
GÄBLER

Piston Slide

Valves

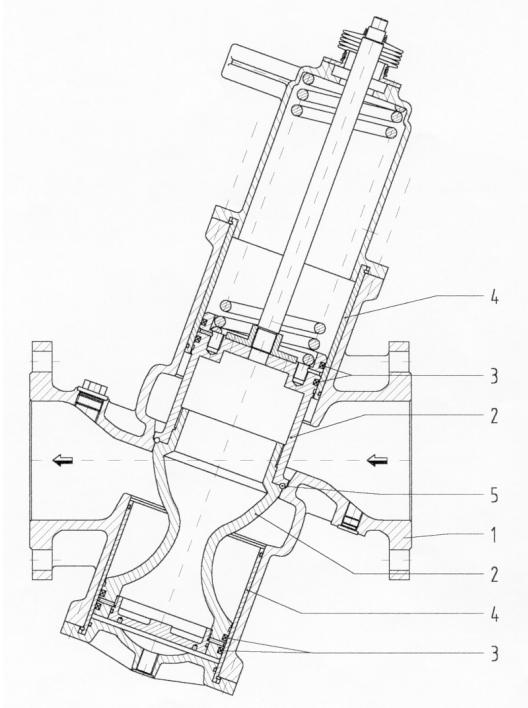
General Information



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1. General Information

GÄBLER piston slide valves are flanged shut-off valves for gaseous and liquid media. Since fifty years these valves are well-known for their reliability and their safety as pipeline-shut-off-valve or as process-control valves in iron and steel plants, in the chemical industry, in cement plants and within many other industrial branches. Based on their reliability and design, which determines them for an operation at high pressure differences and at high flow velocity as well as for the choice of materials that ensures a high level of safety especially within gaseous oxygen, the GÄBLER piston slide valves became indispensable in many fields of valve applications.



GÄBLER PISTON SLIDE VALVE

DN 150 PN 40 type : GKV 515

spring closed, opened with own medium

- 1 : piston slide valve body
- 2 : piston
- 3 : FKM piston seals
- 4 : piston guiding liner
- 5 : middle FKM-O-ring for absolute tightness in the valve seat

2. Construction & Function

2.1 Piston valve

In contradiction to the well known expression piston slide valve it is not a slide valve but a piston valve that's sealing the pipeline with a piston - guided on both ends - in the direction of flow that is marked on the valve body. Due to the parabolic shape of the piston (2) a smooth, but quick opening and closing of the line is possible preventing the downstream pipeline from a sudden pressure surge.

Based on the construction of the valve body and the piston, the piston is surrounded by the flowing medium and nearly completely pressure balanced in the opened and closed position. Therefore the valve can be opened even at the highest differential pressures without any problems, the time for the operation is very short based on the comparatively small stroke and the required actuation pressure is - depending on the nominal bore - low.

If the flowing medium is almost free of particles even at higher differential pressure over the closed valve more than one million operations without maintenance are possible.

The valves correspond with the requirements of the European Pressure Equipment Directive 97/23 for the chosen category IV, valves exceeding DN 25 are marked with the **CE**-sign and the number of the notified body.

2.2 Materials

The material of the valve body is cast tin bronze CuSn10-C acc. EN 1982. DN 65 and bigger valves do also have a piston made of that cast bronze, the piston guiding liners are made of gun metal CuSn7Zn4Pb7-CZ. The decision to choose an alloy with a high copper content predetermines the GÄBLER piston slide valve for the use in gaseous oxygen.

2.3 Tightness and seal elements

The tightness towards the atmosphere is achieved by using four square shaped rings (quad-rings 3), that are resting twist-proof in the piston grooves. For oxygen the material of the seals is FKM, which has been specially cleaned for oxygen service. These seals are tightening the ring gap between the piston and the guiding liners based on their stress and elasticity with almost no friction. On the ground that the piston is not pressed against the sealing elements, the friction is nearly independent from the pressure figure. If the flowing medium is free of abrasive particles, the GÄBLER piston valve is almost free of wear. The sealing elements are lubricated with a very thin film of a lubricant to reduce friction and in coincidence the wear even more.

The impermeability in the valve seat is performed by an o-ring (5), which is fixed between the piston head and the piston skirt. In the closed position this o-ring is pressed onto the conical valve seat, which is integrated in the valve body and needs no special armouring. The surface of the o-ring is covered by approx. 75 % to ensure that even at highest velocities of the medium the o-ring keeps in its place. In the opened position the o-ring is resting behind a bulge of the valve body in order to be protected against particles within the flowing medium.

The valve concept concerning the metallic materials as well as the material of sealings and the lubricant has been tested by the German Federal Institute for the Testing and the Research of Materials (BAM). Adiabatic pressure shock tests were applied and the valve was found suitable for the use in gaseous oxygen for an operation range of max. 100 bar / 100°C.

2.4 Guiding liners

Throughout all nominal diameters the valve body is protected from damage based on media-pollution by a gun metal - piston guiding liner (4) on the piston head. For valves bigger than DN 65 incl. the piston skirt is running within a liner, too. If the medium contains a lot of abrasive particles leading to an increased wear of the sealing elements and the liners, these liners can easily be exchanged without taking the valve body out of the pipeline.

2.5 Sizes and pressures

The production range for the GÄBLER piston slide valve reaches from DN 15 to DN 400, the pressure class goes up to PN 100, depending on the valve size. The flanges can be machined acc. to DIN or ASME standards or acc. to customer's specifications.

3 Valve design types

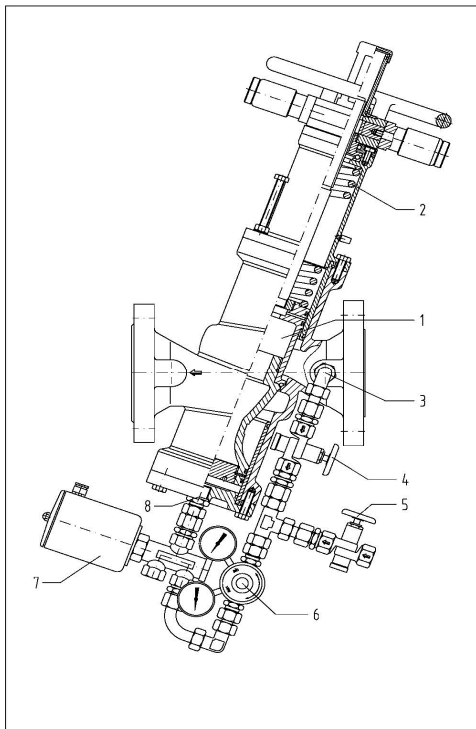
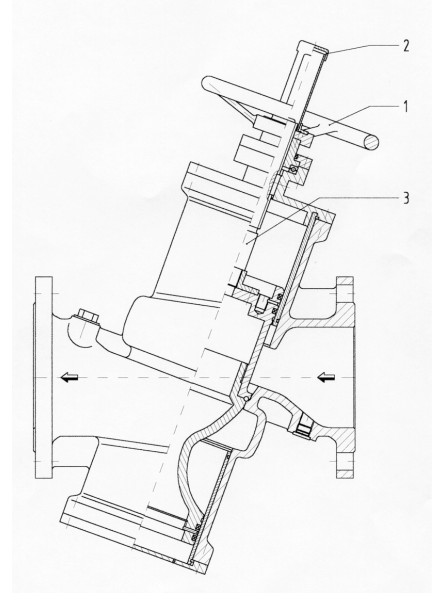
GÄBLER piston valves can generally be divided into manually operated valves and remote controlled valves. .

3.1 Manually operated valves

The piston is operated with a hand wheel (1) using a threaded stem (3) . Valves up to and including DN 80 have a rising hand wheel. At bigger valves the weight of the piston is born by an axial thrust ball bearing, the hand wheel is non-rising, whereas the Stem is rising.

The position of the piston can be seen through the acrylic glass windows within the stem sleeve (2) . The stem thread is self-stopping, the valve shuts tight in both directions of flow.

Up to DN 65 the valve can be operated via a hand lever as an alternative design to shorten operating times. Further on stem extensions with universal joints are available for sizes up to DN 80.



3.2 remote controlled valves

The actuation of remote controlled GÄBLER-piston slide valves can be done on the one hand with the medium that's flowing within the pipeline (own medium) or with an auxiliary medium like compressed air. The actuation can be realized single or double acting, the fail position can be chosen between open and closed.

The remote actuation is controlled with a solenoid valve (8). If the electrical power is switched on, the own medium pressure gets through the pressure connection in the pneumatic cover (9) under the piston and lifts it against the force of the compression spring. The diameters of the piston are chosen in way that the piston can be operated with comparatively low pressures with own medium. Left hand an example of an own medium operated valve with a closing spring is shown with a stainless steel control tube including a 3/2-directional solenoid valve, a pressure reducer (7) as well as an additional small piston valve (6) for test purposes.

Characteristics of the GÄBLER-piston slide valve

The **GÄBLER-piston slide valve** shows some advantages, that make him first choice for all shut-off problems in pipelines for oxygen, technical gases and neutral liquids.

The body material is exclusively made of cast bronze, all other components that are in contact with the flowing medium are made of copper alloys, too.

Especially for pipelines for gaseous oxygen the hazard of an ignition of the pipeline materials is high. A sudden combustion might occur if particles like welding pearls, swarfs or major rust particles hit the surface with a sufficient impact leading to a sudden oxidation of the surface. According to the recommendation of the EIGA document 13/02/E the flow velocity is limited for oxygen pipelines. With exempt materials materials like tin bronze the flow velocity can be increased and is not limited up to a pressure of 21 MPa.

Therefore the choice of tin bronze (without aluminium content) for oxygen pipelines is, due the **excellent heat conductivity** and the **low thermal energy set free at the oxidation of bronze** is of decisive importance and a fundamental aspect of safety.

The piston is is guided on both ends for high reliability. The concept of the GÄBLER-piston slide valve includes a short piston stroke and the possibility of a smooth and slow opening as well as a **very fast closing**.

GÄBLER-piston slide valves can be operated with the pipeline medium (own medium operation) with no additional pneumatic energy such as instrument air or nitrogen.

Another decisive advantage of the **GÄBLER-piston slide valve** is, that **the replacement of liners or sealing elements**, if ever necessary, **is possible without dismantling the piston slide valve body from the pipeline**.

If the flowing medium is free of abrasive mineral dust, dirt and rust particles the **GÄBLER-piston slide valve will show almost no wear**.

All **GÄBLER-piston slide valves for oxygen** are degreased carefully within an ultra-sonic degreasing bath before they are assembled and are tested for tightness in the valve seat and towards the atmosphere.

The **GÄBLER-piston slide valve** is a **modular construction system**, which makes it possible to shift the mode of operation later on reusing the most parts one assembled.

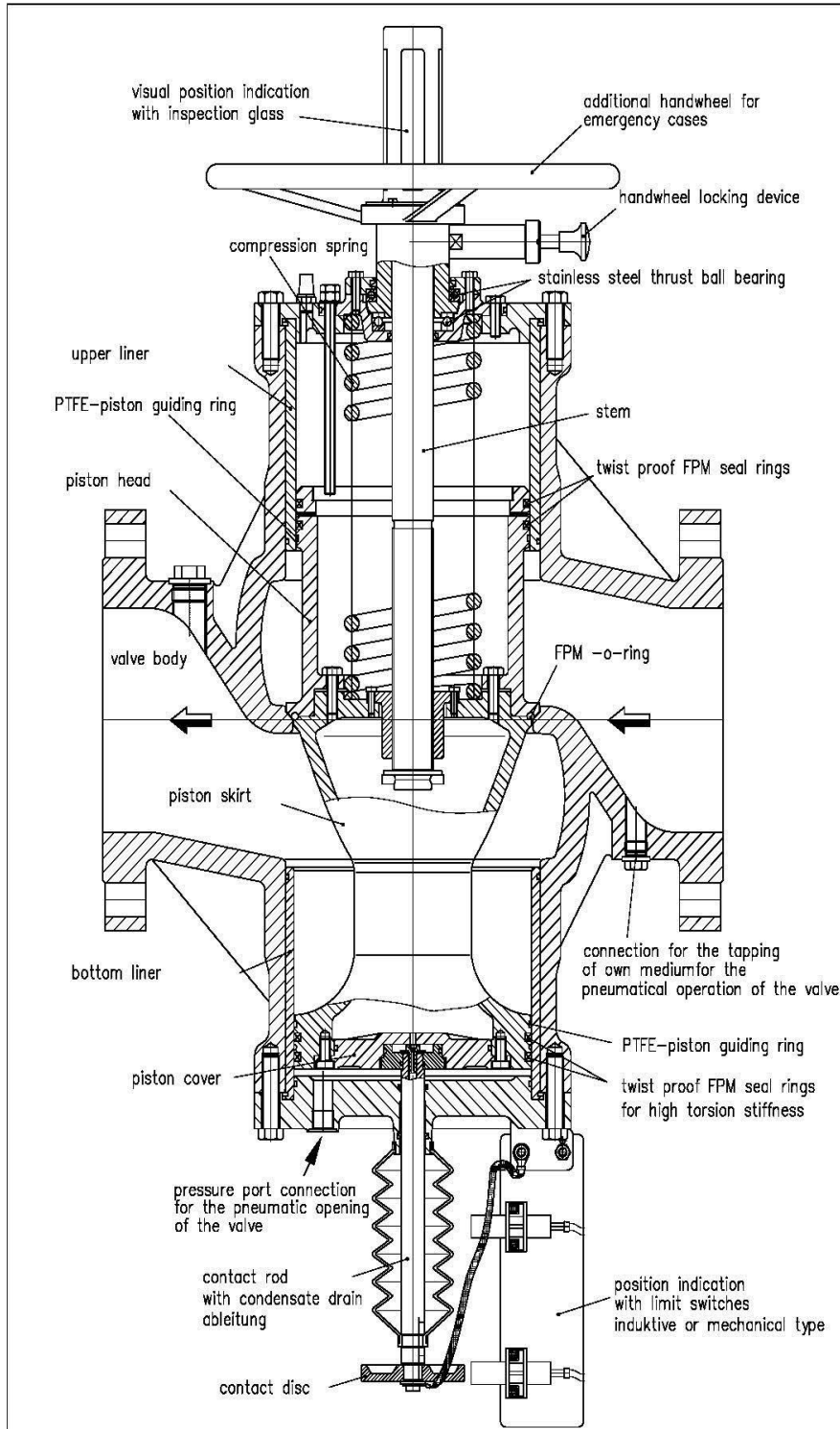
Further on just as some examples for other optional valve design types it is possible to chose the valve as :

- Piston slide valve with additional actuator cylinder for the operation with auxiliary medium
- Piston slide valve combination with intermediate deaeration as double block and bleed valve
- Piston slide valve with a pressure switch or with switch board cabinet as pipe burst sentinel
- Piston slide valve in special design according to customer's request
- Piston slide valve with actuation through bevel gear drive or through AUMA multi-turn actuator

Standard-length FTF for GÄBLER-Piston slide valves follows EN 558-1/2.

Basic pattern 1 is used for valves up to pressure class PN 40 / ASME 300, basic pattern 2 is used for valves in pressure class PN 63 / PN 100 or Class 400 / Class 600.

**CROSS SECTION DRAWING of an own medium operated
GAEBLER piston slide valve:
DN 200 PN 40 type GKV 660**



Description: remote controlled valve, opened by own medium, closed by compression spring, add. emergency manual operation, position indication with mechanical limit switches

FLOW CHARACTERISTICS
for
GAEBLER-PISTON SLIDE VALVES

DN	Kvs-value [m³/h] Single valves	ζ-value (single valves)
15	4,2	4,59
20	7,5	4,55
25	13,8	3,28
32	19,1	4,6
40	35,6	3,23
50	53,7	3,47
65	90,5	3,49
80	134	3,65
100	212	3,56
125	213	8,61
150	501	3,23
200	725	4,87
250	1280	3,82
300	1630	4,87
350	1630	9,03
400	2800	5,22

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