

PRESSURE REDUCING VALVE

Purpose: Control outlet pressure

Model Number: 23WR

Sizes: 1½" - 3"

Type: Throttling

Primarily Controlled By:

Hydraulic pressure

Located: In line

Purpose: To prevent pressure out of the main valve from exceeding a preset maximum level.

Ends: Female NPT or flanged

Inlet Pressure: Maximum: 300 psi

Inlet Pressure: Minimum: 20 psi

Class: 125 ANSI for inlet pressures to 180 psi
250 ANSI for inlet pressures to 300 psi

Discharge pressure: 5 psi - 250 psi

Fluid: Cold water service

Construction: Cast iron body/bronze cover, pilot, piston and internal trim

Control Valves:

Orifice

Pilot: Pressure Reducing: Model 23WR

See overall parts lists and specific parts information for complete details.

Options

1. All bronze body
2. Stainless steel trim
3. Indicator Rod

Customized Features

Any one or a selection of features can be added to the basic pressure reducing valve.

Code

1E - All External Controls

BP - Back Pressure Sustaining Pilot Valve

SC or **SO** - Solenoid Pilot Valve: 2 Way

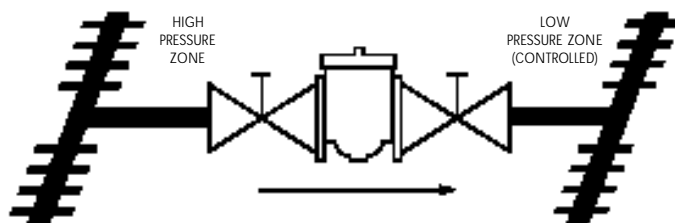
SG or **SF** - Solenoid Pilot Valve: 3 Way



Ross engineers customize the basic **23WR** to accommodate individual needs.

Basic Applications

1. Utilize water reserves in adjacent systems under emergency conditions.
2. Control large quantities of water while holding close limits on downstream pressure.



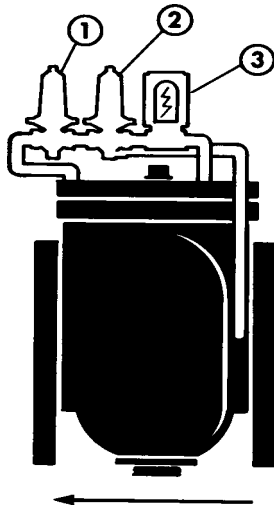
If: Supply pressure is higher than user capacity

Ross Main Valve will: Throttle to pass only enough water to the user to maintain a preset lower pressure.

PRESSURE REDUCING VALVE

Customized Features

Model Number: 23WR



FEATURES

- 1 Pilot Valve (Standard)
- 2 BP - Back Pressure Sustaining Pilot Valve
- 3 SC/SO - Solenoid Pilot (2 Way - N.O. or N.C.)

1E - All External Controls

Primarily Controlled By: Hydraulic pressure (upstream)

Located: Complete control circuit is piped externally on the main valve.

Purpose: Facilitates easy access to all controls, including pilot valve, needle valve, strainer, and isolation valves.

BASIC APPLICATION: While supplying controlled pressure to the downstream zone, this feature also allows for manual operation of the main valve (through manipulation of isolation valves in external control piping).

BP - Back Pressure Sustaining Pilot Valve

Primarily Controlled By: Hydraulic pressure (upstream)

Located: On external control circuit in series with the pressure reducing pilot valve

Purpose: To prevent inlet pressure from falling below a preset minimum level

BASIC APPLICATION: Protect a supply system or transmission line against low pressure caused by excessive flow rates through the pressure reducing valve by causing it to discharge just enough water to sustain an acceptable preset inlet pressure.

SC - Normally Closed:

SO - Normally Open:

Solenoid Pilot Valve - 2 Way

Primarily Controlled By: Electricity

Located: On external control circuit in series with the pressure reducing pilot valve

A pilot port controls flow through external piping out of the operating chamber.

Purpose: To override hydraulic pilot to close the main valve

BASIC APPLICATION:

1. Remotely start and stop flow through various lines within a system.
2. Allow the main valve to function in a predetermined manner in case of power outage.

OPERATION: Energizing and de-energizing the solenoid pilot controls the main valve.

OPTION 1 - Solenoid pilot can be:

Closed when **de-energized** which locks the main valve closed.

Open when **energized** which allows the main valve to operate as a pressure reducing valve.

OPTION 2 - Solenoid pilot can be:

Open when **de-energized** which allows the main valve to operate as a pressure reducing valve.

Closed when **energized** which locks the main valve closed.

SG

- Opens Valve When Energized:

SF

- Opens Valve when De-energized:
Solenoid Pilot Valve - 3 Way

Primarily Controlled By: Electricity

Located: On external control circuit in series with the pressure reducing pilot valve

Three openings and two ports control pressure in the operating chamber:

- 1 Opening - to the operating chamber
- 1 Opening - to the line (controlled by 1 port)
- 1 Opening - to waste (controlled by 1 port)

A 3 way solenoid pilot is always open to the operating chamber.

Purpose: To override hydraulic pilot and lock the main valve in a WIDE OPEN position

BASIC APPLICATION:

1. Remove the valve's control over line flow/pressure so the system operates as if no valve is involved.
2. Allow the main valve to function in a predetermined manner in case of a power outage.

OPERATION: Energizing and de-energizing the solenoid pilot controls the main valve.

OPTION 1 - When the pilot is:

De-Energized - Port to the line opens/waste port closes which allows the main valve to operate as a pressure reducing valve.

Energized - Port to the line closes/waste port open which locks the valve in a WIDE OPEN position

OPTION 2 - When the pilot is:

De-Energized - Port to the line closes/waste port opens which locks the valve in a WIDE OPEN position.

Energized - Port to the line opens/waste port closes which allows the main valve to operate as a pressure reducing valve.

PRESSURE REDUCING VALVE

Operation

COMMON CONFIGURATIONS

- 1 23WR-BP
- 2 23WR-SO OR 23WR-SC
- 3 23WR-BP-SC or 23WR-BP-SO

Control Unit

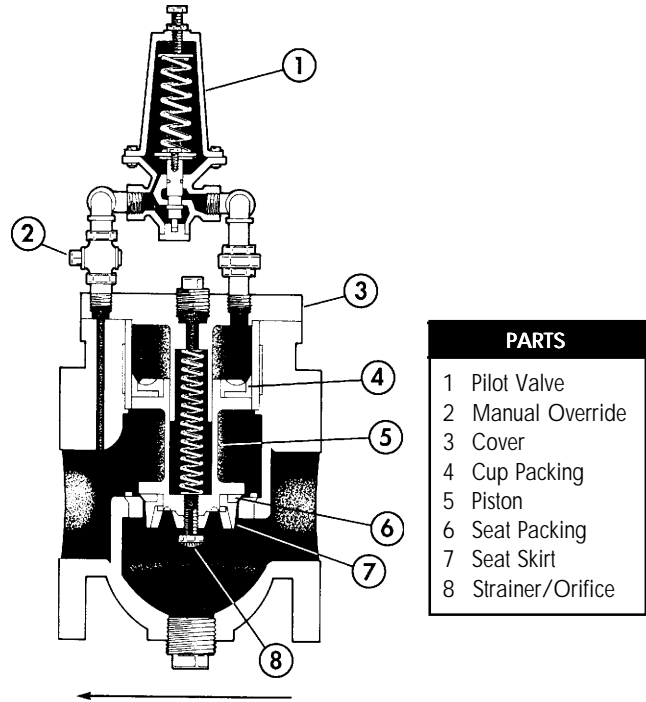
By regulating the flow in and out of the operating chamber, an external piping circuit accurately controls the piston position. It includes:

1. External piping - Two basic segments are attached to the hydraulic pilot valve on one end. One each is also attached to the
 - a. Operating chamber.
 - b. Channel leading to the main valve discharge side.
2. Hydraulic pilot valve - Controls water flow out of the operating chamber by means of a diaphragm which is held in balance between a spring load on its top side and downstream pressure which enters through a small orifice underneath. (The spring resistance is preset and can be adjusted when pressure requirements change.)

Operation

Because of the straight forward interaction between the control unit and the piston, the valve automatically delivers a smooth flow while providing a sensitive pressure reducing function.

1. When water flows out of the main valve at a preset pressure level, the
 - a. Control unit causes water to flow at an equal rate in and out of the operating chamber.
 - b. Piston rests in a mid open/closed position.
2. When downstream (user) pressure increases, the
 - a. Downstream water exerts upward pressure on the downstream channel, back up through the external piping into the pilot valve.
 - b. Pressure increases through a channel in the pilot, pushes up the pilot diaphragm.
 - c. Pilot seat closes.
 - d. Pressure builds up in the operating chamber, pushing the piston down.
 - e. Main valve gradually closes.
3. When downstream (user) pressure decreases, the
 - a. Pressure on the outlet side of the pilot valve decreases.
 - b. Pressure under the pilot diaphragm, falls below the preset spring load pressure which pushes it down.
 - c. Pilot seat opens, letting increased water flow out of the operating chamber.
 - d. Pressure in the operating chamber drops as more water flows out than is let in through the strainer/orifice valve.
 - e. Piston gradually rises and the main valve opens accordingly.



PARTS

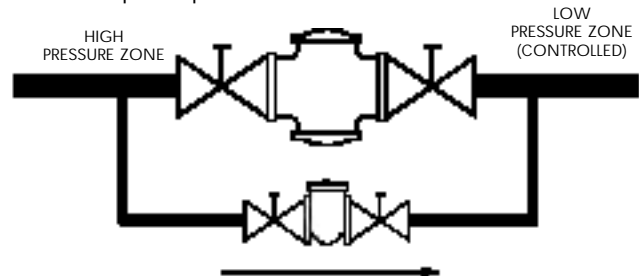
- 1 Pilot Valve
- 2 Manual Override
- 3 Cover
- 4 Cup Packing
- 5 Piston
- 6 Seat Packing
- 7 Seat Skirt
- 8 Strainer/Orifice

Recommendation for 40WR Installation

When a wide range of flows is required for a 40WR installation, this smaller 23WR valve can be installed on a parallel pipe as follows:

The 23WR valve - Usually adjusted for a discharge pressure setting of 3 to 5 psi above the large valve setting, will handle the low flow requirements.

The large valve - Opens only when the demands exceed the small valve capacity and pressure drops to the large valve preset pressure.



Benefits include:

1. **Reduces maintenance costs** on the larger, more expensive valve which result when the large valve operates at low flows.
2. Reduces noise which occurs when a large valve operates at low flows.
3. Avoids hunting action of a single large valve operating at low flows and the resulting pressure fluctuations.
4. Provides uninterrupted service while repacking one of the reducing valves.
5. Minimizes the effects of failure of a single large unit.

Factory: Telephone (518) 274-0961; Fax (518) 274-0210

PRESSURE REDUCING VALVE

Model Number: 23WR

Cavitation

Cavitation may occur when 2 factors, a high pressure drop combined with a low outlet pressure, are present. Cavitation damage is caused by the collapse of the small cavities formed in the fluid stream during the sudden decrease in pressure. When the valve body or pipe walls confine the fluid stream and raise the pressure above the vapor pressure of the "bubbles", minute implosions occur resulting in extremely high impact forces. Where these implosions contact the valve parts, structural damage will result. If conditions for cavitation are expected, consult a Ross engineer.

Sizing

DO NOT OVERSIZE.

Ideal Operating Position: 20% to 100% open - In this position seat erosion is at a minimum and pressure control is stable.

Maximum Flow Rates: Limit line velocity to approximately 15 fps. The valve is capable of passing larger quantities of water for short periods of time. Sustained rates at higher levels may result in high and increased valve maintenance.

Minimum Flow Rates: Intended for sustained flow rates. Valves in good operating condition can shut off drop tight and handle lower flows. Sustained rates at lower levels may result in high maintenance costs.

Caution

1. If the inlet pressure falls below anticipated levels when the pilot was set, the reduced inlet pressure may effect the discharge pressure.
2. Consider stainless steel trim if low rates are expected for long periods of time.
3. DON'T USE in closed systems where quick acting valves are installed.

Note

It is important to service the pilot periodically in order to insure a smooth flow. This may require periodic shutdown of the system.

Consult a Ross Representative

1. For recommendations if conditions for cavitation are encountered.
2. To recommend correct valve sizing.
3. To build a customized valve for any specific requirements

ROSS ADVANTAGE

1. Ross engineers provide in depth service based on:
 - a. state of the art technology and
 - b. the company's experience which dates back to 1879.
2. Globe body design provides most desirable characteristics for pressure reduction.
3. Throttling action of the piston gives a relatively unobstructed flow at maximum flow rates.
4. Valve operates totally on hydraulic pressure. No external controls are needed.
5. Valve is completely pre-piped, tested and adjusted in the factory.
6. Rugged construction materials provide a longer valve life and insure that the valve WILL NOT experience sudden breakdowns due to component failures.
7. All parts are built and manufactured in the USA.

Additional Information

Item	Page
Differential Pressure Guide	EN - 5
Dimensions - Valve	EN - 22
- Strainers	EN - 26
Head Loss Guide	EN - 2
Parts List - Valve	EN - 37
- Strainers	EN - 42
Solenoid Pilot Valves	EN - 48, 49

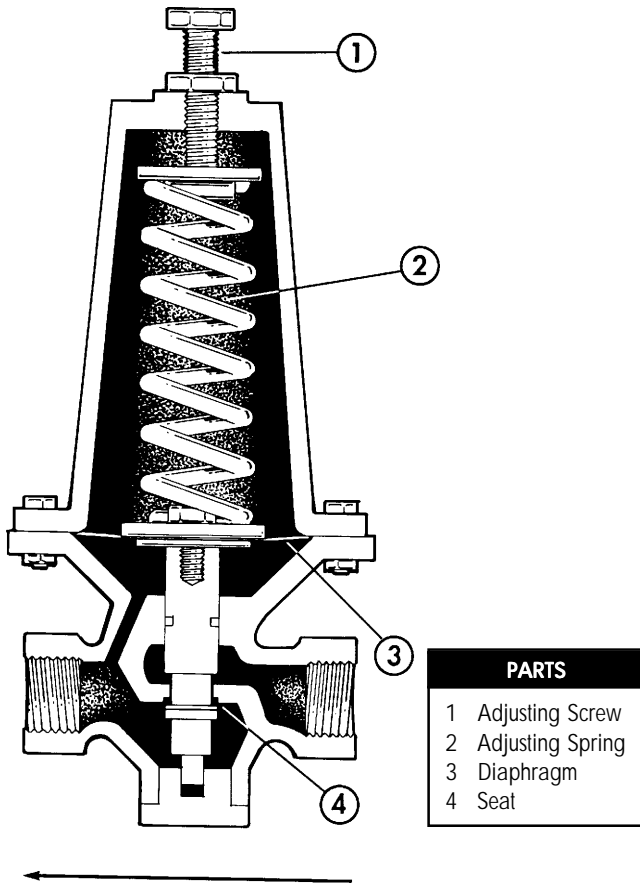
Approximate Shipping Weights (lbs.)

Valve Size	1 1/2"	2"	2 1/2"	3"
125 lb.	35	55	75	80
250 lb.	42	65	85	90
NPT	30	50	70	75

PRESSURE REDUCING VALVE

Pilot Valve

Specifications



Basic Valve: Pressure Reducing 23WR

The pressure reducing valve shall maintain a pre-adjusted downstream pressure regardless of changes in flow rate.

The pressure reducing valve shall reduce a high incoming pressure to a lower, constant discharge pressure regardless of variations in flow rate or changes in upstream pressure.

The pressure reducing valve shall be an external pilot operated globe type valve ruggedly constructed with a size _____ inch with 125 lb./250 lb. flanged or screwed ends as shown on the drawings.

The piston shall be sealed with a replaceable synthetic mechanical seal to allow maximum stroke.

The piston shall be sealed with a synthetic elastomer seal to insure tight closure.

The seat design shall incorporate either a sawtooth (V port) or parabolic bronze skirt to provide gradual change of flow area when the piston is operating near the seat.

The external pilot valve shall be easily adjustable over a wide range of pressure and be equipped with a manual override to lock the pressure reducing valve closed.

The pilot valve and all associated piping and fittings necessary for proper operation shall be factory assembled and furnished with the pressure reducing valve.

(Option) The valve shall include a position indicator to show position of opening of the stem.

Pilot: Internal Sensing Port

Primarily Controlled By:

Hydraulic pressure (down stream)

Located: In external piping

Purpose: To control mainline flow out of the mainline valve

Operation

1. When downstream (user) pressure increases, the
 - a. Pressure backs up through a small channel under the diaphragm, pushes the diaphragm up.
 - b. Pilot seat closes, increasing pressure in the operating chamber.
 - c. Main valve closes accordingly.
2. When downstream (user) pressure decreases, the
 - a. Pressure under the diaphragm decreases.
 - b. Pilot seat opens wider, decreasing pressure in the operating chamber.
 - c. Main valve opens accordingly.

Operation

- 1E - The valve will include **all external controls**.
- BP - The valve will include a **back pressure sustaining pilot** to prevent the incoming pressure from falling below a pre-adjusted minimum.
- SC - The valve will include a **normally closed solenoid** to lock the valve closed when de-energized.
- SO - The valve will include a **normally open solenoid** to lock the valve closed when energized.
- SG - The valve will include a **3 Way solenoid** pilot to open the valve fully when the solenoid is energized
- SF - The valve will include a **3 Way solenoid** pilot to open the valve fully when the solenoid is de-energized.

PRESSURE REDUCING VALVE

Model Number: 23WR

Physical and Chemical Properties

The 125 lb. and 250 lb. flanged assemblies shall conform to ANSI standards for flange thickness and drilling and wall thickness of body and caps.
The valve shall be ruggedly constructed of first class grey iron.
The grey iron shall be free from cold shuts, defective or spongy spots and conforming to ASTM specification A-126 Class B with stainless steel trim.
The bronze parts shall conform to ASTM specification B-62.
The pilot valve shall be bronze.
The cover shall be bronze.
The stem shall be bronze.
The plug shall be bronze.
The seat disc, seat disc ring shall be bronze.
The cup follower shall be bronze.
The piping shall be rigid brass pipe.
The seat ring shall be bronze.
The guide spring shall be stainless steel.
The strainer/orifice shall be Grade 304 stainless steel.
The cup packing shall be made of leather or other soft materials.

(Option) The indicator rod shall be bronze.
(Option) The seat ring shall be Grade 303 / 304 / 316 / CF8M / _____ stainless steel.

Test

The test before shipment may be witnessed by a representative of the Engineers for simulated field conditions and a cold hydrostatic test of at least 100% above the maximum pressure for which the valve is to be operated.

Painting

Ferrous surfaces of the valve shall be coated with NSF Certified Epoxy in accordance with ANSI/NSF Std. 61, and conforms to AWWA D102 Inside System No. 1.

Reference

The valve will be equal in all respects to the basic 23WR _____ model manufactured by the Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy NY 12181

NOTE: To indicate the basic valve with the required customized features, simply add the related codes to the basic valve number.

Example: The valve will be equal in all respects to the 23WR-BP model as manufactured by the Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, NY 12181. (23WR-BP = 23WR with back pressure sustaining pilot valve.)

Customized Feature Codes

- 1E - All External Controls
- BP - Back Pressure Sustaining Pilot Valve
- SC - Solenoid Pilot Valve: 2 Way - Normally Closed
- SO - Solenoid Pilot Valve: 2 Way - Normally Open
- SG - Solenoid Pilot Valve: 3 Way: Opens the Valve When Energized
- SF - Solenoid Pilot Valve: 3 Way: Opens the Valve When De-energized

NOTE: The Ross Valve Mfg. Co., Inc. reserves the right to modify valve construction which will result in equal or superior performance to existing designs. These modifications may be made at any time and at the sole discretion of the manufacturer.