

SINGER®

a **MUELLER** brand

OPERATING INSTRUCTIONS MANUAL

PR-10159 UL / ULC Pressure Reducing Valve

106-PR-10159

S106-PR-10159

A106-RP-10159

SA106-PR-10159

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WARNING:

1. Read and follow instructions carefully. Proper training and periodic review regarding the use of this equipment is essential to prevent possible serious injury and/or property damage. The instructions contained herein were developed for using this equipment on fittings manufactured by Mueller Co. only, and may not be applicable for any other use.
2. DO NOT exceed the pressure ratings of any components or equipment. Exceeding the rated pressure may result in serious injury and/or property damage.
3. Safety goggles and other appropriate protective gear should be used. Failure to do so could result in serious injury.

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PR-10159 PRESSURE REDUCING VALVE

General Information / Operation

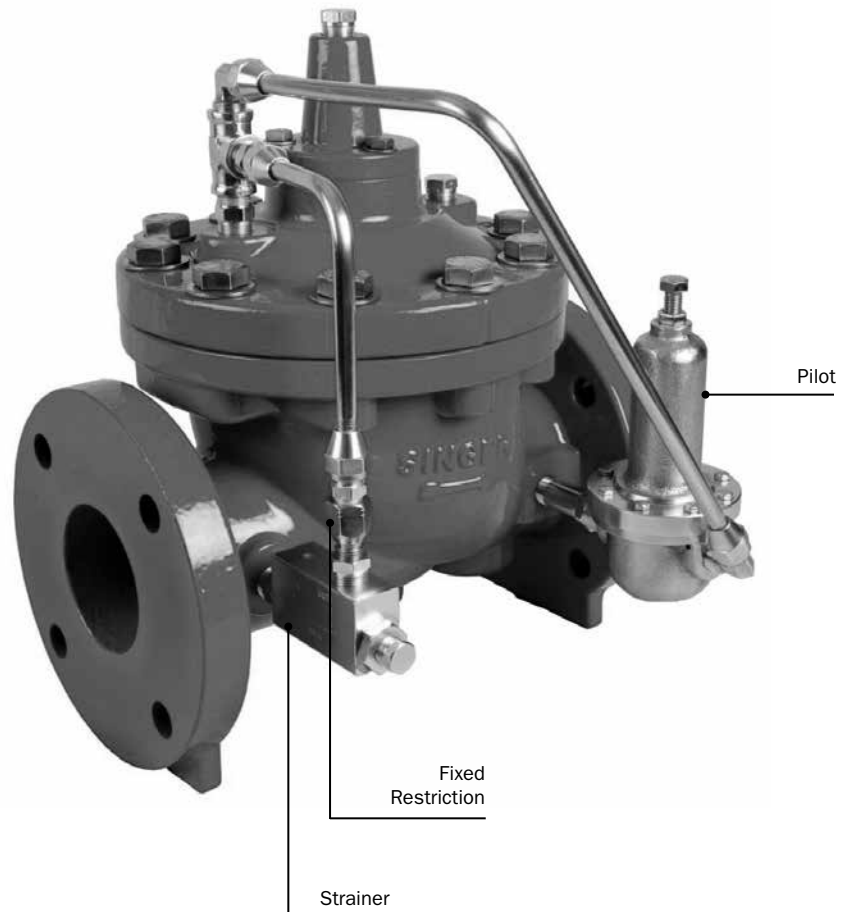
OVERVIEW

Model PR-10159 is a pilot operated pressure reducing valve designed to automatically reduce a high inlet pressure to a lower outlet pressure. The valve will maintain a relatively steady downstream pressure regardless of fluctuations in the supply pressure or flow rate.

Maximum Pressure

- For sizes up to and including 4", maximum inlet pressure is 300 psig.
- For the 6" and 8" sizes, the maximum inlet pressure is 300 psig.
- The outlet pressure setting range for all sizes is 30-165 psig and shall not exceed 175 psig.

NOTE: With any manufactured product there is a risk of malfunction in service, whether by operating conditions such as a plugged strainer or normal wear and tear. We recommend regular maintenance with frequency to suit the importance to customer's application. We draw attention to our warranty which limits our responsibility to defects in workmanship and materials only. Visit singervalue.com for warranty details.



OPERATION

Model PR-10159 reacts to changes in downstream pressure via Pilot. Since the capacity of Pilot is much larger than that of Fixed Restriction, the state of the pilot (open or closed) determines whether the Main Valve is open or closed. Refer to Model 106-PG 'Operation' for more details.

High Downstream Pressure

When there is no demand (and the downstream pressure is at, or higher than the setting of Pressure Reducing Pilot), Pilot closes. Flow through the pilot circuit is then directed to the bonnet through

Fixed Restriction and Flow Stabilizer, pressurizing the bonnet and closing Main Valve.

Low Downstream Pressure

When flow is required, and downstream pressure is lower than the setting of Pilot, the pilot opens. Flow in the pilot circuit is greater from the bonnet to downstream. The bonnet therefore depressurizes, opening Main Valve.

At zero flow conditions, the maximum increase in downstream pressure will be within 10% of the set pressure or will not exceed 7 psi.

Modulating

Under flowing conditions below the set point of Pilot, the pilot reacts to small changes in downstream pressure and modulates the bonnet pressure (and Main Valve position) as required to keep the downstream pressure constant.

The speed of opening and closing of the main valve depends on the setting of Model 26 Flow Stabilizer. Refer to Model 26 instructions for details and adjustment.

INSTALLATION AND ADJUSTING PROCEDURE

Installation is to be done in accordance with NFPA 13, the Standard for Installation of Sprinkler Systems, or NFPA 14, the Standard for Installation of Standpipe and Hose Systems, as applicable.

1. Model S106-PR-10159 shall be installed on systems not exceeding the valve end configurations working capabilities.
2. Pressure gauges MUST be installed on the inlet and outlet piping of the valve.
3. If valve is for use with Standpipe and Hose Systems, refer to NFPA 14 for minimum installation requirements.

4. Refer to (S)106-PG 'Installation' for other installation requirements.

5. Installation with loosely held piping and/or elbows close to the valve may cause the valve to pulsate.

NOTE: For a valve intended for use in sprinkler systems, as indicated by NFPA 13:

A relief valve at least 1/2" (13 mm) in size with adequate drainage is to be installed on the downstream side of this valve. The relief valve must be set above the "lock-up" or "zero flow" shutoff pressure which is approximately between 4 to 10 psi higher than set pressure.

Adjustment

1. Open Isolating Valves (2), (5) and (7) (if so equipped).
2. Crack outlet stop valve and slowly open inlet stop valve wide.
3. Bleed air from Main Valve bonnet. See (S)106-PG 'Installation'.
4. Open outlet stop valve wide.
5. Set reduced (downstream) pressure by turning Pilot (6) adjusting screw: To increase pressure, turn adjusting screw **clockwise**.

- To reduce pressure, turn adjusting screw **counter-clockwise**.

NOTE: There must be flow through the valve when pressure is adjusted.

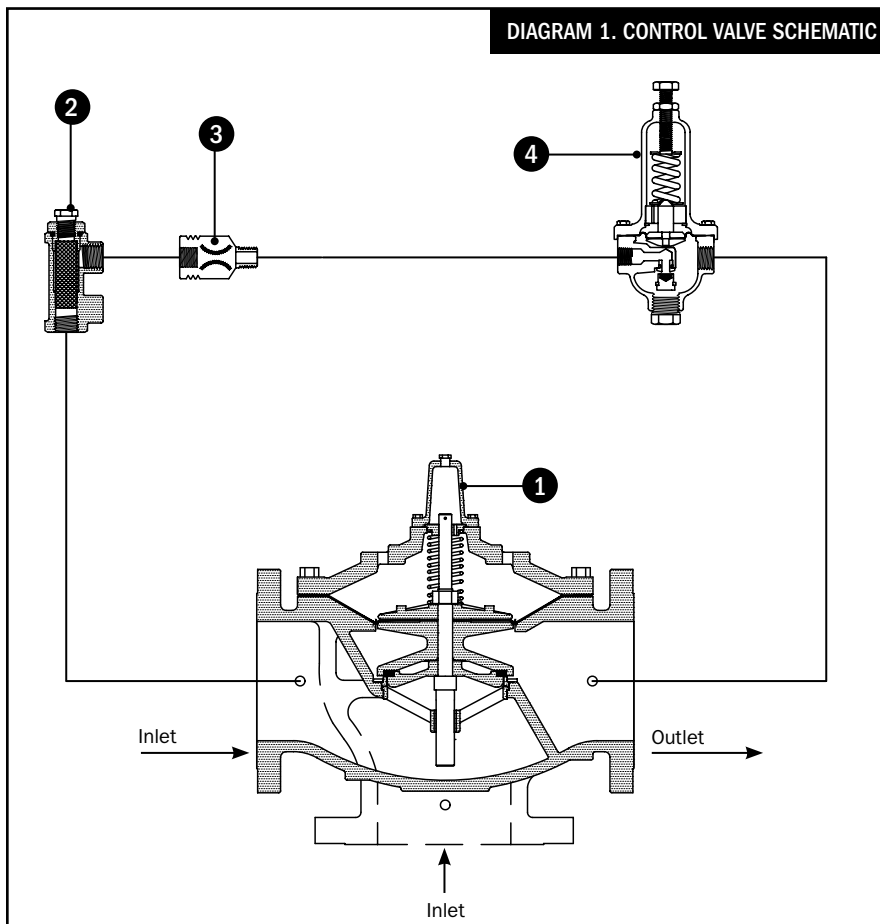
6. If the valve does not open (pressure remains low), check the adjustment of Pressure Reducing Pilot (6).

7. If the valve begins to oscillate or hunt, bleed air from Main Valve bonnet. See (S)106-PG 'Installation'.

PARTS LIST

ID	PART	DESCRIPTION
1	Main Valve	(S)106-PG or (S) A106-PG
2	Strainer	J0098A
3	Fixed Restriction	
4	Pressure Reducing Pilot	Model 161-PR, Range 30-165 psi

Tubing Option: Copper.



NOTE: For dimension information and material specifications see component data sheets.

PR-10159 PRESSURE REDUCING VALVE

CARE / MAINTENANCE

Testing after installation is to be done in accordance with NFPA 13 or NFPA 14, or both NFPA 13 and 14, whichever is applicable, and tested periodically thereafter in accordance

with NFPA 25, the Standard for Inspection, Testing, and Maintenance for Water-Based Fire Protection Systems requirements.

In addition to service suggestions listed under NFPA 25 refer to (S)106-PG Service Suggestions.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Valve Fails to Open	1. Insufficient inlet pressure	1. Check inlet pressure source and increase as needed
	2. Pressure in the bonnet not being released: a) Isolating valves on pilot lines closed b) Pilot components not functioning c) Foreign material in pilot system	2. Try the following: a) Open valves b) Refer to specific instructions on pilot components c) Clear obstruction
Valve Fails to Close	1. Lack of pressure in bonnet due to: a) Pilot components not functioning b) Foreign material in pilot system c) Ruptured diaphragm d) Obstruction in the valve e) Worn main valve disc f) Plugged pilot strainer	1. Try the following: a) Refer to specific instructions on pilot components b) Clear obstructions c) Replace worn parts d) Remove obstructions e) Replace disc f) Flush strainer free of debris
	1. Air in the bonnet	1. Vent air (refer to "Installation" #16)
Pulsations Occurring	2. Improper adjustments to pilot components	2. Refer to specific instructions on pilot components
	3. Valve oversized	3. Smaller valve may be more suitable

OVERVIEW

The 106-PG (flat diaphragm) and (S)106 -PG (single rolling diaphragm) valves (**Pic. A**) are the main valves used for Singer® control valve systems.

Unless otherwise specified, the valve is assembled with components suitable for water service up to 180° F (80° C). For other service conditions, contact your Singer representative.

NOTE: This valve must be stored indoors, away from direct sunlight.



OPERATION

Opening and Closing

The opening and closing action is performed by the inner valve assembly, controlled by the pressure in the bonnet chamber above the diaphragm.

The valve opens when:

a) Bonnet chamber is vented downstream with a minimal pressure drop of 10 psi across the main valve.

b) Bonnet chamber is vented to atmosphere with a minimal pressure drop of 5 psi across the main valve.

The valve closes when:

a) Bonnet is pressurized by upstream pressure or an external pressure (equal to or higher than line pressure), sealing the inner valve to the seat area tight.

Modulating

The valve can be made to modulate by varying the bonnet pressure between inlet pressure and outlet pressure. This is done by the pilot circuit.

INSTALLATION

1. Use washers under nuts when bolting valve flanges to pipe flanges to protect the Epoxy Coating.

2. It is recommended that valves be installed in a horizontal pipe with the bonnet up for more convenient access for maintenance. However, smaller valves (6" and smaller) may be installed in a vertical pipe if the order states the orientation.

3. A stable, continuous source of pressure is necessary to operate a pilot operated control valve.

4. Operating fluid must be clean and free of air.

5. Under high velocity conditions, when the pressure signal is located at main valve inlet, it may be adversely affected. When possible, a more suitable location should be used. For example, a relief valve will

operate more effectively and control more accurately if the operating pressure and sensing pressure is connected to the header.

6. Six pipe diameters of straight pipe on the inlet of any control valve is recommended but:

a) Fully open **Gate Valve** can be installed on the inlet of a valve, provided it is used as an isolating valve and never used in partially open condition.

b) A **Butterfly Valve** with stem horizontal cannot be installed in the inlet of a control valve unless operating pressure and sensing lines are connected upstream of the butterfly valve, in a location that gives true system pressure.

c) A **Butterfly Valve** with stem vertical can be installed in the inlet

of a control valve as long as velocity does not exceed 15 ft / sec. The butterfly valve can not be used for throttling. If problems develop at high flows, operating pressure and possible sensing can be connected upstream of the butterfly valve, in a location that gives true system pressure.

d) A **Control Valve** can be installed with no straight pipe on the inlet if the operating and sensing lines are connected to a location that gives true system pressure. The connection point should be made at the pipe center line to avoid air pick-up at the top of the pipe.

7. This valve is shipped with air pressure in the bonnet. Do not open the Bonnet Isolating Valve until the valve has been installed and ready for pressurization.

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(S)106-PG – Single Chamber, Hydraulically Operated Valve

INSTALLATION (CONT.)

8. It is possible that diaphragms may take a set after shipping and storage. It is highly recommended that Bonnet and Body Bolts or Nuts be tightened after installation but before pressurizing the valve. If a leak develops after pressurizing, de-pressurize the valve and tighten the bolts or nuts.

9. For most convenient operation and maintenance, line isolation valves should be installed.

10. A suitable bypass should be provided to allow for servicing of the valve without interrupting the flow.

11. Install pressure gauges upstream and/or downstream of valve as appropriate. This will facilitate ease of setting the pilot system.

12. A strainer with a suitable basket should be installed ahead of the valve to protect it from foreign material.

13. Sufficient space should be provided around the valve for disassembly.

14. Flush system of all debris before installing the valve.

15. Check direction of flow (inlet of valve is marked OR an arrow

on the side of body indicates flow direction) and install the valve accordingly.

16. Vent air from the bonnet:

Valves with no Limit Switch:

Loosen pipe plug at the centre of the bonnet to bleed air. If equipped with position indicator, use bleed-valve on indicator.

Valves with Limit Switch:

Refer to Drawing and use bleed screw to vent air.

MAINTENANCE

The Singer® Model (S)106-PG requires minimal maintenance.

All parts are accessible for inspection and repair without removing the valve from the line.

1. Close upstream and downstream isolating valves.

2. Disconnect body and bonnet pilot lines.

3. Remove bonnet. If bonnet does not come free readily, it can be pried loose with a small pry-bar.

4. Remove inner valve assembly for inspection. Do not remove seat ring

unless inspection shows that it is damaged or debris is found below the guide assembly. Be very careful not to damage the epoxy coating when removing and installing the inner valve assembly.

5. Replace worn or defective parts as necessary and reassemble.

PR-10159 PRESSURE REDUCING VALVE

161-PR Pressure Reducing Pilot

DESCRIPTION / OPERATION

Model 161-PR is a direct acting, spring and diaphragm type pressure reducing pilot. The valve is held open by an adjustable spring.

Operation

The setpoint of the Model 161-PR is determined by the compression of Spring. The spring provides

a constant downward force on diaphragm, while the outlet pressure acting under the diaphragm opposes the spring, which closes valve.

INSTALLATION / ADJUSTMENT

1. Install the Pilot as shown in the enclosed schematic or drawing.
2. Note the direction of flow and install the valve accordingly.
3. The valve should be installed with the adjusting screw pointing up.

Adjustment

1. Turning the Adjusting Screw (#17, page 10) **clockwise** increases the setting of the pilot, providing a higher downstream pressure.
2. Turning Adjusting Screw **counter-clockwise** decreases the setting of the pilot, providing a lower downstream pressure.

Note: Range of adjustments and corresponding pressures are also shown on the name plate on the body of the pilot.

SPRING RANGE (PSI)	ADJUSTMENT (PSI / TURN)
30 – 165	26

MAINTENANCE

Disassembly

1. Close upstream and downstream isolating valves.
2. Remove the entire pilot from the system.
3. Remove the adjusting screw.
4. Remove the Body Screws and remove the spring casing assembly.
5. Loosen the diaphragm if it adheres to the body and remove the Stem / Yoke assembly. Be careful to avoid damage to the stem as

any additional friction between the Stem and Guide Bushing can affect performance.

Inner Valve Replacement

1. Hold the Inner Valve hex in a vise and use a screwdriver or similar tool to turn the Yoke.

Diaphragm Replacement

1. Hold the inner valve hex in a vise and use a screwdriver to turn the stem **counter-clockwise** using the slot at the top of Stem.

If required, use a secondscrewdriver or similar tool at the Yoke to prevent the yoke from turning. When doing so, take extra care to avoid damage to the stem guiding surface.

2. Replace the diaphragm in the same orientation as the original one, straddling the legs of the yoke.

Assembly

Reassembly is the reverse of disassembly. Ensure that parts are replaced in the sequence shown on the drawing.

TESTING PROCEDURE

1. Connect a source of air or water to the inlet.
2. Attach a 3/8" line with a pressure gauge and shut-off valve to the outlet.

3. Back off the adjusting screw, then proceed to turn it in. The gauge should show an increase within the range marked on the valve.

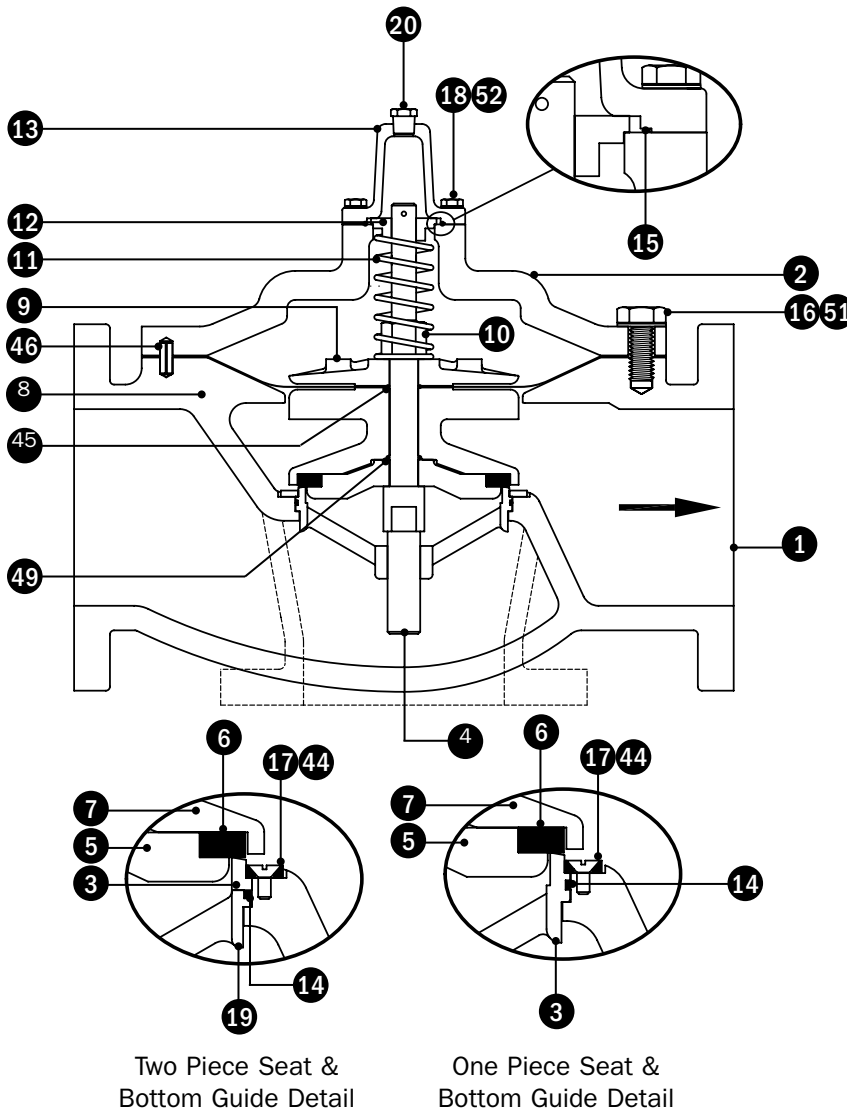
4. Open the shut-off valve slightly and bleed flow to atmosphere. Pressure should drop slightly and return to setting when the shut-off valve is closed. This check should be repeated at various settings.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Main Valve Fails to Open	1. Pilot setting too low	1. Raise setting (turn adjusting screw clockwise)
Main Valve Fails to Close	1. Pilot setting too high	1. Lower setting (turn adjusting screw counter-clockwise)
	2. Obstruction on seat	2. Locate and remove obstruction
	3. Ruptured diaphragm	3. Replace diaphragm
	4. Worn inner valve	4. Replace inner valve

PR-10159 PRESSURE REDUCING VALVE

Parts



PARTS LIST

ID	DESCRIPTION	MATERIAL
1	Body	Ductile Iron/ NAB/ SS
2	Bonnet	Ductile Iron/ NAB/ SS
3	Seat Ring	Stainless Steel (See Note 2)
4	Stem	Stainless Steel
5	Disc Retainer	Ductile Iron (See Note 3)
6	Resilient Disc	EPDM or Buna-N
7	Inner Valve	Ductile Iron/ NAB/ SS
8*	Diaphragm	EPDM or Buna-N
9	Clamp Plate	Ductile Iron/ NAB/ SS
10	Stem Nut	Brass B-16
11	Spring	Stainless Steel
12	Guide Bushing	Brass B-16
13	Stem Cap	Ductile Iron/ NAB/ SS
14*	Seat Ring Seal	Buna-N
15*	Stem Cap Seal	Buna-N
16	Bonnet Bolt	Stainless Steel
17	Seat Ring Screws	Stainless Steel 2
18	Stem Screw	Stainless Steel
19	Bottom Guide	Ductile Iron & Bronze (See Note 4)
44	Seat Retaining Washer	Stainless Steel (See Note 1)
45*	Diaphragm Seal	Buna-N
46	Locating Pin	Stainless Steel
49*	Disc Retainer Seal	Buna-N
51	Bonnet Washer	Stainless Steel
52	Stem Cap Washer	Stainless Steel

*Recommended spare parts (included in Rebuild Kit).

NOTES:

1. Not required on size 2 - 1/2", (One piece seat ring and guide, shown as item 3).

2. On sizes 2 - 1/2" - 8" items 3 & 19 may be one piece; material - Stainless Steel.

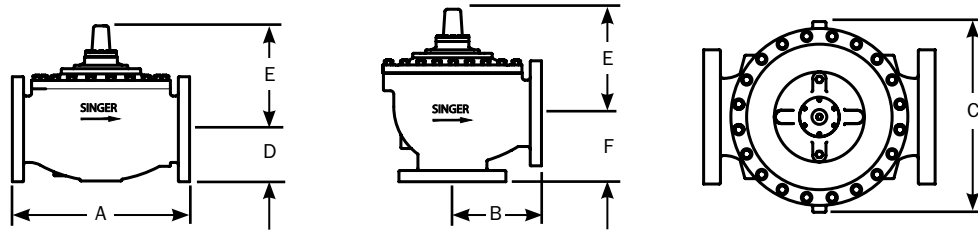
3. On sizes 2 - 1/2" & 3", material is brass B-16. On size 4", material is bronze.

4. On size 3", material is bronze B-62.

PR-10159 PRESSURE REDUCING VALVE

Dimensions

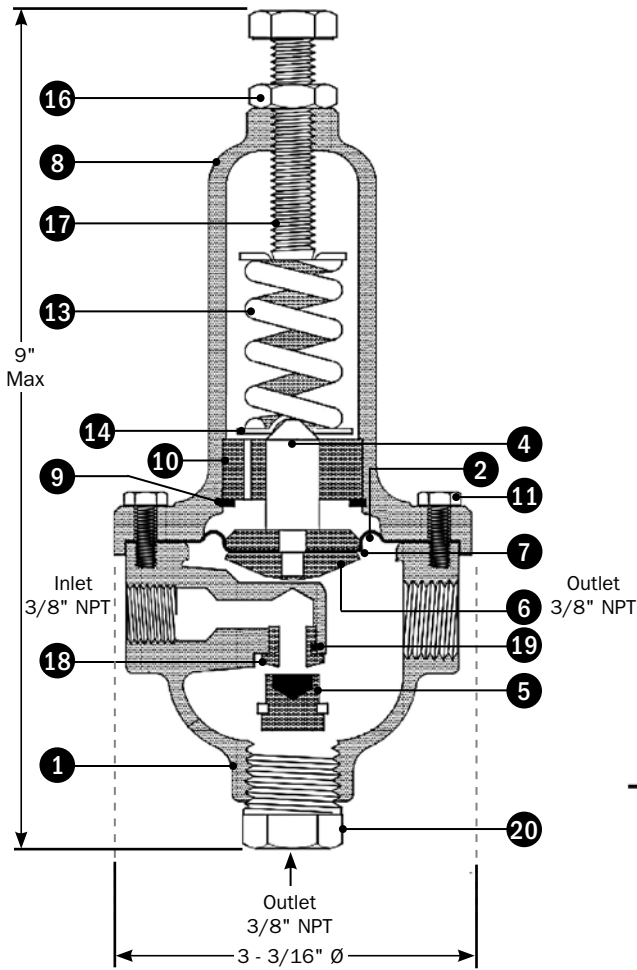
DIMENSIONS



106-PG & A106-PG		GLOBE		GLOBE & ANGLE		ANGLE		
		A	D	E	C	B	E	F
2 - 1/2" 65 mm	NPT/ BSPT	11" 279 mm	3.38" 86 mm	7.50" 191 mm	8.19" 208 mm	5.50" 140 mm	7.50" 191 mm	4" 102 mm
	150F/ PN10, PN16, PN25, PN40	11" 279 mm	3.50" 89 mm	7.50" 191 mm	8.19" 208 mm	5.50" 140 mm	7.50" 191 mm	4" 102 mm
	300F	11.63" 295 mm	3.75" 95 mm	7.50" 191 mm	8.19" 208 mm	5.88" 149 mm	7.50" 191 mm	4.31" 110 mm
3" 80 mm	NPT/ BSPT	13.50" 343 mm	3.68" 94 mm	8" 203 mm	9.25" 235 mm	6.63" 168 mm	8" 203 mm	4.63" 118 mm
	150F	12" 305 mm	3.75" 95 mm	8" 203 mm	9.25" 235 mm	6" 152 mm	8" 203 mm	4" 102 mm
	300F	13.25" 337 mm	4.13" 105 mm	8" 203 mm	9.25" 235 mm	6.38" 162 mm	8" 203 mm	4.38" 111 mm
	PN10, PN16, PN25, PN40	12.25" 311 mm	4" 102 mm	8" 203 mm	9.25" 235 mm	6.38" 162 mm	8" 203 mm	4.38" 111 mm
4" 100 mm	150F/ PN10, PN16, PN25, PN40	15" 381 mm	4.60" 117 mm	9.15" 232 mm	10.88" 276 mm	7.50" 191 mm	9.15" 232 mm	5" 127 mm
	300F	15.63" 397 mm	5.09" 129 mm	9.15" 232 mm	10.88" 276 mm	7.88" 200 mm	9.15" 232 mm	5.31" 135 mm
6" 150 mm	150F/ PN10, PN16	20" 508 mm	5.60" 142 mm	11.75" 299 mm	16.63" 422 mm	10" 254 mm	11.75" 299 mm	6" 152 mm
	300F/ PN25, PN40	21" 533 mm	6.34" 161 mm	11.75" 299 mm	16.63" 422 mm	10.50" 267 mm	11.75" 299 mm	6.50" 165 mm
8" 200 mm	150F/ PN10, PN16	25.38" 645 mm	7.63" 194 mm	14.91" 379 mm	21.63" 549 mm	12.75" 324 mm	14.91" 379 mm	8" 203 mm
	300F/ PN25, PN40	26.38" 670 mm	7.88" 200 mm	14.91" 379 mm	21.63" 549 mm	13.25" 337 mm	14.91" 379 mm	8.50" 216 mm

PR-10159 PRESSURE REDUCING VALVE

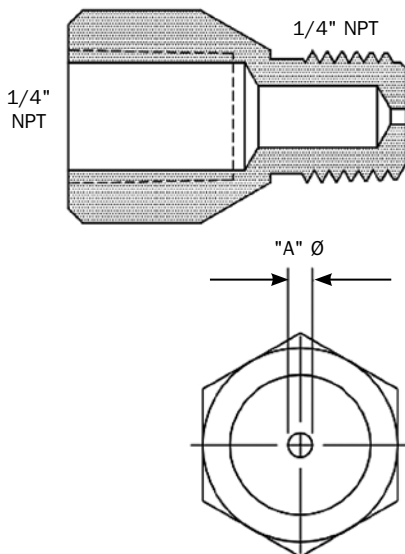
161-PR Pressure Reducing Pilot Parts & Dimensions



PARTS LIST

ID	DESCRIPTION	MATERIAL
1	Body	Stainless Steel
2	Diaphragm	EPDM
3	Outlet Connector	Stainless Steel
4	Stem	Stainless Steel
5	Inner Valve	Stainless Steel and EPDM
6	Yoke	Stainless Steel
7	Clamp Plate	Stainless Steel
8	Spring Casing	Stainless Steel
9	Retaining Ring	Stainless Steel
10	Guide Bushing	Delrin
11	Casing Screw (8)	Stainless Steel
13	Spring	Spring Steel
14	Spring Step (2)	Stainless Steel
16	Locknut	Stainless Steel
17	Adjusting Screw	Stainless Steel
18	Seat Ring	Stainless Steel
19	Seat Ring Seal	Buna-N
20	Plug, 1/2 NPT	Brass

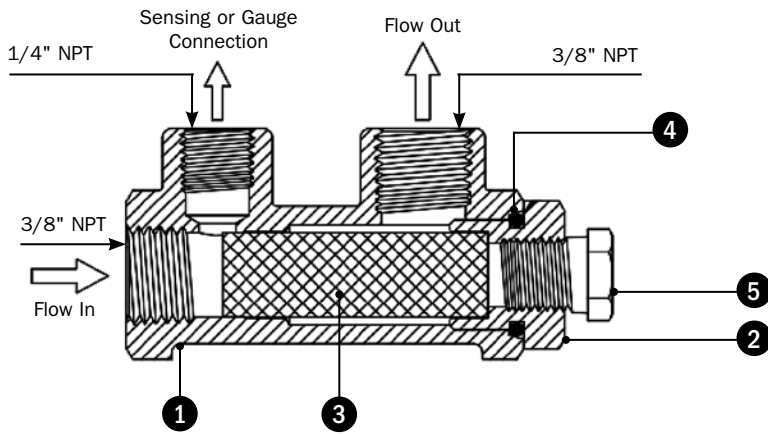
FIXED RESTRICTION



"A" DIAMETER	NO. OF ID GROOVES	STAINLESS STEEL 303 PART NUMBER	STAINLESS STEEL 316 PART NUMBER
1/16" (1.6mm)	1	M1009E-SS	M1009E-S3
3/32" (2.4mm)	2	M1149E-SS	M1149E-S3
1/8" (3.2mm)	3	M1010E-SS	M1010E-S3
1/4" (6.4mm)	4	M1997A-SS	M1997A-S3
7/64" (2.8mm)	5	M2023A-SS	M2023A-S3
3/16" (4.8mm)	6	M1813B-SS	M1813B-S3

PR-10159 PRESSURE REDUCING VALVE

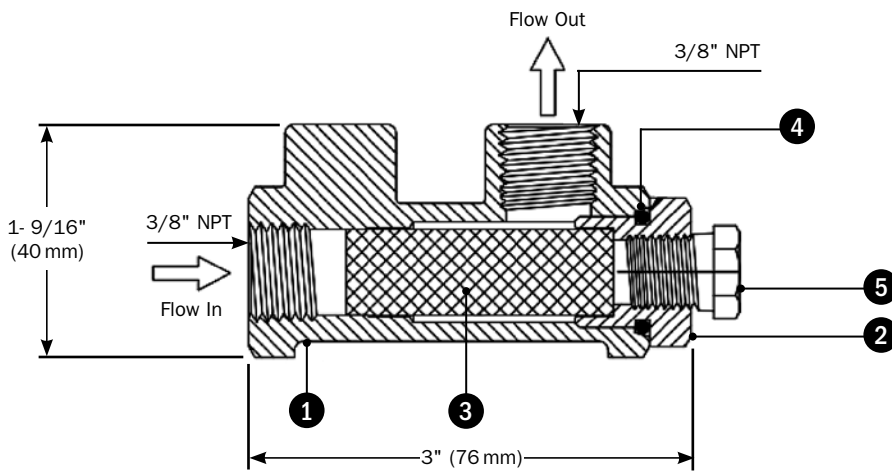
Strainer – Parts & Dimensions



Model J0097A

PARTS LIST

ID	DESCRIPTION	MATERIAL
1	Body	Stainless Steel 316
2	Screen Retainer	Stainless Steel 316
3	Screen (40 Mesh)	Stainless Steel 316
4	Screen Retainer Seal	Buna-N
5	Blow Down Plug	Stainless Steel 316



Model J0098A

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