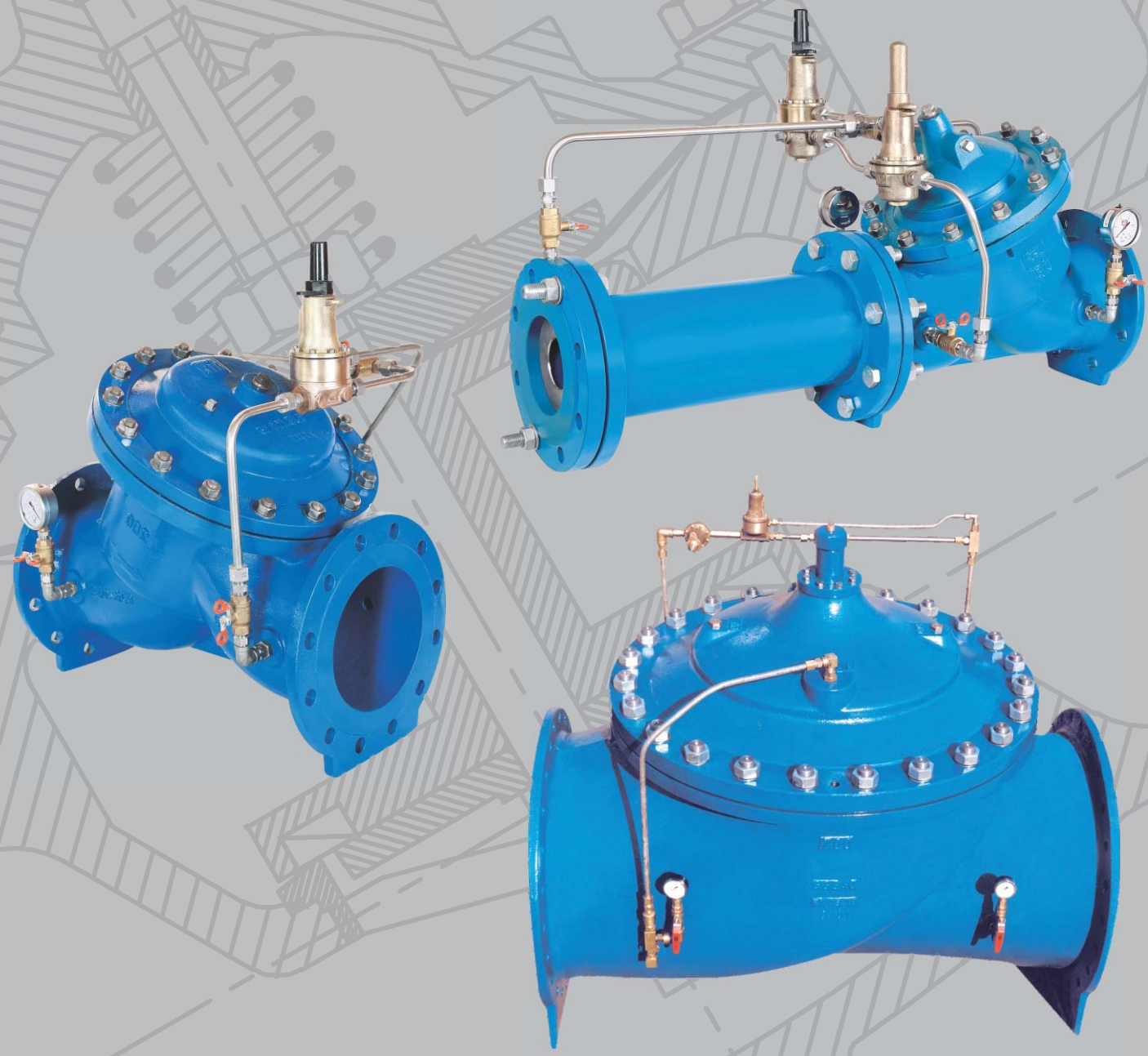
MIRAB CO.®

Manufacturer of Industrial Valves
and Relevant Equipment

Automatic Control Valves



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Automatic Control Valves

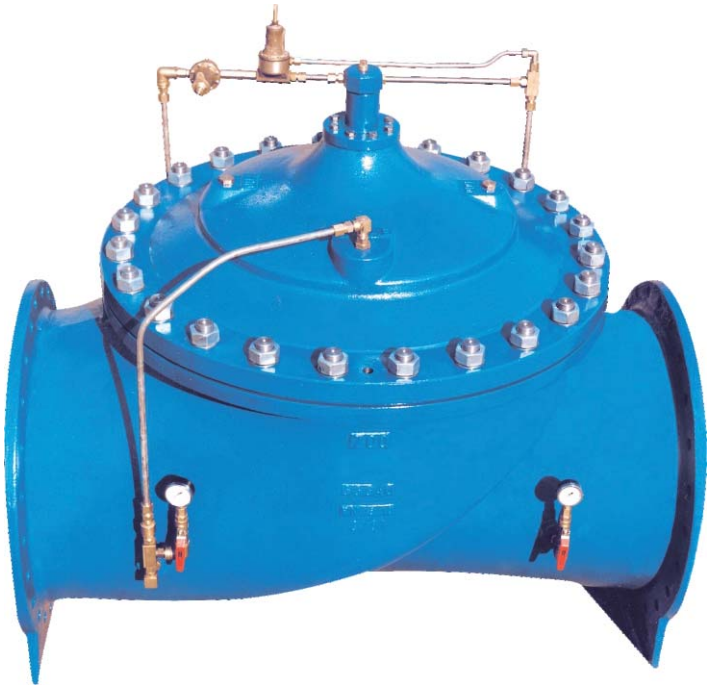
Size: DN 50 – 1000 mm
Pressure: PN 10 – 40 bar
Face to face: DIN EN 588-1 series 1(DIN 3202-F1)
Flanges: DIN EN1092-2(DIN 2501)

Product Features:
Mirab Control Valves are used as regulating and Control valves. The body is designed in either horizontal or diagonal shape, with the internal configuration suitable for fluid flow. The valves are controlled automatically by a pilot valve and water flow.

Corrosion protection:
All casting parts are coated with epoxy powder RAL 5015 or 5005 by electrostatic method.

Application:
Automatic control valves can be used for fluids such as water and raw water with temperature up to 70°C.

Hydrostatic test Pressure (bar) according to DIN EN 12266-1		
Nominal Pressure PN (bar)	Test Pressure, with water, (bar)	
	Shell Test	Closure Test
10	17	11
16	25	18
25	38	28
40	60	44

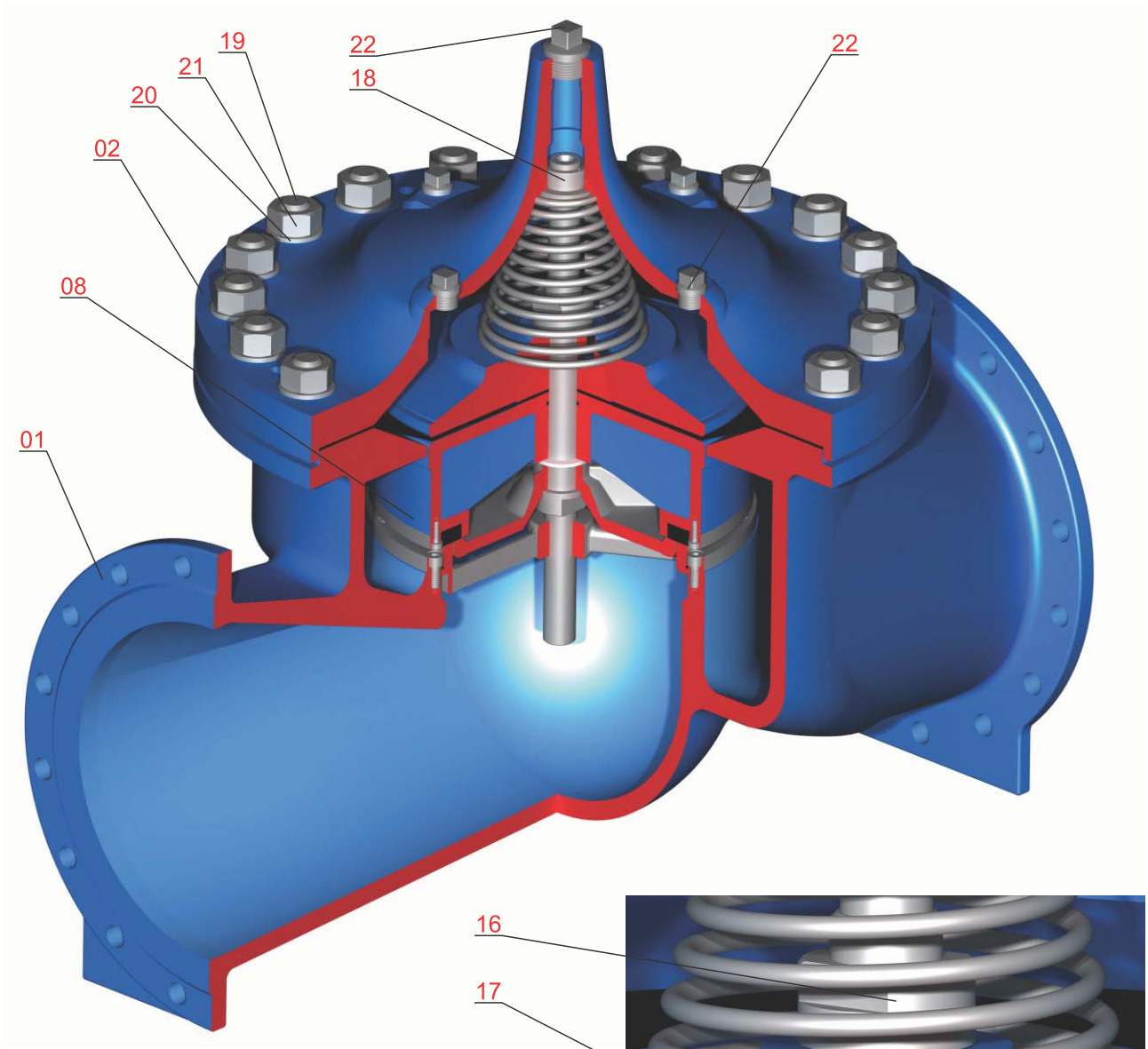


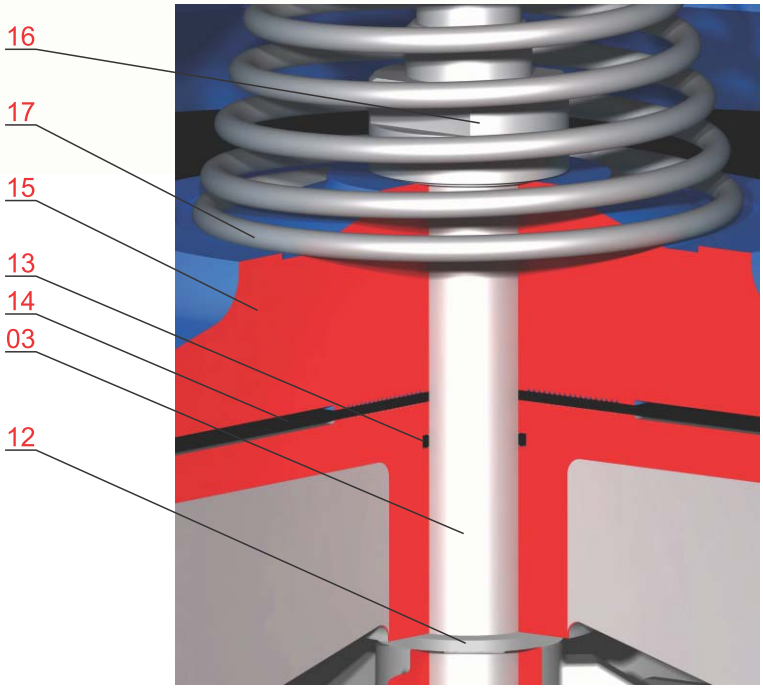
Different types of Automatic valves

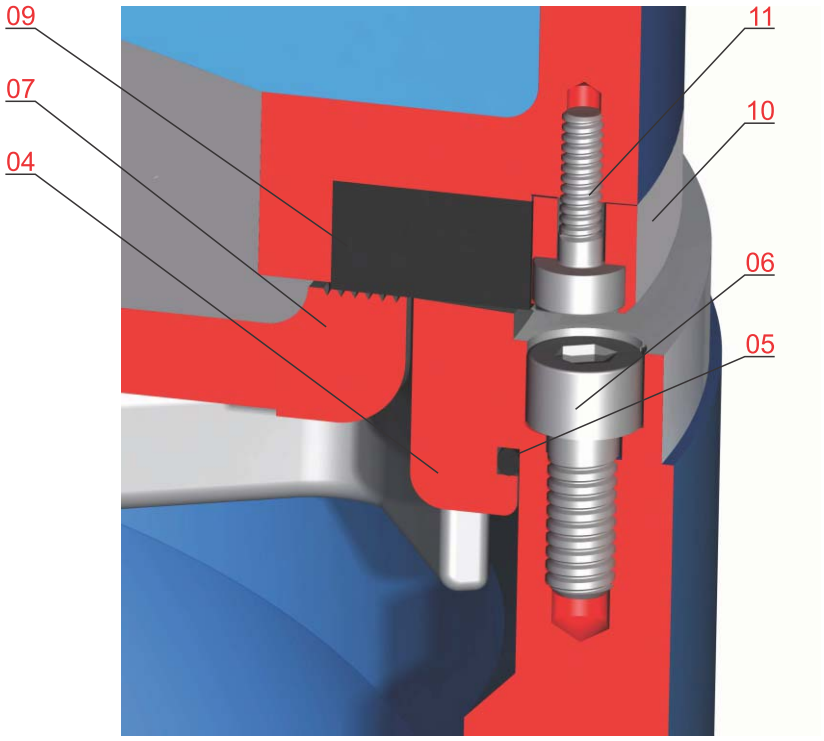
Pressure reducing valve (RVAP115)	The Automatic valve type 115 maintains the reduced downstream pressure at a constant value irrespective of the changes in upstream pressure and flow rate.
Pressure reducing & Sustaining valve (RVAP115-2)	Automatic valve type 115-2 performs the two following functions automatically: 1- Keeps outlet pressure constant irrespective of variation in the inlet pressure. 2- Adjust and maintain inlet pressure at constant value.
Pressure relief or Sustaining valve (RVAR116)	Automatic valve type 116 is capable of adjusting the inlet pressure, control the network pressure and if necessary bypass the excessive pressure through the adjacent pipe.
Pressure regulating solenoid valve (RVAP116E)	Automatic valve type 116E/D performs two duties: 1- Acting as a relief valve when the inlet pressure exceeds the adjusted value. 2- Acting as a shut-off valve by signal from the solenoid valve.
Surge anticipator valve (RVAP116-6)	In electricity failure situations, the automatic valve type 116-6 opens to release excessive pressure and then closes slowly before creation of surge effect.
Check valve with controllable opening & closing speed (RVAF118-2R)	Automatic valve type 118-2R closes on pressure return wave and opens with adjustable speed when the inlet pressure returns to the initial valve.
Pump control valve (RVAC118)	Automatic valve type 118-2R-EL is responsible for protection of the pump's electric motor by preventing water hammer effect when pump is turned off.
Rate of flow control valve (RVAF114)	Automatic valve type 114-E&D controls the outlet flow rate irrespective of pressure variation.
Solenoid control valve (RVAF113)	Automatic control valve type 113 equipped with solenoid valve, acts as a shut-off valve and can be used in the following status: 1- To close when power failure occurs. 2- To open when power failure occurs.
Float control valve (RVAM-RVAS)	Floater valves model 110-6 and 110-10 keep tank water at constant level or keep the water level between the adjusted maximum and minimum range.
Excess flow shut - off valve(RVAE85)	Automatic valve type 85-H&E is used as a safety valve down stream of water reservoirs to prevent the reservoir water from wasting and from downstream flood. When the pipe bursts, the valve closes quickly with adjustable closing time – Type 85-H for places without electricity. – Type 85-E for places with electricity.

In addition to the described automatic valves, it is possible to design a control valve that performs two or three duties at the same time by certain arrangements in the control circuit. Mirab control valves are manufactured with pressure rating up to PN 40 bar.

Automatic operated control valve Part list







Part No.	Part Name	Part Material	1	2
01	Body	*EN 1563/ EN-GJS-400-15		
02	Cover	*EN 1563/ EN-GJS-400-15		
03	Axle	DIN EN 10088-3/ 1.4301	●	
04	Seat Ring	DIN EN 10088-3/ 1.4308		
05	O-ring	NBR (EPDM on Request)	●	●
06	Socket Screw	ISO 3506-1, Gr. A2, Property Class 70		
07	Disk Guide	DIN EN 10088-3/ 1.4308		
08	Disk Retainer	EN 1563/ EN-GJS-400-15		
09	Sealing Ring	EPDM (NBR on Request)	●	●
10	Ring Disk Retainer	DIN EN 10088-3/ 1.4301	●	
11	Socket Screw	ISO 3506-1, Gr. A2, Property Class 70		
12	Spacer	PTFE	●	●
13	O-ring	NBR (EPDM on Request)	●	●
14	Diaphragm	Nylon Reinforced NBR Rubber	●	●
15	Diaphragm Washer	EN-GJS-400-15/ ASTM B148 C95200		
16	Nut	DIN EN 10088-3/1.4301		
17	Spring	DIN EN 10088-3/1.4310	●	
18	Cover Bearing	DIN EN 10088-3/1.4301		
19	Stud	DIN EN 10088-3/1.4301		
20	Washer	ISO 3506-2, Gr. A2, Property Class 70		
21	Nut	ISO 3506-2, Gr. A2, Property Class 70		
22	plug	ISO 3506-1, Gr. A2, Property Class 70	●	

1- Recommended Spare Parts
2- Parts Subjected to Wear
*EN-GJS-500-7 available on request.

Dimensions and weight of automatic control valves

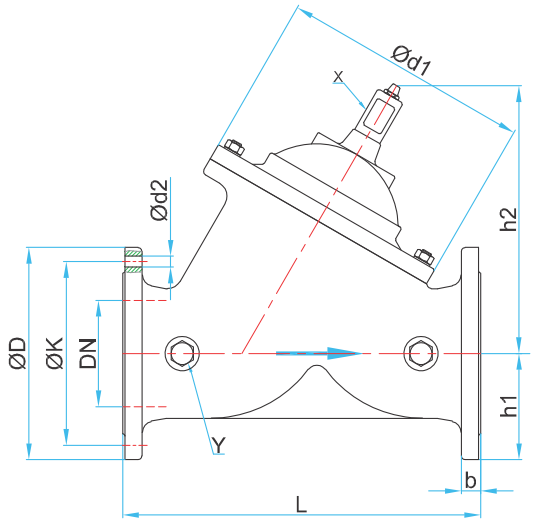


Fig 100

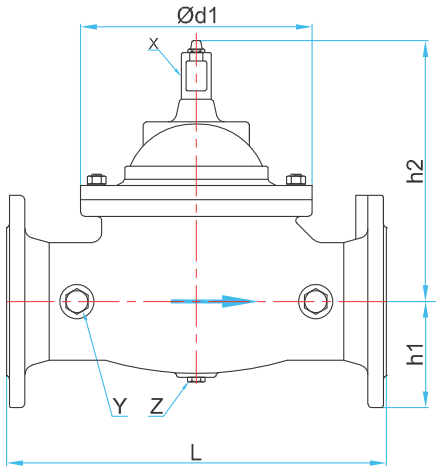


Fig 200

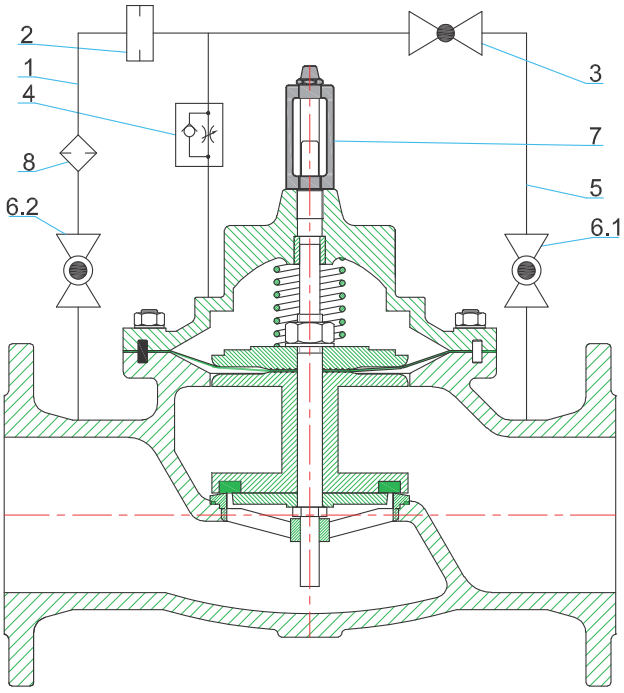
Flanges: DIN EN 1092-2 (DIN 2501)
Face to face: DIN EN 558-1 Series1 (DIN 3202-F1)

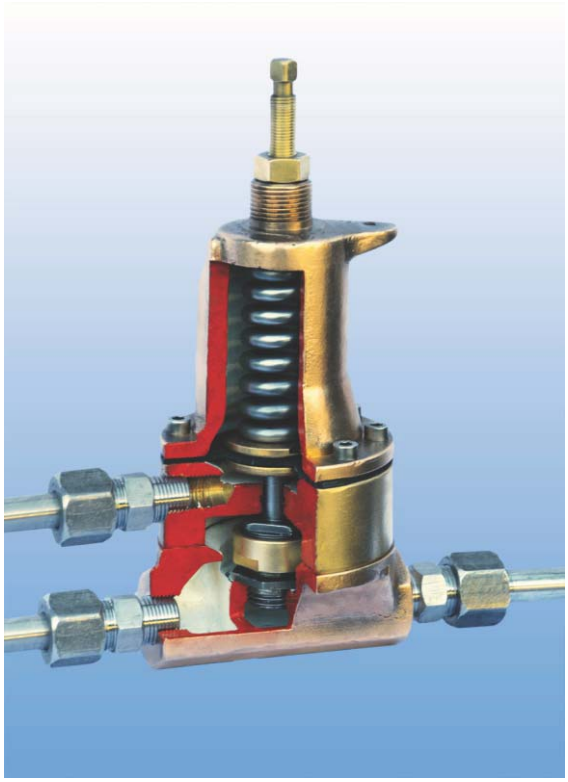
DN mm	PN bar	L mm	ØD mm	ØK mm	Ød2 mm	n	b mm	h1 mm	h2 mm	Ød1 mm	Fig	X in	Y in	Z in	Weight Kg
50	10,16	230	165	125	19	4	19	83	140	143	200	G 3/8"	G 3/8"	G 1/4"	17
65	10,16	290	185	145	19	4	19	93	185	200	200	G 3/8"	G 3/8"	G 3/8"	27
80	10,16	310	200	160	19	8	19	100	185	200	200	G 3/8"	G 1/2"	G 3/8"	31
100	10,16	350	220	180	19	8	19	110	230	245	100,200	G 1/2"	G 1/2"	G 3/8"	41
125	10,16	400	250	210	19	8	19	125	240	245	100	G 1/2"	G 1/2"	G 3/8"	50
150	10,16	480	285	240	23	8	19	143	324	335	100	G 1/2"	G 1/2"	G 3/8"	80
200	10	600	340	295	23	8	20	178	370	430	100,200	G 1/2"	G 3/8"	—	135
	16		340	295	23	12	20								
250	10	730	395	350	23	12	22	200	390	430	100,200	G 1/2"	G 3/8"	G 3/8"	165
	16		405	355	28		22								
300	10	850	445	400	23	12	24.5	208	488	560	100,200	G 1"	G 1/2"	G 1/2"	300
	16		460	410	28		24.5								
350	10	980	505	460	23	16	24.5	253	650	712	200	G1 1/4"	G 1/2"	—	583
	16		520	470	28		26.5								
400	10	1100	565	515	28	16	24.5	283	650	712	200	G1 1/4"	G 1/2"	—	620
	16		580	525	31		28								
450	10	1200	615	565	28	20	25.5	312.5	715	712	200	G1 1/4"	G 1/2"	—	765
	16		640	585	31	20	30								
500	10	1250	670	620	28	20	26.5	345	781	900	200	G 1"	G 1/2"	—	950
	16		715	650	34		31.5								
600	10	1450	780	725	31	20	30	400	781	900	200	G 3/4"	G 1/2"	—	1300
	16		840	770	37		36								
700	10	1650	895	840	31	24	32.5	458	1068	1226	200	G 3/4"	G 1/2"	—	2550
	16		910	840	37		39.5								
800	10	1850	1015	950	34	24	35	593	1068	1226	200	G 3/4"	G 1/2"	—	2800
	16		1025	950	41		43								
1000	10	2250	1230	1160	37	28	40	620	1453	1530	200	G 3/4"	G 1"	—	4700
	16		1255	1170	44	28	50	632.5							

PN 25 bar and higher as per request.

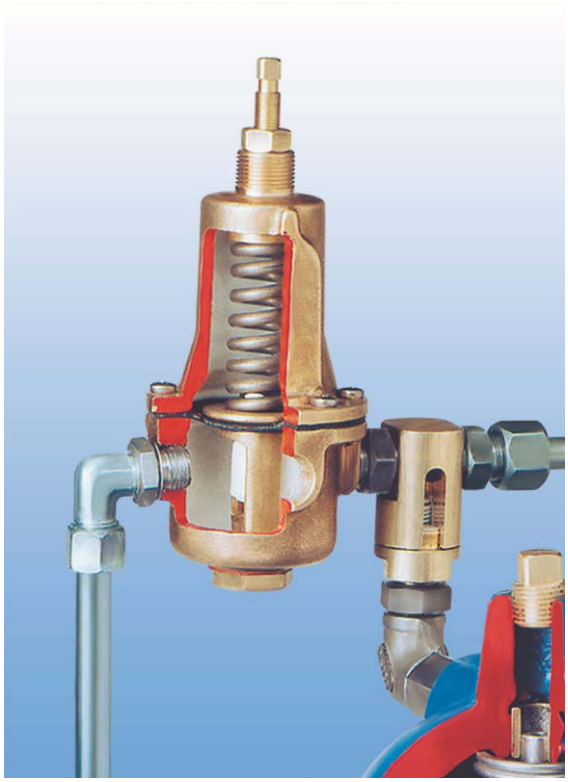
Components of Pressure reducing valve

1- Inlet pipe (pressurized)
2- Orifice
3- Pilot
4- Flow control valve
5- Outlet pipe (pressurized)
6- Ball valve
7- Valve disc position indicator
8- Strainer (filter)



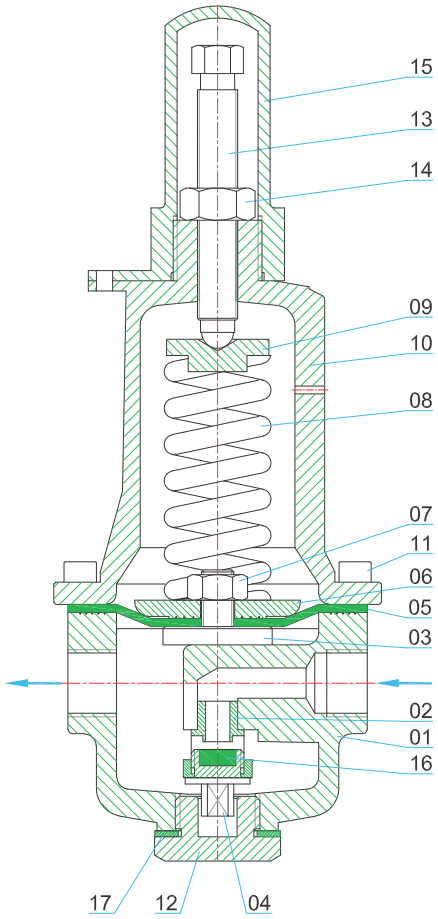


Pilot 016



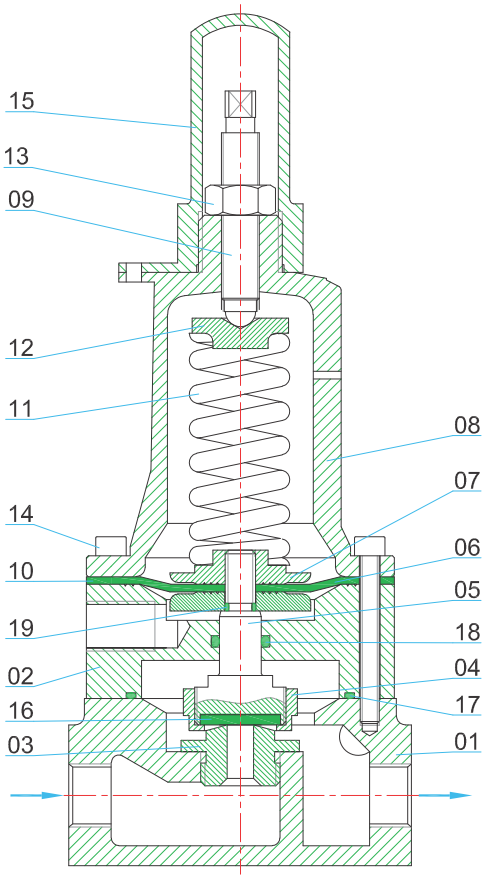
Pilot 015

Pressure Reducing Pilot



Part No.	Part Name	Part Material	Spare Part
01	Body	Al . Bz	
02	Seat	1.4401	●
03	Yoke	Al . Bz	
04	Disc retainer assembly	1.4401	
05	Diaphragm	NBR	●
06	Diaphragm washer	Brass	
07	Lock nut	A2	
08	Spring	1.4310	●
09	Spring guide	Brass	
10	Cover	CuZn40	
11	Socket screw	A2	
12	Plug	Brass	
13	Adjusting screw	Brass	●
14	Lock nut	Brass	●
15	Cap	PP/ABS	
16	Rubber	NBR	●
17	Gasket	Paper	●

Pressure Relief Pilot



Part No.	Part Name	Part Material	Spare Part
01	Body	Al . Bz	
02	Power unit body	CuZn 40	
03	Seat	1.4401	●
04	Nut	Brass	
05	Stem	1.4401	
06	Lower diaphragm washer	Brass	
07	Upper diaphragm washer	Brass	
08	Cover	CuZn40	
09	Adjusting screw	Brass	●
10	Diaphragm	NBR	●
11	Spring	1.4310	●
12	Spring guide	Brass	
13	Lock nut	1.4301	●
14	Socket screw	A2	
15	Cap	PP/ABS	
16	Rubber	NBR	●
17.18.19	O-Ring	NBR	

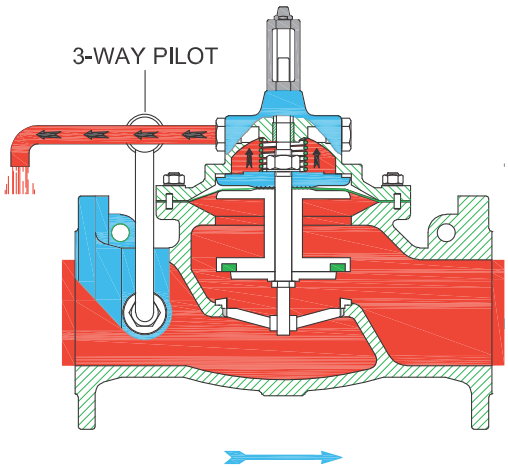
Type of pilots manufactured by Mirab:

1- Pressure reducing pilot
2- Pressure relief pilot
3- 2-way on/off float level control
4- Flow control pilot
5- 3-way excess flow shut off

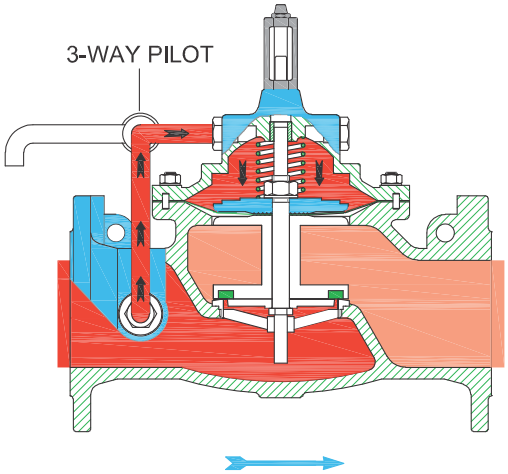
Operation of Automatic Control Valves

- **On/Off position**

3-Way pilot drains the fluid from the Control chamber.
The main valve opens completely.

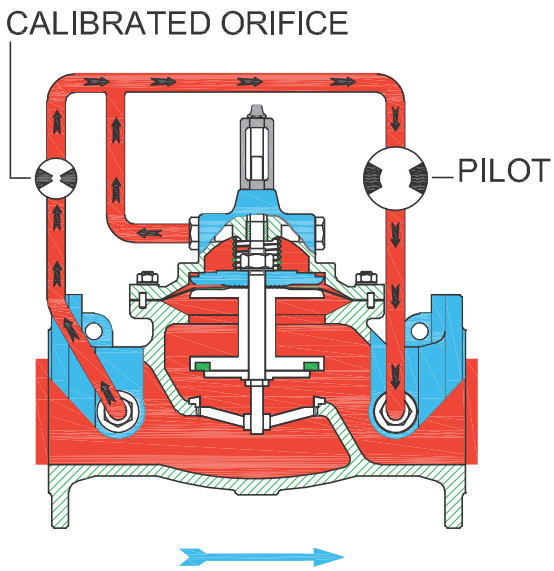


3-Way pilot runs the fluid into the control chamber.
The main valve closes.

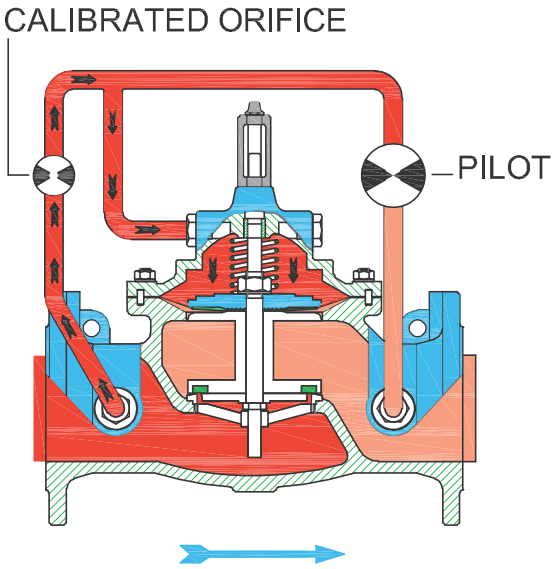


- **Modulating version**

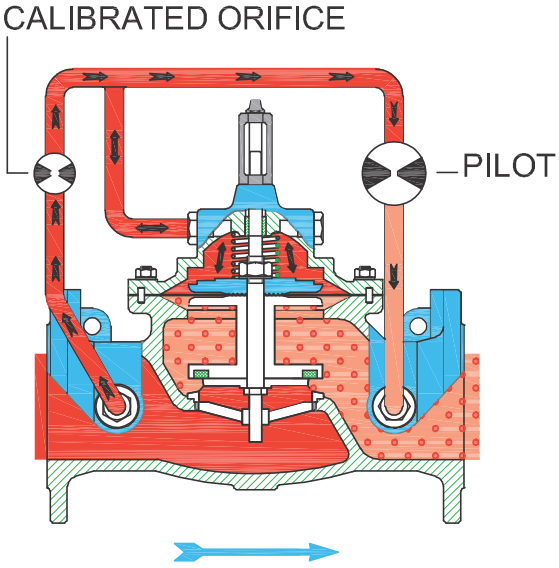
By opening the pilot, flow rate through the calibrated orifice increases **and the valve opens.**



By closing the pilot, flow rate through the calibrated orifice decreases **and causes the main valve to close gradually.**



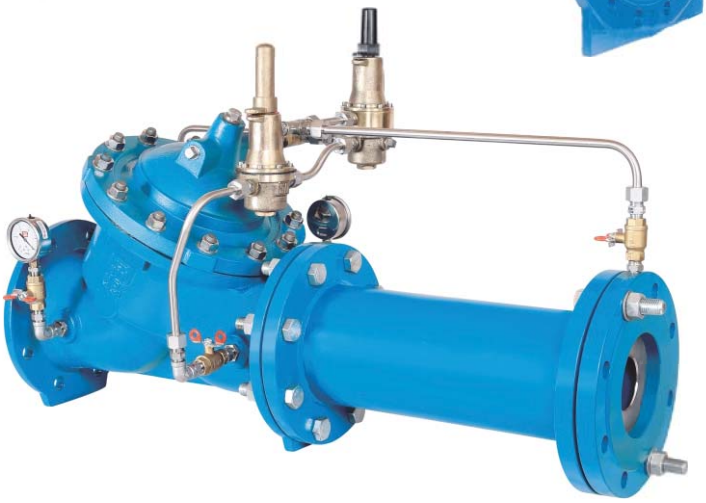
When the flow rate through the pilot and the orifice is balanced **the main valve would be in a balanced half open position.**



Automatic Control Valves

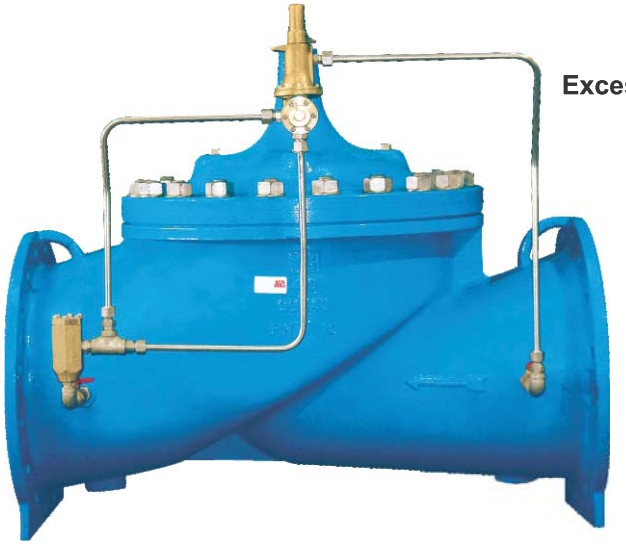
Pump control valve

Float control valve (On/Off)



Rate of flow control & Pressure reducing valve

Pressure relief & Pressure reducing valve



Excess flow shut- off valve

Float control valve

Rate of flow control valve

Pressure reducing valve

Significant points in choosing control valves

The maximum and minimum rate of flow is the major element in the choice of control valves, pressure reducing valves in particular, whereas pipe diameter is not a significant factor. The following table shows the minimum, normal and maximum flow rate for different valves. These values are very important for the correct performance of the valves.

Minimum, Normal and Maximum flow rate in automatic control valve (l/s)

DN	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000
l/S min.	1.6	2.7	4	6	10	14	25	39	56	77	100	127	157	226	307	402	508	628
l/S norm.	6	10	15	24	37	53	94	147	212	289	377	477	589	848	1154	1508	1907	2355
l/S max.	10	17	25	40	61	88	157	245	353	481	628	795	982	1414	1924	2513	3180	3925

Note: For valves under continuous operation the maximum flow rate should be considered 20% less than the Valves mentioned in the above table.

Determination of pressure loss (ΔP) in Automatic control valves

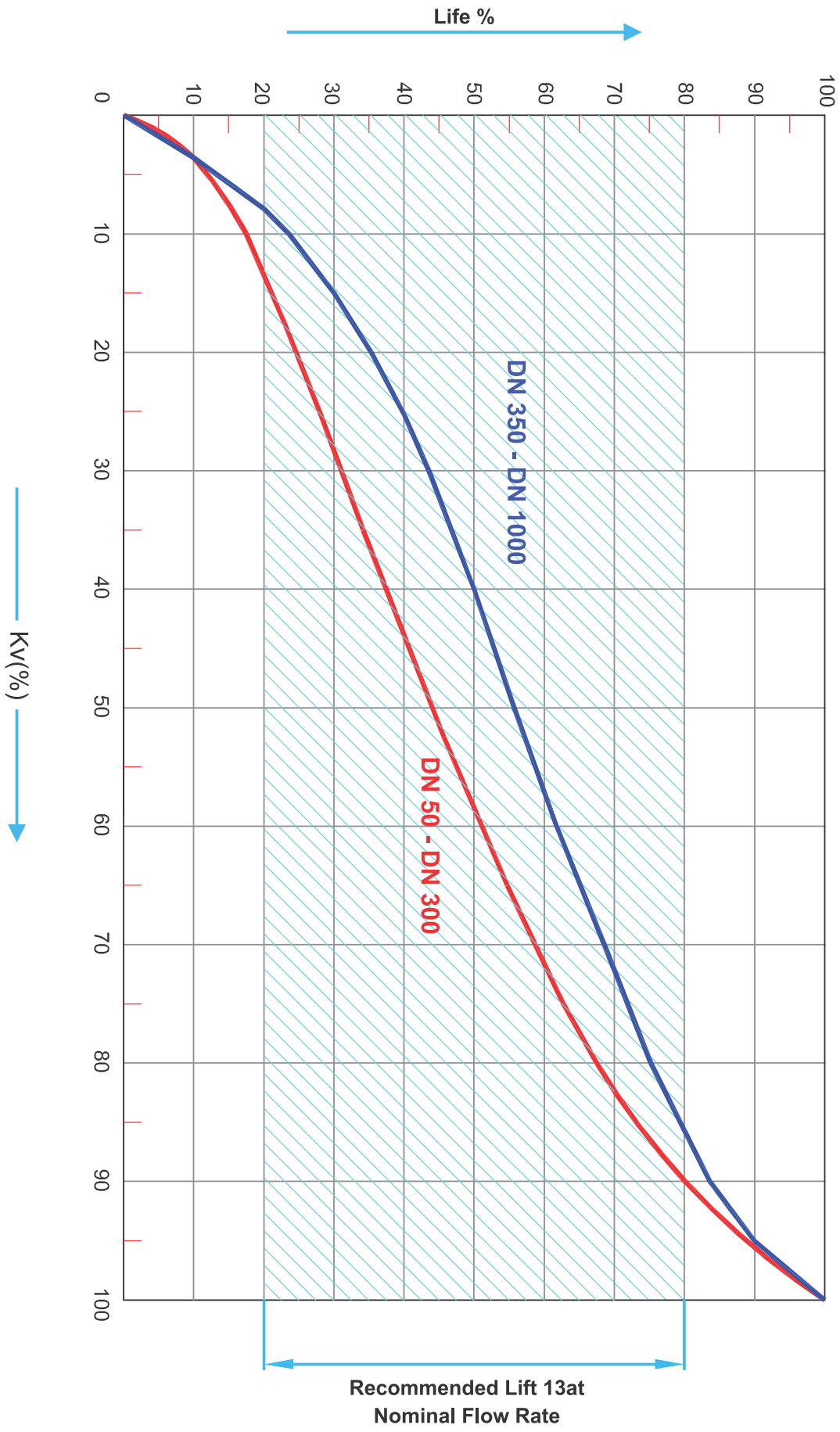
a) Determination of pressure loss by calculation:

ΔP = Pressure loss (bar)
Kv = Flow coefficient (m^3/h)
Q = Flow rate (m^3/h)

$$Q = Kv\sqrt{\Delta P} \qquad \Delta P = \left(\frac{Q}{Kv}\right)^2$$

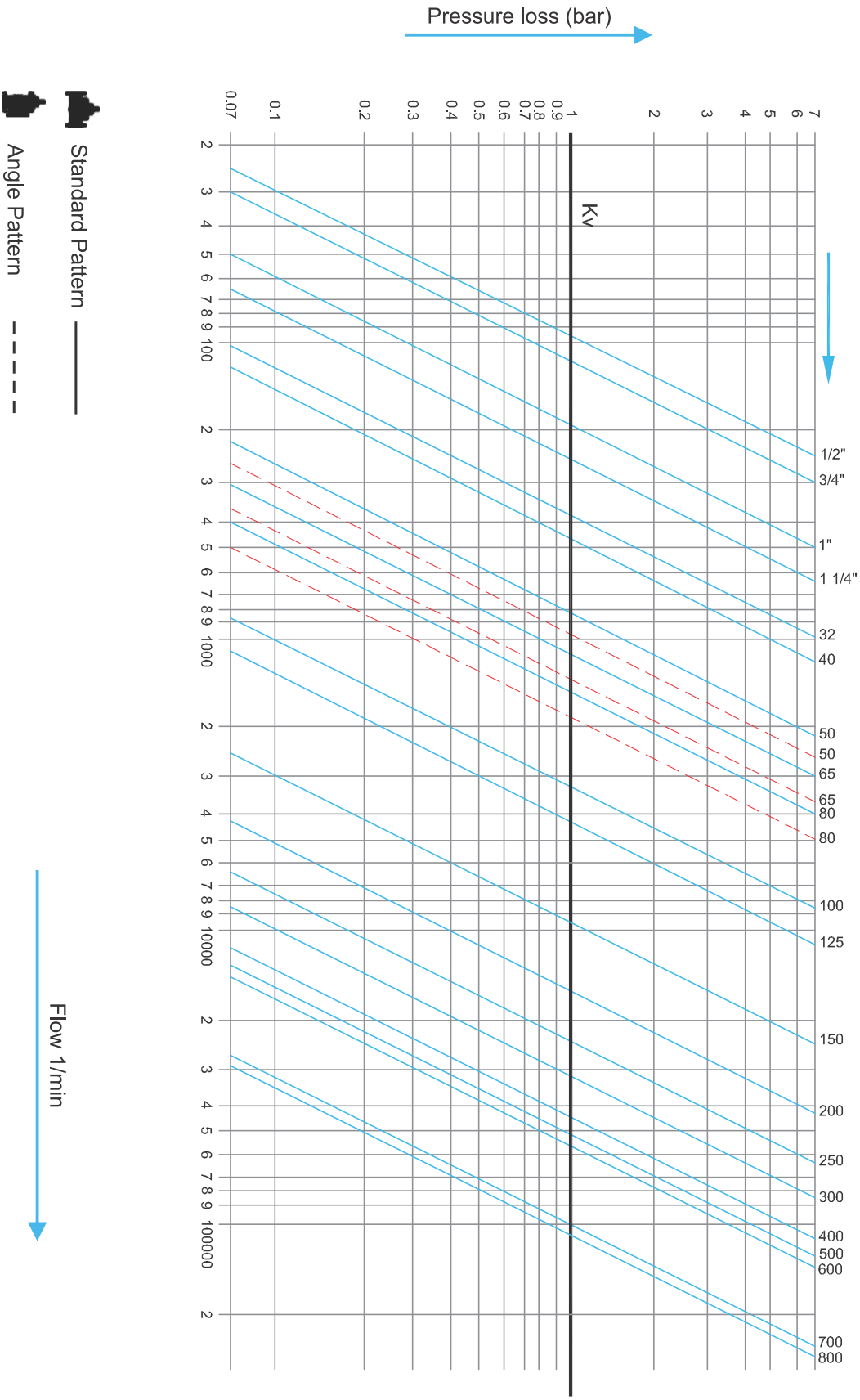
DN (mm)	Lift Fully open (mm)	Chamber Volume (lit)	Kv Fully open (m3/h)	ξvalve Fully open
50	15	0.12	46	4.72
65	25	0.3	66	6.54
80	25	0.3	96	7.10
100	30	0.64	172	5.40
125	30	0.64	240	6.77
150	45	2	470	3.66
200	58	4.7	810	3.89
250	58	4.7	860	8.43
300	70	9.5	1640	4.81
350	82	16.8	1650	8.80
400	82	16.8	1790	12.76
450	82	16.8	2298	12.4
500	110	41	3050	10.73
600	110	41	3250	19.59
700	150	108	6200	9.97
800	150	108	6820	14.06
900	205	210	11520	7.89
1000	205	210	12600	10.05

Definition of Kv:
The amount of flow in m3 that passes through the valve in one hour in ambient temperature of 20°C, causing a pressure loss of 1 bar when the valve is fully open.

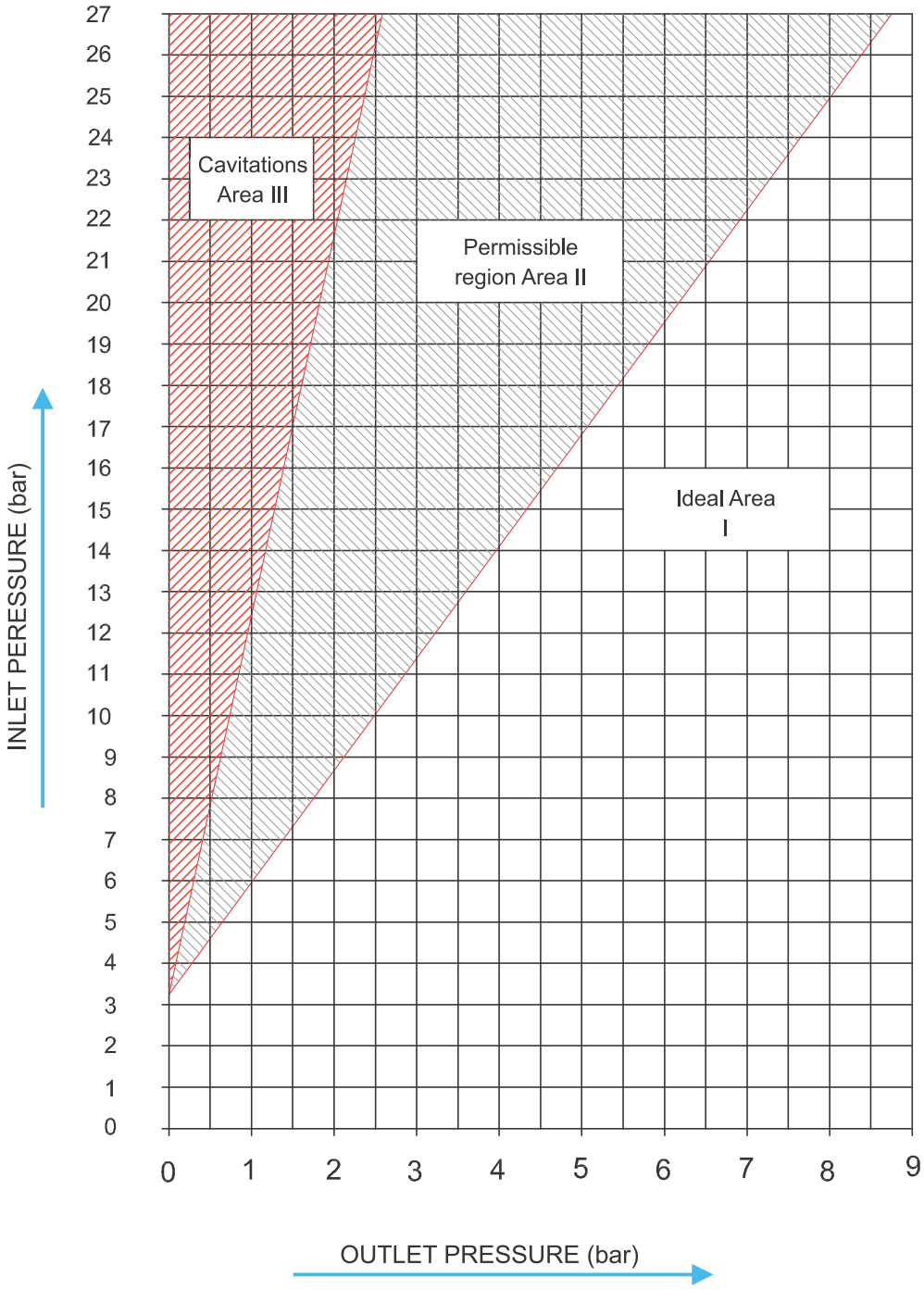


Lift / Kv Diagram

b) Kv value from table



Cavitations chart



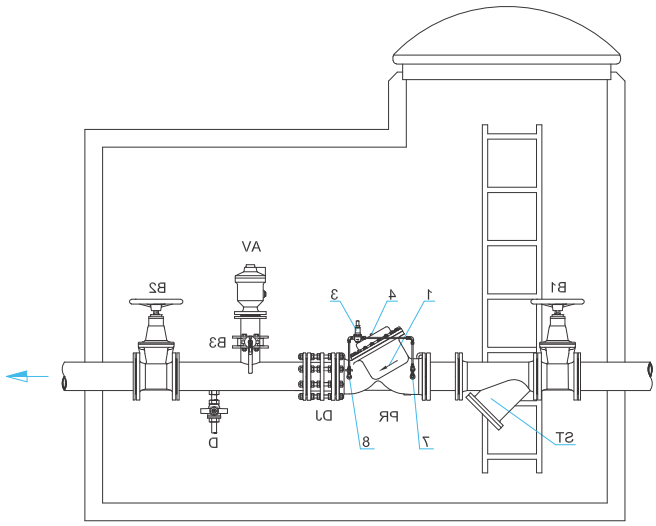
One other major element in choosing automatic control valve is that they should not get into cavitation situation. The ration of inlet pressure to outlet pressure is a significant element. If the valves operate in the cavitation conduction, it would cause extensive wear of the parts which would shorten the service life of the valves.
Area I: ideal valve performance.
Area II: acceptable valve performance.
Area III: valves are not allowed to operate in this situation.

Installation and operation of Mirab pressure reducing valve

1 -Make sure that the pipe is clean and check that there are no objects like pieces of wood, stone, etc., in the pipe before installation. Start installation of Mirab pressure reducing valve according to the installation drawing. Make sure that the directional arrow on the valve body points to the direction of the flow line.
2 -Open ball valve no. 7 fixed before the pilot and close ball valve no. 8 fixed after the pilot.
3 -Fully open the air bleeding bolt (4) on top of the control chamber, and loosen by one turn the pipe fitting at the highest point in the control circuit.
4 -Loosen the lock nut on the pilot adjusting screw and turn the adjusting screw anti clockwise until you can feel tension on the spring.
5 -Fill in the control chamber with water through the bolt (4) and fasten the bolt, but not tightly.
6 -Open the inlet shut-off valve B1 slowly until water starts flowing in the valve.
7 -When the air is completely exhausted from the control chamber, fasten the bolt on the control chamber and all the fittings tightly on the control circuit and make sure there is no leakage of water in the control system.
8 -To make sure that all above mentioned operation are carried out correctly, open shut-off valve B2 slightly, the pressure reducing valve should be in closed position or should close in a few moments. If the valve did not close repeat the procedure all over again and make sure there is no air in the control parts. After complete air bleeding, the shut-off valve B2 must be completely closed.
9 -To adjust the downstream pressure, slowly open the ball valve no. 8. The pressure reducing valve should start opening and fill the pipe between the valve and B2 with water. In this situation the downstream pressure would reach to about 0.4 bars and the pressure reducing valve would close automatically.
10 -Open the shut-off valve B2 slowly, the main valve would close again when the pipe is full of water. When the shut-off valve B2 is fully opened slowly open the valve B1 until fully opened.
11 -If there is a fire hydrant valve at downstream, open the fire hydrant valve to allow adjustment of the downstream pressure with pilot adjusting screw while the water is running.(Pressure increases by turning the pilot adjusting screw clockwise). Close fire hydrant valve when adjustment is completed.
12 -Wait a little after each turn of pilot's adjusting screw for the downstream pressure to remain unchanged. Downstream pressure can be seen on pressure gauge.
13 -Tighten the lock nut on the pilot adjusting screw when the downstream pressure is adjusted to the desired valve.

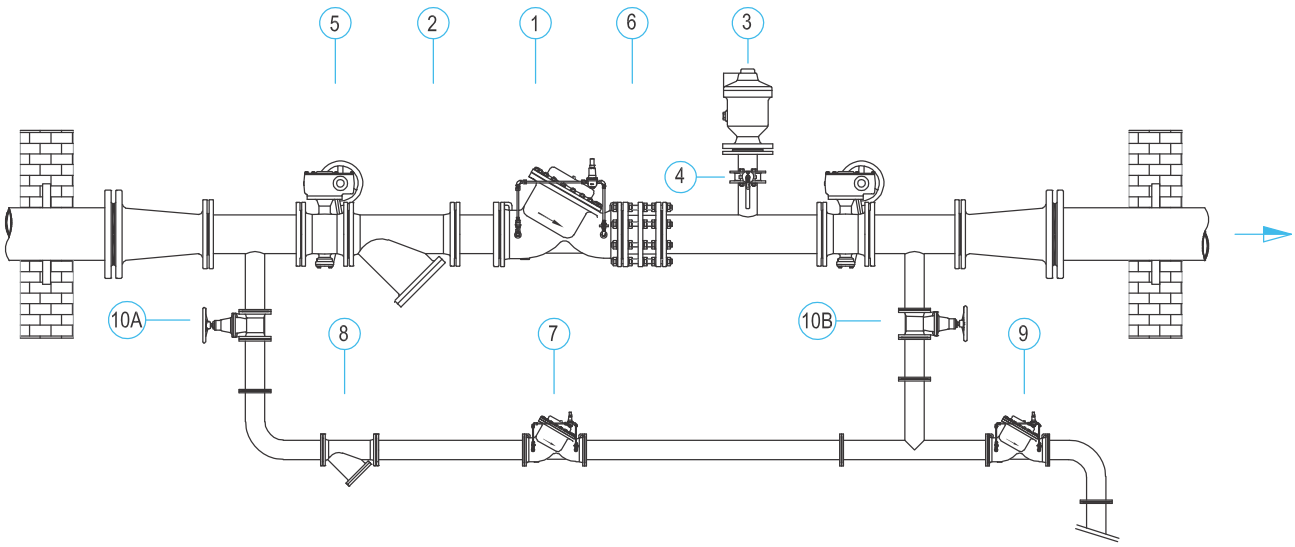
Before installation contact to Mirab technical department if is needed.

Recommended situation of Mirab pressure reducer valve in pipeline.
PR – Mirab Pressure Reducing valve
ST – Filter
AV – Air valve
B– Shut-Off valve (B1, B2)
DJ – Dismantling Joints17
D – Ball valve (for emergency use)



Installation of Pressure reducing valve using bypass system.

For a better operation of larger size pressure reducing valves, a bypass system is recommended.



1 - Pressure Reducing valve
2 - Filter
3 - Air valve
4 - Butterfly valve wafer type
5 - Butterfly valves flanged type
6 - Dismantling joints
7 - Pressure reducing valve
8 - Filter
9 - Relief valve
10 - Gate valve

Type of bypass	Parts
A - Manual bypass	10A
B - Manual bypass with relief valve	9 - 10A - 10B
C - Automatic bypass	7 - 8 - 10A - 10B
D - Automatic bypass with relief valve	7 - 8 - 9 - 10A - 10B
E - Relief valve (without bypass)	9 - 10B

Maintenance

As Mirab is well experienced in manufacturing and choice of material, Mirab Pressure Reducing Valves are basically maintenance free, and can be used for a long time without a problem. However for more efficient performance we recommend the following:

A) For operation in normal condition

- Every 6 months: check and clean the strainer in the valve control circuit
- Annually: check the valve for correct functioning
- Every 4 years: All moving components must be dismantled and cleaned from sediment deposited on them and faulty parts must be replaced.

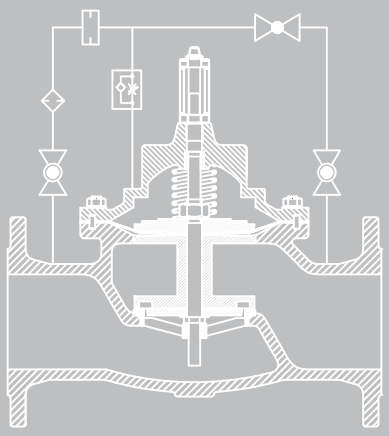
B) In conditions such as floating substances in the water, high pressure differential between inlet and outlet, low flow rate, operations mentioned in section A must be carried out more frequently.

Spare parts

For 4 years operation; spare parts are required for components that are subject to wear like components of the Main body, Pilot and control circuit. Spare parts are shown on pages 4, 5, 8 and 9.

MIRAB Co' PRODUCTS

Butterfly Valves Family: Double Flanged Type, Butt-weld End, Wafer Type, Lug Type, Hydraulic Actuated, Pneumatic Actuated.
Gate Valves Family: Soft-Sealing Gate Valve, Metal Seat Gate Valve, Knife Gate Valve, Sluice Gate Valve.
Non Return Valves Family: Tilting Disc with Counter Weight, Tilting Disk with Counter Weight and Hydraulic Damper, Swing Check Valve, Silent Check Valve, Foot Valve, Nozzle Check Valve, Wafer Pattern Check Valve, FlapValve.
Air Vent Family: Single Chamber - Double Orifices , Double Chambers - Double Orifices, Sewage Air Valves, Large - Orifice Air Valve.
Control Valves Family: Automatic Control Valves, Needle Valve, Globe Valve, Fixed Cone Free Discharge Valve, Hollow Jet Valve, Sleeve Valve.
Hydrant Valves Family: Standing Type, Pit Type, Wet Barrel Fire Fighting Valve, Post Indicator Valve.
Strainers Family: Y Type, T Type, One Side Flanged Type.
Fittings Family: Dismantling Joint F1&F2, Pipe Coupling, Flange.
Actuators: Electrical, Hydraulic, Penumatic, Portable Electrical.



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