

Pneumatic Control and Shut-off Butterfly Valve

Pfeiffer Type BR 14b/31a and Type BR 14c/31a



Application

Tight-closing, double eccentric butterfly valve for process engineering and plants with industrial requirements

Nominal size DN 80 to 600 · 3" to 24"

Nom. pressure PN 10 to 40 · ANSI Class 150 and 300

Temperatures -196 to 400 °C · -320 to 752 °F

Double eccentric Type BR 14b/14c Butterfly Valve with single-acting Pfeiffer Type BR 31a-SRP Actuator.

Valve body material

- Steel or
- Stainless steel

Body style

- Wafer or lug type

Sealing

- Soft sealing or
- Metal sealing

Further features

- Low breakaway torque and low amount of wear due to the double eccentric bearing design of the shaft
- Extended valve neck to allow easy installation in insulated pipelines
- TA-Luft (German clean air act) packing
- Continuous sealing face assured by mounting ring attached without screws
- Blow-out proof shaft
- Soft seat rings can be replaced with metal seat rings on site
- Face-to-face dimensions can be changed by using different mounting rings

The control valves can be equipped with various accessories: positioners, solenoid valves and other components according to VDI/VDE 3845.

Versions

Standard version (Fig. 1) · Butterfly valve with single-acting Pfeiffer Type BR 31a-SRP Rotary Actuator (see T 9929 EN) in DN 80 to 400

- **Type BR 14b/31a** · Cast valve with seat ring made of PTFE with 20 % glass for temperatures from -10 to 200 °C (14 to 392 °F)
- **Type BR 14c/31a** · Full-mold cast valve with metal seat ring for temperatures from -10 to 350 °C (14 to 662 °F)

Further versions

- DN 500 and DN 600 (20" and 24") on request
- Facing with groove (only with series 16 and 25 of EN 558)
- Adjustable packing
- Double packing

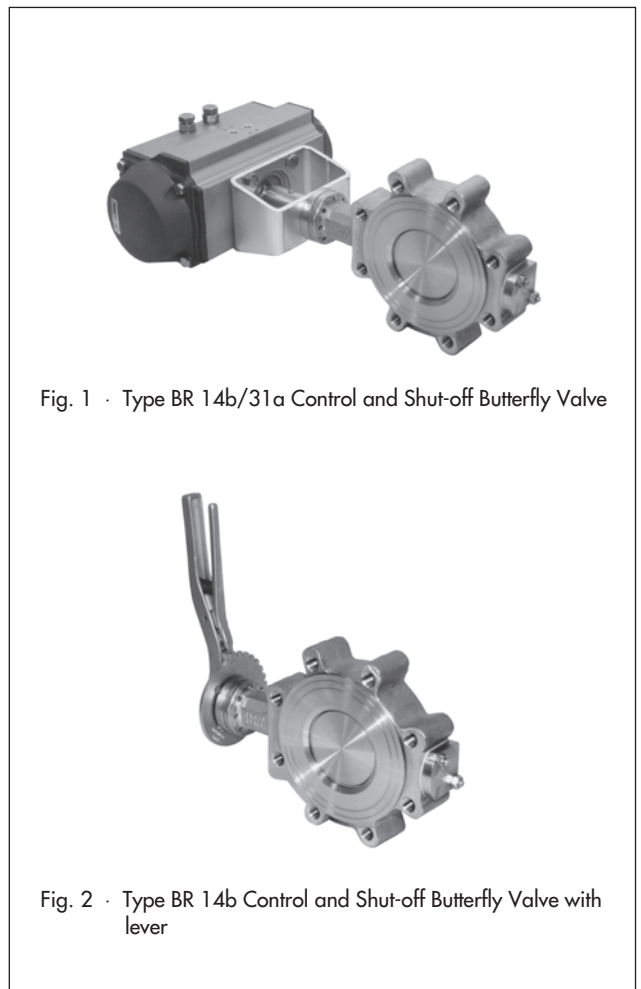


Fig. 1 · Type BR 14b/31a Control and Shut-off Butterfly Valve

Fig. 2 · Type BR 14b Control and Shut-off Butterfly Valve with lever

- Primary seal with O-ring
- For high temperatures (+400 °C · 752 °F)
- For cryogenic applications (-196 °C · -320 °F)
- Special materials
- Double-acting Pfeiffer Type BR 31a-DAP Rotary Actuator
- Electric actuator
- Lever with locking plate up to DN 150 · 6" (Fig. 2)
- Manual gear

Principle of operation (Fig. 3)

The process medium can flow through the butterfly valve in either direction. The position of the butterfly disc (3) determines the flow across the free area between disc and body (1). The shaft (2) is sealed by a PTFE V-ring packing (9) which is loaded by Belleville spring washers (10) on top of the packing chamber and requires no maintenance.

Butterfly valves are sealed between the disc (3) and seat. The direction of flow as well as the differential pressure determine the breakaway torque required to open the valve. The double eccentric bearing design has the effect that the disc only remains in contact with the seat over a very small angle of rotation as it opens and closes. This reduces wear and increases the service life of the valve. Additionally, it reduces the breakaway torque.

Direction of flow (Fig. 3)

The direction of flow "A" is recommended for throttling service, whereas the direction of flow "B" is recommended for shut-off service.

Fail-safe position

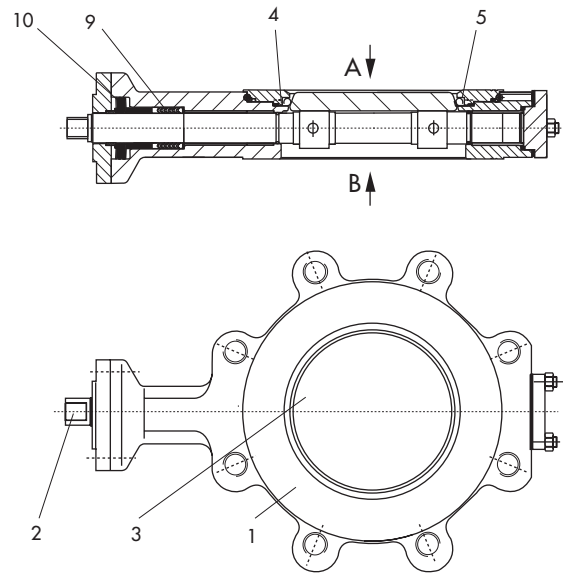
Attached to the Type BR 31 a-SRP Rotary Actuator, the butterfly valve has two fail-safe positions which become effective when the piston is relieved of pressure as well as when the supply air fails:

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.



- | | | | |
|---|-----------|----|---------------------------|
| 1 | Body | 5 | Mounting ring |
| 2 | Shaft | 9 | V-ring packing |
| 3 | Disc | 10 | Belleville spring washers |
| 4 | Seat ring | | |

Fig. 3 · Lug type

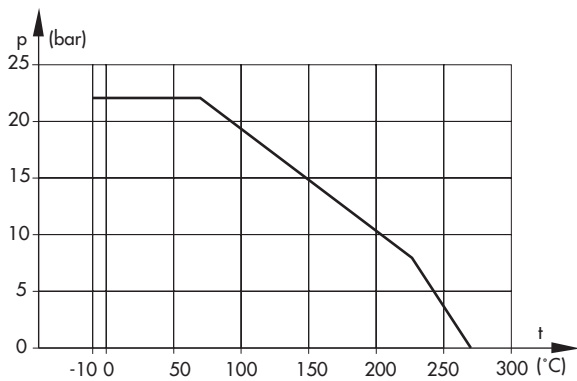


Fig. 4 · p/t diagram for version with soft sealing

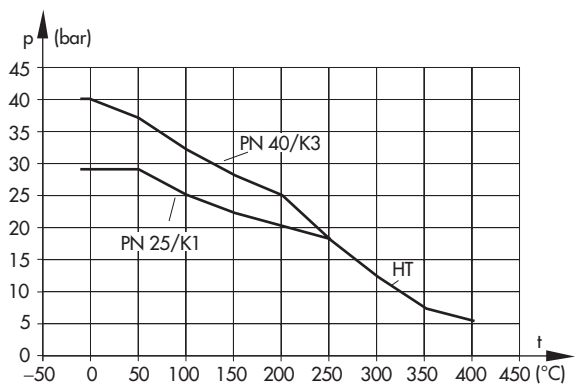


Fig. 5 · p/t diagram, version with metal sealing

Table 1 · Technical data for Type BR 14b and Type BR 14c

Nominal size		DN 80 to 400 · 3" to 16"	
Nominal pressure		PN 10 to 40 · ANSI Class 150 and 300	
Body style		Wafer or lug type	
Seat ring		Soft sealing	Metal sealing
Rangeability		50 : 1	
Face-to-face dimensions	DIN	Standard:	DIN 3202 K1/EN 558-1 Series 20
		Special version:	EN 558 Series 25
	ANSI	Class 150 with DIN 3202 K1 · Class 300 with DIN 3202 K3/EN 558-2 Series 16	
Perm. operating pressures		See pressure-temperature diagram	
Temperature range ¹⁾		-10 to 200 °C 14 to 428 °F	-10 to 350 °C ²⁾ 14 to 482 °F
Leakage acc. to DIN EN 1349 for direction of flow		A:	On request as it depends on pressure and temperature
		B:	Class VI

1) Version for high temperatures or cryogenic services on request; see TV-SK for wider temperature ranges

2) With graphite packing for temperatures > 200 °C

Table 1b · Body version, materials and associated temperature ranges (HT - High-temperature version)

Butterfly valve version and body material		Shaft material and seat sealing			
		1.4462		1.4542	
		Soft sealing	HT metal sealing	Soft sealing	HT metal sealing
BR 14b Cast version	1.4408	-10 ... 200 °C	-10 ... 280 °C	-10 ... 200 °C	-10 ... 300 °C
	1.0619				-10 ... 350 °C
	A 351 CF8M				-10 ... 300 °C
	A 216 WCB				-10 ... 300 °C
BR 14c Full-mold cast	1.4571	-10 ... 200 °C	-10 ... 280 °C	-10 ... 200 °C	-10 ... 350 °C
	S355J2G3				-10 ... 350 °C
	A 240 Gr.316L				-10 ... 350 °C
	A 516 Gr.70				-10 ... 350 °C

Table 2 · Materials for Pfeiffer Type BR 14b

Version		DIN	ANSI
Valve body		1.4408 · 1.0619	A 351 CF8M · A 216 WCB
Butterfly disc		1.4408	
Shaft		1.4462 · 1.4542	
Mounting ring		1.4571	
Packing flange		1.4571	
Seat ring	Soft	PTFE with 25 % glass	
	Metal	Nickel	
Packing		Live-loaded PTFE V-ring or graphite packing · Belleville washers 1.8159 Delta Tone coated	

Terms for control valve sizing and noise level calculation

Table 3a · K_{VS} coefficients

Nominal size		Opening angle								
DN	in	10°	20°	30°	40°	50°	60°	70°	80°	90°
80	3"	4,5	23	45	68	93	118	133	147	150
100	4"	7	36	72	108	149	190	214	235	240
150	6"	21	105	210	315	434	553	623	686	700
200	8"	42	208	417	625	862	1098	1237	1362	1390
250	10"	68	341	681	1022	1407	1793	2020	2224	2270
300	12"	100	501	1002	1503	2071	2639	2973	3273	3340
400	16"	183	915	1830	2745	3782	4819	5429	5978	6100

Table 3b · C_V coefficients

Nominal size		Opening angle								
DN	in	10°	20°	30°	40°	50°	60°	70°	80°	90°
80	3"	5,3	27	53	80	109	138	156	172	176
100	4"	8	42	84	126	174	222	250	275	281
150	6"	25	123	246	369	508	647	729	803	819
200	8"	49	243	488	731	1009	1285	1447	1594	1626
250	10"	80	399	797	1196	1646	2098	2363	2602	2656
300	12"	117	586	1172	1759	2423	3088	3478	3829	3908
400	16"	214	1071	2141	3212	4425	5638	6352	6994	7137

Table 3c · Terms for noise level calculation

Open. 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

Permissible differential pressures for Type BR 14c/14c Butterfly Valve with Type SRP Rotary Actuator
Table 4a · Version with soft sealing, applicable for both fail-safe positions · All pressures stated in bar

Nominal size		Type SRP Actuator	Springs n=	Required supply pressure	Max. perm. supply pressure with shaft				Perm. diff. pressure ¹⁾ for CLOSED position, direction of flow A or B
DN	in				1.4462		1.4542		
					20 °C 68 °F	200 °C 392 °F	20 °C 68 °F	200 °C 392 °F	
80	3"	300	2/3	2.5	6	6	6	6	16.0
		220	4	4	6	6	6	6	16.0
		150	5/6	5.5	6	6	6	6	16.0
100	4"	450	2/3	2.5	6	6	6	6	16.0
		300	4	4	6	6	6	6	16.0
		220	5/6	5.5	6	6	6	6	16.0
150	6"	900	2/3	2.5	6	5	6	6	16.0
		600	4	4	6	6	6	6	16.0
		450	5/6	5.5	6	6	6	6	16.0
200	8"	2000	2/3	2.5	5	3.4	6	6	16.0
		1200	4	4	6	6	6	6	16.0
		900	5/6	5.5	6	6	6	6	16.0
250	10"	3000	2/3	2.5	4.2	2.5	6	6	16.0
		2000	4	4	5	3.4	6	6	16.0
		1200	5/6	5.5	6	6	6	6	10.0
300	12"	3000	2/3	2.5	6	5	6	6	8.0
		2000	4	4	6	6	6	6	9.0
		1200	5/6	5.5	6	6	6	6	5.0
400	16"	5000	2/3	2.5	6	5.3	6	6	5.0
		3000	4	4	6	6	6	6	4.0
		3000	5/6	5.5	6	6	6	6	13.0

¹⁾ The permissible differential pressure is the same as the operating pressure.

Table 4b · Version with metal sealing, applicable for both fail-safe positions · All pressures stated in bar

Nominal size		Type SRP Actuator	Springs n=	Required supply pressure	Max. perm. supply pressure with shaft				Perm. diff. pressure ¹⁾ for CLOSED position, direction of flow A or B
DN	in				1.4462		1.4542		
					20 °C 68 °F	200 °C 392 °F	20 °C 68 °F	200 °C 392 °F	
80	3"	600	2/3	2.5	4.6	3.4	6	6	28.0
		450	4	4	6	4.7	6	6	35.0
		300	5/6	5.5	6	6	6	6	29.0
100	4"	600	2/3	2.5	4.6	3.4	6	6	15.0
		600	4	4	5.1	-	6	6	28.0
		450	5/6	5.5	6	-	6	6	28.0
150	6"	1200	2/3	2.5	4.5	3.3	6	6	10.0
		1200	4	4	5.1	-	6	6	25.0
		900	5/6	5.5	6	-	6	6	25.0
200	8"	2000	2/3	2.5	4.1	3.1	6	6	8.0
		2000	4	4	4.7	-	6	6	16.0
		1200	5/6	5.5	6	5.9	6	6	12.0
250	10"	3000	2/3	2.5	3.3	2.5	6	6	5.0
		3000	4	4	4	-	6	6	10.0
		2000	5/6	5.5	5.4	4.2	6	6	14.0
300	12"	3000	2/3	2.5	6	4.9	6	6	2.0
		3000	4	4	6	5.5	6	6	7.0
		2000	5/6	5.5	6	6	6	6	8.0
400	16"	5000	2/3	2.5	6	5.4	6	6	3.0
		3000	4	4	6	6	6	6	3.0
		3000	5/6	5.5	6	6	6	6	6.0

¹⁾ The permissible differential pressure is the same as the operating pressure.

Table 5a · Permissible shaft and breakaway torques for Type BR 14 Butterfly Valve with soft sealing

The required torques specified are average values which have been determined using water at 20 °C at the corresponding differential pressures. Operating temperature, process medium as well as longer lasting operating times may affect the torques considerably.

Nominal size		Perm. torque M_{dmax} in Nm	Breakaway torque M_{dI} in Nm with differential pressure Δp in bar			
DN	in		0 bar	5 bar	10 bar	16 bar
80	3"	280	40	43	45	51
100	4"	280	48	54	59	67
150	6"	505	91	106	114	157
200	8"	785	190	219	269	288
250	10"	785	320	364	433	480
300	12"	1591	370	467	578	654
400	16"	3215	690	903	1089	1239

Table 5b · Permissible shaft and breakaway torques for Type BR 14 Butterfly Valve with metal sealing

The required torques specified are average values which have been determined using water at 20 °C at the corresponding differential pressures. Operating temperature, process medium as well as longer lasting operating times may affect the torques considerably.

Nominal size		Perm. torques in Nm with shaft				Breakaway torque M_{d1} in Nm with differential pressure Δp in bar							
		1.4462		1.4542		0 bar	5 bar	10 bar	15 bar	20 bar	25 bar	30 bar	40 bar
DN	in	20 °C 68 °F	250 °C 482 °F	20 °C 68 °F	250 °C 482 °F								
80	3"	416	280	944	805	32	32	46	56	73	79	103	125
100	4"	416	280	944	805	43	51	73	89	116	126	164	199
150	6"	750	505	1704	1450	60	127	183	222	290	316	410	500
200	8"	1169	785	2654	2260	82	241	348	422	551	600	779	950
250	10"	1169	785	2654	2260	189	473	683	857	1224	–		
300	12"	2373	1591	5387	4584	357	609	893	1301	–			
400	16"	4796	3215	10890	9265	523	1024	1638	–				

Table 6 · Dimensions in mm and weights

Nominal size	DN/in	80/3"	100/4"	150/6"	200/8"	250/10"	300/12"	400/16"
L	PN 10 to 40/ Class 150	46	52	56	60	68	78	102
	Class 300	64	64	76	89	114	114	140
Wafer	A1	160	170	225	277	262	295	372
	B1	95	108	114	164	176	244	300
	D1	142	160	217	272	326	378	485
Lug type	A2	160	170	225	277	262	300	376
	B2	95	108	141	164	206	244	300
	D2	138	158	215	272	326	378	481
Ø-K lug type	PN 10	160	180	240	295	350	400	515
	PN 16	160	180	240	295	355	410	525
	PN 25	160	190	250	310	370	430	550
	PN 40	160	190	250	320	385	450	585
	Class 150	152.4	190.5	241.3	298.5	362	431.8	539.8
	Class 300	168.1	200.2	269.7	330.2	387.4	450.9	571.5
Ø-K wafer style		With through boreholes as with the lug type						
Flange	DIN 3337	F05	F05	F07	F10	F10	F12	F14
SW	mm	14	14	17	19	19	24	30
Weight	Approx. kg	7	10	18	28	42	66	120

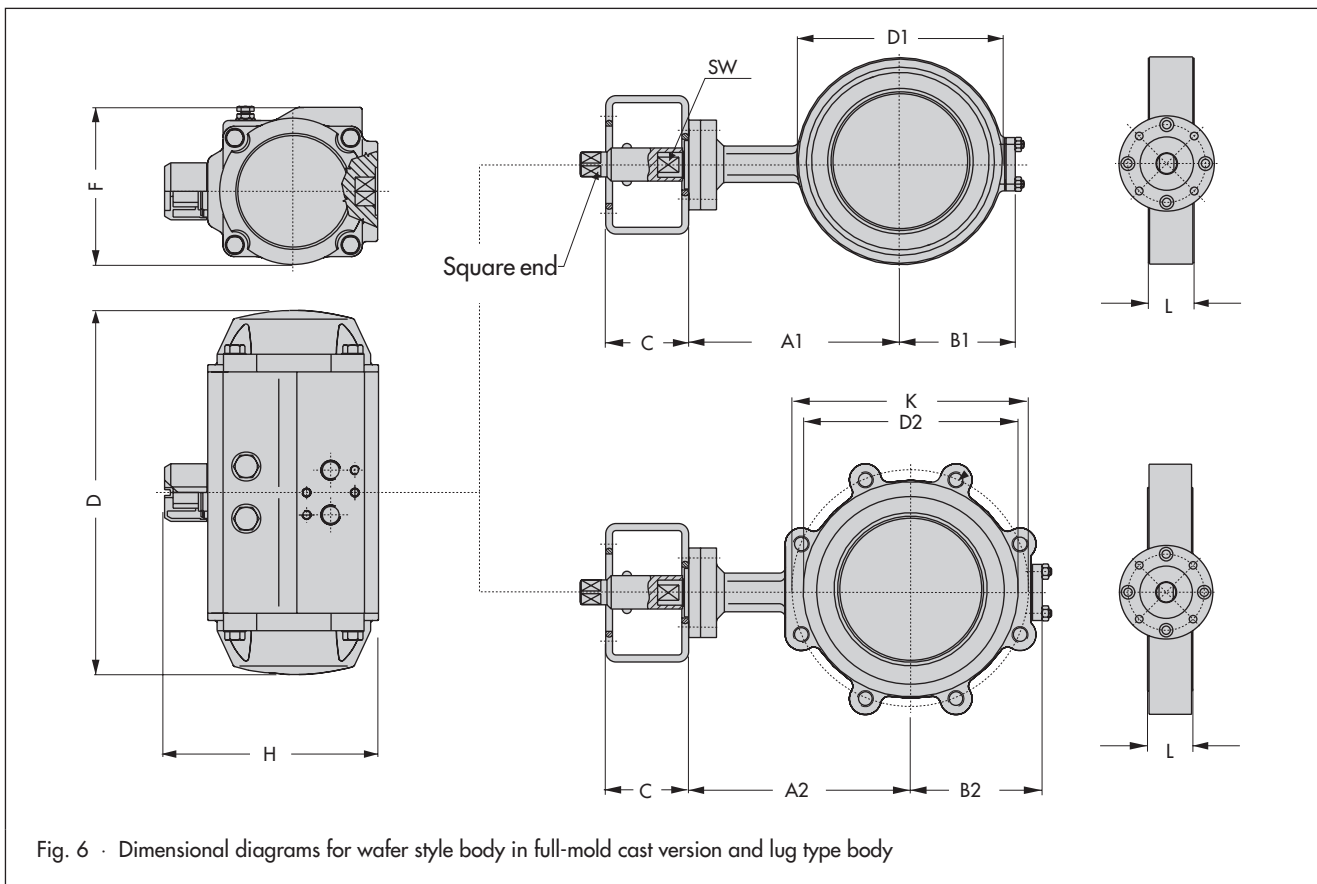


Fig. 6 · Dimensional diagrams for wafer style body in full-mold cast version and lug type body

Table 7 · Type SRP Rotary Actuator · Dimensions in mm and weights

Rotary Actuator	Type SRP	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 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 according to DIN/ISO 5211 for Type SRP Rotary Actuator · Dimensions in mm

Connecting flange	Valve	F05	F05	F07	F05	F07	F10	F05	F07	F10	F07	F10	F14	F10	F14
	Actuator	F05	F05	F07	F10	F10	F10	F12	F12	F12	F14	F14	F14	F16	F61
C	mm	60			80			90			120				

The following details are required on ordering:

Nominal size	DN ...	Actuator	Type BR 31α-SRP
Nominal pressure	PN ...	Fail-safe position	Valve OPEN or valve CLOSED
Valve body material	According to Table 2	Supply air	... bar
Seat seal	Metal sealing or soft sealing	Operating range	Number of springs
Direction of flow	"A" standard direction of flow for throttling service "B" reversed direction of flow for shut-off service	Operating pressure	... bar
		Medium temperature	... °C or ...°F
		Medium	Dry or lubricating

Specifications subject to change without notice.

