FLOW CONTROL VALVES

FOR CONSISTENT FLOW IN EVERY DIRECTION

AUTOMATIC FLOW & PRESSURE CONTROL VALVES DIAPHRAGM TYPE SCADA COMPATIBLE

FLOW CONTROL VALVE FOR WATER WORKS

DARLING MUESCO-FLOW CONTROL VALVES are specially designed for accurate control of Flow and Pressure in water works and integrated water supply scheme for villages, towns and city for 24x7 water supply.

These Valves are used as self regulating type with the use of pilot valve for automatic control without power supply or operated through 2 nos. (1 No + 1 NC) solenoid valves, which acts as actuator or electric actuator, when SCADA compatibility is required. They can also be operated and controlled by our DARCON-101 controller.

Flow and pressure control valve – **series F113-14 uses F100 valve**, which is diaphragm actuated electrical solenoid operated - PLC controlled automatic control valve which uses water/line fluid for actuation and control.

Series F313-14 uses F300 valve, which is having **contoured modulating plug**, which helps in better control and positioning of the valve in **low flow condition**.

The valve has single moving assembly, guided from top and bottom for stability, with nylon re-inforced, WRAS/NSF approved Buna-N/EPDM diaphragm, which forms a sealed chamber. The diaphragm is not to be used for sealing surface.

Valve closes tight with the use of elastomer O-Ring/Flat disk to give bubble tight shut-off and zero leakage as per ANSI FC-70-2 class VI.

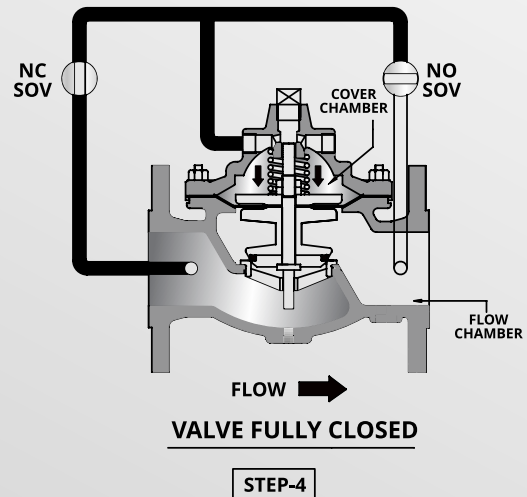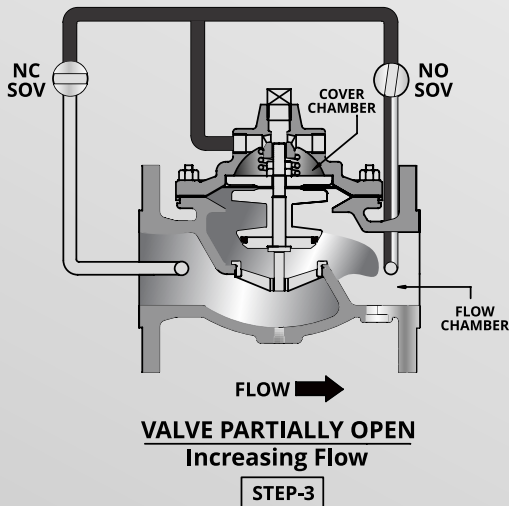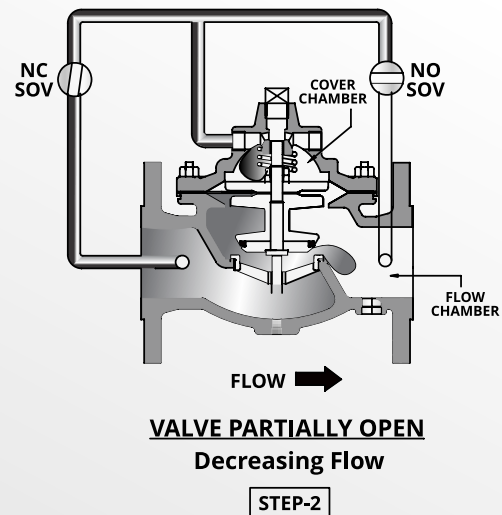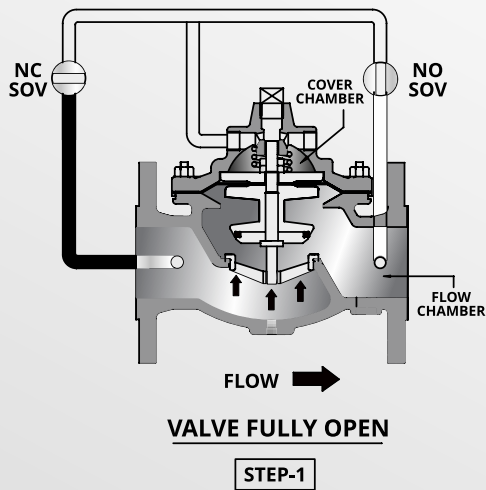Seat shall be removable type. There are no packing glands and pistons.

The entire internal assembly shall be removable and separable without removing the valve body from the line for ease in maintenance.

The valve body and cover shall be ductile iron to ASTM A-536/GGG 40 or cast steel to ASTM A216 Gr.WCB and epoxy coated inside and outside.

These valves has been tested at FCRI for Flow Capacity.

OPERATING PRINCIPLE OF FLOW CONTROL VALVE - F113 - 14

1. In order to understand the working principle of Flow Control Valve Model No.F.113-14 for flow control, please understand the Design and Operating Principle of Basic Valve (Main Valve (1), please refer below Drawing.
2. The Main Valve is made of two Chambers :
   a) Flow Chamber. (Refer Drawing below)
   b) Cover Chamber. (Refer Drawing below)
3. These two Chambers are separated by a Diaphragm in such a way that Liquid above the Diaphragm (Cover Chamber) cannot come into Flow Chamber.
4. All FCV are provided with NC-Sol. Valve on Inlet side and NO - Sol. Valve on outlet side. This ensures that Valve remains fully Open in Case of NO POWER or Power Failure Situation.
5. The Valve is designed by using the Hydraulic Principle in such a way that when there is water in Cover Chamber at the same pressure as inlet pressure, the Valve remains in Closed Condition. The Area of Diaphragm is 1.5 times the Area of seat. When there is No Water in the Cover chamber, the line pressure pushes valve Assembly up and the valve remains in Full open Position **(Step-1 Full Open)**.
6. When NC is partially Opened and NO is closed (Energized), the FCV starts closing **(Step-2, Decreasing Flow)**
7. When NC is Fully Closed (De-Energized) and NO is partially opened, the valve again starts opening **(Step-3, Increasing Flow)**. This is done by giving Digital Signals from PLC.
8. When NC is opened (Energized) and NO is closed (Energized), the FCV remains Fully Closed **(Step-4, Fully Closed)**
9. Using this Operating Principle and NO & NC Sol. Valves, the FCV can be made to modulate and control Flow by positioning the Sol. Valves using signal received from EMFM (Electro Magnetic Flow Meter) to PLC and from PLC to Sol. Valves. The PLC has to be programmed suitably.
10. Volume of water in Cover Chamber, determines the opening of Main Valve. This water volume can be decreased or increased to open more or close more.

VALVE FULLY OPEN

STEP-1

VALVE PARTIALLY OPEN
Decreasing Flow

STEP-2

VALVE PARTIALLY OPEN
Increasing Flow

STEP-3
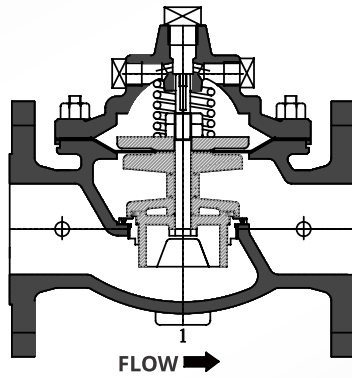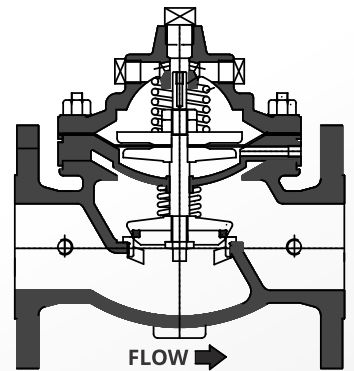

VALVE FULLY CLOSED

STEP-4

BASIC VALVES

Following are different types of Basic Valves used in all of our applications including, Flow Control (FCV) Pressure Reducing and many more.
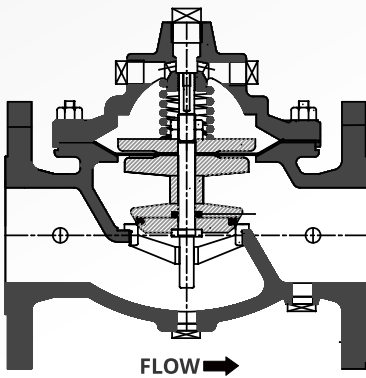
FLOW

F100
Globe - Straight

FLOW

F300
Globe - V.Port
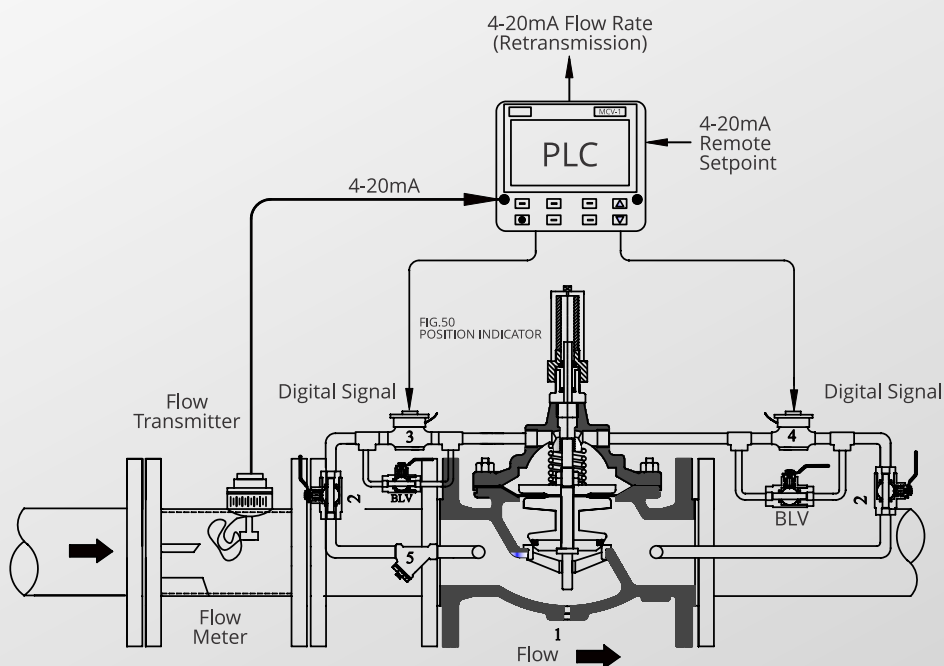
FLOW

F500
**Double Chamber**

FLOW CONTROL VALVE - F113 - 14

VALVE FUNCTION
Offers reliable and accurate flow control when utilized with a flow transmitter from flow meter.
Flow Data is fed into PLC, which operates NO & NC Sol. Valve to control the flow rate.
Sol. Valves has Manual By Pass Arrangement in case of Power Failure.

4-20mA Flow Rate
(Retransmission)

PLC

4-20mA
Remote
Setpoint

4-20mA

Digital Signal

FIG.50
POSITION INDICATOR

Digital Signal

Flow
Transmitter

3

2

BLV

4

2

BLV

Flow
Meter

5

1

Flow

FLOW CONTROL VALVE ELECTRIC
# ACTUATOR OPERATED - F113 - 14 - EA

F113-14-EA is Single Phase Electric Actuated, Hydraulically operated flow control valve. It is operated on 4 to 20 mA signal received from Flow meter through PLC to position for Set Flow Rate. Operating Voltage can be 230 VAC / 110 VAC or 24 VDC.
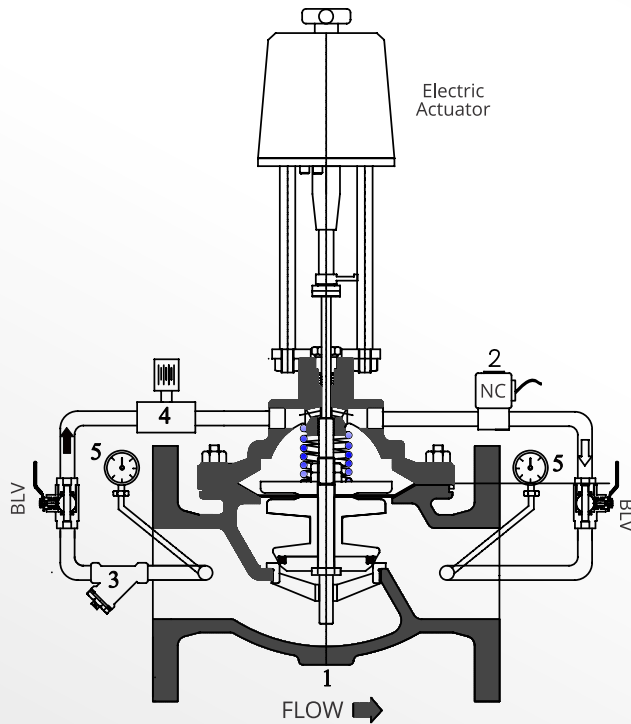
PRESSURE REDUCING VALVE - F115

VALVE FUNCTION
Reduces higher inlet pressure to constant lower outlet pressure (Adjustable).
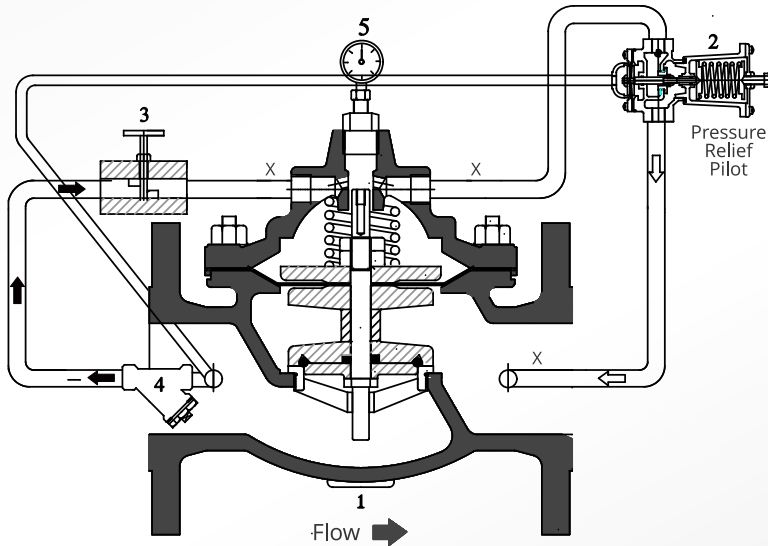This is done Hydraulically-Self Regulating Type.
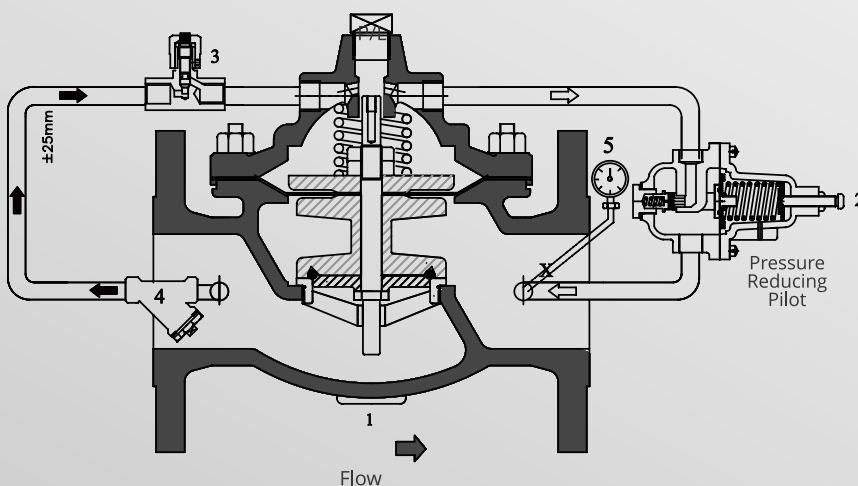
PRESSURE RELIEF VALVE / PUMP BY PASS RELIEF VALVE - F116

VALVE FUNCTION

Maintains constant upstream pressure (inlet to outlet) by relieving excess pressure
• Protects downstream piping from high pressure
• Opens instantly on increase above set pressure

ALTITUDE VALVE-
# LEVEL CONTROL FOR OVERHEAD TANKS - F127 - 5

VALVE FUNCTION
• Opens when reservoir level drops below pilot setting (adjustable)
• Closes when reservoir level reaches pilot setting • No Overflow of Overhead Tanks.
• Available Spring Range for 5' to 20' / 10' to 75' & 50' to 225' height.
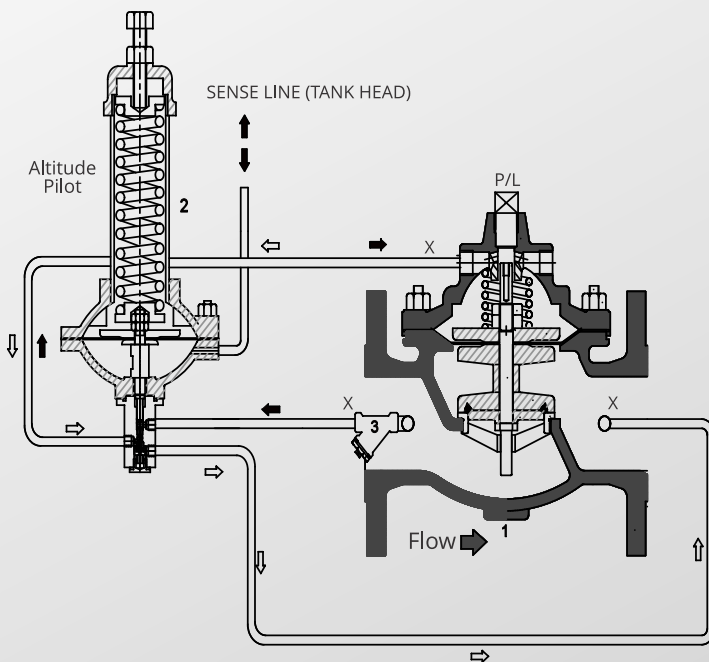
RATE OF FLOW & PRESSURE REDUCING VALVE - F120 - 2

The Valve controls Flow & Pressure both by use of Two Pilots and an Orifice Plate to sense the differential pressure. The Flow Range (Minimum & Maximum) has to be specified and Orifice Plate has to be designed accordingly. The outlet pressure will be controlled as per set value irrespective of changes in Inlet Pressure.

• Design appropriate system
• Regulates a constant flow rate (adjustable)
• Reduces higher inlet pressure to constant lower outlet pressure (adjustable)

5 Rate of Flow Pilot
Pressure Reducing Pilot
FIG.50 POSITION INDICATOR
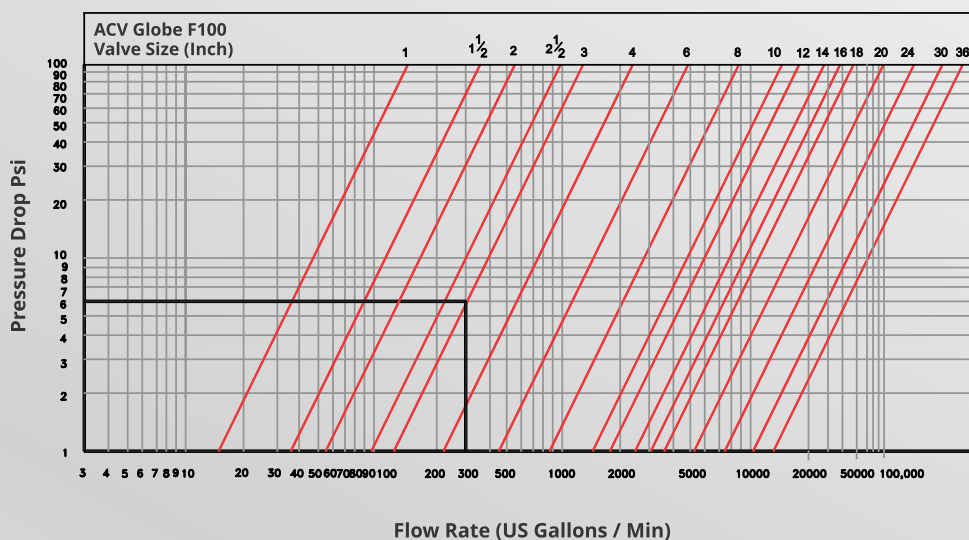6
4
2 Orifice Plate
3
1
Flow
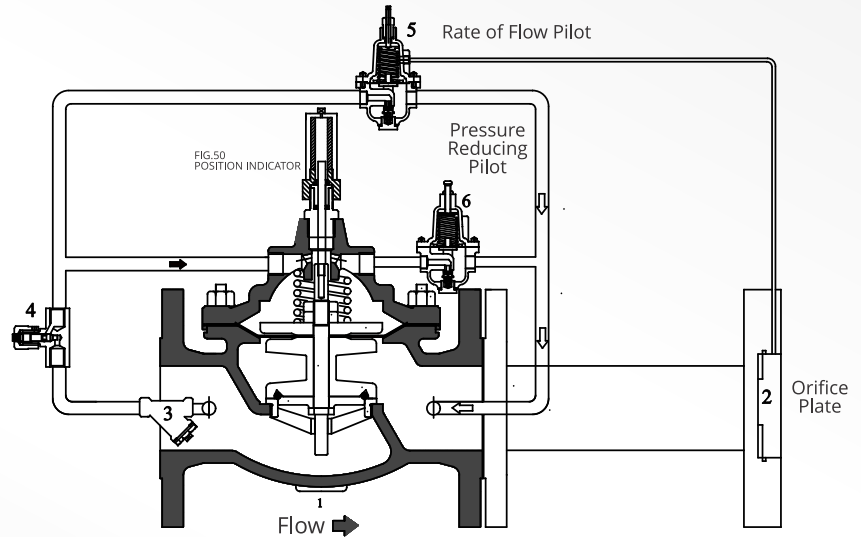
ELECTRONIC CONTROLLER
DARCON - 101

This is PLC based Pre Programmed Controller to Control the Flow Rate passing through FCV by giving Digital Signal to Sol. Valves and receiving 4 to 20 MA signals from Flow Meter. It has built in Display, Power back-up & GPRS for SCADA Communication. This can also be provided with solar panel as optional. This Controller is used with F113 - 14 Valve.

HMI CUM RTU JB

PRESSURE DROP CHART ACV - 100

ACV Globe F100 Valve Size (Inch)
Pressure Drop Psi
Flow Rate (US Gallons / Min)

Example :
300 GPM Flow Rate -
Valve Size 3" -
Shall Have 6 PSI
Pressure Drop
Across The Valve

DARLING MUESCO

FLOW DATA - ACV 100 (GLOBE)

VALVE SIZE - INCH	VALVE SIZE - mm	F/F DISTANCE-(GLOBE) 150 # (mm)	CV VALUE (GLOBE) F-100 (G.P.M.@ 1 PSIΔP)	KV VALUE (GLOBE) F-100 (M3/hr@ 1 BarΔP)	MAXIMUM CONTTNUOS FLOW RATE LPM (WATER)	MAXIMUM INTERMITTENT FLOW RATE LPM (WATER)	APPROX WEIGHT (Kgs)
1"	25	152	14	12	227	321	6
1-1/2"	40	179	37	32	454	598	14
2"	50	238	55	47	775	985	20
2-1/2"	65	241	90	77	1135	1400	24
3"	80	305	125	107	1740	2155	28
4"	100	381	220	188	3030	3785	55
5"	125	385	240	205	3300	4100	60
6"	150	462	460	394	6810	8700	115
8"	200	645	840	718	11735	14740	182
10"	250	756	1400	1200	18550	22700	375
12"	300	864	1730	1482	26495	32550	500
14"	350	991	2300	1970	32175	39750	728
16"	400	1075	2950	2528	41600	52990	1025
18"	450	1168	3625	3106	52250	63500	1450
20"	500	1321	5250	4499	68130	79595	1700
24"	600	1562	7500	6426	83280	90850	2600
28"	700	1662	8600	7369	87960	93530	2750
32"	800	1800	12500	10711	141800	158600	2900
36"	900	1900	15800	13540	189200	257500	3400

- Maximum Continuous flow based on pipe line velocity of 6.0 meter per Second. (20 ft. per Second.)
- Maximum Intermittent flow based on pipe line velocity of 7.5 meter per Second. (25 ft. per Second.)
- Cv = Flow rate in US Gallons / Min, at 60 degrees F at 1 Psi pressure drop.
- Kv = Flow rate in M3/hr at 30 degrees C at 1 Bar pressure drop.

- The factors stated are based on a fully open valve.
- Cv factor can be used in the following equations
- $Cv = Q \text{ (flow)} / \sqrt{\Delta P}$
- $\Delta P \text{ (Pressure drop)} = (Q/Cv)2$
- $Q = Cv \times \sqrt{\Delta P}$
- $V = \text{Velocity (ft./sec.)} = 0.4085 \times Q/d2$ Where: Q= Flow in GPM. d= Inside pipe dia in inches
- $Cv = 1.17 \times Kv$

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