Technical information for gas springs

Assembly position:
If possible, the gas springs size 04/12 and 06/15 should always be installed with the piston rod pointing downwards. This ensures optimum lubrication of the guide and the sealing system. By gas springs from size 08/19, an additional grease chamber permits installation in any position. End position damping however, is only effective when the piston rod points downwards. To avoid increased gas loss, gas springs must not be subjected to flexural forces, tensile loads or lateral forces. We recommend the use of ball head connections where possible.
With stainless steel gas springs, all sizes should always be installed with the piston rod pointing downwards.

Gas springs may only be installed or removed when they are not under pressure.

Gas springs may be used as end stops as long as a nominal force of +30 % is not exceeded. Gas springs must not be subjected to tensile loads.

Maintenance:
The gas springs are maintenance-free.
Lubrication or service is not required.

Temperature range:
-20 °C up to +80 °C.

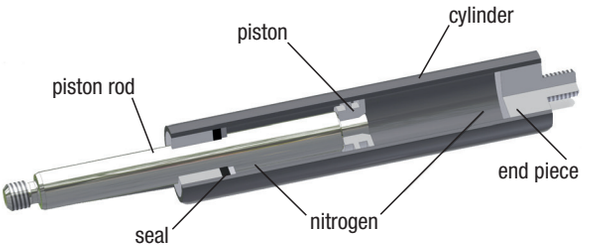
Influence of temperature:
Nominal force is measured at 20 °C.
Subject to physical conditions, the gas springs' force changes every 10 °C by 3.4 %.

Transport and storage:
Gas pressure springs in the sizes 04/12 and 06/15 should be stored with the piston rod extending downward at an ambient temperature of approx. 20 °C. As of size 08/19, storage in any orientation is possible. Actuate the gas springs after 6 months' storage at the latest. Storage of gas springs for a period of over 1 year should be avoided.
By stainless steel gas springs, all sizes should always be stored with the piston rod pointing downwards.

Valve:
The gas springs have a check valve inside the the pressure tube thread for subsequent increase and decrease of the nitrogen pressure.

Disposal
If gas springs are no longer needed, they must be disposed of in an environmentally responsible way. For this purpose, a hole is drilled at a suitable spot in order to release the compressed nitrogen gas and drain the oil contained in them. Our opening and disposal instructions are available at our website under the menu item Download.

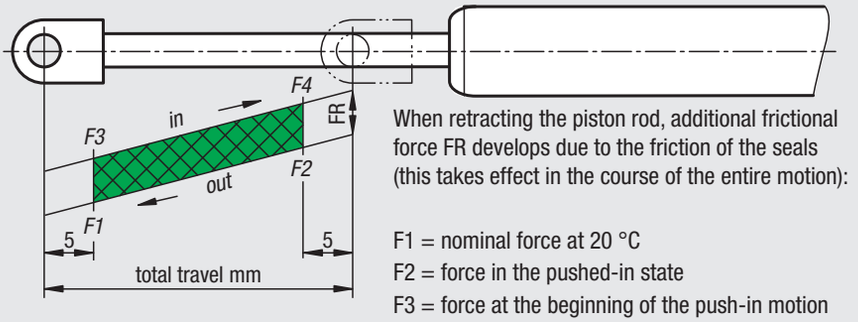
Design and function principle of gas springs



Gas springs are hydropneumatic, self-contained and maintenance-free adjustment elements. Spring force F1 results from the internal pressure (maximum 160 bar on no-load) in the cylinder, which is produced by the nitrogen fill medium. This pressure on the gas spring acts on the cross-sectional area of the piston rod. The piston rod is always extended in the no-load state.

In the course of pushing the piston rod in, the volume in the cylinder is reduced and the gas is compressed.. By doing this, an increase in the force (progression) of the gas springs results subject to the diameter of the piston rod and the cylinder volume. Norelem gas springs contain an oil filling for lubrication and end-of-travel damping.

Gas spring characteristic in the force/distance diagram

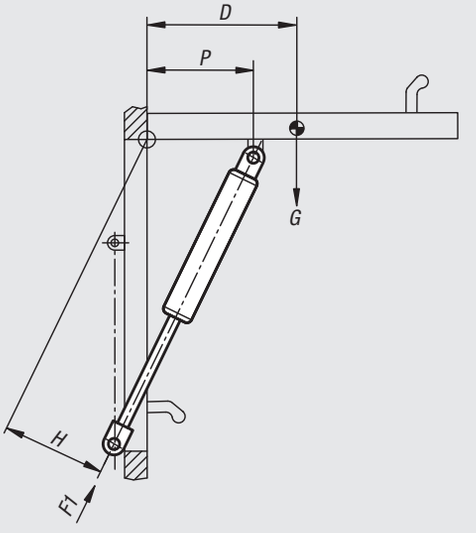


When retracting the piston rod, additional frictional force FR develops due to the friction of the seals (this takes effect in the course of the entire motion):

F1 = nominal force at 20 °C
F2 = force in the pushed-in state
F3 = force at the beginning of the push-in motion
F4 = force at the end of the push-in motion

The approximation formula and application sketch shown below assist in providing a rough estimate and in selecting the appropriate gas spring from the standard programme.

Calculating push-out force F1



Approximation formula for calculating the thrust F1 [N] at 20 °C

$$F1 = \frac{G \cdot D}{H \cdot n} \times 13\ [N]$$

G = hatch weight in kg
H = effective lever arm of gas spring in mm, hatch open
13 = conversion factor kg → N + safety margin
P = hatch fastening ca. 2/3 D
n = No. of gas springs (standard: n = 2)
D = effective centre of gravity in mm, hatch open

Example:

G = 25 kg, D = 300 mm, H = 150 mm, n = 2

$$F1 = \frac{25 \cdot 300}{150 \cdot 2} \times 13 = 325\ N$$