Service Instructions for Yarway™ AT-18/28 and AT-38/48 Heavy Duty A.T.-Temp Desuperheaters

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 local 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 A.T.-TEMP DESUPERHEATER STANDARD/HEAVY DUTY

INSTALLATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood

MODEL 38/48
STANDARD DUTY

MODEL 18/54 AND 28/64
HEAVY DUTY

ATTENTION WHEN PUTTING INTO OPERATION

Readjust 'Stuffing box' immediately as required (see re-installation). Leakage is out of guarantee.

UNPACKING

The Yarway A.T.-Temp Desuperheater is packed with the greatest of care in wooden boxes or cartons for protection during handling and transit to site. After hydrostatic testing, the A.T.-Temp Desuperhater is flushed through with a high grade of preservative to protect machined and internal surfaces from corrosion. If it is found, however, that damage has occurred during shipment, then this should be reported immediately to your forwarder or Yarway representative.

Particular care should be taken when removing the A.T.-Temp Desuperheater from its packing and your special attention is required to check carefully that no damage has occurred to flange faces, threading, actuators, connecting pipes, etc. (See figures 1 and 2).

INSTALLATION OF THE A.T.-TEMP DESUPERHEATER

Before installation, check the A.T.-Temp Desuperheater, actuator and accessories for any visible damage.
Check that the information on the documentation, identification plate and tag number complies with the order specification.
Remove the A.T.-Temp Desuperheater carefully from it's packaging, lifting by means of straps around the body. Do not use the water inlet connection, yoke, actuator or any of it's accessories for lifting. Leave the flange covers in place during transportation, until ready to install in the pipework.

WARNING

The hoisting lug is for the actuator only, NOT for a total assembly!

When installing the A.T.-Temp Desuperheater use gaskets and bolting material in accordance with the relevant piping code, for example ASME/ANSI B31.1 or DIN/TRD/EN. Place the gasket onto the mounting flange and carefully insert the nozzle into the branch pipe. Ensure that the spray cylinder is pointed in the direction of the steam flow before tightening the mounting bolts (see figure 3).

Note: the A.T.-Temp Desuperheaters should be installed free of 'forces, moments and torques'.

The A.T.-Temp Desuperheater is provided with a standard lower body length, as specified in the contract drawing and the mounting branch for the steam pipework must be manufactured to suit. The length of this branch should be such, that the centerline of the spray cylinder is located on the centerline of the steam pipe (± 5 mm).
The mounting branch should be 3" (DN 80) nominal bore, maximum pipe schedule 160 for clearance purposes (check the applicable power piping code).

RECOMMENDATIONS
(acid cleaning of steam boilers)
Remove A.T.-Temp Desuperheaters from the piping prior to acid cleaning!

The minimum pipe run, required downstream of the A.T.-Temp Desuperheater, varies with each individual application and would be specified by Yarway at the enquiry stage. This straight run is needed to prevent erosion due to impingement of water droplets against pipewalls, valves and fittings and is normally in the order of 4 to 6 meters, as a minimum (no upstream straight length is normally required).

The distance from the A.T.-Temp Desuperheater to the temperature sensor is nominally 12 to 15 meters, although the distance specific to the application would be advised by Yarway at the enquiry stage. Longer distances will ensure that full evaporation of the water will take place at lower steam velocities.
The temperature sensor should be located in the upper half of the pipe, avoid branching of the steam pipework between the A.T.-Temp Desuperheater and the sensor (see figure 4).

FIGURE 1 - MODEL 38/48

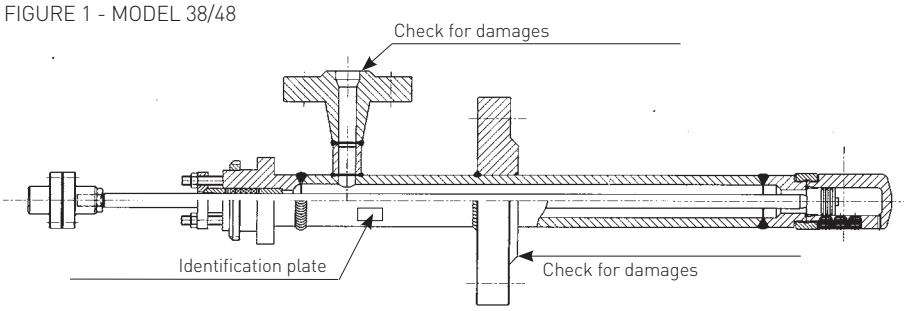


FIGURE 2 - MODEL 18/54 AND 28/64

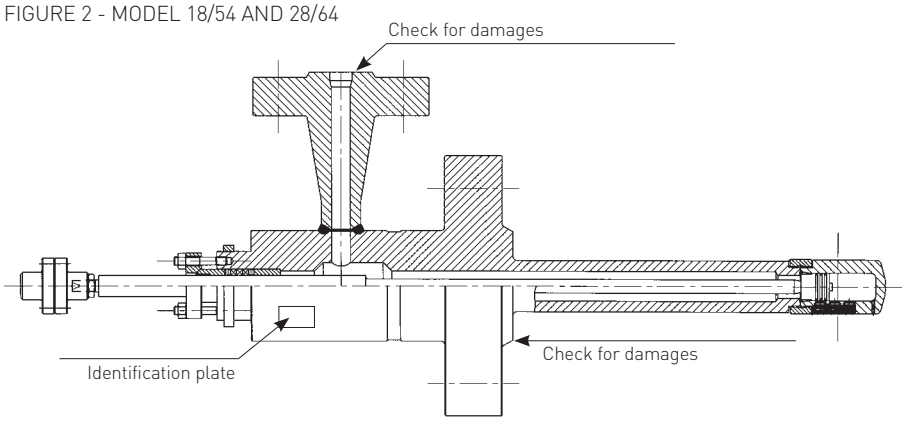


FIGURE 3

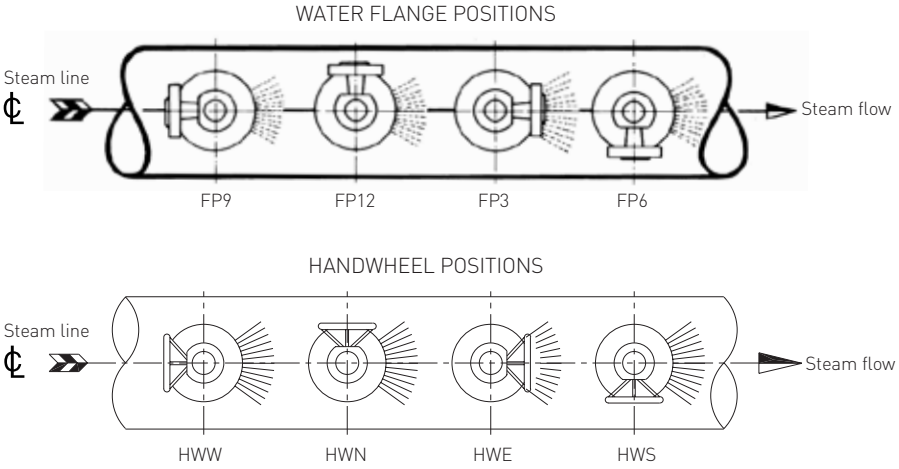
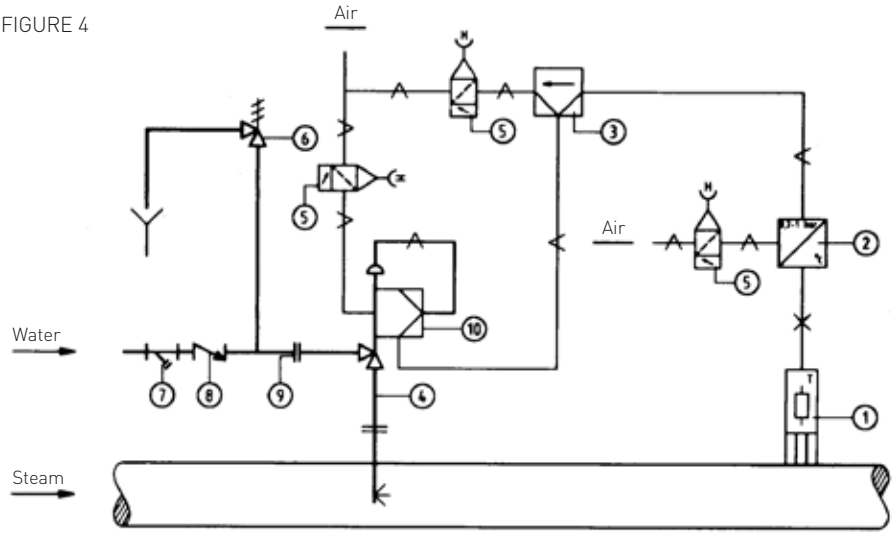


FIGURE 4



Item	Description
1	Temperature sensor
2	Temperature transmitter
3	Temperature controller
4	A.T.–Temp Desuperheater
5	Air filter regulator
6	Safety relief valve
7	Strainer
8	Check valve
9	Flange
10	Pneumatic -or E/P- positioner

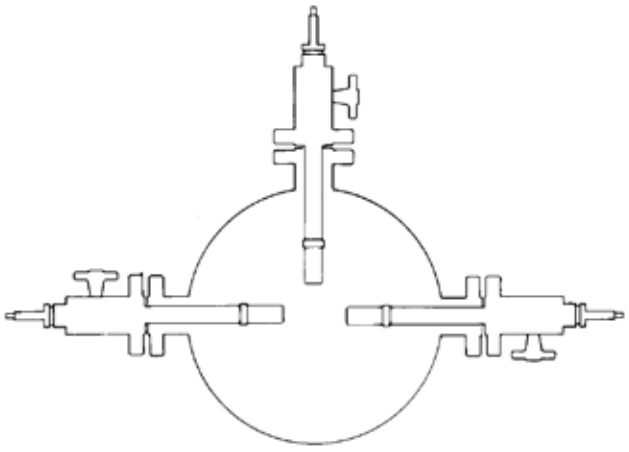
Pipe bends should always be of the long radius type to assist in keeping the water droplets in suspension, until complete evaporation has taken place. Installation may be in vertical or horizontal piping, but the direction of water injection should always be with the steam flow. The A.T.-Temp Desuperheater may be mounted at 90° to the steam pipe, for all steam flow orientations, but avoid installation in the vertically downwards position, wherever possible (see figure 5).
Yarway supplies the A.T.-Temp Desuperheater as follows:
Identification number:

xx. 38. xxxxx - Fabricated type with non-balanced stem.
xx. 48. xxxxx - Fabricated type with semi-balanced stem and oversized trim.
xx. 18/54 - Forged type with semi-balanced stem.
xx. 28/64 - Forged type with semi-balanced stem and oversized trim, all with the spray cylinder tack welded to the body extension pipe.

Note: horizontal orientated A.T.-Temp Desuperheater has to be installed with a support for weight compensation.

The water supply should be of a good quality; clean and filtered, for example boiler feed water and should have a constant pressure as specified in the order documents. Each water supply line should be protected with it's own individual strainer with a maximum element perforation size of 0.1 mm (0.4 mm acceptable for nozzles 'E' size and up).
Where there are positive shut-off components in the water supply (including electric actuators) then a safety relief valve of an approved type should be fitted. As in the case of the steam pipework, use gasketing and bolting in accordance with the relevant piping code.
Flush out the water line before connecting to the A.T.-Temp Desuperheater mounting flange (see figure 6).

FIGURE 5



START-UP

Ensure that all components are installed correctly. Connection of electrical supplies and instrument air piping should be in accordance with the manufacturer's instruction manual. Verify and adjust, if necessary, set points for filter regulators and valve positioners, following the manufacturer's recommendations. Similarly, calibrate the temperature transmitter/controller, verifying automatic response to temperature changes.

Warm the steam main and open the valve in the water supply. Check the water pressure at the A.T.-Temp Desuperheater. Verify the operation of the temperature transmitter and controller by manually increasing and decreasing the output signal and observing indicated and recorded temperatures.
When satisfactory coordination between instrument signals and temperature are attained, adjustment of the set point can be made and the system transferred to automatic operation.
It is recommended to record the various steam coordinates, over a sustained period, to verify operation, adjusting where necessary.

MAINTENANCE

Note: maintenance of the A.T.-Temp Desuperheater is straight forward and does not require any special tools or training. Care should be taken during any maintenance operation, particularly when working with grinders, compressed air and rotating machinery. It is imperative that safety glasses and protective workwear are used in accordance with Standard Safety Procedures. In case of doubt, consult your Supervisor or Safety Officer before commencing any work on the equipment.

Removal

Before removing the A.T.-Temp Desuperheater from the system, ensure that both the steam- and water-pipework are pressureless and vented. Isolate any electrical supplies to the actuator and/or ancillaries, prior to disconnection. Vent and remove instrument air supply piping. Loosen steam flange and water flange bolting, but vent connections before complete removal.

The A.T.-Temp Desuperheater may now be removed from the system. It is recommended that the A.T.-Temp Desuperheater is transported to a convenient workshop which has a workbench and vice. Lift the unit by means of straps around the body. Do not attempt to lift the A.T.-Temp Desuperheater by the yoke, actuator or any of its accessories.

Depending upon the type of actuator fitted, various stem couplings are used. Measure accurately, and record the dimensions A and B (see figure 7) for reassembly purposes. Also record positions of any levers or specials fixings, sketching if necessary, prior to removal. If any work is required on the actuator, then please refer to the actuator manufacturer's manual.

FIGURE 6

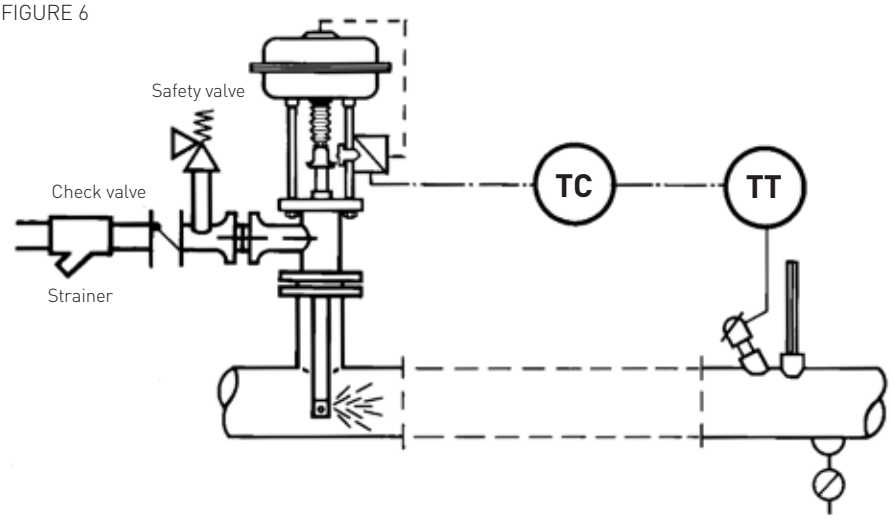
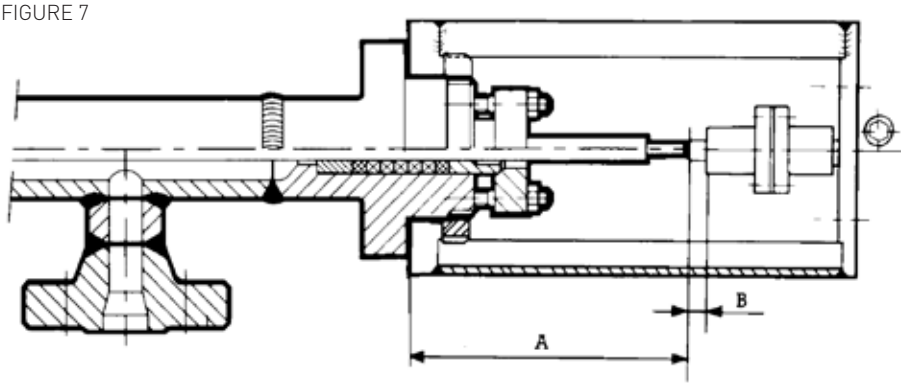


FIGURE 7



Disassembly (see figure 8)
The A.T.-Temp Desuperheater can be disassembled, most easily when in the horizontal position with the body extension section clamped firmly in the vice. Grind off the nozzle tack welds, using any standard type of angle grinder. Make sure that the weld is removed sufficiently to allow rotation of the fastener ring, without fouling.

Unscrew the fastener ring by rotating anticlockwise. Note that the threading on the body extension is right handed. Tapping the fastener ring with a hammer may facilitate removal. Note that the threading on the spray cylinder is left handed. If difficulties are encountered with the removal of the fastener ring, then this item may be removed by grinding through at two diametrically opposite points. Please be careful not to damage the body and spray cylinder threading.

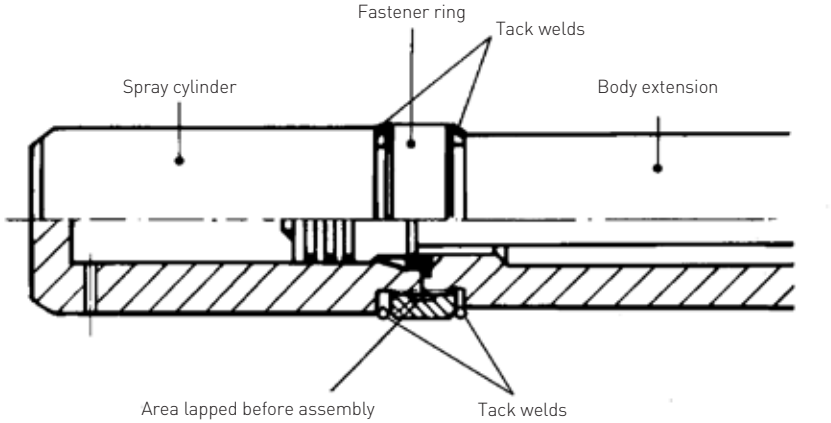
Spray cylinder
Once removed, inspect the condition of the cylinder internally, using a flashlight. Scratches and blemishes may be removed by either polishing or honing.
The cylinder bore should not exceed 32 mm with a maximum eccentricity of 0.25 mm. Debris can be removed from the nozzles by blowing through with compressed air. Inspect the nozzle atomizer outlet holes. These should not show any undue elliptical wear, roughness or damage or this will have a detrimental affect on the A.T.-Temp Desuperheater performance. Carefully clean the cylinder threading, dressing where necessary, with a small file.

Body extension
Examine the threading on the body extension, dressing where necessary, with a small file. If care is exercised, during routine maintenance, the valve body extension should never require any repair work. If this threading does become accidentally damaged, however, then weld repair may be possible. It should be noted that this job is for a specialist welder and filler materials must be compatible with both the base material and the service conditions. In the event that such work is necessary, please consult Yarway for further advice.

Piston assembly
Withdraw the piston and stem. The piston and stem are always supplied as a complete assembly. If the piston shows no signs of wear and tear, then it may be re-used. Replace piston rings as a matter of course, any time that the unit is disassembled. Take care not to overstress the piston rings when fitting. The rings are marked 'top' and should always point in the direction of the stuffing box, for proper functioning. Examine the condition of the stem, where it runs in the stuffing box, remove any graphite with a fine grade emery cloth, polishing in the longitudinal direction.

Stuffing box
Remove all rings, lantern ring and packing material from the valve body. Clean the stuffing box carefully, using a rotating wire brush and/or honing device. Cleanless of the packing area is vital for proper valve sealing. Do not use grease or lubricants in combination with graphite packing! Only ever use genuine Yarway components, as their are supplied as matched sets (see figures 9 and 10).

FIGURE 8



Packing set

CAUTION
Before repacking any valve, make sure all safety precautions are taken as applicable to the particular valve being serviced.

1. Completely remove old packing including any spares, washers or lantern rings, if any. Make sure that surfaces contacting packing are clean. Inspect the stuffing box and stem for straightness, wear, scratches, pitting and other abnormalities which would prevent establishment of a good seal around the packing. A smooth undamaged surface is essential a good sealing. Repair or replace as necessary.
2. If a spacer is supplied with this packing or if a spacer was removed from the stuffing box, make sure it is installed first. If one end of the spacer is chamfered, install chamfered end down so that it sills at bottom of stuffing box.
3. Packing is supplied as a complete set and rings should be in same order as packaged in the set. Install packing set in correct order, see figure 9/10.
4. Check packing rings for proper fit. They should be push fit into stuffing box.
5. Install one ring at a time, in the proper sequence, using a packing driver or gland bushing. Facing must be seated individually with a packing driver. Pre-compression of each ring during installation is very important for the tightness of the seal. Do not use screwdriver or other sharp object to seal the packing. This could damage the packing and/or stem. If a packing driver is used, make sure that the diametrical clearances between the I.D. of the driver and O.D. of the stem and the O.D. of the driver and I.D. of the stuffing box do not exceed 0.5 mm (0.020").
6. Stagger the joints (if present) on each successive ring 180° apart.
7. Do not over compress the packing. The amount of compression should be only that which is required to the install the correct number of rings into the stuffing box. Compression of the packing in a partially filled stuffing box, to make room for the rest of the packing, can be accomplished using the gland bushing and taking up on the gland nuts.
8. When all the packing has been installed in the stuffing box and the gland bushing and packing flange are in place, take up on the gland nuts evenly with a wrench to seat and form the complete packing set to the stuffing box and stem. Compress the packing set enough to cause the packing slightly grip the stem (if stem movement is performed by hand, the stem should not move). If the stem moves with stick slip, the packing set is over tightened.
9. Re-tightening of the gland nuts is necessary within a hour after start-up. During operation it may be necessary to adjust the gland nuts. Check regular.

FIGURE 9 - MODEL 38/48

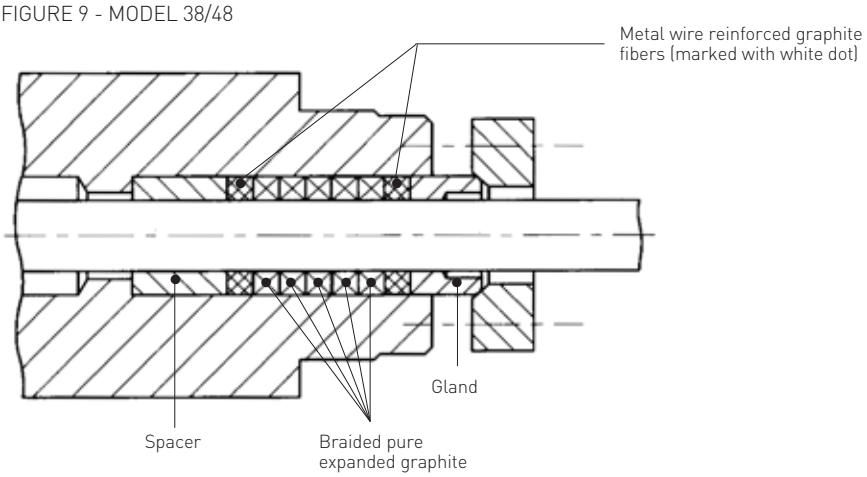


FIGURE 10 - MODEL 18/54 AND 28/64

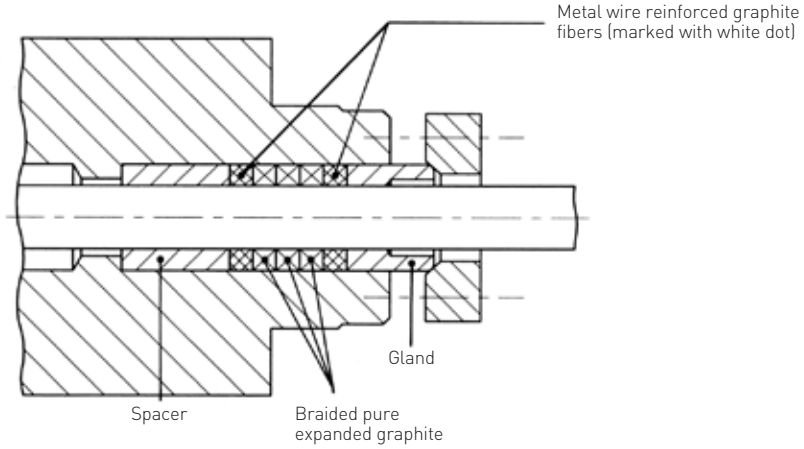
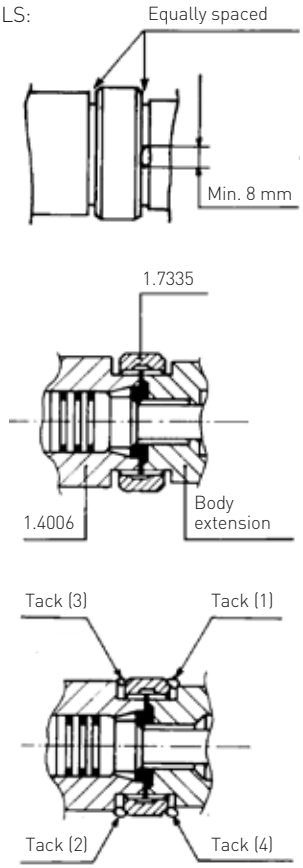


FIGURE 11

DETAILS:



Reassembly
Before reassembling the valve, lubricate all threads with a suitable high temperature nickel compound. Do not use grease or other oil based lubricants as these may lead to dismantling problems later. Apply a thin coating of the compound to the piston rings to prevent scoring. Position the slots in the piston rings, such that they are at 120° to each other. Reassemble the spray cylinder onto the body extension. Use a fine grade polishing paste to lap the seating area of cylinder and body extension. The seal is metal to metal so a concentric seat area is vital. Always use a new fastener ring. Set the spray cylinder into the correct orientation (the water spray should always be in the same direction as the steam flow) and tighten the fastener ring.

Tack welding
After reassembly, the spray cylinder should be tack welded for security. It is essential that this welding is carried out by a competent welder. A Welding Procedure Specification is available from Yarway, upon request. Both TIG and ARC welding methods are acceptable and the recommended electrode material is ER NiCrMo3. A minimum of 4 (Model 38/18) or 8 (Model 48/28) 8 mm long tacks are required, diametrically opposite, with one weld securing the fastener ring to the body extension, the other securing the spray cylinder to the fastener ring. After welding, use a suitable dye penetrant method to check the weld. No cracks are permitted. If necessary, grind-off, re-check until a satisfactory weld is obtained (see figure 11).

Re-installation
Refit the actuator onto the A.T.-Temp Desuperheater, referring to the notes taken during disassembly, for re-setting the stem position. If the actuator is electric, check that the limits switches are functioning correctly by manual operation of the unit. Set at mid-stroke before applying power and verify that opening and closing directions are correct and correspond with system logics.

Before re-installing the A.T.-Temp Desuperheater, make sure that the connecting flange faces are cleaned thoroughly and any gasketting material removed. Insert the A.T.-Temp Desuperheater into the steam pipework and check that the nozzle is orientated correctly with the spray in the direction of the steam flow. Apply a high temperature lubricating compound to the bolts and nuts and tighten evenly, in accordance with the manufacturer's recommendations. Before connecting the water line, flush through and check for any contamination or restriction in the supply.

Follow the procedure for 'start-up', as detailed earlier in the installation instructions. Check the flange and stuffing box tightness. Do not overtighten the stuffing box packing gland as this may prevent proper A.T.-Temp Desuperheater operation. In the event of persistent leakage through the stem packing, the unit should be removed to the workshop, for further examination. Experience shows that providing the stuffing box, packing and stem are clean and score, leak-free tightness can be achieved. Tighten stuffing box by evenly turning the gland plate nuts.

SPARE PARTS

Make sure that the identification number (indicated on the nameplate) is verified and specified when ordering spare parts. For cross-sectional drawings and part lists, see the next pages.

INSPECTION PROCEDURE

Spray nozzle assemblies (1) and (2), fastener rings (5), piston (4) and piston rings (3) 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.

STORAGE PROCEDURE

Upon receipt, check both the A.T.-Temp Desuperheater and the packing case for any transit damage. Any damage to the A.T.-Temp Desuperheater should be reported immediately to Yarway or their local agent. Any damage to the packing container should be rectified to prevent the ingress of dust or water, prior to placing the equipment into storage.
Check the information contained on the identification plate - tag plate and documentation and return the unit to its packing with protective covers in place.

For short term storage, up to 6 months duration, no additional preservation measures are necessary. Retain the unit in its original packing in a clean, dry indoor location.
If outdoor storage is unavoidable, then the packing case should be enclosed in a waterproof covering.

For long term storage use only a dry indoor location. Remove the stem packing and ensure that the A.T.-Temp Desuperheater is dry and free from moisture. Apply a cosmoline type grease to machined faces, valve stem and stuffing box. Retain A.T.-Temp Desuperheater in its original packing and inspect at 3 monthly intervals to ensure that no deterioration has occurred.

Before placing the A.T.-Temp Desuperheater into service, replace stem packing and inspect other components, such as actuator, seals, etc., to ensure correct functioning. Follow the procedure for installation as detailed in the operating and maintenance instruction manual.

Note: materials and data of units supplied, may deviated from this Instruction Manual. Please consult order documents in case of doubt.

A.T.-Temp Desuperheater is classified under European Directive 97/23/EC under category I with CE-marking.

FIGURE 12

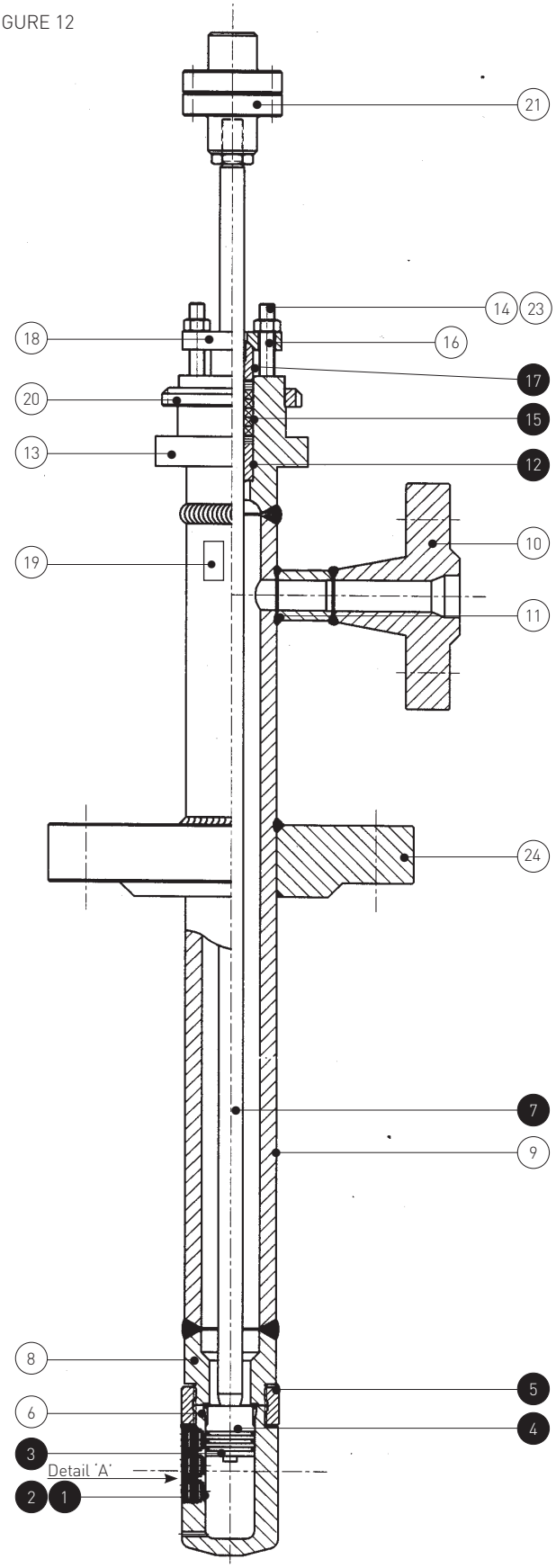


TABLE 1: MODEL 38/48 - STANDARD MATERIALS

Item	Name	Material	Equivalent
1 + 2 •	Spray nozzle assembly	AISI 410	1.4006
3 •	Piston ring	AISI 431 *	1.4057 *
4 •	Piston	AISI 420	1.4021
5 •	Fastener ring	SA182 F11	1.7335
6	Seat	Stellite 6	Stellite 6
7 •	Stem	AISI 431 *	1.4057 *
8	Seat housing	SA105	P250GH
		SA182 F11	1.7335
9	Body pipe	SA106 Gr.B	P235GH TC2
		SA335 P11	1.7335
10	Water flange	SA105	P245GH
		SA182 F11	1.7335
11	Adaptor	SA105	P250GH
		SA182 F11	1.7335
12 •	Spacer	AISI 431 *	1.4057 *
13	Packing box	SA105	P250GH
		SA182 F11	1.7335
14	Nut	A194 4H	1.4923
15 •	Packing set	Graphite	Graphite
16	Stud	A193 B16	1.4923
17 •	Gland	AISI 431 *	1.4057 *
18	Gland plate	AISI 304	1.4301
19	Name plate	AISI 304	1.4301
20	Nut (yoke)	C. steel	C. steel
21	Coupling	C. steel	C. steel
23	Securing washer	Steel	Steel
24	Steam flange	SA105	P250GH
		SA182 F11	1.7335

NOTES

* Nitrated

• Recommended spares

Other materials are available upon request

Certification

Standard Duty A.T.-Temp Desuperheaters are approved by authorized authorities to comply with the requirements of ASME 16.34 and EN. All data are subject to change.

DETAIL 'A'