SINGER VALVE

Result-Based Solutions. Globally.™

Pressure Reducing Valve with Integral Back-up



- **Non-stop pressure management**
- **Absolutely no downstream surges**
- **Fewer maintenance calls**

singervalve.com

PR-SM
Pressure Reducing Valve with Integral Back-up

Relax. You can count on this valve.

Imagine a pressure reducing valve that keeps working even when the primary diaphragm or pilot system fails. The Singer Pressure Reducing Valve with Integral Back-Up (PR-SM) is a pressure reducing valve that has a built-in independent back-up system. If the primary diaphragm is damaged or fails, the secondary system kicks in automatically. As a result, the valve keeps on working, performing its pressure management role (at a slightly higher pressure) without any interruptions. It's the perfect solution for critical applications that can't risk malfunction or failure.



Pressure Reducing Valve with Integral Back-Up (PR-SM)

An Innovative Design Solution

Every day at Singer Valve Inc., we strive to solve water system control problems. Sometimes that means designing brand new valves for unique applications. Sometimes it means modifying an existing valve with new ideas. Like the Singer Pressure Reducing Valve with Integral Back-up (PR-SM).

In 1991, East Bay Municipal Utility District (MUD) near San Francisco, California, was having problems because their street flushing crews were taking water from fire hydrants and closing the hydrants too quickly. As with all pilot operated, pressure reducing valves, their valves could not close fast enough, resulting in high pressure downstream.

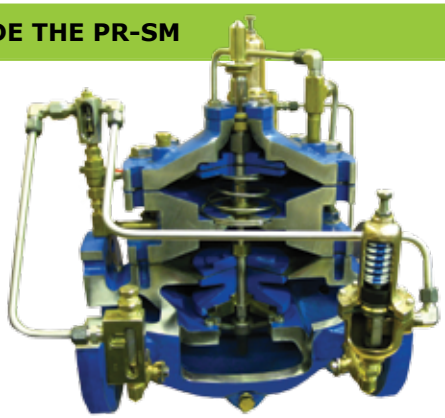
After unsuccessful attempts to solve the problem using their existing valves, the East Bay MUD team began designing a new valve with standard components. When our Singer Valve team visited East Bay's office, our engineers were intrigued with the application challenge. They consulted with the team about the ideal solution, and decided on a modification of an existing valve with new features.

Determined to find a solution that met all of East Bay MUD's requirements including budget and maintenance costs, our engineers designed and tested several options. The most effective solution was fitting a standard pressure reducing valve with a completely independent back-up system. The back-up system had its own diaphragm and its own pilot system and had the ability to close the valve quickly. The design rationale? If the primary pressure reducing valve malfunctioned or failed, the secondary system would kick in, resulting in continuous and consistent pressure management. Essentially, the design concept was to have two valve chambers and two pilots systems functioning as one reliable pressure reducing valve.

After extensive testing in our lab, our engineers returned to East Bay MUD with a prototype of Singer's first-ever PR-SM valve. The 4" / 100mm valve was installed with excellent results. Singer's PR-SM overcame the limitation in closing speed by having a secondary / redundant back-up (diaphragm) chamber that is capable of very high operating forces which allows the valve to close rapidly when required. There were no more surges during rapid hydrant closing. Impressed with the new valve, East Bay MUD became the first water utility in the world to use our PR-SM. Not surprisingly, the Singer PR-SM valve is now East Bay's preferred pressure reducing valve.

Today, our Singer PR-SM valve is the natural pressure management solution for applications that require back-up protection. Because of its effectiveness and reliability, it has been installed in water systems around the world.

INSIDE THE PR-SM



Here's how it works:

- The primary pilot maintains control of downstream pressure
- If the primary valve or pilot fails, the back-up pilot takes over
- The secondary pilot, set at a slightly higher pressure, provides redundant control of the pressure above the diaphragm in the secondary operating chamber
- The secondary pilot maintains control of downstream pressure
- The PR-SM maintains pressure reducing control

To view the PR-SM in operation, visit singervalve.com and watch the animation video.

A Dynamic Duo

The Singer PR-SM was designed based on the simple fact that some applications cannot risk having a pressure reducing valve malfunction or fail. The PR-SM is engineered with a primary system and a secondary redundant system. If the primary diaphragm fails or malfunctions, the built-in back-up system enables the valve to provide uninterrupted pressure management. When things such as dirt or debris causes the primary diaphragm, pilot or strainer to malfunction or fail, the secondary system kicks in to provide redundant control. Because the secondary diaphragm remains out of the waterway until the secondary pilot takes control, the potential for dirt or debris to cause problems in the secondary system is limited.

With two valve chambers and two pilots acting as one integrated unit, it's the ultimate safeguard against complications that arise from malfunction or failure. If ever there was a dynamic duo that can overcome primary valve failure, the Singer PR-SM is it. In fact, no other pressure reducing valve we know functions seamlessly even when the primary system fails. What a combo.

So, how does the PR-SM actually work? Under normal pressure reducing conditions, the primary pilot senses the downstream pressure through a connection at the valve outlet. Under flowing conditions, the primary pilot reacts to small changes in pressure to control the valve position by modulating the pressure above the primary diaphragm in the lower operating chamber. The downstream pressure is maintained virtually steady at the pilot set-point which is adjustable. If the primary pilot fails or if the primary diaphragm is damaged, the independent back-up system kicks in automatically. Set slightly higher than the primary pilot, the secondary pilot controls the pressure above the secondary diaphragm in the second operating chamber. Because the secondary chamber is not exposed to the water flowing through the valve, the cause of the damage in the primary diaphragm is not an issue. The forces now operating in the top chamber assume control of the inner valve assembly and maintain pressure reducing control. Should there be a rapid rise in downstream pressure, the secondary pilot responds quickly and pressurizes the top chamber. The result? It maintains constant downstream pressure regardless of fluctuations in upstream flow or pressure, eliminating the possibility of downstream surges due to primary pilot and diaphragm failure.

WHY SINGER DOES IT BETTER!

Because the Singer PR-SM is equipped with a redundant back-up system that kicks in automatically, you receive uninterrupted pressure management. Constant downstream pressure means no downstream surges. The back-up system means no immediate repairs. Another smart solution by Singer Valve.

THE VALVE THAT NEVER LETS YOU DOWN

- Safe, continuous pressure management
- Downstream surge protection
- No emergency call-outs

Key Features

THE SINGER PR-SM IS UNIQUE. In fact, there are no comparable products on the market. If the primary diaphragm or pilot system fails, or if the valve is incapable of closing fast enough, the secondary system is triggered to take control. As a result, the valve never stops functioning. Our secondary system circumvents the damaged component and uses the secondary pilot to provide redundant control of the secondary independent diaphragm. With two valve chambers and two pilots, the Singer PR-SM is unique. Another unique aspect is the speed and force with which the primary valve closes when the secondary system kicks in. With virtually no delay, the valve offers uninterrupted pressure management and, as a result, superior downstream surge protection. The rapid response of our PR-SM is unique in the market.

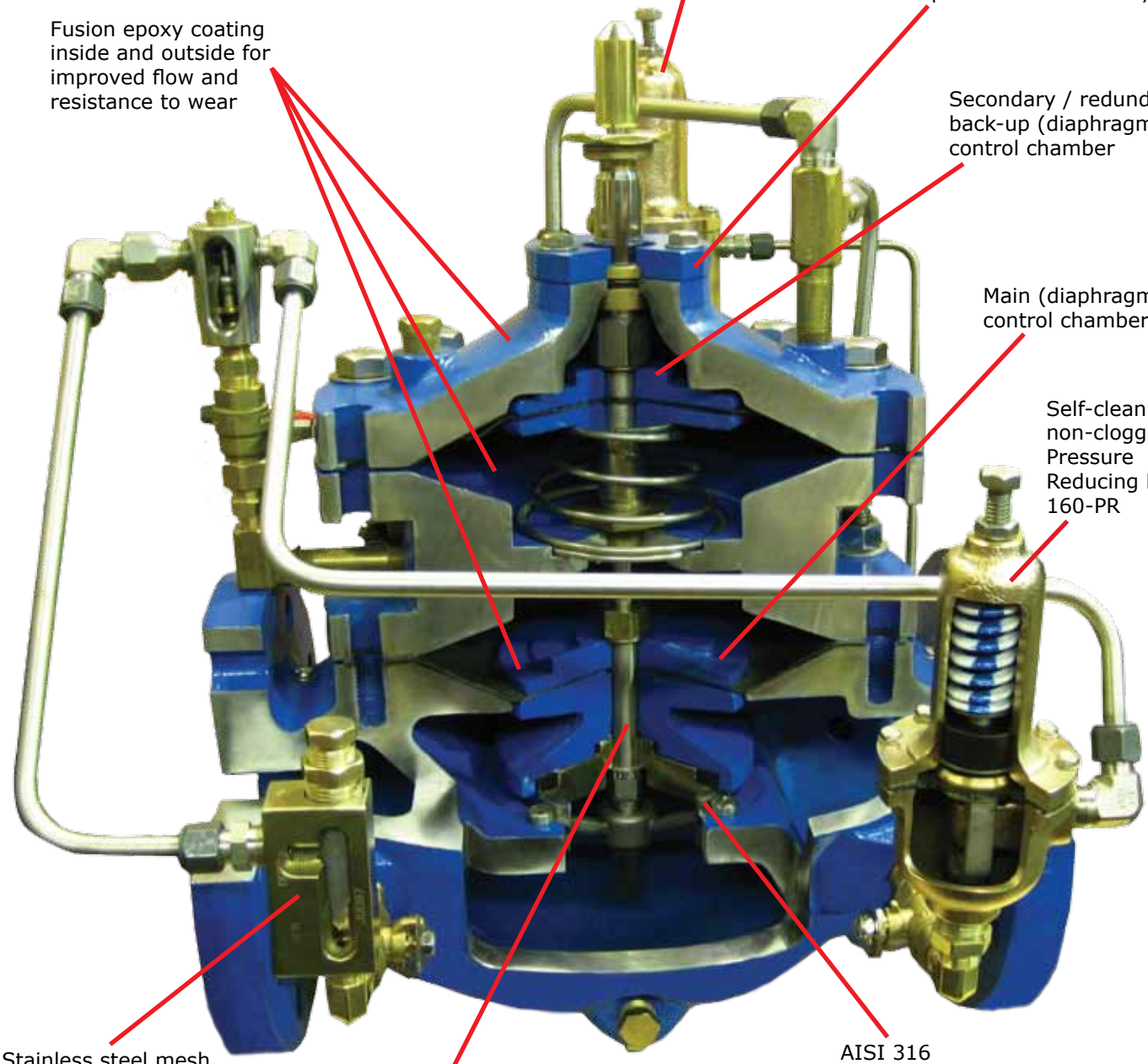
THE SINGER PR-SM IS RELIABLE. Imagine what would happen if a pressure reducing valve fails near a major hospital, by a massive reservoir or within a large distribution system. The damage and associated costs can be astronomical and the effects on human life can be disastrous. With the Singer PR-SM, even if the primary diaphragm fails, the secondary system kicks in and takes control to provide ongoing pressure management. That's what we call reliable. In fact, we know no other valve that provides such reliable protection against a failed diaphragm.

THE SINGER PR-SM IS VERSATILE. Yes, it's a pressure reducing valve but the applications are almost limitless. When the pilot system is removed from the PR-SM valve, the valve is referred to as a Full Port, Integral Back-up, Dual Diaphragm, Automatic Control Valve (PGM). Thanks to the innovative nature of our Singer engineers, the PR-SM and the PGM valves have numerous applications beyond pressure management. One New York client uses the PGM body fitted with the primary system having a solenoid control and back-up system hydraulic float control (Model 106-SC-NO-F-Type 5-SM). Another client depends upon the Singer 2SC-PCO Dual Solenoid Control Valve for Positioning and SCADA Controls for flow control by tying its operation to a flow meter with a flow set-point. On loss of power, the secondary chamber is activated and reduces pressure until power is restored. As a result, there is no need for a second valve or exotic pilot plumbing. In New South Wales, Australia, one municipality depends upon the Singer 2SC-PCO Dual Solenoid Control Valve for Positioning and SCADA Controls fitted with a back-up altitude pilot as a reservoir fill valve. It's the ideal answer to controlling reservoir levels, giving peace of mind to nearby homeowners that water won't breach the reservoir embankment, washing out their homes.

PR-SM
Pressure Reducing Valve with Integral Back-up

The Singer Valve Advantage

At Singer Valve, we are all about innovative design solutions. Our Singer PR-SM provides guaranteed performance despite primary system malfunction or failure. So, what's the difference between the Singer PR-SM and others on the market? Take a look.



Wet Indicator (X107) is included with the standard PR-SM product but not shown here.

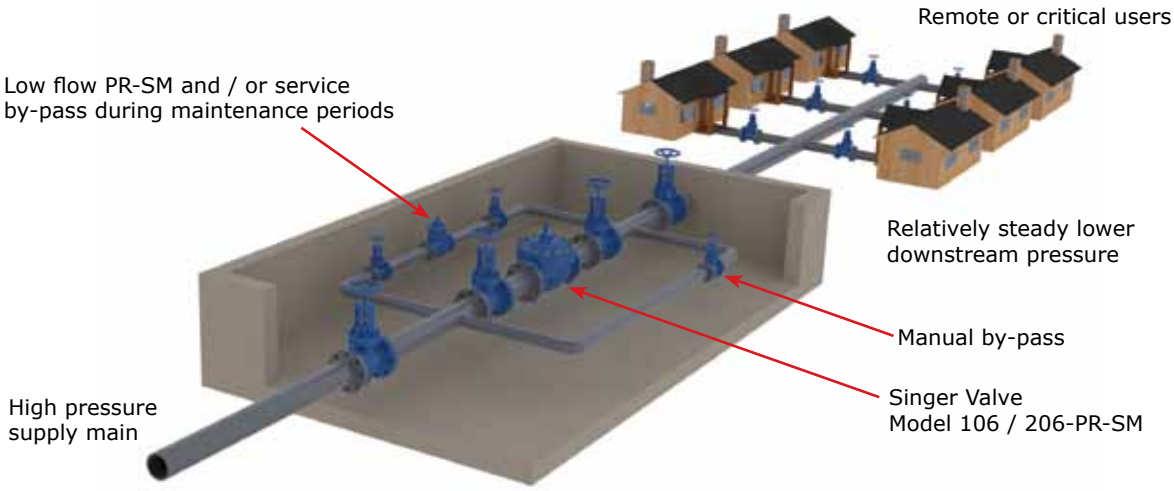
Typical Applications

The Singer Pressure Reducing Valve with Integral Back-up (PR-SM) is ideal for:

- Remote or sensitive locations
- Fire flow

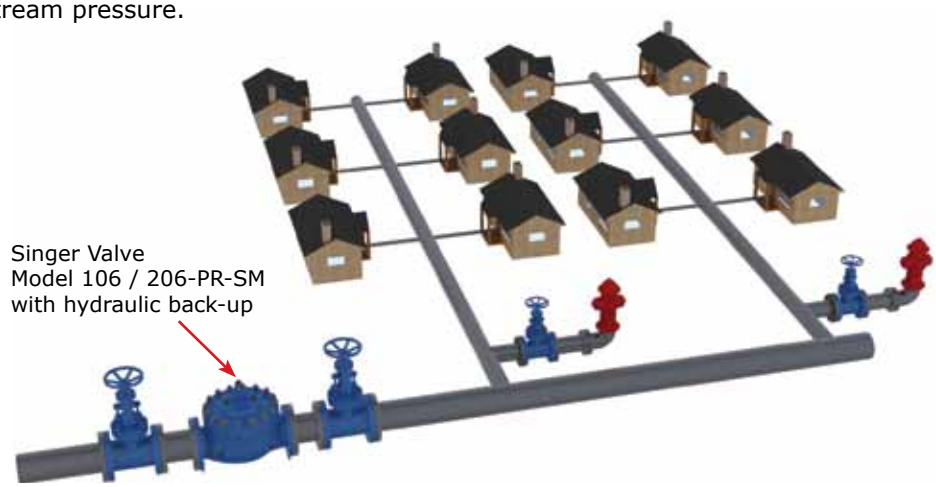
For Remote or Sensitive Locations

Because the Singer PR-SM controls pressure even when there's a failure or malfunction, the need for either emergency repairs or scheduled maintenance calls is reduced. That's why the PR-SM is ideal for remote or sensitive locations as many of the older subdivisions and associated residences cannot withstand severe pressures. The result? Fewer repair costs, less down time and unnecessary maintenance for utilities and homeowners alike.



For Fire Flow

The Singer PR-SM may be utilized for fire protection systems because it automatically reduces a higher inlet pressure to a steady lower discharge pressure, regardless of fluctuations in flow or inlet pressure. If the diaphragm of the main control chamber fails during a fire event, the secondary / redundant back-up (diaphragm) control chamber will assume control of downstream pressure.



PGM Main Valve
Alternate Applications

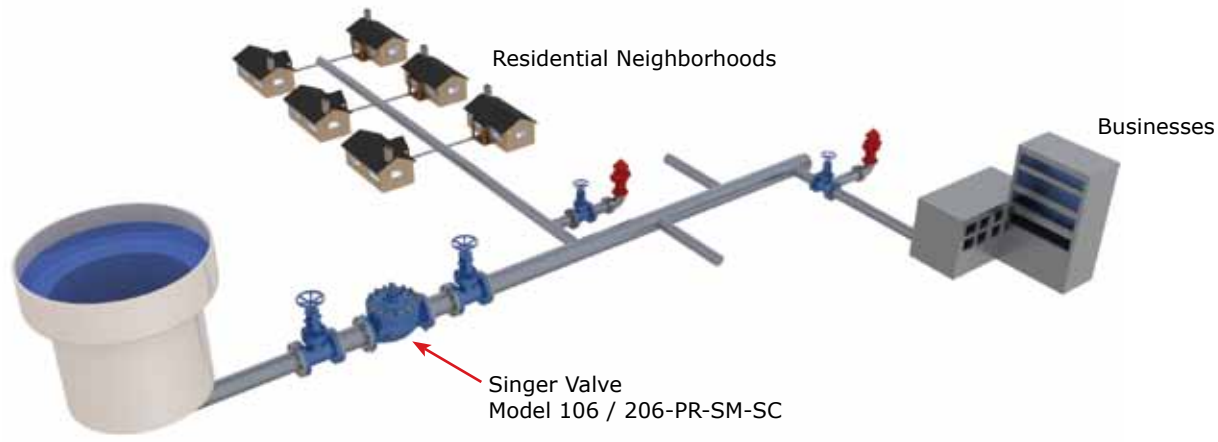
When the pilot system is removed from the PR-SM valve, the valve is referred to as a Full Port, Integral Back-up, Dual Diaphragm, Automatic Control Valve (PGM). Thanks to the innovative nature of our Singer engineers, the PR-SM and the PGM valves have numerous applications beyond pressure management.

The Singer Full Port, Integral Back-up, Dual Diaphragm, Automatic Control Valve (PGM) valve is ideal for:

- Security Breach or Earthquake Protection
- Tank or reservoir fills (level control)

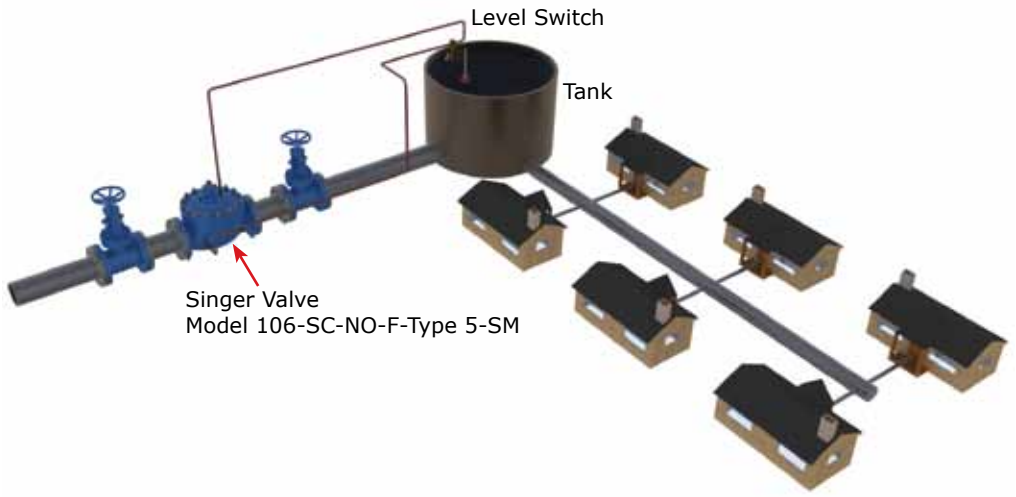
For a Security Breach or Earthquake Protection

The Singer PGM valve with pressure reducing on the primary chamber can be equipped with devices and equipment (solenoids) to allow the valve to close in case of emergencies such as an earthquake or a security breach. On normal operation, the primary chamber can control the downstream pressure. If there is an earthquake, the valve will close to keep water in the reservoir and limit the potential loss of drinking water in emergency situations.



For Tank or Reservoir Fills (Level Control)

Reservoirs are usually built in remote areas and are sometimes difficult to access and maintain. A Singer PGM valve (106-SC-NO-F-Type 5-SM) with level control pilots can effectively control level with two stages of overflow protection. The primary pilot controls the level at high level. If the primary chamber fails, the secondary pilot, which is installed slightly above the primary, will assume control and prevent overflow. Also, the secondary chamber can be equipped with limit switches to signal the operator that the secondary chamber has activated; therefore, the primary chamber has failed. With the available two-stage operation, a PGM valve (106-SC-NO-F-Type 5-SM) can provide consistent and reliable level control.



PR-SM Sizing Chart

106-PR-SM	Flow Capacity									
Size (inches)	3 in	4 in	6 in	8 in	10 in	12 in	14 in	16 in	20 in	24 in
Size (mm)	80 mm	100 mm	150 mm	200 mm	250 mm	300 mm	350 mm	400 mm	500 mm	600 mm
Minimum (USGPM) Flat Diaphragm	5	10	20	40	-	-	-	-	-	-
Minimum (USGPM) Rolling Diaphragm	-	-	1*	1*	3	3	3	3	10	10
Minimum (L/s) Flat Diaphragm	0.32	0.63	1.26	2.52	-	-	-	-	-	-
Minimum (L/s) Rolling Diaphragm	-	-	0.06	0.06	0.19	0.19	0.19	0.19	0.63	0.63
Maximum Continuous (USGPM)	460	800	1800	3100	4900	7000	8500	11000	17500	25000
Maximum Continuous (L/s)	29	50	114	196	309	442	536	694	1104	1577

206-PR-SM	Flow Capacity													
Size (inches)	4 in	6 in	8 in	10 in	12 in	16 in	18 in	20 in	24 x 16 in	24 x 20 in	28 in	30 in	32 in	36 in
Size (mm)	100 mm	150 mm	200 mm	250 mm	300 mm	400 mm	450 mm	500 mm	600 x 400 mm	600 x 500 mm	700 mm	750 mm	800 mm	900 mm
Minimum (USGPM) Flat Diaphragm	5	10	20	40	-	-	-	-	-	-	-	-	-	-
Minimum (USGPM) Rolling Diaphragm	-	-	-	-	3	3	3	3	3	3	10	10	10	10
Minimum (L/s) Flat Diaphragm	0.32	0.63	1.26	2.52	-	-	-	-	-	-	-	-	-	-
Minimum (L/s) Rolling Diaphragm	-	-	-	-	0.19	0.19	0.19	0.19	0.19	0.19	0.63	0.63	0.63	0.63
Maximum Continuous (USGPM)	580	1025	2300	4100	6400	9230	16500	16500	16500	21700	33600	33650	33700	33800
Maximum Continuous (L/s)	37	65	145	259	404	582	1041	1041	1041	1370	2120	2123	2126	2132

*Consult with Factory.

Specifications

A. The valve shall be a Singer Valve model 106-PR-SM or 206-PR-SM

The main valve shall be a Singer 106-PGM or Singer 206-PGM.

B. Operation: The primary main valve and pilot system shall maintain relatively accurate control of the downstream pressure regardless of fluctuation in flow or upstream pressure. Should the primary main valve and / or pilot system fail to maintain downstream pressure, the independent back-up pilot system will take over and control the downstream pressure (at a slightly higher pressure).

C. Pressure Reducing Pilot
The Model 160 Pressure Reducing Pilot (Normally Open Pilot) spring range shall be "___ to ___" psi / "___ to ___" bar, with set-point preset at Singer Valve to "___" psi / "___" bar.

D. Pressure Relief Pilot
The Model 81-RP Pressure Relief Pilot (Normally Closed Pilot) spring range shall be "___ to ___" psi / "___ to ___" bar, with set-point preset at Singer Valve (slightly higher than Model 160 Normally Open Pilot) to "___" psi / "___" bar. Assembly shall be according to Schematic A-7697D.

Visit our online product catalog at singervalve.com to download the specifications.

How to Order

Please contact your local Singer Valve Sales Office with the following information ready:

1. Full port (106) or reduced port (206)
2. Outlet pressure range

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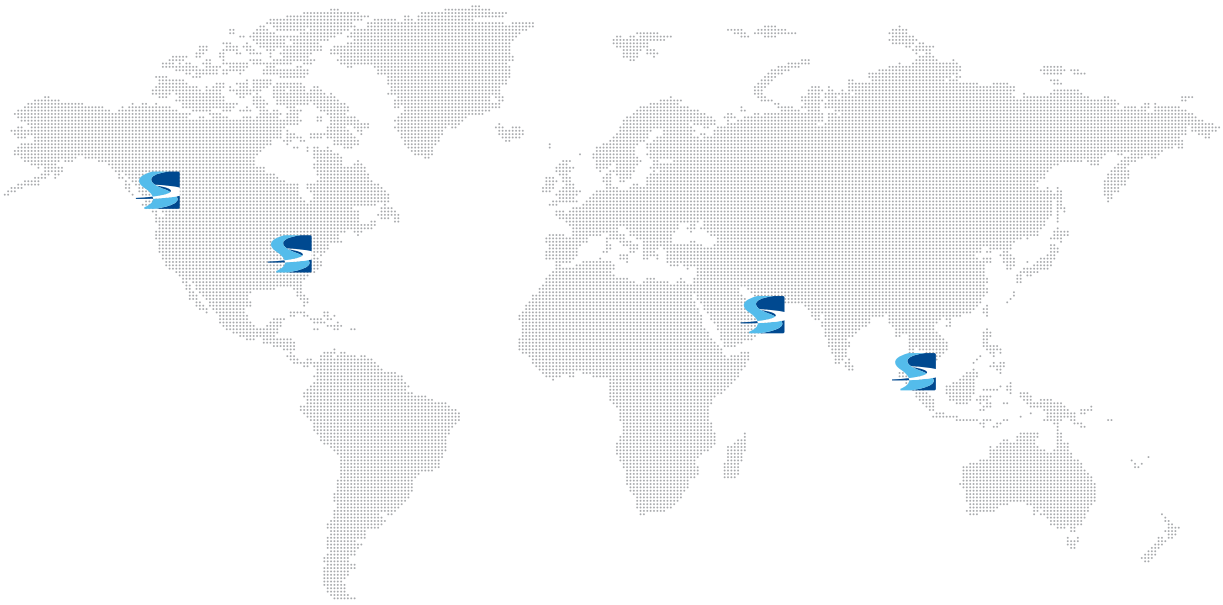

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