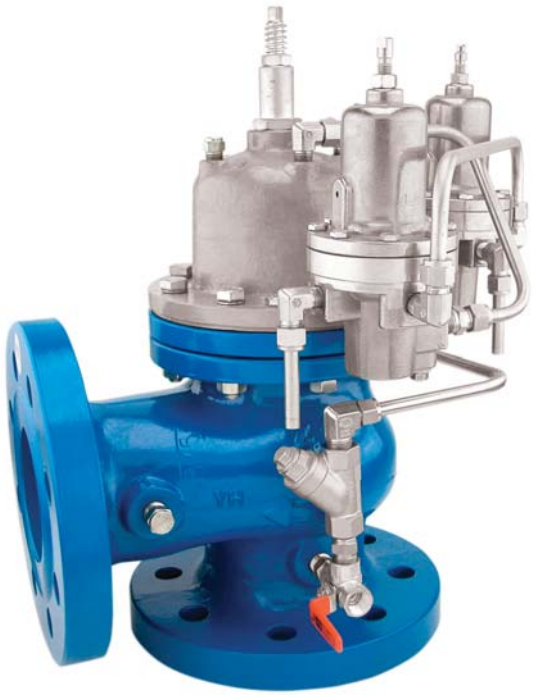
800 Series

Model 835-M

High Pressure, Surge Anticipating Control Valve



- Eliminates surge in all pumping systems:
  - Booster & deep well, single & variable speed
- Eliminates surge in all distribution networks:
  - Municipal, high-rise buildings, sewage, HVAC, irrigation
  - Difficult to maintain, remote locations, & older systems

The Model 835-M High Pressure, Surge Anticipating Valve is an off-line, hydraulically operated, piston actuated valve. The valve, sensing line pressure, opens in response to the pressure drop associated with abrupt pump stoppage. The pre-opened valve dissipates the returning high pressure wave, eliminating the surge.
The Model 835-M smoothly closes drip tight as quickly as the relief feature allows, while preventing closing surge.
The valve also relieves excessive system pressure.

Features and Benefits

- **Robust structure, piston actuated** – High pressure service
- **Replaces surge air vessels**
  - Relieves surge, fail-safe open
  - Minimal maintenance
  - Economy of space
  - Lower investment & maintenance costs
  - Especially economic for higher pressure ratings
- **Line pressure driven**
  - Independent operation
  - No motor required
  - Long term drip tight sealing
  - Adjustable hydraulic actuation
- **Double chamber** – Moderated valve closing (no surges)
- **In-line serviceable** – Easy maintenance
- **Obstacle free, full bore** – Uncompromising reliability
- **Balanced seal disk** – High flow capacity

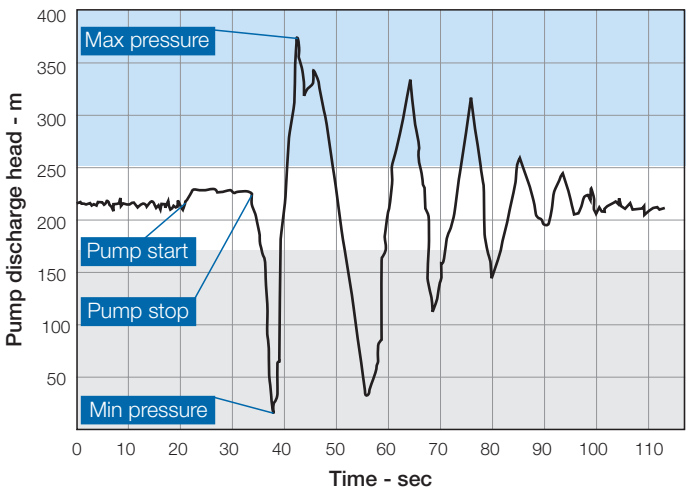
Major Additional Features

- Solenoid control – **835-55-M**
- Sensing diaphragm (for sewage) – **835-Md**
- Quick pressure relief valve – **83Q**

Operation

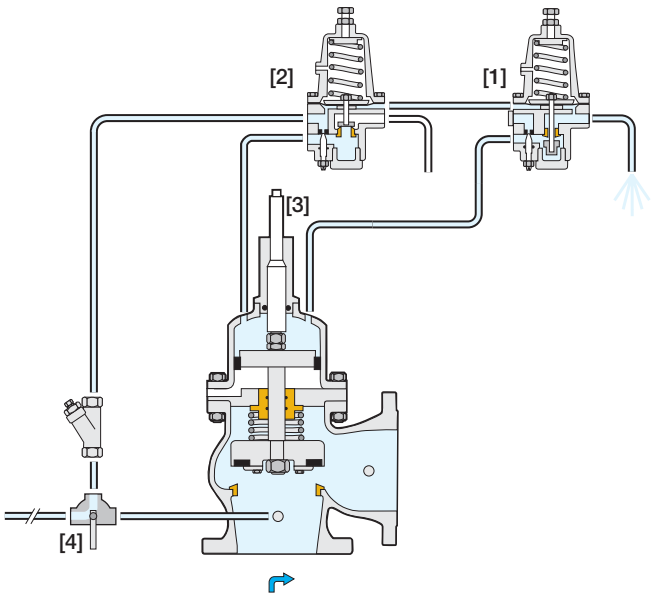
The abrupt stopping of a pump produces a pressure drop as the traveling column of water, with its inherent momentum, continues to travel along the line, generating severe low pressure.
When the traveling column of water loses its momentum, it travels back towards the pump. Should it hit the closed check valve, a very high pressure surge is created and travels throughout the system as a damaging wave at velocities of up to "Mach 4". No quick relief valve can react quickly enough to eliminate it.

Surge at Pump Station Without Protection

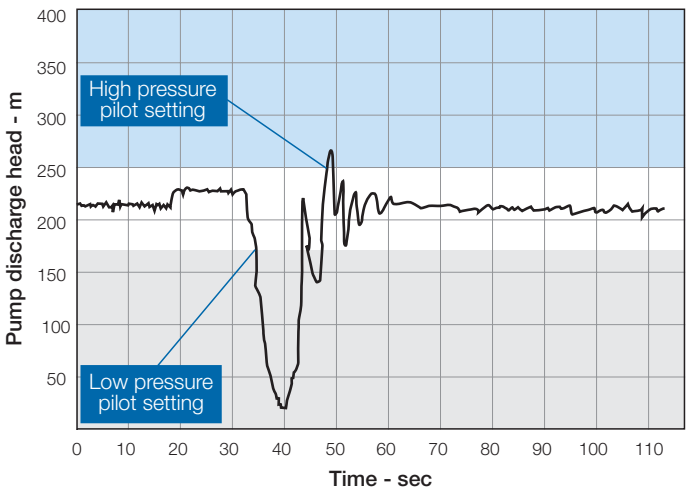


Eliminating surge requires anticipation and pre-action. The Model 835-M is well suited to this task.
The Low Pressure (LP) pilot **[1]** senses the initial pressure drop and opens. This immediate reaction allows remaining line pressure to quickly open the main valve.
The already opened Model 835-M releases the returning column of water, minimizing the line pressure rise. Should the relief rate be insufficient, and the pressure exceeds the High Pressure (HP) pilot **[2]** setting, the pilot immediately opens, further opening the main valve.
As system pressure stabilizes again at static pressure, both pilots close and the main valve begins closing. Should line pressure rise during main valve closing, the HP pilot briefly stops the process, preventing the pressure from continuing to rise.
The flow stem **[3]** limits the relief flow to prevent column separation and preserve closing pressure.
Cock valve **[4]** serves for selecting operating and sensing source:

- Directly from main discharge line - Recommended (see “Typical Application”)
- From Model 835-M inlet



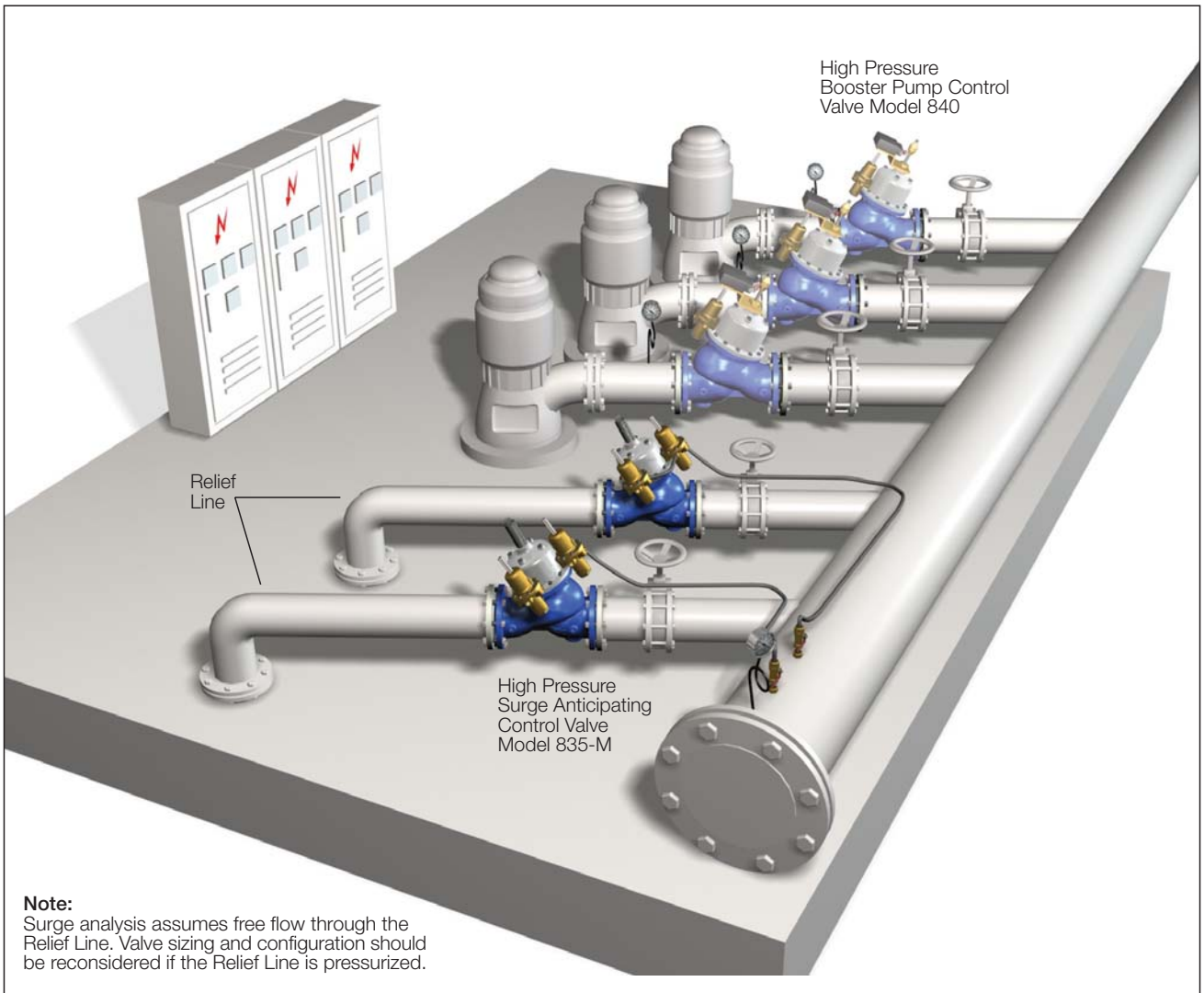
Pressure at Pump Station Protected by Model 835-M



Typical Applications

In this system, a pump battery supplies the main line through a manifold. The Model 835-M:

- Eliminates surge on power failure
- Provides surge free switching between “on-duty” pumps
- Closes smoothly according to pilot setting



Note:
Surge analysis assumes free flow through the Relief Line. Valve sizing and configuration should be reconsidered if the Relief Line is pressurized.

Bermad Surge Analysis Program – "BERSAP II"

Surge is the result of many factors: designed flow rate, pumping system, main line characteristics, etc. By using advanced mathematics and computer software, BERMAD's experienced engineers can perform the desired analysis.
For best analysis, all of the following data is required.

- Main Line
  - Line Profile (Chainage), elevations at accumulated length
  - Internal diameter
  - Length
  - Material
  - Wall thickness
- Pumps
  - Pump curve(s)
  - Max. number of pumps in simultaneous operation
  - Type of non-return valve
- System
  - Max. designed flow rate
  - Max. & min. levels at suction, and at delivery reservoirs

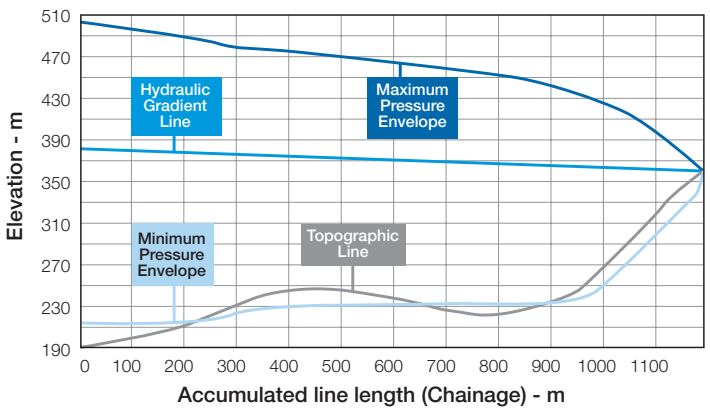
For systems with multiple pumping stations and/or multiple consumers along the supply line, the following data is also required:

- System layout including pumping station, and consumer locations and characteristics
- Head Gradient Line (HGL) for each and every node based on "Network-Solver" analysis

This surge analysis indicates that without protection the system is exposed to:

- Pressure of ~32 bar (see max. pressure envelope line)
- Vacuum conditions (see min. pressure envelope line)

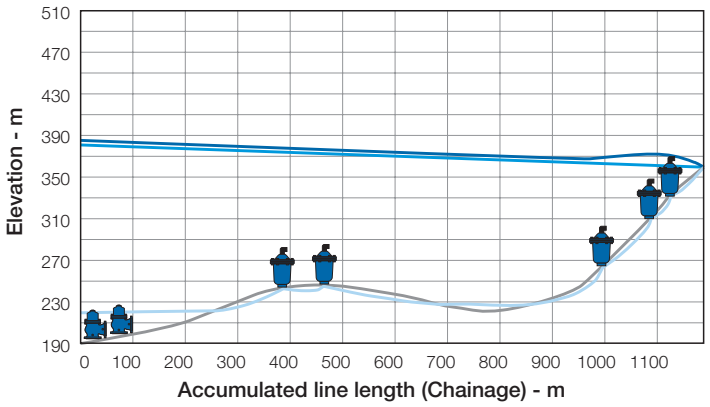
Line Hydraulic Behavior without Protection



Simulated surge protection recommends:

- Two Model 835-M valves installed in parallel at the pumping station
- Five Non-Slam Air Valves installed along the line
  With full surge protection, the simulation shows no surge and minimal vacuum.
- Pressure at max. of ~19 bar (see max. pressure envelope line)
- No appreciable vacuum (see min. pressure envelope line)

Line Hydraulic Behavior with Full Protection



Any pipeline design requires air valves to admit air under vacuum conditions and to release air under pressure. The size, type and location of these air valves should consider surge protection requirements.

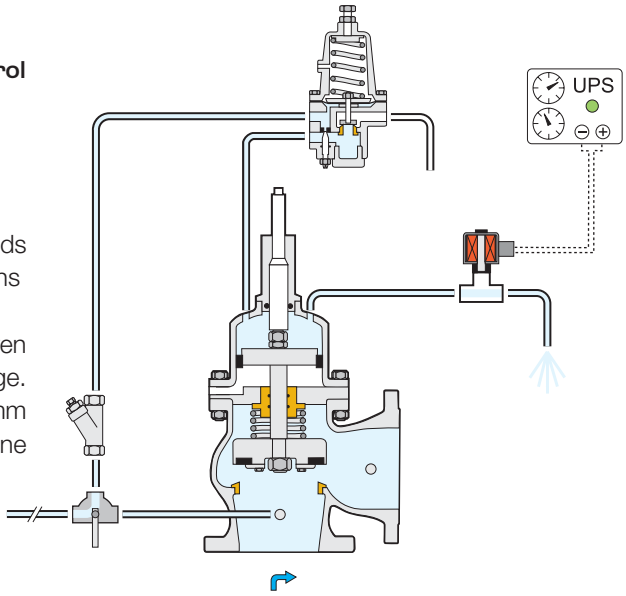
Additional Application

High Pressure, Surge Anticipating Valve with Solenoid Control
Model 835-55-M

This model provides the appropriate solution to pumping systems when:

- Static pressure is lower than 3 bar (45 psi)
- Discharge line is short & wave critical time is less than 3 seconds
- Electric control is preferred due to maintenance considerations

Upon power failure, the BR 735-UPS Controller immediately energizes the Model 835-55-M, normaly closed DC solenoid, even prior to the pressure drop associated with abrupt pump stoppage. The already opened Model 835-55-M releases the returning columm of water eliminating the surge. The Model 835-55-M, sensing line pressure, smoothly closes drip tight as quickly as the relief feature allows, while preventing closing surge.
The valve also relieves excess system pressure.



BR-735-UPS Controller

The Model 835-55-M Surge Anticipating Valve with Solenoid Control should remain closed except in the event of power failure. This requires a Normally Open (N.O.) always energized solenoid, which is vulnerable to problems (coil heating, sticking problems, calcium build-up, etc.).
The recommended alternative is using a combination of a Normally Closed (N.C.) de-energized solenoid, and an **U**n-Interruptible **P**ower **S**ource **(UPS)**.
The BR-735-UPS Controller includes two re-chargeable lithium batteries and a settable timer for determining the period that the valve remains open. The Controller, as a part of the pump control panel, immediately energizes the N.C. solenoid to open the valve for a preset time after which it de-energizes the solenoid, allowing the valve to start closing

Engineer Specifications

The Surge Anticipating Valve shall open in response to the pressure drop associated with abrupt pump stoppage to dissipate the returning high pressure wave, eliminating the surge. It shall smoothly close drip-tight as quickly as the relief feature allows, while preventing closing surge. The valve shall also relieve excessive system pressure.

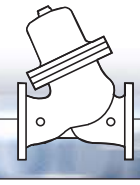
Main Valve: The main valve shall be a center guided, piston actuated globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings, or supporting ribs. All external bolts, nuts, and studs shall be Duplex® coated. All valve components shall be accessible and serviceable without removing the valve from the pipeline.

Actuator: The actuator assembly shall be double chambered with a sealed inherent separating partition between the lower surface of the piston and the main valve. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.

Control System: The control system shall consist of a control tube connecting the upper control chamber to the valve outlet. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested to customer requirements.

Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard.

BERMAD Waterworks



800 Series

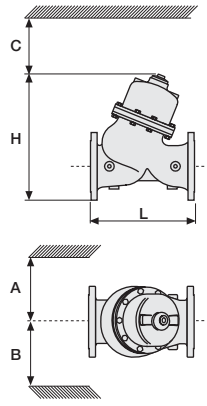
Model 835-M

Technical Data

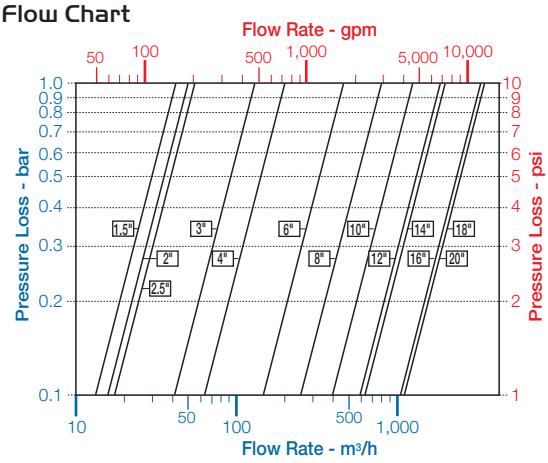
Dimensions and Weights

Size		A, B		C		L		H		Weight	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	kg	lbs
40	1½"	210	8	180	7	205	8.1	260	10.2	11.8	26
50	2	210	8	180	7	210	8.3	265	10.4	15	33
65	2½"	210	8	180	7	222	8.7	278	10.9	18.4	40
80	3"	230	9	230	9	264	10.4	332	13.1	32	70
100	4"	255	10	275	11	335	13.2	422	16.6	56	123
150	6"	290	11	385	15	433	17	542	21.3	106	233
200	8"	335	13	460	18	524	20.6	666	26.2	190	418
250	10"	380	15	580	23	637	25.1	783	30.8	307	675
300	12"	405	16	685	27	762	30	961	37.8	505	1111
350	14"	405	16	685	27	767	30.2	996	39.2	549	1208
400	16"	505	20	965	38	1024	40.3	1179	46.4	1070	2354
450	18"	505	20	965	38	1030	40.5	1208	47.6	1095	2409
500	20"	505	20	965	38	1136	44.7	1241	48.9	1129	2484

Data is for Y-pattern, PN25,40/ANSI300,400 valves
Weight is for basic valves
For more dimensions and weights tables, refer to Engineering Section.



Flow Chart



Data is for Y-pattern, flat disk valves
For more flow charts, refer to Engineering Section

Main Valve

Valve Patterns: "Y" (globe) & angle
Size Range: 1½–20" (40-500 mm)*
End Connections (Pressure Ratings):
Flanged: ISO PN16, PN25, PN40 (ANSI Class 150, 300, 400)
Others: Available on request
Working Temperature:
Water up to 80°C (180°F)
Standard Materials:
Body: Carbon Steel or Ductile Iron
Cover (piston cylinder):
Bronze or Stainless Steel
Internals:
Stainless Steel & Bronze
Seals: NBR
Coating:
Fusion Bonded Epoxy, RAL 5005 (Blue) NSF & WRAS approved or Electrostatic Polyester Powder, RAL 6017 (Green)

* 16-20" (400-500mm) valves are rated PN25 (Class 300)

Control System

Standard Materials:
Accessories:
Bronze, Brass, Stainless Steel & NBR
Tubing: Copper or Stainless Steel
Fittings: Forged Brass or Stainless Steel
Pilot Standard Materials:
Body: Brass, Bronze or Stainless Steel
Elastomers: NBR
Springs: Galvanized Steel or Stainless Steel
Internals: Stainless Steel

How to Order

Please specify the requested valve in the following sequence: (for more options, refer to Ordering Guide)

Sector	Size	Primary Feature	Additional Feature	Pattern	Body Material	End Connections	Coating	Voltage & Position	Tubing & Fittings	Additonal Attributes
WW	6"	835	PB	Y	S	40	EB	–	NN	M

Sector: WW — Waterworks

Size: 6" — 1½ - 20"

Primary Feature: 835 — Surge Anticipating Control Valve

Additional Feature: PB

Double Chambered	PB
No Additional Feature	00
Solenoid Controlled	55

Multiple choices permitted

Pattern: Y

Oblique (up to 20")	Y
Angle (up to 18")	A

Body Material: S

Ductile Iron Standard	C
Cast Steel	S
St. Steel 316	N
Nickel Alumin. Bronze	U

End Connections: 40

ISO-16	16
ISO-25	25
ISO-40	40
ANSI-150	A5
ANSI-300	A3
ANSI-400	A4
JIS-16	J6
JIS-20	J2
JIS-30	J3

Coating: EB

Epoxy FB Blue	EB
Polyester Green	PG
Polyester Blue	PB
Uncoated	UC

Voltage & Position: –

24VAC/50Hz - N.C.	4AC
24VAC/50Hz - N.O.	4AO
24VDC - N.C.	4DC
24VDC - N.O.	4DO
24VDC - L.P.	4DP
220VAC/50-60Hz N.C.	2AC
220VAC/50-60Hz N.O.	2AO

Use when additional electric control feature is selected

Tubing & Fittings: NN

Copper Tubing & Brass Fittings	CB
Plastic Tubing & Brass Fittings	PB
St. St. 316 Tubing & Fittings	NN

Additonal Attributes: M

Flow Stem	M
Large Control Filter	F
Sensing Diaphragm	d
V-Port Throttling Plug	V
Orifice Assembly	U
St. St. 316 Control Accessories	N
St. St. 316 Internal Trim (Closure & Seat)	T
St. St. 316 Actuator Internal Assembly	D
Delrin Bearing	R
Viton Elastomers for Seals & Diaphragm	E
Pressure Gauge	6

Multiple choices permitted

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