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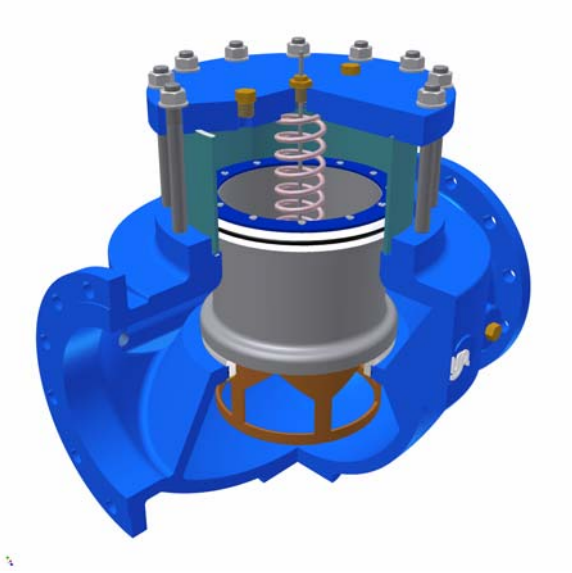
AUTOMATIC CONTROL VALVES (Globe Type)

General Catalogue

I N D E X

1. Basic Valve



The "Balanced Piston" basic valve is used in IRUA Series 2000 pilot-operated control valves for water. Simple and dependable with only one moving part, the balanced piston design main valve provides excellent service in municipal and industrial control applications.

Description

Piston-operated control valve with no diaphragms, hydraulic / pilot operated, globe type, top-entry design (for easy maintenance). Full-ported for high capacity.
The standard control valve is simple chamber design but double chamber design is also available for some applications.

Minimum inlet pressure required for simple chamber valves: 0,7 bar
Minimum inlet pressure required for Double chamber valve: 0,3 bar
The main functions of the automatic control valves are: pressure control, flow control, tanks water level control, water hammer control, anti-burst and open/close service.

Range of Manufacture

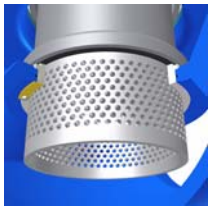
Sizes: DN50 – DN1200 / 2" – 48"
Ratings: PN10-16-25-40 acc. to EN1092 / #150-#300 acc. to ANSI standards

Regulation / Seal of the Valve

Standard Long Vee-ports for precise control (see picture 1).

Multi sleeve seal to handle severe drops of pressure and to combat cavitation, dissipating its damaging implosions in middle of the port. (see picture 2).

1



2

Flat disc seal also available but normally used for pressure relief applications

Standard Materials

The standard materials of the basic valve are:
Body: ductile iron ENGJS500-7 (same as DIN GGG50)
Cover: steel plate
Seat: SST A304
Vee-Ports: bronze
Piston: ductile iron or gunmetal
Indicator rod: SST A316
External and internal bolting: SST A-2 (SST A304)
Note: any other material available under request.

Coating

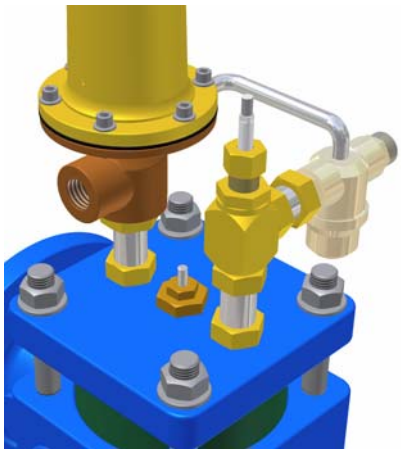
Body, cover and piston: Internal and external 300 microns thickness of fusion bonded epoxy coating.
Special coatings available under request.

2. Operation Systems / Accessories / Devices

The Series 2000 IRUA valves can be controlled:

- Hydraulically, by means of pilot valves
- Electrically, by means of solenoid valves

There are different pilots for each service. The basic valve can be controlled by one pilot or a combination of two or even more pilots in order to obtain several services at the same time.
The pilots are direct acting controlled valves itself, spring loaded diaphragm type designed to operate on potable water. The operating principle of the pilot is such the main valve upstream / downstream (depending on the service required) pressure connections shall increase or decrease pushing the diaphragm up and down to obtain the pressure and/or flow set values.
Acting on the top adjusting screw, the setting can be modified at site. See details for each service.



Standard Materials

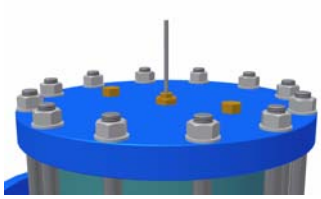
The standard materials of the pilots are:
Body: bronze
Bonnet: bronze
Seat: SST A304
Membrane: Reinforced rubber
External and internal bolting: SST A-2 (SST A304)
The standard material for the pilot tubing is copper

Note: any other material available under request.

The closing and opening speed shall be controlled by means of a needle valves installed in the pilot system which also shall include a strainer with fine mesh screen.

Valve Position Indicator Device

High resistance to leakage position indicator is supplied as standard in all the automatic valves. The material of the indicator rod shall be stainless steel A316.



Ultrasonic Sensor

Optional ultrasonic sensor device to show position of opening of the piston. The electrical signal shall permit the monitoring of the piston stroke opening percentage (at 1% intervals). Easy adjusting of the switching points: the ultrasonic sensor features two switch outputs with one teachable switching point. The switching points shall be set by applying the supply voltage to the Teach-In input.

Other Accessories / Devices

- Trim fully stainless steel
- Pilot tubing in stainless steel
- Double strainer in the external tubing pilot system to facilitate the maintenance works without interruption of service.
- Limit switches
- Pressure gauges at inlet & outlet main valve.
- Transparent box to protect the pilot/s and external pilot system.

3. Services / Applications

The combination of the different control systems, devices and valve materials and trims applied on the basic valve will permit to obtain a wide range of valve categories. Most of them are described below.

Pilot Operated Pressure Reducing Valve Fig. 2450
Function: the valve shall function to maintain a uniform valve downstream pressure as pre-adjusted on the control pilot adjusting screw, regardless of changing flow rate and/or varying inlet pressure.

Pilot Operated Pressure Sustaining Fig. 2670
Function: the valve shall function to sustain upstream pressure as preadjusted on the control pilot adjusting screw.

Pilot Operated Flow Rate Control Valve Fig. 2650
Function: the valve shall operate to avoid a rate of flow beyond the one set in the pilot regardless of changing system pressure and demand. The pilot control shall actuate through the diferential pressure produced across an orifice plate installed downstream of the valve.

Pressure Relief Valve Fig. 2660

The pressure relief valve shall have a flat disc seal for rapid discharge. The basic valve for this application use to be angle type to get higher performances. The valve shall be supplied with one pilot: High pressure pilot.
Function: the valve shall open quickly when the system pressure exceeds the setting for which the high pressure pilot is set.

Surge Anticipator and Pressure Relief Valve / Hydraulically Operated Fig. 2530

The Fig. 2530 valve shall be fully hydraulically operated. The valve shall be supplied with two pilots:

- High pressure pilot
- Low pressure pilot

Functions: the valve shall open quickly when the system pressure exceeds the setting for which the high pressure pilot is set or when the system pressure falls below the setting for which the low pressure pilot is set.

Water Hammer Control Valve / Electrically Op. Fig. 2520

The Fig. 2520 valve shall incorporate::

- High pressure pilot for hydraulic operation
- Solenoid valve for electrical operation

Functions: the valve shall protect a pumping system from destructive over pressures by opening a valve in response to causes of a pressure surge. Should an over pressure condition occur, the high pressure pilot will open once the over pressure exceeds the spring adjustment.
An electrical power failure to the pumps will cause the solenoid valve to become energized by way of the internal battery within the control box. The open solenoid then shall exhaust to atmosphere the pressure at the top main valve piston. The main valve shall open wide in anticipation of the over pressure surge shortly to arrive. The control box can also be supplied by IRUA under request.

Solenoid Control ON-OFF Valve Fig. 2440

The Fig. 2440 valve shall be supplied with 2 solenoid valves to permit the inlet and outlet of the water to the piston chamber.
Function: Open/Close. The valve will close tight when solenoid is energized and will open for full pipe line flow when solenoid is de-energized.
This valve duly connected to a flow meter and a pressure meter can also be used to control pressure and flow in the line in accordance to the rates set in a control box.

Anti-Burst Service Valve Fig. 2662

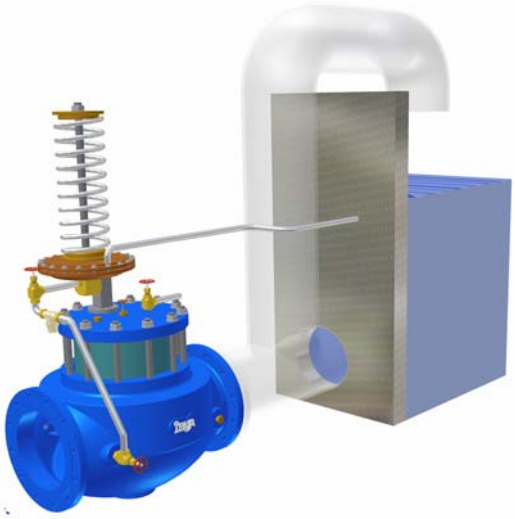
Pipe burst control valve (excessive flow) will automatically shutoff the supply if the flow demand will exceed
Its preset point caused by pipe burst. The flow speed over the preset point shall be detected by the pilot by means of the differential pressure across an orifice plate. Should the flow rate exceed the maximum allowed as a result of pipe burst, it will increase the differential pressure across the orifice, signalling the pilot to shut off the valve

Pump Control Check Valve Fig. 2920

The Fig. 2920 pump control check valve shall control the normal pump-start surges and pump shut-down surges. The valve shall close quickly and automatically on power failure preventing reverse flow.
Normal sequence of operation:
Valve opening: start button depressed / pump motor starter, 3-way & emergency solenoid pilots simultaneously energized / valve opens as pump reaches full speed (or by means of a time delay).
Valve closing: stop button depressed / 3-way solenoid pilot de-energized / pump motor circuit and emergency solenoid pilot remain energized / valve starts to close, pump running / as piston nears its seat, limit switch contacts open, de-energized pump circuit and emergency solenoid pilot / valve closed & pump stopped.

Altitude Valve Fig. 2320

Function: the valve shall operate automatically to close when water level reaches the upper stop to prevent overflow and to open when the float contacts the lower stop. The valve will be supplied with an altitude pilot to be connected to the tank side.
Special devices for adjustment of upper/lower stop length and to limit piston stroke available under request.



Pilot Operated Float Valve Fig. 2810

Function: the valve shall operate automatically to close when water level reaches the upper stop to prevent overflow and to open when the float contacts the lower stop. The valve will be supplied with a pilot control float mechanism to be mounted on the internal top part of the tank. Easy installation and service works.

MULTI-SERVICE VALVES:

Pilot Operated Pressure Reducing & Pressure Sustaining Valve Fig. 2470

The valve shall be supplied with 2 pilots:

- Pressure reducing pilot
- Pressure sustaining pilot

Functions: the valve shall function to maintain a uniform valve downstream pressure as pre-adjusted on the control pilot adjusting screw, regardless of changing flow rate and/or varying inlet pressure; the valve shall also function to sustain upstream pressure as pre-adjusted on the control pilot adjusting screw.

Pilot Operated Pressure Reducing & Flow Control Valve Fig. 2499

The valve shall be supplied with 2 pilots:

- Pressure reducing pilot
- Flow control pilot

Functions: the valve shall function to maintain a uniform valve downstream pressure as pre-adjusted on the control pilot adjusting screw; the valve shall also limit flow to pre-set volumetric rate under varying pressure conditions; the flow rate shall be always below a presetable maximum flow rate.

Pilot Operated Float Valve & Flow Control Fig. 2680

The valve shall be supplied with 2 pilots:

- Pilot control float mechanism
- Flow control pilot

Functions: the valve shall operate automatically to close when water level reaches the upper stop to prevent overflow and to open when the float contacts the lower stop. The valve will be supplied with a pilot control float mechanism to be mounted on the internal top part of the tank.
The valve shall also limit flow to pre-set volumetric rate under varying pressure conditions; the flow rate shall be always below a presetable maximum flow rate.
There are many other combination of services to be made. Technical information for each case is available under request.

OTHER SERVICES

There are other functions to be made by the automatic control valves as main and sole service or in conjunction with other services:

Check Service

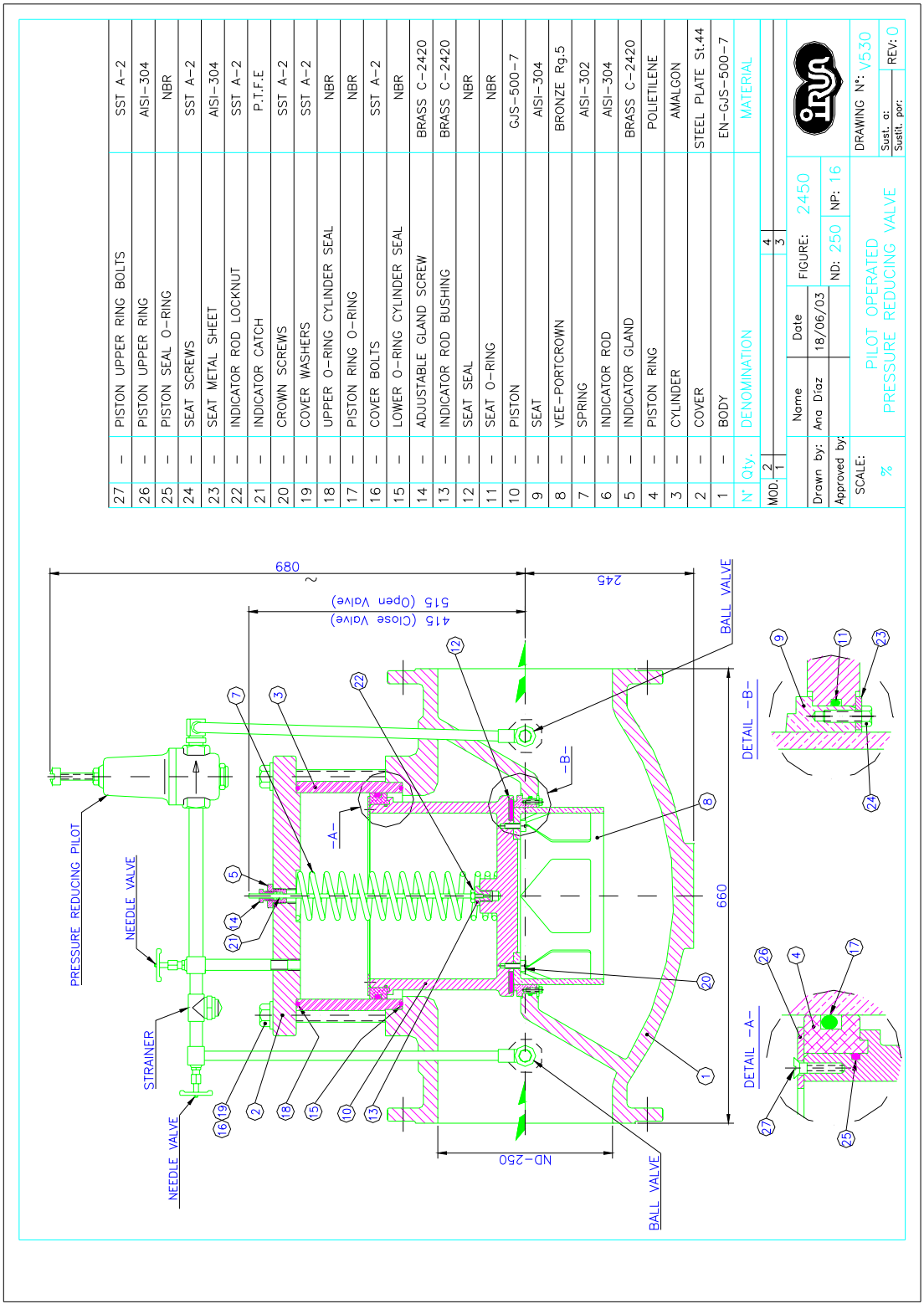
The valve shall also positively prevent reverse flow should upstream pressure fall below downstream pressure.

Electrically Actuated / Solenoid Valves

The valve shall be controlled electronically for regulation or just for open/close function.

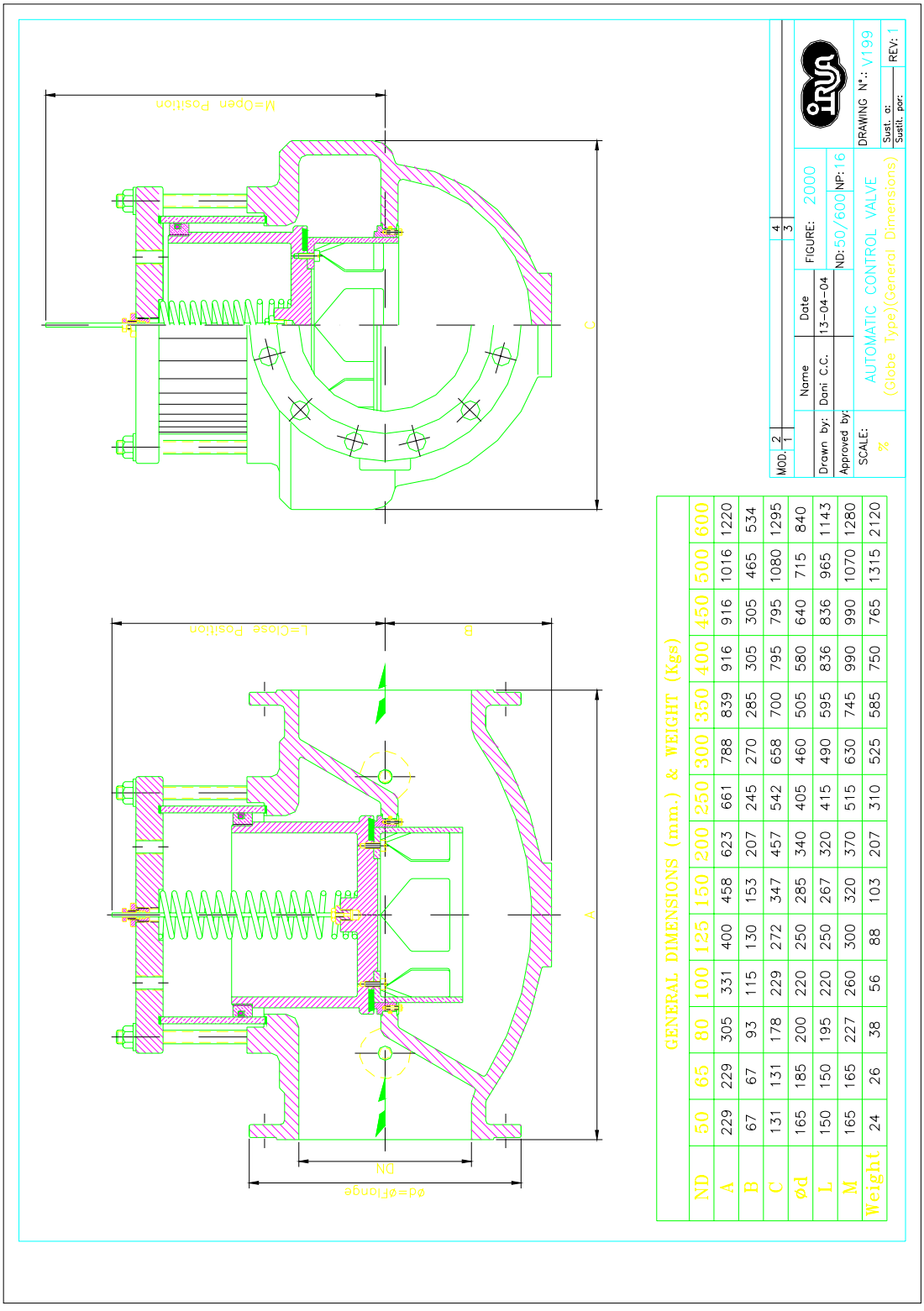
4. General and Typical Control Valve Drawing

General drawing of standard Fig. 2450 DN250 pilot operated pressure reducing control valve.



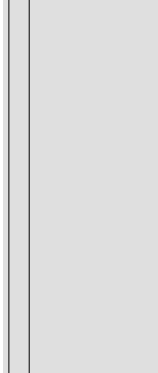
5. Additional Technical Information

Dimensions and weights general drawing:



GENERAL DIMENSIONS (mm.) & WEIGHT (Kgs)

ND	50	65	80	100	125	150	200	250	300	350	400	450	500	600
A	229	229	305	331	400	458	623	661	788	839	916	916	1016	1220
B	67	67	93	115	130	153	207	245	270	285	305	305	465	534
C	131	131	178	229	272	347	457	542	658	700	795	795	1080	1295
ød	165	185	200	220	250	285	340	405	460	505	580	640	715	840
L	150	150	195	220	250	267	320	415	490	595	836	836	965	1143
M	165	165	227	260	300	320	370	515	630	745	990	990	1070	1280
Weight	24	26	38	56	88	103	207	310	525	585	750	765	1315	2120



Cv/Kv GLOBE TYPE VALVE – V-PORTS				
DN (Inches)	(mm)	Cv	Kv	K
6"	150	447	332	5.79
8"	200	831	709	5.30
10"	250	1173	1001	6.49
12"	300	1836	1566	5.50
14"	350	2500	2133	5.50
16"	400	3264	2784	5.50
18"	450	4121	3558	5.52
20"	500	5100	4350	5.50
24"	600	7344	6265	5.50
28"	700	9818	8375	5.70
32"	800	12499	10662	6.00
36"	900	15820	13495	6.00
40"	1000	19530	16659	6.00

CLEAN WATER

$Cv = \frac{Q\ (US\ G.P.M.)}{\sqrt{\frac{\Delta P\ (psi)}{\rho}}}$

$Cv = 1.16\ Kv$
$Kv = 0.853\ Cv$

$Kv = \frac{Q\ (m^3/h)}{\sqrt{\frac{\Delta P\ (Kgs/cm^2)}{\rho}}}$

ρ = Specific gravity for water to 60° F = 1

Q = Flow rate U.S.A. gallons minute.

ΔP = psi= Pressure drop P.S.I.

1 U.S.A. Gallon = 3.78541 Liters.

1 Psi = 0.070307 Kgs/cm.^{2}

ρ = Specific gravity for water to 15° F = 1

Q = Flow rate m^3/hour

ΔP = Pressure drop Kgs/cm ^{2}

1 m^3= 264,1797 U.S.A. Gallons

1 Kgs/cm ^{2}= 14,223 p.s.i.

$h_L = K\frac{v^2}{2g}$

h_L = Pressure drop in water colum meters

v = Flow velocity m/sec.

g = 9.81 m/sec.^{2}

h_L = Water colum feets.

v = Flow velocity foots second

g = 32.2 foot/sec.^{2}

6. Installation, Start-Up & Maintenance

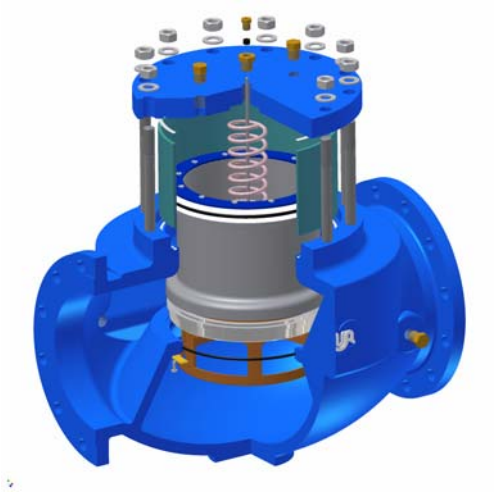
The valve is supplied from the factory completely piped and ready for installation. It must be installed with the flow direction as indicated on the valve.

An inlet strainer is recommended to prevent debris from entering the valve (see IRUA's Fig. 2010). Upstream and downstream isolating shutoff valves should be provided to allow the valve to be serviced.

If a critical installation, a manual by-pass should be provided to permit flow while servicing the valve.

For proper operation, ensure all air is bled from above the piston when valve is initially put in service.

Although the pilot is factory set according to the requirements of the client, it is adjustable within its range in the field by turning the adjusting screw



The Top-Entry design Series 2000 valves will permit an easy and short time maintenance works. By removing the pilot external system and the cover, the access to all the internal components of the valve is got. All the internals are replaceable and can be removed vertically without dismantling the valve from the line.

DN900 Level control valve dismantling / maintenance / re-assembly works.