

# Pressure Regulators

## DESIGN & OPERATION

### One-Piece Design



### Description

A Pressure Regulator is a mechanical device designed to regulate system flow pressure in response to upstream or downstream pressure changes.

### Principles of Operation

Trerice Pressure Regulators are available in two basic configurations: a one-piece design with an integrated actuation system, or a two-piece design comprised of individual components (actuator and globe valve), which are factory assembled into a complete regulator.

#### **One-Piece Pressure Regulators (Series 988, 1002)**

have an internal diaphragm that is attached to a valve plug. The diaphragm is balanced between the downward force of an adjustment spring and the upward force of the reduced downstream pressure within the regulator. As the downstream pressure decreases, the adjustment spring pushes down on the diaphragm, which in turn opens the valve. Conversely, as downstream pressure increases, the diaphragm is forced upward, overcoming the force of the spring and closing the valve.

### Two-Piece Design



**Two-Piece Pressure Regulators (921 Series)** employ a user-supplied pressure line connecting the actuator to the point of regulation within the pipeline or process. The process pressure will depress a diaphragm within the actuator housing and the subsequent movement of the diaphragm will push an attached valve stem to the “in” position. Choice of a stem In-To-Close or stem In-To-Open globe valve will determine if the assembled pressure regulator is for reducing downstream pressure (ITC or normally open) or relieving upstream pressure (ITO or normally closed). This unit features spring-opposed actuation: when the controlled pressure decreases, the adjustment spring will push the diaphragm upward, which will in turn move the valve stem back to the “out” position.

## Selecting a Pressure Regulator

- **Trerice 921 Series Pressure Regulators** provide a quick response to large system load changes, while maintaining precise flow regulation. The 921 Series is capable of both downstream pressure reduction and back pressure relief. Valve sizes from 1/2" through 6" port are available.
- **Trerice 988 Series Pressure Regulators** are designed for steam service and recommended for saturated and superheated steam applications. Valve sizes from 1/2" through 2" port are available.
- **Trerice 1002 Series Pressure Regulators** are designed for high volume water service applications. Valve sizes from 1/2" through 2 1/2" port are available.

All Trerice Pressure Regulators should be carefully selected to meet the demands of the particular application. The information contained within this catalog is offered only as a guide to assist in making the proper selection. Selection of the proper pressure regulator is the sole responsibility of the user. Improper application may cause failure, resulting in possible personal injury or property damage.

Trerice Pressure Regulators are NOT intended for use in applications where the media comes in direct contact with the skin or body, such as showers, baths, lavatories or wash fountains.

## Pressure Range and Set Point

Each Trerice Pressure Regulator is designed to operate efficiently within a specified operating range. The regulator, when properly specified, will modulate pressure flow at the set point desired within the selected pressure range. The set point can be modified using the range adjustment screw provided on the unit.

## Pressure Regulator Valve Availability

Series	Body Material	Connection	Size												
			1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"
921	Bronze	Iron Unions			✓	✓	✓	✓	✓	✓					
	Cast-Iron	Class 125 Flanged									✓	✓	✓	✓	✓
988	Cast-Iron	Threaded			✓	✓	✓	✓	✓						
1002	Bronze	Threaded			✓	✓	✓	✓	✓						
	Cast-Iron	Threaded								✓					

\*Reduced port sizes are available.

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## DESIGN & OPERATION

### Valve

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Trerice Two-Piece Pressure Regulators are available with a wide variety of globe valve designs, materials, connections and sizes.

### Style

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Trerice Pressure Regulator Valve Bodies are available in single seated and double seated designs.

- **Single Seated Valves** are an excellent choice when a higher degree of shut-off is required. However, this design is unbalanced and limited in the pressure that it will shut off against. The leakage rate is approximately 0.1% of the maximum capacity.
- **Double Seated Valves** are nearly pressure balanced and, therefore, are able to close the valve plug against higher operating pressures. However, since temperature fluctuations may cause expansion and contraction across the seats, tight shut-off is not always possible. The leakage rate is approximately 0.5% of the maximum capacity. Double seated valves have a faster flow response and greater capacity than single seated valves, and are recommended when tight shut-off is not required.

**The Trerice Pressure Regulator is a balanced equilibrium system at the set point and provides no power to tightly seat the valve plug. The valve is not considered a shut-off valve. Large pressure surges may force a single seated valve plug open. A power driven or hand actuated valve is required to ensure tight shut-off when necessary.**

### Action

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Trerice 921 Series Pressure Regulators can be specified for use in either pressure reducing or back pressure relief applications. All other Trerice Pressure Regulators are designed for pressure reducing applications only.

Pressure Regulator Valve Action		
Application	Stem Action	Normal (Fail) Position
Pressure Reducing	In-To-Close	Normally Open
Back Pressure Relief	In-To-Open	Normally Closed

## Body Material and Construction

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Trerice Pressure Regulators are available with bronze or cast-iron valve bodies. Union and flanged connection styles are available.

## Trim

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Valve trim is composed of the stem and plug assembly, and the seats within the ports. Trerice single and double seated, bronze valve bodies employ a stainless steel, tapered plug for enhanced modulation, as well as permanently brazed-in stainless steel seats for smooth performance throughout the life of the valve. The valve plug is both top and bottom guided to ensure positive seating alignment.

## Packing

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Trerice valves feature a self-energizing Teflon V-Ring packing, which reduces leakage around the valve stem. V-Ring packing is spring loaded to maintain proper compression and **does not** require manual adjustment.

## Size

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The proper sizing of a regulating valve is one of the most important factors in its selection. A valve that is too small will not be able to provide the desired capacity during peak load conditions, while a valve that is too large may overshoot the control point and operate with the valve plug too close to the seat, resulting in undue wear of the plug and seat. The valve coefficient ( $C_v$ ) is mathematically determined through an evaluation of the system service conditions (operating pressures and flow). From this evaluation, a valve body with the appropriate port size can be selected. Port sizes from 1/4" through 6" and connection sizes from 1/2" through 6" are available. Please consult the Valve Selection Section of this catalog.

## Pipeline Strainer

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A Trerice Series 1100 Pipeline Strainer should always be installed upstream of a Trerice Regulator. This Y-Type strainer employs a stainless steel screen to remove debris from the line, which will prevent jamming of the valve and extend its life.