Service Instructions for Yarway™ Series 43000 TempLow™ Steam Desuperheater

This instruction manual was prepared by Emerson.

Do not install, operate or maintain this product without being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance.

To avoid personal injury or property damage it is important to carefully read, understand, and follow all of the contents of this manual, including all safety cautions and warnings.

If you have any questions about these instructions, contact your Emerson sales office before proceeding.

Installation

⚠ WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations. Check with your process or safety engineer for any other hazards that may be present from exposure to process media.

Personal injury or equipment damage caused by sudden release of pressure may result if the desuperheater is installed where service conditions could exceed the limits given on the product nameplate. To avoid such injury or damage, provide a relief valve for over-pressure protection as required by government or accepted industry codes and good engineering practices.

CAUTION

When ordered, the desuperheater configuration and construction materials were specified to meet particular pressure, temperature, pressure drop, and fluid conditions. Do not apply any other conditions to the desuperheater without first contacting your Emerson sales office.

Maintenance

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**
- **Safely vent the power actuator loading pressure.**
- **Use lock-out procedures to be sure the above measures stay in effect with you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, even with the valve has been removed from the pipeline. Process fluids may spray out under pressure when removing the packing hardware or packing rings.**
- **Check with your process or safety engineer for any other hazards that may be present from exposure to process media.**

CAUTION

When adjusting the travel stop for the closed position of the valve ball or disk, refer to the appropriate valve instruction manual for detailed procedures. Undertravel or overtravel at the closed position may result in poor valve performance and/or damage to the equipment .

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YARWAY TEMPLOW® STEAM DESUPERHEATER

INSTALLATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood

PRINCIPLES OF OPERATION

The Yarway TempLow Desuperheater (also model 91 and 93) responds to pneumatic or electric signals generated by a temperature instrumentation control loop to provide automatic introduction and metering of cooling water for steam temperature control. This desuperheating process effectively and efficiently cools steam in accordance to a thermodynamic heat balance at constant pressure.

Desuperheating water, at a pressure at least 50 psi above steam pressure, enters the valve at a flanged inlet. Water flows down through the jacket to the seating area above the disc where tight shutoff is achieved.

When the temperature control unit signals for a reduction in steam temperature, the pneumatic actuator moves the stem/disc downward, progressively uncovering a series of vortex feedholes. The water enters the vortex, acquires a rotational sense and exits the spray nozzle as a thin spinning conical fan which immediately breaks up into a finely atomized mist of water droplets. These mix with the superheated steam for rapid evaporation. There are seven stages of water control for each vortex nozzle. Multiple nozzles are fitted to the spray cylinder, thus giving a fine control capability and fast response to a change in the temperature control signal. Use of multiple swirl chamber, orifice fan type spray nozzles provide the sequential application of an efficiently generated spray cone. The combination provides a precise method of control with a high order of rangeability. In the normally closed position, the desuperheater maintains a tight shutoff by virtue of the actuator top works.

Valve selection is based on flow requirement at maximum conditions of water need and nominal water pressure. The valve exhibits a linear or modified linear characteristic. Nominal flow should be in the range of 50% to 80% of maximum valve capacity. Follow the Yarway certified engineering drawing for specific details which supersede these general instructions. If the conditions differ from those specified, consult the Yarway Customer Services Department.

STANDARD SPECIFICATIONS

- Steam pressure and temperature ratings - Standard Class Valve ASME B16.34 - limits as specified for ASTM-A217-WC6 in Pressure Classes 150, 300, 600, 900 and 1500.
- Steam line installation diameters (minimum) - nozzle sizes A6 and B6 - 6 inch diameter minimum, C6, D6, and E6 - 8 inch diameter minimum. Consult certified drawing.
- Cooling water supply pressure - water pressure 50 psi greater than steam pressure as measured at the valve inlet.
- Steam line nozzle and valve outlet flange - 3 inch ASME B16.5 (DN 80) raised face - pressure class as specified. Extension pipe 3 inch schedule 160 maximum (2.6 inch diameter clearance).
- Valve water inlet flange - 1 inch (DN 25) ASME B16.5 raised face flange; pressure class or DIN flange as specified.
- Valve actuator/positioner - standard actuator; Yarway Model 20, air failure to close diaphragm type. Positioner upon client request.
- Instrument air failure mode - loss of instrument air, valve fails closed.
- Instrument electric signal: 4-20 mA.
- Instrument air signal - standard - 3 to 15 psig (.21 to 1.03 bar).
- Connections - ¼ inch - NPT instrument air supply (IA) and PG 20 instrument signal (IS). Check certified order drawing for specific details.

Engineering Doc. #961245 Rev. H

UNPACKING, PREPARATION AND STORAGE

Upon receipt of the valve, inspect valve and shipping container for transit damage such as a broken crate, broken yoke, bent valve stem or broken accessories. Check the documentation, identification plate, valve tag data, instruction manual, etc. Locate and identify spare parts included in the shipment.
Use the shipping container for temporary valve protection. Leave protective covers in place until ready to proceed with inspection and installation. Store the valve in a clean, dry location. If outdoor storage is unavoidable, support the valve off the ground or pavement and provide a waterproof covering. Lift the valve by means of straps around valve body and inlet flange. Do not use the actuator yoke to attach lifting straps.

LONG TERM STORAGE

Use a dry, heated, inside storage area. Remove the valve stem packing. Make sure valve is dry and free from moisture. Apply Cosmoline-type protective grease to the flange face, packing stuffing box and valve stem.

PREPARATION FOR INSTALLATION

Remove all paper, tape and packing materials, and all foreign materials. Transport carefully to the installation site. Remove valve protective covers and install the valve in the system.

INSTALLATION

See Yarway Engineering Approval Drawings for certified dimensions, installation details and marking for each TempLow Desuperheater by serial no./tag no.

Main steam system piping (Figures 1 and 2)

1. The desuperheater requires a minimum of 15 feet (4.6 meters) of straight pipe from the valve installation to the first bend downstream and six straight pipe diameters upstream.
2. Branching of the main steam pipe should not be allowed between the desuperheater and the temperature sensor.
3. Pipe bends should be long radius type to aid keeping the steam/water vapor mixture in suspension until evaporated.
4. Avoid using "T" fittings between the desuperheater and the temperature sensor.
5. The distance from the desuperheater to the temperature sensor is nominally 40 feet (12.2 meters). The certified drawing specifies a minimum based on system requirements. Greater distance assures full mixing and total evaporation at low steam velocities. Care must be exercised to accommodate low steam flow conditions near saturation temperature. A water film can form on the pipe wall and reach the temperature sensor.
6. The temperature sensor should be mounted in accordance with manufacturer's recommendation. Yarway recommends mounting in the top of the line ± 45°. The sensor should not be mounted at the outside of an elbow.
7. The steam velocity can be increased by reducing the steam pipe size by one or two sizes for the distance between the desuperheater and the sensor.
8. Desuperheater applications requiring control over large turn down load ranges can utilize split range control from a single sensor for multiple desuperheaters installed in the steam pipe.
9. Steam dump systems may require multiple units to control maximum temperature.

Pipe mounting orientation

1. The desuperheater may be mounted at 90° to the steam line for all orientations of steam flow.
2. The "vertical-up" position is preferred for the valve stem and actuator. If the TempLow is installed in other than vertical position, consideration must be given to supporting the actuator.
3. The cooling water supply should be clean, filtered condensate or boiler feed water. The source selection must consider water temperature.
4. Yarway recommends that the cooling water line include a locked open shut-off valve and a strainer with 0.004 inch (0.1 mm) perforated mesh sized for the flow requirements. The cooling water line must be thoroughly flushed prior to connection for use.
5. The water line pressure at the inlet to the valve is to be per certified drawing data sheet.

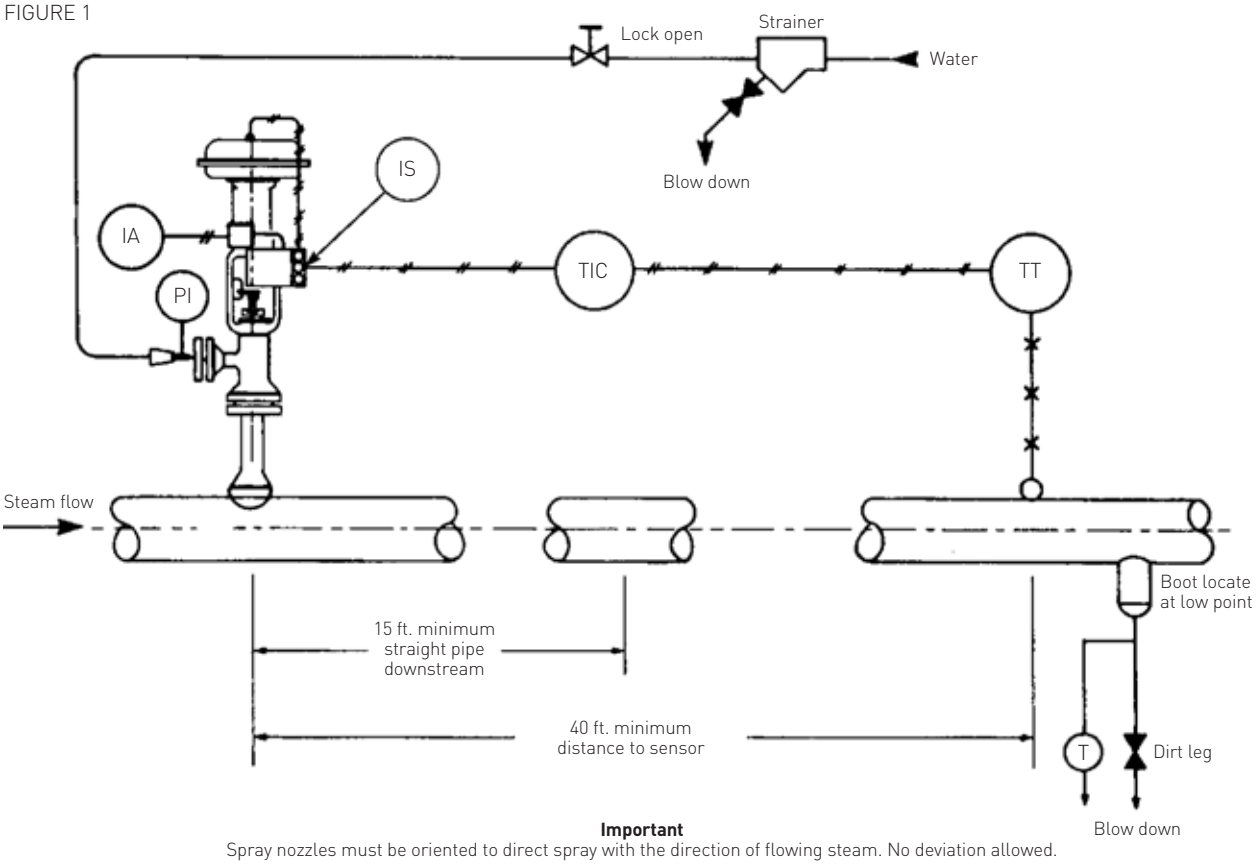
STEAM LINE

Mounting flange and pipe (Figure 3)

1. The spray cylinder should be located at the center line of the pipe which is most important in small lines.
2. The primary dimension variable is the length "X" of the 3-inch (DN 80) nozzle that supports the mounting flange. The 3-inch (DN 80) connecting pipe must provide a 2.60-inch (65 mm) diameter internal clearance. A 3-inch schedule 160 pipe provides the maximum wall thickness pipe allowed.
3. The variable "X" is nominally calculated by subtracting ½ the pipe OD dimension from 15½ inches (394 mm). This dimension varies in order that the spray cylinder portion of the valve is centered within the pipe OD ("Y"). For pipe sizes greater than 24 inches (600 mm) the "X" dimension is 3½ inches (88.9 mm). (See certified drawing.)

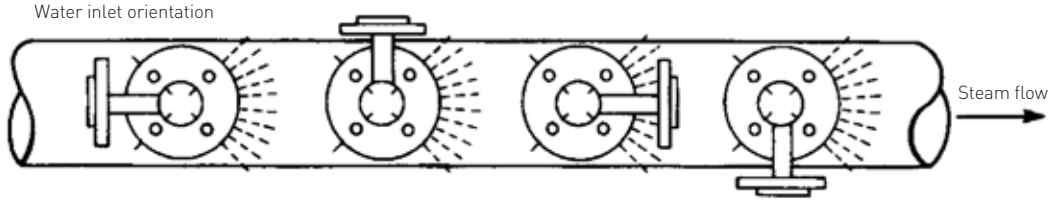
RECOMMENDED STANDARD INSTALLATION

DESUPERHEATING STATION
FIGURE 1



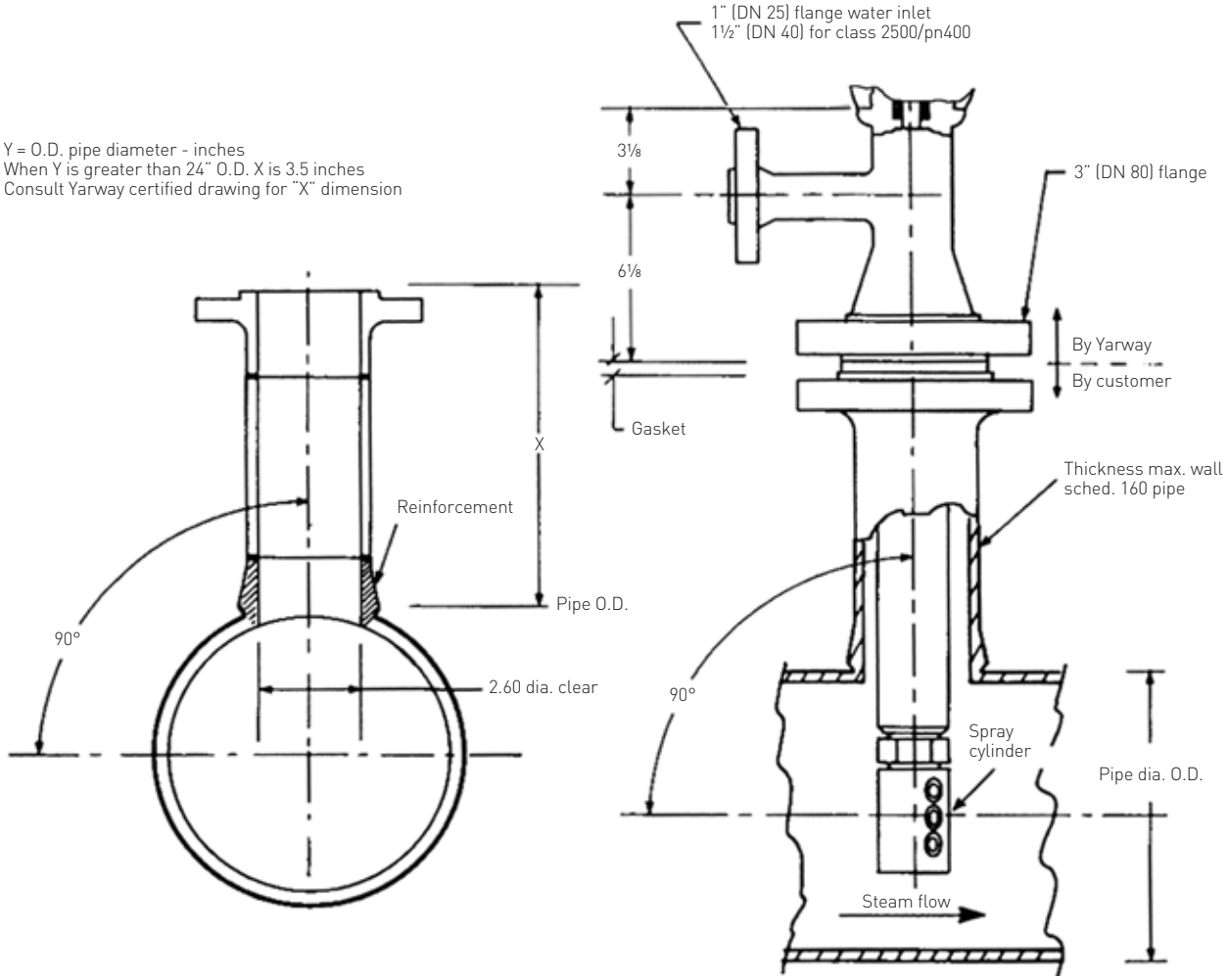
Important
Spray nozzles must be oriented to direct spray with the direction of flowing steam. No deviation allowed.

FIGURE 2



Configuration position	1	2	3	4

FIGURE 3



CONFIGURATION 1 POSITION

MOUNTING INSTRUCTIONS

1. Use gasket and bolting material, installed and meeting recommendations of ASME B31.1 "Power Piping" Code or another recognized standard.
2. Put the gasket on the mounting flange.
3. Carefully insert the desuperheater into the 3-inch (DN 80) nozzle.
4. Mount the desuperheater to aim water spray outlet points with the direction of steam flow.
5. Assemble the bolting and tighten.
6. Clean and flush the cooling water line.
7. Connect the water line.

OPERATING CONTROLS

The desuperheating station instrument control loop should include an indicating temperature controller, a temperature transmitter, and a thermo well (Figure 1).
If the steam pressure varies widely, a self-compensating cascade pressure loop can be added to vary the temperature set point to assure control close to saturation conditions.

START UP

1. Verify the proper system installation, the sensor location and the distance.
2. Connect the instrument air supply (IA) and the instrument signal (IS) tubing.
3. Adjust the instrument air regulator for correct output pressure.
4. Switch the temperature controller to manual.
5. Assuming an instrument air signal (IS) of 3-15 psi, the valve has three important instrument signal response points.

Inst. signal, psi (IS)	Valve position
3	Closed
3.5	Valve stem starting to move
15	Full valve stem stroke

   The zero positioner output pressure (diaphragm pressure) at 3 psig (IS) instrument signal provides full actuator spring force to close the desuperheater and assure tight shutoff.
6. Set (IS) at 3.5 psi. Adjust the positioner so the valve is barely closed.
7. Set (IS) at 15 psi. Check the valve stem for full stroke. Adjust the positioner to the correct range and re-zero if needed by checking the 3.5 psi point.
8. Set (IS) at 3 psi - the valve should close and the output of the positioner should drop to 0 psi.
9. Calibrate the temperature transmitter (TT). Adjust for increasing temperature to give an increasing signal.
10. With the temperature controller (TIC) in automatic position, ascertain that an increase in temperature will cause an increase in the instrument signal (IS) (controller output).
11. Manual start up
    a. Warm the main steam line.
    b. Instrument signal (IS) 3 psi (desuperheater closed).
    c. Open the water valve to the desuperheater.
    d. Verify the water pressure at the valve.
    e. Establish the main steam flow (at least the design minimum).
12. Slowly increase the instrument signal (IS) to 4 or 5 psi. The indicated temperature starts to fall. The temperature transmitter (TT) signal decreases. The controller (TIC) output pressure also decreases.
13. Slowly decrease the instrument signal (IS) to 3.5 psi. The temperature will increase, the temperature transmitter (TT) output will increase, and the controller (TIC) output will increase.
14. When satisfactory coordination between the instrument air signal (IS) and the steam temperature is reached, adjust the controller setpoint to the desired temperature using the directions of the manufacturer.
15. Transfer from manual to automatic control will put the desuperheater station in operation.
16. Log records of steam pressure, water pressure, inlet steam temperature, controlled steam temperature and steam flow should be maintained to verify operation.

IMPORTANT
Verify tightness of the valve stuffing box regularly after start-up.
Re-tighten if necessary. Do not overtighten the stuffing box.

INSPECTION PROCEDURE

Spray nozzle assemblies (3) and (6), fastener ring (4), stem assembly (2) and piston rings (5) shall be considered wear parts. The materials selected are such that they do cope with the conditions as found on applications in steam/water environments. Thermal cycling does occur and users should realize that the temperature differentials at Desuperheaters are usually the highest found in the Plant. It is recommended to check the spray nozzle assembly, with the integrally vacuum brazed injection nozzles, fastener ring and tack-welds after the first year of service.
At the inspection, by use of dye check or fluor penetrant investigation, these parts shall be checked for cracks. Parts with hair crack indications shall not be re-used. 'Defect free' heads in such installations shall be inspected once per 2 year of operation.
It is advised to replace the above mentioned components at least once per 5 years of service. Taking these precautions has historically proven to give reliable service.
Note: spray nozzle assemblies may have been made specifically for the specification. Delivery time of such components will be 8 weeks.

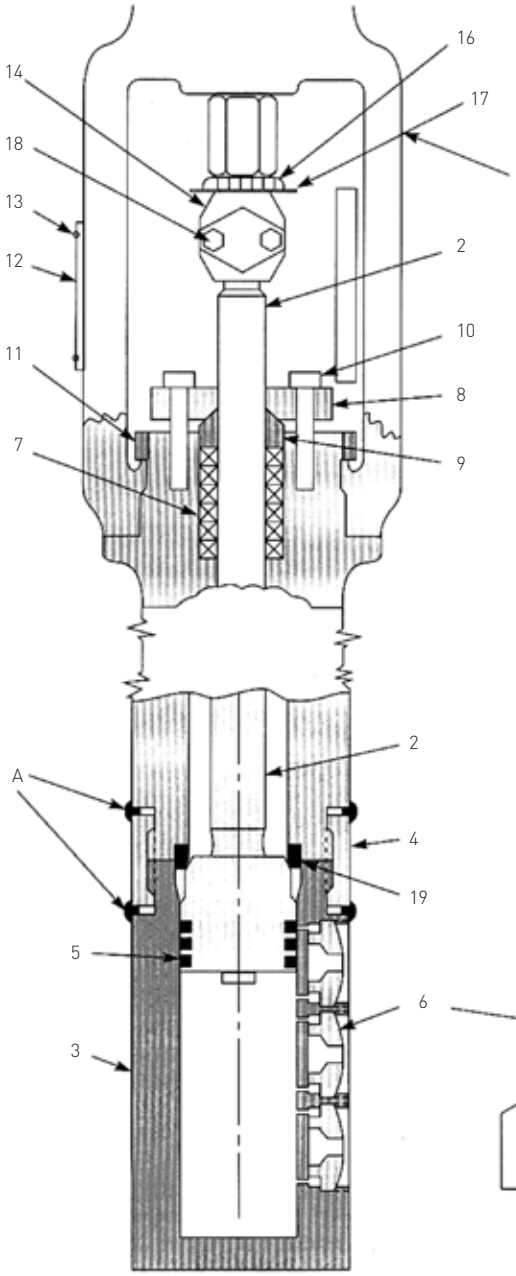
INSPECTION

1. Review the current operating conditions of temperature, steam flow, pressure of steam and pressure of cooling water and compare with those specified on the installation drawing.
2. Estimate the valve position from the operating conditions and the heat balance.
3. Check the valve stem position.
4. Check the valve stem packing leakage. The packing gland should appear slightly wet.
5. Check to assure that the packing gland is equally centered on the valve stem.
6. Check to assure that the valve stem is smooth and not scored due to rubbing or binding.
7. Check the instrument air supply pressure and check the filter.
8. Check the air signal from the controller.
9. Inspect the positioner linkage to assure proper non-binding action.
10. Check the steam pressure and temperature.
11. Compare the temperature, temperature setpoint of the controller and the steam pressure to provide a minimum margin above saturation.
12. Blow down the strainer-changes in water inlet pressures indicate a contaminated supply.
13. Evaluate.
14. If operation conditions permit: manually cause small changes to the system
    1. To stroke valve.
    2. To change temperature.
    3. Note changes.
15. If the findings for the above checkpoints are satisfactory, return the valve to service.

ASSEMBLY, INSPECTION AND OVERHAUL

1. Isolate (valve out) the desuperheater valve from the system.
2. **CAUTION:** secure the steam line by shutting off the block valves. Cool the line and vent, assure the steam line is cold and depressurized. Shut off the water supply.
3. Stroke the valve full open to fully closed. Check the stroke and adjustments. Note the smoothness of operation. Repeat several times noting the positioner gage readings. Observe the motion and inspect for freeness and proper action.
4. Disconnect and remove the valve.
   CAUTION: use care in lifting by using the proper sling rigging. Assure proper removal without bending the positioner linkages, etc.
5. Check leakage.
6. Connect the temporary supply of water to the inlet port.
7. Increase the water pressure to approximate the difference between the installed water pressure and the steam pressure (differential pressure).
8. Factory test: leakage allowed 7 drops per minute at 550 psig.

FIGURE 5



SPRAY CYLINDER DETAIL

FIGURE 4

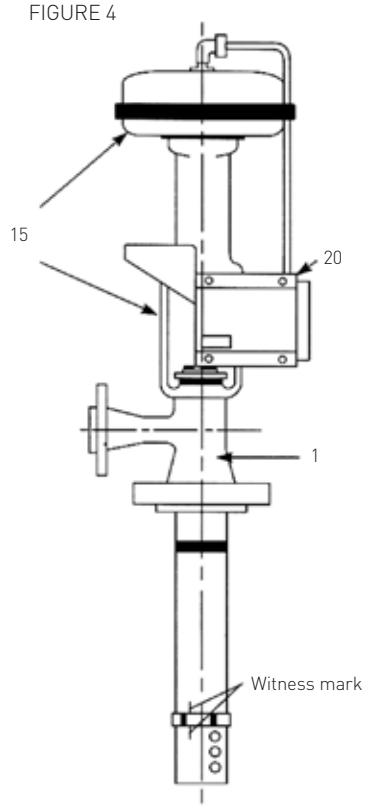
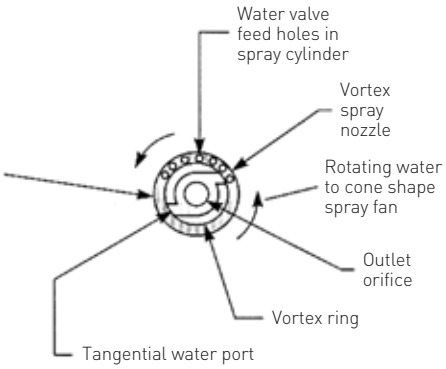


FIGURE 6



VORTEX SPRAY NOZZLE NOT AVAILABLE AS A SPARE PART

PARTS LIST

Item		Part
1		Body assembly
2		Stem assembly
3		Spray cylinder assembly
4		Fastener ring
5	Set	Piston ring
6		Vortex nozzle
7*	Set	Packing
8		Packing gland
9		Gland bushing
10		Cap screw
11		Lock nut
12		Data plate
13		Drive screw
14		Split nut stem connector
15		Actuator
16		Jam nut
17		Scale plate
18		Coupling bolt (2x)
19		Welded Stellite 6 seat**
20		Positioner

NOTES

* Recommended spare part. Specify spare part by item no., figure no., serial no.

** Integral part of the body, no spare part

DISASSEMBLE WITH VALVE IN BENCH VISE (FIGURES 4, 5 AND 6)

1. Mark the body assembly (1) and the spray cylinder assembly (3) (Figure 4) with witness marks to ensure proper alignment at reassembly. Fastener ring (4) has right and left hand threads to allow properly oriented tightening at reassembly. RH and LH for right hand and left hand respectively are stamped on fastener ring (4).
2. Grind out the tack weld (A) (Figure 5) at two places. To release the fastener ring (4) from the body assembly (1) and the spray assembly (3):
   a. Hold cylinder (3); loosen the ring (4) by turning the ring clockwise.
   b. Inspect the piston rings (5) for wear or erosion.
   c. Inspect the cylinder bore (3) for gouges or ridges.
   d. Clean the spray cylinder assembly (3) using boiler acid wash to remove scale. Thoroughly rinse in clean water.
   e. Inspect the spray nozzles (6) for erosion of outlet orifices.
   f. Replace worn or eroded parts.
   g. Connect the filtered air supply (IA) and, using the regulator, supply approximately 9 psi to the instrument signal (IS) ports of the positioner.
   h. The actuator will cause the stem assembly (2) to extend.
   i. Inspect the seat (19) and the disc (2) seating surface. The seating surface should be clean and free from cuts, gouges or wiredrawing. A proper seat shows a narrow concentric lapped seating band.
   j. Slowly decrease the instrument signal (IS) allowing the actuator to retract, closing the valve. Shut off the air and vent.

DECISION POINT

If the seat band and leakage are correct, proceed to Reassembly procedure. If the stem and disc are to be replaced or refinished, proceed to "Removal of stem/disc assembly."

Removal of stem/disc assembly

Place valve in vise. The instrument air (IA and IS) should be connected to the positioner.

1. Carefully observe and make sketch notes of the orientation of the:
   a. Positioner link attachment to valve stem and the orientation of the split nut stem connector (14). Count the stem threads above and below the connector to aid in proper reassembly.
   b. Carefully disconnect the positioner links.
   c. Loosen the jam nut (16) and leave on the actuator stem.
   d. With (IA) at 40 to 50 psi and (IS) at 7 psi, slowly move the positioner arm to cause the actuator stem to extend to mid-travel.
   e. With the valve stem at mid-position, loosen the split nut stem connector bolts (18) and stem connector (14).
   f. Slowly retract the actuator stem. Remove the instrument signal (IS).
   g. Loosen and remove the cap screws (10), packing gland (8) and gland bushing (9).
   h. With a packing hook, remove packing (7).
   i. Remove the valve stem and disc (2).
   j. Clean the packing box of packing and foreign material.
   k. The stem disc (2) and seat (19) may be lapped to repair the seat using Carborundum Compound, Grade 360 (fine) or equivalent. A proper seat shows a narrow concentric lapped seating band.
   l. Clean the seat and disc thoroughly after lapping.

REASSEMBLY OF VALVE

1. Insert the stem/disc assembly (2) into the valve body (1).
2. Install the packing rings (7) alternating the ring gaps. Bottom each ring. Refer to packing installation instructions supplied with replacement packing.
3. Install the gland bushing (9).
4. Install the packing gland (8).
5. Install the cap screws (10).
6. Pull down the packing evenly taking up slack, making sure not to bind the stem, bushing or gland.
7. Leave the final packing adjustment until later in this instruction.
8. Place the scale plate (17) on actuator stem (Figure 8).
9. Actuator/stem coupling (Figure 7).
   a. Make a temporary witness mark at the actuator stem and spring adjustor - actuator fully retracted.
   b. Connect 7 to 9 psi regulated instrument air to actuator port to cause actuator to extend ¾" (19 mm).
   c. Couple valve stem and actuator stem with two-piece stem connector (14). Stems to touch or gap slightly to match fit the thread form. Valve stem to have a full thread engagement with stem connector.
   d. Attach mating stem connector half, assemble positioner bracket if applicable. Tighten assembly using connector bolts (18). Tighten to 20 ft/lb (27 Nm) torque.
   e. Slowly remove regulated instrument air to allow actuator stem to retract at final position ("0" air pressure) and valve disc on seat. The actuator stem witness mark shall be extended 1/16" (1.5 mm) minimum. Full actuator spring force is on valve to close, assuring tight shutoff.
10. Tighten the jam nut (16) to 50 ft/lb (68 Nm) on the scale plate (17) and the split nut (14). Adjust indicator scale.
11. Remove the air pressure to the actuator.
12. Connect the positioner link in the same position as found at disassembly.
13. Reconnect actuator line to the positioner. Cause valve to open and close by raising and lowering pressure (IS) (3 to 15 psi).
14. Turn off the air pressure to the positioner.

REASSEMBLE SPRAY CYLINDER ASSEMBLY

1. Inspect the piston ring (5) position and make proper orientation with respect to witness marks established at disassembly (Figure 4).
2. Orient piston rings as shown in Figure 8.
3. Engage ring (4) 1-2 threads on body (1) to hold in place. Align the witness marks on cylinder (3) and valve body (1). Assemble cylinder (3) by inserting disc (2) with properly oriented piston rings (5). Water can be used as a lubricant.
4. Engage the threads in ring (4) simultaneously with thread in body (1) and cylinder (3).
5. Rotate the ring (4) counterclockwise to pull body (1) and the cylinder (3) into face to face contact. Do not rotate cylinder (3).
6. Tighten the ring (4) to 40 to 50 ft/lb (54-68 Nm).
7. The fastener ring (4) must have a gap on both sides - 1/64" (0.4 mm) minimum.
8. Inspect location of witness marks for alignment of spray cylinder (3) and body (1).
9. Turn on the instrument air supply pressure port (IA). Apply 3 to 15 psi at port (IS). Slowly extend and retract the valve stem (2). Valve action should be smooth.
10. Shut off the air pressure and vent. Remove connections.
11. Tack weld ring (4) to the body (1) and to the cylinder (3) - 2 places, 180° apart.
12. Use welding filler material, Specification SFA 5.14, AWS ER NiCrMo-3. Preheat not required. Post weld heat treat not required.
13. Apply 500 psi water at water inlet flange. Check leakage.
14. Tighten packing cap screws (10) equally until gland leakage is a drop per minute. Do not bind stem.
15. Remove pressure.

FIGURE 7

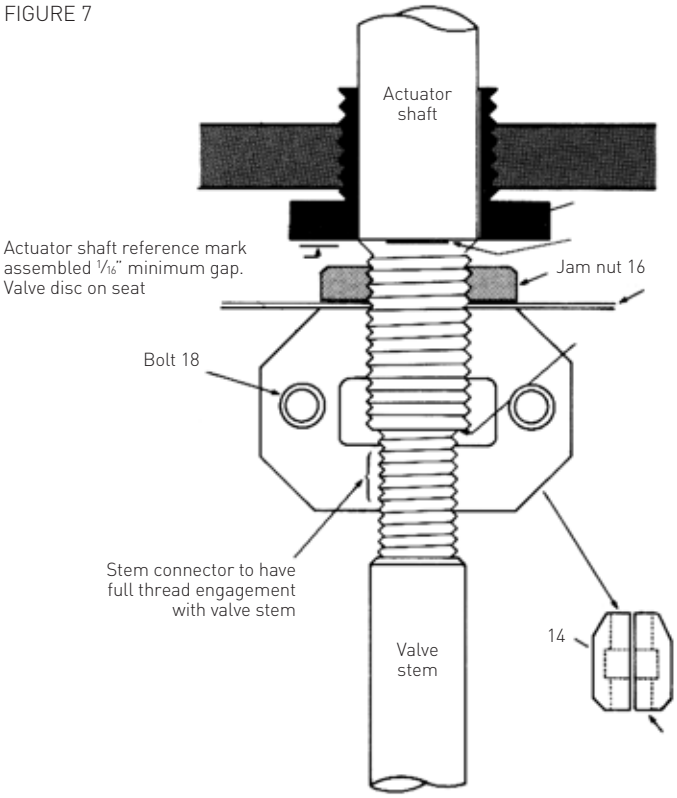
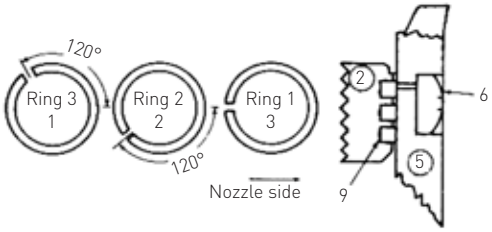


FIGURE 8



VALVE AND ACTUATOR REASSEMBLY AND ADJUSTMENT

1. Actuator and positioner adjustment are covered in manufacturer's manuals.
2. **CAUTION:** the actuator has springs installed with a preload in place. Do not disassemble without proper preparation.
3. Pin the positioner arm linkage to the split nut stem connector (14) in the same manner as noted at disassembly. Take care to ensure freedom of motion to linkage.
4. The valve trim has a linear or modified linear stroke/flow characteristic.
5. Valve to remain on valve seat at 3 psi instrument signal (IS), "0" diaphragm pressure, and to start open at 3.5 psi (IS). This ensures positive seating force at minimum signal. Full stroke at 15 psi (IS).
6. Install the valve using new gaskets as described in mounting and startup instructions above.

FIGURE NUMBERS

			Weight*	
ANSI class rating	**ISO rating**	**Figure number**	**lb**	**(kg)**
150	20	4322	141	(64)
300	50	4324	150	(68)
600	110	4326	155	(70)
900	150	4328	171	(77)
1500	260	4330	187	(85)
2500	420	4332	231	(105)

* Including pneumatic actuator

Spray cylinder nozzle assemblies are furnished in 7 standard capacities depending on application requirements. Special nozzle configuration may be supplied. Consult certified order drawing.

			Valve stroke	
Size	**C_v**	**K_v**	**inch**	**(mm)**
AS 6	0.09	0.07	1⅛	(28)
AO 6	0.19	0.16	1⅝	(41)
A 6	0.30	0.26	1⅝	(41)
B 6	0.80	0.68	2⅛	(54)
C 6	2.10	1.80	2⅞	(73)
D 6	3.20	2.60	3⅛	(80)
E 6	5.50	4.70	3 5/16	(84)

RECOMMENDED SPARES

Packing set - Item (7).

Special note:

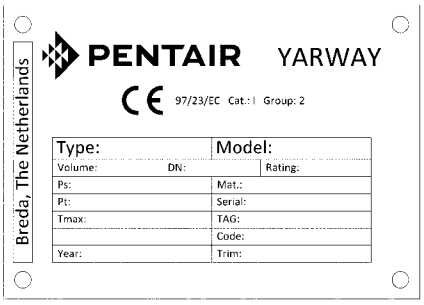
1. All parts are available. Identify by name, item number, and desuperheater valve serial number.
   The seat is a part of the body assembly and not available separately.
2. Spray cylinder assembly (3) includes vortex nozzles (6) which are not available separately.
3. When ordering a spray cylinder (3), matching piston rings (5) must be ordered to assure proper sealing.
4. When ordering stem assembly (2), piston ring set (5) will be supplied.

HOW TO ORDER SPARE PARTS

When ordering spare parts, always give the:
Figure no.
Serial no.

Describe parts by name and item number.
See Figure 5.

Data plate is attached to actuator yoke.



TROUBLESHOOTING CHART FOR SYSTEM

Steam flow	Steam pressure	Actual effective steam temp.	Temp. control	Valve action	Cause	What is wrong	To correct
Very low	Low	Low	Low	Closed	Startup		
Very high	Low	Low	OK	Normal		Water on sensor Evap. beyond sensor	
Normal	Normal	Low	OK	Normal	Wet sensor	Sensor too close to valve	Move sensor
Very low	High	Low Due to syst. heat losses	OK	Normal to flood	Setpoint at press. sat. temp.	Poor heat transfer Sat. steam Wet steam	Raise setpoint or lower pressure
Normal	Normal	OK	OK				
Normal	Low	OK	OK	Normal	High superheat	Poor heat transfer	Raise system pressure
Normal	High	OK	OK	Poor control	Sat. steam	Setpoint at saturation	Lower system pressure
Low	High	High	High	Fails open Floods	Temp. above Sat. temp.	Over temperature Wet steam	Lower system pressure
Low	Normal	High	OK	Closes	Water on sensor	Sensor too close to valve	Move sensor
Very low	Normal	High	High	Opens Floods	Water fallout	Steam velocity low	Lower system pressure
Normal	Normal	High	High	Opens Floods	Operating saturated	Wet steam	Lower system pressure Raise setpoint
Normal	Normal	High	High	Open	Needs water	Water supply	Clean the strainer
Very high	Low	High	High	Open	Needs water	Check water supply	Raise water pressure

VALVE TROUBLESHOOTING CHART

Malfunction	Reason	Corrective action
Low temperature	Valve cycling, low system flow, valve throttling too close to seat	1. Reduce water pressure Must be steam saturated pressure plus 50 psi
Low temperature	Controller action reversed	1. Check system signal sense
Low temperature	Water pressure too high	1. Reduce inlet water pressure
Low temperature	Valve does not shut off	1. Check valve stroke 2. Check 3.5 psi Instrument Signal (IS) shutoff point
Low temperature	Valve seat leakage indicated	1. Secure system and evaluate seat leakage
High temperature, no control	Water pressure at valve inlet less than specified	1. Open water valve 2. Blow down strainer 3. Check supply pressure
High temperature, no control	Air pressure to actuator/positioner	1. Air pressure too low. Adjust to 40-50 psi 2. Clean air set filter 3. Blow down air supply line 4. Check for moisture in instrument air
High temperature, no control	Water pressure at valve as specified	1. Check valve stroke 2. Check water temperature 3. Check for valve plugging 4. Check water quality
Hunting or limit cycling	Temperature setpoint too close to saturation pressure temperature	1. Increase temperature (steam superheat) 2. Evaluate and readjust controller action
Hunting or limit cycling	Temperature controller tuning not correct	1. Positioner arm link bent, loose or binding
Hunting or limit cycling	Valve binding or friction	1. Check packing adjustment (some leakage expected) 2. Check packing gland/stem clearance 3. Use correct original type packing 4. Review positioner calibration 5. Check instrument air supply pressure

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