



**BR 51b · Shut-off ball valve with dead space relief**

Ball valve for Block & Bleed application · DIN- and ANSI Version



**Application**

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

- **Nominal size DN 15 to 200 and NPS $\frac{1}{2}$  to 8**
- **Nominal pressure PN 10 to 40 as well as c1150 and c1300**
- **Temperatures -60 °C to +200 °C (-76 °F bis +392 °F)**

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

The Shut-off ball valve with dead space relief combines the functions of 3 shut-off valves, block & bleed configuration in one valve:

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

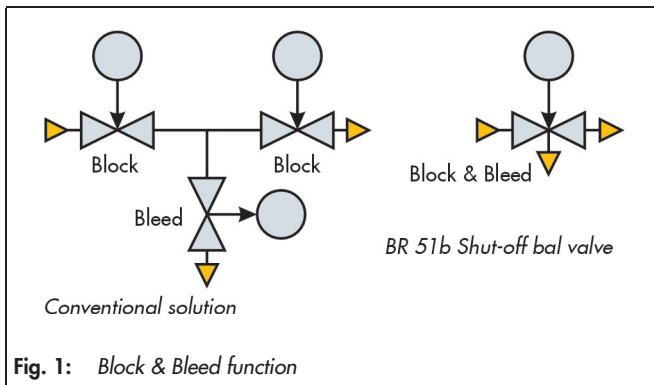


Fig. 1: Block & Bleed function

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
- Seat rings spring loaded, both sides
- Exchangeable sealing strips in PTFE
- 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 acc. to DIN ISO 5211
- Face-to-face dimension DIN EN 558, Series 1, except for DN 15 and NPS $\frac{1}{2}$



Fig. 2: BR 51b Shut-off ball valve with BR 31a Quarter-turn actuator

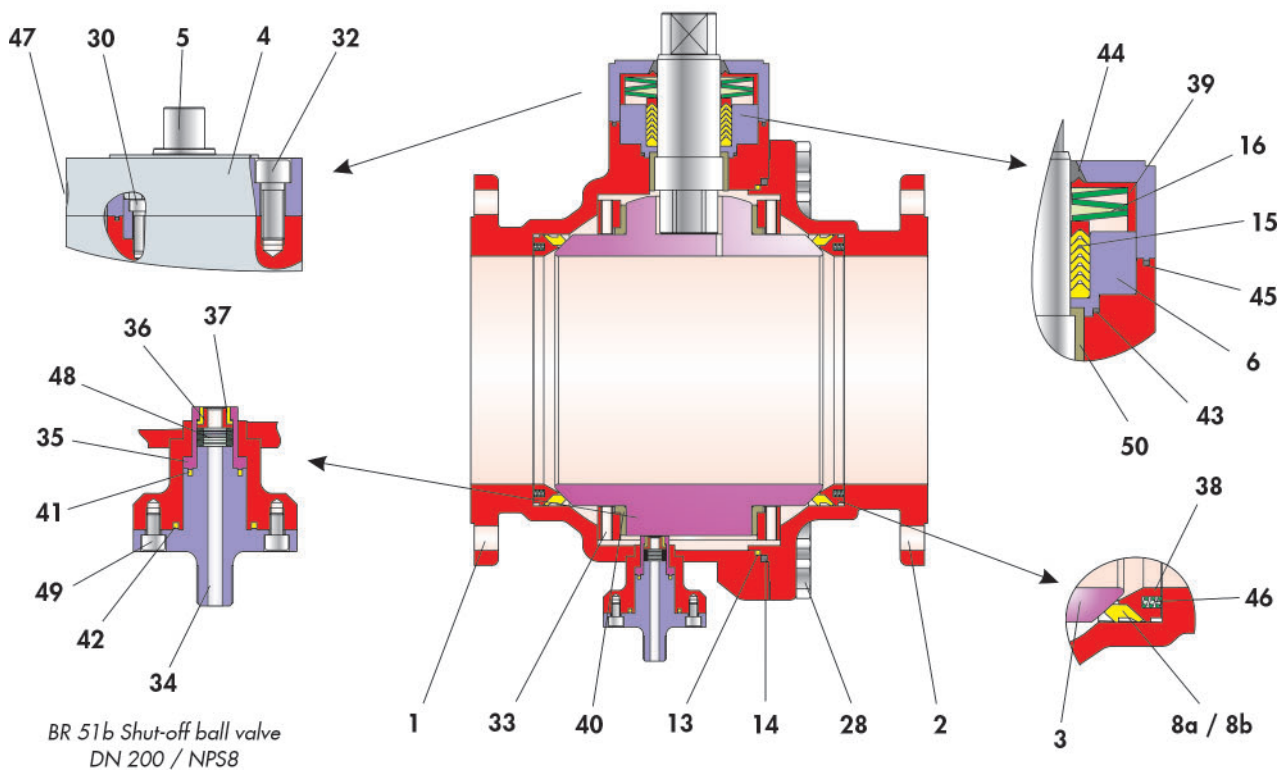
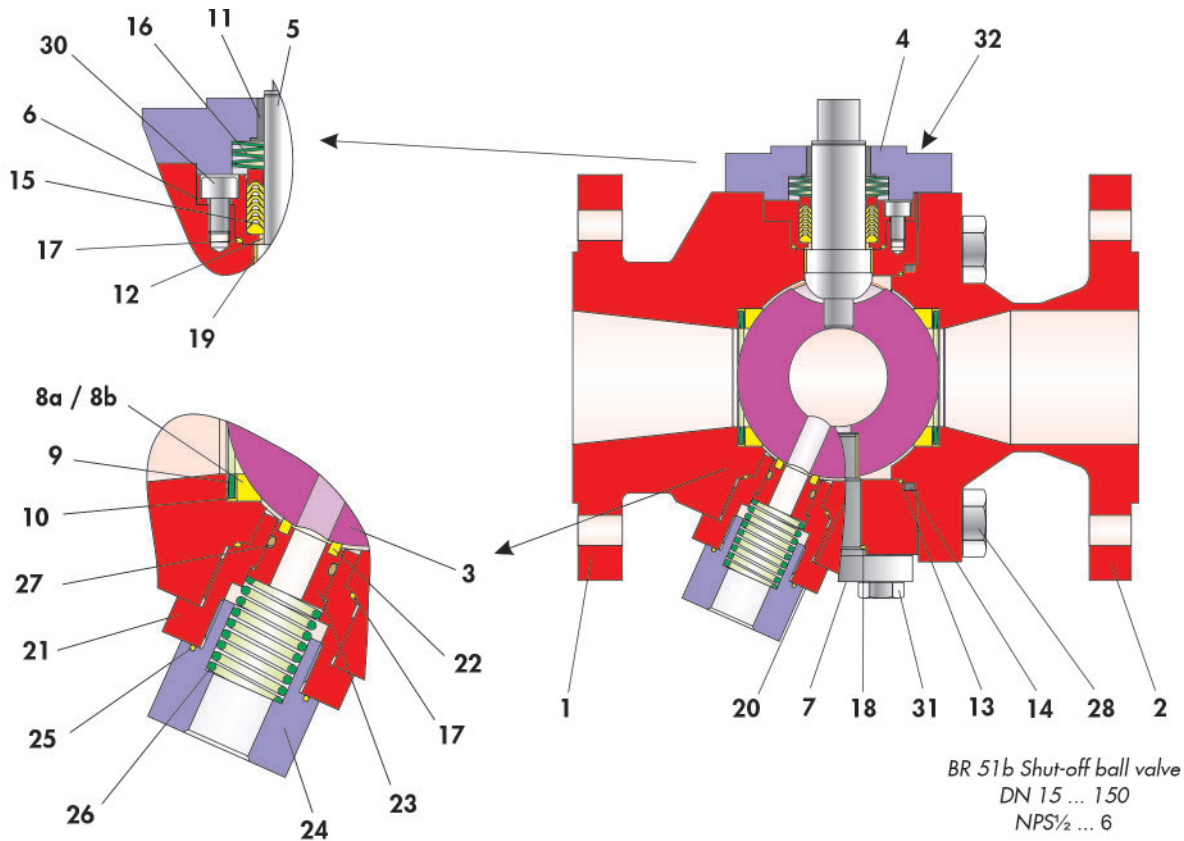


Fig. 3: Sectional drawing through a BR 51b Shut-off ball valve

**Table 1: List of parts**

Item	Description
1	Main body
2	Side body
3	Ball
4	Stuffing box flange
5	Control shaft
6	Packing bearing
7	Trunnion
8	Seat ring
9	Disc spring
10	Disc spring jacket
11	Bearing bush
12	Bearing bush
13	Sealing
14	Sealing
15	V-ring packing
16	Disc spring set
17	O-ring

Item	Description
18	O-ring
19	Bearing bush
20	Bearing bush
21	Adapter body
22	Ring sleeve
23	Retainer
24	Threaded support
25	O-ring
26	Pressure spring
27	O-ring
28 <sup>1)</sup>	Screw / Stud bolt
29 <sup>1)</sup>	Nut
30	Screw
31	Screw
32	Screw
33	Bearing shell
34	Connection housing

Item	Description
35	Sealing ring chamber (outside)
36	Sealing ring chamber (inside)
37	Sealing ring
38	Thrust ring
39	Bush
40	Bearing
41	Ring
42	Ring
43	Ring
44	Ring
45	Ring
46	Compression spring
47	Screw plug
48	Disc spring set
49	Screw
50	Bearing bush

<sup>1)</sup> Depending on the nominal width, stud bolts can be fitted with nuts or screws.

## Design

BR 51b ball valve optionally in the following designs:

- Ball valve with hand-lever (DN 15 to 100 or NPS1 to 4)
- 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
- Bleed-connection with different adaptations
- Additional dimensions and nominal diameters (also acc. ANSI) are possible on request

## Optional material

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

## Function- and operation mode

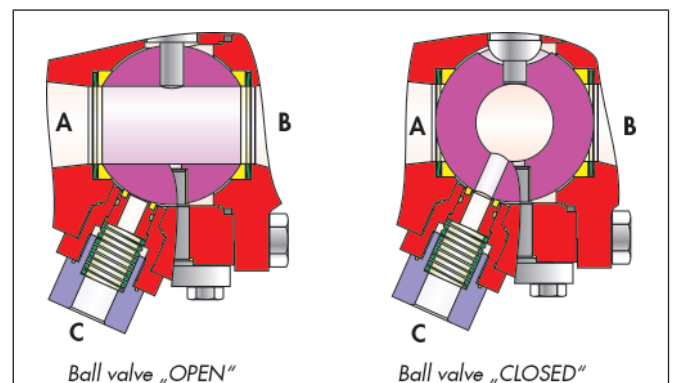
The BR 51b ball valves permits full pressure flow in both directions, i.e. the shut-off is in both directions absolutely effective.

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). The ball (3) is sealed by exchangeable seat rings (8).

The control shaft (5) is sealed by a PTFE V-ring packing (15) which is spring supported by disc springs (16) positioned above the packing.

The shaft is equipped with a lever. Optionally, a pneumatic actuator or gear-operated actuator can be assembled.

## Block & Bleed Function



**Fig. 4:** Positions of the shut-off ball valve

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 „C“ 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 seat 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 seat rings.

Should a leakage occur on one or both of the main seat 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 integrated 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.

### **i** Info

Before using the valve in hazardous areas, check whether this is possible according to ATEX 2014/34/EU by referring to the mounting and operating instructions ► EB 51b.

## Fail-safe position

Depending on assembly position of the pneumatic actuator, the valve has two fail-safe positions which become effective when the air pressure in the actuator is relieved or when the supply air fails:

### – Ball valve with fail-close actuator [FC]:

While air failure, the valve is closed. The valve opens when the signal pressure increases, acting against the force of the springs.

### – Ball valve with fail-open actuator [FO]:

While air failure, the valve opens. The valve closes when the signal pressure increases, acting against the force of the springs.

Normally the valve is in the safety position „CLOSED“ e.g. The connection „A-B“ is then closed (**blocked**).

The cavity between the integrated shut-offs is then relieved through the outlet port „C“ (**bleed**).

## Additional equipment and mounting parts

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

- Control shaft extension (100 mm)
- Pneumatic and electric multi-turn actuator
- Positioner, Samson 3730 for ESD application
- Limit switch
- Solenoid valves
- Filter-regulators

Further attachments are available according to customer specifications.

## Advantages of the pre-loaded sealing system

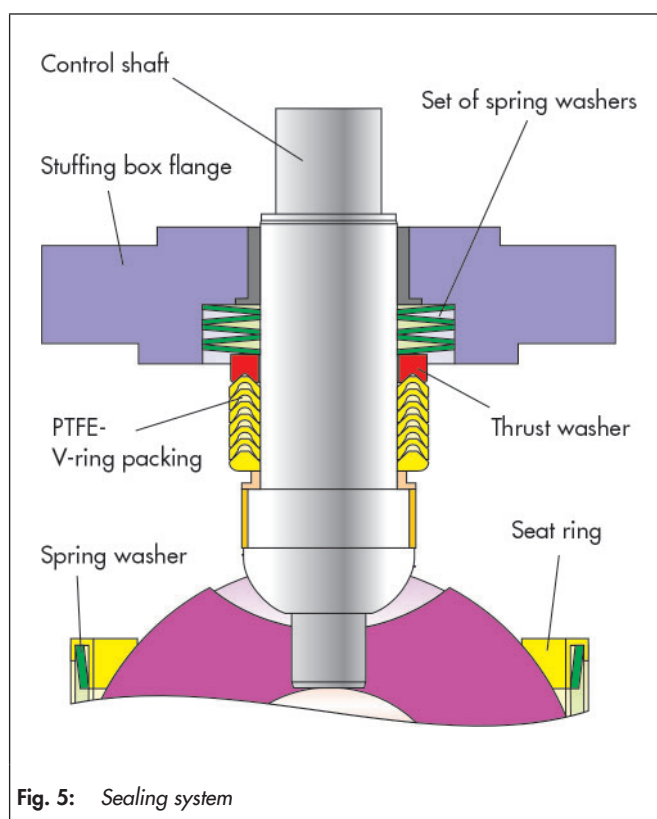


Fig. 5: Sealing system

- Maintenance free, and self adjusting
- Two independent seat 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!**

**Table 2:** General technical data

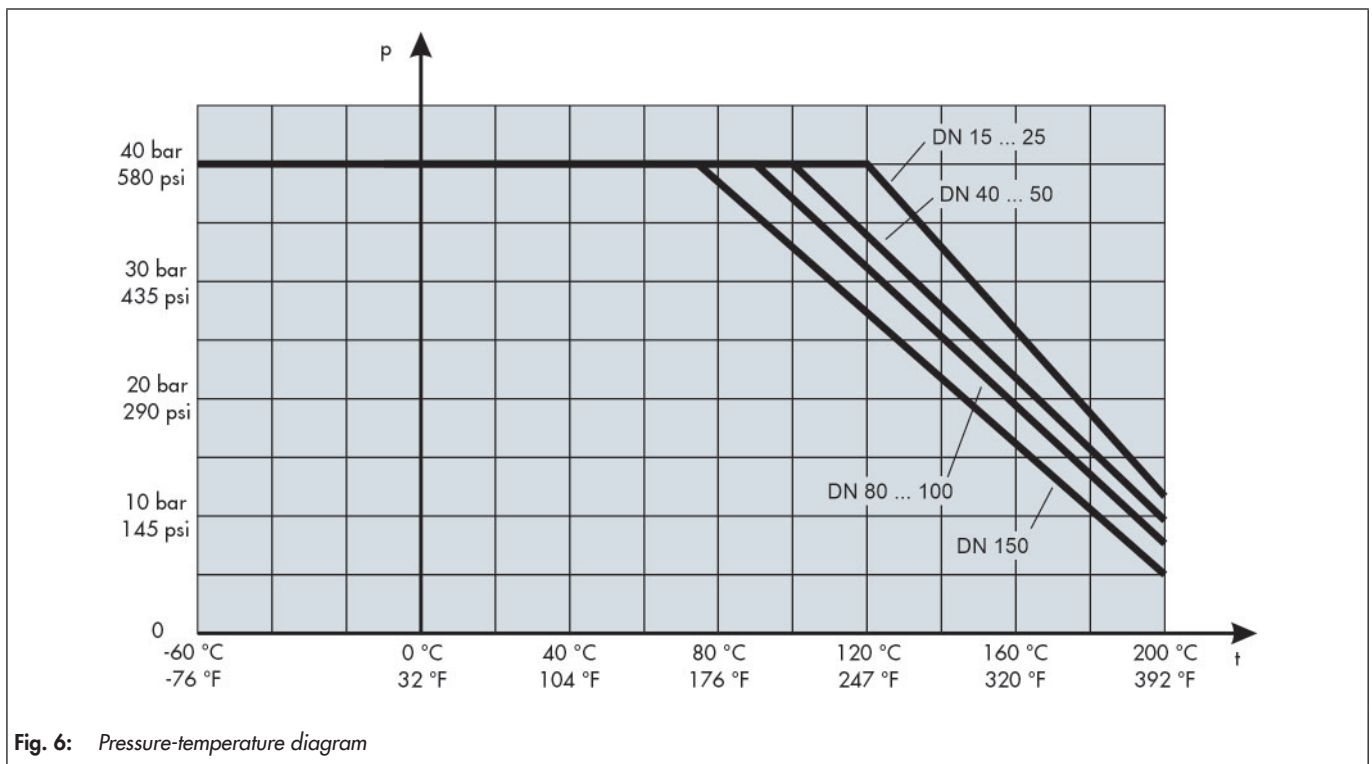
	DIN	ANSI
Nominal size	DN 15 ... 200	NPS½ ... 8
Nominal pressure	PN 10, PN 16, PN 25 and PN 40	cl150 and cl300
Temperature range	-60 °C ... +200 °C (-76 °F ... +392 °F)	
Ball sealing	PTFE e.g. compound filled	
Leakage rate	Leakage rate A acc. to DIN EN 12266-1, test P12	
Flanges	Acc. to DIN	Acc. to ANSI
Packing	PTFE V-ring packing supported by spring washers	
Face to face	DIN EN 558, row 1	ASME B 16.10

**Table 3:** Materials

	DIN	ANSI
Main body	1.4408 / 1.4571	A351 CF8M
Side body	1.4408 / 1.4571 / 1.4404	A351 CF8M
Ball	1.4408 / 1.4571	A351 CF8M
Control shaft	1.4462	A479 S3 1803
Seat rings	PTFE	
Spring washer	1.4404 lined with PTFE	
Stuffing box packing	PTFE - V-ring packing with spring washers made of 1.8159 Delta Tone coated	
Lower bearing bush	PTFE with 25% glass	
Upper bearing bush	PTFE with 25% carbon	
Body sealing	PTFE	

### 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.



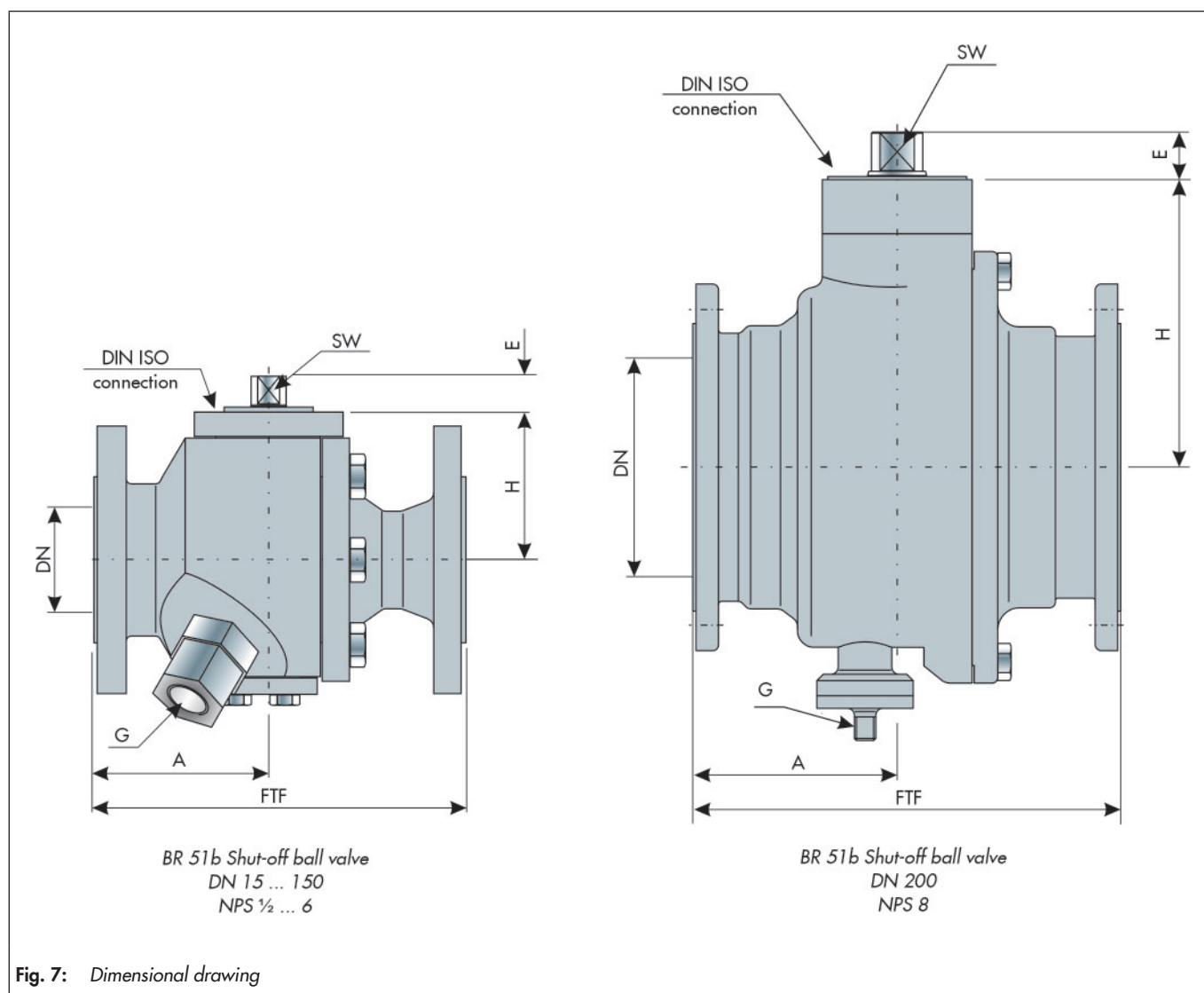
**Fig. 6:** Pressure-temperature diagram

**Table 4:** Torque and breakaway torque

Differential pressure		$\Delta p$ in bar	0	10	16	25	40
Nominal size		M <sub>dmax.</sub> in Nm	M <sub>dI</sub> in Nm				
DN	NPS						
15	½	240	15	20	25	30	35
25	1	240	15	20	25	30	35
50	2	450	45	50	55	60	65
80	3	750	80	90	100	110	125
100	4	750	140	150	160	180	200
150	6	3160	330	340	350	360	380
200	8	7156	276	523	738	999	1250

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 and Weights



**Fig. 7:** Dimensional drawing

**Table 5: Dimensions in mm and Weights in kg for the shut-off ball valve in DIN design**

Nominal size DN	15	25	50	80	100	150	200
PN	40	40	40	40	16 - 40	16 - 40	16 - 40
FTF	160	160	230	310	350	480	400
A	77	77	108	115	120	240	191
H	58.5	58.5	91	130	143	212	268
E	19	19	22	26	26	37	44.5
G	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 3/4"	G 3/4"	G 1/2"
SW	14	14	17	19	19	30	36
DIN ISO connection	F05	F05	F07	F10	F10	F14	F16
Weight	On request						165

**Table 6: Dimensions in mm and Weights in kg for the shut-off ball valve in ANSI design**

Nominal size NPS	1/2	1	2	3	4	6	8
cl	300	300	300	300	300	300	300
FTF	165	165	216	283	305	403	502
A	82.5	82.5	108	141.5	152.5	201.5	191
H	58.5	58.5	91	130	143	212	268
E	19	19	22	26	26	37	44.5
G	G 3/8"	G 3/8"	G 1/2"	G 1/2"	G 3/4"	G 3/4"	G 1/2"
SW	14	14	17	19	19	30	36
DIN ISO connection	F05	F05	F07	F10	F10	F14	F16
Weight	On request						215

**Table 7: kvs and Cv coefficients**

DN	15	25	50	80	100	150	200
NPS	1/2	1	2	3	4	6	8
kvs	12	49	178	422	610	1575	2810
Cv	14	57	207	491	709	1830	3260

### 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

Shut-off ball valve with dead space relief Type: BR 51b

Nominal size: DN / NPS . . . .

Nominal pressure: PN / cl . . . .

Possible special version:

Actuator (manufacturer): . . . .

Air supply: . . . . bar,

Safety position: „CLOSED“ (standard version)

Limit switch (manufacturer): . . . .

Solenoid valve (manufacturer): . . . .

Positioner (manufacturer): . . . .

Others: . . . .

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**i Info**

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.

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**i Info**

DN 15 and NPS $\frac{1}{2}$  are currently only available in face-to-face dimension 160 mm.

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## Associated Documents

- |                                     |          |
|-------------------------------------|----------|
| Mounting and operation instructions | ▶ EB 51b |
| Safety manual                       | ▶ SH 51b |
| Quarter-turn actuator               | ▶ TB 31a |