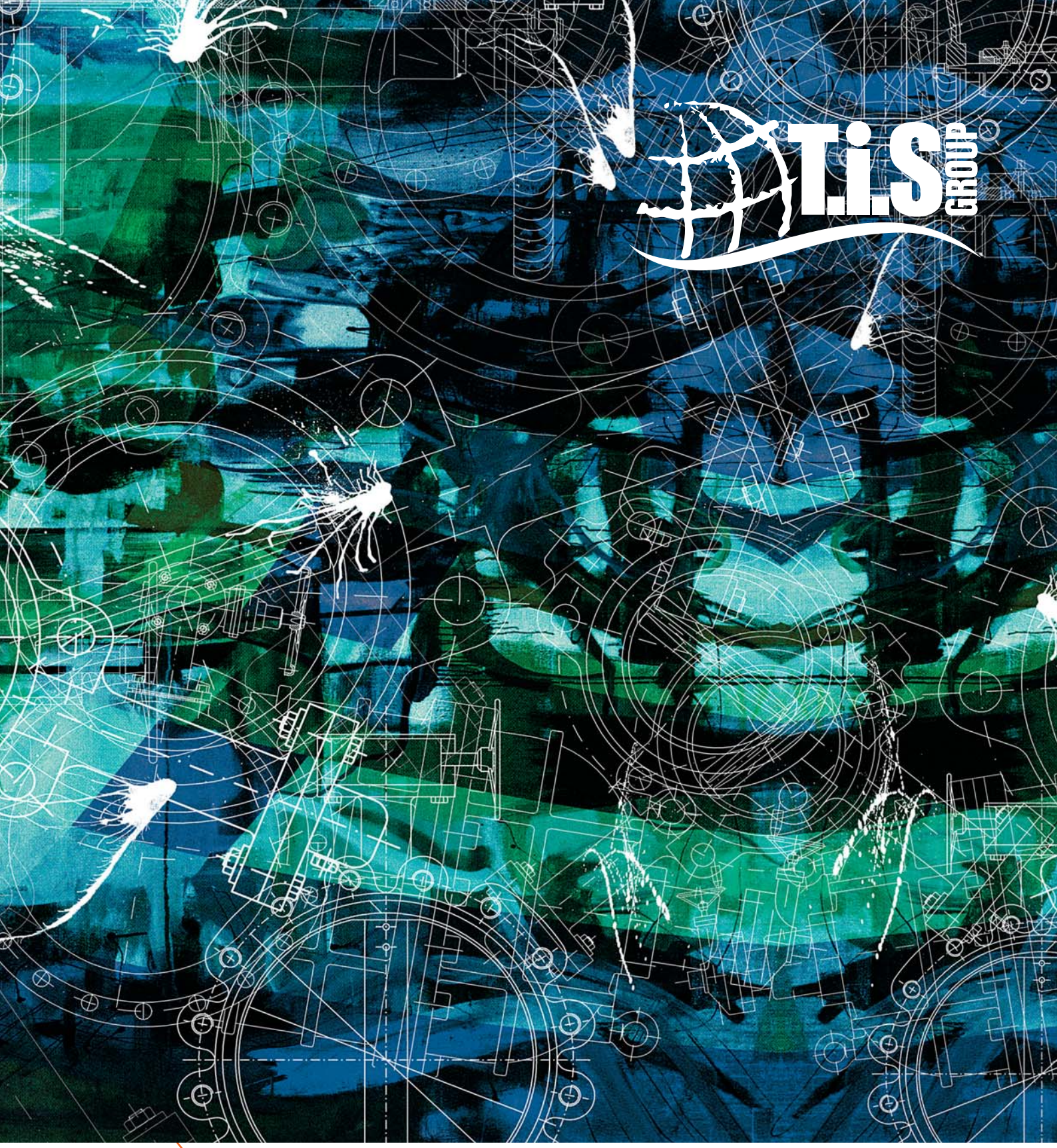


# PLUNGER FLOW CONTROL VALVE

# PLUNGER FLOW CONTROL VALVE



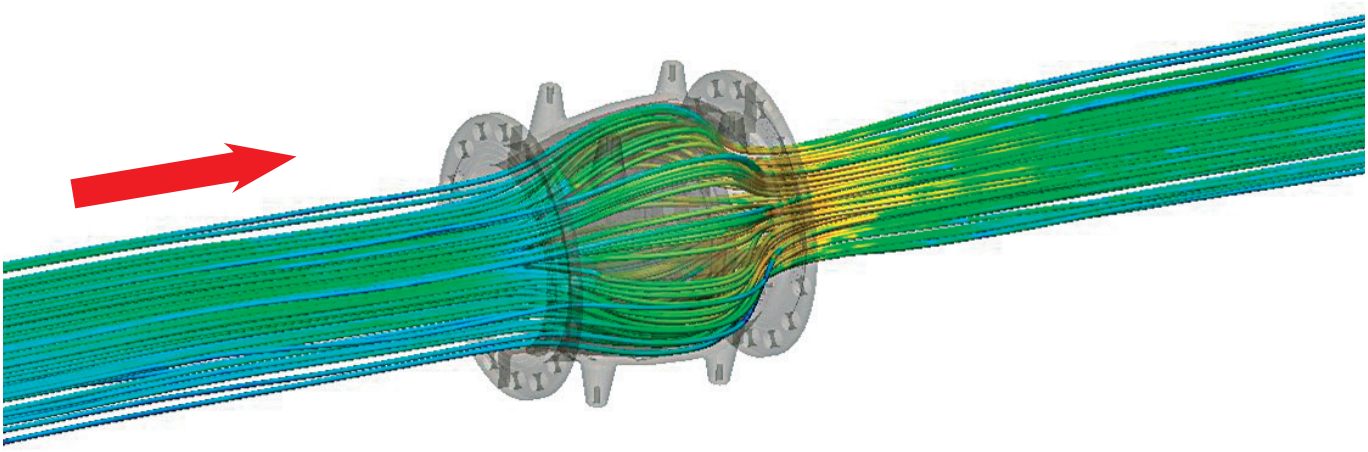
The plunger flow control valve is mainly designed for regulating flow rate and pressure in water pipelines. This regulation is achieved by the axial movement of a plunger, operated by a shaft-rod-crank mechanism.
The plunger is positioned in the center of the valve, in a chamber specially shaped to protect it from the water flow and avoid noise and cavitation damage, while also ensuring vibrations-free operation.
The water flow is channelled through a ring-shaped chamber around the central body of the valve. The cross section of this chamber diminishes constantly from the inlet to the outlet, causing the flow speed to rise and the pressure to drop.
This ideal geometric shape protects the pipe from cavitation bubbles, which are directed towards the center of the down-stream outlet flange.

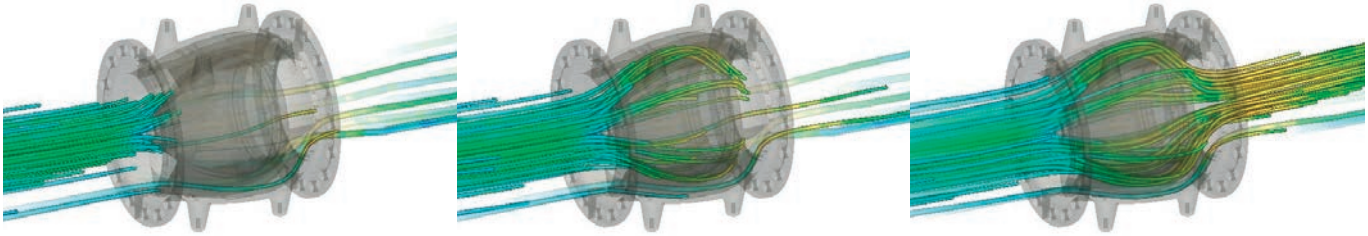
A perfect balance between the upstream and downstream chambers allows the plunger valve to be operated under low torque levels. The operating mechanism consists of a link, shaft, and connecting rod made of stainless steel. All the moving parts are supported by marine bronze bushings.

The plunger's sliding surface is entirely in stainless steel and is guided by sliding blocks which ensure stability in all operating conditions. The sliding blocks are screwed to the valve body for very easy maintenance.

A stainless steel seating ring is screwed onto the valve body. It is designed to ensure a perfect seal and easy maintenance of the interior valve components.

The seals are made of polyurethane rubber, with the main seal inserted directly into the top of the piston and the lip seal, with a special anti-extrusion profile, inserted into a matching seat formed in the valve body.





The special design directs the fluid towards the axis of the valve where the outflow collides, dissipating energy and protecting the walls of the down-stream pipe.

# F560 • PLUNGER FLOW CONTROL VALVE DN80 - DN150

## DESIGN FEATURES

- Hydraulic test according to EN 1074-5;
- Compliant with EN 1074-5;
- The parts in contact with water are compliant with DM 174 of 6/04/2004, KTW, DVGW W270, WRAS;
- One-piece body made of ductile cast iron type EN GJS 400-15 EN 1563 (GS 400-15);
- Face to face dimension according to EN 558 Series 15 (if not differently indicated);
- Flange dimensions according to EN 1092-2;
- All screws, washers, and nuts made of stainless steel A2-70 EN ISO 3506-1 (interior);
- Pressure-balanced piston movable with minimal torque made of stainless steel 1.4301 EN 10088-3 (AISI 304) or 1.4306 EN 10088-3 (AISI 304L);
- Seating box in 1.4408+AT EN 10283 (AISI 316);
- Seal retaining ring made of 1.4301 EN 10088-3 (AISI 304);
- Rod-link mechanism:
  - ⋆ link made of 1.4028 EN 10088-3 (AISI 420B);
  - ⋆ expulsion-safe shaft made of 1.4028 EN 10088-3 (AISI 420B);
  - ⋆ connecting rod made of 1.4301 EN 10088-3 (AISI 304);
- All rotating parts of the rod-link mechanism are supported by solid maintenance-free bronze bearings;
- Main seal protected from the water stream, made of HPU (polyurethane);
- Piston seal obtained with a low friction lip-type seal made of HPU (polyurethane);
- The gearbox is suitable for coupling to an electrical actuator with an ISO 5211 flange;
- Interior and exterior corrosion protection obtained with FBE (fusion bounded epoxy) coating, colour blue RAL 5015, thickness 300µm;.

## ACCESSORIES

- Depending on the operating conditions, dissipating cylinders made of 1.4301 EN 10088-3 (AISI 304) or 1.4306 EN 10088-3 (AISI 304L) can be supplied
- Depending on the operating conditions, an air-intake device made of FBE coated structural steel can be supplied.

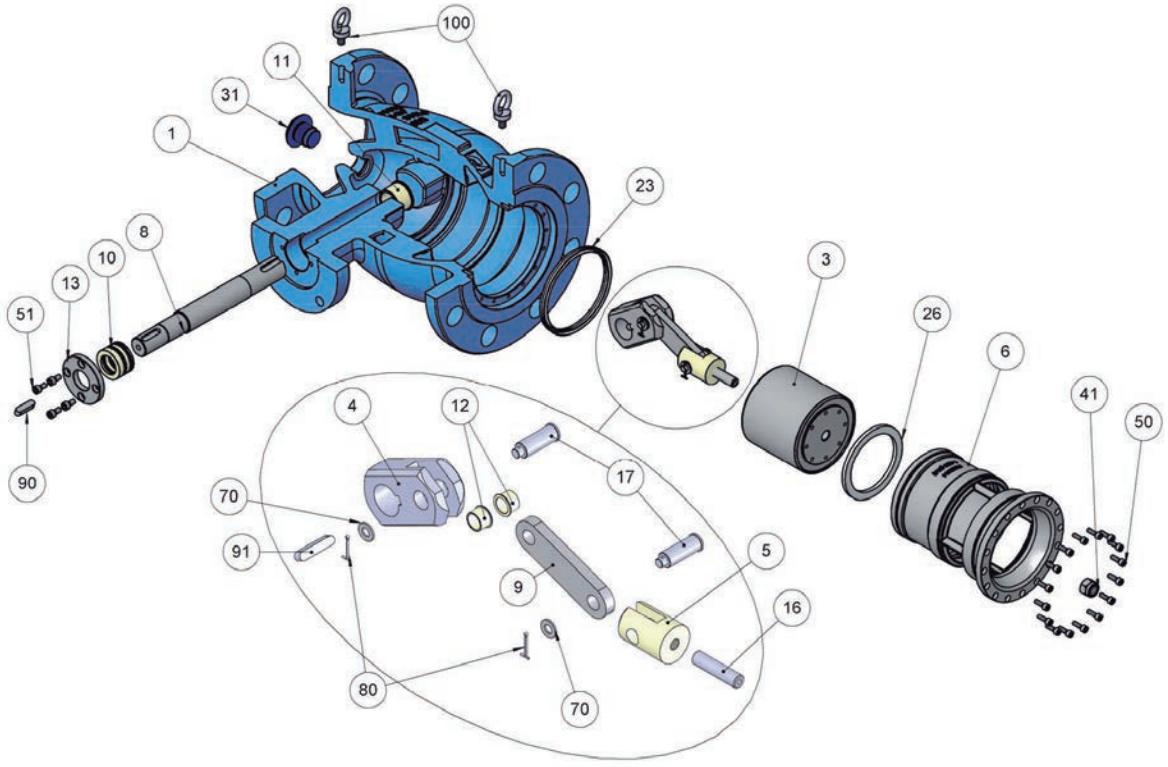
## OPERATING LIMITS

- Operating temperature: (water temp. ) min.+0°C (without freezing) max. + 90°C.
- Storage temperature: (Room temp.) min. - 20°C max. + 70°C.
- Minimum permitted differential pressure: 0.2 bar

## HIGH CORROSION-RESISTANT MATERIALS

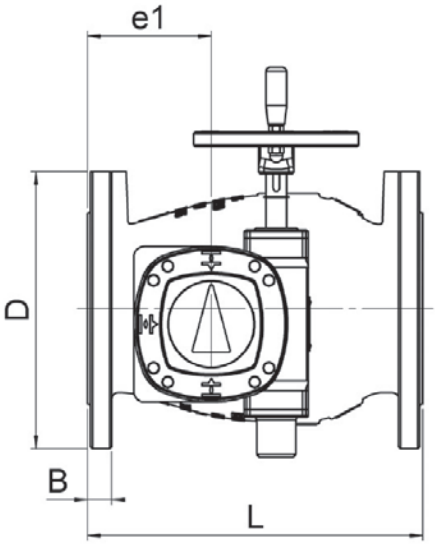
On request, some parts can be made in high corrosion-resistant materials:

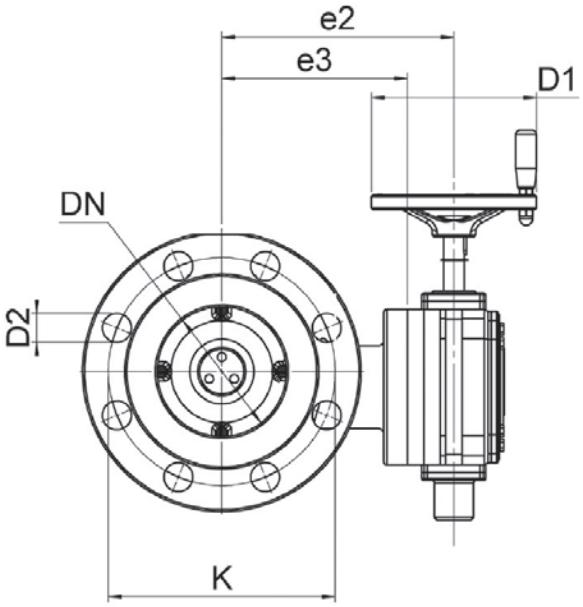
- piston, seat ring, and seal retaining ring made of 1.4401 EN 10088-3 (AISI 316) or 1.4404 EN 10088-3 (AISI 316 L) stainless steel;
- rod-link mechanism made of 1.4462 EN 10088-3 DUPLEX stainless steel;
- screws, washers, and nuts made of A4-70 EN ISO 3506-1 stainless steel ;
- anticavitation cylinder made of 1.4401 EN 10088-3 (AISI 316) or 1.4404 EN 10088-3 (AISI 316L) stainless steel.




| ITEM | COMPONENT | MATERIAL | NOTES |
|---|---|---|---|
| 1 | Body | EN-GJS 400-15 EN 1563 (GS 400 - 15) | Epoxy coating 300 µm |
| 3 | Obturator | 1.4301 EN 10088-3 (AISI 304) | |
| 4 | Link | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 5 | Fork | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 6 | Seating box | 1.4408+AT EN 10283 (AISI 316) | |
| 8 | Shaft | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 9 | Piston rod | 1.4301 EN 10088-3 (AISI 304) | |
| 10 | Outer bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 11 | Inner bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 12 | Link bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 13 | Actuator coupling disk | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 16 | Screw fork | 1.4301 EN 10088-3 (AISI 304) | |
| 17 | Connecting pins | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 23 | Lip seal | C-HPU Rubber | |
| 26 | Main seal | C-HPU Rubber | |
| 31 | Nose cone | 1.4301 EN 10088-3 (AISI 304) | |
| 41 | Nuts | 1.4301 EN 10088-3 (AISI 304) | |
| 50 | Bolts | A2-70 EN ISO3506-1 | |
| 51 | Bolts | A2-70 EN ISO3506-1 | |
| 70 | Washers | A2-70 EN ISO3506-1 | |
| 80 | Cotter pins | A2-70 EN ISO3506-1 | |
| 90 | Tongue | 1.0511 EN 10083-2 + QT (C40B) | |
| 91 | Tongue (internal) | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 100 | Eyebolt | -- | |
| 110 ÷ 114 | O-ring | EPDM | |

## DIMENSIONS AND WEIGHTS




## PN10

| DN | 80 | 100 | 125 | 150 |
|---|---|---|---|---|
| D [mm] | 200 | 220 | 250 | 285 |
| D1 [mm] | 175 | 175 | 200 | 200 |
| D2 [mm] | 19 | 19 | 19 | 23 |
| B[3] [mm] | 19 | 19 | 19 | 19 |
| e1 [mm] | 109 | 120 | 120 | 127 |
| e2 [mm] | 170 | 185 | 225 | 237 |
| e3 [mm] | 130 | 145 | 180 | 195 |
| K [mm] | 160 | 180 | 210 | 240 |
| L[1] [mm] | 280 | 300 | 325 | 350 |
| Holes [nr] | 8 | 8 | 8 | 8 |
| Weight[2] [kg] | 31 | 38 | 41 | 78 |

## PN16

| DN | 80 | 100 | 125 | 150 |
|---|---|---|---|---|
| D [mm] | 200 | 220 | 250 | 285 |
| D1 [mm] | 175 | 175 | 200 | 200 |
| D2 [mm] | 19 | 19 | 19 | 23 |
| B[3] [mm] | 19 | 19 | 19 | 19 |
| e1 [mm] | 109 | 120 | 120 | 127 |
| e2 [mm] | 170 | 185 | 225 | 237 |
| e3 [mm] | 130 | 145 | 180 | 195 |
| K [mm] | 160 | 180 | 210 | 240 |
| L[1] [mm] | 280 | 300 | 325 | 350 |
| Holes [nr] | 8 | 8 | 8 | 8 |
| Weight[2] [kg] | 31 | 38 | 41 | 78 |

## PN25

| DN | 80 | 100 | 125 | 150 |
|---|---|---|---|---|
| D [mm] | 200 | 235 | 270 | 300 |
| D1 [mm] | 175 | 175 | 200 | 200 |
| D2 [mm] | 19 | 23 | 28 | 28 |
| B[3] [mm] | 19 | 19 | 19 | 26 |
| e1 [mm] | 109 | 120 | 120 | 127 |
| e2 [mm] | 170 | 185 | 225 | 237 |
| e3 [mm] | 130 | 145 | 180 | 195 |
| K [mm] | 160 | 190 | 220 | 250 |
| L[1] [mm] | 280 | 300 | 325 | 350 |
| Holes [nr] | 8 | 8 | 8 | 8 |
| Weight[2] [kg] | 30,5 | 38 | 46 | 82 |

## PN40

| DN | 80 | 100 | 125 | 150 |
|---|---|---|---|---|
| D [mm] | 200 | 235 | 270 | 300 |
| D1 [mm] | 175 | 200 | 200 | 200 |
| D2 [mm] | 19 | 23 | 28 | 28 |
| B[3] [mm] | 19 | 19 | 23,5 | 26 |
| e1 [mm] | 109 | 120 | 120 | 127 |
| e2 [mm] | 170 | 185 | 225 | 237 |
| e3 [mm] | 130 | 145 | 180 | 195 |
| K [mm] | 160 | 190 | 220 | 250 |
| L[1] [mm] | 280 | 300 | 325 | 350 |
| Holes [nr] | 8 | 8 | 8 | 8 |
| Weight[2] [kg] | 31 | 43 | 46 | 82 |

## PN64

| DN | 80 | 100 | 125 | 150 |
|---|---|---|---|---|
| D [mm] | 215 | 250 | 295 | 345 |
| D1 [mm] | 175 | 200 | 200 | 200 |
| D2 [mm] | 23 | 28 | 31 | 34 |
| B[3] [mm] | 31 | 33 | 37 | 39 |
| e1 [mm] | 109 | 120 | 120 | 127 |
| e2 [mm] | 175 | 190 | 237 | 262 |
| e3 [mm] | 130 | 145 | 180 | 205 |
| K [mm] | 170 | 200 | 240 | 280 |
| L[1] [mm] | 280 | 300 | 325 | 350 |
| Holes [nr] | 8 | 8 | 8 | 8 |
| Weight[2] [kg] | 35 | 55 | 80 | 108 |

[1]: face to face dimension according to EN 558 series 15
[2]: gearbox included

Inlet/outlet flange: PN10-16-25 Type B seal surface (raised face)

NUOVAL LINE

# F500 • PLUNGER FLOW CONTROL VALVE DN200 - DN1400

## DESIGN FEATURES

- Hydraulic test according to EN 1074-5;
- Compliant with EN 1074-5;
- The parts in contact with water are compliant with DM 174 of 6/04/2004, KTW, DVGW W270, WRAS;
- One-piece body made of ductile cast iron:
  - ★ EN GJS 500-7 EN 1563 (GS 500-7) up to PN25 included;
  - ★ EN GJS 400-15 EN 1563 (GS 400-15) for PN≥40 ;
- Face to face dimension according to EN 558 Series 15 (if not differently indicated);
- Flange dimensions according to EN 1092-2 (PN40 DN≥700 excluded);
- All screws, washers, and nuts made of stainless steel A2-70 EN ISO3506-1 (interior);
- Pressure-balanced piston movable with minimal torque:
  - ★ from DN150 to DN1000 made of stainless steel 1.4301 EN 10088-3 (AISI 304) or 1.4306 EN 10088-3 (AISI 304L);
  - ★ from DN1200 to DN1400 made of stainless steel and FBE coated structural steel;
- Piston guides screwed to the valve body, made of friction and corrosion resistant bronze;
- Seat ring made of 1.4301 EN 10088-3 (AISI 304);
- Seal retaining ring made of 1.4301 EN 10088-3 (AISI 304);
- Rod-link mechanism:
  - ★ link:
    - ◆ from DN200 to DN700 made of 1.4028 EN 10088-3 (AISI 420B);
    - ◆ from DN800 to DN1400 made of FBE coated structural steel;
  - ★ expulsion-safe shaft made of 1.4028 EN 10088-3 (AISI 420B);
  - ★ connecting rod made of 1.4028 EN 10088-3 (AISI 420B);
- All rotating parts of the rod-link mechanism are supported by solid maintenance-free bronze bearings;
- Main seal protected from the water stream, made of HPU (polyurethane);
- Piston seal obtained with a low friction lip-type seal made of HPU (polyurethane);
- The gearbox is suitable for coupling to an electrical actuator with an ISO 5211 flange;
- Interior/exterior corrosion protection with FBE coating (fusion bounded epoxy), blue colour RAL 5015, thickness 300µm.

## ACCESSORIES

- Depending on the operating conditions, dissipating cylinders made of 1.4301 EN 10088-3 (AISI 304) or 1.4306 EN 10088-3 (AISI 304L) can be supplied;
- Depending on the operating conditions, an air-intake device made of FBE coated structural steel can be supplied.

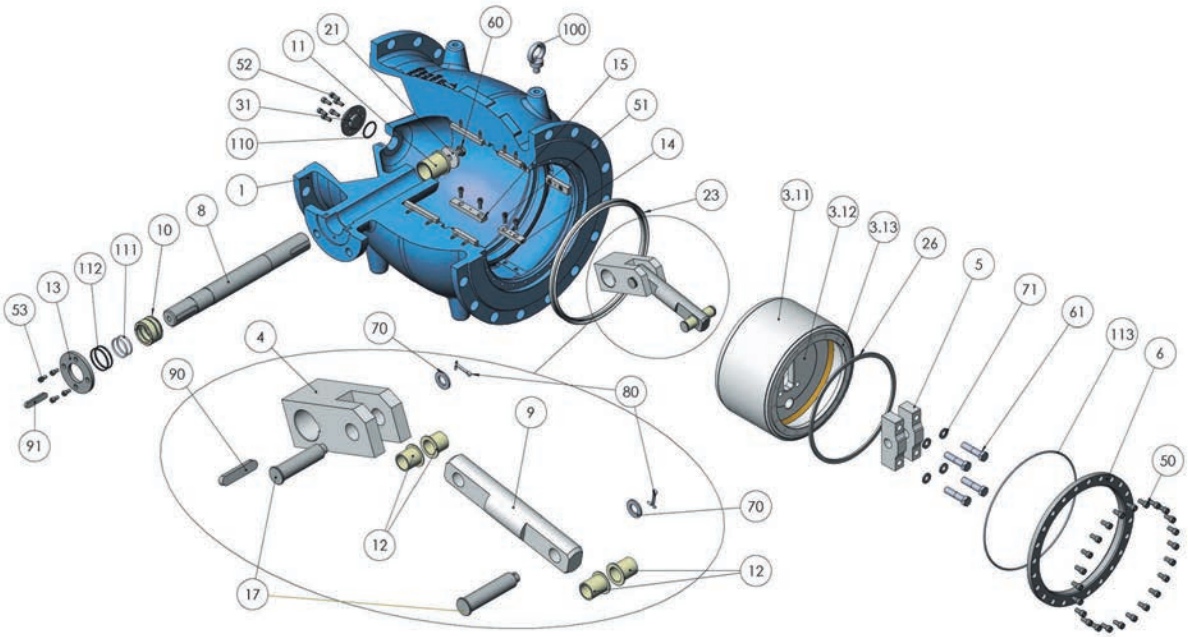
## OPERATING LIMITS

- Operating temperature: (water temp. ) min.+0°C (without freezing) max. + 90°C.
- Storage temperature: (Room temp.) min. - 20°C max. + 70°C.
- Minimum permitted differential pressure: 0.2 bar.

## HIGH CORROSION-RESISTANT MATERIALS

On request, some parts can be made in high corrosion-resistant materials:

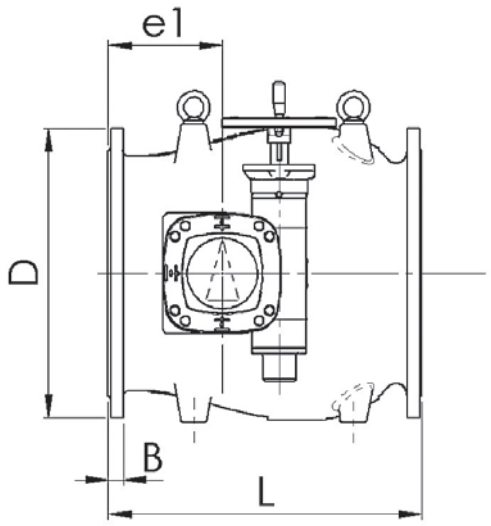
- piston, seat ring, and seal retaining ring made of 1.4401 EN 10088-3 (AISI 316) or 1.4404 EN 10088-3 (AISI 316L) stainless steel;
- rod-link mechanism made of 1.4462 EN 10088-3 DUPLEX stainless steel;
- screws, washers, and nuts made of A4-70 EN ISO 3506-1 stainless steel;
- anticavitation cylinder made of 1.4401 EN 10088-3 (AISI 316) or 1.4404 EN 10088-3 (AISI 316L) stainless steel.

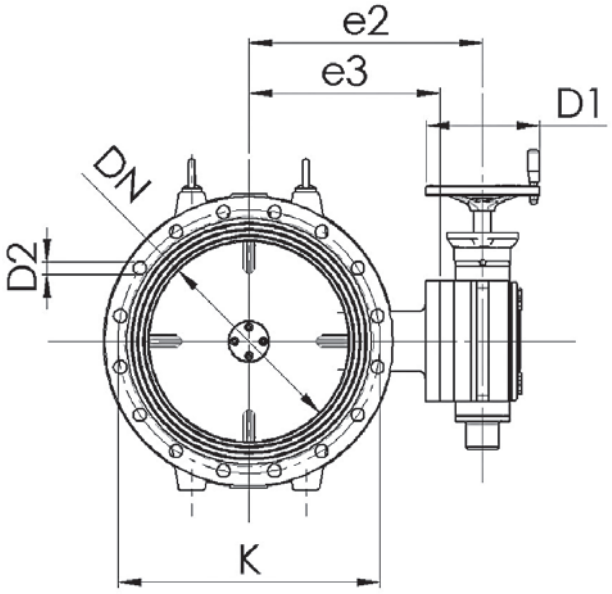



| ITEM | COMPONENT | MATERIAL | NOTE |
|---|---|---|---|
| 1 | Body | EN-GJS 500 - 7 EN 1563 (GS 500 - 7) | Epoxy coating 300 µm |
| | Body (for PN ≥ 40) | EN-GJS 400 - 15 EN 1563 (GS 400 - 15) | Epoxy coating 300 µm |
| 3 | Obturator | 1.4301 EN 10088-3 (AISI 304)<br>1.4306 EN 10088-3 (AISI 304L) | |
| 4 | Link (DN200 - DN700) | 1.4028 EN 10088-3 (AISI 420 B) | |
| | Link (DN800 - DN1400) | Structural steel | Epoxy coating 300 µm |
| 5 | Fork (DN200 - DN300) | 1.4028 EN 10088-3 (AISI 420 B) | |
| | Bracket-fork (DN350 - DN1400) | Stainless steel | |
| 6 | Seating ring | 1.4301 EN 10088-3 (AISI 304)<br>1.4306 EN 10088-3 (AISI 304L) | |
| 8 | Shaft | 1.4028 EN 10088-3 (AISI 420 B) | |
| 9 | Connecting rod | 1.4028 EN 10088-3 (AISI 420 B) | |
| 10 / 11 / 12 | Outer/Inner bearing<br>Link bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C (Bronze) | |
| 13 | Actuator coupling disk | Stainless steel | |
| 14/15 | Sliding blocks | CC 333 G EN 1982 CuAl10Fe5Ni5-C (Bronze) | |
| 17 | Connecting pins | 1.4028 EN 10088-3 (AISI 420 B) | |
| 21 | Stop washer | Stainless steel | |
| 23 | Lip Seal | C-HPU Rubber | |
| 26 | Main Seal | C-HPU Rubber | |
| 41/50/51<br>52/53/60<br>61/70/71/80 | Screws | A2-70 EN ISO3506-1 | |
| 90 | Tongue (internal) | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 91 | Tongue | 1.0511 EN 10083-2 + QT (C40B) | |
| 110…113 | O-Ring | EPDM | |
| 31 | Nose cone (DN200 - DN800) | Stainless steel | |
| | Nose cone (DN900 - DN1400) | Polymer POM | |

NUOVAL LINE

## DIMENSIONS AND WEIGHTS




## PN10

| DN | | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 | 800 | 900 | 1000 | 1200 | 1400 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | [mm] | 340 | 395 | 445 | 505 | 565 | 615 | 670 | 780 | 895 | 1015 | 1115 | 1230 | 1455 | 1675 |
| D1 | [mm] | 200 | 200 | 200 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| D2 | [mm] | 23 | 23 | 23 | 23 | 28 | 28 | 28 | 31 | 31 | 34 | 34 | 37 | 41 | 44 |
| B[3] | [mm] | 20 | 22 | 24,5 | 24,5 | 24,5 | 25,5 | 26,5 | 30 | 32,5 | 35 | 37,5 | 40 | 45 | 46 |
| e1 | [mm] | 160 | 164 | 185 | 200 | 230 | 235 | 245 | 318 | 310 | 325 | 350 | 360 | 425 | 475 |
| e2 | [mm] | 273 | 300 | 352 | 410 | 440 | 470 | 500 | 563 | 647 | 700 | 753 | 815 | 1015 | 1128 |
| e3 | [mm] | 228 | 255 | 295 | 335 | 365 | 395 | 425 | 488 | 572 | 625 | 678 | 740 | 900 | 1013 |
| K | [mm] | 295 | 350 | 400 | 460 | 515 | 565 | 620 | 725 | 840 | 950 | 1050 | 1160 | 1380 | 1590 |
| L[1] | [mm] | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1400 | 1600 |
| Holes | [nr] | 8 | 12 | 12 | 16 | 16 | 20 | 20 | 20 | 24 | 24 | 28 | 28 | 32 | 36 |
| Weight[2] | [kg] | 106 | 145 | 195 | 290 | 335 | 495 | 470 | 700 | 1000 | 1330 | 1725 | 2265 | 3530 | 5020 |

## PN16

| DN | | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 | 800 | 900 | 1000 | 1200 | 1400 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | [mm] | 340 | 405 | 460 | 520 | 580 | 640 | 715 | 840 | 910 | 1025 | 1125 | 1255 | 1485 | 1685 |
| D1 | [mm] | 200 | 200 | 200 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| D2 | [mm] | 23 | 28 | 28 | 28 | 31 | 31 | 34 | 37 | 37 | 41 | 41 | 44 | 50 | 50 |
| B[3] | [mm] | 20 | 22 | 24,5 | 26,5 | 28 | 30 | 31,5 | 36 | 39,5 | 43 | 46,5 | 50 | 57 | 60 |
| e1 | [mm] | 160 | 164 | 185 | 200 | 230 | 235 | 245 | 318 | 310 | 325 | 350 | 360 | 425 | 475 |
| e2 | [mm] | 273 | 300 | 352 | 410 | 440 | 470 | 500 | 563 | 647 | 700 | 753 | 815 | 1015 | 1128 |
| e3 | [mm] | 228 | 255 | 295 | 335 | 365 | 395 | 425 | 488 | 572 | 625 | 678 | 740 | 900 | 1013 |
| K | [mm] | 295 | 355 | 410 | 470 | 525 | 585 | 650 | 770 | 840 | 950 | 1050 | 1170 | 1390 | 1590 |
| L[1] | [mm] | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1400 | 1600 |
| Holes | [nr] | 12 | 12 | 12 | 16 | 16 | 20 | 20 | 20 | 24 | 24 | 28 | 28 | 32 | 36 |
| Weight[2] | [kg] | 106 | 145 | 195 | 290 | 335 | 495 | 510 | 750 | 1005 | 1330 | 1770 | 2290 | 3575 | 5030 |

# PN25

| DN | | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 | 800 | 900 | 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | [mm] | 360 | 425 | 485 | 555 | 620 | 670 | 730 | 845 | 960 | 1085 | 1185 | 1320 |
| D1 | [mm] | 200 | 200 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| D2 | [mm] | 28 | 31 | 31 | 34 | 37 | 37 | 37 | 41 | 44 | 50 | 50 | 57 |
| B[3] | [mm] | 22 | 24,5 | 27,5 | 30 | 32 | 34,5 | 36,5 | 42 | 46,5 | 51 | 55,5 | 60 |
| e1 | [mm] | 160 | 164 | 185 | 200 | 230 | 235 | 245 | 318 | 310 | 325 | 350 | 360 |
| e2 | [mm] | 273 | 300 | 370 | 410 | 440 | 470 | 500 | 563 | 682 | 735 | 778 | 840 |
| e3 | [mm] | 228 | 255 | 295 | 335 | 365 | 395 | 425 | 488 | 607 | 660 | 703 | 725 |
| K | [mm] | 310 | 370 | 430 | 490 | 550 | 600 | 660 | 770 | 875 | 990 | 1090 | 1210 |
| L[1] | [mm] | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 800 | 900 | 1000 | 1100 | 1200 |
| Holes | [nr] | 12 | 12 | 16 | 16 | 16 | 20 | 20 | 20 | 24 | 24 | 28 | 28 |
| Weight[2] | [kg] | 113 | 152 | 248 | 324 | 404 | 501 | 593 | 768 | 1190 | 1575 | 2160 | 2850 |

# PN40

| DN | | 200 | 250 | 300 | 350 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | [mm] | 375 | 450 | 515 | 580 | 660 | 755 | 890 | 995 | 1140 | 1250 | 1360 |
| D1 | [mm] | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 315 | 315 | 400 | 400 |
| D2 | [mm] | 31 | 34 | 34 | 37 | 41 | 44 | 50 | 48 | 56 | 56 | 56 |
| B[3] | [mm] | 30 | 34,5 | 39,5 | 43,5 | 48 | 52 | 58 | 64 | 72 | 76 | 80 |
| e1 | [mm] | 160 | 164 | 185 | 200 | 200 | 245 | 275 | - | - | - | 400 |
| e2 | [mm] | 262 | 287 | 345 | 440 | 470 | 555 | 610 | - | - | - | 999 |
| e3 | [mm] | 205 | 240 | 270 | 390 | 420 | 480 | 535 | - | - | - | 854 |
| K | [mm] | 320 | 385 | 450 | 510 | 585 | 670 | 795 | 900 | 1030 | 1140 | 1250 |
| L[1] | [mm] | 400 | 450 | 500 | 550 | 600 | 700 | 800 | 1000 | 1100 | 1200 | 1300 |
| Holes | [nr] | 12 | 12 | 16 | 16 | 16 | 20 | 20 | 24 | 24 | 28 | 28 |
| Weight[2] | [kg] | 122 | 165 | 265 | 350 | 435 | 880 | 1020 | 1650 | 2300 | 3050 | 3950 |

# PN64

| DN | | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|
| D | [mm] | 415 | 470 | 530 | 600 | 670 |
| D1 | [mm] | 250 | 250 | 250 | 250 | 250 |
| D2 | [mm] | 37 | 37 | 37 | 41 | 44 |
| B[3] | [mm] | 46 | 50 | 57 | 61 | 65 |
| e1 | [mm] | 160 | 164 | 185 | 218 | 238 |
| e2 | [mm] | 280 | 315 | 345 | 465 | 495 |
| e3 | [mm] | 205 | 240 | 270 | 390 | 420 |
| K | [mm] | 345 | 400 | 460 | 525 | 585 |
| L[1] | [mm] | 400 | 450 | 500 | 585 | 636 |
| Holes | [nr] | 12 | 12 | 16 | 16 | 16 |
| Weight[2] | [kg] | 150 | 195 | 285 | 490 | 640 |

Inlet/outlet flange: PN10-16-25 Type B seal surface (raised face)

[1]: Face to face dimension according to EN 558 series 15 (DN350 and DN400 PN64, DN700, DN800, DN900 and DN1000 PN40 excluded)

[2]: Gearbox included

NUOVAL LINE

# F550 • PLUNGER FLOW CONTROL VALVE DN1600 - DN1800

## DESIGN FEATURES

- Hydraulic test according to EN 1074-5;
- Compliant with DM 174 of 6/04/2004;
- Compliant with EN 1074-5;
- The parts in contact with water are compliant with KTW, DVGW W270, WRAS;
- One-piece body made of ductile cast iron according to EN GJS 500-7 EN 1563 (GS 500-7);
- Flange dimensions according to EN 1092-2;
- All screws, washers, and nuts made of stainless steel A2-70 EN ISO 3506-1 (interior);
- Pressure-balanced piston movable with minimal torque made of stainless steel;
- Piston guides screwed to the valve body, made of friction and corrosion resistant bronze;
- Seat ring made of 1.4301 EN 10088-3 (AISI 304);
- Seal retaining ring made of 1.4301 EN 10088-3 (AISI 304);
- Rod-link mechanism:
  - ⋆ link made of FBE coated structural steel;
  - ⋆ expulsion-safe shaft made of 1.4028 EN 10088-3 (AISI 420B);
  - ⋆ connecting rod made of 1.4028 EN 10088-3 (AISI 420B);
- All rotating parts of the rod-link mechanism are supported by solid maintenance-free bronze bearings;
- Main seal protected from the water stream, made of HPU (polyurethane);
- Piston seal obtained with a low friction lip-type seal made of HPU (polyurethane);
- The gearbox is suitable for coupling to an electrical actuator with an ISO 5211 flange;
- Interior and exterior corrosion protection obtained with FBE (fusion bounded epoxy) coating, colour blue RAL 5015, Thickness 300µm;

## ACCESSORIES

- Depending on the operating conditions, anticavitation cylinders made of 1.4301 EN 10088-3 (AISI 304) or 1.4306 EN 10088-3 (AISI 304L) can be supplied;
- Depending on the operating conditions, an air-sucking device made of FBE coated structural steel can be supplied;.

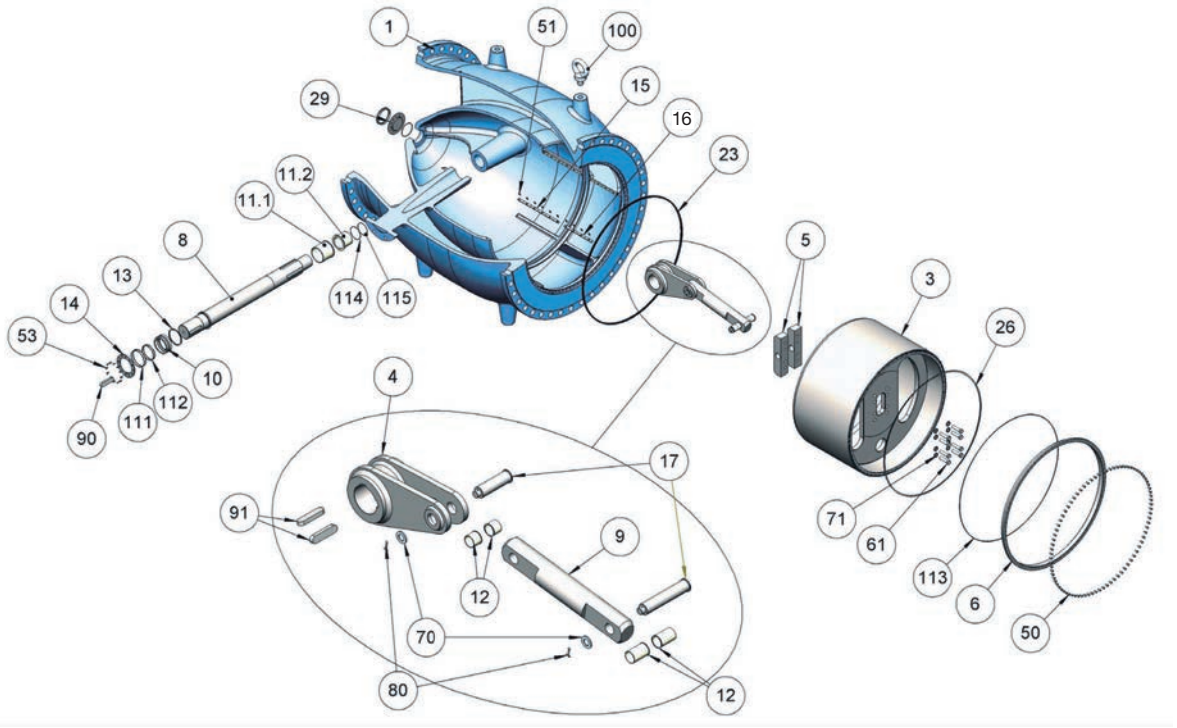
## OPERATING LIMITS

- Operating temperature: (water temp. ) min.+0°C (without freezing) max. + 90°C.
- Storage temperature: (Room temp.) min. - 20°C max. + 70°C.
- Minimum permitted differential pressure: 0.2 bar.

## HIGH CORROSION-RESISTANT MATERIALS

On request, some parts can be made in high corrosion-resistant materials:

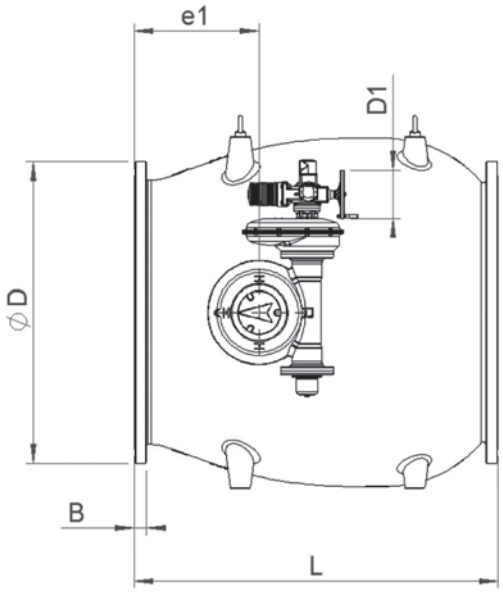
- piston, seat ring, and seal retaining ring made of 1.4401 EN 10088-3 (AISI 316) or 1.4404 EN 10088-3 (AISI 316L) stainless steel;
- rod-link mechanism made of 1.4462 EN 10088-3 DUPLEX stainless steel;
- screws, washers, and nuts made of A4-70 EN ISO 3506-1 stainless steel ;
- anticavitation cylinder made of 1.4401 EN 10088-3 (AISI 316) or 1.4404 EN 10088-3 (AISI 316L) stainless steel.

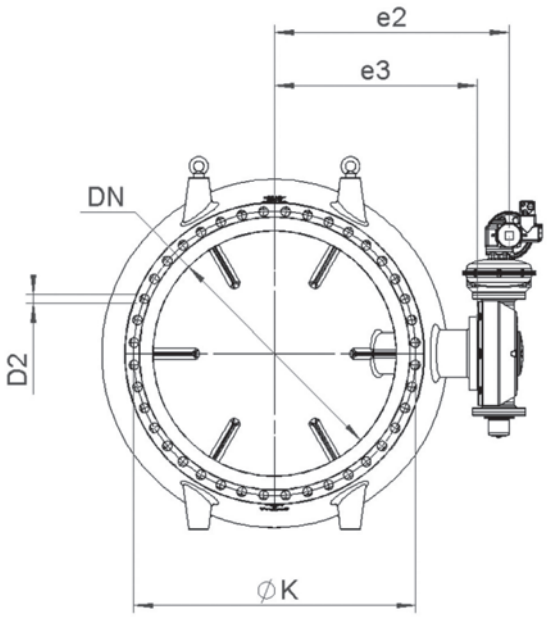



| ITEM | COMPONENT | MATERIALS | NOTE |
|---|---|---|---|
| 1 | Body | EN-GJS 500-7 EN 1563 (GS500) | Epoxy coating 300 µm |
| 3 | Obturator (pipe, frontal ring and frontal plate) | 1.4306 EN 10088-3 (AISI 304L) | |
| 4 | Link | S275JR EN 1025-2 (Fe430B) | Epoxy coating 300 µm |
| 5 | Bracket-fork | S275JR EN 1025-2 (Fe430B) | Epoxy coating 300 µm |
| 6 | Seating ring | 1.4301 EN 10088-3 (AISI 304) | |
| 8 | Shaft | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 9 | Piston rod | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 10 | Outer bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 11.1 / 11.2 | Inner bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 12 | Bearing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 13 | Thrust bearing bushing | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 14 | Actuator coupling disk | 1.4301 EN 10088-3 (AISI 304) | |
| 15 - 16 | Guides | CC 333 G EN 1982 CuAl10Fe5Ni5-C | |
| 17 | Connecting rod | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 23 | Lip seal | C-HPU Rubber | |
| 26 | Main seal | C-HPU Rubber | |
| 29 | Nose cone | 1.4301 EN 10088-3 (AISI 304) | |
| 50/51/53/61 | Bolts | A2-70 EN ISO 3506-1 | |
| 70/71 | Washers | A2-70 EN ISO 3506-1 | |
| 80 | Cotter pins | A2-70 EN ISO 3506-1 | |
| 90 | Tongue | 1.0511 EN 10083-2 +QT (C40B) | |
| 91 | Tongue (internal) | 1.4028 EN 10088-3 QT850 (AISI 420 B) | |
| 100 | Eyebolt | -- | |
| 111...115 | O-ring | EPDM | |

NUOVAL LINE

## DIMENSIONS AND WEIGHTS




### PN10

| DN | 1600 | 1800 |
|---|---|---|
| D [mm] | 1915 | 2115 |
| D1 [mm] | 320 | 500 |
| D2 [mm] | 50 | 50 |
| B[2] [mm] | 49 | 52 |
| e1 [mm] | 855 | 855 |
| e2 [mm] | 1610 | 1740 |
| e3 [mm] | 1365 | 1410 |
| K [mm] | 1820 | 2020 |
| L [mm] | 2300 | 2600 |
| Holes [nr] | 40 | 44 |
| Weight[1] [kg] | 10480 | 13850 |

### PN16

| DN | 1600 | 1800 |
|---|---|---|
| D [mm] | 1930 | 2130 |
| D1 [mm] | 320 | 500 |
| D2 [mm] | 57 | 57 |
| B[2] [mm] | 65 | 70 |
| e1 [mm] | 855 | 855 |
| e2 [mm] | 1610 | 1740 |
| e3 [mm] | 1365 | 1410 |
| K [mm] | 1820 | 2020 |
| L [mm] | 2300 | 2600 |
| Holes [nr] | 40 | 44 |
| Weight[1] [kg] | 10500 | 14000 |

### PN25

| DN | 1600 | 1800 |
|---|---|---|
| D [mm] | 1975 | 2195 |
| D1 [mm] | 320 | 500 |
| D2 [mm] | 62 | 70 |
| B[2] [mm] | 81 | 88 |
| e1 [mm] | 855 | 855 |
| e2 [mm] | 1610 | 1740 |
| e3 [mm] | 1365 | 1410 |
| K [mm] | 1860 | 2070 |
| L [mm] | 2300 | 2600 |
| Holes [nr] | 40 | 44 |
| Weight[1] [kg] | 11000 | 16000 |

[1]: gearbox included
Inlet/outlet flange: Type B seal surface (raised face)

## PRESSURE DROPS

Pressure drops in plunger flow control valves can be evaluated using equation (1.a) or equation (1.b):

$$\Delta P = \xi * V^2 / (2\ g)\ [mhw] \qquad (1.a)$$
$$\Delta P = (Q / Kv)^2\ [bar] \qquad (1.b)$$

Where:

- $\Delta P$ = pressure drop [unit: see formula above]
- $\xi$ = pressure drop coefficient
- v = fluid speed referred to valve's DN [m/s]
- Kv = flow coefficient [$m^3/h$]
- g = 9.81 [$m/s^2$]
- Q = flow rate [$m^3/h$]

The pressure drop coefficient $\xi$ can be calculated using (2.a) and the flow coefficient Kv can be calculated using (2.a):

$$\xi = \xi^* \times \xi_{100} \qquad (2.a)$$
$$Kv = Kv\% \times Kvs \qquad (2.b)$$

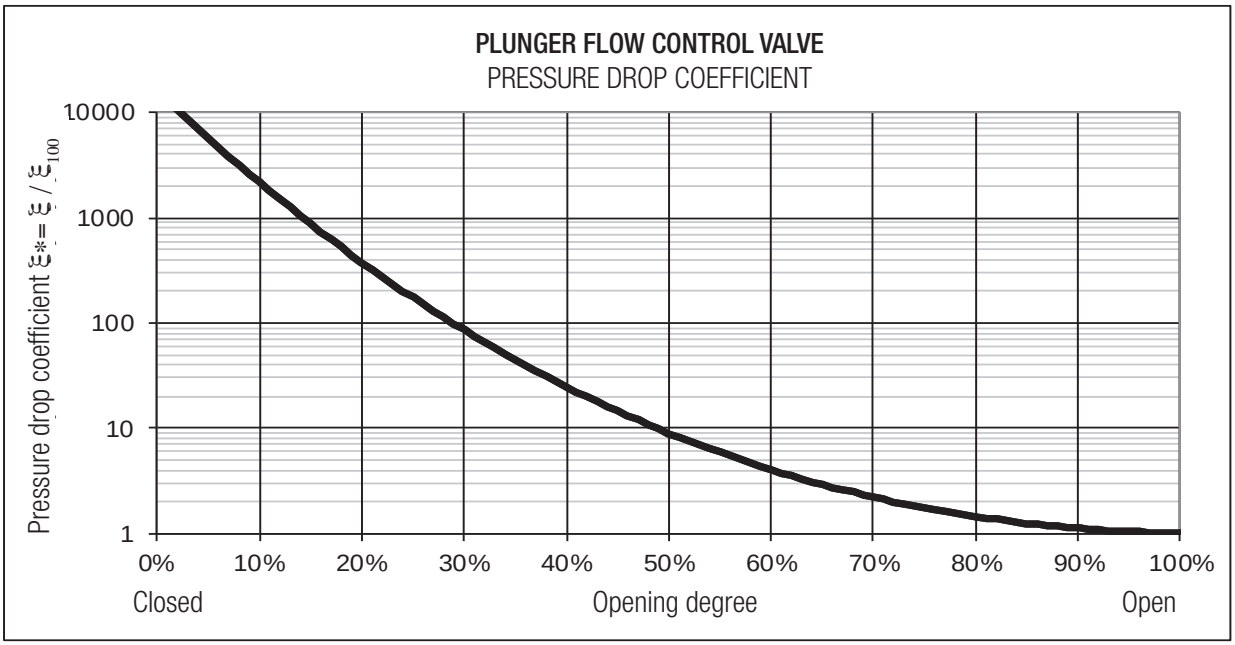
Where:

- $\xi_{100}$ is the pressure drop coefficient of the fully open valve. It is listed in Table_1 for standard valves (no dissipating cylinder). For valves equipped with dissipating cylinders, $\xi_{100}$ is the distinctive value of the cylinder (e.g.: for a valve equipped with a K20 dissipating cylinder, it will be $\xi_{100} = 20$).
- $\xi^*$ expresses the percentage change in the pressure drop as the degree of valve aperture varies ($\xi^* = \xi / \xi_{100}$). $\xi^*$ is shown in Diagram_1.
- Kvs is the flow coefficient of the fully open valve and is listed in Table_1.
- Kv% expresses the percentage change of Kv as the degree of valve aperture varies. Kv% = Kv / Kvs. Kv% is shown in Diagram_2.

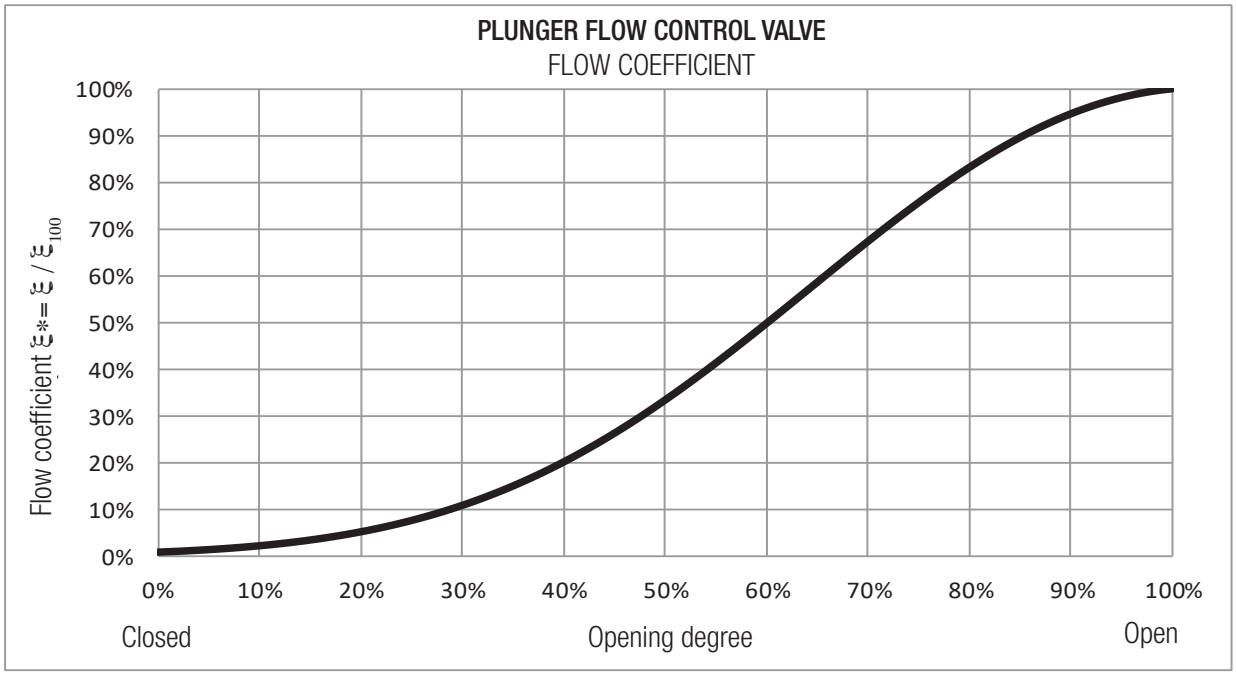
| PLUNGER FLOW CONTROL VALVES - HYDRAULIC SPECIFICATIONS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F560 | | | F500 | | | | | | | | | | | | | | | F550 | |
| DN | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 | 800 | 900 | 1000 | 1200 | 1400 | 1600 | 1800 |
| Kvs [$m^3/h$] | 145 | 203 | 310 | 430 | 678 | 1070 | 1550 | 2120 | 2785 | 3540 | 4395 | 6380 | 8750 | 11480 | 14580 | 18010 | 26020 | 35430 | 64100 | 81200 |
| $\xi_{100}$ | 3,1 | 3,8 | 4,0 | 4,3 | 5,5 | 5,4 | 5,3 | 5,2 | 5,2 | 5,1 | 5,1 | 5,0 | 4,9 | 4,9 | 4,8 | 4,8 | 4,8 | 4,8 | 2,5 | 2,5 |

Table 1

## DIAGRAM 1




## DIAGRAM 2



## CAVITATION

Cavitation risk in plunger valves can be evaluated by using equation (3):

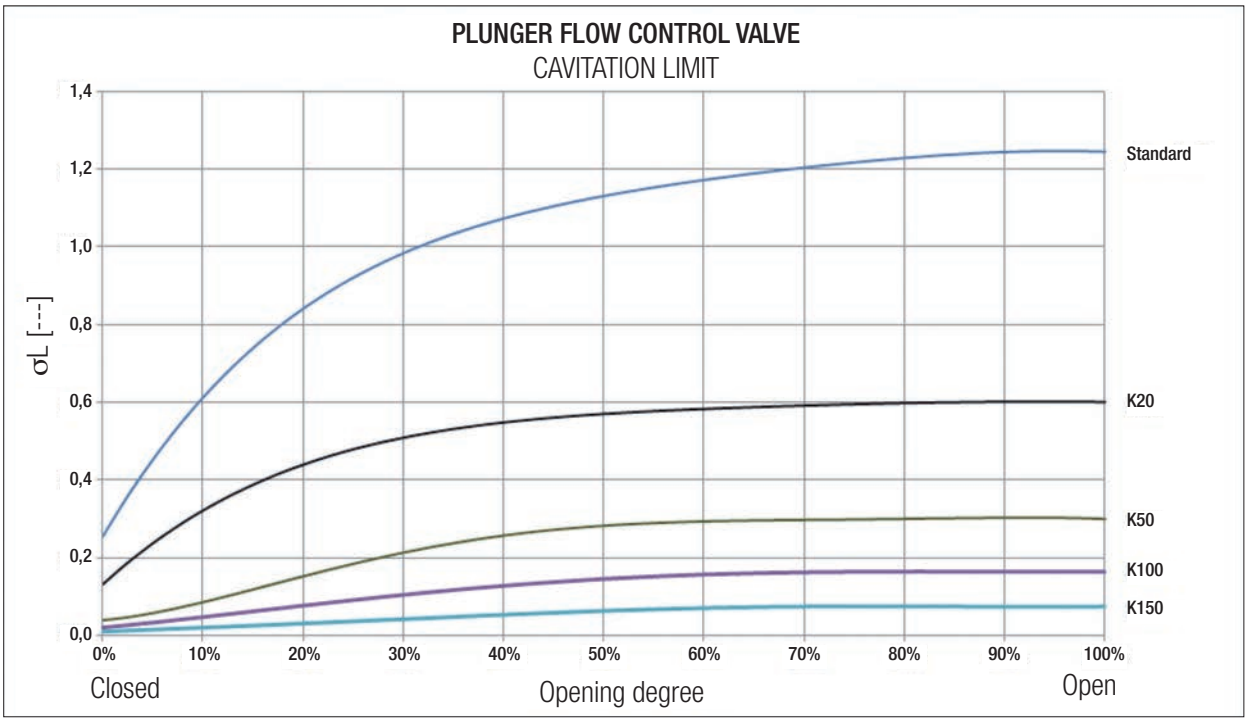
$$\sigma > \sigma L \qquad (3)$$

Where:

- Cavitation number $\sigma = P_{out} / (\Delta P + v^2/2g)$ (4)
- Cavitation limit $\sigma L$ is given in the diagram below
- $\Delta P$ = pressure drop [mhw]
- $P_{out}$ = valve outlet pressure
- v = fluid velocity referred to valve's DN [m/s]
- g = 9.81 m/s$^2$

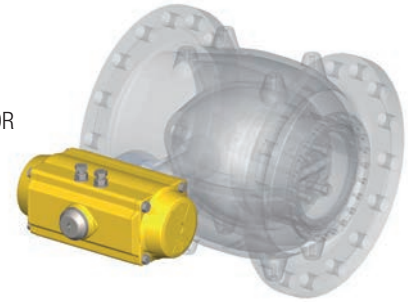
The valve will not cavitate as long as $\sigma > \sigma L$.

## DIAGRAM 3

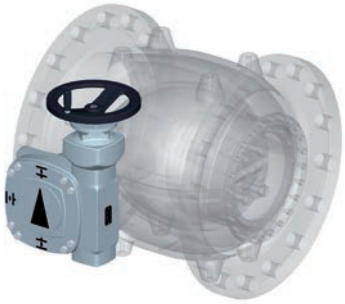


# OPERATING DEVICES

PNEUMATIC ACTUATOR

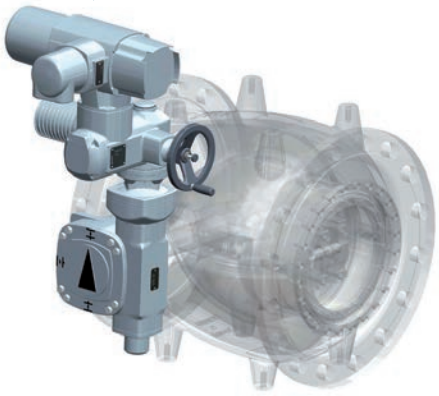


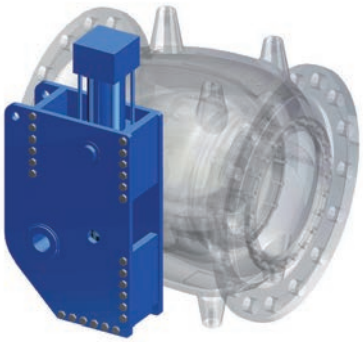
WORM GEARBOX
AND HANDWHEEL



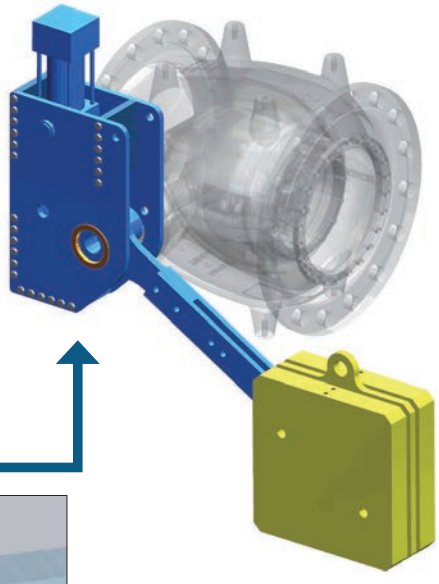
MAIN VALVE

ELECTRIC ACTUATOR



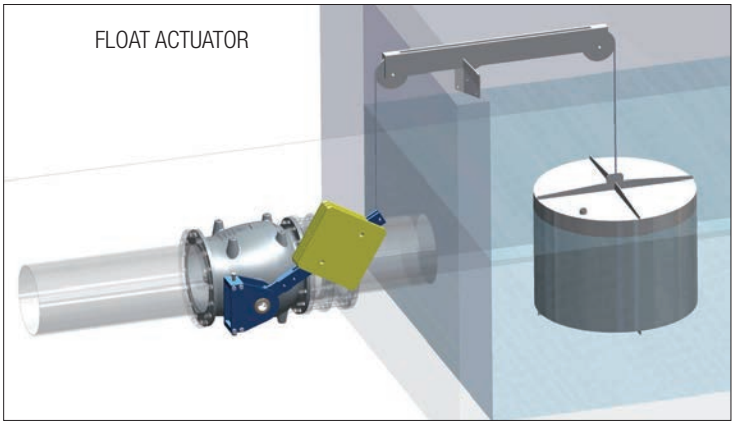


DOUBLE-ACTING
HYDRAULIC
ACTUATOR



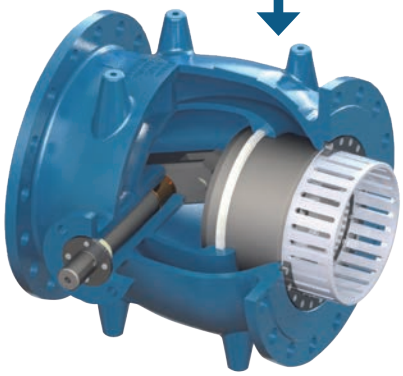
HYDRAULIC CYLINDER
AND COUNTERWEIGHT

FLOAT ACTUATOR



# ACCESSORIES

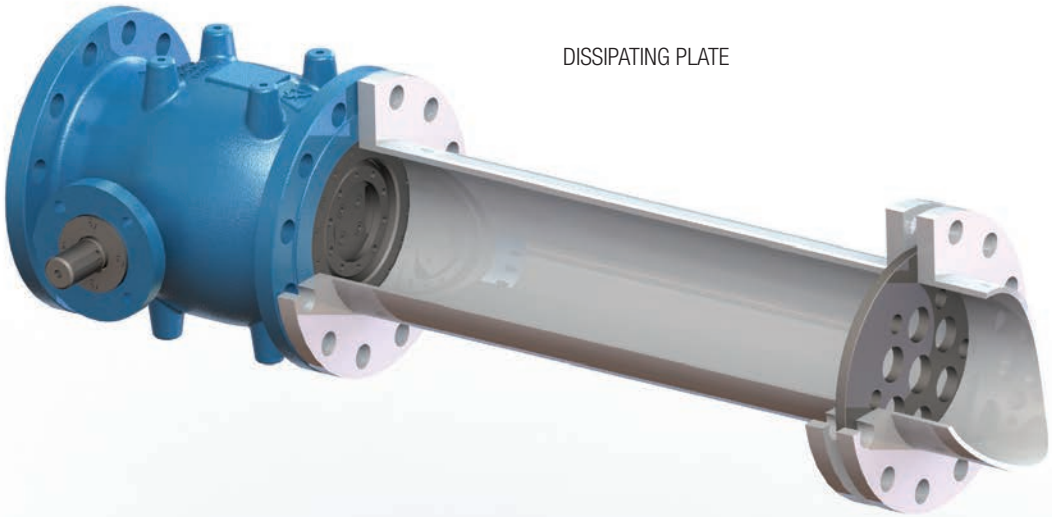
DISSIPATING CYLINDER



AIR INTAKE DEVICE

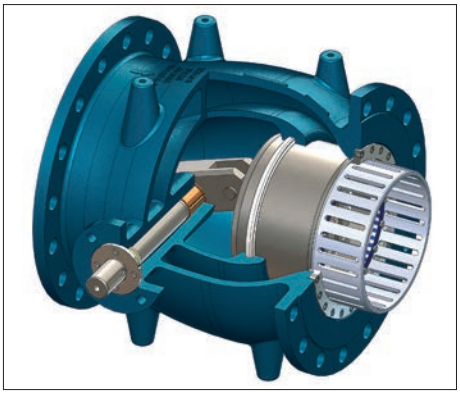
MAIN VALVE

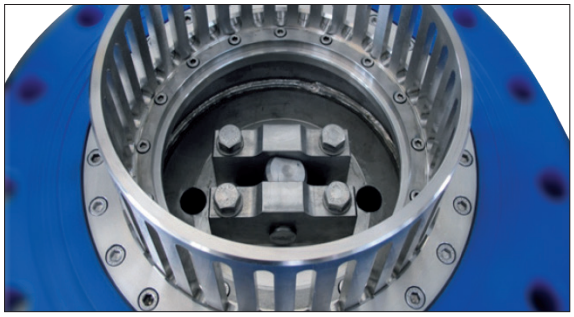
DISSIPATING PLATE



## DISSIPATING CYLINDERS

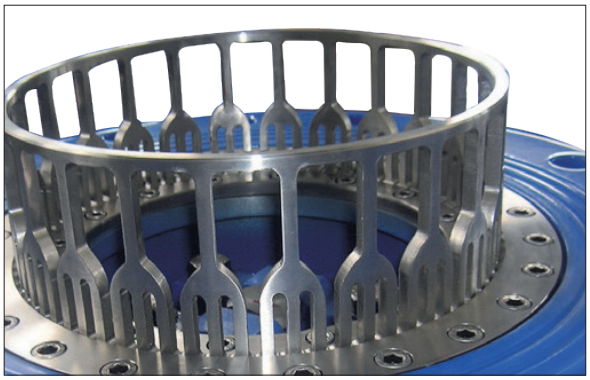
The valve can be equipped with a stainless steel dissipating cylinder specially slotted to divide the outlet flow into radial fluid jets that collide at the valve centre axis. This device offers an energy dissipation curve adjusted to the real operating conditions of the valve and based on the plant's effective requirements. Standard slotted cylinders are available for progressively greater resistance to cavitation and increasing pressure drops. Special slotted cylinders can be fitted with the dimension, shape, and aperture calculated on the basis of the valve's effective operating conditions. For example, it is possible to limit headloss at higher valve apertures, and ensure high cavitation resistance at small apertures.





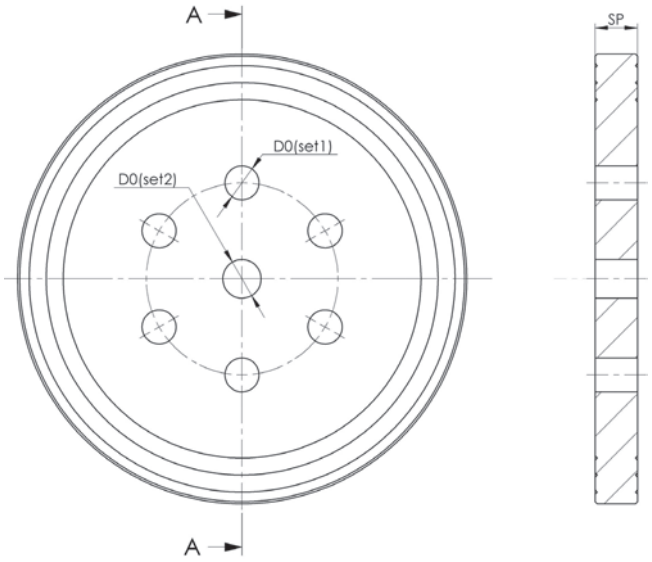
## DIFFERENT TYPES OF DISSIPATING CYLINDERS

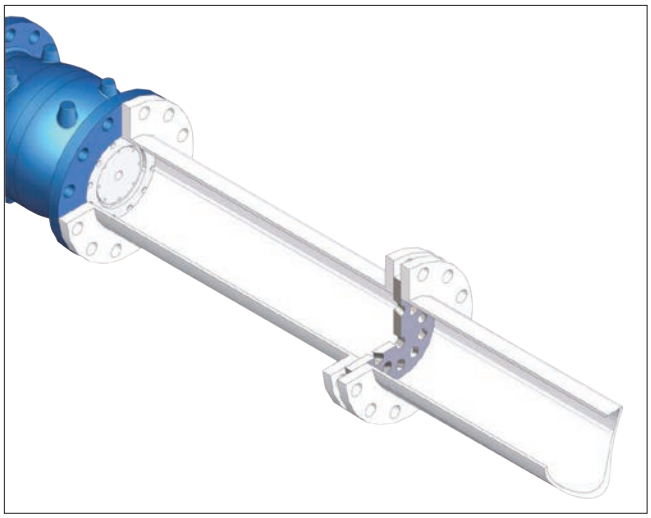
## SPECIAL DISSIPATING CYLINDERS



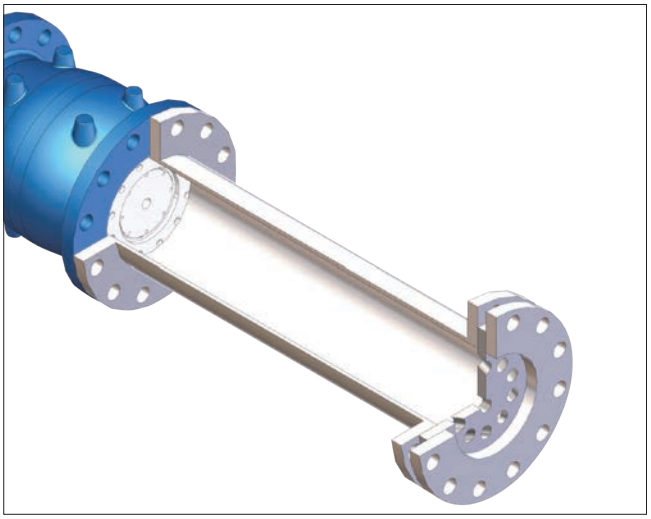
## DISSIPATING PLATE

In the case of high hydraulic heads, when a dissipating cylinder is not enough to ensure adequate dissipation it should be combined with a perforated dissipating plate mounted downstream of the valve. A suitably designed plate will reduce the hydraulic head and support the dissipating action of the dissipating cylinder.
Depending on the number, size, and inclination of the holes, a dissipating plate provides different load dissipation values, improving the overall performance of the valve.
The recommended minimum pipe length upstream of a dissipating plate is $L_{PIPE} \geq 3$ X Valve DN. The outside diameter of a dissipating plate is suitable for connection using a flange according to EN 1092-2. The recommended seal is flat type (on request, a dissipating plate can be made with O-ring seats).



DISSIPATING PLATE DUCTED



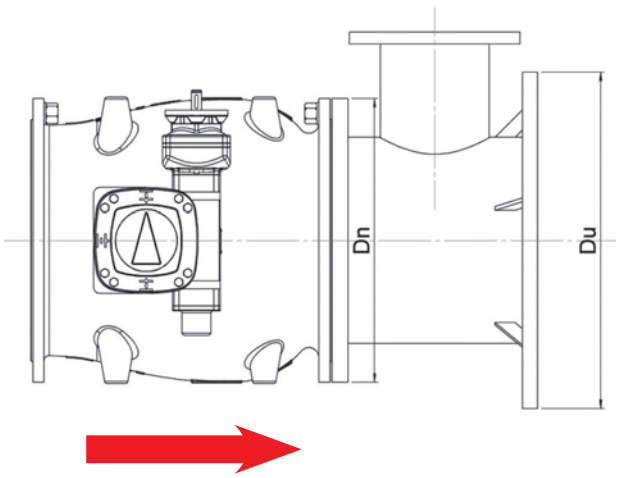
DISSIPATING PLATE - FREE DISCHARGE

## AIR INTAKE DEVICE

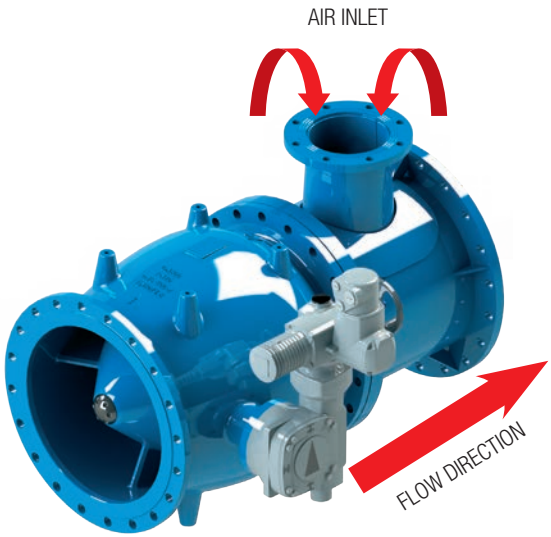
Cavitation can occur due to depression in proximity to a flange or pipe downstream of a valve. This can be avoided by fitting the valve with an adequate air intake device to intake air and compensate the fluid depression, thus reducing the risk of cavitation, ensuring extended safe operation of the valve, and protecting the downstream section of the plant.
ATTENTION: The maximum working pressure allowed for an air intake is 2 bar.
When an air intake is fitted, the Silencer AS accessory can be useful to limit noise emissions.
The Silencer AS is fitted directly onto the air intake:

- Low noise emission, Silences AS is able to reduce noise down up to 30 decibels;
- Easy to install;
- Cost saving, no need for piping to connect the air intake to the exterior.

We recommend providing the maneuver chamber with a ventilation opening to avoid occurrence of under pressure.



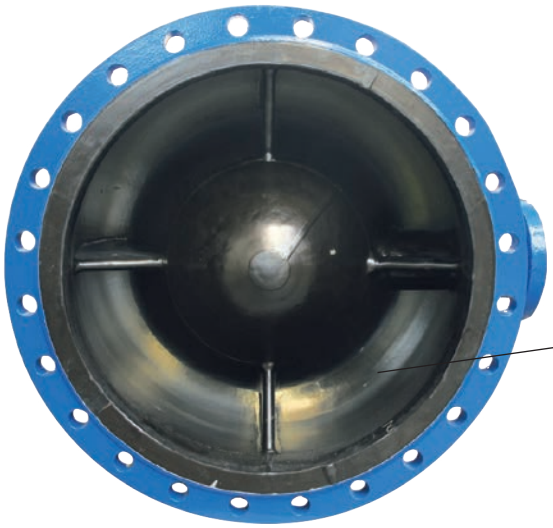

| AIR INTAKE STANDARD DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DN valve | *= DOUBLE AIR INLET / **= TO BE CONFIRMED | | | | |
| [PN10/16] | Dn | Du | DN air inlet | Face to face | Weight [kg] |
| 150 | DN150 | DN200 | DN65 | 280 | 30 |
| 200 | DN200 | DN250 | DN80 | 340 | 45 |
| 250 | DN250 | DN300 | DN100 | 350 | 60 |
| 300 | DN300 | DN400 | DN125 | 360 | 95 |
| 350 | DN350 | DN450 | DN150 | 420 | 130 |
| 400 | DN400 | DN500 | DN200 | 460 | 185 |
| 450 | DN450 | DN600 | DN200 | 550 | 215 |
| 500 | DN500 | DN600 | DN200 | 600 | 255 |
| 600 | DN600 | DN700 | DN250 | 680 | 340 |
| 700 | DN700 | DN800 | DN300 | 850 | 420 |
| 800 | DN800 | DN900 | DN300 | 865 | 530 |
| 900 | DN900 | DN1000 | DN350 | 900 | 720 |
| 1000 | DN1000 | DN1200 | DN400 | 1000 | 940 |
| 1200* | DN1200 | DN1400 | DN400 | 1200 (**) | 1550 |
| 1400* | DN1400 | DN1600 | DN400 | 1400 (**) | 1950 |

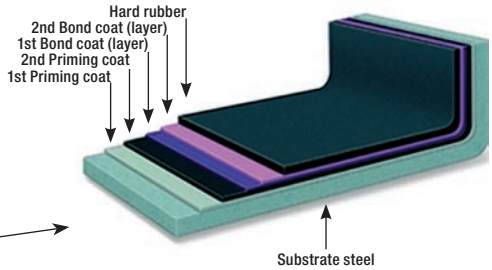



PLUNGER FLOW CONTROL VALVE WITH AIR INTAKE DEVICE AND SILENCER “AS”

# F500RL • PLUNGER FLOW CONTROL VALVE WITH VULCANIZED HARD RUBBER LINING

Valves for saline media (seawater or well-desalination) or corrosive media have to resist chemical attack from chloride ions. Standard epoxy coated valve surfaces will be rapidly abraded due to the fluid aggressivity. The best possible solution to ensure extended valve life and safe operation of plants, is to entirely protect the internal valve surfaces with a hard rubber lining of 3 mm which ensures no metal parts come into contact with the aggressive fluids. The linings are applied by heating the elements to around 135°-145° C and vulcanizing rubber sheets onto the surfaces at a pressure of about 4.5 bar.
Other parts of the valve in contact with the fluids are made in duplex and AISI 316 stainless steel, offering high resistance to corrosion in the presence of ions dissolved in water.
Typical applications for these valves are: water treatment plants, desalination plants, mines, industrial water handling, mineral treatment plants.






The valve body is internally covered with a rubber layer which provides additional protection to corrosion from brackish water and significantly increases the life of the valve.

NUOVAL LINE

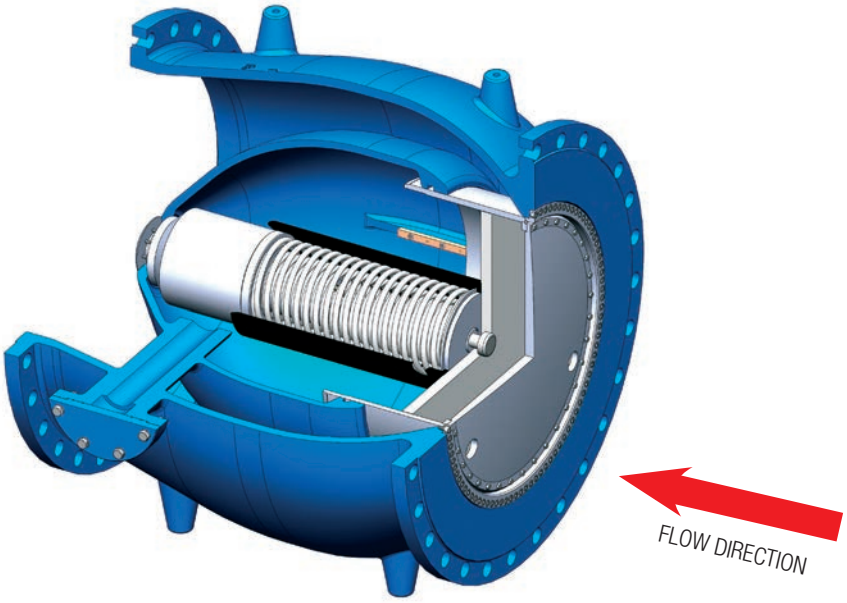
# F600 - F650 • PLUNGER FLOW CONTROL VALVE FABRICATED WELDED STEEL

In high pressure applications the valve body is made of fabricated welded steel P355N (DN500 and above forged steel), material with high mechanical strength and good weldability (PN100 - PN64 for big diameters)
Typical applications include: hydroelectric power plants with high hydraulic heads, snowmaking systems, testing systems, and systems subject to high pressure testing.

F600 PN100
HYDRAULIC TEST
(PRESSURE TEST = 150 BAR)

# PLUNGER CHECK VALVE

Check valves are designed to perform a retaining function, typically downstream of pumping stations.



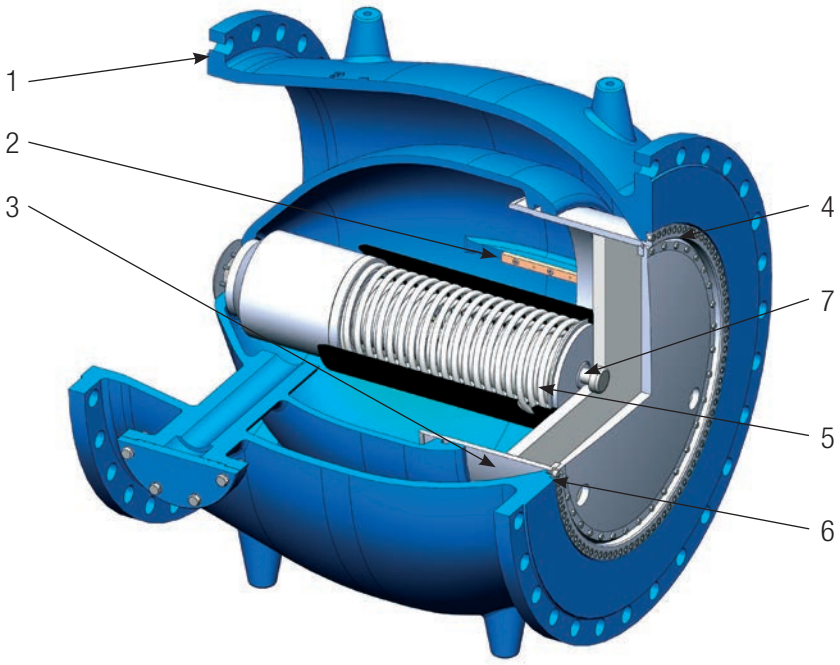

In the case of pump stoppage, a check valve provides rapid closure of the plunger by a spring system before the flow can reverse into the pump with a risk of damage. The seal is secured by the pressure generated in the inner barrel under backflow pressure, augmenting the action of the springs. The valve plunger is supported by four external self-lubricating guides, which guarantee a smooth sliding action. These features ensure the check valve high strength and reliability. Available two standard versions, to satisfy most customer needs:

## TYPE “A” WITH OPERATING CIRCUIT

## TYPE “B” WITHOUT OPERATING CIRCUIT

Other versions available on request.

## MATERIALS AND COMPONENTS




| ITEM | COMPONENT | MATERIAL |
|---|---|---|
| 1 | Body | Ductile iron |
| 2 | Guides | Marine bronze |
| 3 | Plunger (shutter) | Stainless steel (AISI 304) |
| 4 | Seating ring | Stainless steel (AISI 304) |
| 5 | Springs | Stainless steel for springs |
| 6 | Main seal | C-HPU Polyurethane |
| 7 | Spring guide components | Stainless steel (AISI 304) |
| | Main components of the pilot circuit (when present - optional) | Stainless steel (AISI 304) |

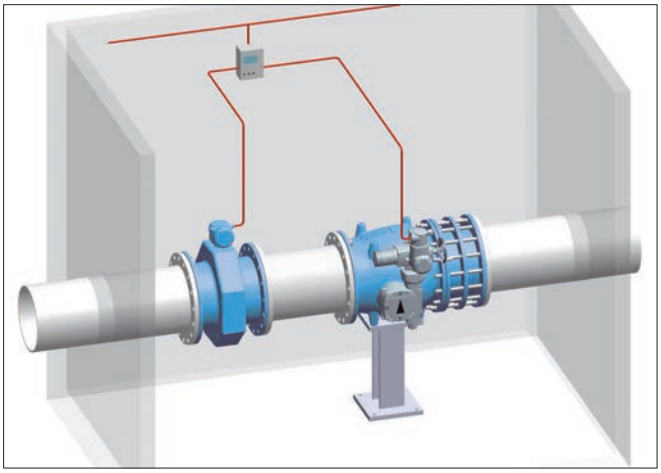
| VALVE RANGE* | | | | |
|---|---|---|---|---|
| PN | 10/16 | 25 | 40 | 64 |
| DN | 80 - 1000 | 80 - 600 | 80 - 500 | 80 - 150 |

* For the overall dimensions of check valves, refer to those of the plunger valves previously mentioned.

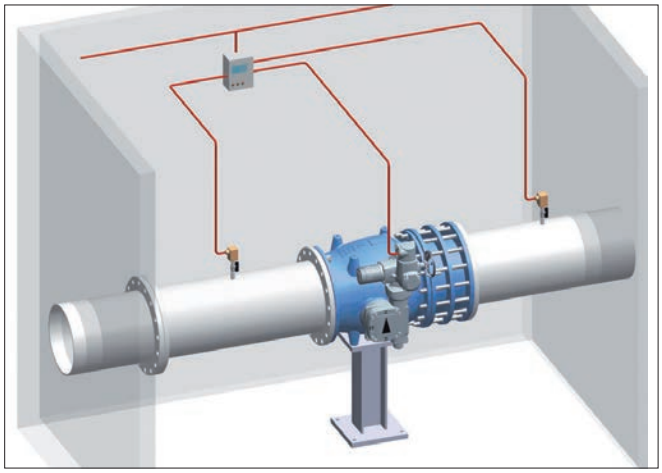
# MAIN APPLICATIONS

## FLOW AND PRESSURE CONTROL

The most frequently used valves for pressure reduction or flow control are diaphragm valves, but these have limitations as regards hydraulic behaviour and size.Plunger valves are also perfectly suited for precise and reliable control of pressure and flow, and they have the advantage of nominal diameters ranging from DN 80 to DN 1800. Unlike diaphragm valves (only operated hydraulically), plunger valves require an external actuator, which can be operated manually, electrically, pneumatically, hydraulically, by float devices, or by gravity (cylinder with counterweight). Pressure or flow can be controlled using external actuators to reduce or increase the inner cross-section of the valve, commanded by an external unit (PLC) connected to pressure gauges (fitted upstream and downstream of the plunger valve) or a flow meter (mounted upstream of the plunger valve).



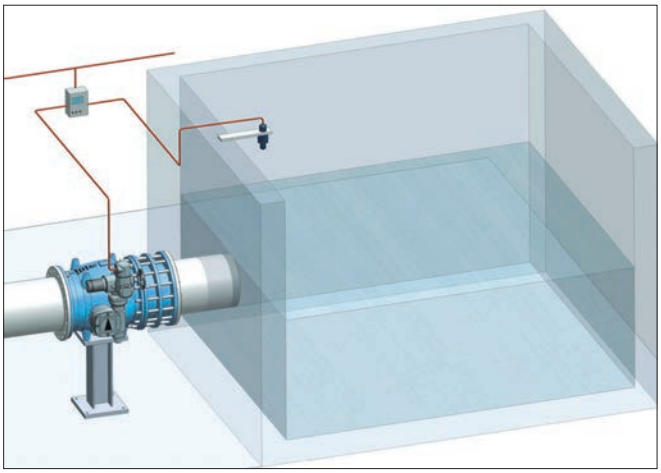
FLOW CONTROL CONFIGURATION



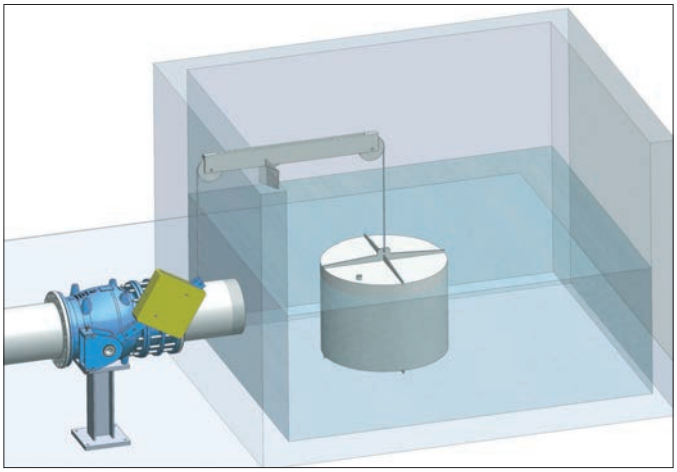
PRESSURE CONTROL CONFIGURATION

## LEVEL CONTROL

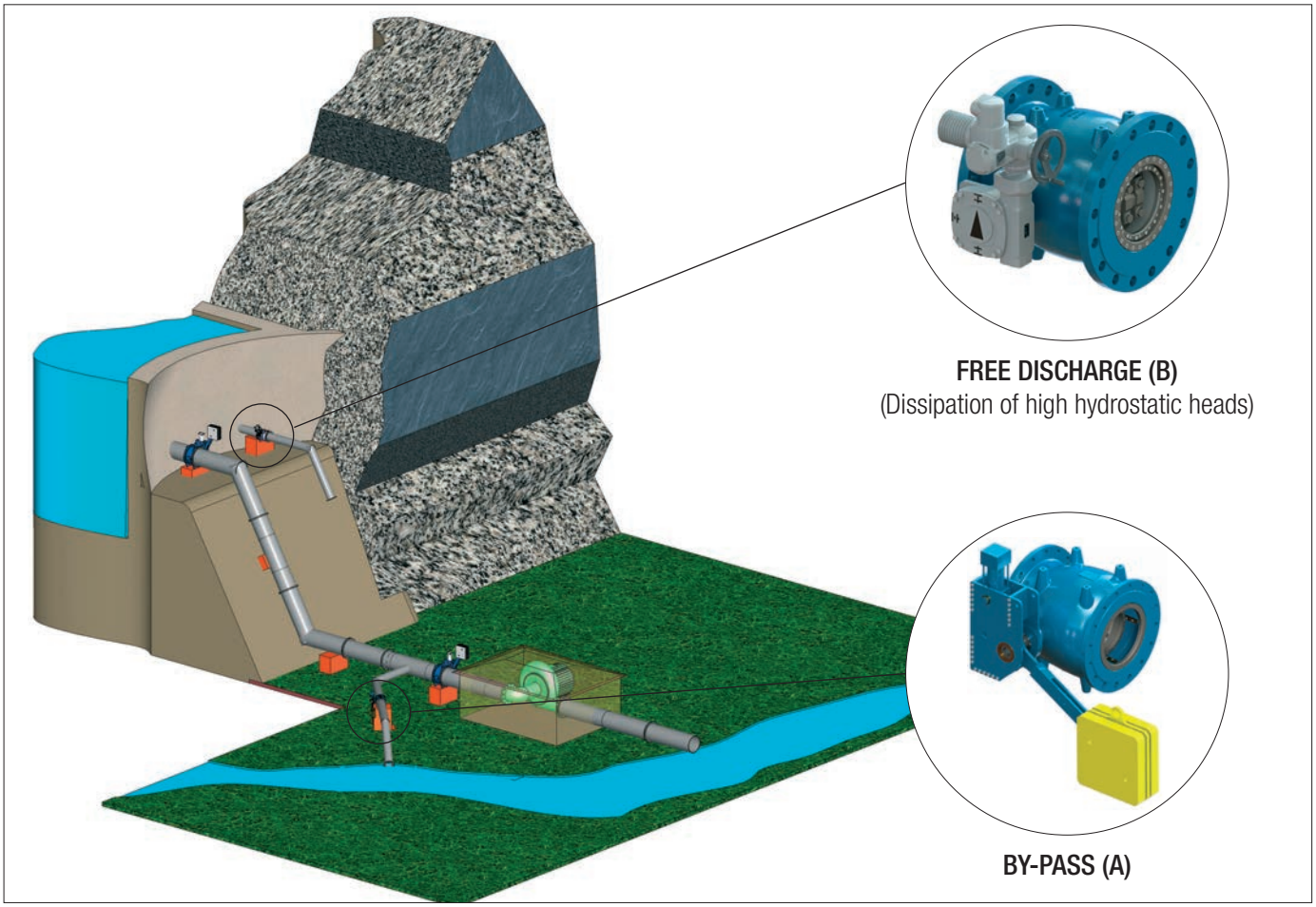
Plunger valves can control reservoir filling to maintain a constant water level regardless water demand.
It is important to carefully select the valve diameter according to the system's hydraulic parameters: if the valve is oversized, there could be fluctuations in tank level or the time needed to reach the desired level may be too long.



WITH ELECTRIC TYPE ACTUATOR AND LEVEL SENSOR



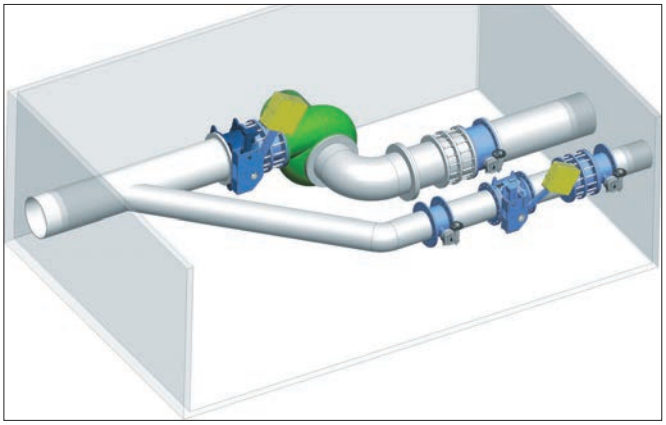
WITH COUNTERWEIGHT SYSTEM AND FLOAT



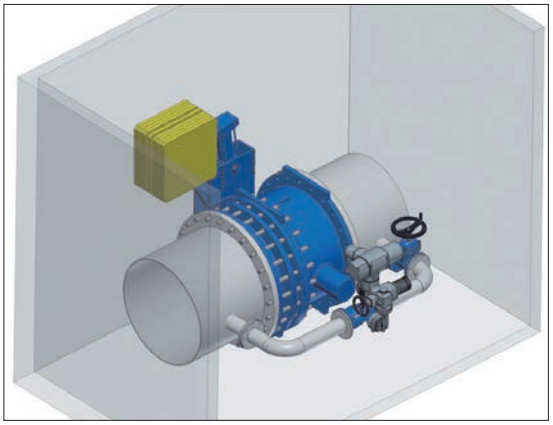

## A • BY-PASS VALVE

A plunger valve can be used as a:

- By-pass valve for hydroelectric installations for the protection of the turbine-generator or when servicing the turbine;
- By-pass valve for filling large pipelines.



BY-PASS FOR TURBINE-GENERATOR



BY-PASS FOR FILLING LARGE PIPELINES

## B • DISSIPATION OF HIGH HYDROSTATIC HEADS

Plunger valves are used for free discharge outlets. A typical example is a dam base discharge valve.