



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 to 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

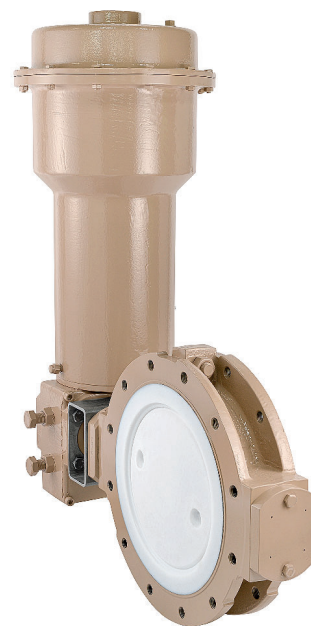


Fig. 2: M-PTFE-lined BR 10a Butterfly valve with BR 30a Multi-turn actuator

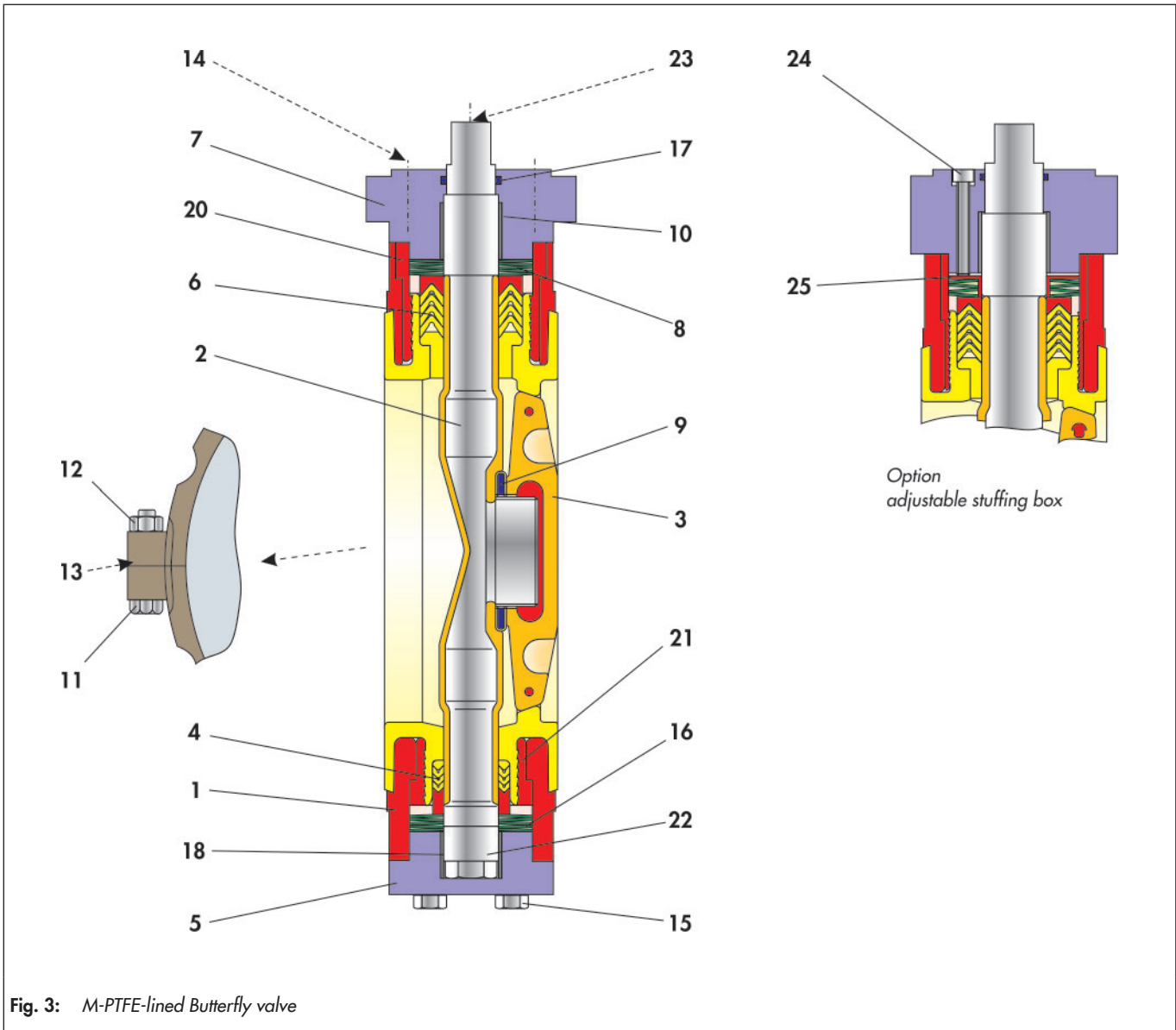


Fig. 3: M-PTFE-lined Butterfly valve

Table 1: List of parts

| Item | Description |
|------|---------------------------|
| 1 | Valve body |
| 2 | Valve shaft |
| 3 | Valve disc |
| 4 | V-ring packing |
| 5 | Lower gland flange |
| 6 | V-ring packing |
| 7 | Guide bushing |
| 8 | Set of Belleville washers |
| 9 | Sealing element |
| 10 | Bushing |
| 11 | Screw |
| 12 | Nut |

| Item | Description |
|------|---------------------------|
| 13 | Grooved pin |
| 14 | Screw |
| 15 | Screw |
| 16 | Set of Belleville washers |
| 17 | O-ring |
| 18 | Bushing |
| 20 | Bushing |
| 21 | Bushing |
| 22 | Bearing screw |
| 23 | Threaded pin |
| 24 | Screw |
| 25 | Bushing |

Versions

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

- Butterfly valve with manual gear actuator
- Shut-off valve with BR 31a pneumatic rotary actuator
- Throttling valve preferably with Series 30a pneumatic diaphragm 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

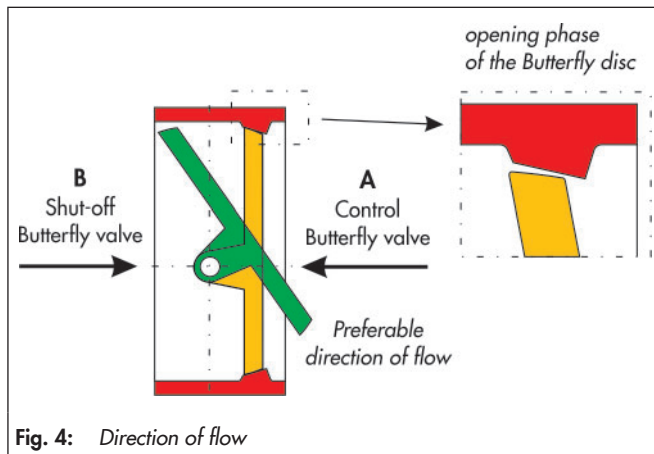
Additional accessories and attachments

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



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 operating Instructions ► BA10a.

Functional diagram with opening angles

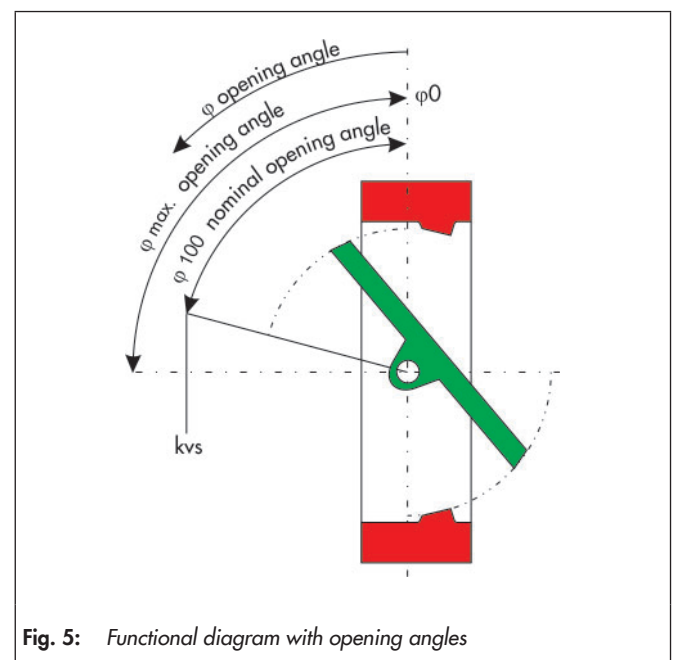


Fig. 5: Functional diagram with opening angles

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 70-2-1976) |
| 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 ⁻⁶ 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 Belleville washers (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.

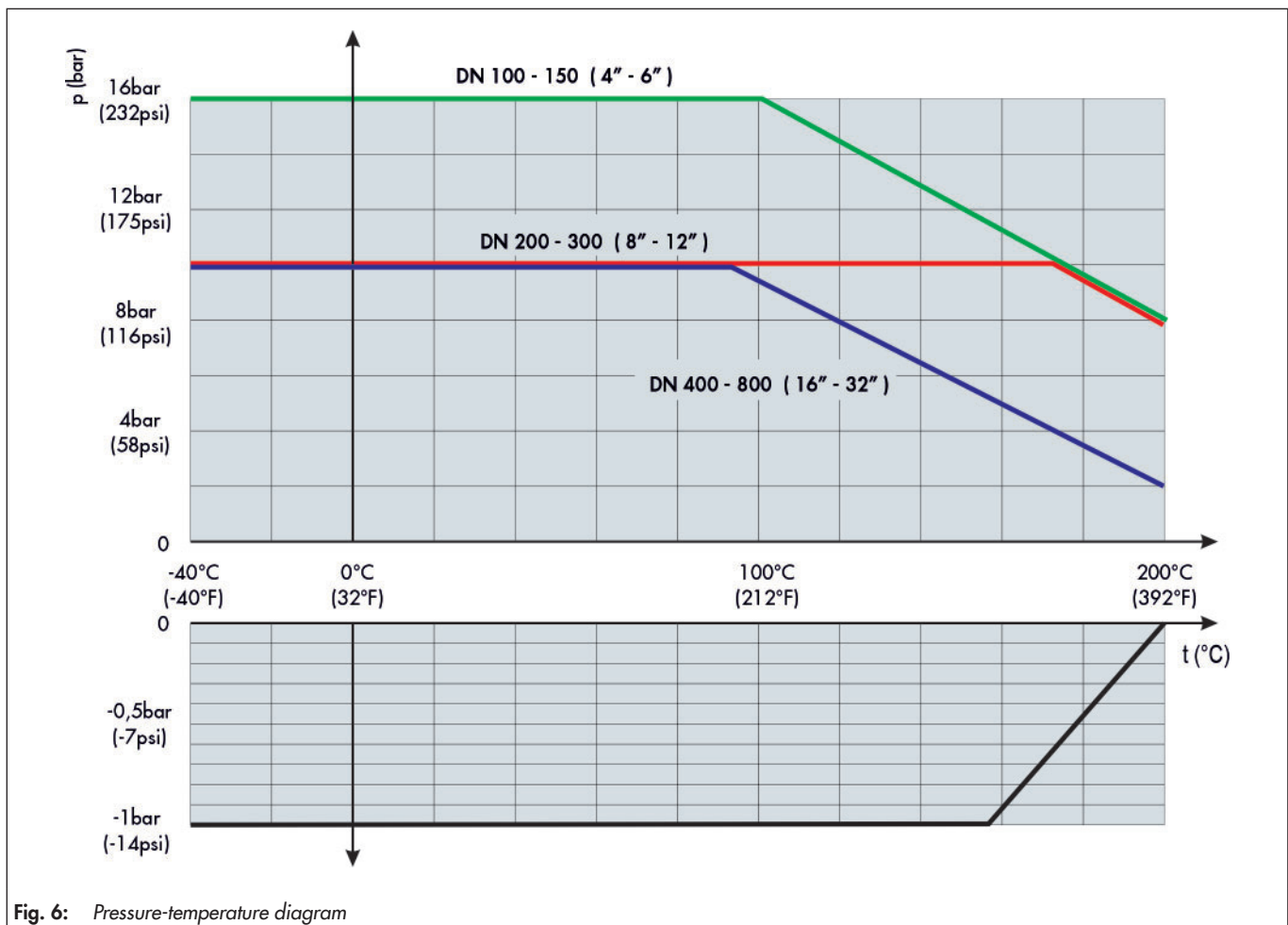


Fig. 6: Pressure-temperature diagram

Table 4: 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.

| φ | 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 termsWith liquids $\Delta LF = 0$,With gases and vapors $\Delta LG = 0$ **Table 5: Torque and breakaway torques**

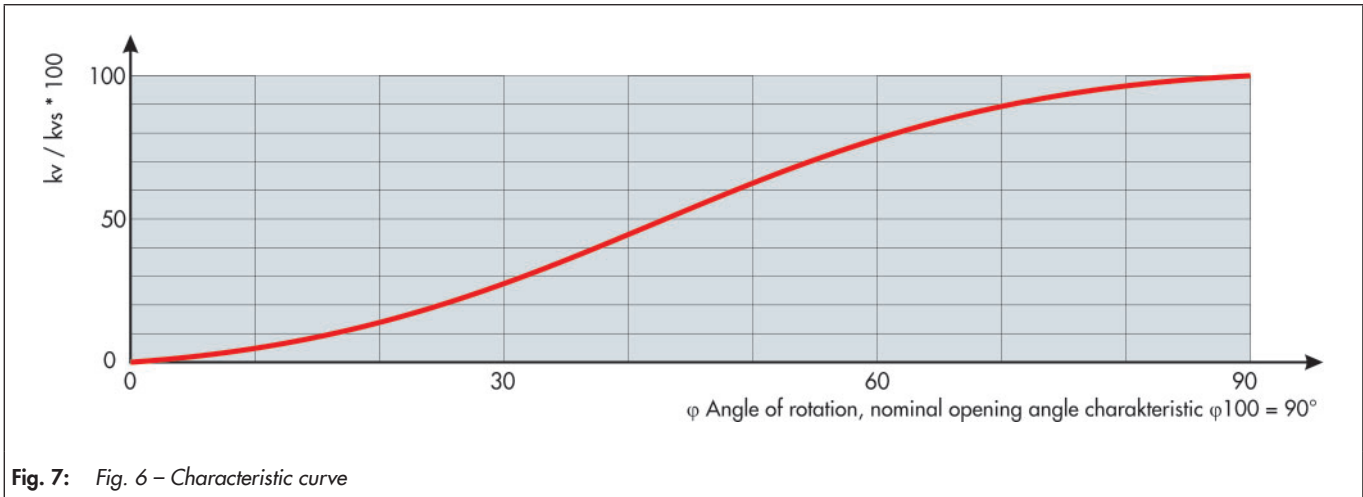
| DN | NPS | Torque MD _{max.} in Nm | Perm. Differential pressure Δp with direction of flow | | | | |
|----------------------------|-----|------------------------------------|---|----------------|----------------|----------------|----------------|
| | | | A | B | | | |
| | | | 0 bar (0 psi) | 1 bar (15 psi) | 2 bar (29 psi) | 3 bar (44 psi) | 5 bar (73 psi) |
| Breakaway torque Mdl in Nm | | | | | | | |
| 100 | 4 | 225 | 40 | 40 | 44 | 48 | 55 |
| 150 | 6 | 490 | 120 | 135 | 160 | 180 | 205 |
| 200 | 8 | 988 | 190 | 220 | 250 | 280 | 340 |
| 250 | 10 | 1930 | 350 | 480 | 640 | 700 | 820 |
| 300 | 12 | 3066 | 500 | 600 | 700 | 800 | |
| 350 | 14 | 4365 | 840 | 870 | | | |
| 400 | 16 | 4576 | 800 | 870 | | | |
| 500 | 20 | 8938 | 924 | 1280 | | | |
| 600 | 24 | 15444 | 1300 | 1700 | | | |
| 800 | 32 | 33930 | 1700 | 2200 | | | |

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 6: kv and Cv-values and associated opening angles

| Nominal size | | kv-value at φ Opening angle | | | | | | | | | Cv-value at φ 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

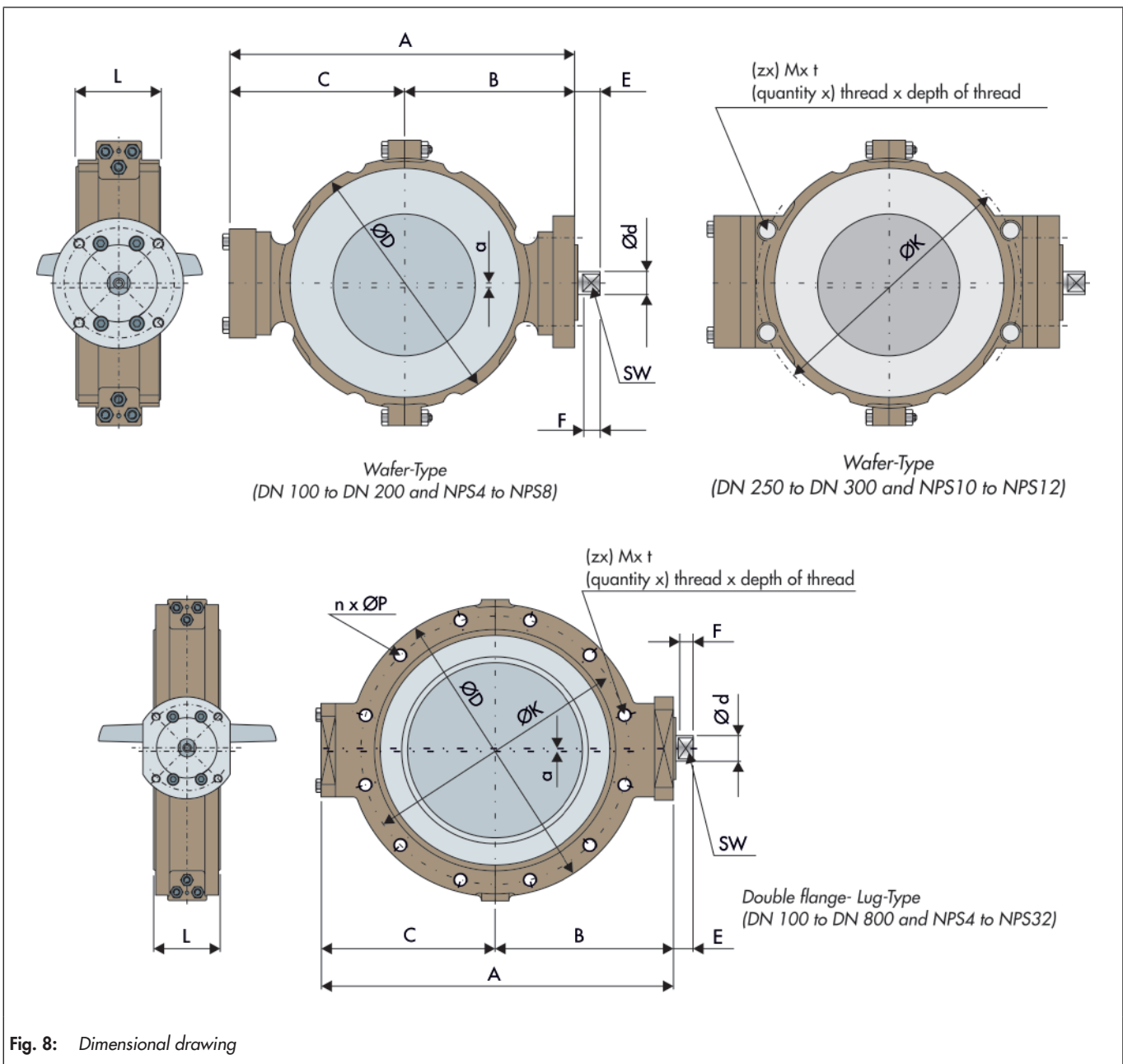


Table 7: Dimensions in mm and weights in kg

| 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 | | |
| α | 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 | PN10 | - | - | (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 | |
| | Wafer-Type (zx) Mx t | cl150 | - | - | (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 | |
| | ØD | 206 | 270 | 331 | 386 | 445 | - | 565 | 687 | 780 | 1015 | |
| | nx ØP | 8x M16 | 8x M20 | 8x M20 | 12x M20 | 12x M20 | - | - | - | - | - | |
| | Lug-Type (zx) Mx t | PN10 | (8x) M16x35 | (8x) M20x40 | - | (8x) M20x50 | (8x) M20x40 | - | - | - | - | |
| | nx ØP | 8x UNC 5/8" | 8x UNC 3/4" | 8x UNC 3/4" | 12x UNC 7/8" | 12x UNC 7/8" | - | - | - | - | - | |
| | Lug-Type (zx) Mx t | cl150 | (8x) 5/8"x40 | (8x) 3/4"x45 | - | (8x) 7/8"x55 | (8x) 7/8"x45 | - | - | - | - | |
| Mono flange | ØD | 164 | 228 | - | - | - | 445 | - | - | - | - | |
| | nx ØP | 8x 18 | 8x 22 | - | - | - | - | - | - | - | - | |
| | Wafer-Type (zx) Mx t | PN10 | - | - | - | - | - | - | - | - | - | |
| | nx ØP | 8x 19.1 | 8x 22.4 | - | - | - | 12x 28.4 | - | - | - | - | |
| | Wafer-Type (zx) Mx t | cl150 | - | - | - | - | (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 | - | - | - | |
| | Lug-Type (zx) Mx t | PN10 | (8x) M16x35 | - | (8x) M20x50 | (8x) M20x50 | (8x) M20x40 | (8x) M20x55 | (8x) M24x45 | - | - | - |
| | 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" | - | - | - | |
| | Lug-Type (zx) Mx t | cl150 | (8x) 5/8"x40 | - | (16x) 3/4"x55 | (8x) 7/8"x55 | (8x) 7/8"x45 | (8x) 1"x65 | (8x) 1"x55 | - | - | - |
| ØK | PN10 | 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 | | |

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):

Others:

Associated data sheets

- For pneumatic Multi-turn actuator ▶ TB 30a
- For pneumatic Quarter-turn actuator ▶ TB 31a

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
