

Surge Relief Valve

INSTRUCTIONS

Installation - Operation - Inspection - Maintenance



_____” ROSS MODEL - 20WR-STEEL
Surge Relief Valve

Serial #S _____

ROSS VALVE Mfg. Co., Inc.

6 OAKWOOD AVENUE, TROY, NY 12180 - PHONE 518/274-0961 - FAX 518/274-0210

MODEL 20WR ANGLE RELIEF VALVE

INSTRUCTIONS

General: The Model 20WR is an all bronze, internal Pilot-Operated Angle Body Relief Valve capable of handling large quantities of water while maintaining close pressure tolerance. The valve is self-contained and easily adjusted through various pressure ranges which cover from 30 psi to 1000 psi.

Design: The “controlled” pressure is piped into the bottom connection. This pressure enters the bottom of the movable floating piston through a combination strainer-orifice and passes into the power chamber area above the main piston. Assuming the pilot seat is closed, the pressure in the power chamber becomes equal to the incoming pressure and a hydraulic seating force is developed due to area differentials on the piston. The incoming pressure is also communicated to the small reservoir under the diaphragm through the port on the side of the valve opposite the outlet branch. As long as the springload above the diaphragm exceeds the upward force of the inlet pressure acting under the diaphragm, the pilot seat will remain closed. This in turn keeps the main piston closed.

When the pressure under the diaphragm exceeds the spring loading, the diaphragms lift the pilot stem off its seat. Since the flow into the power chamber is restricted by the strainer-orifice at the bottom of the main stem, opening of the pilot seat results in a decrease in pressure above the piston. This allows the incoming pressure to lift the valve piston and relieve itself through the side outlet.

Adjustment: Adjustment is made by turning the adjusting screw on the top of the valve. Turning the screw *clockwise* increases the compression on the springs and requires a higher pressure to open the valve; *counter-clockwise* decreases the setting.

Maintenance: The best possible maintenance the valve can experience is occasional operation. This keeps the packings soft and pliable and keeps the valve flushed out. If the valve has been idle for a long period of time (or if an extended period of disuse is anticipated), the valve piston should be removed and a light coat of grease applied to the cup leather after it has been “worked” in the hand.

Repairs: When repairs are required, the following parts (11 diaphragms, 16 cup packing, 19 seat packing, 22 strainer/orifice, 25 o-ring pilot packing and 29 diaphragm plate gaskets), should be replaced, and may be ordered as “Repair Kits” for Valve Serial Number _____. In addition, other parts (especially the pilot seat, main seat, cylinder wall, etc.) should be inspected for damage, wear or mineral deposits. The seat on the pilot stem may require lapping with fine valve grinding compound to restore a tight seat.

BACK PRESSURE SUSTAINING/RELIEF VALVE

Purpose: Maintain inlet pressure/Control pressure in main line

Model Number: 20WR



20WR Flanged



20WR NPT

Sizes: 1" - 3"

Type: Pressure positioned

Primarily Controlled By:

Hydraulic pressure (upstream)

Located:

Back Pressure Sustaining: In line

Relief: In tee connection

Purpose:

Back Pressure Sustaining: To control inlet pressure within close tolerance

Relief: To prevent excessive pressure in the main line within close tolerance

Body Design: Angle (90 degree)

External Piping: None

End: Flanged or Female NPT

Inlet Pressure: Maximum: 1000 psi

Inlet Pressure: Minimum: 30 psi

Construction: All bronze body

Control Valves: None

Option

Stainless Steel Trim

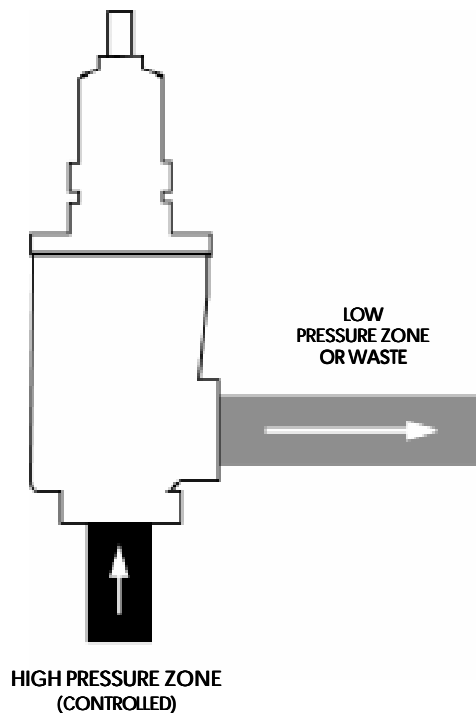
BACK PRESSURE SUSTAINING/RELIEF VALVE

Basic Applications

Model Number: 20WR

Basic Applications: Back Pressure Sustaining

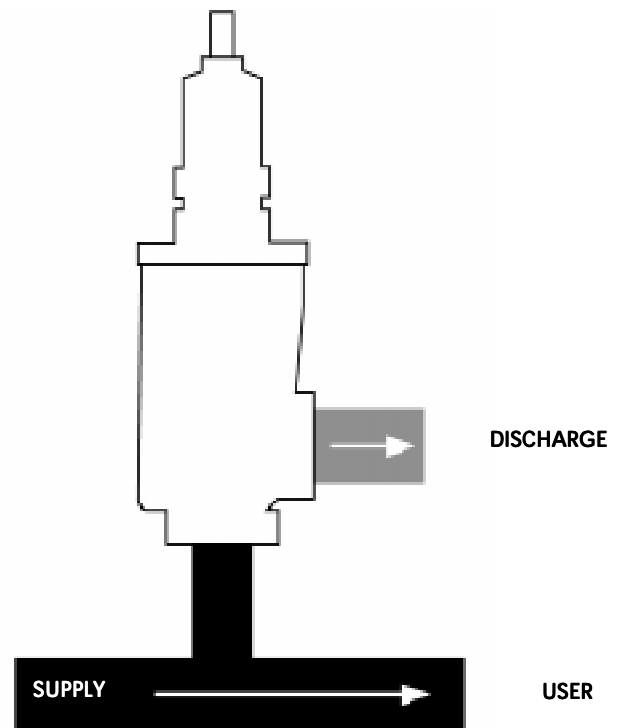
1. Permit a higher pressure zone to reinforce the lower pressure zone without lowering the high zone pressure.
2. Prevent over pumping in the event of a line break or excessive demand.
3. Prevent a pump from lowering the suction pressure below a safe minimum.



- If:** User's demand increases enough to reduce the pressure from the supply into the Ross Valve
Ross Main Valve will: Throttle to pass only the amount of water to the user that will sustain an acceptable preset inlet pressure.
- If:** Supply pressure falls below the preset level
Ross Main Valve will: Close.

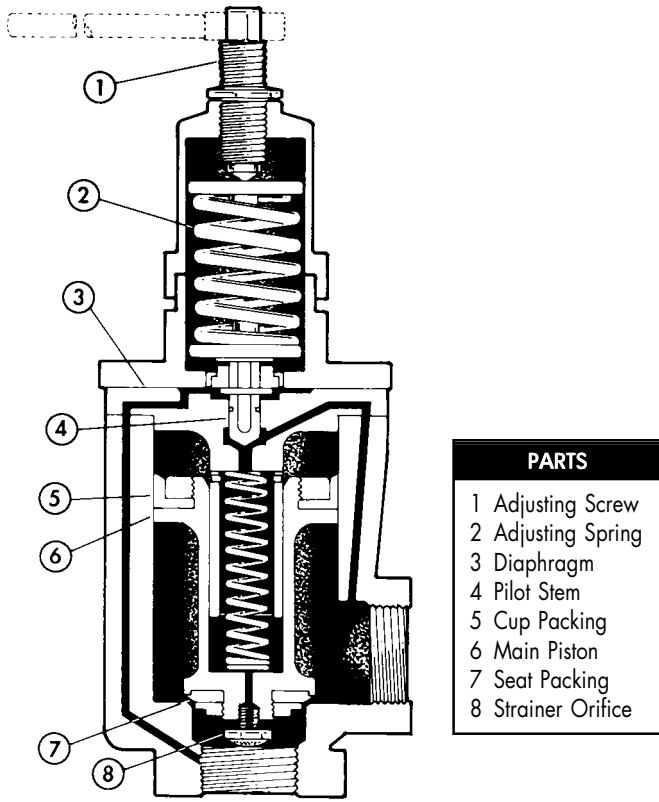
Basic Applications: Relief

- Protect lines against excessive pressures 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 volume 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.

BACK PRESSURE SUSTAINING/RELIEF VALVE



PARTS	
1	Adjusting Screw
2	Adjusting Spring
3	Diaphragm
4	Pilot Stem
5	Cup Packing
6	Main Piston
7	Seat Packing
8	Strainer Orifice

Control Unit

Piston movement is accurately controlled by the incoming water pressure exerted on an operating chamber above the main piston, and the balance between an adjustable piping load above a diaphragm and a small reservoir underneath.

1. Into/Out of the Operating Chamber
 - a. A hollow piston stem with a strainer on the bottom - Introduces some inlet water into the operating chamber above the main piston.
 - b. Discharge port - Leads water to the discharge side.
2. Into/Out of a small reservoir under the diaphragm
 - a. Sensing port on the inlet side of the valve - Communicates incoming pressure.

Operation

The straight forward action combined with its angle body makes this valve particularly suited to handle large quantities of water while maintaining close pressure tolerance.

1. When upstream (supply) or line pressure increases the,
 - a. Pressure exerted through the channel to the reservoir under the diaphragm increases, causing the pilot seat to open.
 - b. Water bleeds out of the reservoir reducing pressure above the piston.

- c. Pressure exerted up against the piston stem leading into the operating chamber increases.
 - d. Piston stem is lifted off its seat decreasing pressure above the diaphragm.
 - e. Inlet hydraulic pressure lifts the piston, opening the valve.
2. When upstream (supply) or line pressure decreases,
 - a. Decreased incoming water pressure is sensed by the reservoir under the diaphragm.
 - b. Springload pressure above the diaphragm, exceeding the pressure below, expands, closing the pilot seat.
 - c. Water gets trapped in the operating chamber, exerting downward pressure on the piston.
 - d. 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. Throttling action of the piston gives a relatively unobstructed flow at maximum flow rates when valve is positioned on line or it offers a quick, but monitored, reaction to increased line pressure when on a tee.
3. Valve operates totally on hydraulic pressure. No external controls are needed.
4. Valve is completely tested and adjusted in the factory.
5. Rugged construction materials provide a longer valve life and insure that the valve WILL NOT experience sudden breakdowns due to component failures.
6. All parts are built and manufactured in the USA.

To Adjust the Preset Pressure

1. Turn the screw clockwise to increase the compression on the springs and require a higher pressure to open the valve.
2. Turn the screw counter-clockwise to decrease the setting.

Consult a Ross Representative

1. About physical piping requirements for installing this valve.
2. For any specific requirements.

Additional Information

Item	Page
Differential Pressure Guide	EN - 6
Dimensions - Valve	EN - 17
- Strainers	EN - 20, 21
Head Loss Guide	EN - 3
Parts List - Valve	EN - 32
- Strainers	EN - 36

BACK PRESSURE SUSTAINING/RELIEF VALVE

Specifications

Model Number: 20WR

Approximate Shipping Weights (lbs.)

NPT						
Size (In.)	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
Small Body	27	27	27			
Large Body			34	34	43	43

FLANGED						
Size (In.)		2"	2 1/2"	3"		
		43	54	52		

Basic Valve: Back Pressure Sustaining (20WR)

The back pressure sustaining valve shall be a pressure positioned angle body type.

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

Basic Valve: Relief (20WR)

The relief valve shall be a pressure positioned angle body type.

The design of the valve shall be such to prevent excessive pressure in the main line within close tolerance.

The back pressure sustaining/relief valve shall be ruggedly constructed with a size _____ inch flanged or screwed ends as shown on the drawings.

The piston shall be an integral part of the valve and shall be sealed with a leather cup and poly seat.

The valve shall be adjustable by means of a convenient adjusting screw.

The inlet pressure shall be a maximum of 1000 psi.

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 bronze that shall conform to ASTM specification B-62.

The pilot valve shall be bronze.

The diaphragm cover shall be bronze.

The diaphragm shall be bronze.

The diaphragm plate shall be bronze.

The stem shall be bronze.

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

The strainer/orifice shall be Grade 304 stainless steel.

The pilot pin, guide spring shall be Grade 304 stainless steel.

The cup packing shall be leather.

Test

The test before shipment may be witnessed by a representative of the Engineers for Simulated Field Conditions.

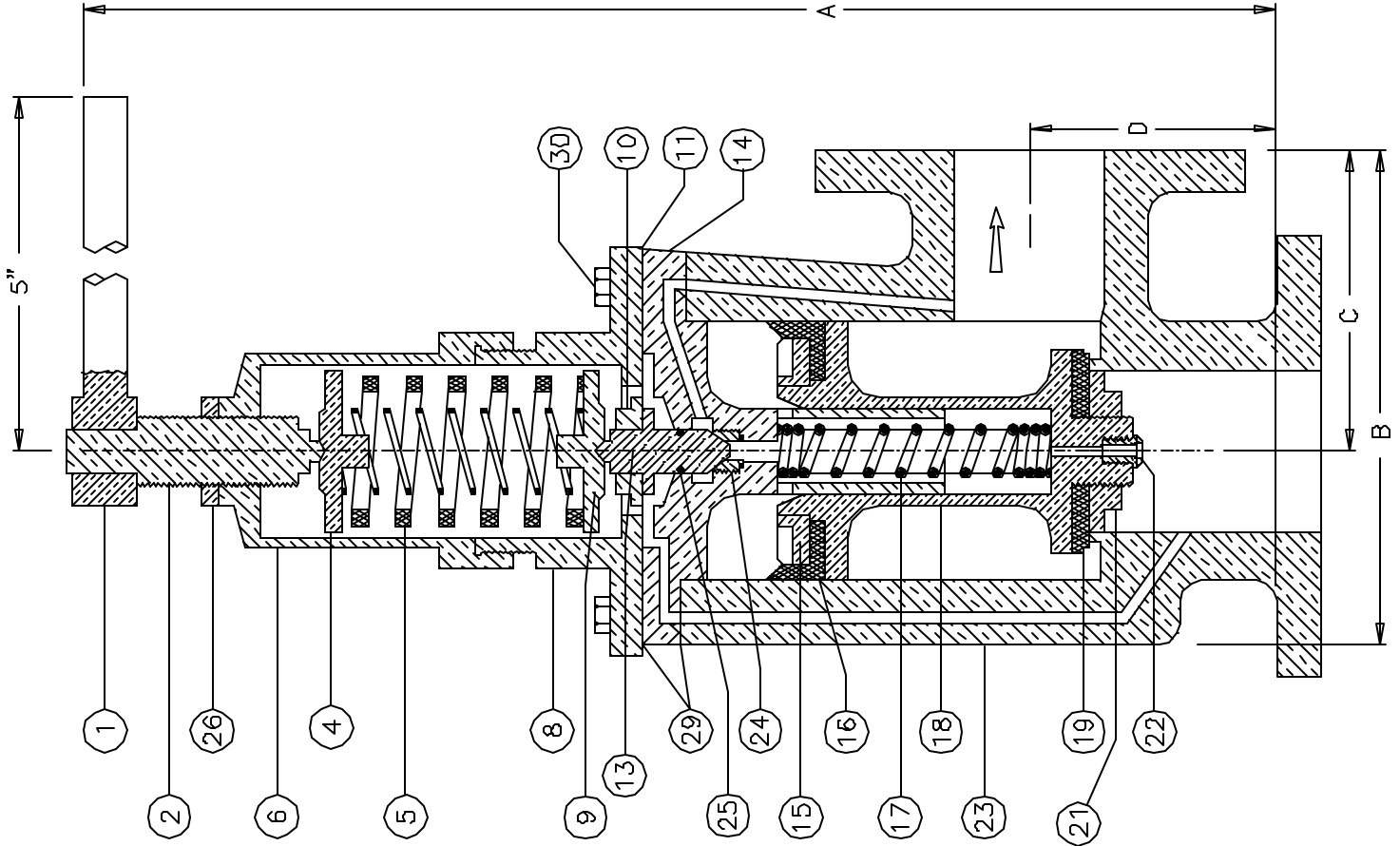
Reference

The valve will be equal in all respects to the Model 20WR Back Pressure Sustaining/Relief 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



* INCLUDED IN STANDARD REPAIR KIT

** OPTION CHROME PLATED

PART	DESCRIPTION	QTY	MATERIAL
1	ADJUSTING HANDLE	OPT.	BRONZE**
2	ADJUSTING SCREW	1	BRONZE**
4	TOP SPRING WASHER	1	BRONZE
5	ADJUSTING SPRING(S)	VARY	STEEL
6	SPRING CHAMBER	1	BRONZE**
8	DIAPHRAGM COVER	1	BRONZE**
9	BOTTOM SPRING WASHER	1	BRONZE
10	DIAPHRAGM NUT	1	BRONZE
11*	DIAPHRAGM	1	BRONZE
13	PILOT STEM	1	STAINLESS
14	DIAPHRAGM PLATE	1	BRONZE
15	CUP FOLLOWER	1	BRONZE
16*	CUP PACKING	1	LEATHER
17	GUIDE SPRING	1	STAINLESS
18	STEM	1	BRONZE
19*	SEAT PACKING	1	POLYURETHANE
21	SEAT FOLLOWER	1	BRONZE
22*	STRAINER/ORIFICE	1	STAINLESS
23	SHELL	1	BRONZE
24	PILOT SEAT	1	STAINLESS
25*	O-RING PACKING	1	BUNA-N
26	LOCK NUT	1	BRONZE**
29*	GASKETS - DIAPHRAGM PLATE	2	COMPOSITION
30	BOLTS - ASSEMBLY	10	BRONZE**

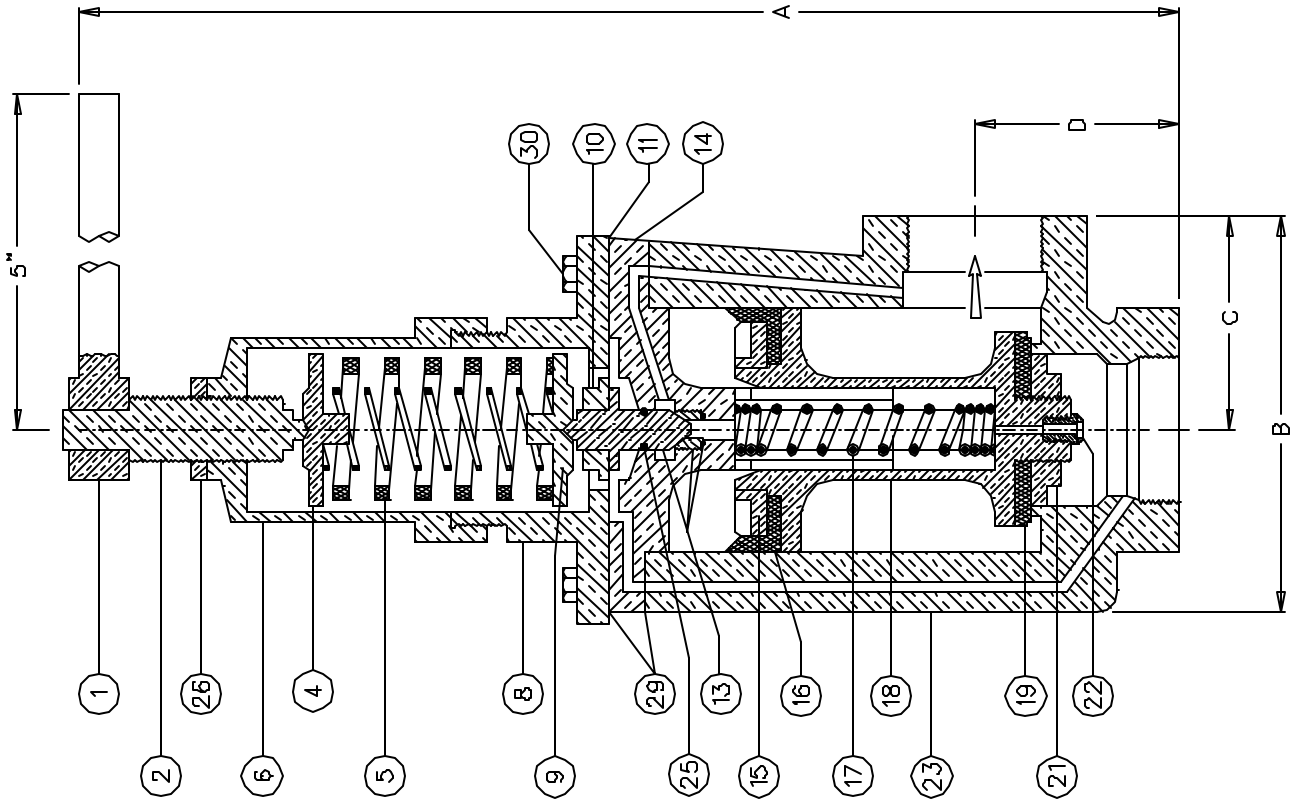
SIZE	ANSI B16.1	WEIGHT (LBS.)	DIMENSIONS (INCHES)			
			A	B	C	D
1-1/2	125	43	17	7-3/16	4-3/16	3-3/4
	250	53	17	7-3/16	4-7/16	4-1/16
2	125	43	17	7-1/4	4-1/4	3-13/16
	250	53	17	7-3/4	4-1/2	4-1/8
2-1/2	125	54	17	8-3/4	5-3/16	4-5/16
	250	64	17	9-1/4	5-1/2	4-5/8
3	125	52	17	8-13/16	5-1/16	4-1/2
	250	62	17	9-5/8	5-1/2	4-7/8

ROSS VALVE Mfg. Co., Inc.
 8 OAKWOOD AVENUE - P.O. BOX 959 - TROY, NEW YORK, 12181 - TEL. (518) 274 0951

NO. SCALE: DRAWING: 20WR-F-SS
 DATE: 4-6-51 3401-AA REVISED: 6-14-02 TJS

MODEL 20WR-F ANGLE BODY
 SURGE RELIEF VALVE WITH
 INTERNAL STAINLESS STEEL PILOT SET & FLANGES,

FILE: 20WR-F-STEEL



PART	DESCRIPTION	QTY	MATERIAL
1	ADJUSTING HANDLE	OPT.	BRONZE**
2	ADJUSTING SCREW	1	BRONZE**
4	TOP SPRING WASHER	1	BRONZE
5	ADJUSTING SPRING(S)	VARY	STEEL
6	SPRING CHAMBER	1	BRONZE**
8	DIAPHRAGM COVER	1	BRONZE**
9	BOTTOM SPRING WASHER	1	BRONZE
10	DIAPHRAGM NUT	1	BRONZE
11*	DIAPHRAGM	1	BRONZE
13	PILOT STEM/SEAT/O-RING	1 SET	420SS/BUANA-N
14	DIAPHRAGM PLATE	1	BRONZE
15	CUP FOLLOWER	1	BRONZE
16*	CUP PACKING	1	LEATHER
17	GUIDE SPRING	1	STAINLESS
18	STEM	1	BRONZE
19*	SEAT PACKING	1	POLYURETHANE
21	SEAT FOLLOWER	1	BRONZE
22*	STRAINER/ORIFICE	1	STAINLESS
23	SHELL	1	BRONZE
25*	O-RING PACKING	1	BUANA-N
26	LOCK NUT	1	BRONZE**
29*	GASKETS - DIAPHRAGM PLATE	2	COMPOSITION
30	BOLTS - ASSEMBLY	10	BRONZE**

* INCLUDED IN STANDARD REPAIR KIT

** OPTION - CHROME PLATED

SIZE	WEIGHT (LBS.)	DIMENSIONS (INCHES)			
		A	B	C	D
1, 1-1/4, 1-1/2	S.B. 27	14	5-1/8	2-1/2	2-3/4
1-1/2, 2	L.B. 34	16	5-1/2	2-7/8	2-3/4
2-1/2, 3	L.B. 43	17	7-3/4	5-1/4	4-3/8

S.B. - SMALL BODY

L.B. - LARGE BODY

ROSS VALVE Mfg. Co., Inc.	
6 OAKWOOD AVENUE - P.O. BOX 595 - TROY, NEW YORK, 12181 - TEL. (518) 274 0981	
NO SCALE	DRAWING 20WR-STEL
DATE 4-6-51	3401-AA REVISED 8-25-99 DMB
MODEL 20WR ANGLE BODY SURGE RELIEF VALVE WITH NPT END CONNECTIONS & STELLITE SEAT INSERT	
PLF: 20WR-STEL	

DIAPHRAGM PLATE #14 ALIGN THROUGH HOLE IN PLATE WITH INTERNAL WASTE PORT ON OUTLET SIDE OF SHELL.

GASKET PLACEMENT

- PLACE (1) #29 GASKET ON TOP OF #14 DIAPHRAGM PLATE (BELOW #11 DIAPHRAGM) - ALL BOLT HOLES SHOULD BE OPEN, WHILE THE PORT HOLE SHOULD BE COVERED.
- PLACE (1) #29 GASKET BELOW #14 DIAPHRAGM PLATE - ALL BOLT HOLES AND PORT HOLES SHOULD BE OPEN.

REPAIR INSTRUCTIONS

Relief Valve - Ross Valve Model 20WR Dump (Relief) Valve - Ross Valve Model 20WR-D

The repair of the Model 20WR or 20WR-D relief valve is made easy by installing a standard repair kit for the appropriate valve size, as follows:

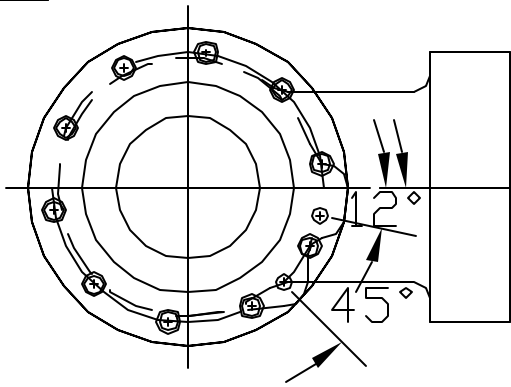
Note: Prior to starting a repair, it is recommended that the position of the adjusting screw #2 be marked. This will ensure that the same pressure setting is obtained upon re-assembly of the valve. The position of the diaphragm plate #14 with respect to the valve shell should also be marked. This will ensure that the valve's internal ports will be correctly aligned upon re-assembly.

- @ Loosen the adjusting screw #2 in order to release the compression on springs #5. (Note: There is no need to remove the adjusting screw completely.)
- @ Remove the spring chamber #6, top spring washer #4, springs #5, and bottom spring washer #9.
- @ Loosen the assembly bolts #30 and remove the diaphragm cover #8.
- @ Remove the pilot assembly (including the diaphragm nut #10, diaphragms #11, pilot pin #12, pilot valve #13, and o-ring #25) and re-pack as follows:
 - @ Remove the diaphragm nut #10 and replace the diaphragms #11 (all 4 sheets).
 - @ Replace the o-ring #25.
 - @ Inspect the pilot valve #13 to ensure that there is a good seating surface.
- @ Remove the diaphragm plate #14 and inspect as follows:
 - @ Check the internal seating surface to ensure that it will create a good seal with the pilot valve. (Note: The pilot valve may be "ground-in" to the diaphragm plate seat, using a light grinding compound, in order to restore a good seal.)
 - @ Check all internal ports to make sure they are clear.
- @ Remove the guide spring #17 and stem assembly (including the cup follower #15, cup packing #16, stem #18, seat packing #19, seat follower #21, strainer/orifice #22, and check valve #27 - if supplied), and re-pack as follows:
 - @ Remove the cup follower #15 and seat follower #21 and replace the corresponding packings. (Note: Care should be taken so that the cup follower #15 is not over-tightened, as it may extrude the cup packing #16 and cause the valve stem #18 to stick.)
 - @ Replace the strainer/orifice #22.
 - @ For dump valves (Model 20WR-D), replace the check valve #27. (Note: If the old neoprene style check valve was used, replace with the new ball style check valve according to separate instructions).
- @ Inspect the valve shell #23 as follows:
 - @ Check the "barrel" and seat areas for nicks or score marks. (Note: A fine sandpaper may be used to restore a smooth finish, when required.)
 - @ Check all internal ports to make sure they are clear.
- @ Re-install the stem assembly and guide spring #17.
- @ Place the first diaphragm gasket #29 on the valve shell #23. (Note: The sensing ports must not be blocked.)
- @ Re-install the diaphragm plate #14, making sure that the port holes underneath line up with the corresponding port holes on the valve shell #23. (Note: The guide spring #17 will cause the diaphragm plate #14 to remain off of the valve shell #23.)
- @ Place the second diaphragm gasket #29 on top of the diaphragm plate #14. (Note: The sensing ports should be blocked by this gasket.)
- @ Re-install the pilot assembly.
- @ Re-install the diaphragm cover #8. (Note: At this time the diaphragm plate #14 and diaphragm cover #8 can be pushed down against the force of the guide spring #17 and held in place by the assembly bolts #30.)
- @ Replace the bottom spring washer #9, springs #5, and top spring washer #4.
- @ Replace the spring chamber #6.
- @ Restore the adjusting screw #2 to its original position and tighten the lock nut #26.

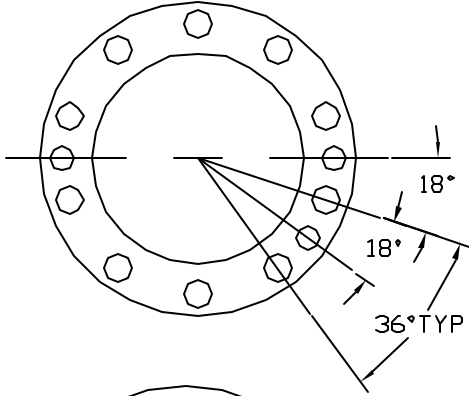
Note: All replaceable packings and gaskets are stock items and may be ordered as a "Main Valve Repair Kit" for valve serial number _____. They are available for regular delivery or next day service. All spare parts are available from:

Ross Valve Mfg. Co., Inc. - 6 Oakwood Avenue, Troy, New York 12181 - Phone (518) 274-0961 - Fax (518) 274-0210

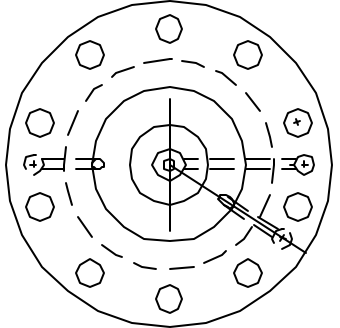
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A	CREATE AUTOCAD DRAWING	TJS		



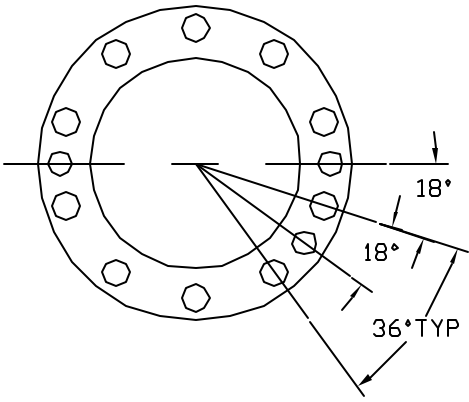
Shell



Paper Gasket



Diaphragm Plate



Paper Gasket

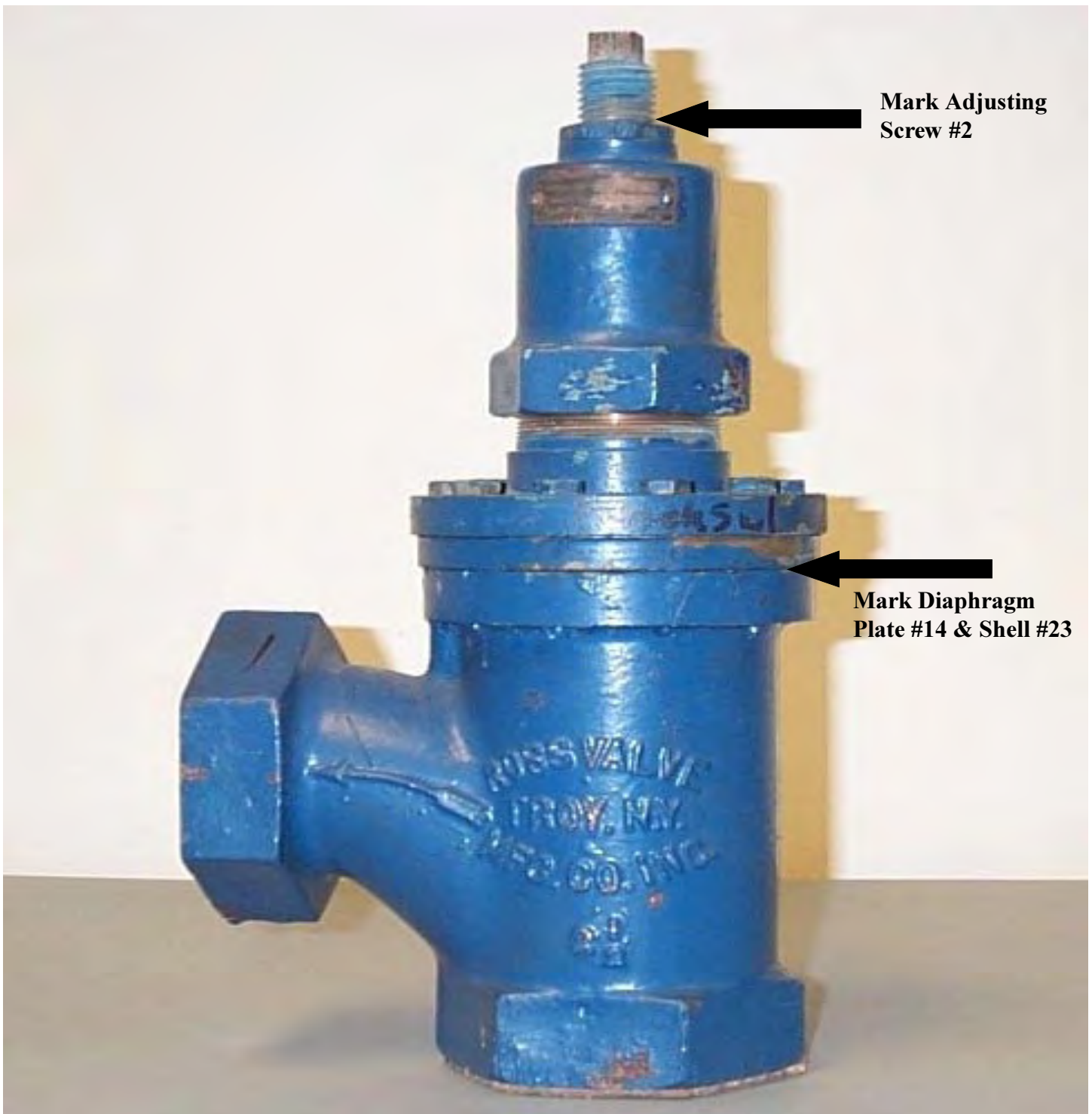
DATE XXXXXX	ROSS VALVE Mfg. Co., Inc.			
TOLERANCES UNLESS OTHERWISE SPECIFIED	6 DAKWOOD AVENUE - P.O. BOX 585 - TROY, NEW YORK, 12181 - TEL. (518) 274 0981			
FRACTIONAL ±1/64	TITLE: 20WR L.B. PORT ALIGNMENT			
DECIMAL ±.015	SCALE NONE	MATERIAL VARIOUS	DWG. NO. 500-XXX-XXX-XXX	REV. A
ANGULAR ±2°				

REPAIR INSTRUCTIONS

Relief Valve - Ross Valve Model 20WR Dump (Relief) Valve - Ross Valve Model 20WR-D

The repair of the Model 20WR or 20WR-D relief valve is made easy by installing a standard repair kit for the appropriate valve size, as follows:

Note: Prior to starting a repair, it is recommended that the position of the adjusting screw #2 be marked. This will ensure that the same pressure setting is obtained upon re-assembly of the valve. The position of the diaphragm plate #14 with respect to the valve shell should also be marked. This will ensure that the valve's internal ports will be correctly aligned upon re-assembly.



**Mark Adjusting
Screw #2**

**Mark Diaphragm
Plate #14 & Shell #23**

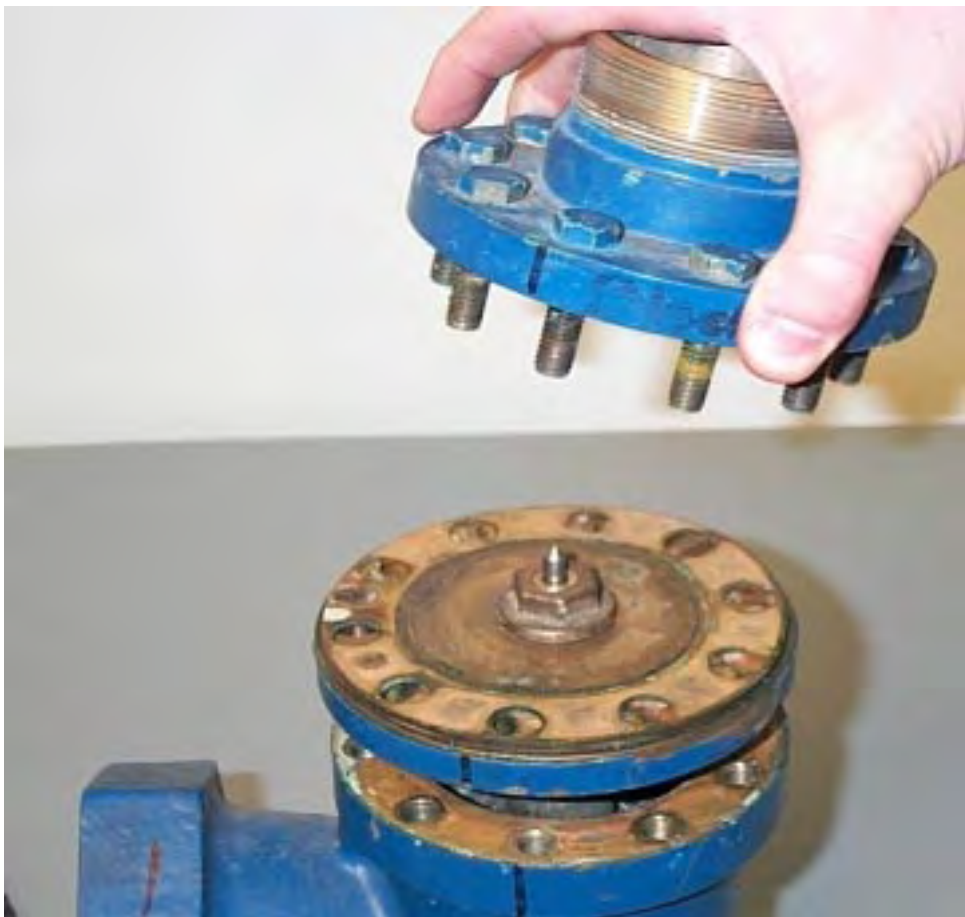
Loosen the adjusting screw #2 in order to release the compression on springs #5. (Note: There is no need to remove the adjusting screw completely.)



Remove the spring chamber #6, top spring washer #4, springs #5, and bottom spring washer #9.



Loosen the assembly bolts #30 and remove the diaphragm cover #8.



Remove the pilot assembly (including the diaphragm nut #10, diaphragms #11, pilot pin #12, pilot valve #13, and o-ring #25) and re-pack as follows:

- ~ Remove the diaphragm nut #10 and replace the diaphragms #11 (all 4 sheets).
- ~ Replace the o-ring #25.
- ~ Inspect the pilot valve #13 to ensure that there is a good seating surface.



Remove the diaphragm plate #14 and inspect as follows:

- ~ Check the internal seating surface to ensure that it will create a good seal with the pilot valve. (Note: The pilot valve may be “ground-in” to the diaphragm plate seat, using a light grinding compound, in order to restore a good seal.)
- ~ Check all internal ports to make sure they are clear.



Remove the guide spring #17 and stem assembly (including the cup follower #15, cup packing #16, stem #18, seat packing #19, seat follower #21, strainer/orifice #22, and check valve #27 - if supplied), and re-pack as follows:

- ~ Remove the cup follower #15 and seat follower #21 and replace the corresponding packings. (Note: Care should be taken so that the cup follower #15 is not over-tightened, as it may extrude the cup packing #16 and cause the valve stem #18 to stick.)
- ~ Replace the strainer/orifice #22.
- ~ For dump valves (Model 20WR-D), replace the check valve #27. (Note: If the old neoprene style check valve was used, replace with the new ball style check valve according to separate instructions).



Inspect the valve shell #23 as follows:

- ~ Check the “barrel” and seat areas for nicks or score marks. (Note: A fine sandpaper may be used to restore a smooth finish, when required.)
- ~ Check all internal ports to make sure they are clear.



Re-install the stem assembly and guide spring #17.

Place the first diaphragm gasket #29 on the valve shell #23. (Note: The sensing ports must not be blocked.)

Re-install the diaphragm plate #14, making sure that the port holes underneath line up with the corresponding port holes on the valve shell #23. (Note: The guide spring #17 will cause the diaphragm plate #14 to remain off of the valve shell #23.)

Place the second diaphragm gasket #29 on top of the diaphragm plate #14. (Note: The sensing ports should be blocked by this gasket.)

Re-install the pilot assembly.

Re-install the diaphragm cover #8. (Note: At this time the diaphragm plate #14 and diaphragm cover #8 can be pushed down against the force of the guide spring #17 and held in place by the assembly bolts #30.)

Replace the bottom spring washer #9, springs #5, and top spring washer #4.

Replace the spring chamber #6.

Restore the adjusting screw #2 to its original position and tighten the lock nut #26.

Note: All replaceable packings and gaskets are stock items and may be ordered as a "Main Valve Repair Kit" for valve serial number _____. They are available for regular delivery or next day service. All spare parts are available from:

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