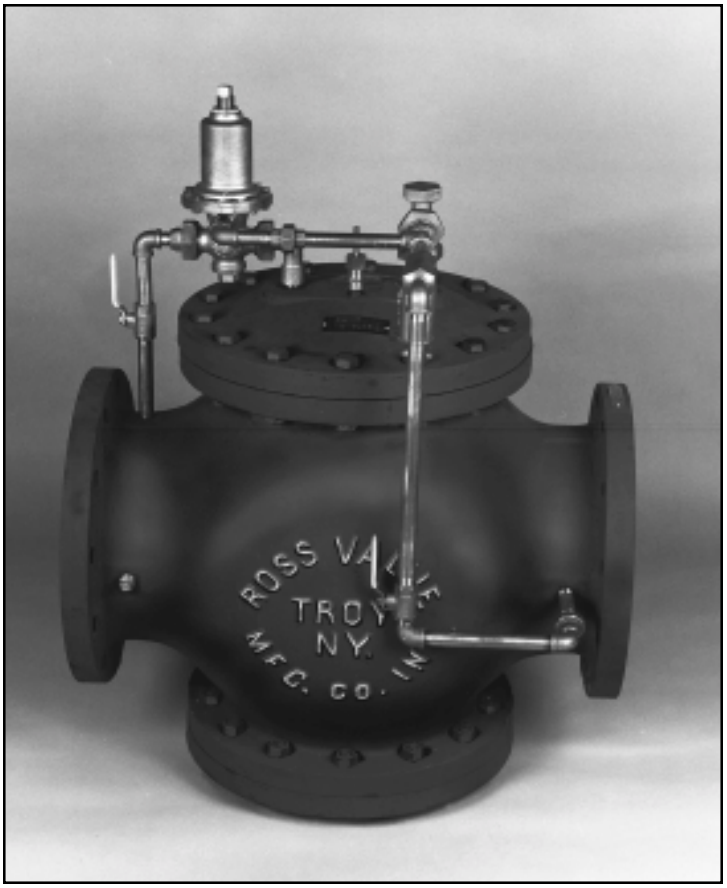
RELIEF VALVE

Purpose: Control pressure in main line Model Number: 50RWR

Sizes: 4" - 48"
Type: Throttling
Primarily Controlled By:
Hydraulic pressure
Located: In tee connection
Purpose: To prevent excessive pressure in the main line
Inlet Pressure: Maximum: 300 psi
Inlet Pressure: Minimum: 5 psi
Construction: Body: 4" - 36" - Cast iron (semi-steel) with bronze trim
40" - 48" - Ductile iron, with bronze / stainless steel trim
Control Devices:
Strainer: Model 5F-2
Valves:
Needle
Pilot: Relief / Back Pressure Sustaining: Model 50RWR
(Can also be added to other basic valves as a customized feature.)
See overall parts lists and specific parts information for complete details.

Options

1. Angle body design (90 degree)
2. Cast steel or ductile iron body and stainless steel trim
3. Teflon coated cylinders



Ross engineers customize the basic **50RWR** to accommodate individual needs.

Customized Features

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

Code

A - Surge Control (Hydraulic)
ACAV - Anti-cavitation Trim
E - Surge Control (Electric)
SC or **SO** - Solenoid Pilot Valve: 2 Way
SG or **SF** - Solenoid Pilot Valve: 3 Way
M - Reversible Electric Motor
ES - Higher Efficiency Strainer
LS - Limit Switch

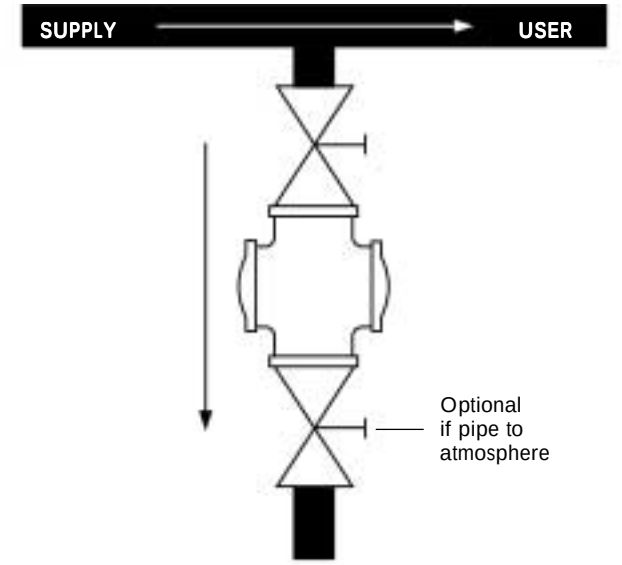
(Basic Applications on next page)

RELIEF VALVE

Basic Applications

Protect lines against excessive pressure that may be caused by:

1. Rapid or erroneous closing of a valve or hydrant.
2. Failure of a pressure reducing station.
3. Starting and stopping a pump equipped with a slow type check valve.
4. Reduced demand in a closed loop pumped system.
5. Power Failure.



If: Pressure in the supply/user line exceeds a preset acceptable pressure

Ross Main Valve will: Discharge a sufficient amount of water to reduce pressure to the preset level.

If: Pressure in the supply/user line drops to the preset pilot valve setting

Ross Main Valve will: Close.

A - Surge Control

Primarily Controlled By: Hydraulic pressure (mainline)
Located: Along external piping of the relief valve
Purpose: To anticipate and minimize pressure waves
SYSTEM COMPONENTS:

Accumulator Drum: Sized according to need
Drain Orifice
Valves: *Ball:* Speed Control
Pilot: Low pressure "anticipating"

BASIC APPLICATION: Start relief valve open on a low pressure wave before the shock wave reaches the station.

CUSTOMIZED CONTROL UNIT: Added to the relief valve external piping circuit to provide additional control over pressure in the operating chamber are:

1. External piping that extends from the operating chamber to the accumulator drum.
2. Accumulator - Collects water from the operating chamber and lets it slowly "bleed" out.
3. Drain orifice - Causes water to slowly "bleed" out of the accumulator.
4. Ball valve - Limits flow from the operating chamber into the accumulator.

OPERATION: Because the surge control feature anticipates the surge, it automatically readies the valve in advance to react, thereby maintaining an acceptable pressure within the main line.

1. When line pressure falls, it activates the following cycle.
   a. When pressure drops to the low pressure valve setting, the valve opens and causes water to flow from the operating chamber into the accumulator where it "bleeds" out at a much slower rate than the water entering.
   b. Main line water, encountering decreased resistance, pushes the piston up, opening the main valve.
   c. Main valve remains open until the accumulator fills up and no more water can be transferred. (The accumulator is sized to insure the valve remains open until the high pressure wave has been relieved through the open valve.)
2. When line pressure exceeds the relief valve setting,
   a. The relief valve pilot overrides all other functions, causing the main valve to act like a standard relief valve.
3. When main line pressure has returned to "normal",
   a. Water remaining in the accumulator continues to discharge into the atmosphere until the accumulator is empty.
   b. The main valve acts like a basic relief valve.

CAUTION: It is important not to oversize valves because they usually go wide open.

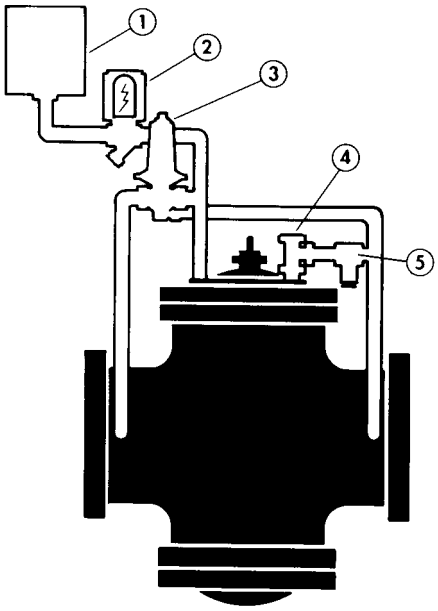
ACAV - Anti-Cavitation Seat Trim

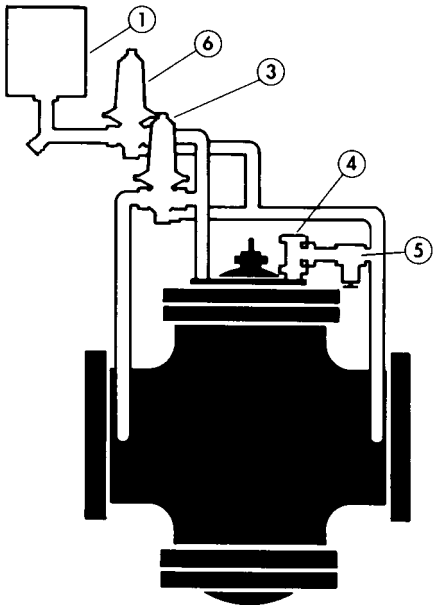
Located: Inside the main valve
Purpose: To provide protection against cavitation damage to the internals of the valve
BASIC APPLICATION: To control potential cavitation in a column of water, away from the valve's surfaces.

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

RELIEF VALVE

Model Number: 50RWR





FEATURES
1 Accumulator Tank
2 3 Way Solenoid Pilot
3 High Pressure Pilot
4 Needle Valve
5 Strainer
6 Low Pressure Pilot

E - Surge Control (Electric)

Primarily Controlled By: Electricity
Located: On external piping of the relief valve
Purpose: To anticipate and minimize pressure waves
SYSTEM COMPONENTS:
Accumulator: Sized according to need
Valves: *Needle:* Speed Control
Pilot: Two 2 Way or One 3 Way Solenoid
BASIC APPLICATIONS:
Overall: Start surge control (relief) valve open before the shock wave reaches the station.
Use Two 2 Way Solenoids to:
1. Supply large orifice for a large main valve.
2. Open the main valve very quickly to transfer a vast quantity of water.

Use One 3 Way Solenoid: When a smaller orifice is sufficient.

CUSTOMIZED CONTROL CIRCUIT (2 WAY)
Added to the relief valve external piping circuit to provide additional control over pressure in the operating chamber are:
a. External piping leading from the operating chamber to the accumulator.
b. Two solenoid pilot valves
When the 1st pilot opens - Water can flow from the operating chamber into the accumulator.
When the 2nd pilot opens - Water can flow from the accumulator to waste.
c. Needle or ball valve located on the piping between the solenoid and the accumulator - Limits the flow rate between the operating chamber and accumulator.
d. Accumulator - Collects water from the operating chamber

OPERATION (2 WAY)
Because the surge control feature electrically anticipates the surge, it readies the valve in advance to react, thereby maintaining an acceptable pressure within the main line.
1. When power is lost, the
a. Solenoid pilots lose their signal, causing solenoid ports controlling flow from the operating chamber to the accumulator to open and the waste port to close.
b. Water flows from the operating chamber into the accumulator. (The rate of transfer is adjustable by the needle or ball valve.)
c. Main valve inlet flow, encountering decreased resistance, pushes the piston up.
d. Main valve opens.
e. Main valve remains open until the accumulator fills up and no more water can be transferred. (The accumulator is sized to insure the valve remains open until the high pressure wave has been relieved through the open valve.)
f. Operating chamber fills. The valve closes.
2. When power is energized, the
a. Solenoid pilots regain their signals, closing the ports from the operating chamber to the accumulator and opening the solenoid pilot to waste.
b. Accumulator empties to waste.
c. Main valve operates as a basic relief valve.

(Customized Features continued on next page)

RELIEF VALVE

Customized Features (continued)

(Surge Control Electric continued)

CUSTOMIZED CONTROL CIRCUIT (3 WAY)

Added to the relief valve external piping circuit to provide additional control over pressure in the operating chamber are:

a. External piping leading from the operating chamber to the accumulator.
b. Solenoid pilot valve - three openings and two ports control pressure in the operating chamber:
   1 Opening - to the operating chamber.
   1 Opening - to the accumulator tank (*controlled by 1 port*).
   1 Opening - to waste (*controlled by 1 port*).
c. Needle or ball valve located on the piping between the solenoid and the accumulator - Limits the flow rate between the operating chamber and accumulator.
d. Accumulator - Collects water from the operating chamber.

OPERATION (3 WAY)

Because the surge control feature electrically anticipates the surge, it readies the valve in advance to react, thereby maintaining an acceptable pressure within the main line.

1. When power is lost, the
   a. Solenoid pilot loses its signal, causing solenoid ports controlling flow from the operating chamber to the accumulator to open. (Waste port closes.)
   b. Water flows from the operating chamber into the accumulator. (The rate of transfer is adjustable by the needle or ball valve.)
   c. Main valve inlet flow, encountering decreased resistance, pushes the piston up.
   d. Main valve opens.
   e. Main valve remains open until the accumulator fills up and no more water can be transferred. (The accumulator is sized to insure the valve remains open until the high pressure wave has been relieved through the open valve.)
   f. Operating chamber fills. The valve closes.
2. When power is energized, the
   a. Solenoid pilot regains its signal, closing the port from the operating chamber into the pilot valve and opening waste port.
   b. Accumulator empties to waste.
   c. Main valve operates as a basic relief valve.

CAUTION: It is important not to oversize valves because they usually go wide open.

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 at juncture leading to mainline storage, hydraulic pilot and operating chamber Three openings and two ports control pressure in the operating chamber:

1 Opening - to the operating chamber
1 Opening - to accumulator tank
1 Opening - to waste (controlled by 1 port)
A 3 way solenoid pilot is always open to the operating chamber.

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

BASIC APPLICATIONS:

1. Remove 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 line opens/waste port closes which allows main valve to operate as a relief valve.
Energized - Port to line closes/waste port opens which locks the valve in a WIDE OPEN position.

OPTION 2 - *When the pilot is:*

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

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

M - Reversible Electric Motor

Primarily Controlled By: Electricity
Located: Coupled to the adjusting screw on the relief pilot valve
Purpose: To change the hydraulic pilot setting from a remote point
OPTIONS: Motor limit switches - To prevent an operator from adjusting past fixed points (preserve the range).
BASIC APPLICATION: By allowing the pilot setting to be changed through a wide range from a remote point, a sophisticated system can be monitored.
NOTE: Valve will continue to regulate the downstream pressure at its last set point if a power failure occurs.

ES - Higher Efficiency Strainer

Located: On external piping
Purpose: To provide extra protection against fouling or damaging the control system from foreign particles
BASIC APPLICATION: Protect external piping and controls when extremely fine particles and/or more than usual debris is expected.
NOTE: This strainer offers an increased capacity to hold debris and comes with a finer screen than the standard model.

LS - Limit Switch

Primarily Controlled By: Valve position indicator
Located: Attached to a valve position indicator
Purpose:
1. To signal if the valve is opened or closed
2. To start or stop allied equipment

COMMON CONFIGURATIONS
1 50RWR-A
2 50RWR-ACAV
3 50RWR-E
4 50RWR-SC or 50RWR-SO
5 50RWR-SG or 50RWR-SF
6 50RWR-M

Control Unit

By accurately regulating the flow in and out of the operating chamber, an external piping circuit reliably controls the piston position. It includes:
1. Into the Operating Chamber
   a. External piping also attached to the inlet side of the main valve - Introduces main line inlet water up into the operating chamber.
   b. Needle valve - Limits flow into the operating chamber. (Can be adjusted to increase or decrease the rate at which water flows into the chamber.)
2. Out of the Operating Chamber
   a. External piping involves two basic piping segments:
      One runs from external piping that connects to the main valve inlet side - Introduces water from that pipe to a chamber just under the diaphragm of the hydraulic pilot valve.
      One leads to outlet side of the main valve - Tracks water from the operating chamber, through the bottom of the pilot valve to the downstream flow.
   b. Hydraulic pilot valve - Controls flow out of the operating chamber by means of a diaphragm that is held in balance between a spring load on its top side and upstream water pressure underneath. (The spring resistance is preset and can be adjusted when pressure requirements change.)

Operation

Given a straight forward interaction between the control unit and the throttling piston along with its rugged construction, this valve remains tightly closed when pressure is within preset limits letting water flow smoothly through the main line. It opens as quickly as needed to discharge the excess when pressure exceeds the preset limits.
1. When main line pressure increases, the
   a. Pressure increases against the water which is diverted to the external inlet pipe and then introduced into the inlet pipe attached to the hydraulic pilot valve.
   b. Pressure increases under the pilot's diaphragm, gradually pushing the springload up.
   c. Pilot seat opens wider.
   d. Water flow out of the operating chamber, through the pilot valve's bottom piping connection increases.
   e. Pressure in the operating chamber gradually drops as more water flows out than is introduced by the needle valve.
   f. Main valve opens.

(Operation continued on next page)

RELIEF VALVE

Operation (continued) Pilot Valves

2. When main line pressure decreases, the
   a. Pressure of the inlet water being diverted into the pilot valve drops.
   b. Pilot valve's spring load, encountering decreased resistance pushes the pilot seat closed, decreasing water flow through its bottom piping connection.
   c. Water continues to flow through the needle valve into the operating chamber where it gets trapped.
   d. Pressure builds up in the operating chamber pushing the piston down.
   e. Main valve gradually closes.

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 relieving line pressure.
3. Throttling action of the piston offers a quick, but monitored reaction to increased line pressure.
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.

Caution

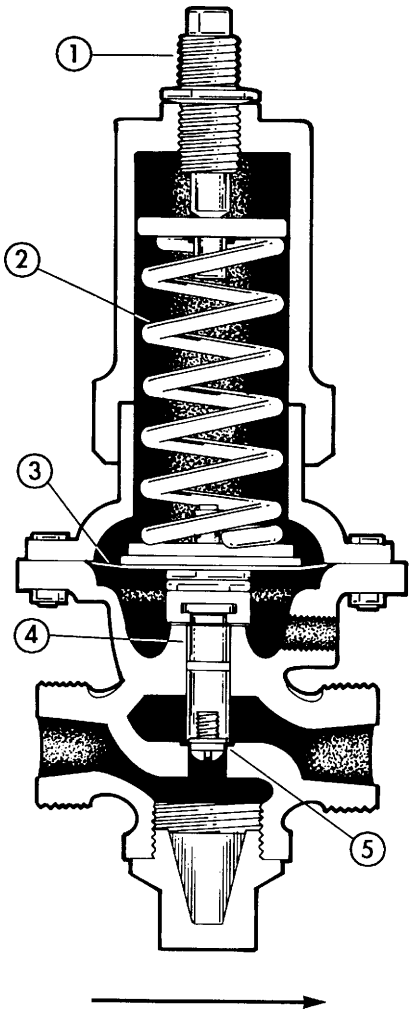
1. Adequate provision should be made to dispose of the discharge, if it escapes to the atmosphere.
2. A minimum pressure differential requirement must be satisfied if the discharge is to a lower pressure zone or to pump suction.

Consult a Ross Representative

1. To recommend correct valve sizing.
2. To build a customized valve for any specific requirements.

Note

Can be used with pump control when there is a power failure.



PARTS
1 Adjusting Screw
2 Adjusting Spring
3 Diaphragm
4 Piston
5 Seat

Pilot: External Sensing Port

Primarily Controlled By: Hydraulic Pressure (upstream)
Located: On a two segmented external pipe which
1. Tracks upstream (supply side) water into an opening in the pilot valve under the diaphragm
2. Leads water out of the operating chamber, through the pilot valve, to the downstream flow

Purpose: To control flow into the main valve

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

RELIEF VALVE

Model Number: 50RWR

Operation

1. When upstream pressure increases, the
   a. Pressure pushes through top piping under the diaphragm, pushing the diaphragm up.
   b. Pilot seat opens wider, increasing flow out of the operating chamber through lower piping.
   c. Main valve opens wider.
2. When upstream (supply side) pressure decreases, the
   a. Pressure under the diaphragm decreases.
   b. Spring load pushes down on the diaphragm.
   c. Pilot seat closes.
   d. Flow out of the operating chamber decreases.
   e. Main valve closes accordingly.

Standard Pilot Adjustment Ranges

These ranges should be used as a guide only. When specific operating conditions are known, the pilot is constructed to give at least a 30% adjustment above and below the anticipated set point. Standard pilot adjustment ranges: 5 to 25 psi; 15 to 60 psi; 40 to 100 psi; 80 to 180 psi; 150 to 250 psi; over 200 psi

Additional Information

Item	Page
Alternative Seats	EN -12
Cavitation Guide	EN - 9
Differential Pressure Guide	EN - 6
Dimensions - Angle Body (Without Controls)	EN - 16
- Globe Body (Without Controls)	EN - 14
- Standard External Controls	EN - 19
- Strainers	EN - 26, 27
Head Loss Guide	EN - 3
Limit Switch	EN - 50
Needle Valve	EN - 47
Parts List - Angle Body (Without Controls)	EN - 31
- Globe Body (Without Controls)	EN - 30
- Standard External Controls	EN - 34
- Strainers	EN - 42
Pump Control With Back Pressure Sustaining Pilot	P - 7
Reversible Electric Motor	EN - 50
Solenoid Pilot Valves	EN - 48, 49

Approximate Shipping Weights (lbs.)

Valve Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"	48"
125 lb. Flanges	235	390	755	965	1530	2120	2750	3300	4050	5200	9800	11800	18300	23000
250 lb. Flanges	275	430	810	1050	1610	2275	2900	3500	4400	5500	10800	12800	19400	24500

RELIEF VALVE

Specifications

Basic Valve: Relief (50RWR)

The relief valve shall be capable of rapid opening whenever the line pressure exceeds its setting.

The relief valve shall be ruggedly constructed with a size_____inch 125 lb./250 lb. flanged, full ported globe/angle body design.

The relief valve shall be fully bronze mounted, external pilot operated, with free floating piston (operated without springs, diaphragm or levers), single seat with seat bore equal to size of valve.

The minimum travel of the piston shall be equal to 25% of the diameter of the seat.

For true alignment (to correct lateral thrust and stem binding) the piston shall be guided above and below the seat a distance equal to no less than 75% of the diameter of the seat.

The piston shall carry a contoured cushion device that will cause a gradual change in flow area as the valve approaches the seat. The cushion device must move with the piston to minimize the head loss when the valve is fully opened and so designed as to insure positive closure.

The main valve shall be packed with leather (or other soft material) to insure tight closure and prevent metal to metal friction and seating.

The main valve shall include a position indicator rod to show position of opening of the piston.

The main valve will include gauge cocks for testing purposes.

The pilot valve, controlling operation of main valve, shall have a range for adjustment, be easily accessible and so arranged to allow for its removal from the main valve while the main valve is under pressure.

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

Ball valves shall be installed in the control piping to completely isolate the pilot valve when conditions may require pilot isolation for maintenance or repair.

An external strainer with blow off will be provided to protect the pilot and speed control valves.

The design shall be such that repairs and dismantling internally of the main valve may be made without its removal from the line.

Operation

A - The valve shall include a **surge control** to anticipate the surge wave by monitoring the line pressure and opening when an unusual drop in pressure occurs. Valve operation shall be purely hydraulic requiring no electrical power. A **relief pilot** shall have over-riding control at all times.

ACAV - The valve will include an **anti-cavitation trim feature** to prevent cavitation damage to the valve internals.

E - The valve shall include a **surge control valve** shall anticipate the surge wave by opening the valve on loss of an electrical signal. The valve shall remain open for a pre-determined period of time, then slowly close. A **relief pilot** shall have over-riding control at all times.

SC - The valve shall include a **normally closed solenoid** to lock the valve closed when de-energized.

SO - The valve shall include a **normally open solenoid** to lock the valve closed when energized.

SG - The valve shall include a **3 Way solenoid pilot** to open the valve fully when the solenoid is energized.

SF - The valve shall include a **3 Way solenoid pilot** to open the valve fully when the solenoid is de-energized.

M - The pilot shall be equipped with a **reversible motor** operator connected to the pilot adjusting screw. The motor shall operate on 120 volt AC 60 Hz supply and shall incorporate built in limit switches to limit the pilot adjustment range.

ES - The valve will include a **higher efficiency strainer** to provide extra protection against fouling or damaging the control system.

LS - The valve will include a **limit switch** to signal if the valve is opened or closed.

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 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.

For sizes 4" - 12"

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

The seat disc shall be bronze.

For sizes 14" - 36"
The seat disc shall be a cast iron center/bronze outer ring.
The main cup plates shall be bronze.
The main bushing shall be bronze.

For sizes 42" - 48"
The seat disc shall be a cast steel.
The main cup plates shall be cast steel.
The main bushing shall be stainless steel.

For all sizes
The external pilot valve shall be bronze
The rugged internal piston shall be bronze.
The seat ring shall be bronze.
The stem nuts shall be bronze.
The seat packing support shall be bronze.
The position indicator shall be bronze.
The bottom cap cylinder shall be bronze.
Piping shall be rigid brass pipe.
The strainer shall be bronze body with stainless steel screen.
The ball valves shall be full ported with stainless steel shaft, nut and adjusting handle.
The stainless steel shall be Grade 303 / 304 / 316 / CF8M / _____ .

(*Option*) The bottom cap cylinder shall be bronze and teflon coated. The Teflon shall be applied in two parts: Part 1 shall be a primer Teflon coating with a minimum thickness of 5 mils. Part 2 shall be a finish coat of Teflon TFE with a minimum thickness of 5 mils. for a final coat minimum thickness of 10 mils.

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 50RWR_____model with customized features checked below; as 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 50RWR-A model as manufactured by the Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, NY 12181.
(50RWR-A = 50RWR with an hydraulic surge control.)

Customized Feature Codes

A - Surge Control: Hydraulic
ACAV - Anti-cavitation Trim
E - Surge Control: Electric
SC - Solenoid Pilot Valve: 2 Way - Normally Closed
SO - Solenoid Pilot Valve: 2 Way - Normally Open
SG - Solenoid Pilot Valve: 3 Way - Opens Valve When Energized
SF - Solenoid Pilot Valve: 3 Way - Opens Valve When De-energized
M - Reversible Electric Motor
ES - Higher Efficiency Strainer
LS - Limit Switch

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.