

# PRESSURE REDUCING VALVE

## INSTRUCTIONS

Installation - Operation - Inspection - Maintenance



ROSS MODEL - 98EP  
Direct Acting Pressure Reducing Valve

Serial #S \_\_\_\_\_

**ROSS VALVE** Mfg. Co., Inc.

PO BOX 595, TROY, NY 12181 - PHONE 518/274-0961 - FAX 518/274-0210

# PRESSURE REDUCING VALVE

Purpose: Control outlet pressure

Model Number: 98EP

**Sizes:** 2" - 3"

**Type:** Direct Acting Throttling

**Primarily Controlled By:**

Hydraulic pressure (downstream)

**Located:** In line

**Purpose:** To prevent outlet pressure from exceeding a preset maximum level

**External Piping:** None

**Ends:** Flanged or screwed

**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:** Range 5 – 240 psi

**Fluid:** Cold water service

**Construction:** Cast iron body, bronze internal trim, o-ring packing

**Control Valves:** None

## Options

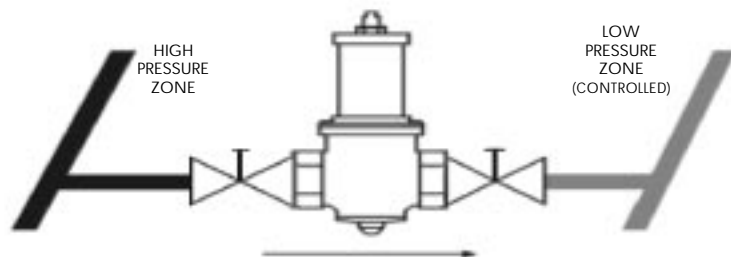
1. All bronze body
2. Stainless steel trim



Ross engineers customize the basic 98EP to accommodate individual needs.

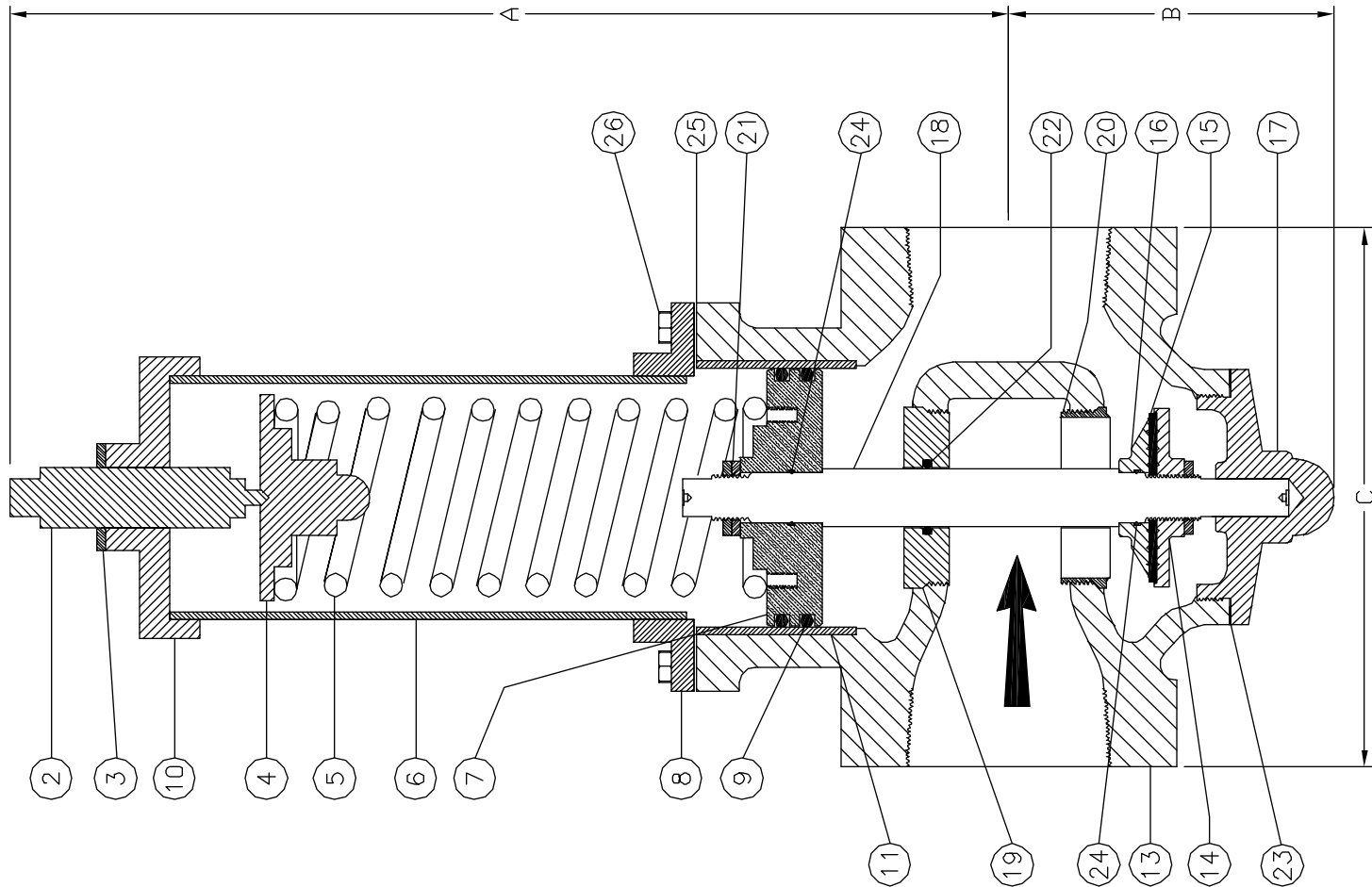
## Basic Applications

1. Utilize reserves in adjacent systems under emergency conditions.
2. Deal with shock waves when the line has other quick acting valves.
3. Service small subdivisions.



**If:** Supply's pressure is higher than the user capacity (User's demand may include quick increases and decreases.)

**Ross Valve will:** Pass only the quantity of water to the user, with a minimum of shock waves, to maintain a preset lower pressure. (adjustable)



| PART | DESCRIPTION           | QTY  |
|------|-----------------------|------|
| 2    | ADJUSTING SCREW       | 1    |
| 3    | LOCK NUT              | 1    |
| 4    | SPRING WASHER         | 1    |
| 5    | SPRING(S)             | VARY |
| 6    | SPRING CHAMBER        | 1    |
| 7    | PISTON                | 1    |
| 8    | SPRING CHAMBER BASE   | 1    |
| 9    | PISTON O-RING         | 2    |
| 10   | SPRING CHAMBER CAP    | 1    |
| 11   | BUSHING               | 1    |
| 13   | SHELL                 | 1    |
| 14   | SEAT PACKING NUT      | 1    |
| 15   | SEAT PACKING          | 1    |
| 16   | SEAT FOLLOWER         | 1    |
| 17   | BOTTOM CAP            | 1    |
| 18   | STEM                  | 1    |
| 19   | STEM GUIDE            | 1    |
| 20   | SEAT RING             | 1    |
| 21   | STEM LOCK NUTS        | 3    |
| 22   | STEM GUIDE O-RING     | 1    |
| 23   | BOTTOM CAP GASKET     | 1    |
| 24   | STEM O-RING           | 2    |
| 25   | COVER GASKET          | 1    |
| 26   | BOLT - SPRING CHAMBER | VARY |

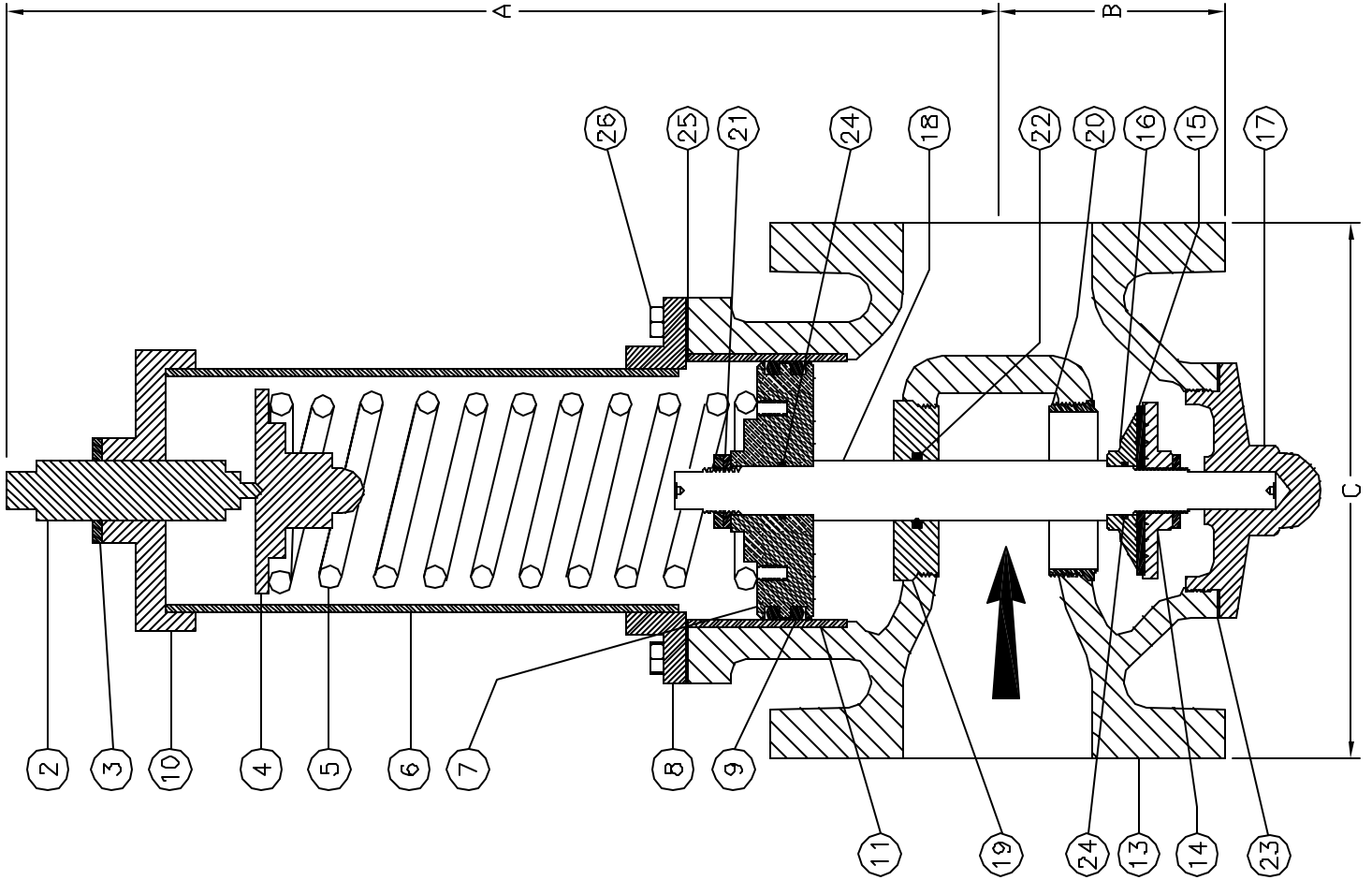
| VALVE SIZE | DIMENSIONS |   |       |
|------------|------------|---|-------|
|            | A          | B | C     |
| 2"         | 15         | 4 | 7-1/2 |
| 2-1/2"     | 18-1/4     | 5 | 8-7/8 |
| 3"         | 18-1/4     | 5 | 8-7/8 |

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 WEBSITE: [www.rossvalve.com](http://www.rossvalve.com) - E-MAIL: [sales@rossvalve.com](mailto:sales@rossvalve.com)

DRAWING 98EP-SCR-SS\_NM      DATE 1-3-06 TJS  
 NO SCALE

Model 98EP

DIRECT ACTING PRESSURE REDUCING VALVE  
 WITH FNPT CONNECTIONS



| PART | DESCRIPTION            | QTY  | MATERIAL    |
|------|------------------------|------|-------------|
| 2    | ADJUSTING SCREW        | 1    | BRONZE      |
| 3    | LOCK NUT               | 1    | BRONZE      |
| 4    | SPRING WASHER          | 1    | CAST IRON   |
| 5    | SPRING(S)              | VARY | STEEL       |
| 6    | SPRING CHAMBER         | 1    | BRONZE      |
| 7    | PISTON                 | 1    | BRONZE      |
| 8    | SPRING CHAMBER BASE    | 1    | BRONZE      |
| 9    | PISTON O-RING          | 2    | BUNA-N      |
| 10   | SPRING CHAMBER CAP     | 1    | BRONZE      |
| 11   | BUSHING                | 1    | AMALGA      |
| 13   | SHELL                  | 1    | CAST IRON   |
| 14   | SEAT PACKING NUT       | 1    | BRONZE      |
| 15   | SEAT PACKING           | 1    | COMPOSITION |
| 16   | SEAT FOLLOWER          | 1    | BRONZE      |
| 17   | BOTTOM CAP             | 1    | BRONZE      |
| 18   | STEM                   | 1    | BRONZE      |
| 19   | STEM GUIDE             | 1    | BRONZE      |
| 20   | SEAT RING              | 1    | STAINLESS   |
| 21   | STEM LOCK NUTS         | 3    | BRONZE      |
| 22   | STEM GUIDE O-RING      | 1    | BUNA-N      |
| 23   | BOTTOM CAP GASKET      | 1    | COMPOSITION |
| 24   | STEM O-RING            | 2    | BUNA-N      |
| 25   | COVER GASKET           | 1    | COMPOSITION |
| 26   | BOLT - SPRING CHAMBER  | VARY | BRONZE      |
|      | GAUGE COCK [NOT SHOWN] | 2    | BRONZE      |

| VALVE SIZE | ANSI B16.1 CLASS | DIMENSIONS (INCHES) |       |        |
|------------|------------------|---------------------|-------|--------|
|            |                  | A                   | B     | C      |
| 2"         | 125              | 15                  | 3     | 7      |
|            | 250              | 15                  | 3-3/8 | 7-3/8  |
| 2-1/2"     | 125              | 18-1/4              | 5     | 8-7/8  |
|            | 250              | 18-1/4              | 5     | 9-9/16 |
| 3"         | 125              | 18-1/4              | 5     | 8-7/8  |
|            | 250              | 18-1/4              | 5     | 9-9/16 |

# ROSS VALVE Mfg. Co., Inc.

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DRAWING 98EP-SS20 DATE 9-10-03 TJS

NO SCALE

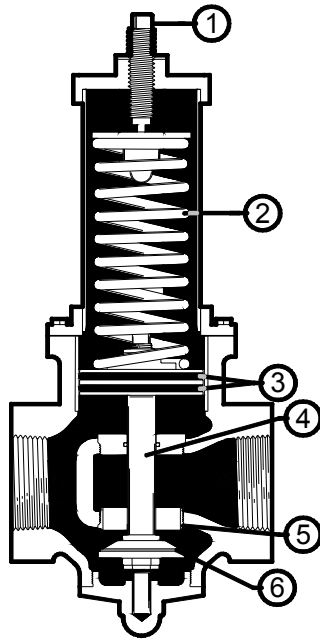
Model 98EP

DIRECT ACTING PRESSURE REDUCING VALVE  
 WITH STAINLESS STEEL SEAT

# PRESSURE REDUCING VALVE

Operation

Model Number: 98EP



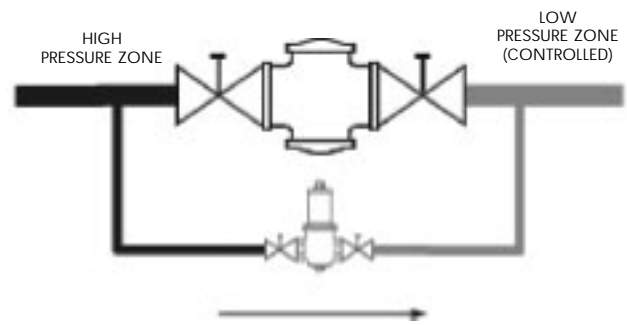
| PARTS |                  |
|-------|------------------|
| 1     | Adjusting Screw  |
| 2     | Adjusting Spring |
| 3     | O-Rings          |
| 4     | Stem             |
| 5     | Seat Ring        |
| 6     | Seat Packing     |

## Recommendation for 40WR Installation

When a wide range of flows is required, for a 40WR installation, this smaller 98EP valve can be installed on a parallel pipe as follows:

**The 98EP 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.



## Control Unit

A straight forward control mechanism can be adjusted as pressure requirements change.

1. A diaphragm, connected to a stem is held in balance by a spring load on its top side and downstream water pressure underneath.
2. Seat packing against a seat ring, connected to the same stem - Holds back the high inlet pressure.

## Operation

Because of its fundamental, but sophisticated design, the valve can reduce a high water pressure to a lower pre-determined pressure regardless of flows.

1. When downstream (user) pressure increases, the
  - a. Water pressure builds up beneath the diaphragm, pushes it up (as the springs above it contract.)
  - b. Seat packing, which is connected to the diaphragm by a stem, also moves up.
  - c. Valve throttles, decreasing the amount of water it lets flow through.
2. When downstream (user) pressure decreases, the
  - a. Springs above the diaphragm, encountering decreased resistance, push the diaphragm down.
  - b. Seat packing, also moves down.
  - c. Valve opens wider, increasing the amount of water it lets flow through.

### 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.

## 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.

(Operation continued on next page)

# PRESSURE REDUCING VALVE

Operation (continued)

Model Number: 98EP

## 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.

| VALVE SIZE | FOR FLOWS UP TO |
|------------|-----------------|
| 2"         | 200 GPM *       |
| 2 1/2"     | 325 GPM *       |
| 3"         | 400 GPM *       |

\* - Estimated flows through testing at factory.

Accurate head loss curves are difficult to describe for this type of valve because as a direct acting, diaphragm operated valve, the capacity depends primarily on the drop in outlet pressure below its setting. Although pressure differential across the valve does effect the volume handled, the drop in outlet pressure below the shut-off point of the valve is of greater importance. The volume increases as the outlet pressure drops.

The capacity of this type of valve is considerably less than the pilot operated type of valve; however its simplicity and ability to operate without hunting for low flow or sudden changes in flow make it desirable for use where quick opening and closing valves are used such as industrial plants or multiple dwelling units.

## Consult a Ross Representative

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

## ROSS ADVANTAGE

1. Ross valve 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 tested and adjusted in the factory.
6. Rugged construction and simple design provide superior performance where severe conditions exist.
7. All parts are built and manufactured in the USA.

## Additional Information

| Item                              | Page        |
|-----------------------------------|-------------|
| Alternative Seats .....           | EN - 7      |
| Differential Pressure Guide ..... | EN - 5, 6   |
| Dimensions - Valve .....          | EN - 16     |
| - Strainers .....                 | EN - 20, 21 |
| Flange Drilling Guide .....       | C - 2       |
| Parts List- Valve .....           | EN - 30     |
| - Strainers .....                 | EN - 42, 43 |

## Approximate Shipping Weights (lbs.)

| Valve Size | 2" | 2 1/2" | 3" |
|------------|----|--------|----|
| 125 lb.    | 50 | 60     | 75 |
| 250 lb.    | 65 | 75     | 90 |
| NPT        | 45 | 55     | 70 |

# PRESSURE REDUCING VALVE

Specifications

Model Number: 98EP

## Basic Valve: Pressure Reducing (98EP)

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The pressure reducing valve shall maintain a pre-adjusted downstream pressure regardless of changes in flow rate. Some drop in outlet pressure will occur as flow rate increases.

The pressure reducing valve shall be a direct acting type with a single seat.

The design of the valve shall be such that the inlet pressure is hydraulically balanced so that changes will not affect the outlet pressure.

The valve shall be ruggedly constructed with a size \_\_\_\_\_ inch body and 125 lb./250 lb. flanged or screwed ends as shown in the drawings.

The valve shall be factory assembled.

## Physical and Chemical Properties

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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 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.

The bronze parts shall conform to ASTM specification B-62.

The diaphragm cover, button, washer shall be bronze.

The spring housing shall be bronze.

The spring chamber shall be bronze.

The stem shall be bronze.

The stem packing, bottom packing nuts shall be bronze.

The spool, spool guide shall be bronze.

The internal trim shall be bronze.

## Test

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The test before shipment may be witnessed by a representative of the Engineers for simulated field conditions.

## Painting

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All iron castings shall be coated on all sides with at least two coats of a rust inhibiting synthetic resin and asphaltum enamel.

## Reference

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**The valve will be equal in all respects to the Model 98EP Pressure Reducing Valve** as manufactured by the Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, NY 12181.

**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.

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

**ROSS MODEL 98EP  
DIRECT ACTING PRESSURE REDUCING VALVE**

**PURPOSE:** The function of the Ross Model 98EP direct acting pressure reducing valve is to reduce a high inlet water pressure to a lower, pre-determined downstream pressure, regardless of flows. The maximum reduced downstream pressure is maintained by the spring loaded piston assembly which automatically positions the valve seat in accordance with the hydraulic pressures.

**DESIGN:** The valve is a direct acting, spring and hydraulic pressure operated, with single seat providing large capacity and semi-balanced construction. The valve is simple, rugged, and especially useful where severe conditions exist.

**INSTALLATION:**

1. Flush line if possible before inserting valve.
2. Place valve in line with arrow on body pointing in the direction of flow.
3. Open downstream gate valve, slowly to full open.
4. Open upstream gate valve one-quarter (1/4) open, then slowly to full open.
5. Observe pressure on downstream side. If lower downstream pressure is desired, turn the adjusting screw (2) *counter-clockwise* (out). If higher pressure is desired, turn the adjusting screw *clockwise* (in).

**OPERATION:** The piston assembly is held in balance by the spring load on the top side of the piston (7) and the hydraulic downstream (reduced) pressure on its underside. The high inlet pressure is held back by the seat packing (15) seating against the seat ring (20). If the downstream pressure were to decrease due to increased demand, the spring(s) (5) would then no longer be balanced by the downstream pressure under the cup packing and would push the piston assembly down. Since the seat packing is a component of the piston assembly, it will also move down and allow high pressure water to pass through the valve. When sufficient water passes through the valve to satisfy the demand and increase the downstream pressure, the piston assembly is lifted against the spring load to shut off the flow through the valve. The stem is guided above and below the seat by stem guide (19) and bottom cap (17). The depth of the guide hole in the bottom cap also limits the opening of the valve.

**MAINTENANCE:** When excessive downstream pressures (especially during periods of low demand) indicate leakage through the valve, it may be quickly dis-assembled for repair. Close upstream & downstream gate valves to isolate valve. Open inlet & outlet gauge cocks to relieve trapped water pressure. Loosen the lock nut (3) and turn the adjusting screw (2) counter-clockwise to relieve any spring tension, usually one turn is sufficient after isolation & relief. Remove the base bolts (26) to remove spring chamber assembly, cap (10), chamber (6) & base (8). Remove the spring(s) (5) and spring washer (4). Remove the two lock nuts (21) to remove piston (7) with piston O-rings (9). Remove the bottom cap (17), and withdraw the piston assembly through the bottom cap opening. Remove bottom packing nut (16) to replace seat packing (15). The stem guide O-ring (22) should be examined and replaced if necessary. Replace piston O-rings (9) before valve is re-assembled in reverse order.

The **standard repair kit** contains all internal replaceable packings and gaskets which are stock items, and may be ordered and shipped via FedEx / UPS **regular or next day** service for -

**Ross \_\_" Valve S/No. \_\_\_\_\_**

All spare parts are available from: