

# Safety - shut-off ball valve Series 51b for Block & Bleed Applications

## Application:

Tight closing, shut-off ball valve made of non-corrosive materials for aggressive media, especially as exchangeable unit for block & bleed shut-off device in chemical plants for:

- Nominal diameter DN 15 to DN 150 and 1/2" up to 6".
- Nominal pressure PN 10 to PN 40 also class 150 and 300.
- Temperature -60°C up to 200°C.

The control valve consists of a special reliable shut-off ball valve, with integrated connecting bleed flange, pneumatic multi-turn actuator, and a manual gearbox or hand-lever.

The safety shut-off ball valve combines the functions of 3 shut-off valves, block & bleed configuration in 1 valve.

- 2 shut-off (block) with safety position „CLOSED“.
- 1 shut-off (bleed) with safety position „OPEN“.

The appliances in modular assembly design, have the following special features:

- Body, ball and control shaft made of stainless steel, nickel, titan and other non-corrosive materials.
- Sealing rings spring loaded, both sides.
- Exchangeable sealing strips in TFM.  
Control shaft, sealed by a pre-loaded spring washer V-ring packing.
- „OPEN-CLOSED“ - operation with a special low leakage flow rate „bubble tight design“.
- Blow out proof control shaft.
- Connecting flange for actuator according to DIN ISO 5211.
- Face-to-face dimension DIN EN 558, Series 1 (except for DN 15 und 1/2").

## Design:

Ball valve series 51b optionally in the following designs:

- Ball valve with hand-lever.
- Ball valve with manual gear-box.
- Ball valve with pneumatic multi-turn actuator.  
(for details see the respective data sheet).

## Special designs:

- Body or other parts made of special materials (monel, hastelloy, etc.).
- Double stuffing box with test port.
- Fire-safe design.
- Heating jacket, steel or stainless steel with different adaptations.
- Flange nut according to DIN EN 1092.
- Metal sealing in through passage.
- High temperature design.
- Bleed-connection with different adaptations.
- additional dimensions and nominal diameters (also acc. ANSI) are possible on request.



Fig. 1 - Shut-off ball valve series 51b with AT-multiturn actuator series 31a

# Shut-off ball valve series 51b

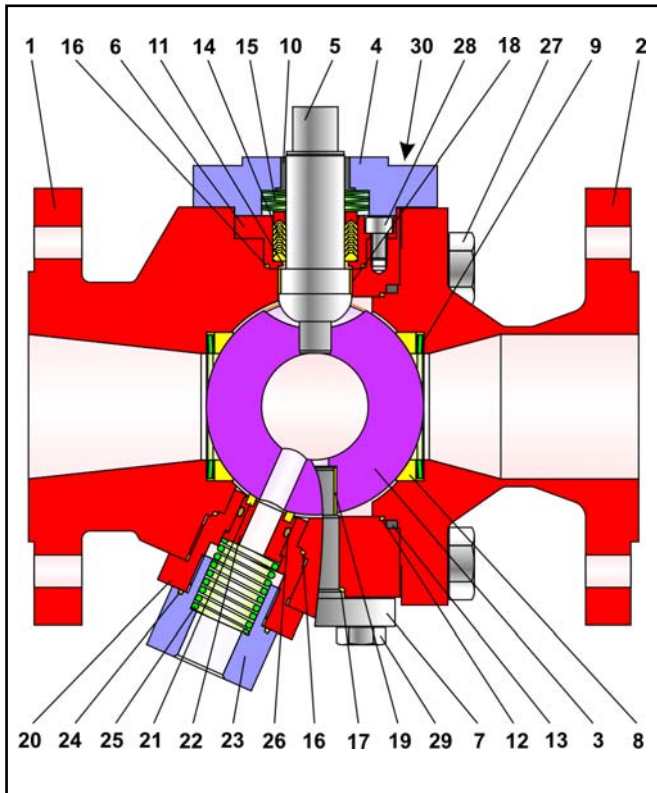


Fig. 2 - Sectional drawing of the shut-off ball valve series 51b

Pos.	Description	Pos.	Description
1	Main body	16	O-ring
2	Side body	17	O-ring
3	Ball	18	Bearing bush
4	Stuffing box flange	19	Bearing bush
5	Control shaft	20	Adapter body
6	Sleeve	21	Ring sleeve
7	Lower bearing stud	22	Retainer
8	Sealing ring	23	Threaded support
9	Spring washer	24	O-ring
10	Bearing bushing	25	Pressure ring
11	Bearing bushing	26	O-ring
12	PTFE-ring	27	Hexagon screw
13	Carbon-ring	28	Allen screw
14	V-ring packing	29	Hexagon screw
15	Spring washer set	30	Screw

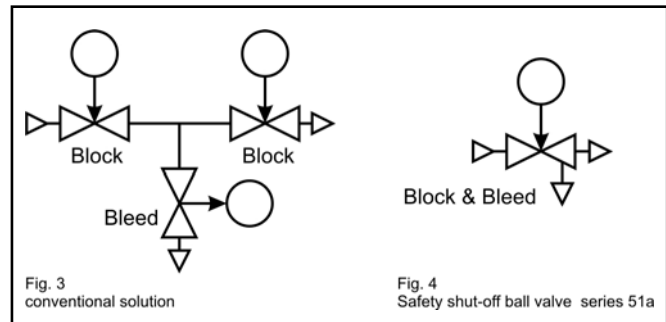
Table 1 - Parts list

## Additional equipment and mounting parts:

For the control valve the following accessories are available, either separately, or in combination:

- Control shaft extension (100mm),
- Pneumatic and electric multi-turn actuator ,
- Positioner, Samson 3730 for ESD application,
- Limit switch
- Solenoid magnet valves,
- Filter - regulators, further attachments are available according to customer specifications.

## Compare the conventional solution with the safety-shut-off ball valve:

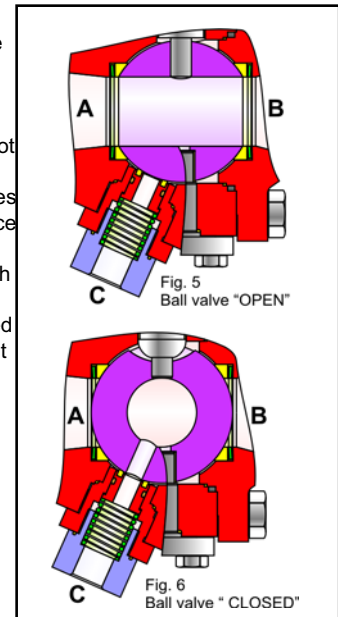


## Function- and operation mode:

The ball valves of the series 51b permits full pressure flow in both directions, i.e. the shut-off is in both directions absolutely effective. The ball ( 3 ) with its cylindrical passage, is rotatable around the middle axis. The ball is guided on both sides, through the control shaft ( 5 ) and the lower bearing stud ( 7 ).

When the ball valve is opened, both „A“ and „B“ connections are joined through the ball bore passage, and the media can flow through the ball valve. In this position the outlet port is not connected with the media flow, because the plunger seal provides complete sealing between surface of ball and plunger.

When the ball valve is closed both „A“ and „B“ connections are separated, and both spring loaded sealing rings, (block) independent of each other and maintenance free, are pressed and sealed against the surface of the ball. When the ball is in this closed position, the outlet-port is connected through the leakage bore of the ball, with the cavity between the two sealing rings.



Should a leakage occur on one or both of the main sealing rings, this is then discharged through the outlet port. Apart from the shut-off effectiveness, and high quality standard achieved through both spring loaded and independent sealing systems, an absolute intergrated leakage safeguard, in the valve is assured. Because of this system, the position of the outlet shut-off is dependent on the position of the block shut off, for which the application is especially reliable.



**Note:** Before using the ball valve in hazardous-areas, check whether this is possible according to ATEX 94/9/ EG please refer to the respective operating instructions



**Safety position:** Normally the valve is in the safety position „CLOSED“ e.g. The connection „A-B“ is then closed (blocked). The cavity between the intergrated shut-offs is then relieved through the outlet port „C“ (bleed).

### General technical data:

Nominal diameter	DN 15 up to DN 150
Nominal pressure	PN 10, 16, 25, 40 also ANSI class 150 or 300
Temperature range	-60°C up to 200°C
Ball sealing	TFM (PTFE) e.g. compound filled
Leakage rate	Leakage rate Acc. DIN EN 12266-1, test P12 (Leakage rate 1 BO acc. DIN 320 part 3)
Flange	acc. DIN e.g. ANSI
Packing	pre-loaded spring washer PTFE-V-ring packing
Dimensions	DIN EN 558-1, row 1 e.g., ASME B 16.10

Table 2 - technical data

### Material:

Main body	1.4408 / 1.4571
Side body	1.4408 / 1.4571 / 1.4404
Ball	1.4408 / 1.4571
Control shaft	1.4462
Sealing rings	TFM (PTFE)
Spring washer	1.4404 lined with PTFE-white
Stuffing box packing	PTFE - V-ring-packing with spring washers made of 1.8159
Lower bearing sleeve	PTFE with 25% glass
Top bearing sleeve	PTFE with 25% carbon
Body sealing	PTFE-white

Table 3 - Material

### Optional material:

- Control shaft and ball in special materials,
- Sealing rings in PTFE-compounds, special plastics
- metal sealing system,
- Sealing in graphite.

### Advantages of the pre-loaded sealing system:

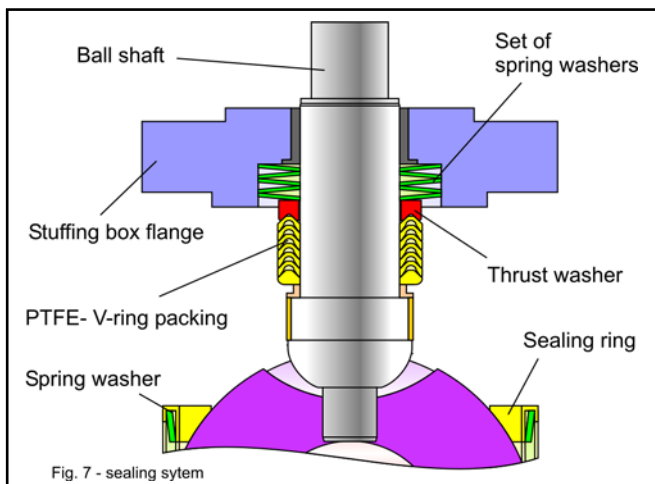


Fig. 7 - sealing system

- maintenance free, and self adjusting,
- two independent sealing rings,
- highest sealing effectiveness, even by extreme pressure and temperature variations,
- longer service life,
- reduced increase in torque by rising temperature therefore, smaller actuator for automation required,
- reduced torque, by higher pressure differences,
- **conclusion: much more reliable shut-off!**

### Pressure - Temperature - diagram:

The range of application is determined by the pressure - temperature-diagram.

Process data and media can affect the values in the diagram.

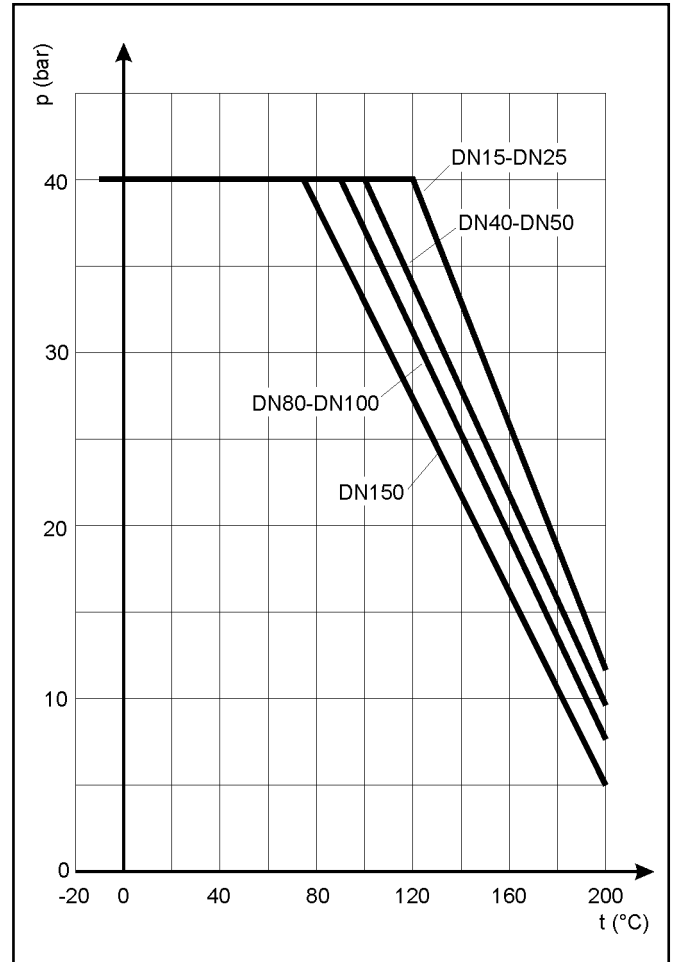


Fig. 8 - Pressure - Temperature diagram

### Torque and breakaway torque:

Pressure difference $\Delta p$ in bar		0	10	16	25	40
DN	Mdmax. in Nm	Mdl in Nm				
15	240	15	20	25	30	35
25	240	15	20	25	30	35
50	450	45	50	55	60	65
80	750	80	90	100	110	125
100	750	140	150	160	180	200
150	3160	330	340	350	360	380

Table 4 - max. permissible torque, required torque and breakaway torque

The breakaway torques specified are average values, which were measured with air at 20°C with the corresponding differential pressures. Operating temperature, process media, and long operating periods may affect the permissible torque and breakaway torques considerably.

## Dimensions:

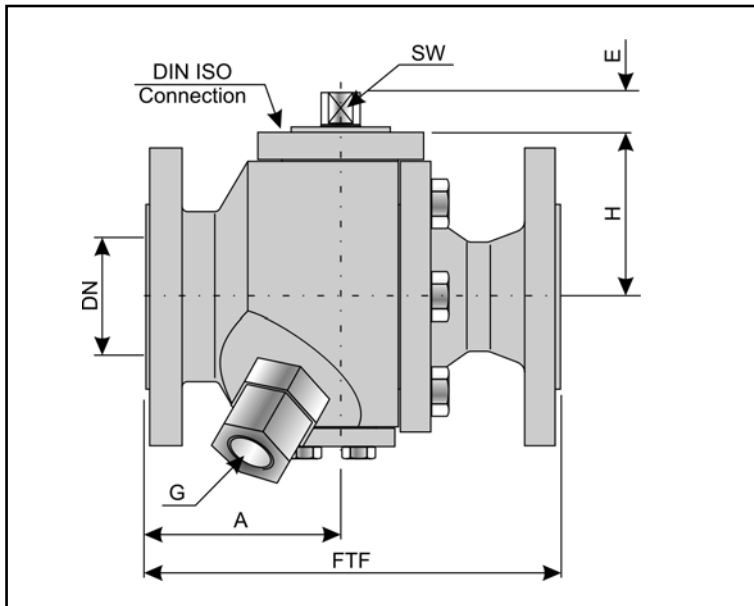


Fig. 10 - Dimensional drawing

DN	15	25	50	80	100	150
PN	40	40	40	40	16 - 40	16 - 40
FTF	160	160	230	310	350	480
A	77	77	108	115	120	240
H	58.5	58.5	91	130	143	212
E	19	19	22	26	26	37
G	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 3/4"	G 3/4"
SW	14	14	17	19	19	30
DIN ISO Connection	F05	F05	F07	F10	F10	F14

DN	1/2"	1"	2"	3"	4"	6"
Class	300	300	300	300	300	300
FTF	165	165	216	283	305	403
A	82.5	82.5	108	141.5	152.5	201.5
H	58.5	58.5	91	130	143	212
E	19	19	22	26	26	37
G	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 3/4"	G 3/4"
SW	14	14	17	19	19	30
DIN ISO Connection	F05	F05	F07	F10	F10	F14

Table 5 - Dimensions in mm

## Selection and sizing of the ball valve:

1. Determine the required nominal size.
2. Select the valve in accordance with table 2, table 3 and the pressure-temperature diagram
3. Select the actuator acc. to table 4.
4. Select additional equipment/accessories

## Ordering text:

Safety shut-off ball valve series: 51b,  
DN . . . . / PN . . . . ,  
poss. special version

Actuator (manufacturer): . . . .  
Air supply: . . . . bar,  
Safety position: „CLOSED“ (standard version)

Limit switch (manufacturer): . . . .  
Solenoid valve (manufacturer): . . . .  
Positioner (manufacturer): . . . .

Others: . . . .



**Note:** All relevant details regarding the version ordered, which deviate from the specified version in this technical description data, can be taken if required, from the corresponding order confirm.



**Note:** DN 15 and 1/2" are currently only available in face-to-face dimension 160 mm.

For your special requirements, please contact our technical sales department.

# Pfeiffer Chemie-Armaturenbau GmbH

Hooghe Weg 41 • 47906 Kempen

Telephone: ++49 (0)2152 / 2005-0 • Telefax: 02152 / 1580

E-Mail: [vertrieb@pfeiffer-armaturen.com](mailto:vertrieb@pfeiffer-armaturen.com) • Internet: [www.pfeiffer-armaturen.com](http://www.pfeiffer-armaturen.com)

Specifications are subject to change without notice