts the hatch without assistance from the operator. Self-closing is the angle at which the hatch closes without assistance from the operator.

In most cases, it is undesirable to allow the hatch to open without the operator's input (the so-called "instant lift"), as this behavior is unpredictable for the operator and the hatch could open without warning, for example, due to increased ambient temperatures.

Mounting - Practical Considerations

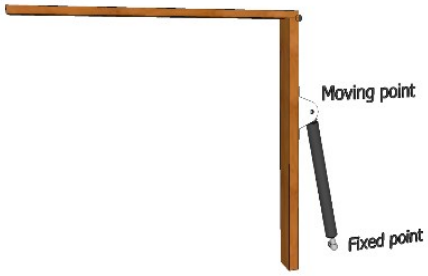
Unused Stroke

It is safe to allow 10 mm of unused stroke when integrating a gas spring. This provides margin to accommodate mounting tolerances and prevents the hatch from not fully closing.

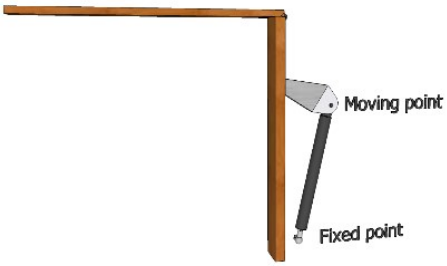
Preventing Instant Lift

By strategically positioning the moving mounting point, we can effectively influence the opening of the hatch. In the images below, we see A a mounting that leads to immediate lifting and B an overcenter mounting that reduces immediate lifting.

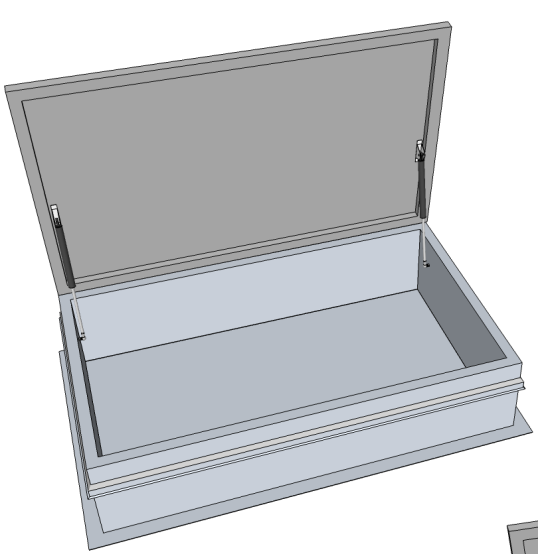
A)

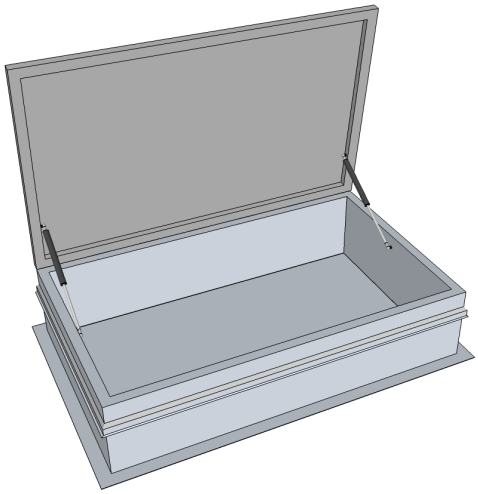


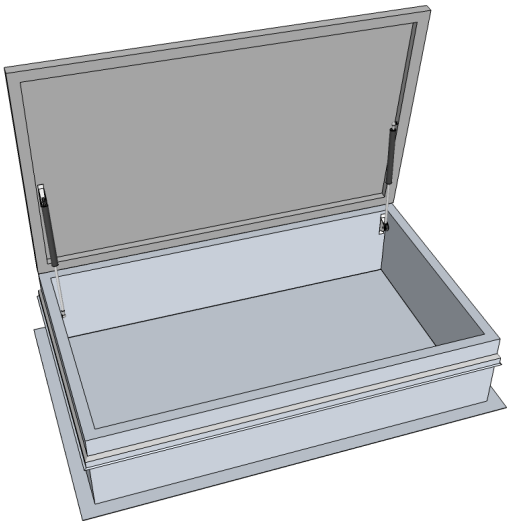
B)



Mounting examples







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Vind ons!

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