

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!

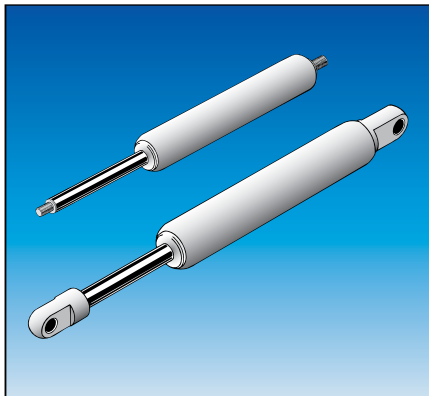
**Gas springs are filled with high pressure nitrogen.
They must not be opened or damaged under any circumstances.**

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

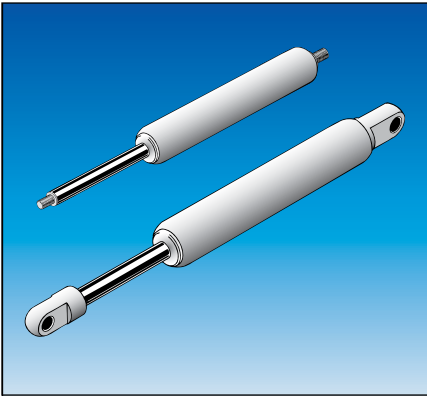
- should only be carried out according to our special instructions.
- appropriate protective glasses must always be worn.
- If necessary our Central Customer Service Department can take care of this, but only if the gas springs were manufactured by us.

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.

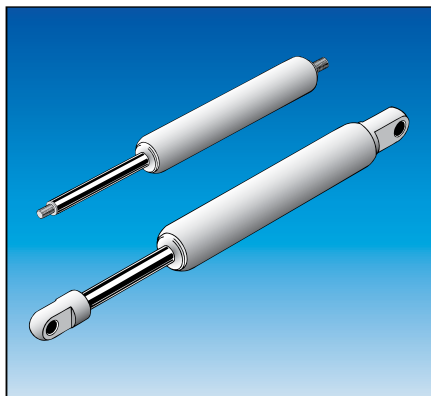
7. Secure threaded end fittings (eyelets etc.) properly. Ensure mountings are fitted properly (threaded parts lie face-up) before installing the gas spring. If vibration should occur, prevent end fittings from unscrewing by using suitable thread lock.

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 $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$. Please notify us if you plan to use them below $0\text{ }^{\circ}\text{C}$. 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, $20\text{ }^{\circ}\text{C}$) or whether foreign substances affect them (e.g. steam hotter than $80\text{ }^{\circ}\text{C}$, 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: $\pm 2\text{ mm}$.

20. The tolerance for pushing and pulling forces generally amounts to:
Minimum $\pm 3\text{ Newtons}$ or $\pm 5\%$ of the rated force; Maximum $\pm 10\%$ of the rated force ($20\text{ }^{\circ}\text{C}$). 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 F_1 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.