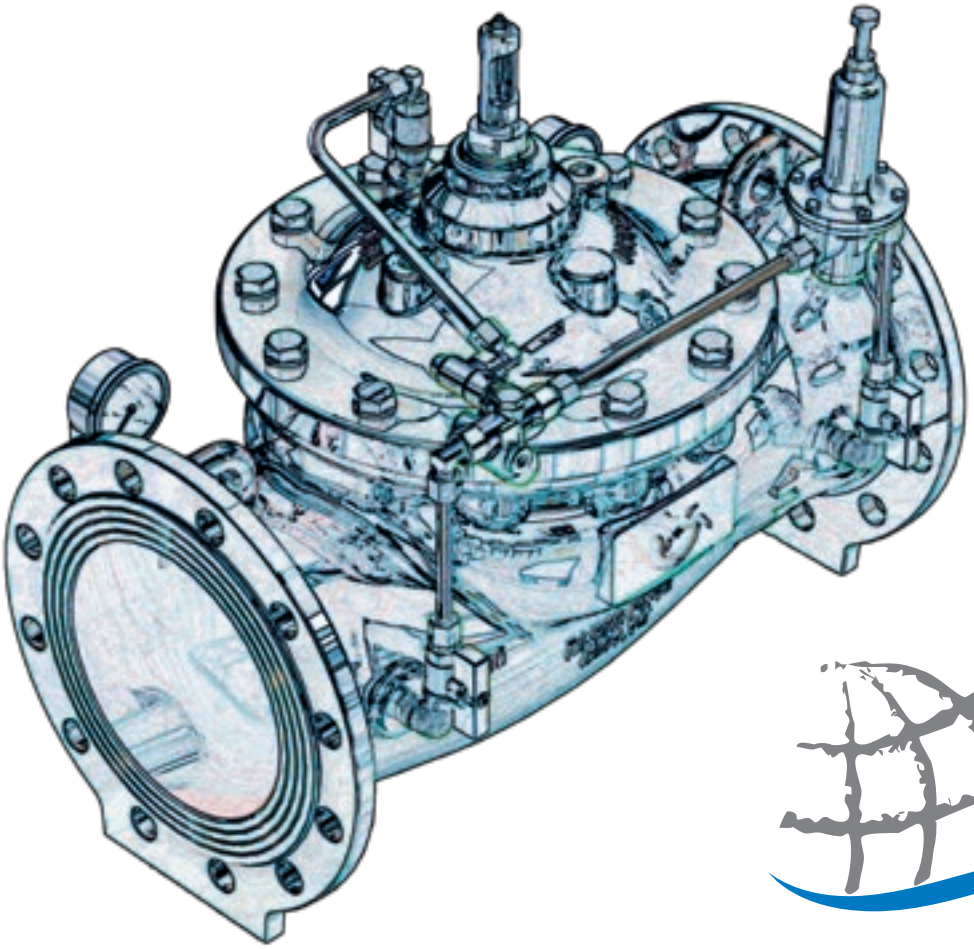


AUTOMATIC CONTROL VALVES

VALVES DEDICATED TO THE WATER DISTRIBUTION NETWORK
AND HYDROPOWER SECTOR

WE DO NOT SELL JUST VALVES, WE SELL A SOLUTION
FOR THE EFFICIENCY OF THE WATER NETWORK

MADE IN EUROPE

T.I.S. SERVICE S.p.A., is a leading international company specializing in the production and sale of equipment for water networks services and for hydroelectric power plants. One of its core products are safety valves.

Thanks to its partners, the company is able to produce a wide range of high technology valves and fittings, both in cast iron and plastic; butterfly valves, gate valves, air release valves, automatic control valves, plunger flow control valves and dismantling joints. These products can be controlled by electric motors or pneumatic actuators.

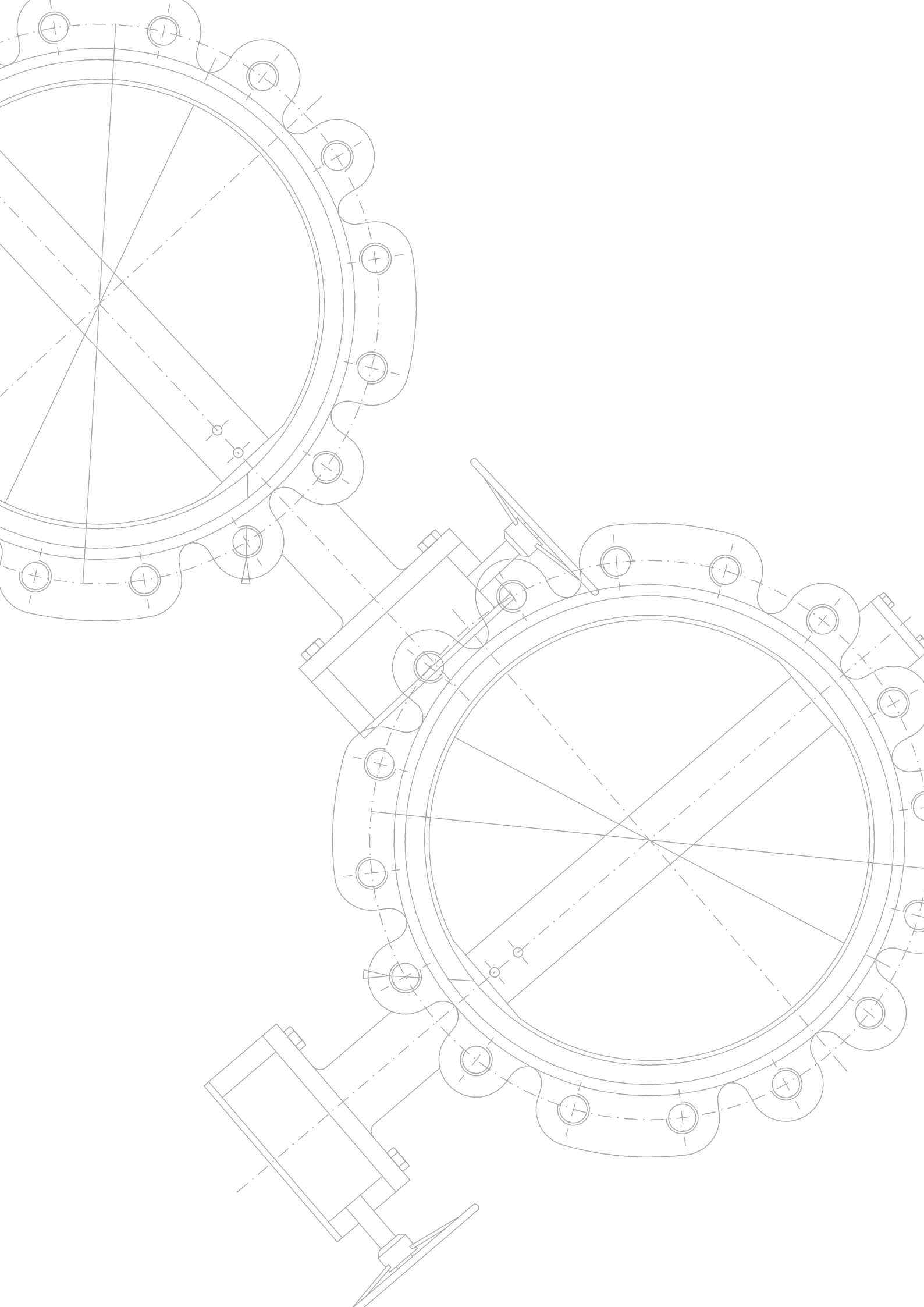
The T.i.S. system guarantees a complete solution package: from individual equipment supplies to engineering consultations on the more complex problems of water systems. The company's main activities are: supply of hydraulic equipment, automation, hydraulic network modelling and model calibration, leak detection, controlled pressure management, energy efficiency, white certificate management.

T.i.S. Service offers customers a personalized service, from the equipment selection stage right through to after-sales support.

All T.i.S. companies are certified ISO 9001. The company has held the prestigious Group certification since 2011.

AUTOMATIC CONTROL VALVES

INDEX



INTRODUCTION

INTRODUCTION

Automatic control valves, as described by EN 1074-5: *"have the integral capability to control the function using energy from the conveyed water by adjusting the position of the obturator. They can be directly operated, i.e. the force is applied (via a spring or diaphragm) directly to the obturator. They can be pilot operated, i.e. the force is applied through an adjustable pilot valve"*.

Automatic control valves M-Type are made for water supplies, irrigation and fire protection; they are the result of years of research, design and development.

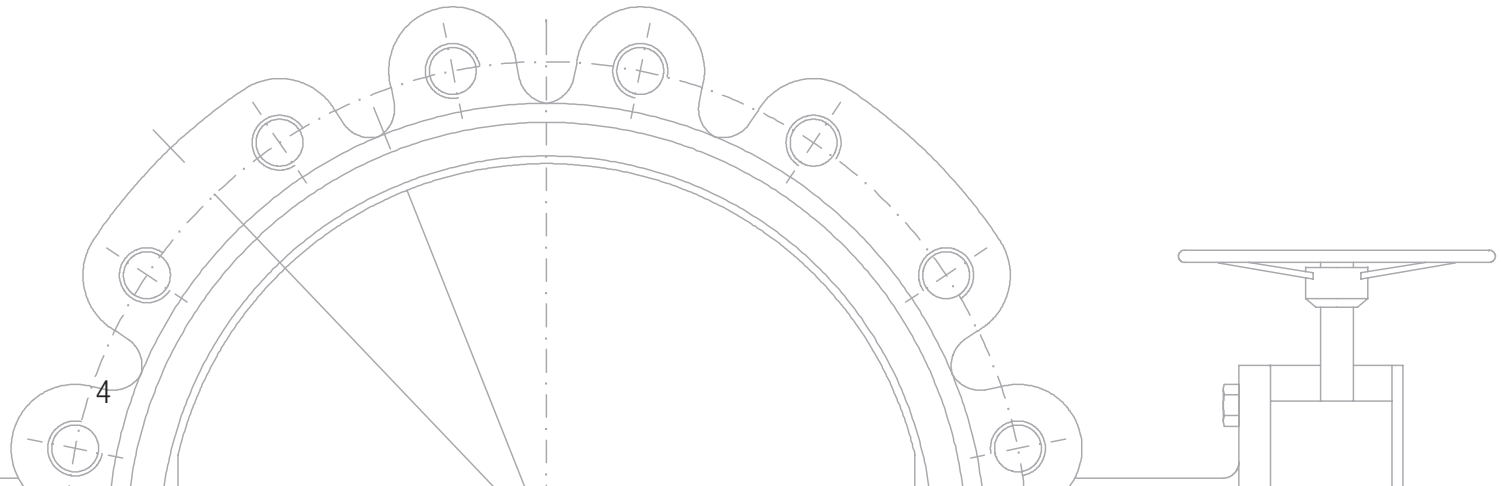
Valves are available in sizes from DN50 to DN1000 flanged according to EN 1092-2, with nominal pressure PN10-PN16-PN25.

The valves are hydraulically operated, that means, the metallic obturator is moved by a thin diaphragm subject to water pressure.

The use of a high performance gasket ensures, even in harsh operating conditions, excellent seal and a long life of the valve.

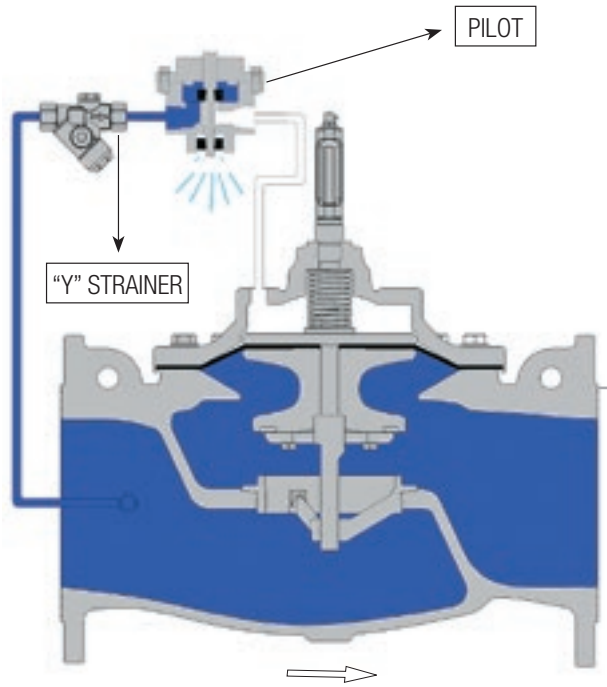
M3000 valves are reduced port type (size of the port smaller than the nominal diameter of the valve); this offers an improved regulating performance and a higher dissipation capability.

M2000 valves are full port type (size of the port equal to the nominal diameter of the valve), recommended for ON/OFF and for REGULATING applications with low differential pressure.



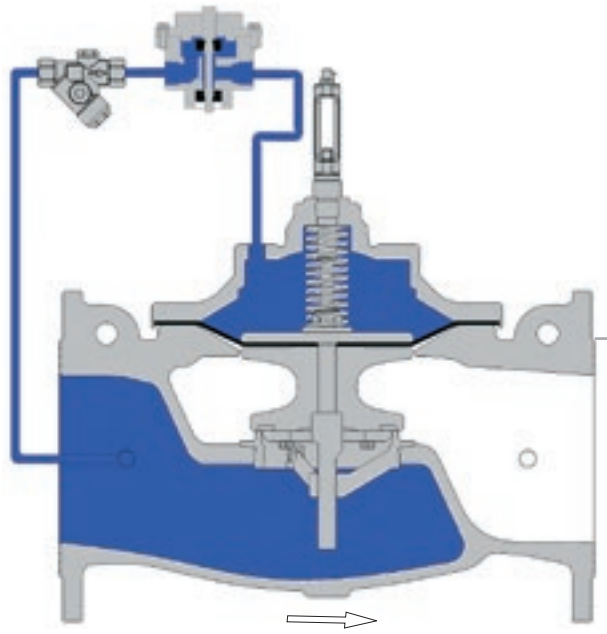
OPERATING PRINCIPLES

ON-OFF VALVE



"OPEN VALVE" POSITION

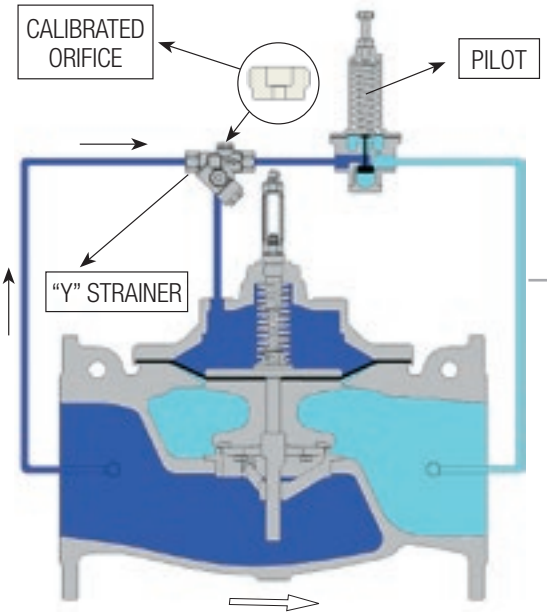
By releasing the pressure from the control chamber, the obturator lifts and the valve opens.



"CLOSED VALVE" POSITION

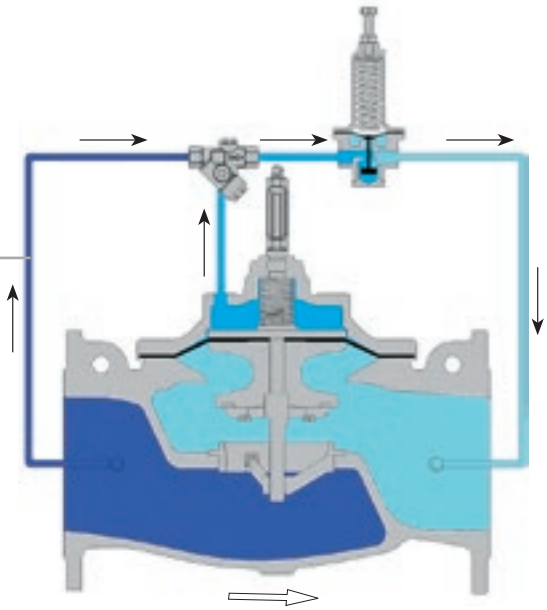
The upstream pressure, which acts on the upper surface of the rubber diaphragm, moves the valve obturator to the closed position.

MODULATING VALVE



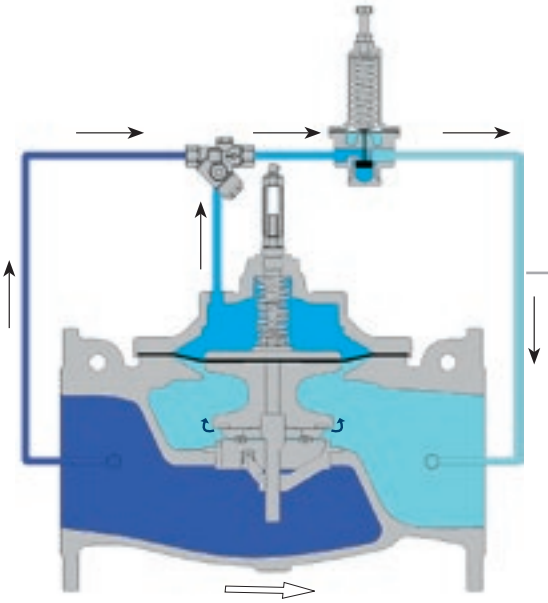
CLOSE POSITION

The pilot loads the control chamber with the upstream pressure; the resultant force on the rubber diaphragm moves the obturator to the closed position.



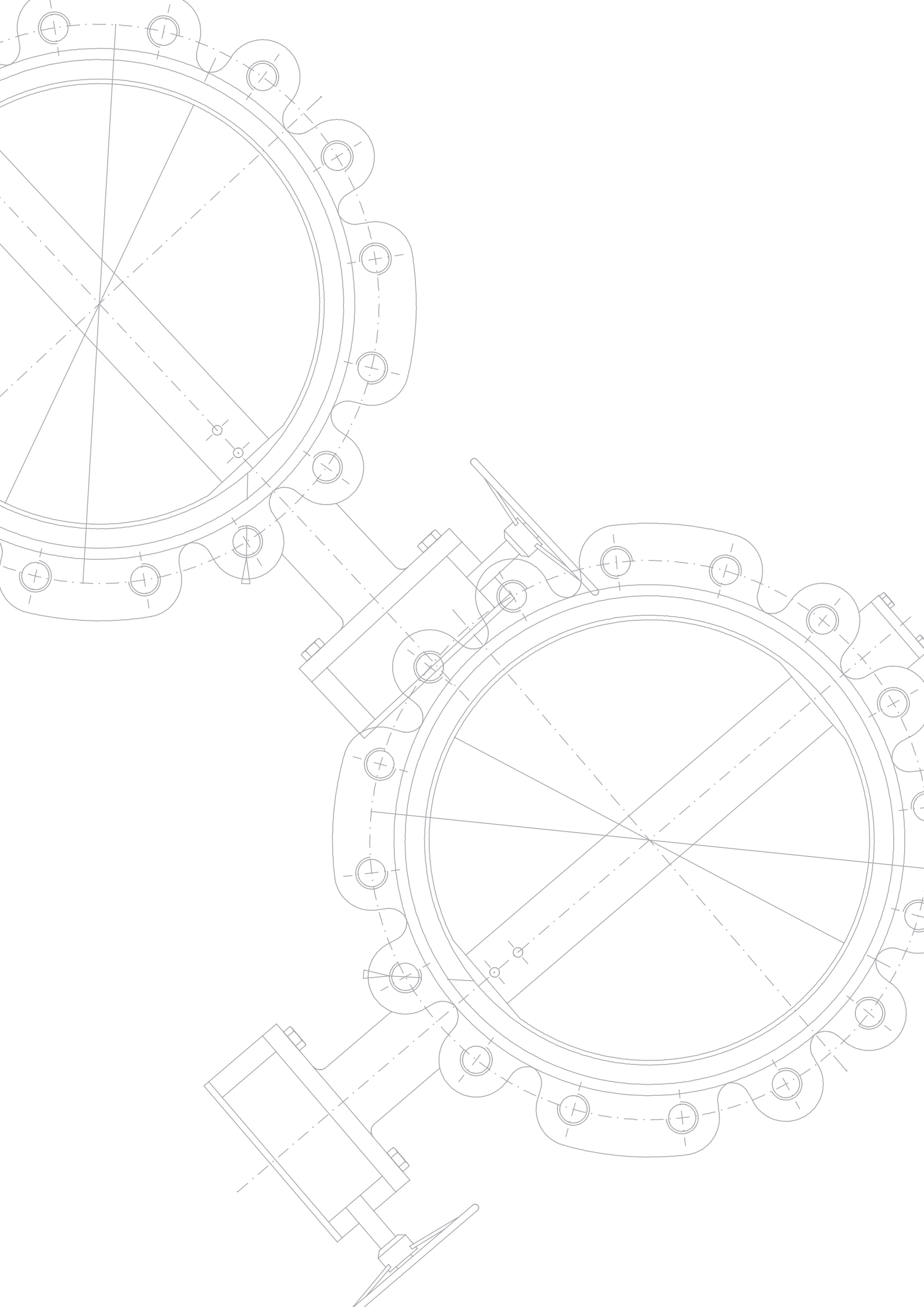
OPEN POSITION

The pilot opens to release, through the pressure drop on the calibrated orifice, the pressure in the control chamber. The resultant force on the rubber diaphragm moves the obturator to the open position.



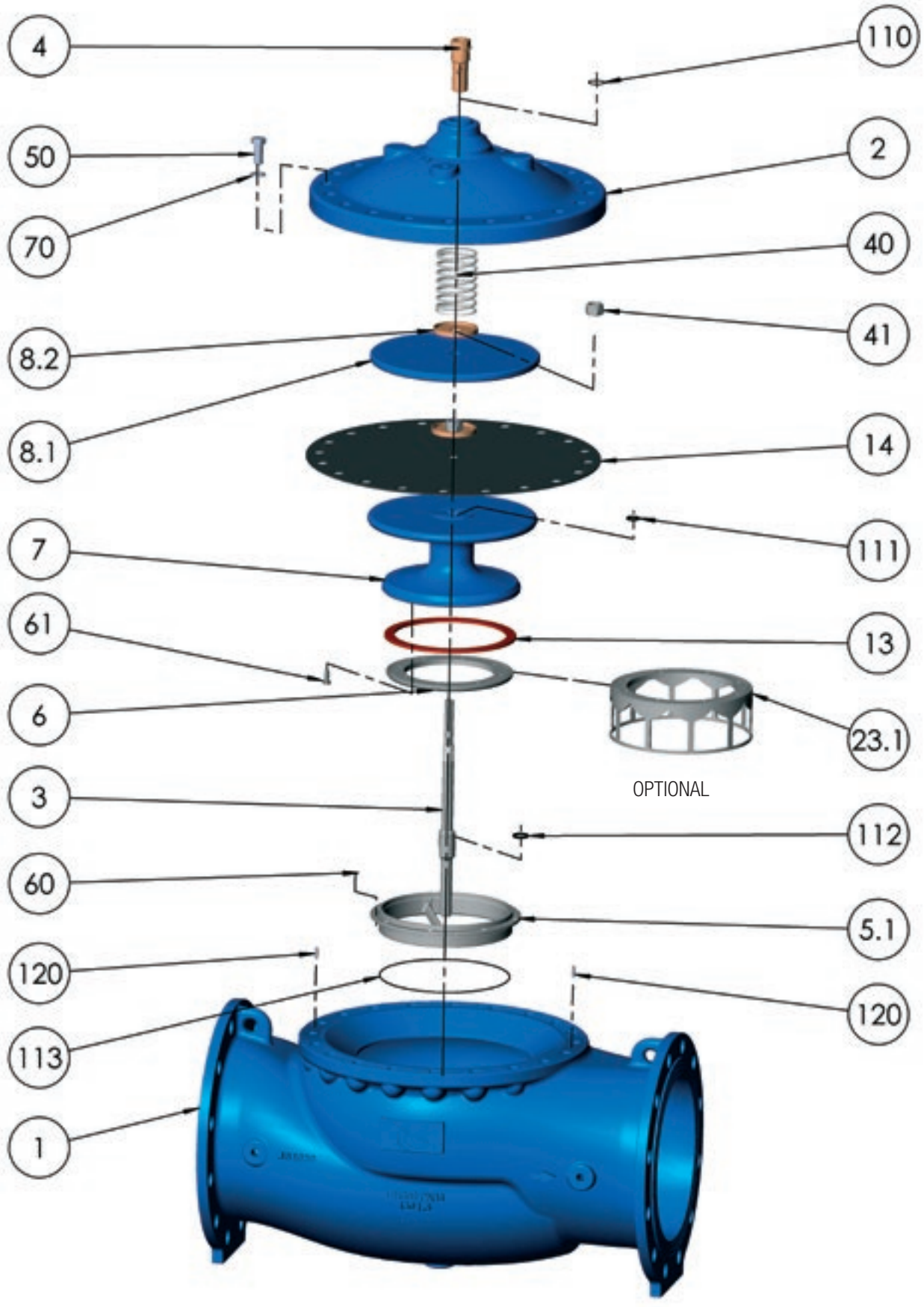
MODULATING

The main valve modulates to any degree of opening in response to changes in the pilot.
At an equilibrium point the main valve opening and closing forces hold the valve in balance. This balance holds the valve partially open, but immediately responds and readjusts the position to compensate for any charge in the controlling condition.



TECHNICAL SPECIFICATIONS

STANDARD MAIN VALVE MATERIALS



M3000

ITEM	DESCRIPTION	DN	PN	MATERIAL	MATERIAL DESIGNATION
1	Body			Ductile cast iron	EN-GJS 400-15 EN1563 (GS400)
2	Cover			Ductile cast iron	EN-GJS 400-15 EN1563 (GS400)
3	Stem			Stainless steel	1.4301 EN10088-3 (AISI304)
4	Cover bearing			Brass	CW614N EN 12164 (OT58)
5.1	Seat ring			Stainless steel	1.4408 EN10283 (AISI316)
-	V-port seat ring			Stainless steel	1.4301 EN10088-3 (AISI304)
6	Seal retaining ring			Stainless steel	1.4301 EN10088-3 (AISI304)
7	Obturator	From 50 to 125	10 - 16 - 25	Stainless steel	1.4301 EN10088-3 (AISI304)
		From 150 to 1000	10 - 16	Ductile cast iron	EN-GJS 400-15 EN1563 (GS400)
		From 250 to 800	25	Steel	S275JR EN10025-2 (Fe430B)
8.1	Disc			Steel	S275JR EN10025-2 (Fe430B)
8.2	Spring washer			Brass	CW614N EN 12164 (OT58)
13	Main seal			Elastomer	EPDM (85Sh A)
14	Diaphragm			Reinforced elastomer	NYLON reinforced NBR
23.1	V-port			Stainless steel	1.4301 EN10088-3 (AISI304)
40	Spring	50…600	10 - 16 - 25	Stainless steel	1.4310 EN10270-3 (AISI302)
41	Self-locking nut			Stainless steel	A2-70
50	Cover bolts			Stainless steel	A2-70
60	Seat ring bolts	200…1000	10 - 16 - 25	Stainless steel	A2-70
61	Retaining ring bolts			Stainless steel	A2-70
70	Cover washer			Stainless steel	A2-70
110 - 111 112 - 113	O-Ring			Elastomer	EPDM
120	Pin	100…600	10 - 16	Stainless steel	A2-70
		150 - 200	25		

All parts subject to corrosion are fusion bonded epoxy coated with thickness 250 micron

M2000

ITEM	DESCRIPTION	DN	PN	MATERIAL	MATERIAL DESIGNATION
1	Body			Ductile cast iron	EN-GJS 400-15 EN1563 (GS400)
2	Cover			Ductile cast iron	EN-GJS 400-15 EN1563 (GS400)
3	Stem			Stainless steel	1.4301 EN10088-3 (AISI304)
4	Cover bearing			Brass	CW614N EN 12164 (OT58)
5.1	Seat ring			Stainless steel	1.4408 EN10283 (AISI316)
5.2	V-port seat ring			Stainless steel	1.4301 EN10088-3 (AISI304)
6	Seal retaining ring			Stainless steel	1.4301 EN10088-3 (AISI304)
7	Obturator	From 50 to 100	10 - 16 - 25	Stainless steel	1.4301 EN10088-3 (AISI304)
		150 - 200	10 - 16 - 25	Steel	S275JR EN10025-2 (Fe430B)
8.1	Disc			Steel	S275JR EN10025-2 (Fe430B)
8.2	Spring washer			Brass	CW614N EN 12164 (OT58)
13	Main seal			Elastomer	EPDM (85Sh A)
14	Diaphragm			Reinforced elastomer	NYLON reinforced NBR
23.1	V-port			Stainless steel	1.4301 EN10088-3 (AISI304)
40	Spring			Stainless steel	1.4310 EN10270-3 (AISI302)
41	Self locking nut			Stainless steel	A2-70
50	Cover bolts			Stainless steel	A2-70
60	Seat ring bolts	150 - 200	10 - 16 - 25	Stainless steel	A2-70
61	Retaining ring bolts			Stainless steel	A2-70
70	Cover washer			Stainless steel	A2-70
110 - 111 112 - 113	O-Ring			Elastomer	EPDM

All parts subject to corrosion are fusion bonded epoxy coated with thickness 250 micron

TECHNICAL SPECIFICATIONS

CONSTRUCTION CHARACTERISTICS:

- Hydraulic test according to EN12266-1;
- According to EN 1074-5 and EN 1074-1;
- The parts in contact with water are conform to DM 174 of 6/04/2004, KTW and DVGW W270;
- Monoblock body made of ductile cast iron EN GJS 400-15 EN 1563 (GS 400-15);
- Face to face dimension according to EN 558 Series 1;
- Flange dimensions according to EN 1092-2;
- Stem made of 1.4301 EN10088-3 (AISI304) and guided at both ends;
- Seat ring made of 1.4408 EN10283 (AISI316);
- Seal retaining ring made of 1.4301 EN10088-3 (AISI304);
- Main seal made of EPDM;
- Spring made of 1.4310 EN10088-3 (AISI302);
- Obturator made of stainless steel 1.4301 EN10088-3 (AISI304), cast iron EN GJS 400-15 and coated steel (depending on valve DN and PN);
- Diaphragm: NBR rubber nylon reinforced;
- All screws, washers and nuts made of stainless steel A2-70 EN ISO3506-1;
- External/Internal FBE coating protection (fusion bounded epoxy), blue colour RAL5015, thickness 300µm.

MAIN VALVE ACCESSORIES:

- Depending on the working conditions V-PORT made of 1.4301 EN10088-3 (AISI304) or 1.4306 EN10088-3 (AISI304L) can be supplied;
- Depending on the working conditions DOUBLE SLOTTED CYLINDER made of 1.4301 EN10088-3 (AISI304) and 1.4028 EN10088-3 (AISI420B) can be supplied;

CIRCUIT ACCESSORIES:

- Pipes made of 1.4401 EN10088-3 (AISI316);
- Fittings made of 1.4401 EN10088-3 (AISI316);
- Strainer made of 1.4401 EN10088-3 (AISI316) and Brass;
- Needle valves made of 1.4401 EN10088-3 (AISI316) and Brass;
- Isolating ball valves made of Ni-plated Brass;
- Pilots made of 1.4401 EN10088-3 (AISI316) and Brass;
- Position indicators made of Hardened glass and Brass;
- Pressure gauges case made of 1.4301 EN10088-3 (AISI304) and filled with Glycerine;
- Gauge holders with drainage made of Ni-plated Brass;
- Floats made of 1.4301 EN10088-3 (AISI304).

HIGH CORROSION-RESISTANT MATERIALS

Upon request, some parts can be produced by high corrosion-resistant materials:

- Stem and seal retaining ring and obturator from DN50 to DN125 made of **1.4401 EN10088-3 (AISI316)**;
- screws, washers and nuts made of **A4-70 EN ISO3506-1** stainless steel ;
- V-PORT made of **1.4401 EN10088-3 (AISI316)**;
- DOUBLE SLOTTED CYLINDER made of **1.4401 EN10088-3 (AISI316)**.

CIRCUIT ACCESSORIES:

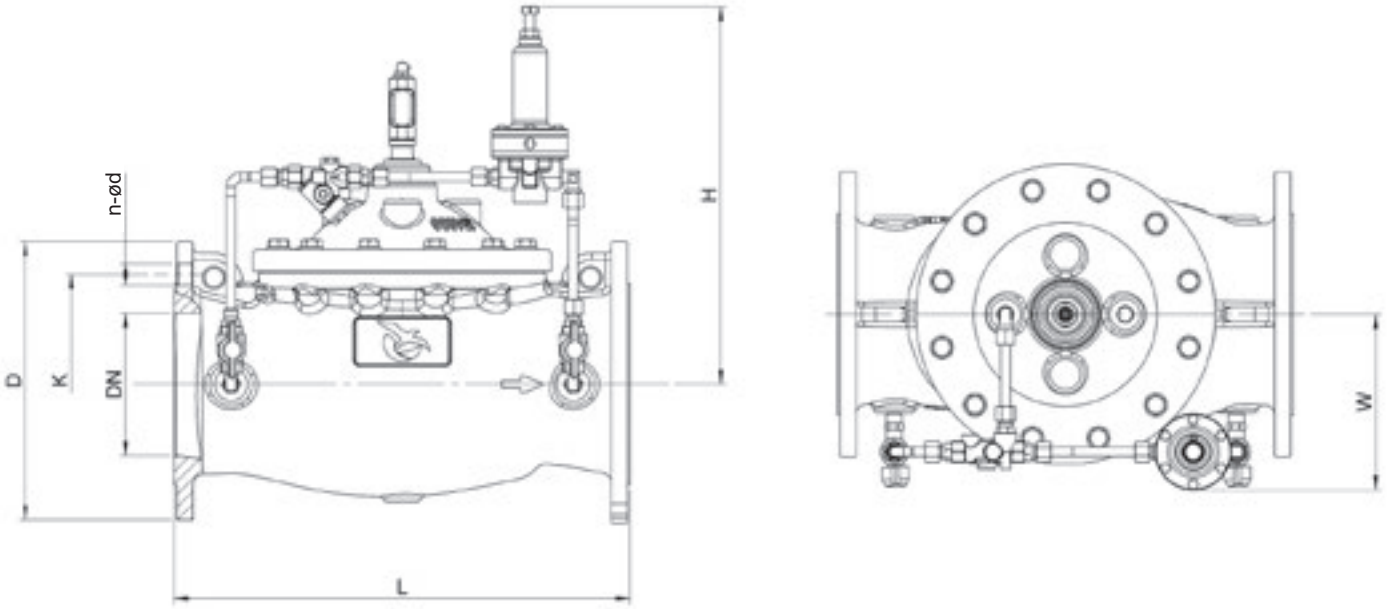
- Pilots made of **1.4401 EN10088-3 (AISI316)** and Brass (not wet parts);
- Screws, washers and nuts made of **A4-70 EN ISO3506-1** stainless steel;

OPERATIVE LIMITS:

Valves are designed and manufactured to operate with drinking water.
For any other use, please, contact the manufacturer.

- Working temp.: (Water temp.) min.+0°C max. (excluded frost) + 70°C (On request up to 90°C).
- Storage temp.: (Air temp.) min. - 20°C max. + 70°C.

DIMENSIONS AND WEIGHT

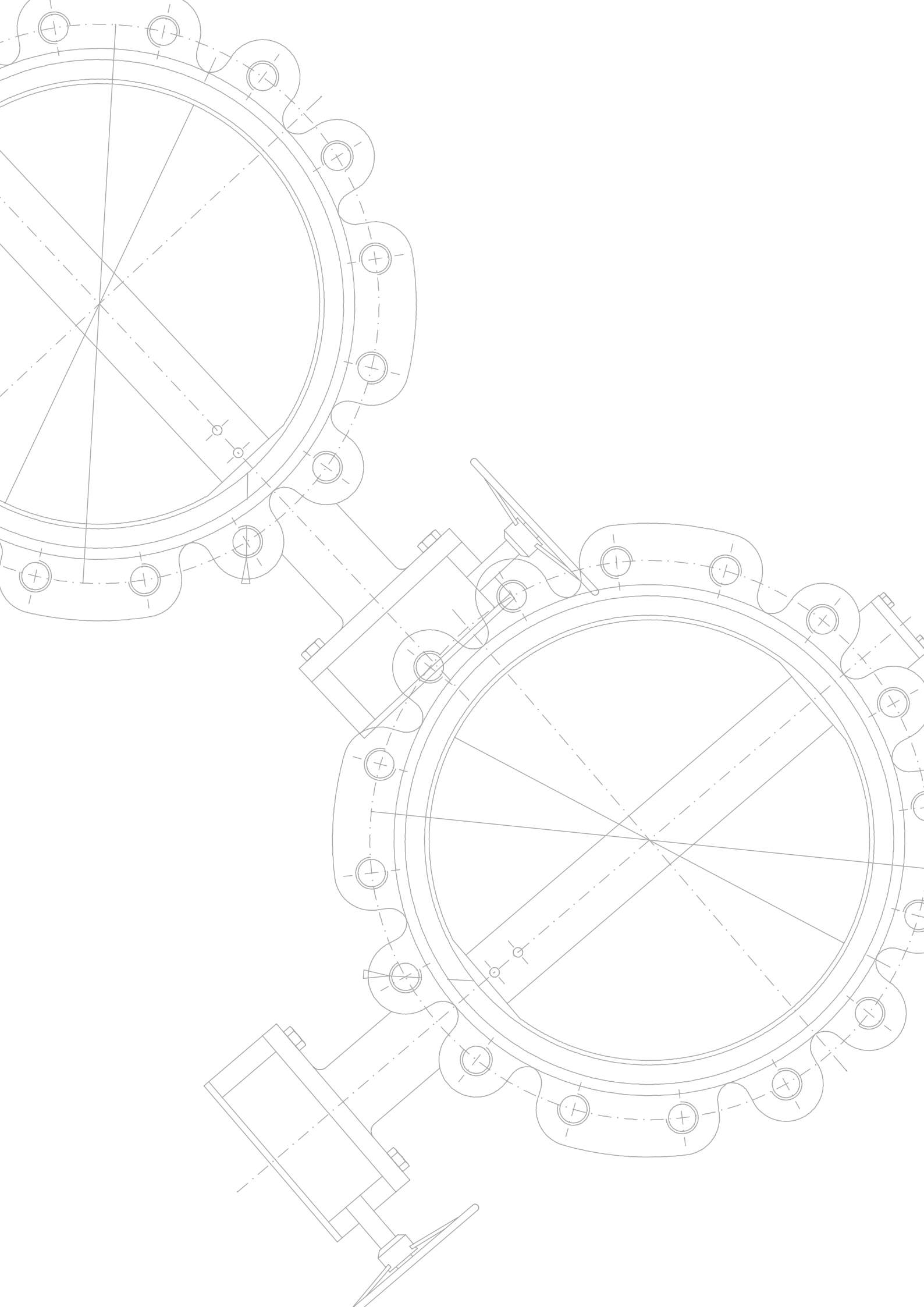


M3000

DN	K			D			n-Ød						WEIGHT (kg)
	PN10	PN16	PN25	PN10	PN16	PN25	PN10	PN16	PN25	L	H	W	
50	125	125	125	165	165	165	4-19	4-19	4-19	230	220	170	20
65	145	145	145	185	185	185	4-19	4-19	8-19	290	250	180	24
80	160	160	160	200	200	200	8-19	8-19	8-19	310	280	200	30
100	180	180	190	220	220	235	8-19	8-19	8-23	350	310	210	43
125	210	210	220	250	250	270	8-19	8-19	8-28	400	380	230	48
150	240	240	250	285	285	300	8-23	8-23	8-28	480	420	250	70
200	295	295	310	340	340	360	8-23	12-23	12-28	600	520	280	118
250	350	355	370	405	405	425	12-23	12-28	12-31	730	600	300	173
300	400	410	430	460	460	485	12-23	12-28	16-31	850	740	340	280
350	515	470	490	520	520	555	16-23	16-28	16-34	980	800	380	510
400	515	525	550	565	580	620	16-28	16-31	16-37	1100	810	390	550
500	620	650	660	670	715	730	20-28	20-34	20-37	1250	890	460	873
600	725	770	770	780	840	845	20-31	20-37	20-41	1450	970	540	1400
700	840	840	875	895	910	960	24-31	24-37	24-44	1650	1020	590	1950
800	950	950	990	1015	1025	1085	24-34	24-41	24-50	1850	1070	640	2050
1000	1160	1170	1210	1230	1255	1320	28-37	28-44	28-57	2250	1360	820	4500

M2000

DN	K			D			n-Ød						WEIGHT (kg)
	PN10	PN16	PN25	PN10	PN16	PN25	PN10	PN16	PN25	L	H	W	
50	125	125	125	165	165	165	4-19	4-19	4-19	230	220	170	20
65	145	145	145	185	185	185	4-19	4-19	8-19	290	250	180	24
80	160	160	160	200	200	200	8-19	8-19	8-19	310	280	200	30
100	180	180	190	220	220	235	8-19	8-19	8-23	350	310	210	43
150	240	240	250	285	285	300	8-23	8-23	8-28	480	420	250	90
200	295	295	310	340	340	360	8-23	12-23	12-28	600	520	280	142



HYDRAULIC SPECIFICATIONS

HYDRAULIC SPECIFICATIONS

M3000 PRESSURE DROP

Automatic control valves pressure drops can be evaluated by using below formula:

$$\Delta P = (Q / K_{VS})^2 \qquad [bar]$$

Where:

- ΔP = pressure drop [bar]
- K_{VS} = flow coefficient [m³/h]
- Q = flow rate [m³/h]

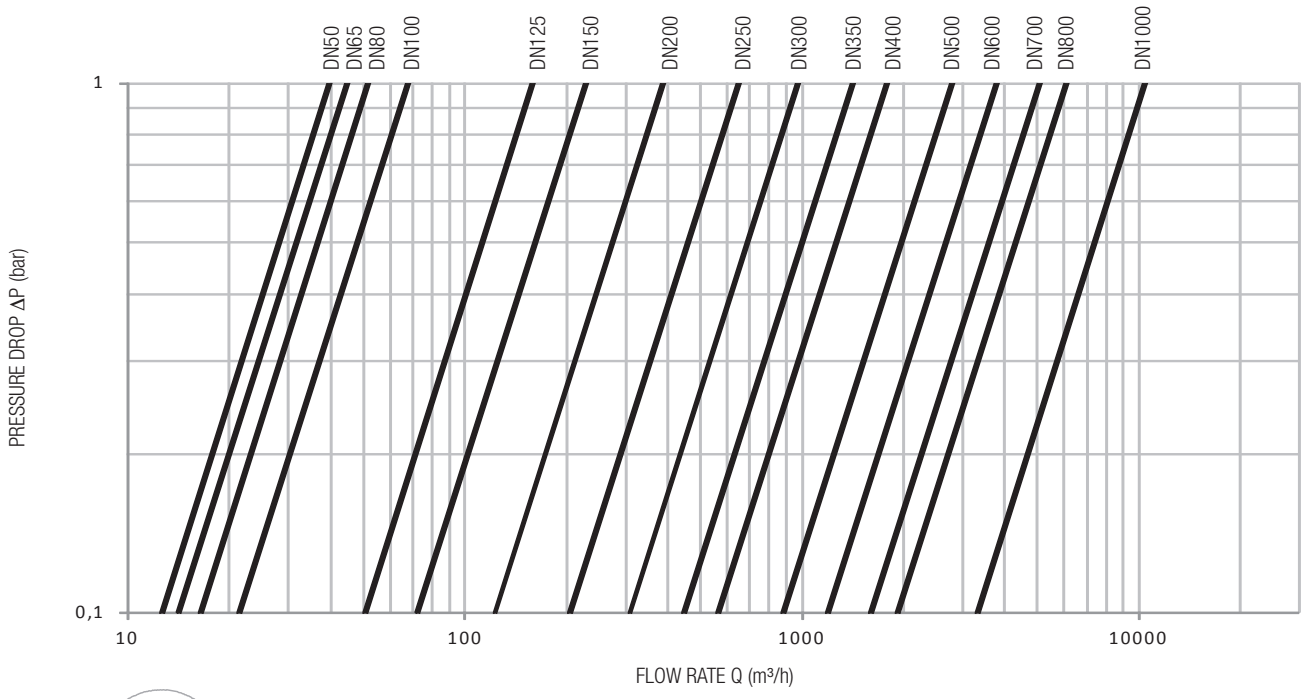
K_{VS} flow coefficient indicates 20°C water flow rate [m³/h] through the fully open valve that induces 1bar pressure drop.

FLOW COEFFICIENT

DN	50	65	80	100	125	150	200	250	300	350	400	500	600	700	800	1000
Kvs [m³/h]	40	45	70	107	210	230	390	650	980	1420	1790	2800	3800	5100	6100	10500
Stroke [mm]	15	16	16	17	23	38	46	56	65	73	87	105	126	130	145	195

Automatic control valves pressure drop can be also evaluated by using below diagram:

PRESSURE DROP DIAGRAM



M2000 PRESSURE DROP

Automatic control valves pressure drops be evaluated by using below formula:

$$\Delta P = (Q / K_{VS})^2 \qquad [bar]$$

Where:

- ΔP = pressure drop [bar]
- K_{VS} = flow coefficient [m³/h]
- Q = flow rate [m³/h]

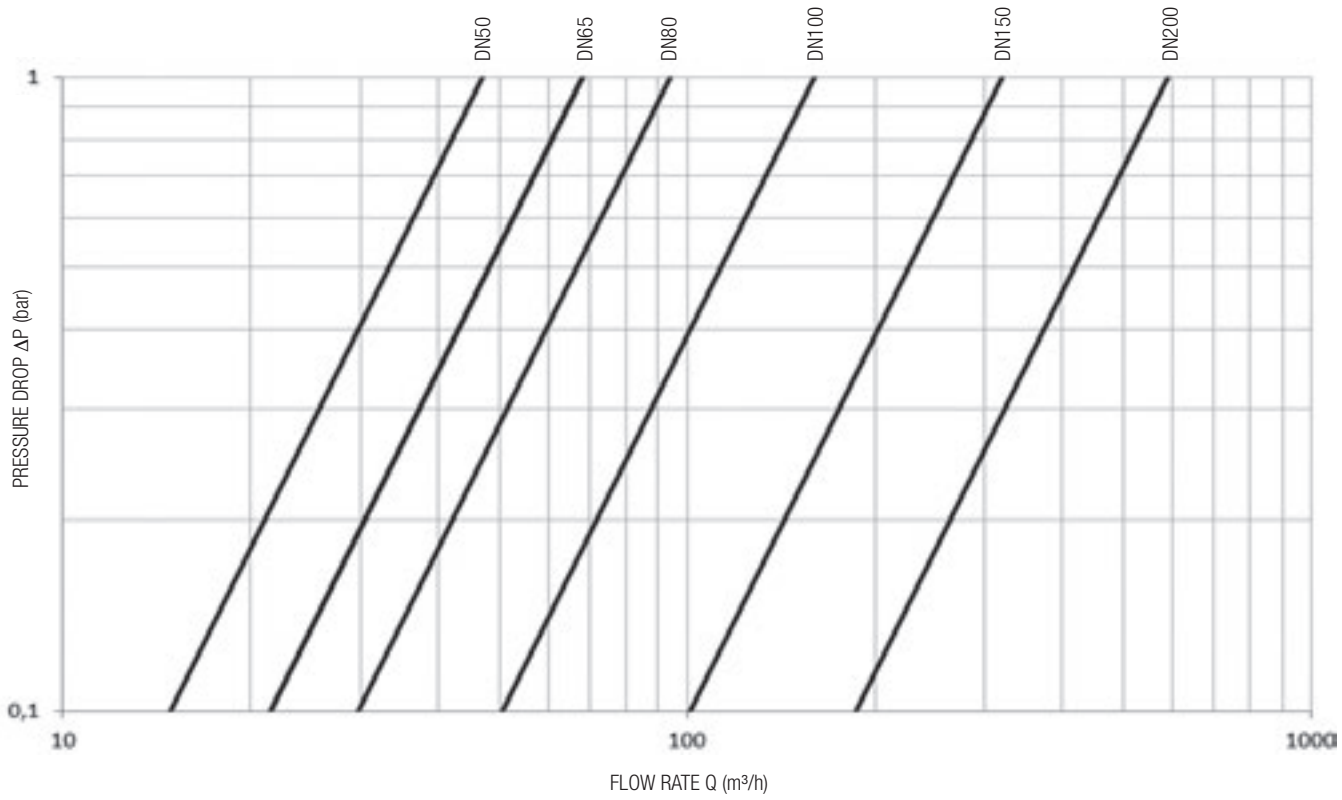
K_{VS} flow coefficient indicates 20°C water flow rate [m³/h] through the fully open valve that induces 1bar pressure drop.

FLOW COEFFICIENT

DN	50	65	80	100	150	200
Kvs [m³/h]	47	68	94	160	320	590
Stroke [mm]	15	16	18	23	39	50

Automatic control valves pressure drop can be also evaluated by using below diagram:

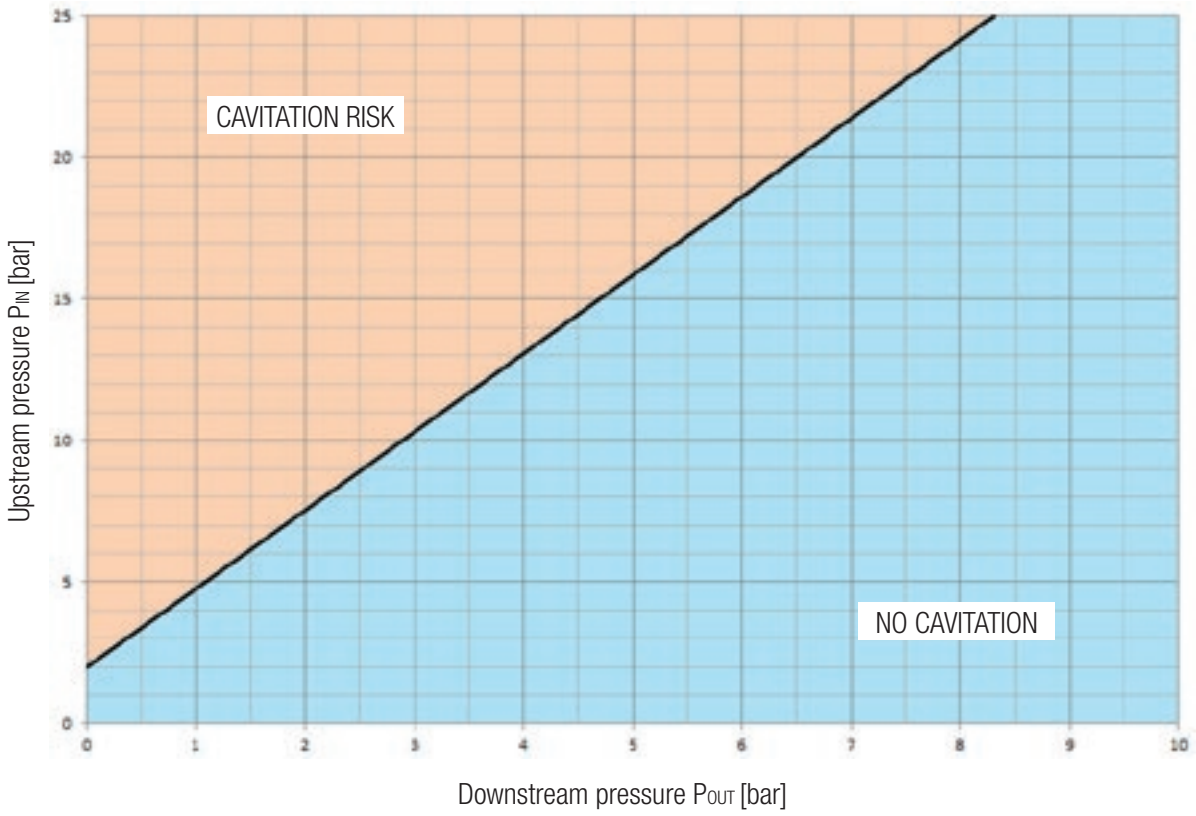
PRESSURE DROP DIAGRAM



CAVITATION

Cavitation is a phenomenon which occurs when the flow pressure within the valve descends to the steam pressure, creating bubbles, which are transported by the flow in higher pressure areas and there they implode. This causes high intensity forces and concentrated stresses, that could erode strong materials such as ductile iron and steel in a few weeks with the association of noise and vibrations, harmful for the entire system.
Pressure waves produce stress on the inner surfaces of the valve body, outlet side.
Pressure drop must therefore be contained in order to avoid noise and erosion of the valve.
The valve operating conditions can be preliminary checked by using the cavitation diagram below.
The valve shall not continuously operate under cavitation risk.
It can be accepted that the valve operates under light cavitation conditions for short periods.

CAVITATION DIAGRAM



Cavitation diagram refers to 40% open valves. When the opening degrees of the valve significantly differs from this value, we recommend to verify the actual cavitation conditions by using the software specifically developed by TIS Nuoval. Please contact us providing valve's required operating conditions.

MAIN FUNCTIONS

MAIN FUNCTIONS

M3100
PRESSURE REDUCING VALVE

M3200
PRESSURE SUSTAINING / RELIEF VALVE

M3400
RATE OF FLOW CONTROL VALVE

MAIN VALVE

M3219
SURGE ANTICIPATOR / PRESSURE
RELIEF VALVE

M3410
RATE OF FLOW CONTROL / PRESSURE
REDUCING VALVE

M3120
PRESSURE REDUCING / SUSTAINING

M3500
MODULATING FLOAT CONTROLLED
CONSTANT LEVEL VALVE

M3600
ON-OFF FLOAT CONTROLLED VALVE

M3800
ALTITUDE VALVE ONE-WAY FLOW

M3620
ON-OFF FLOAT CONTROLLED VALVE
WITH PRESSURE SUSTAINING / RELIEF

MAIN VALVE

M3805
MODULATING ALTITUDE VALVE

M3640
ON-OFF FLOAT CONTROLLED VALVE
WITH RATE OF FLOW CONTROL FUNCTION

M3520
MODULATING FLOAT CONTROLLED
CONSTANT LEVEL VALVE
WITH PRESSURE SUSTAINING

M3170
PRESSURE REDUCING VALVE WITH
SOLENOID CONTROL

M3771 *[DN50 to DN250]*
M3770 *[DN300 to DN1000]*
SOLENOID CONTROLLED / ELECTRICALLY
OPERATED "STEP BY STEP"

M3701 *[DN50 to DN250]*
M3700 *[DN300 to DN1000]*
SOLENOID CONTROLLED
ON-OFF VALVE

MAIN VALVE

M3900
EXCESS FLOW VALVE

ACCESSORIES

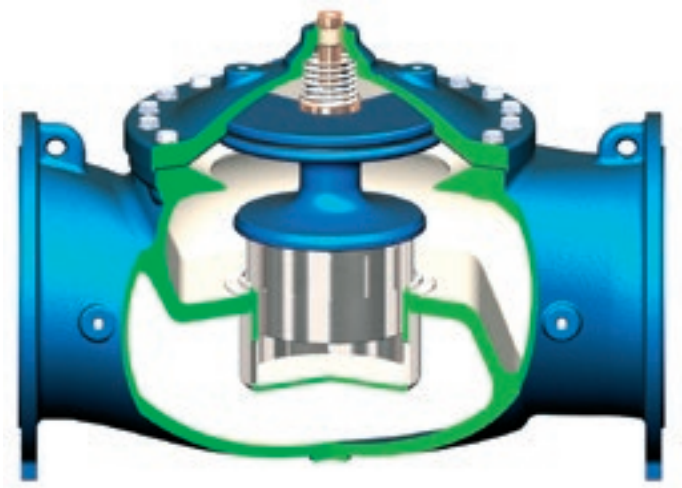
ACCESSORIES

DISSIPATING CYLINDERS

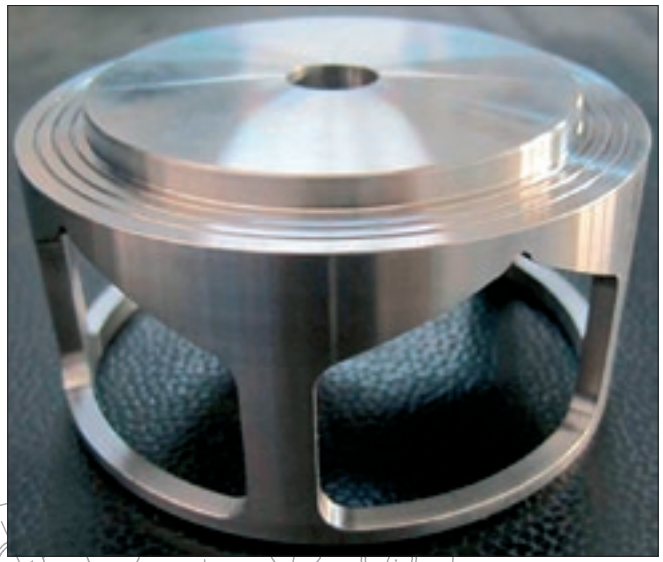
The valve, according to the different applications, can be equipped with different seat profiles.
In case of modulating applications (pressure reducing valve, constant level control valve) and if minimum flows regulation is required, the opening percentage of the valve could be tending to zero. In this working conditions, in order to avoid oscillation and noise problems, we recommend the use of the device V-Port which stabilizes the operation of the valve at low flow rates.

In case of applications where the valve must dissipate energy in terms of pressure, that also means that risk of destructive cavitation is high, we recommend the use of the DSC (Double Slotted Cylinder) that it is able to dissipate energy (pressure) in 3 consecutive steps, preventing downstream valve/pipe damages and reducing significantly the noise level of the valve.

V-PORT
Main valve configuration



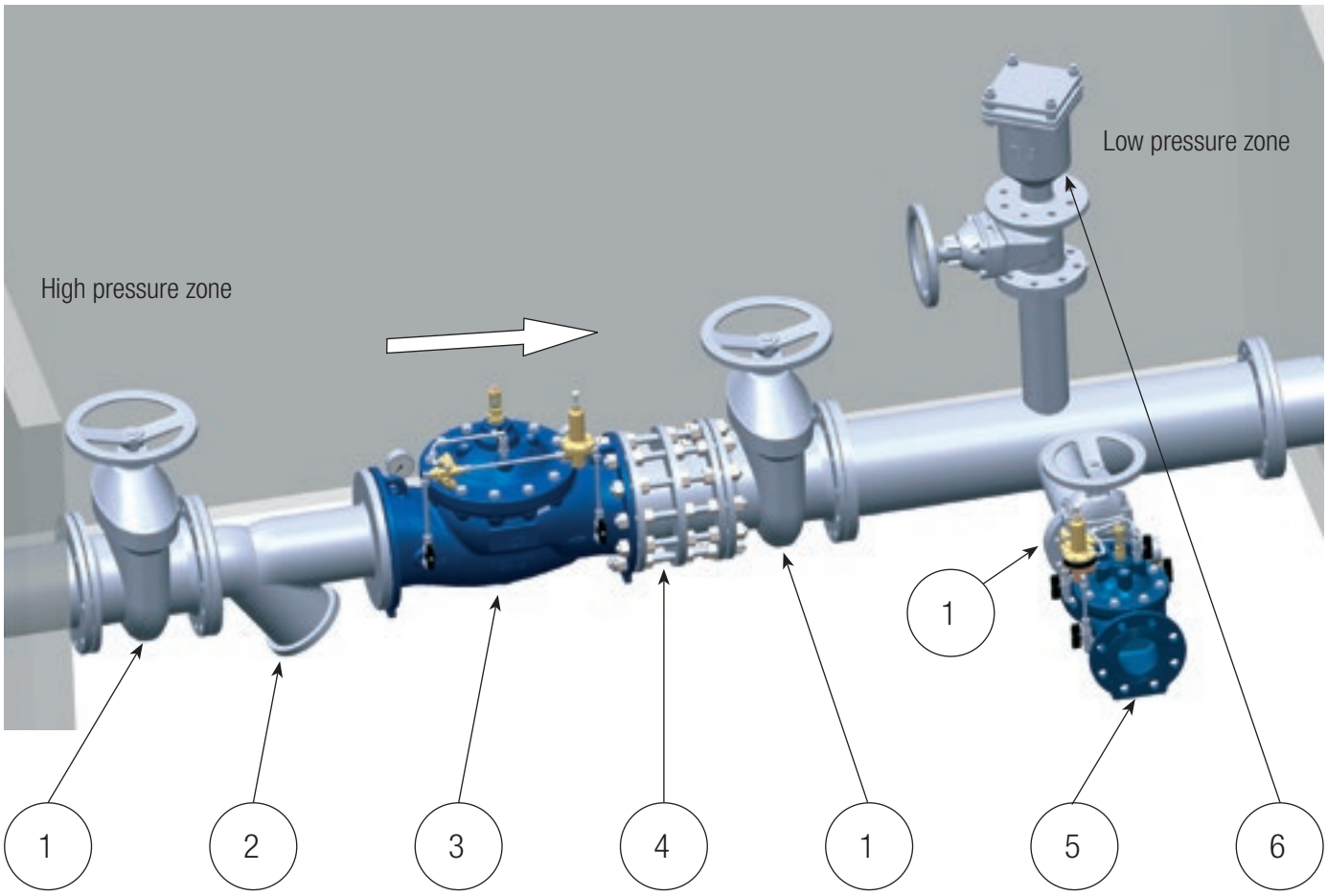
DOUBLE SLOTTED CYLINDER
Main valve configuration



INSTALLATION EXAMPLE

INSTALLATION EXAMPLE

Here below an example of installation for control valves. This kind of layout will ensure long life and correct operation of the valve, reducing the probability of damages or malfunction.



1 ISOLATING GATE VALVE;

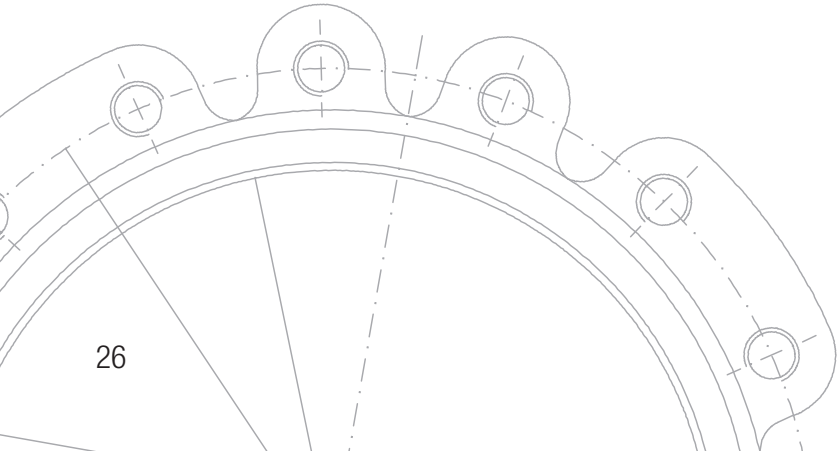
2 “Y” STRAINER;

3 REGULATING VALVE (AUTOMATIC CONTROL VALVE);

4 DISMANTLING JOINT

5 RELIEF VALVE;

6 AIR RELEASE VALVE (3 FUNCTIONS).

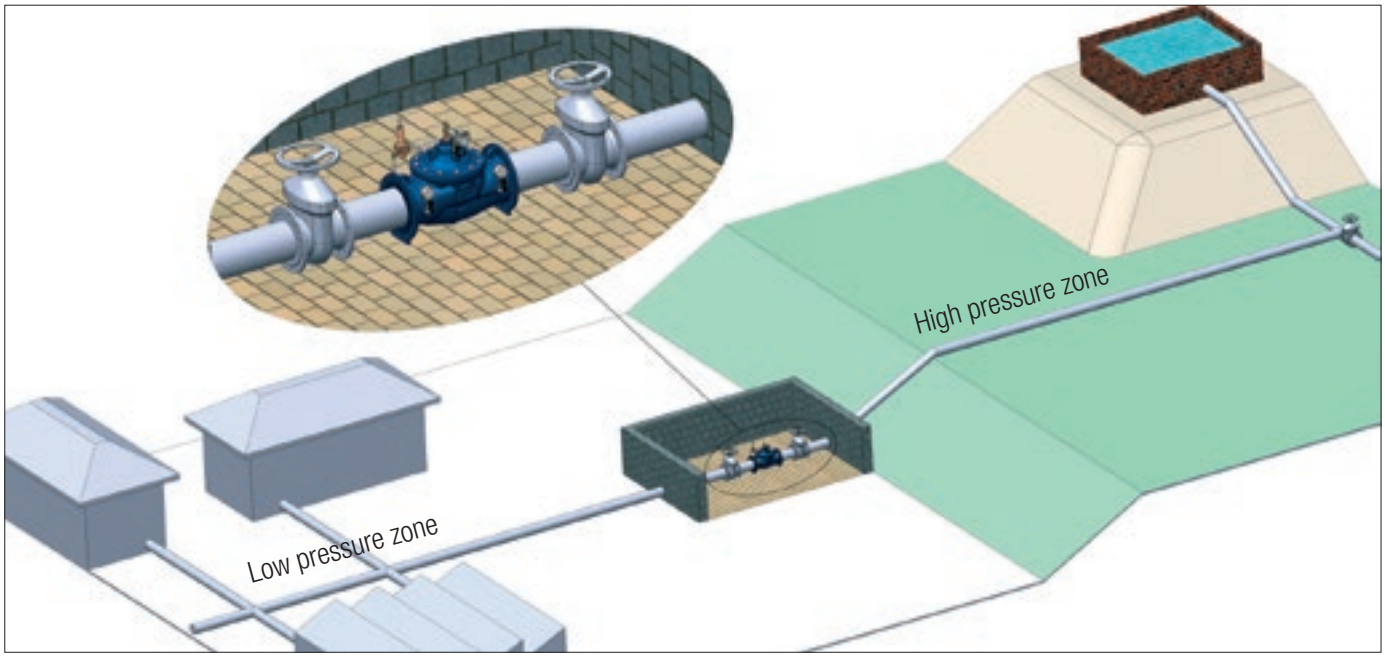


MAIN APPLICATIONS

MAIN APPLICATIONS

PRESSURE REDUCING CONTROL VALVE

The valve reduces a higher inlet pressure to a constant, lower, outlet pressure independently of the flow rate or inlet pressure fluctuations. This kind of valve is mainly used to reduce elevated pressures in distribution network.

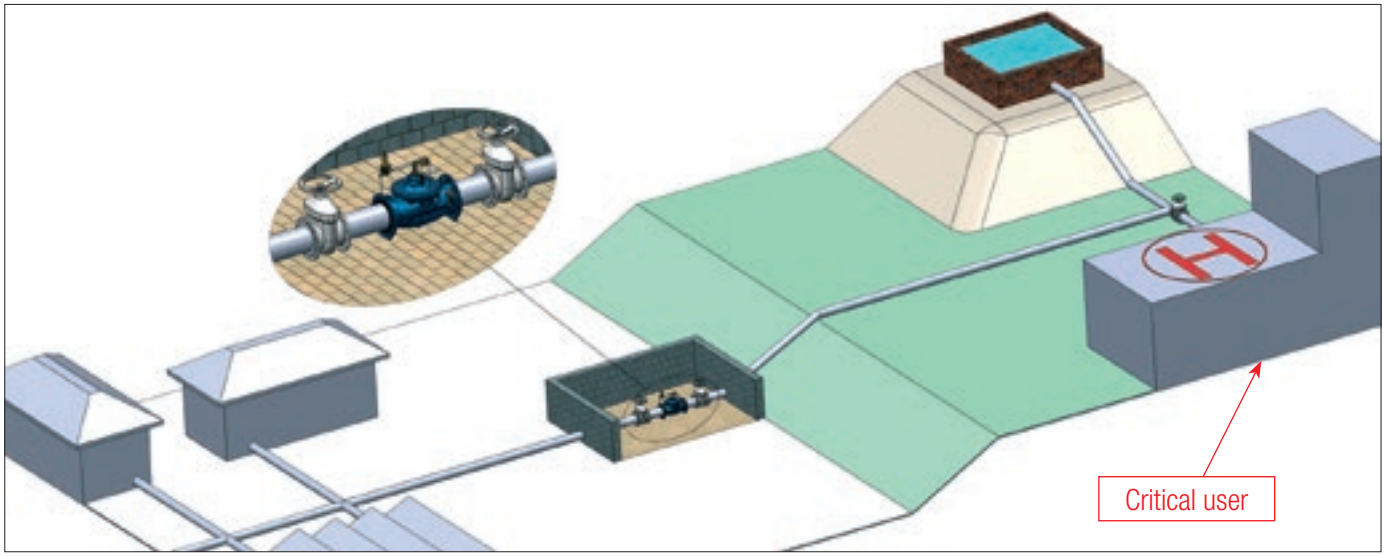


PRESSURE RELIEF / SUSTAINING CONTROL VALVE

The valve maintains a minimum upstream pressure (valve inlet) by relieving excess pressure.

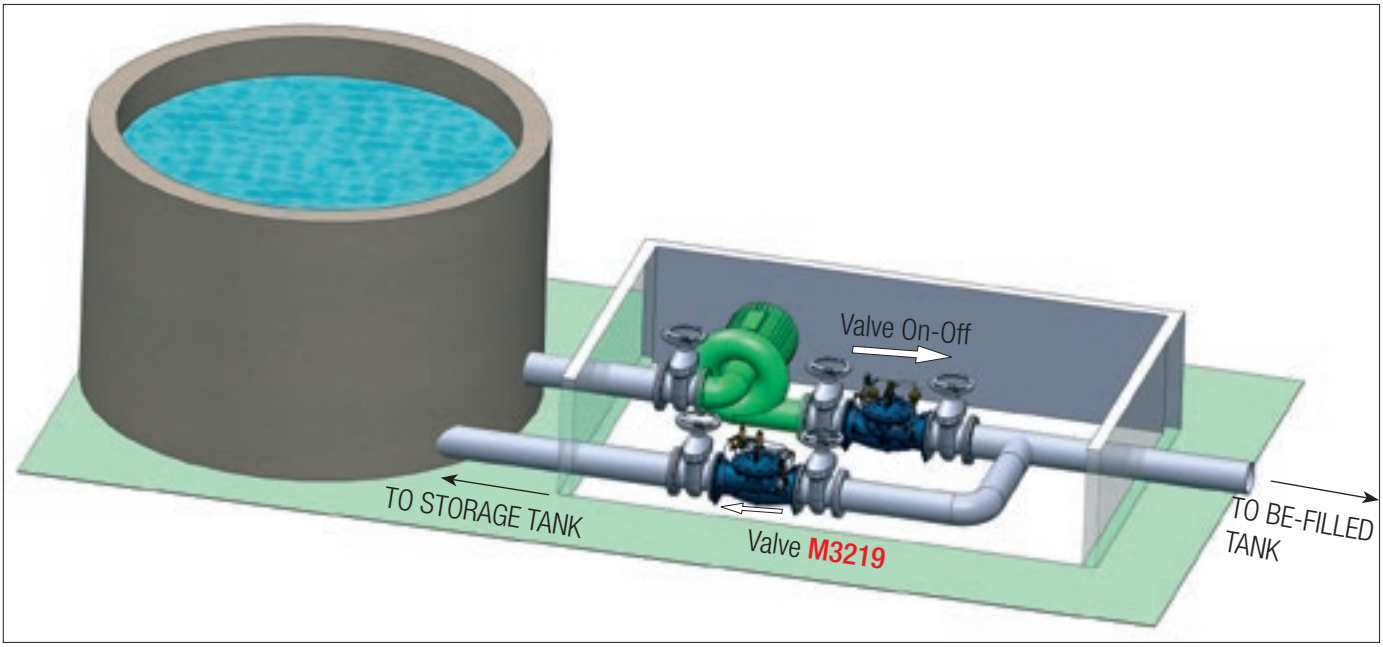
SUSTAINING APPLICATION - The valve is installed in the distribution line between two pressure zones. If the demand on the lower zone causes a drop pressure in the upper zone, then the pressure is hydraulically sustained to minimum pre-set by the valve. When it happens the pressure available to the downstream zone will be reduced.

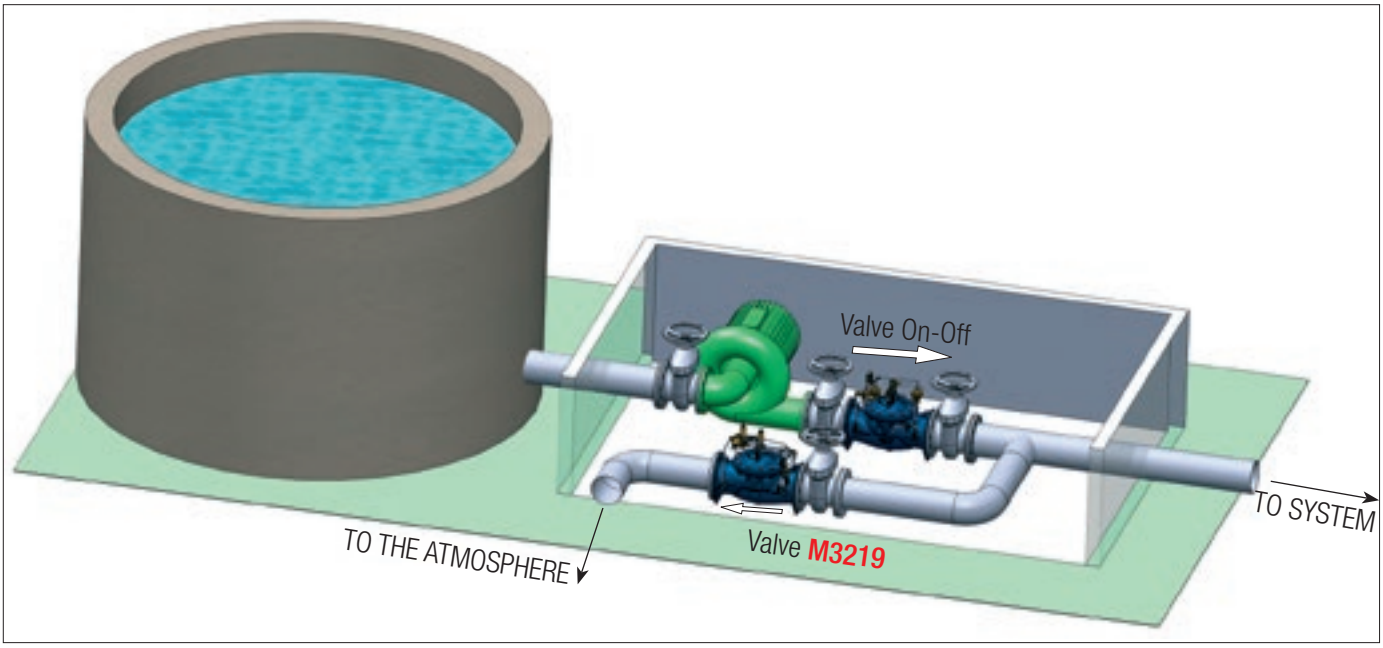
RELIEF APPLICATION - The valve is installed to relieve excess pressure from the source. Typically, the valve discharges excess flow/ pressure into the atmosphere, storage tank, or back to pump suction.



SURGE ANTICIPATOR / PRESSURE RELIEF VALVE

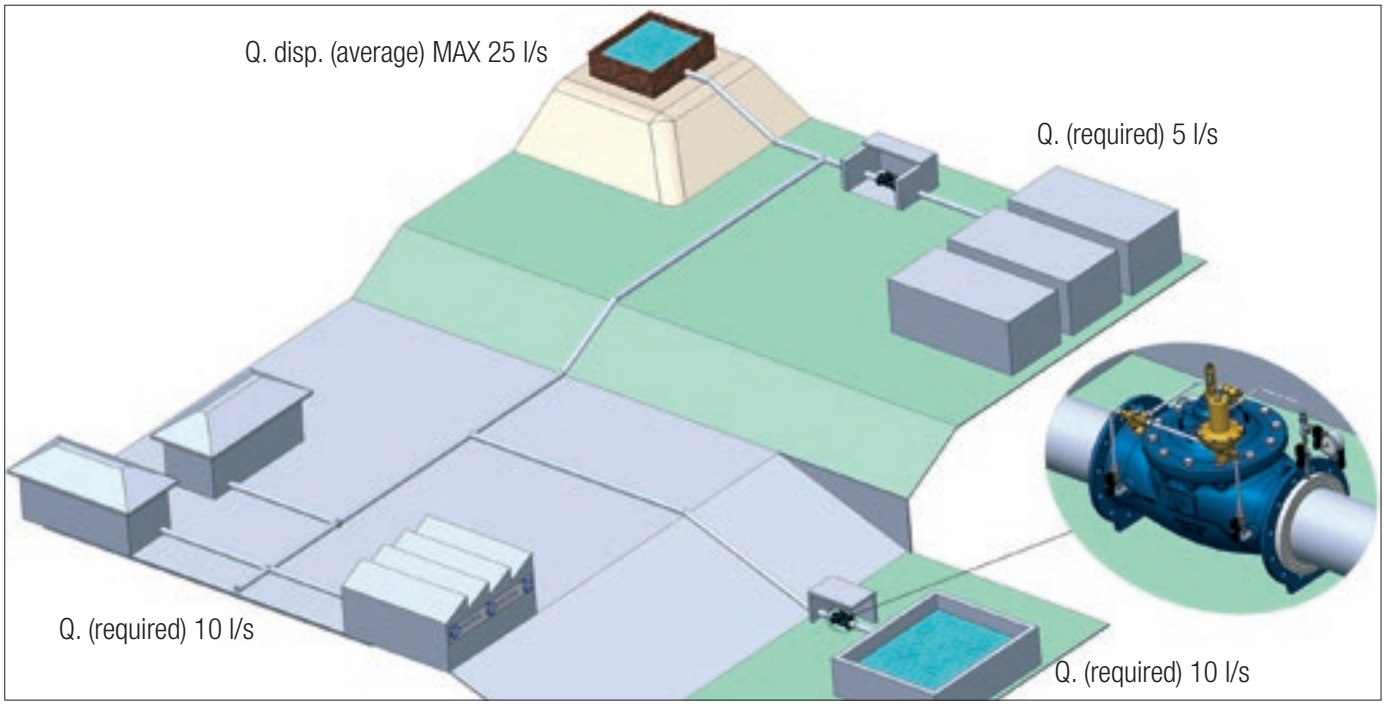
The valve is designed to protect pumping stations against excess pressure. The valve detects low pressure which occurs in case of power failure that precedes water hammer (surge). It relieves high pressure build-up and protects system from over-pressure condition. The valve shall open on a low and/or high pressure wave. The valve is normally mounted in a by-pass of the main pipe line to discharge the over flow to the atmosphere or into the suction tank.





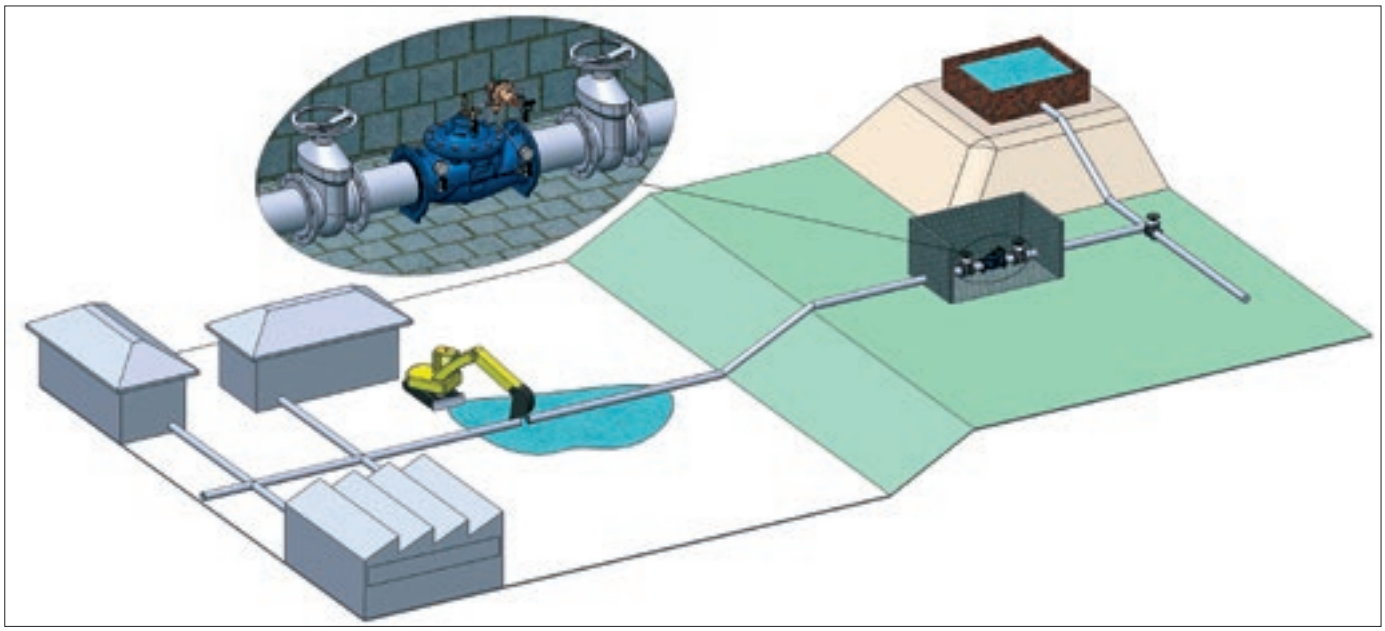
RATE OF FLOW CONTROL VALVE

The valve is used to limit a preset value of flow rate regardless of fluctuations in upstream and downstream pressure.



EXCESS FLOW VALVE

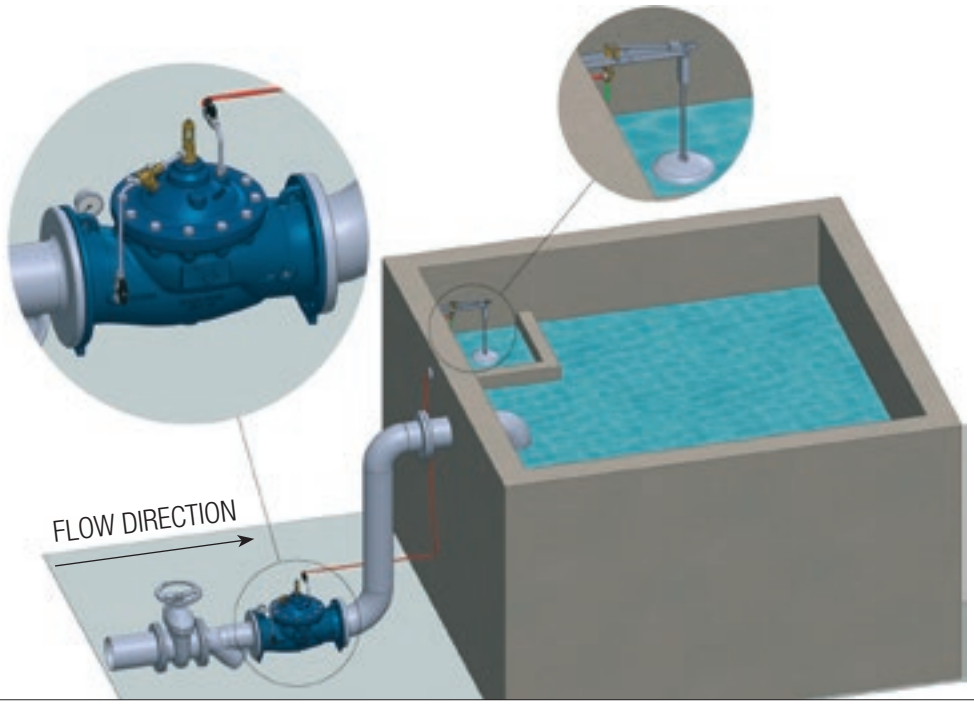
The valve is used as a shut off valve in order to stop the flow of water in case of downstream pipe breaks (e.g. landslides, earthquakes, surge, incorrect excavations).



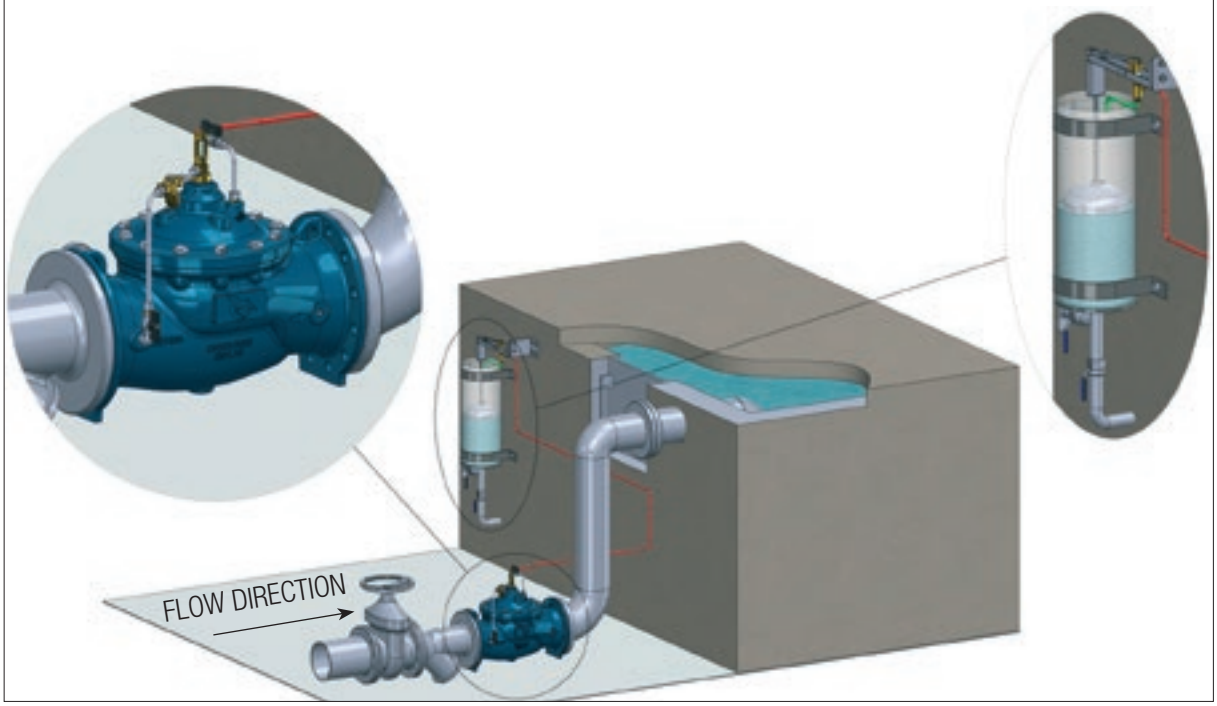
FLOAT CONTROLLED VALVE

The valve is used to control the water level in reservoir, tank: the water level could be controlled in on-off or modulating layout.

IN-TANK INSTALLATION. (Float placed in a calm zone)

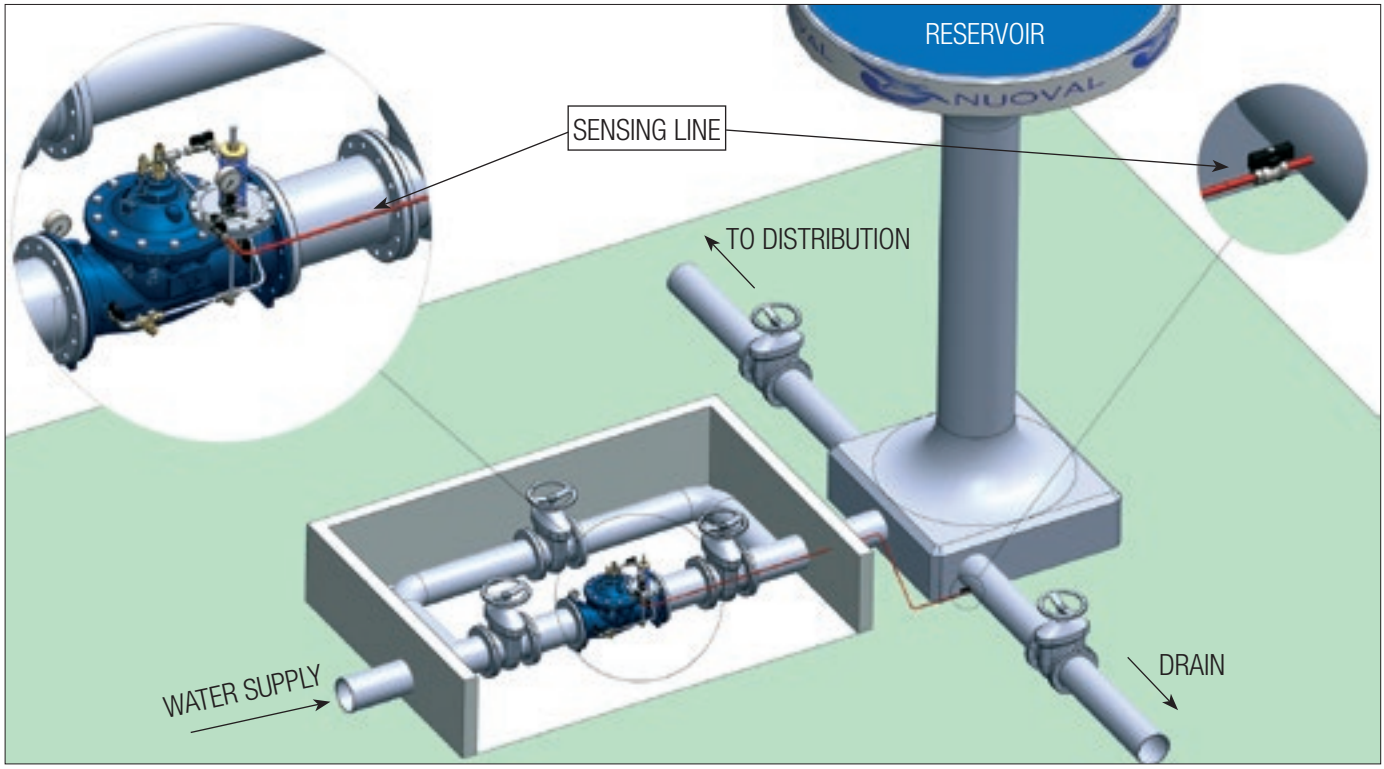


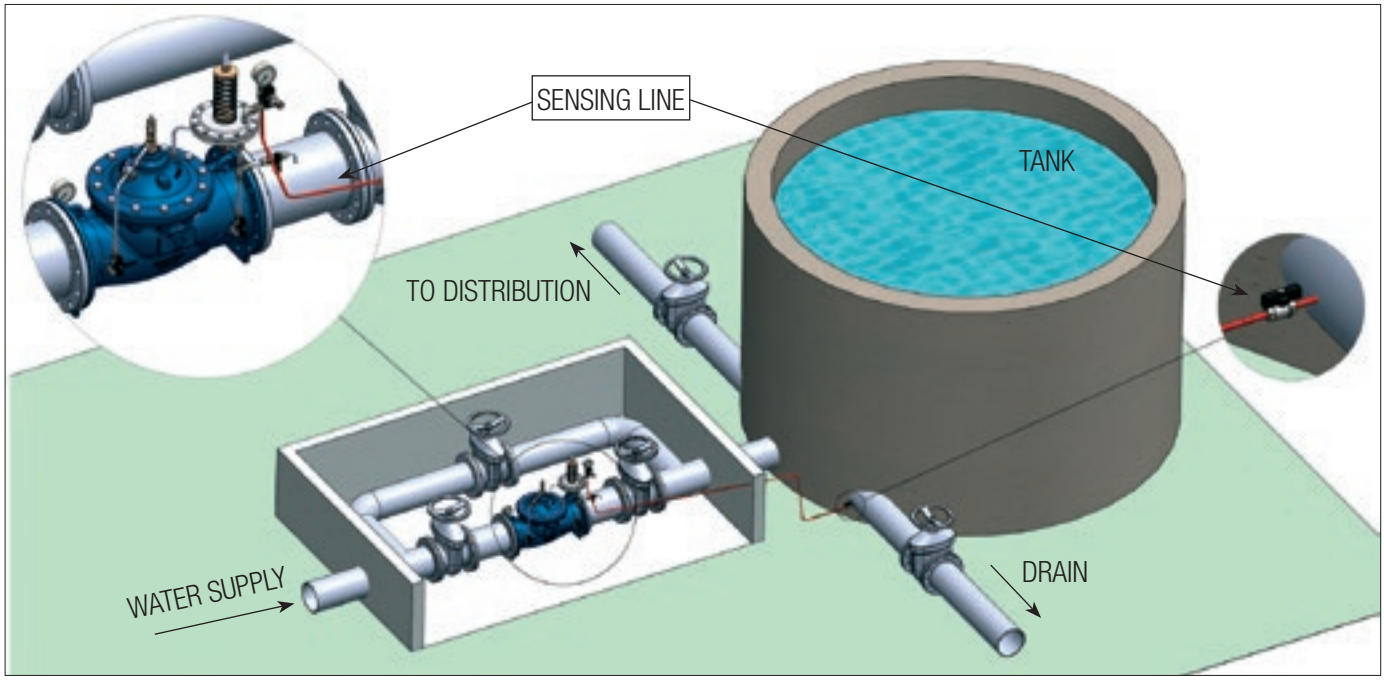
OUT-TANK INSTALLATION

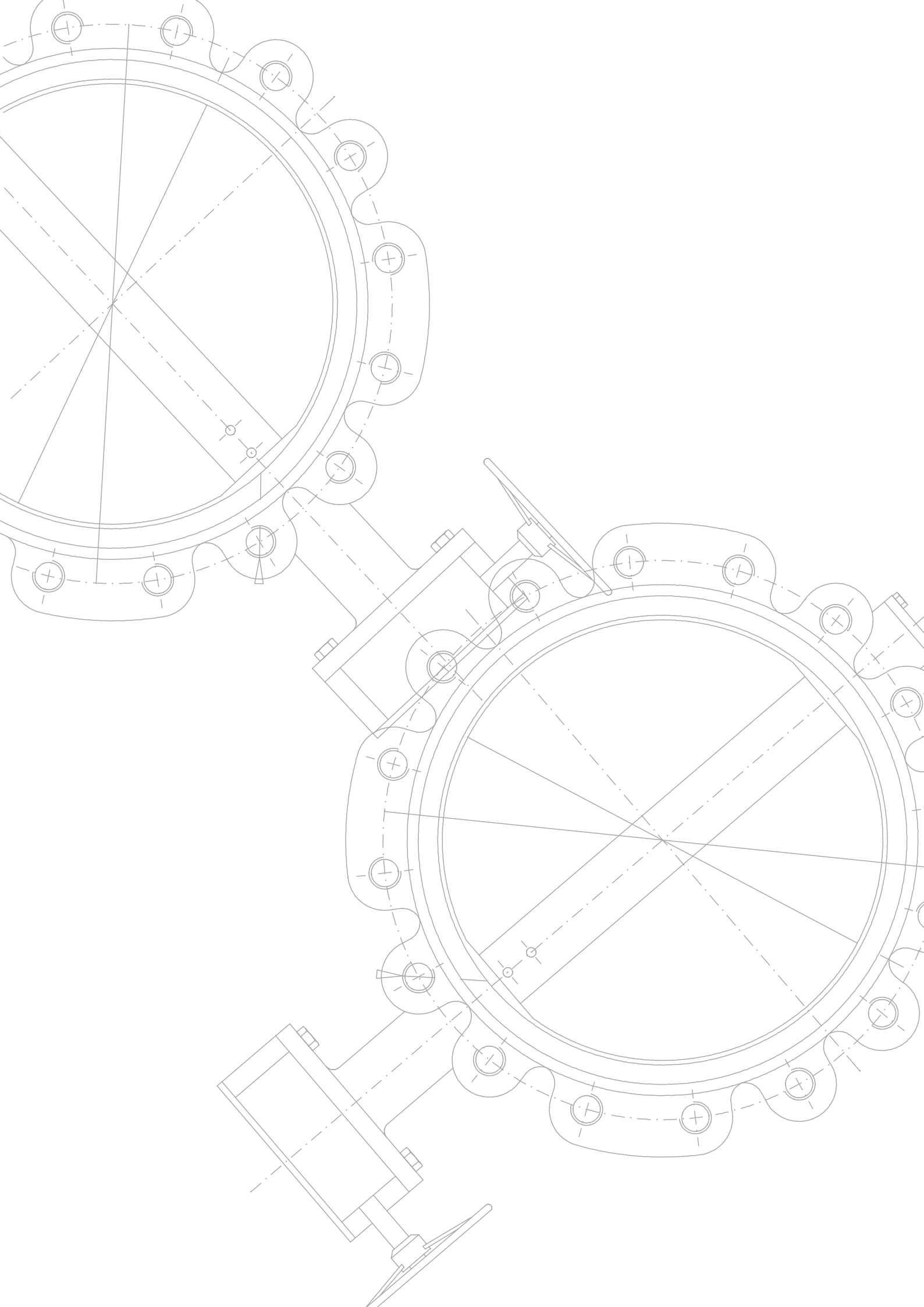


ALTITUDE VALVE

The valve is used to control the filling of a reservoir to an adjustable water level. Altitude pilot is connected by a properly pipe (sensing line) with the reservoir and it is located on the main valve at the bottom of the tank. This valve could be used as an alternative to a float pilot controlled valve, where it is not allowed human contact with water accumulated in the tank of where the maintenance operations could be difficult and dangerous.







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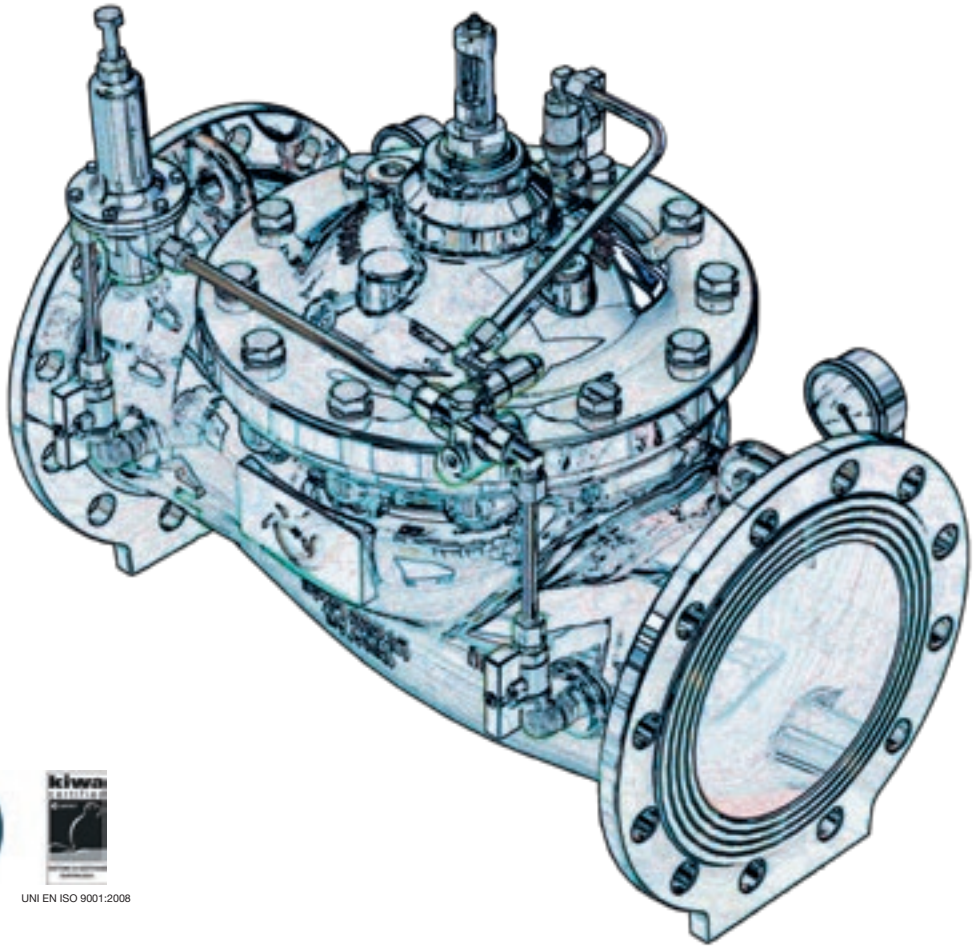

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T.I.S. SERVICE S.P.A.
VIA LAGO D'ISEO 4,6 - 24060 BOLGARE (BG) - ITALY
TEL. +39/035/83.54.811 - FAX +39/035/83.54.888
WWW.TISGROUP.IT - INFO@TISGROUP.IT

T.I.S. POLSKA SP. Z O.O.
UL. OŻAROWSKA 30D 05-850 OŻARÓW MAZOWIECKI - DUCHNICE - POLAND
TEL. +48/22/483.56.00 - FAX +48/22/483.56.03
WWW.TISPOLSKA.PL - INFO@TISPOLSKA.PL

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