

Lined Control and Shut-off Butterfly Valve

Pfeiffer Type BR 10a

Pfeiffer
Chemie-Armaturenbau GmbH



Application

Tight-closing, double eccentric butterfly valve with PTFE lining for process engineering and plants with industrial requirements, especially suitable for corrosive process media

Nominal size DN 100 to DN 800
Nominal pressure PN 10
Temperatures -10 °C to 200 °C

Lined Type BR 10a Butterfly Valve with a wafer style body with

- Pneumatic actuator

Valve body material

- EN-JS1049 (formerly GGG 40.3) or
- St 52-3
- Body with a 8 to 12 mm thick PTFE lining

Butterfly disc material

- Stainless steel 1.4313, PTFE encapsulated

Further features

- Low breakaway torque and low amount of wear due to double eccentric bearing design of the shaft
- Disc can be replaced without having to remove the shaft
- TA-Luft (German clean air act) equivalent certification

Versions

Standard version (Fig. 1)

- **Type BR 10a** · PTFE-lined butterfly valve in sizes DN 100 to 800, PN 10, with pneumatic rotary actuator

Further versions

- Manual actuator
- Electric rotary actuator
- Linings with special, e.g. conductive PTFE compounds
- Conductive linings
- Special stem seal for high vacuum
- Lug type version (tapped holes)
- Closure member made from special materials such as titanium or Hastelloy
- Extension for cryogenic applications down to -50 °C

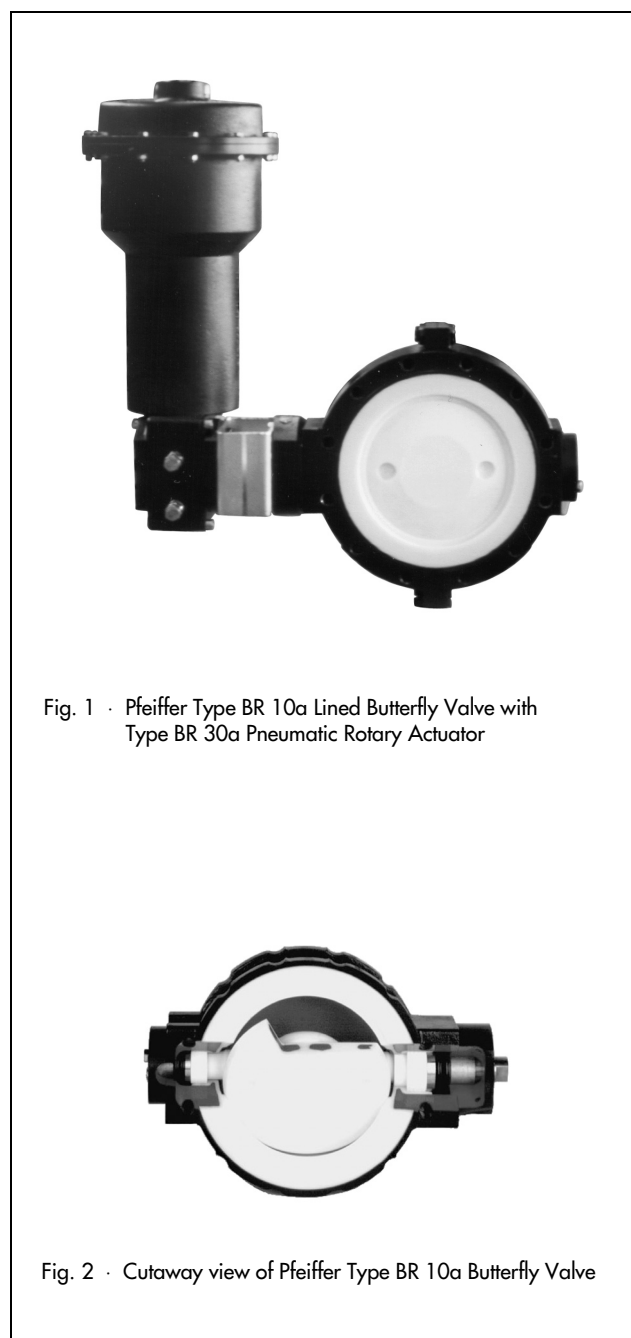


Fig. 1 · Pfeiffer Type BR 10a Lined Butterfly Valve with Type BR 30a Pneumatic Rotary Actuator

Fig. 2 · Cutaway view of Pfeiffer Type BR 10a Butterfly Valve

Principle of operation

The process medium can flow through the butterfly valve in either direction. The butterfly disc (3) determines the flow through the free area between disc and seat. The shaft (2) is sealed from both sides by a V-ring packing (9).

Butterfly valves are sealed between the butterfly disc (3) and the seat (4). The direction of flow and the differential pressure determine the breakaway torque to open the butterfly valve.

The double eccentric bearing design of the shaft causes the disc on opening and closing to remain in contact with seat only over a very small angle of rotation (see Fig. 4). This reduces wear and increases the service life of the valve. Additionally, it reduces the breakaway torque.

When the process medium flows through the valve in direction "A" (Fig. 5), the butterfly disc is slightly lifted out of the seat from a certain differential pressure onwards. This reduces the breakaway torque. On calculating which actuator is required, in this case, select the breakaway torque for direction of flow "A" listed in Table 5.

When the process medium flows through the valve in direction "B", the butterfly disc is pressed firmly into the seat as the differential pressure rises. A better tightness is achieved, however, the breakaway torque also increases, as shown in Table 5.

Fail-safe position

Depending on how the pneumatic rotary is attached to the butterfly valve, the valve has two fail-safe positions which become effective when the actuator is relieved of pressure or when the supply air fails:

Valve CLOSED without supply air,
the butterfly valve closes when the supply air fails.

Valve OPEN without supply air,
the butterfly valve opens when the supply air fails.

Pressure-temperature diagram

The operating pressures specified are limited by the pressure-temperature diagram. Should the effective values be above the limit curve, please contact us for further advice.

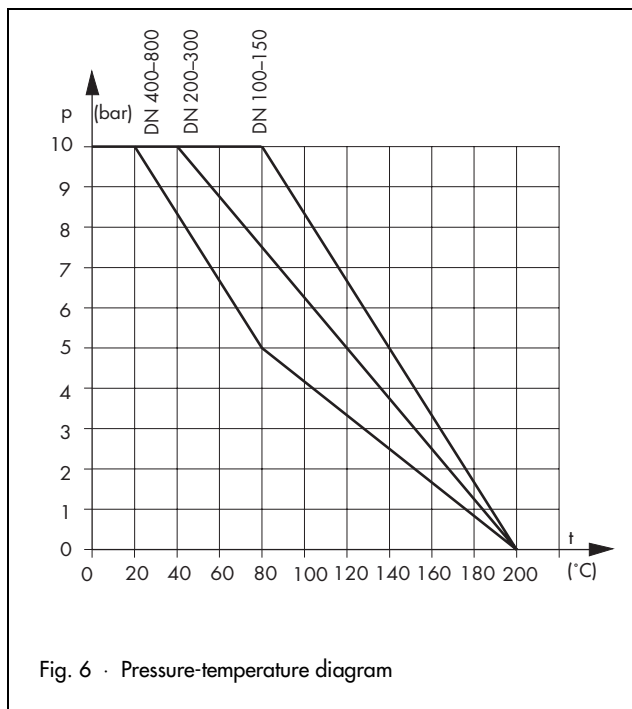


Fig. 6 · Pressure-temperature diagram

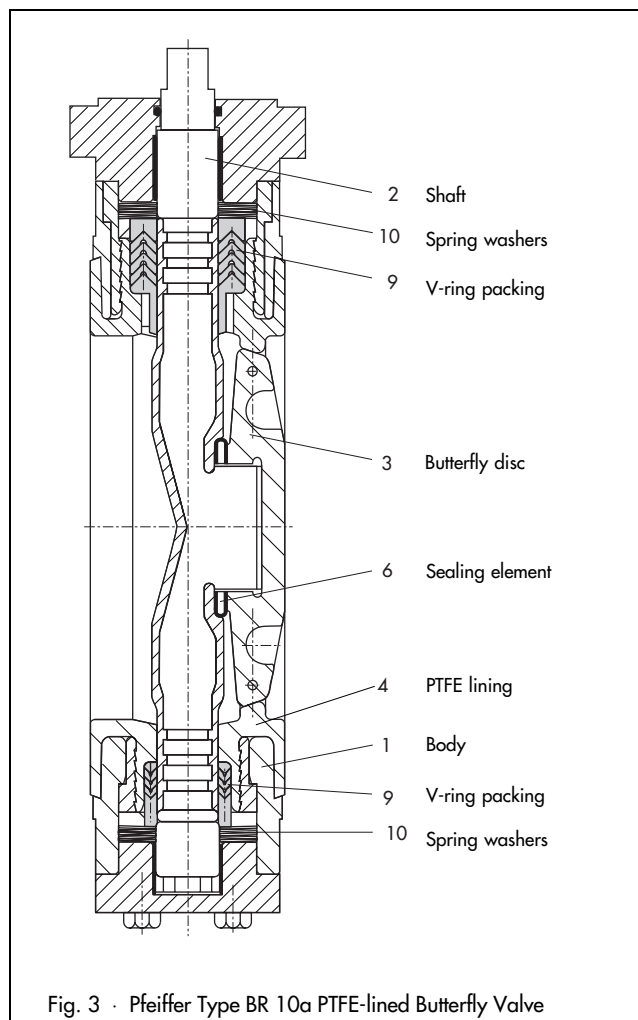


Fig. 3 · Pfeiffer Type BR 10a PTFE-lined Butterfly Valve

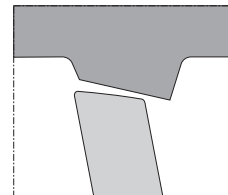


Fig. 4 · Opening phase of the butterfly disc

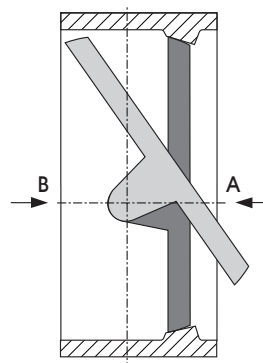


Fig. 5 · Direction of flow "A" for throttling service or "B" for shut-off service

Table 1 · Technical data

Nominal size	DN 100 to DN 800
Nominal pressure	PN 10
Connection	Can be mounted between flanges PN 10 or ANSI Class 150
Rangeability	50 : 1
Temperature range	See pressure-temperature diagram
Leakage	
Leakage class acc. to DIN EN 1349	Direction of flow "B": VI · Direction of flow "A": IV (VI on request)
Sealing effectiveness to the outside	$<10^{-6} \frac{\text{mbar l}}{\text{s}}$

Table 2 · Materials

Nominal size	DN	100	100 to 300	400 to 800
Body	Wafer	St 52-3 · 1.0570	EN-JL1049 · 0.7043	
	Lug type	St 35-2		EN-JS1049 · 0.7043
Lining	White PTFE			
Butterfly disc	Stainless steel 1.4313, PTFE encapsulated			
Shaft	1.4313, PTFE encapsulated			
Packing	PTFE V-ring packing · Spring washer 1.8159 Delta Tone coated, maintenance-free			

Table 3 · K_v values and associated opening angles

DN	Opening angle								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
100	7	24	48	79	120	161	211	232	240
150	21	70	140	231	350	469	616	679	700
200	42	139	278	459	695	931	1223	1348	1390
250	68	227	454	749	1135	1520	1998	2200	2270
300	100	334	668	1102	1670	2238	2939	3240	3340
400	183	610	1220	2013	3050	4087	5368	5917	6100
500	288	962	1924	3175	4810	6445	8465	9331	9620
600	415	1385	2771	4572	6926	9281	12177	13473	13853
800	737	2463	4925	8128	12314	16499	21674	23887	24627

Table 4 · Terms for control valve sizing and noise level calculation

Opening angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
F_L	0.95	0.95	0.92	0.82	0.74	0.67	0.61	0.57	0.54
x_T	0.75	0.75	0.73	0.57	0.47	0.38	0.31	0.28	0.25
x_{Fz}	0.35	0.30	0.25	0.20	0.17	0.15	0.13	0.12	0.11

Correction terms with liquids: $\Delta L_F = 0$ Correction terms with gases and vapors: $\Delta L_G = 0$

Table 5 · Maximum permissible torque M_{dmax} and breakaway torque M_{dl} in Nm

The required torques specified are average values which were measured with water at 20 °C at the corresponding differential pressures. Operating temperature, process medium and long operating times may affect the torques considerably. The closing torques is increased by 20 % when dry gas is used.

DN	Torque M_{dmax}	Permissible differential pressure (corresponds to the operating pressure) at				
		Direction of flow "A"		Direction of flow "B"		
		0 bar	1 bar	2 bar	3 bar	5 bar
		Breakaway torque M_{dl}				
100	198	40	40	44	48	55
150	594	83	95	108	120	145
200	1549	148	177	207	236	296
250	2816	231	288	346	404	520
300	3947	332	432	532	632	On request
400	5295	800	828	On request		
500	9740	924	On request			
600	10680	1300	On request			
800	29896	On request				

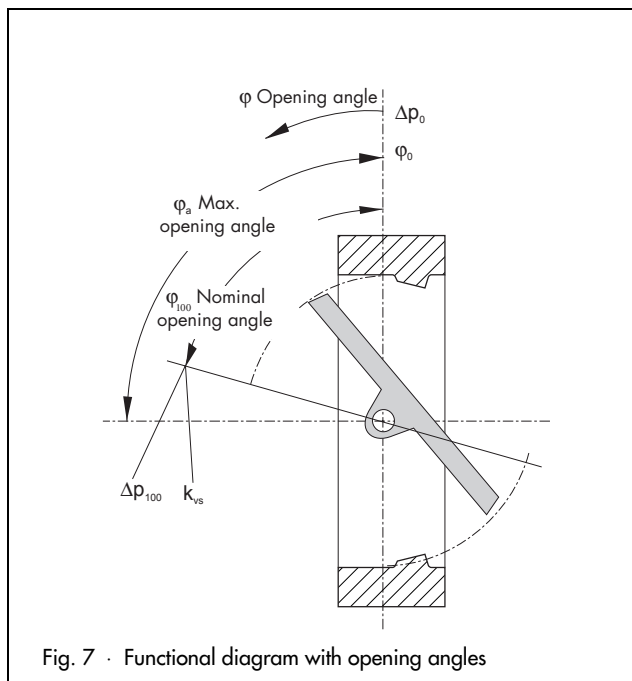


Fig. 7 · Functional diagram with opening angles

Selecting and sizing the butterfly valve

1. Calculate the appropriate K_v value.
2. Select the nominal size and the K_{vs} value acc. to Table 4.
3. Select a suitable actuator according to Table 4.
4. Select PTFE materials and pressure-temperature diagram.

Following details are required on ordering:

Nominal size	DN
Nominal pressure	PN
Body material	Acc. to Table 2
Direction of flow	"A", standard direction of flow for throttling service "B", reverse direction of flow for shut-off service
Actuator	Type ...
Fail-safe position	Valve CLOSED or OPEN
Supply air bar
Operating range	Number of springs
Operating pressure bar
Temperature of medium °C
Medium dry or lubricating	

Specifications subject to change without notice.

Table 6 · Dimensions in mm and weights

Nom. size DN	100	150	200	250	300	400	500	600	800
L (DIN 3202-3, R-K3)	64	76	89	114	114	140	152	178	241
A	131	163	206	264	287	344	425	488	598
B	112	153	195	226	280	324	391	478	584
∅-D1	164	228	283	340	388	588	687	780	1015
∅-F	35	70	85	100	100	130	130	200	200
SW Width across flats	12	16	20	24	24	32	34	45	56
∅-d	20	21	28	36	41	45	57	65	90
Connection	F05	F10	F12	F14	F14	F16	F16	F25	F25
Weight approx. kg	7	16	24	40	55	100	170	On request	On request

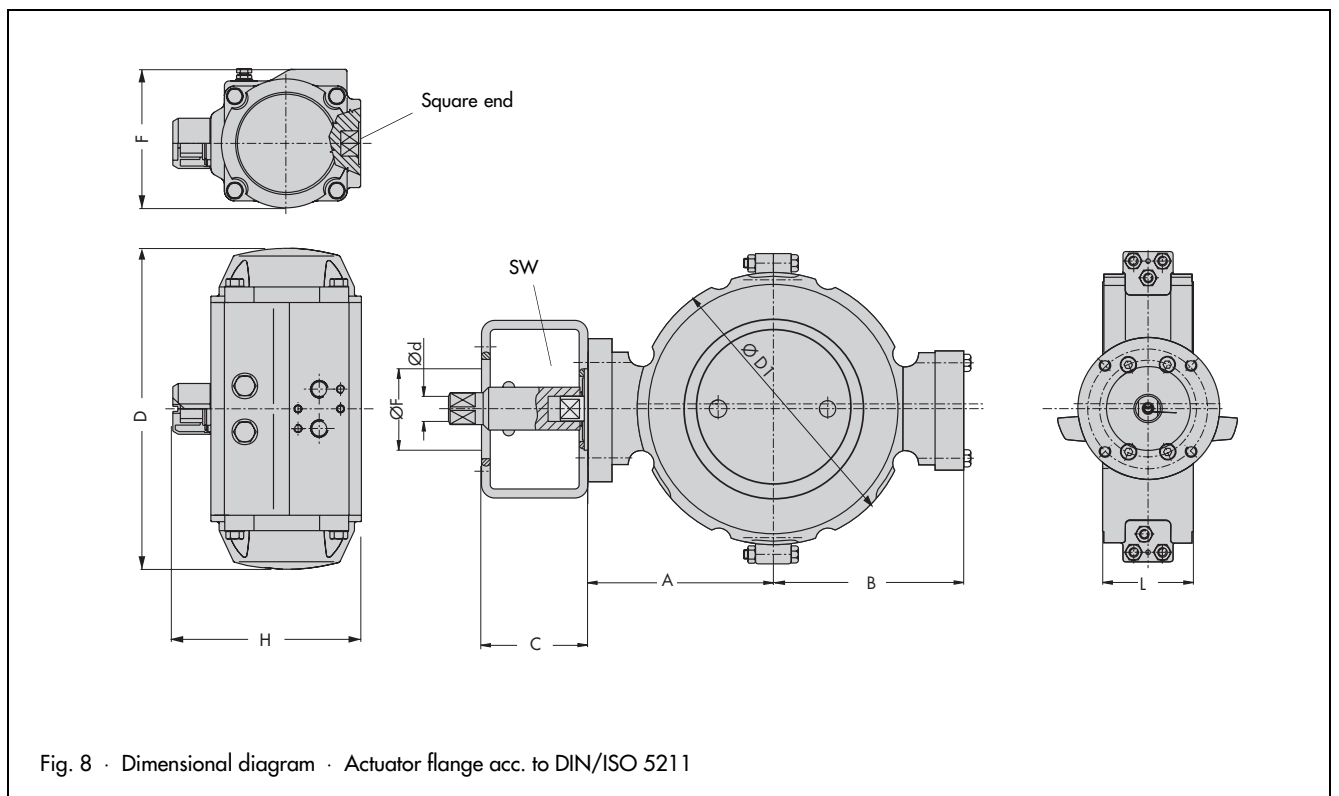
Note: Flange gaskets are required on installing the butterfly valve in the pipeline.

Table 7 · Type BR 31a-SRP Rotary Actuator · Dimensions in mm and weights

Rotary Actuator	150	220	300	450	600	900	1200	2000	3000	5000
D	269	315	345	409	438	487	543	621	684	On request
H	147	175	187	207	226	271	295	349	380	
F	123	141	152	172	187	204	222	262	330	
Connecting flange acc. to DIN 3337	F07	F10	F10	F12	F12	F14	F14	F16	F16	
Square end	17	22	22	27	27	36	36	46	46	
Weight approx. kg	6.5	10	13	18.5	24	32	46	65	103	

Table 8 · Mounting kit acc. to DIN/ISO 5211 for Type BR 31a Rotary Actuator · Dimensions in mm

Valve	F05	F05	F07	F05	F07	F10	F05	F07	F10	F07	F10	F14	F10	F14
Actuator	F05	F07	F07	F10	F10	F10	F12	F12	F12	F14	F14	F14	F16	F16
C mm	60			80						90			120	





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