Flow

Diaphragm Digital Control Valve

VERMONT Diaphragm Digital Control Valve is an electrically actuated, hydraulically operated multi-function control valve. It can be used for local as well as remote controlled batching operations with electronic batch controller. The calve also offers an in-built flow governing function.

DESIGN FEATURES

- Precision Multi-stage opening and closing
- Fail-safe design
- Low pressure drop
- Bubble-tight seat design
- Flow rate control

PRINCIPLE OF OPERATION

The Diaphragm Digital Control Valve basically consists of a diaphragm operated main valve and two solenoid valves. Normally open (NO) solenoid connects the valve cover chamber to the upstream pressure, whereas normally closed (NC) solenoid connects the valve cover chamber to the downstream pressure.

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

The operation of the valve is simple and is explained below. The total batch quantity delivered and controlled through the valve is divided into 7 stages (Refer graph) for the purpose of convenience.
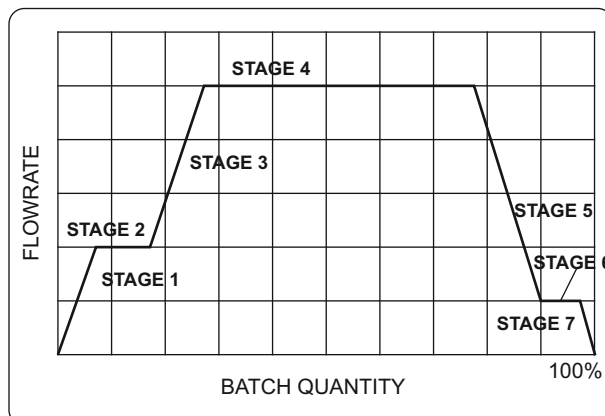
Initially both NO and NC solenoid valves are in de-energized condition. The NO valve applies high upstream pressure on the diaphragm, whereas the NC valve prevents this pressure from getting drained to the downstream side. The valve remains close as a result of this.

Stage 1
Both NO and NC solenoids are energised. NO valve now restricts the high upstream pressure from entering Into the cover chamber. NC valve permits the pressure above the diaphragm to vent to the low downstream pressure. This creates a differential pressure across the diaphragm, the high upstream pressure acting from below the diaphragm opens the main valve and allows the flow to start through the valve.

Stage 2
As the flow rate reaches predefined value (set in the batch controller as "Low Flow Start") the NC valve is de-energised. This prevents further draining of the chamber and locks the valve at this flowrate. Initial delivery at slow speed avoids splashing of product and avoids the generation of static charge.

Stage 3
When sufficient quantity is delivered at the slow speed, the NC valve is energized again. This allows further draining of the chamber and hence increases the flow.

Stage 4
When the flow reaches to the maximum level (set in the batch controller), the NC solenoid is de-energised. This maintains the constant high flowrate for the remaining batch. During this stage, the flowrate control is done by the batch controller. When a number of flowmeters are connected to the same pump, stopping (or starting) one or more meters increases (or decreases) the flowrate at the remaining meters. When the flowrate increases, the NO solenoid is energized momentarily. This injects some high

pressure in the cover chamber and makes the valve to throttle in order to maintain the set flowrate. If the flowrate decreases, the NC solenoid is energized momentarily. This allows slight draining of the chamber and allows the valve to open further in order to maintain the set flowrate.

Stage 5
At the end of the batch, the NO solenoid is de- energised. This injects high upstream pressure into the cover chamber and throttles the valve.

Stage 6
When the valve throttles sufficiently to achieve the predefined slow closing flowrate (set in the batch controller), the NO solenoid is energised. This maintains the uniform flowrate.

Stage 7
When the batch quantity is delivered, the NO solenoid is de-energised.(NC solenoid is already de-energised) This applies high upstream pressure into the cover chamber, which makes the main valve to close completely to achieve bubble-tight shut-off.

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

Caution: Sufficient pumping flowrate 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.
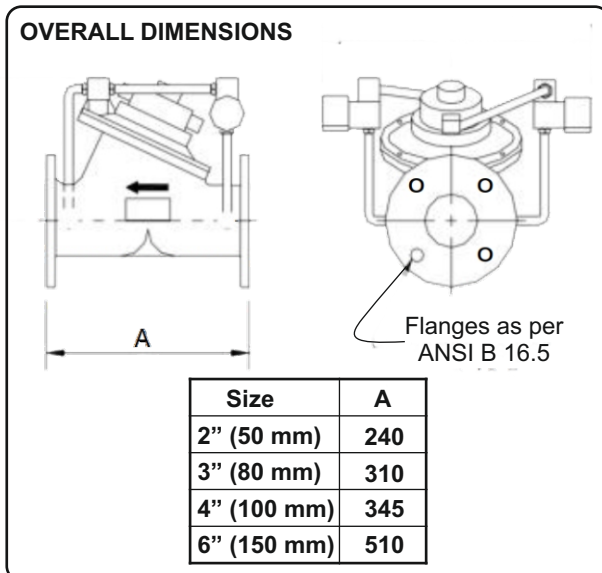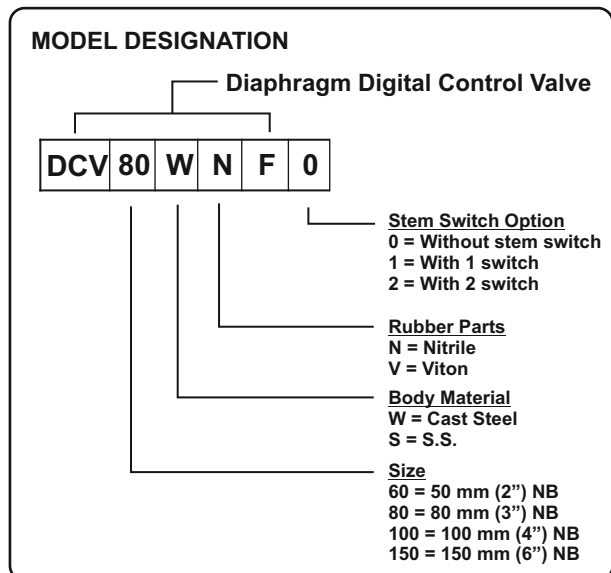
OPTIONS
The Diaphragm Digital Control Valve can be supplied with external stem and limit switches. Signals from the switches can be used to monitor the flowrate(s) and/or to indicate the valve position-open or closed. Standard valve is supplied with 230 VAC solenoids, other voltage solenoids can be supplied on request.

SPECIFICATIONS

Type	: Electrically actuated, hydraulically operated
Size	: 50mm NB, 80mm NB, 100mm NB, 150mm NB
Flow Range	: 500 LPM (50mm), 1500 LPM (80mm), 2400 LPM (100mm), 3800 LPM (150mm)
End Connections	: ANSI B16.5 RF, Class 150/Class 300 (Optional)
Max. Working Pressure	: 150 PSI / 300 PSI (Optional)
Temperature	: 70°C
Solenoid Operating Voltage	: 230 VAC, 50 Hz
Mounting	: Downstream of flow-meter

MATERIALS OF CONSTRUCTION

Valve body/cover	: ASTM A 216 WCB
Internal Parts	: Stainless Steel AISI 304/316
Spring	: Stainless Steel AISI 304
Rubber Parts	: Nitrile / Viton
Solenoid Valves	: Stainless Steel AISI 304
Control tubing and pipe fittings	: Stainless Steel AISI 304

OVERALL DIMENSIONS

Flanges as per ANSI B 16.5

Size	A
2" (50 mm)	240
3" (80 mm)	310
4" (100 mm)	345
6" (150 mm)	510

MODEL DESIGNATION

Diaphragm Digital Control Valve

DCV	80	W	N	F	0

Stem Switch Option
0 = Without stem switch
1 = With 1 switch
2 = With 2 switch

Rubber Parts
N = Nitrile
V = Viton

Body Material
W = Cast Steel
S = S.S.

Size
60 = 50 mm (2") NB
80 = 80 mm (3") NB
100 = 100 mm (4") NB
150 = 150 mm (6") NB

*Detailed GA drawing can be made available on request

- *Specifications are subject to change without notice.*
- *All dimensions are in mm unless otherwise specified.*

Vermont Technologies Pvt. Ltd.

Corporate Office & Operations:

Plot No: PAP- A-8/6, " A" Block, Phase IV, MIDC Chakan, Opp Mahindra Vehicle, Dist:Pune- 410501

Tel.   : +91 9168179461 / 9168176683

Email   : ho@vermonttechnologies.co.in

Website : www.vermonttechnologies.co.in