

Application

Tight-closing, triple eccentric high-pressure butterfly valve for process engineering and plants with industrial requirements

Nominal size NPS 3 to 80 · DN 80 to 2000

Nominal pressure ANSI Class 150 to 2500 · PN 10 to 400

Temperatures -196 to 1000 °C

Triple eccentric Type LTR 43 Control and Shut-off Butterfly Valve with zero leakage designed for bi-directional service at full differential pressure.

Valve body material

- Carbon steel
- Stainless steel
- Special materials

Valve body style

- Wafer
- Lug-type (valve for dead-end service)
- Double-flanged
- Welding ends

Seat ring material

- 316 SS stainless steel/graphite laminated seal
- 316 SS stainless steel stellited
- Filled PTFE
- Special materials

The butterfly valves can be equipped with various actuators, positioners, solenoid valves as well as other accessories.

Versions

Standard version

- **Type LTR 43** · Wafer-style butterfly valve conforming to API 609 and DIN specifications

Other versions

- Lug type body conforming to API 609 and DIN specifications
- Double-flanged valve body according to BS 5155/ISO 5752 specifications
- Face-to-dimensions according to ANSI B 16.10 and DIN
- Fire-safe design conforming to BS 6755 Part 2, API 607 and API 6FA
- Cryogenic version down to -196 °C
- High-temperature version up to +1000 °C
- Alternative materials for valve body and internal parts: Duplex, bronze, Monel, Incoloy, Hastelloy B and C, titanium and zirconium



Fig. 1 · Type LTR 43 High-pressure Butterfly Valve in double-flanged version, NPS 10, Class 1500 with pneumatic actuator and positioner



Fig. 2 · Tight-closing Type LTR 43 Butterfly Valve, lug-type, metal sealing with manual gear

Principle of operation

The process medium can flow through the butterfly valve in both directions. The valve flow coefficient depends on the opening angle of the disc and the area released between the disc and valve body.

The valve is sealed by a metal/graphite laminated seal stack (seat) inserted in between the body and the metal disc edge (LTR 43-1) or by the metal seat ring screwed onto the disc (LTR 43-2). The seat adapts itself to the disc or seat ring. The friction forces are minimized by the triple eccentric design of the disc and shaft.

Fail-safe position

Pneumatic rotary actuators have two fail-safe positions which become effective when the actuator 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.

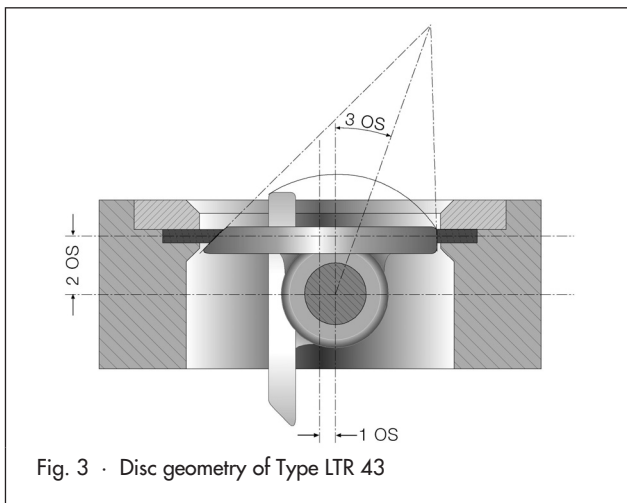


Fig. 3 · Disc geometry of Type LTR 43

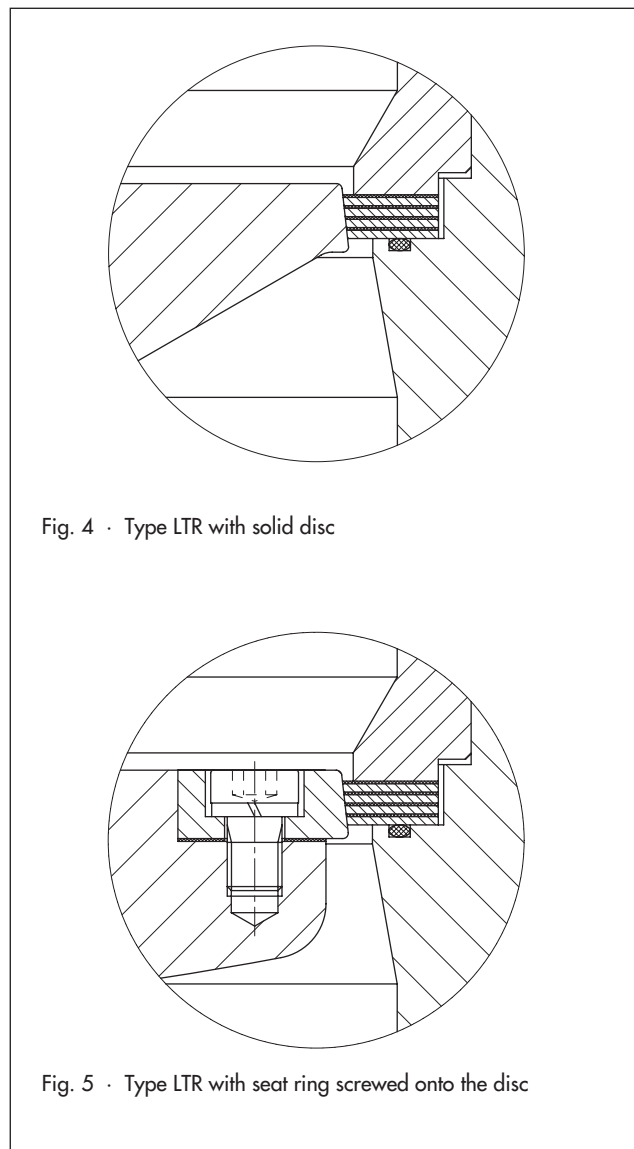


Fig. 4 · Type LTR with solid disc

Fig. 5 · Type LTR with seat ring screwed onto the disc

Table 1 · Technical data

Nominal size	NPS 3 to 80 · DN 80 to 2000		
Nominal pressure	Class 150 to 2500 · PN 10 to 400		
Body style	Wafer · Lug-type · Double-flanged		
Face-to-face dimensions	According to API, ANSI or DIN		
Seat	Metal/graphite laminated seal	Stellited	PTFE
Characteristics			
Opening angle max.	80° (90°)		
Rangeability	>50 : 1		
Permissible operating pressures	See pressure-temperature diagram		
Temperature range	-196 to 1000 °C	-196 to 1000 °C	-196 to 220 °C
Leakage acc. to DIN EN 12266-1	Test P12, leakage rate "A"		

Table 2 · Materials

Version	ANSI	DIN
Body	ASTM A 216 WCB · A 351 CF8M	1.0619 · 1.4408
Disc	ASTM A 216 WCB · A 351 CF8M	
Shaft	17-4PH	
Seat ring (for LTR 43-2 see Fig. 5)	316 SS · 316 SS with hard facing	
Seat	Metal/graphite laminated seal · Stellite · PTFE	
Bonnet and clamp ring	Carbon steel or 316 SS	
Packing gland	316 SS	
Bearing (two-piece)	Bronze · 316 SS with hard facing · Stellite	
Packing	Graphite · PTFE	

Table 3 · K_V coefficients · Determining of C_V value: $C_V = K_V \cdot 1.17$ **Table 3a · Type LTR 43 for Class 150 / PN 25**

Nominal size		Class 150 / PN 25							
		Opening angle							
NPS	DN	10°	20°	30°	40°	50°	60°	70°	80°
3	80	13	29	46	69	103	157	193	223
4	100	20	43	67	102	150	228	308	356
6	150	48	103	160	243	360	551	741	860
8	200	85	183	284	434	641	979	1321	1530
10	250	135	292	452	691	1022	1568	2100	2427
12	300	197	424	657	1005	1488	2280	3058	3534
14	350	265	572	887	1356	2005	3069	4124	4770
16	400	352	760	1180	1803	2669	4085	5486	6341
18	450	458	987	1537	2348	3478	5349	7177	8295
20	500	555	1195	1853	2832	4192	6422	8617	9961
24	600	810	1747	2708	4139	6126	9386	12593	14559
28	700	1099	2369	3674	5614	8309	12730	17082	19741
32	800	1449	3125	4845	7403	10957	16787	22525	26035
36	900	1848	3981	6170	9429	13956	21375	28685	33155
40	1000	2275	4902	7605	11619	17195	25175	35345	40850
48	1200	3278	7068	10963	17148	24790	36043	50963	58900

Table 3b · Type LTR 43 for ANSI 300 / PN 50

Nominal size		Class 300 / PN 50							
		Opening angle							
NPS	DN	10°	20°	30°	40°	50°	60°	70°	80°
3	80	12	27	43	64	96	146	179	208
4	100	19	40	62	95	140	212	286	331
6	150	45	96	149	226	335	512	689	800
8	200	79	170	264	404	596	910	1229	1422
10	250	126	272	420	643	950	1458	1953	2257
12	300	183	394	611	935	1384	2120	2844	3287
14	350	246	532	825	1261	1865	2854	3835	4436

Nominal size		Class 300 / PN 50							
		Opening angle							
NPS	DN	10°	20°	30°	40°	50°	60°	70°	80°
16	400	327	707	1097	1677	2482	3799	5102	5897
18	450	426	918	1429	2184	3235	4975	6675	7715
20	500	516	1111	1723	2634	3899	5972	8014	9264
24	600	753	1625	2518	3849	5697	8729	11711	13540
28	700	1022	2203	3417	5221	7727	11839	15886	18359
32	800	1348	2906	4506	6885	10190	15612	20948	24212
36	900	1719	3702	5738	8769	12979	19879	26677	30834
40	1000	2116	4559	7073	10806	15991	23413	32871	37991
48	1200	3049	6573	10196	15948	23055	33520	47396	54777

Table 3c · Type LTR 43 for ANSI 600 / PN 100

Nominal size		Class 600 / PN 100							
		Opening angle							
NPS	DN	10°	20°	30°	40°	50°	60°	70°	80°
3	80	11	23	37	56	83	127	156	181
4	100	16	35	54	83	122	185	249	289
6	150	39	83	130	197	292	446	600	696
8	200	69	148	230	352	519	793	1070	1239
10	250	109	237	366	560	828	1270	1701	1966
12	300	160	343	532	814	1205	1847	2477	2863
14	350	215	463	718	1098	1624	2486	3340	3864
16	400	285	616	956	1460	2162	3309	4444	5136
18	450	371	799	1245	1902	2817	4333	5813	6719
20	500	450	968	1501	2294	3396	5202	6980	8068
24	600	656	1415	2793	3353	4962	7603	10200	11793

Table 3d · Type LTR 43 for ANSI 900 / PN 160

Nominal size		Class 900 / PN 160							
		Opening angle							
NPS	DN	10°	20°	30°	40°	50°	60°	70°	80°
3	80	8	19	29	44	66	100	124	143
4	100	13	28	43	65	96	146	197	228
6	150	31	66	102	156	230	353	474	550
8	200	54	117	182	278	410	627	845	979
10	250	86	187	289	442	654	1004	1344	1553
12	300	126	271	420	643	952	1459	1957	2262
14	350	170	366	568	868	1283	1964	2639	3053
16	400	225	486	755	1154	1708	2614	3511	4058
18	450	293	632	984	1503	2226	3423	4593	5309
20	500	355	765	1186	1812	2683	4110	5515	6375
24	600	518	1118	1733	2649	3921	6007	8060	9318

Table 4a · Terms for control valve sizing

Opening angle	30°	40°	50°	60°	70°	80°	90°
F _L	0.75	0.74	0.65	0.65	0.60	0.55	0.55
x _T	0.50	0.40	0.35	0.35	0.30	0.25	0.25

Table 4b · x_{Fz} values

Opening angle	30°	40°	50°	60°	70°	80°	90°
x _{Fz}	0.30	0.27	0.25	0.20	0.15	0.12	0.10

Table 4c · Pressure and temperature ranges for valve body made of 1.4408 · Pressures in bar

ANSI	Temperature in °C																			
	0...20	30	40	50	60	70	80	90	100	120	140	160	180	200	250	300	350	400	450	500
Cl. 150	20	20	20	20	20	20	20	20	20	20	19	19	18	18	17	16	16	15	15	15
Cl. 300	50	49	48	47	46	45	44	43	42	41	40	38	37	36	35	33	32	31	30	30
Cl. 600	100	97	95	93	91	89	87	85	83	81	79	77	75	73	70	67	65	63	62	61

Data apply to ANSI Class 900 to 2500, others materials and temperatures over 500 °C available on request.

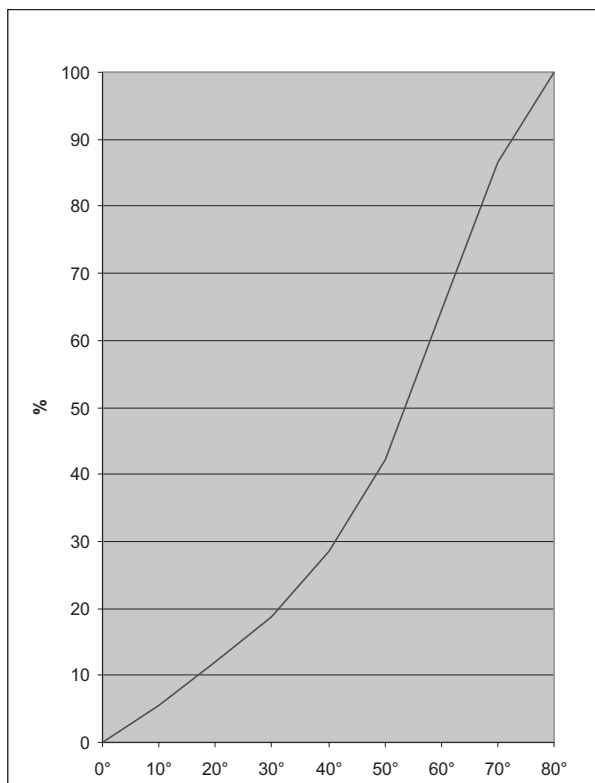


Fig. 6 · Flow characteristics

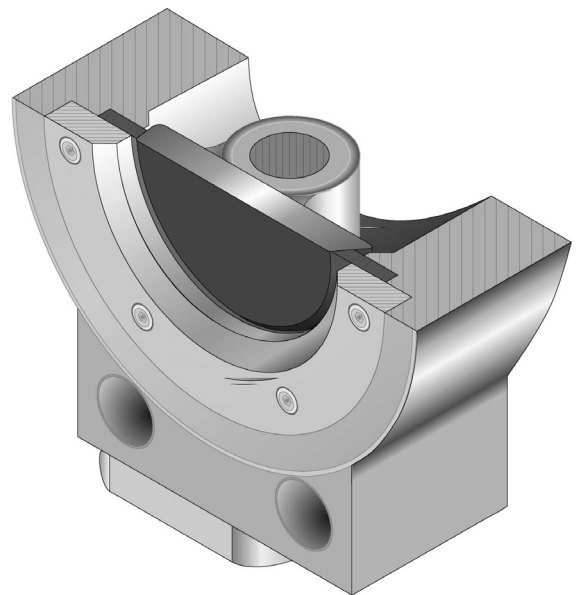


Fig. 7 · Disc with hard-faced seat ring

Table 5 · Torques in Nm

Nominal size		Δp in bar			
NPS	DN	10	20	50	100
3	80	70	80	115	215
4	100	105	125	210	385
6	150	240	300	525	990
8	200	450	570	1040	2225
10	250	735	950	1990	3830
12	300	1050	1370	3125	7100
14	350	1575	2150	4600	9670
16	400	2150	3000	6950	15450
18	450	2800	4000	8750	21900
20	500	3750	5500	13000	31500
24	600	5200	8000	20750	53830
30	750	9500	14450	44000	110000
32	800	10810	16470	50420	126000
36	900	14500	22700	63750	173500
40	1000	18100	28100	78750	214300

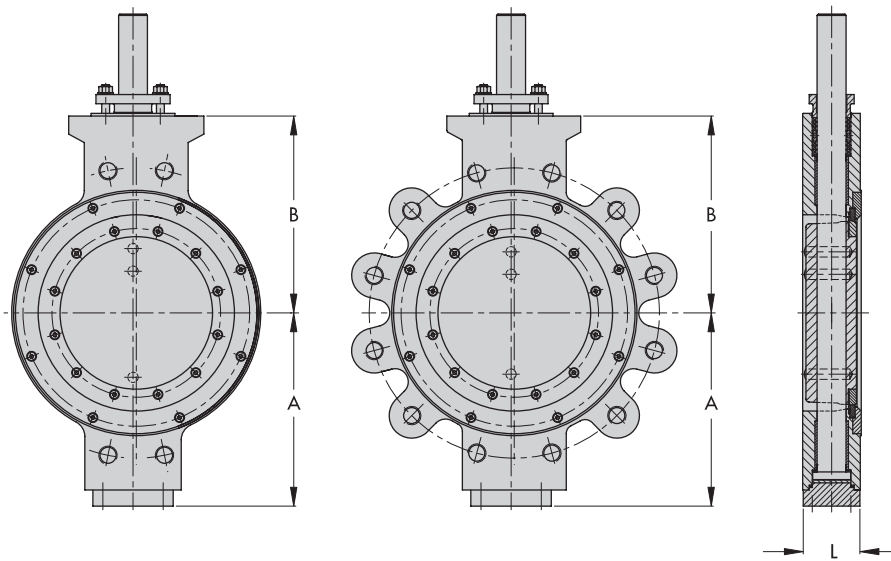


Fig. 8 · Dimensional diagrams for wafer-style body and lug-type body

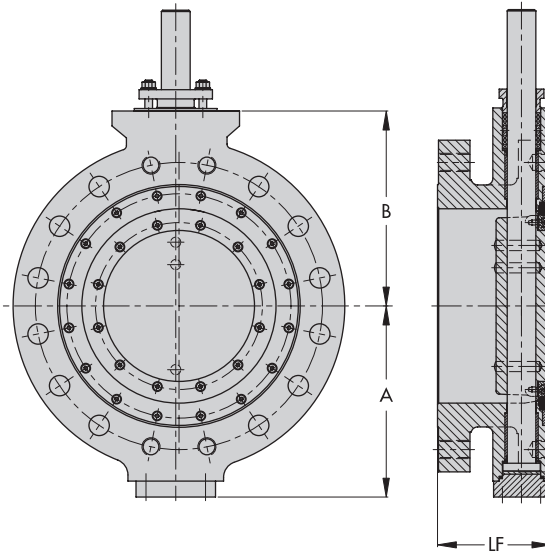


Fig. 9 · Dimensional diagram for double-flanged body

Table 6 · Dimensions in mm for Type LTR 43

Nominal size	NPS	3	4	6	8	10	12	14	16	18	20	24	28	30	32	36	40	48	
	DN	80	100	150	200	250	300	350	400	450	500	600	700	750	800	900	1000	1200	
Class 150 / PN 25																			
A	mm	120	150	190	220	250	290	320	350	375	415	450	515	580	590	640	700	800	
B	mm	125	160	200	235	265	305	330	360	400	450	480	535	610	620	670	730	840	
L	mm	48	54	57	64	71	81	92	102	114	127	154	165	165	190	200	216	276	
LF	mm	114	127	140	152	165	178	190	216	222	229	267	292	318	318	330	410	480	
Class 300 / PN 50																			
A	mm	125	160	200	235	260	300	325	365	400	450	520	580	600	630	700	720	820	
B	mm	135	165	210	240	270	310	335	370	410	460	540	610	630	660	730	740	860	
L	mm	48	54	59	73	83	92	117	133	149	159	181	209	241	241	260	300	320	
LF	mm	114	127	140	152	165	178	190	216	222	229	267	292	318	318	330	410	470	
Class 600 / PN 100																			
A	mm	130	175	225	265	310	335	375	410	440	485	550	580	620	660	720	On request		
B	mm	135	180	235	275	320	340	385	420	450	490	610	640	670	700	740			
L	mm	54	64	78	102	117	140	155	178	200	216	232	292	318	318	330			
LF	mm	180	190	210	230	250	270	290	310	330	350	390	450	480	510	540			
Class 900 / PN 160																			
A	mm	135	215	265	300	350	380	395	425	460	500	590	Larger valve sizes on request						
B	mm	140	225	280	310	375	400	415	440	480	530	630							
L	mm	64	80	104	112	135	170	190	202	230	252	312							
LF	mm	210	235	250	310	350	380	400	430	460	490	530							
Class 1500 / PN 250																			
A	mm	-			310	360	390	430	480	490	540	650	Larger valve sizes as well as Class 2500 on request						
B	mm				320	385	430	470	510	530	580	680							
L	mm				130	160	190	220	260	300	330	385							
LF	mm				420	460	500	570	610	660	710	790							

Options

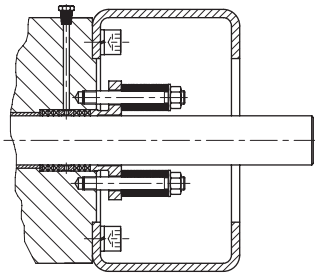


Fig. 10 · TA-Luft packing

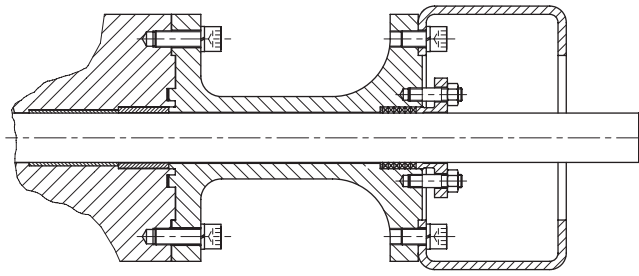


Fig. 11 · Extension for cryogenic or high-temperature applications

Ordering text and valve specifications

Butterfly Valve Type	LTR 43-1	W	1	2	1	1	1	1	DN ...	PN ...
Specification->	1	2	3	4	5	6	7	8	9	10

1 Valve type	LTR 43-1 Solid disc	LTR 43-2 Seat ring screwed onto the disc	8 Packing	1 Graphite	2 PTFE	3 Graphite/graphite (live-loaded with purge port)	4 PTFE/PTFE (live-loaded with purge port)
2 Valve body style	W Wafer	L Lug-type for dead-end service	F Double flange	9 Nominal size	NPS ... / DN ...	10 Nominal pressure	Mating flange, Class ... / PN ...
3 Body material	1 A 216 WCB / 1.0619*	2 A 351 CF8M / 1.4408*	Actuator	Single- or double-acting	Fail-safe position (single-acting only)	Valve OPEN or valve CLOSED	Supply air ... bar
4 Disc material	1 A 216 WCB / 1.0619 (seat ring for LTR 43-2 in 1.4541)*	2 A 351 CF8M / 1.4408*	Pressure drop	... bar	Temperature	... °C	Accessories
5 Seat material	1 Metal/graphite laminated seal	2 Stellite	3 PTFE	Positioner, limit switch, solenoid valve			
6 Shaft material	1 17-4PH*	2 1.4571*	3 1.4571 hard chromed*				
7 Shaft bearing	1 Bronze	2 316 SS with hard facing	3 Stellite				

* or equivalent material

Specifications subject to change without notice.

