DARLING MUESCO

An ISO 9001 : 2008 Certified Company

Digital Control Valve

Piston Type

Piston Type Pneumatically Operated DCV

Fluid Actuated Piston Type DCV

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DESCRIPTION :

Darling Muesco Power Cylinder (Piston) Operated Valves are ideal when minimum pressure drop is required or for applications where it is not possible to use the flowing stream as the power medium to operate a valve. Because the main piston is controlled externally and by reason of the 45 degree body design pressure drop through these valve is extremely low. Standard power cylinders are designed to operate on 30 psi (207 kPa) minimum for full stroke and are limited to a maximum pressure of 150 psi (1034 kPa). An optional power cylinder for 15 psi (103 kPa) full stroke is available, but limited to selected applications that can tolerate a small leakage of the power cylinder operator pressure medium to atmosphere or sump. The power cylinder may be operated either pneumatically or hydraulically with electric, pneumatic or hydraulic pilot valves used to control application or removal of pressure from the cylinder.

DESIGN FEATURES :

- Fail-safe design : The valve is held closed upon loss of electric supply and/or line pressure
- Positive shut-off : Meets ANSI Class VI for bubble-tight closure
- Multi-stage opening and closing : Avoids static charge generation due to splashing of product in the beginning and foaming / overflow at the end, resulting in accurate delivery
- Low pressure drop
- Rectangular ports : For uniform valve response and linear control
- Built-in flow rate control : No need of external pilots for flow rate control, when used with electronic batch controller
- No diaphragm

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CONSTRUCTION :

The Darling Muesco Power Cylinder (Piston) Operated Valve basically consists of a spring loaded piston, sliding in the guide liner, and two solenoid valves. Piston chamber formed between the liner and the piston top. is connected to the upstream and downstream pressures by normally open (NO) and normally closed (NC) solenoid valves respectively.

PRINCIPLE OF OPERATION :

The Darling Muesco Power Cylinder Operated Valve works on the principle of "balanced piston".
Piston is always exposed to high upstream pressure from its bottom side, whereas pressure in the piston chamber can be varied with the help of solenoid valves. When pressure in the piston chamber is equal to the high upstream pressure, the top spring acts as a differential force, pushing the piston down on the valve -seat and the valve is held tightly closed. When the pressure in the piston chamber is relieved with the help of solenoid valves a differential pressure is created across the piston. The high upstream pressure below the piston overcomes the top pressure plus the spring force and pushes the piston up, resulting in valve opening and the flow starts.

DIGITAL CONTROL :

When the Power Cylinder Operated Valve is used with an electronic batch controller, it can be digitally controlled by operating the solenoid valves through any of these three stages

- When NO and NC solenoids are energized, the valve opens gradually.
- When NC solenoid is de-energized (keeping NO solenoid energized), the valve locks at its current position.
- When NO and NC solenoids are de-energized. The valve closes gradually.

MULTI-STAGE OPERATION :

Opening and closing of the Valve can be made in multiple stages, when the valve is configured for digital control using an electronic batch controller. A typical loading cycle with multi-stage opening and closing is explained in Figure 1.

Initially, both NO and NC solenoid valves are in de-energized condition, resulting in complete closure of the valve.

When both solenoid valves are energized, the pressure in the piston chamber starts relieving to the downstream side, creating a differential pressure across the piston. The high upstream pressure below the piston pushes it up in the liner, allowing the flow to gradually start.

When the flow rate reaches an intermediate stage, NC solenoid valve is deenergized. This stops relieving of pressure in the piston chamber and the valve locks at the current flow rate.

After allowing some quantity to pass at this intermediate flow rate, NC solenoid is energized again. This further relieves the chamber pressure, resulting in further increase in the flow rate. When the set high flow rate is reached, NC solenoid is de-energized to lock the valve at this flow rate. Most part of the loading takes place at this flow rate.

Towards the end of the delivery, both NO and NC solenoid valves are deenergized. This applies high upstream pressure over the piston, resulting in a gradual drop in the flow rate. When the flow rate reaches an intermediate value, NC solenoid is energized again to lock the valve at this flow rate. When loading of the set quantity is complete, NC solenoid is de-energized, which pushes the piston down to close completely over the valve seat and achieve bubble-tight shut-off.

RATE OF FLOW CONTROL :

If the same pump is used to feed a number of flow meters, stopping (or starting) one or more meters increases (or decreases) the flow rate at the remaining meters. The Piston Digital Control Valve offers built-in flow rate control through electronic batch Controller.

When the flow rate increases, NO solenoid is energized momentarily to inject some amount of high pressure over the piston and it makes the valve to throttle, in order to maintain the set flow rate.

When the flow rate decreases, NC solenoid is energized momentarily to slightly drain the pressure and it allows the valve to open further, in order to maintain the set flow rate.

Note: The number of stages during opening and closing are programmed in the electronic batch controller and can be as many as desired. One stage during opening and two during closing are recommended.

Caution: Sufficient pumping flow rate should be available to achieve the flow parameters set in the electronic batch controller. In the absence of this, there are chances of delayed response in closure, resulting in valve over-run.

INSTALLATION :

The Piston Digital Control Valve should be connected on the discharge side of the pump. It is not designed for use on the suction side of the pump. For a proper operation, it should be located preferably on the downstream side of the flow meter, so that the meter always remains full of liquid for best metering accuracy.

OPTIONS :

- The Piston Digital Control Valve can be supplied with external stem and limit switches. Signals from the switches can be used to monitor the flow rate(s) and/or to indicate the valve position - open or closed.
- Standard valve is supplied with 230 V AC solenoids, However 110 V AC / 24 V DC can be supplied on request.

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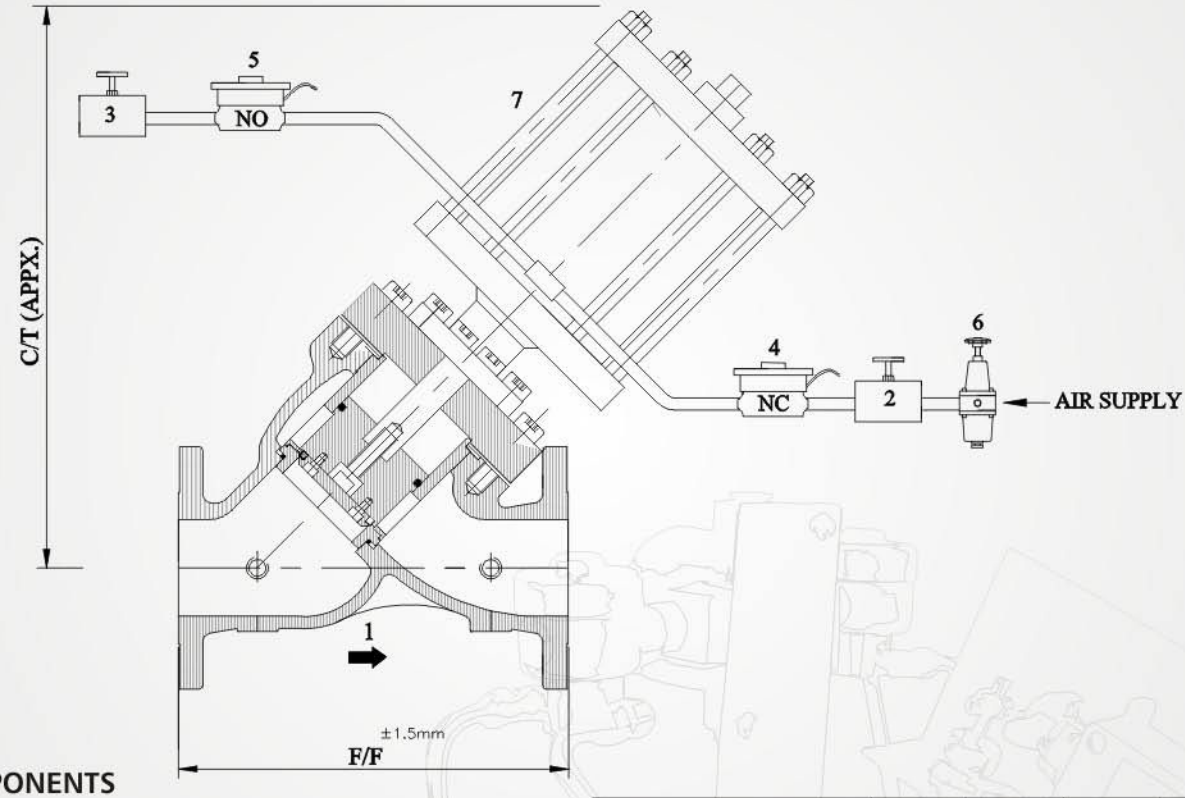
PISTON TYPE PNEUMATIC OPERATED DIGITAL CONTROL VALVE-F 7883-40P

TECHNICAL SPECIFICATION :

Piston digital control valve works on the principle of "balanced piston" Piston is always exposed to high upstream pressure from its bottom side, where air pressure in Penumatic Cylinder chamber can be varied with the help of solenoid valves. when Force in the Penumatic Cylinder chamber is equal to the high upstream pressure, the top spring acts as a differential force, pushing the piston down on the valve seat and the valve is held tightly- closed.



COMPONENTS

1 - BASIC VALVE
2 - NEEDLE VALVE - Adj. Opening speed
3 - NEEDLE VALVE- Adj. closing speed
4 - 2-WAY SOLENOID VALVE - Normally Closed
5 - 2-WAY SOLENOID VALVE - Normally open
6 - AIR FILTER REGULATOR
7 - PNEUMATIC CYLINDER

VALVE SIZE - INCH	2"	3"	4"	6"
VALVE SIZE - mm	50	80	100	150
F/F (150 ANSI)	238	305	345	508
F/F (300 ANSI)	250	324	360	530
C/T (Appx.)	175	225	280	365
VALVE CV	85	185	305	680

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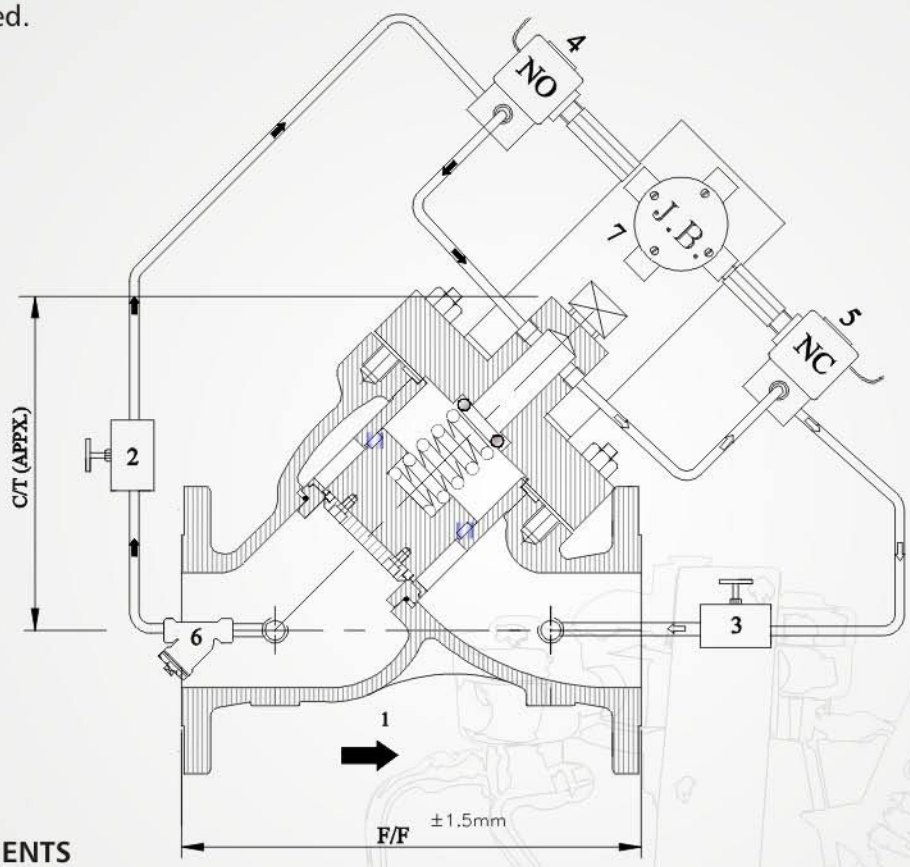
PISTON TYPE HYDRAULIC OPERATED DIGITAL CONTROL VALVE-F 7883-40

TECHNICAL SPECIFICATION :

Piston digital control valve works on the principle of "balanced piston" Piston is always exposed to high upstream pressure from its bottom side, whereas pressure in the piston chamber can be varied with the help of solenoid valves, when pressure in the piston chamber is equal to the high upstream pressure, the top spring acts as a differential force, pushing the piston down on the valve seat and the valve is held tightly- closed.



COMPONENTS

1 - BASIC VALVE
2 - NEEDLE VALVE - Adj. closing speed
3 - NEEDLE VALVE- Adj. Opening speed
4 - 2-WAY SOLENOID VALVE - Normally open
5 - 2-WAY SOLENOID VALVE - Normally Closed
6 - STRAINER-'Y' TYPE
7 - JUNCTION BOX

VALVE SIZE - INCH	2"	3"	4"	6"
VALVE SIZE - mm	50	80	100	150
F/F (150 ANSI)	238	305	345	508
F/F (300 ANSI)	250	324	360	530
C/T (Appx.)	150	196	250	305
VALVE CV	85	185	305	680

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FLOW DATA -PISTON VALVE 7883 (Y-TYPE)
DIGITAL CONTROL VALVE

VALVE SIZE - INCH	2"	3"	4"	6"
VALVE SIZE - mm	50	80	100	150
F/F DISTANCE - 150 # (mm) (Y-TYPE)	238	305	345	508
F/F DISTANCE - 300 # (mm) (Y-TYPE)	250	324	360	530
CV VALUE (Y-TYPE) F-7883 (G.P.M.@ 1 PSIΔP)	85	185	305	680
APPROX WEIGHT (Kgs)	18	26	52	110
MAXIMUM CONTINUOS FLOW RATE GPM (WATER)	208	460	800	1800
MAXIMUM INTERMITTENT FLOW RATE GPM (WATER)	260	570	1000	2300

- Maximum Continuous flow based on pipe line velocity of 20 ft. per Second
- Maximum Intermittent flow based on pipe line velocity of 25 ft. per Second.
- The Cv factor of a valve is the flow rate in USGPM at 60 degrees F that will cause a one psi drop in pressure.
- The factors stated are based on a fully open valve.
- Cv factor can be used in the following equations
- Q (flow) = $Cv\sqrt{\Delta P}$. ΔP (Pressure drop) = $(Q/Cv)2$. $Cv = Q/\sqrt{\Delta P}$ (for water)

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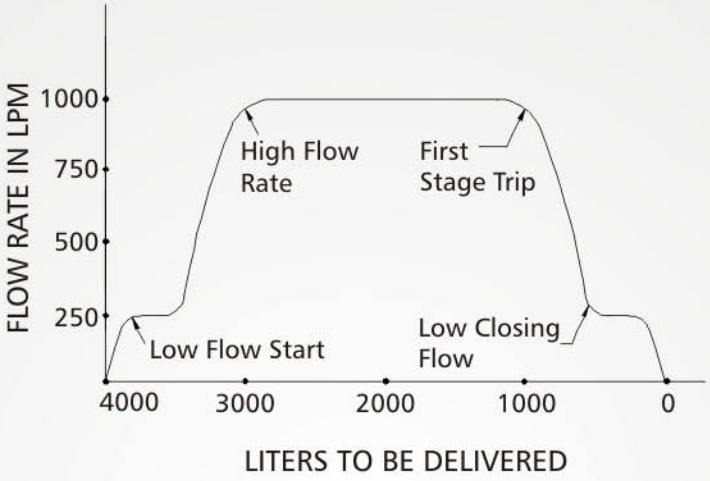
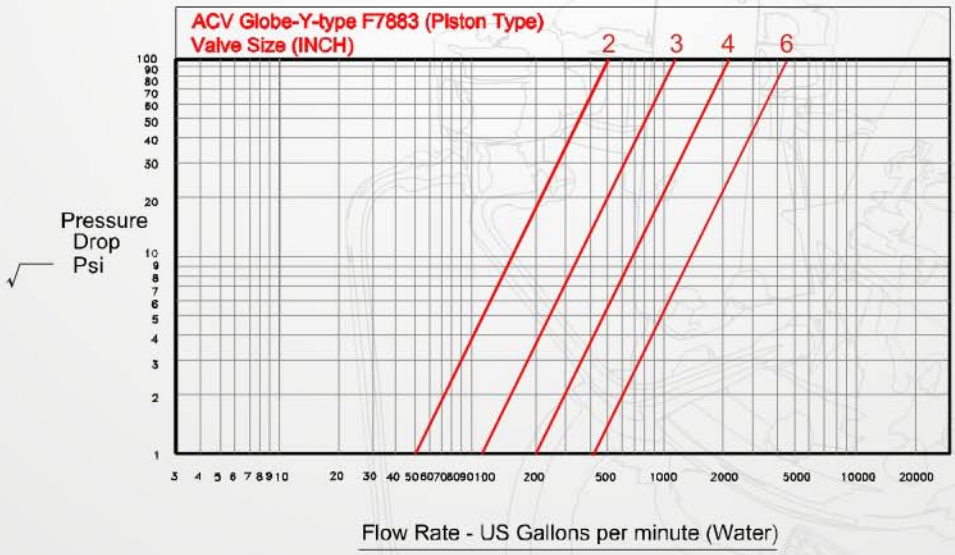
PRESSURE DROP CHART - PISTON VALVE 7883 (Y-TYPE) DIGITAL CONTROL VALVE

TYPICAL LOAD CYCLE



PRESSURE DROP CHART



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OUR ESTEEMED CUSTOMERS:

Indian Oil Corp. Ltd.
(more than 40 Locations)

Reliance Ind. Ltd.
(Hazira, Bharuch)

Bharat Petroleum Corp. ltd.
(more than 50 Locations)

Bina - Bharat Petroleum Corp. ltd.
(more than 400 Valves)
Under EIL Approved

Hindustan Petroleum Corp. ltd.
(more than 50 Locations)
PDIL/MECON Approved

Numaligarh Refinery
Under EIL Approved

LPG Terminals, Ship Loading & Unloading

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