



## BR 10a · M-PTFE-lined double-eccentric Control and Shut-off Butterfly Valve DIN and ANSI Version



### Applications

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

- **Nominal size NPS4 to 32 and DN 100 to 800**
- **Nominal pressure cl150 and PN 10, PN 16**
- **Temperatures -40 to +392 °F (-40 to +200 °C)**

The control equipment consists of a M-PTFE lined Butterfly valve and a pneumatic quarter-turn actuator or a hand-lever. The valves, which are of modular construction have the following features:

- Valve body made of
  - Spheroidal graphite iron A395 with the ANSI-version, or
  - EN-JS 1049 ( GGG 40.3 ) with the DIN-version
- The valve body is lined with a
  - 8 to 12 mm thick isostatic M-PTFE lining
- Body style
  - Wafer-Type or
  - Lug-Type
- Valve disc and valve shaft made of:
  - Stainless cast steel 1.4313, PTFE encapsulated
- Further characteristics:
  - All parts in contact with media, are PTFE-lined
  - Excellent control characteristic even with small opening angles
  - Low breakaway torque and low amount of wear due to the double eccentric bearing design of the shaft
  - Suitable for vacuum operation
  - Wafer type butterfly valve and Lug type butterfly valve can be mounted between flanges acc. to ANSI cl150 or DIN PN 10
  - The disc can be exchanged without removing the shaft
  - "TA-Luft" (German clean air act) and VDI 2440
  - Attachment options acc. to DIN ISO 5211
  - Face-to-face dimensions acc. to ANSI version DIN EN 558 Series 16 (ISO 5752, series 16)
  - Face-to-face dimensions acc. to DIN version DIN EN 558 Series 16 (K3 acc. to DIN 3202)



Fig. 1: M-PTFE-lined BR 10a Butterfly valve with Gear box



Fig. 2: M-PTFE-lined BR 10a Butterfly valve with BR 31a Quarter-turn actuator

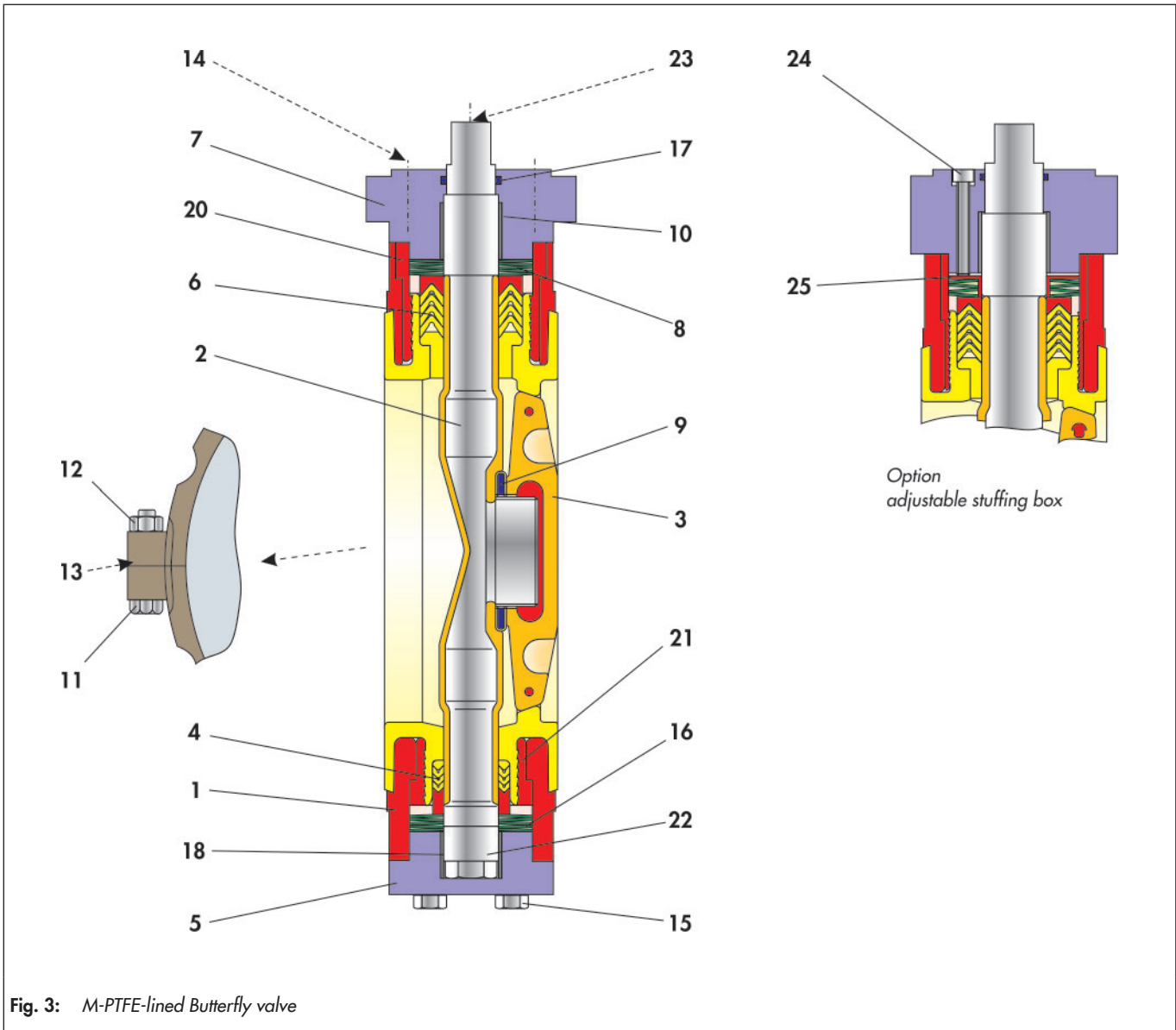


Table 1: List of parts

Item	Description
1	Valve body
2	Control shaft
3	Valve disc
4	V-ring packing
5	Lower gland flange
6	V-ring packing
7	Guide bush
8	Disc spring set
9	Sealing element
10	Bush
11	Screw
12	Nut

Item	Description
13	Grooved pin
14	Screw
15	Screw
16	Disc spring set
17	O-ring
18	Bush
20	Bush
21	Bush
22	Bearing screw
23	Threaded pin
24	Screw
25	Bush

## Versions

M-PTFE lined butterfly control valve in the following versions:

- Butterfly valve with manual gear actuator
- Shut-off and throttling valve with BR 31a pneumatic rotary actuator

## Special version

- Adjustable stuffing box
- Electric rotary actuator
- Linings with special PTFE compounds, e.g. electro conductive
- Special stem seals for high vacuum,
- Disc components made of special materials, e.g. titanium, hastelloy
- Special stem seals for high vacuum
- End stop

## Additional accessories and attachments

The following accessories for the control valve are obtainable either single or in combination:

- Positioner
- Limit switch
- Solenoid valve
- Air supply station
- Pressure gauge mounting blocks
- Pneumatic volume booster

Further attachment parts are possible on request, according to specifications .

## Function and operation

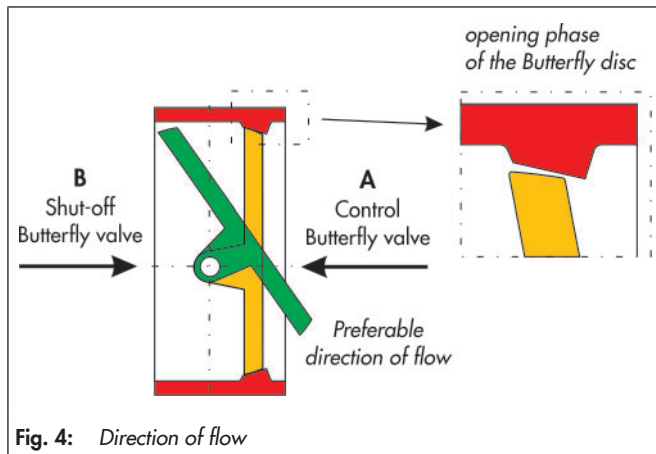


Fig. 4: Direction of flow

The process medium can flow through the butterfly valve in both directions.

The butterfly disc (3) determines the flow through the free area between disc and seat.

The shaft (2) is sealed at both ends by a V-ring packing (4 and 6). With the spring washers (8 and 16) located at the top of packing chamber, the packing is maintenance free and pre-loaded.

Butterfly valves are sealed between the butterfly disc (3) and the seat.

The direction of flow, and the differential pressure determine the breakaway torque to open the butterfly valve. The double eccentric bearing of the disc shaft, causes the disc to remain in contact with the seat only through a very small angle when opening and closing (Fig. 4). This reduces wear and increases the service life of the valve. In addition, the breakaway torque is reduced.

When the process medium flows through the valve in **direction A** (Fig. 4), the butterfly disc is slightly lifted out of the seat. This reduces the pre-loading and the breakaway torque. When the process medium flows through the valve in **direction B**, the pre-load forced rises, with a subsequent increase in the breakaway torque.

## Failure position

Depending on the pneumatic actuator, the butterfly valve has two safety positions, which become effective when pressure is relieved, or when the air supply fails:

- **Butterfly valve with actuator "Spring closes"**

When the air supply fails, the valve closes. The valve opens when the air control pressure increases acting against the force of the springs.

- **Butterfly valve with actuator "Spring opens"**

When the air supply fails, the valve opens. The valve closes when the air control pressure increases against the force of the springs.

### **i** Note

Before using the butterfly valve in hazardous areas, check whether this is possible acc. to ATEX 2014/34/EU. See mounting and operating Instructions ► EB10a.

## Functional diagram with opening angles

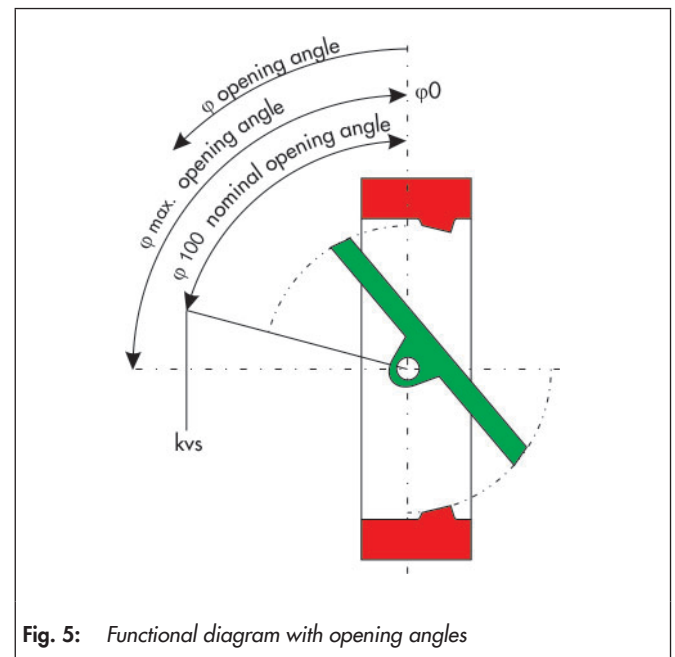


Fig. 5: Functional diagram with opening angles

**Table 2:** General technical data

Nominal size	DN 100 to DN 800	NPS4 to NPS32
Nominal pressure	PN 10	cl150
Body style	Lug-Type and Wafer-Type	
Can be mounted between	Flanges PN 10	Flanges ANSI cl150
Temperature range	See pressure-temperature diagram	
Leakage for	Flow direction A	On request, depending on pressure and temperature
	Flow direction B	Leakage rate A acc. to DIN EN 12266-1, P1 (Class VI acc. to ANSI / FCI 70-2-2006)
Rangeability	50 : 1	
Face to face dimensions	DIN EN 558, series 16 ( DIN 3202, K3 )	DIN EN 558, series 16 (ISO 5752, series 16)
Perm. operating pressure	See pressure-temperature diagram	
External leakage tightness	< 10 <sup>-6</sup> mbar l/sec	

**Table 3:** Material

Version	DIN	ANSI
Body	EN-JS 1049 ( GGG 40.3 )	A 395
Lining	M-PTFE	ASTM D 4894 Type III-2
Butterfly disc	1.4313 with PTFE coating	1.4313 with ASTM D 4894 Type IV-2
Shaft	1.4313 with M- PTFE coating	1.4313 with ASTM D 4894 Type III-2
Packing	PTFE V-ring packing loaded by Disc springs (1.8159)	
Bearing bushing	PTFE with carbon	
Coating	Two-component polyurethane, grey beige, RAL 1019	

## Pressure-Temperature diagram

The area of application is determined by the pressure-temperature diagram.  
Process data and the process medium can affect the values in the diagram.

Body material: EN-JS 1049 (DIN EN 1092-2)

Sealing ring material: PTFE

**Table 4:** Pressure-temperature values

Standard	-40°C to 200°C
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Nominal pressure	Nominal size	Temperature in °C													Pressure in bar	
		-40	-20	0	20	40	60	80	100	120	140	160	180	200		
PN 10	DN 100 ... 300	10	10	10	10	10	10	10	10	10	10	10	9.5	9	8	Pressure in bar
	DN 400 ... 800	10	10	10	10	10	10	10	9	8	6.5	5	3.5	2		
PN 16	DN 100 ... 150	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	14.5	12.8	11.5	9.5	8	Pressure in bar	
cl150	NPS4 ... NPS6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	14.5	12.8	11.5	9.5	8		
	NPS8 ... NPS12	10	10	10	10	10	10	10	10	10	10	9.5	9	8		
	NPS16 ... NPS32	10	10	10	10	10	10	10	9	8	6.5	5	3.5	2		

The BR 10a valves are also suitable for use in vacuum applications

**Table 5: Terms for noise level calculation**

z-values for noise level calculation acc. to VDMA 24422 and terms for control valve sizing acc. to DIN EN 60534 opening angle.

$\varphi$	10°	20°	30°	40°	50°	60°	70°	80°	90°
FL	0.95	0.95	0.92	0.82	0.74	0.67	0.61	0.57	0.54
xT	0.75	0.75	0.73	0.57	0.47	0.38	0.31	0.28	0.25
Z	0.35	0.30	0.25	0.20	0.17	0.15	0.13	0.12	0.11

**Correction terms**With liquids  $\Delta LF = 0$ ,With gases and vapors  $\Delta LG = 0$ **Table 6: Torque and breakaway torques**

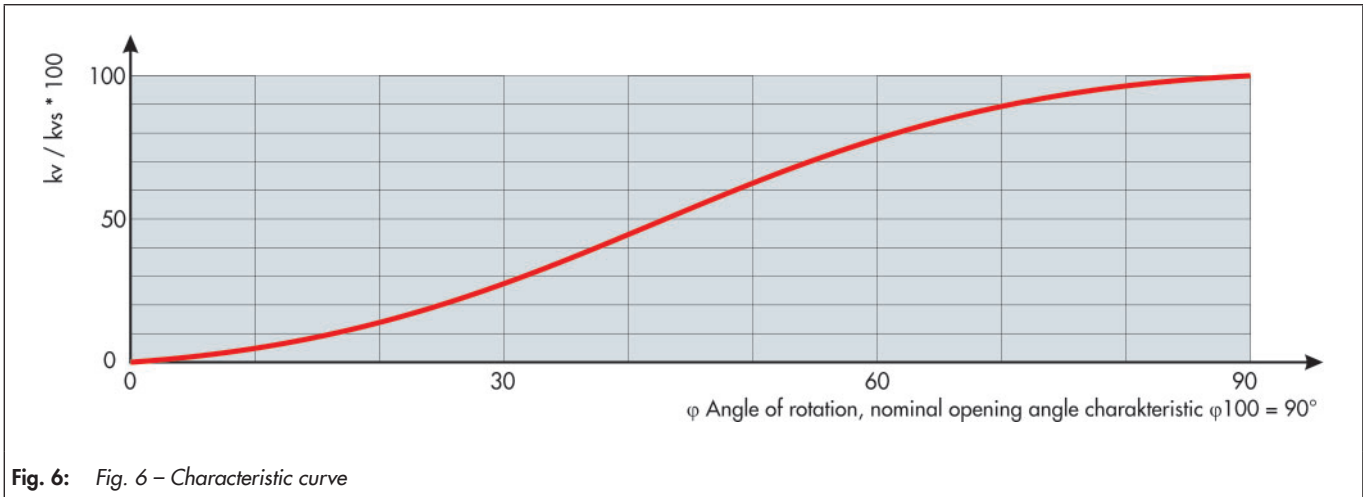
Perm. Differential pressure $\Delta p$			0	5	10	16
Nominal size		Torque MD <sub>max.</sub> in Nm	Breakaway torque Mdl in Nm			
DN	NPS					
100	4	225	40	55	70	88
150	6	490	120	205	290	392
200	8	988	190	340	490	
250	10	1930	350	820	1290	
300	12	3066	500	1033	1567	
350	14	4365	736	1541	2346	
400	16	4576	800	1675	2550	
500	20	8938	924	2100	3276	
600	24	15444	1300	2900	4500	
800	32	33930	1700	4100	6500	

The specified breakaway torques are average values which were measured with air at 20°C (68°F) with the corresponding differential pressures. Operating temperature, process medium and long operating periods may affect the permissible torques and breakaway torques considerably. The maximum permissible torques listed apply to the standard materials specified in table 3.

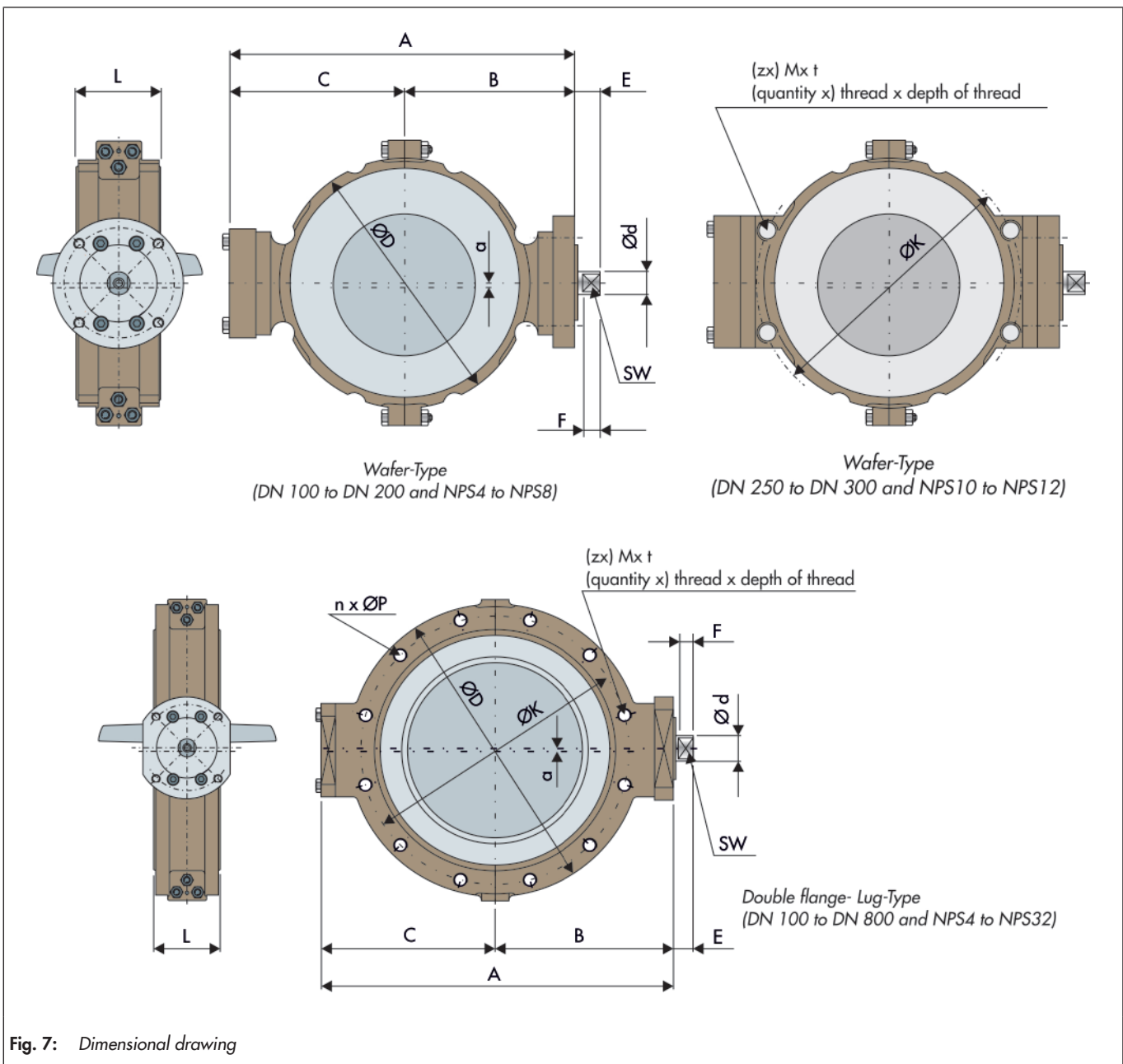
**Table 7:  $k_v$  and  $C_v$ -values and associated opening angles**

Nominal size		$k_v$ -value at $\varphi$ Opening angle									$C_v$ -value at $\varphi$ Opening angle								
DN	NPS	10°	20°	30°	40°	50°	60°	70°	80°	90°	10°	20°	30°	40°	50°	60°	70°	80°	90°
100	4	7	24	48	79	120	161	211	232	240	8	28	56	92	140	188	247	271	281
150	6	21	70	140	231	350	469	616	679	700	25	82	164	270	409	549	721	794	819
200	8	42	139	278	459	695	931	1223	1348	1390	49	163	325	537	813	1089	1431	1577	1626
250	10	68	227	454	749	1135	1520	1998	2200	2270	80	266	531	876	1328	1778	2338	2574	2656
300	12	100	334	668	1102	1670	2238	2939	3240	3340	117	391	782	1289	1954	2618	3439	3791	3908
350	14	142	472	944	1558	2360	3163	4154	4579	4720	166	552	1359	1823	2761	3701	4860	5357	5522
400	16	183	610	1220	2013	3050	4087	5368	5917	6100	214	714	1427	2355	3568	4782	6281	6923	7137
500	20	288	962	1924	3175	4810	6445	8465	9331	9620	337	1126	2251	3715	5628	7541	9904	10917	11255
600	24	415	1385	2771	4572	6926	9281	12177	13473	13853	486	1620	3242	5349	8103	10859	14247	15763	16208
800	32	737	2463	4925	8128	12314	16499	21674	23887	24627	862	2882	5762	9510	14407	19304	25358	27948	28814

## Characteristic curve



## Dimensions and Weights



**Table 8: Dimensions in mm and weights in kg**

Nominal size	DN 100	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400	DN 500	DN 600	DN 800		
	NPS4	NPS6	NPS8	NPS10	NPS12	NPS14	NPS16	NPS20	NPS24	NPS32		
L	64	76	89	114	114	127	140	152	178	241		
A	246	319	404	494	571	617	673	821	971	1214		
B	134	166	209	268	291	312	349	430	493	603		
C	112	153	195	226	280	305	324	391	478	611		
a	1.5	1.5	2	2.5	3	3	3	3	5	6		
Double flange	ØD	164	228	283	340	388	-	588	687	780	1015	
	nx ØP	8x 18	8x 22	8x 22	12x 22	12x 22	-	16x 26	20x 26	20x 30	24x 33	
	Wafer-Type	(zx) Mx t	-	-	-	(8x) M20x50	(8x) M20x40	-	(8x) M24x45	(8x) M24x50	(8x) M27x55	(8x) M30x75 (8x) M30x70
		nx ØP	8x 19.1	8x 22.4	8x 22.4	12x 25.4	12x 25.4	-	16x 28.4	20x 31.8	20x 35.1	48x 22.4
	Lug-Type	(zx) Mx t	-	-	-	(8x) 7/8"x55	(8x) 7/8"x45	-	(8x) 1"x55	(8x) 1 1/8"x65	(8x) 1 1/4"x70	(16x) 1 1/2"x115 (8x) 1 1/2"x105
		nx ØP	206	270	331	386	445	-	565	687	780	1015
	Lug-Type	nx ØP	8x M16	8x M20	8x M20	12x M20	12x M20	-	-	-	-	-
		(zx) Mx t	(8x) M16x35	(8x) M20x40	-	(8x) M20x50	(8x) M20x40	-	-	-	-	-
		nx ØP	8x M16	8x M20	-	-	-	-	-	-	-	-
		(zx) Mx t	(8x) M16x35	(8x) M20x40	-	-	-	-	-	-	-	-
		nx ØP	8x UNC 5/8"	8x UNC 3/4"	8x UNC 3/4"	12x UNC 7/8"	12x UNC 7/8"	-	-	-	-	-
		(zx) Mx t	(8x) 5/8"x40	(8x) 3/4"x45	-	(8x) 7/8"x55	(8x) 7/8"x45	-	-	-	-	-
Mono flange	Wafer-Type	ØD	164	228	-	-	-	445	-	-	-	-
		nx ØP	8x 18	8x 22	-	-	-	-	-	-	-	-
		(zx) Mx t	-	-	-	-	-	-	-	-	-	-
		nx ØP	8x 19.1	8x 22.4	-	-	-	12x 28.4	-	-	-	-
	Lug-Type	(zx) Mx t	-	-	-	-	-	(8x) 1"x65	-	-	-	-
		ØD	206	270	331	386	445	524	565	-	-	-
		nx ØP	8x M16	8x M20	8x M20	12x M20	12x M20	16x M20	16x M24	-	-	-
		(zx) Mx t	(8x) M16x35	-	(8x) M20x50	(8x) M20x50	(8x) M20x40	(8x) M20x55	(8x) M24x45	-	-	-
	Lug-Type	nx ØP	8x M16	8x M20	-	-	-	-	-	-	-	-
		(zx) Mx t	(8x) M16x35	-	-	-	-	-	-	-	-	-
		nx ØP	8x UNC 5/8"	8x UNC 3/4"	8x UNC 3/4"	12x UNC 7/8"	12x UNC 7/8"	12x UNC 1"	16x UNC 1"	-	-	-
		(zx) Mx t	(8x) 5/8"x40	-	(16x) 3/4"x55	(8x) 7/8"x55	(8x) 7/8"x45	(8x) 1"x65	(8x) 1"x55	-	-	-
ØK	PN10/16	180	240	295	350	400	460	515	620	725	950	
	cl150	190.5	241.3	298.5	362	431.8	476.3	539.8	635	749.3	900	
E	19	23	27	31	31	31	41	39	54	65		
F	12	16	20	24	24	24	32	30	45	56		
Ød	20	21	28	36	41	41	45	57	65	90		
SW	12	16	20	24	24	24	32	34	45	56		
DIN ISO Connection	F05	F10	F12	F14	F14	F14	F16	F16	F25	F25		
Weight ca. kg	7	16	24	40	55	76	100	170	277	463		

Others: . . . . .

## Selecting and sizing the butterfly valve

1. Calculate the appropriate kv value
2. Select the nominal diameter and the kvs value (Cv value ) from table 6
3. Check the operation conditions in acc. to the pressure-temperature diagram
4. Select a suitable actuator

## Ordering text

PTFE - lined control/shut-off butterfly valve BR 10a,  
Nominal size: . . . . .  
Nominal pressure: . . . . .  
other special version

Manual gear actuator or actuator (manufacturer): . . . . .  
Supply pressure: . . . . . bar  
Fail-safe position: . . . . .

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

## Associated data sheets

- Mounting and operating instructions ▶ EB 10a
- Safety manual ▶ SH 10
- For pneumatic Quarter-turn actuator ▶ TB 31a

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### **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*

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