



INSTALLATION AND MAINTENANCE

ARMSTRONG "M" AND "MS" SERIES FLOAT AND THERMOSTATIC STEAM TRAPS, CONDENSATE CONTROLLERS, AND LIQUID DRAINERS

This bulletin should be used by experienced personnel as a guide to the installation and maintenance of "M" and "MS" Series ultra capacity float and thermostatic steam traps, condensate controllers, and liquid drainers. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or its local representative if further information is required.

TABLE 1. Maximum Operating Pressures

Model No.	250M	250MS	450MS
Orifice Size	1 7/8"	1 7/8"	1 17/32"
Steam Trap (F & T)	250 PSIG	250 PSIG	250 PSIG*
Condensate Controller (CC)	250 PSIG	250 PSIG	450 PSIG
Liquid Drainer (LD)	250 PSIG	250 PSIG	450 PSIG
Vessel Design Limitation	250 PSIG @ 450°F	450 PSIG @ 650°F	450 PSIG @ 650°F

*Limited by
Thermostatic
Air Vent

INSTALLATION

WARNING: In any steam system, allow adequate time for warm up. If warm up is not completed in the proper time and sequence, serious and costly damage could occur to heat exchange equipment, piping, fittings, and valves as a result of thermal stress and/or water hammer.

ULTRA CAPACITY "M" AND "MS" SERIES TRAPS, NORMALLY INSTALLED ON LARGE VOLUME STEAM SYSTEMS, MUST BE WARMED UP GRADUALLY AND IN THE PROPER SEQUENCE. DO NOT EXCEED A WARM UP RATE OF **100°F/8** MINUTES.

- 1) Series "M" and "MS" steam traps, condensate controllers, and liquid drainers have individual requirements for installation.
 - A) Float and Thermostatic Steam Trap. Install the trap so that its inlet connection is below the liquid level in the equipment to be drained. Figure 1 shows the recommended piping method.
 - B) Condensate Controller. Install the condensate controller below the liquid level in the equipment to be drained. Its ability to handle flash steam enables the condensate controller to operate efficiently with syphon tube drainage systems. Figure 1 shows the recommended piping method.
 - C) Liquid Drainer. Install the liquid drainer with its inlet connection below the liquid level in the equipment to be drained. Figure 2 shows recommended piping for a liquid drainer.
 - D) When secondary steam is to be collected and reused in heat transfer equipment, refer to the piping arrangement in Figure 3.
 - E) When flash steam and noncondensables are to be removed and discharged directly to the condensate return line, use the piping arrangement in Figure 4.
- 2) Before installing any trap, blow down the piping that leads to the unit's inlet. Use full line pressure. Be sure the maximum operating pressure (MOP) of the unit is adequate for the installation. (The MOP is stamped



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- on the casting.)
- 3) Set the unit as shown in Figure 1 or 2, with the flange resting on the floor or on a platform for support. Then install and tighten the inlet and discharge piping to secure the unit in its operating position. IF THE LINE PRESSURE EXCEEDS 30 PSIG, install an anchoring bracket as shown in Figure 5.
 - 4) To allow maintenance, and provide maximum service, install a valve on each side of the unit, and a strainer ahead of the inlet. All valves should be of the fullported type to avoid restricting flow.

NOTE: USE GOOD PIPING PRACTICES. MAKE INLET PIPING AS SHORT AS POSSIBLE WITH A MINIMUM **OF ELBOWS** AND OTHER RESTRICTIONS. INSTALL A DIRT POCKET IN THE LINE AHEAD OF THE UNIT AS SHOWN IN FIGURES 1 AND 2.

- 5) LIQUID DRAINERS must be back-vented to avoid air binding. DO NOT reduce pipe size for the back vent, but use the full 1 -1/2" pipe, connected as shown in Figure 2.
- 6) STEAM TRAP AND CONDENSATE CONTROLLER: If the unit is to be used at near maximum capacity, **increase the size of the DISCHARGE piping to a minimum of 4" as near to the outlet fitting as practical.**
- 7) If the discharge piping is to be elevated, ensure that adequate differential pressure exists at all times to provide proper drainage. Install a check valve in the discharge piping near the unit to prevent backflow when the system is not in operation.
- 8) Series "M" and "MS" units **do not require priming.** They are ready for operation when installed.

MAINTENANCE

Check the internal mechanism of these units for damage at least once a year.

A) OPENING THE UNIT

- 1) Close the valves in supply, discharge, and vent lines. If the unit is hot, allow it to cool. (Liquid Drainers: close the valve in the back-vent line.)
- 2) Remove the drain plug from the bottom of the body slowly and allow the liquid to drain.

CAUTION: DO NOT ATTEMPT TO REMOVE THE BODY WITHOUT FIRST REMOVING THE THERMOSTATIC AIR VENT OR FIXED ORIFICE AND COUPLING.

- 3) Before removing the body:
 - a) STEAM TRAP: Remove the air vent cap (1-1/2" plug) from the top of the body. When the cap is removed, the thermostatic air vent extends through the top of the body. Using a spanner wrench or needle nose pliers, remove the thermostatic air vent and gasket. Inspect the air vent for indications of damage. The valve should be away from the valve seat. If you have the facilities, place the air vent in a pan of water and heat it to boiling temperature. The valve should close. If the bellows is collapsed or ruptured, or the valve and seat of the vent are eroded, discard it and install a new one. If the unit includes a vacuum breaker, it is located in the air vent cap. Blow through the vacuum breaker from atmosphere side to be sure that it opens; suck air from the same side to be sure that it closes tightly. If the vacuum breaker does not operate properly, discard it and install a new one.
 - b) CONDENSATE CONTROLLER: Remove the air vent cap from the body. Remove the fixed orifice air vent and the coupler from the air relief tube.
 - c) LIQUID DRAINER: Disconnect the back-vent or secondary steam piping from the drainer body.
- 4) Put blocks under the body of the unit to support it (Weight 200 lbs for M, 300 lbs. for MS) and remove the 12 bolts that attach the body to the cap. To facilitate handling, screw a lifting lug into the 1-1/2" NPT hole in the top of the body. A hoist can be attached to the lifting lug. If an anchoring bracket has been installed behind the flange, remove the anchoring bracket.
- 5) Carefully pull the body back from the cap, lifting slightly as you pull. Remove and discard the old gasket.
- 6) Inspect all of the moving parts. Remove all worn or damaged parts and replace them with new parts.



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Figures 6, 7, 8, 9, and 10 show all critical or moving parts. Check that each item is in good condition and operates normally. Check the float for pinhole leaks, dents or corrosion. Immerse in hot water and look for air bubbles to detect pinhole leaks.

- 7) If the valve and seat are to be replaced, refer to Section B, DISASSEMBLING THE VALVES AND SEATS."
- 8) After inspection and repair, clean the gasket surfaces and place a new gasket between the body and the cap, you may want to use a gasket sealer/cement to hold the gasket on the cap when installing the body. Replace the body carefully to avoid bending the lever, float, or air relief tube (if used). Install and tighten the 12 bolts. (See Figure 9 for bolt tightening sequence.) If the anchoring bracket was removed, reinstall it.
- 9) Screw the drain plug into the bottom of the body and tighten it securely.
- 10) a) **STEAM TRAP:** Place the thermostatic air vent, with gasket installed, into the coupling at the top of the air relief tube. Tighten with a spanner wrench or pliers. Screw the air vent cap into the top of the body and tighten the cap with a wrench.
- b) **CONDENSATE CONTROLLER:** Screw the fixed orifice and coupling onto the upper end of the air relief tube. Screw the air vent cap into the top of the body and tighten it with a wrench.
- c) **LIQUID DRAINER:** Reconnect the back-vent piping.
- 11) Open the valves in the supply and discharge lines. For liquid drainers, also open the valve in the back-vent line. Check the equipment for normal operation.

B) DISASSEMBLING THE VALVES AND SEATS

"M" and "MS" series have one of two possible seat assemblies. The old style has removable seats (see 6A thru 8A below). Both valves for this style of trap can be replaced with the cap extension attached to the cap.

The new style has integral seats in the cap extension (See 6B thru 8B below). For this reason, the four bolts that secure the cap extension to the cap must be removed to facilitate replacement of the lower valve.

The size of these traps and their common environments usually **make** the valves difficult to inspect and repair on location. The removable cap extensions make it simple to take the entire operating mechanism to a shop where it may be put in a vise for repair. To reduce downtime, we recommend that a previously adjusted cap extension be substituted. Always replace the gasket with a new one once the seal **has been** broken.

- 1) Perform Steps 1 through 6 of Section A to open the unit.
- 2) Use a wrench to loosen the float lock nut. The float unscrews from the lever.
- 3) Using a screwdriver, remove two of the four retaining clips from the pivot pins. The pivot pins and lever can now be removed. Detach cap extension from cap by loosening the four bolts. The cap extension must be detached from the cap in order to replace the valve assembly. Place cap extension in a vise with upper valve on top (See Figure 11).
- 4) Hold the upper valve with a spanner, and use a wrench to remove the valve stem connector.
- 5) Reach through the cap connection and hold the valve stem securely so you may unthread the upper valve.

IF YOU HAVE THE NEW STYLE TRAP (SEE FIGURE 11)

- 6A) Rotate the cap ninety degrees in the vise so that the connection is up. Place a wedge (approximately 1/4" x 3/4" x 3") through the cap connection to jam the lower valve. Then release the lower valve locknut.
- 7A) Reach through the lower valve seat with your hand and lift the lower valve to its upper limit. Unthread the valve stem until it is clear and remove the lower valve through the cap connector.
- 8A) Clean and inspect the seats, excessive wear calls for a new cap extension.

IF YOU HAVE THE OLD STYLE TRAP (SEE FIGURE 10)

- 6B) Remove the four bolts from each seat and pull out the seats along with their gaskets.
- 7B) Remove the stem and valve assembly through the lower seat fitting. Clamp the stem in a vise fitted with brass jaws and unthread the locknut and valve.



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8B) Clean and inspect the seat gasket area for erosion. If the cap extension is in good shape, you may simply replace the seats using new gaskets.

C) INSTALLING VALVES AND SEATS

IF YOU HAVE THE NEW STYLE TRAP (SEE FIGURE 11)

- 1A) Place one valve into the lower chamber with the tapered side facing the seat.
- 2A) Insert the short threaded end of the valve stem through the upper seat and valve guide. Turn the stem into the lower valve until it stops. Then back it off $1/4$ turn.
- 3A) Jam the valve with a wedge, and install and tighten the valve lock nut.

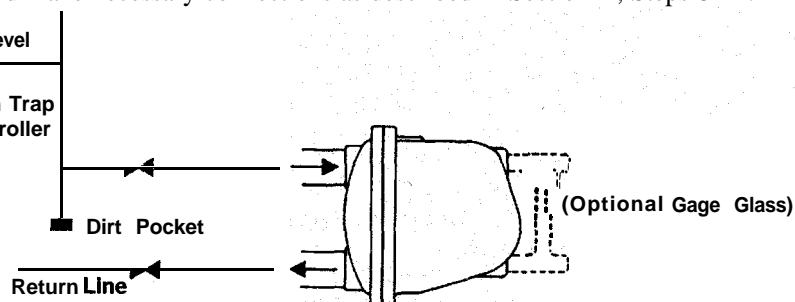
IF YOU HAVE THE OLD STYLE TRAP (SEE FIGURE 10)

- 1B) Clamp the valve stem into a brass jawed vise with the short threaded side up. Screw valve on to the stem with beveled side up until it stops then back off $1/4$ turn and secure it with a locknut.
- 2B) Remove the stem assembly from the vise and install it into the lower opening of the trap, stem first. Place either seat, with a gasket, into the lower opening of the cap extension. Secure the valve seat in place with four seat screws.
- 3B) Place the remaining seat with its gasket into the upper opening of the cap extension, and secure it in place with the remaining four seat screws.

THE REMAINDER OF THE OPERATION IS THE SAME NO MATTER WHICH STYLE TRAP YOU MAY HAVE.

- 4) Thread on the upper valve with the tapered side toward the seat. Turn the stem connector onto the stem, but do not tighten it until the trap is adjusted.
- 5) With the lower valve resting on the valve seat, turn the upper valve down until both valves rest snugly on their seats. If the upper valve is turned down too far, the lower valve will be raised from its seat, so this adjustment is critical to the proper operation of the trap.
- 6) Once the proper position has been found, back the upper valve off $1/8$ th of a turn. Turn the valve stem connector onto the stem above the upper valve and tighten it securely. This final tightening should return the upper valve to a position where both valves seat simultaneously.
- 7) Check the seating of both valves by holding the lower valve firmly in its seat and trying to rock the upper valve. Repeat the process, holding down the upper valve and trying to rock the lower. Although it is impossible to get a perfect seat, it should be sufficient to prevent movement of either valve when the opposite valve is firmly seated. Make any corrections that are necessary by adjusting the upper valve and valve stem connector.
- 8) Place the lever into upright position, and insert the pivot pins. Secure the pins in place with the retaining clips.
- 9) When attaching cap extensions, remember to use a fresh gasket, and to avoid disturbing the valve set up adjustment.
- 10) If the float was removed, place a drop of Loktite on the thread at the float end of the lever and tighten the float lock nut.
- 11) Install the trap body and make necessary connections as described in Section A, Steps 8-1 1.

FIGURE 1. "M" and "MS" Steam Trap or Condensate Controller





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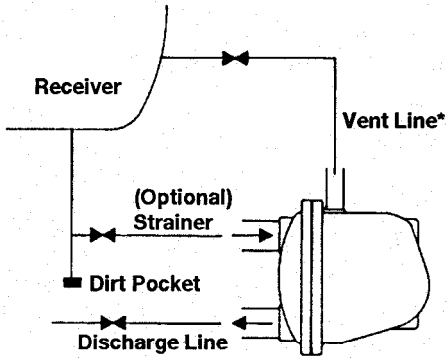


FIGURE 2. "M" and "MS" Liquid Drainer

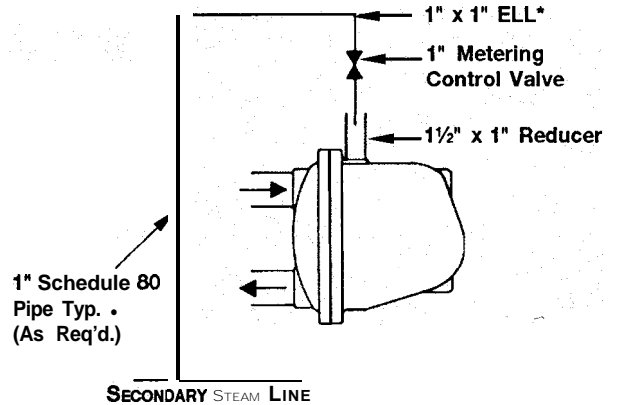


FIGURE 3. Piping arrangement when secondary steam is collected and reused in heat transfer equipment.

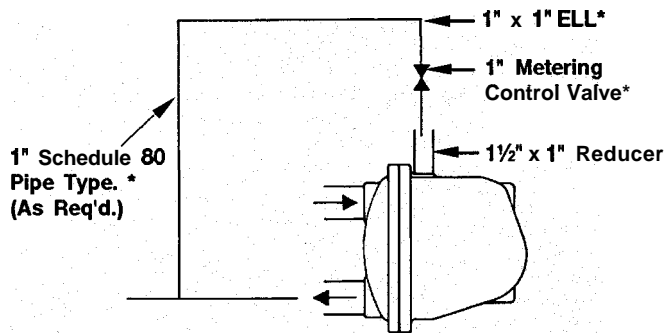


FIGURE 4. Piping arrangement when flash steam and noncondensables are to be removed and discharged directly to the condensate return line.

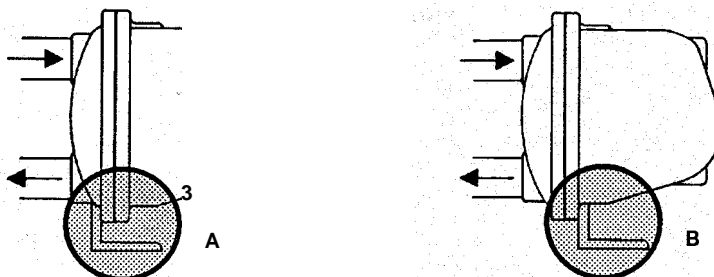


FIGURE 5. Optional "M" and "MS" Anchoring Bracket
 NOTE: Mounting the anchoring bracket behind the flange as in (B) requires that the bracket be completely removed before opening the unit for repair.

*All External Piping by Others



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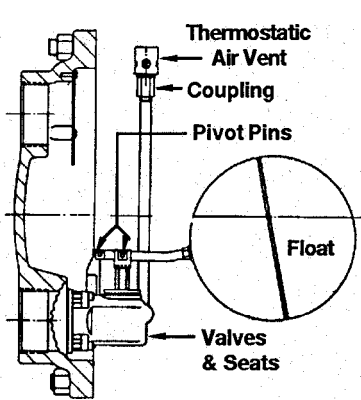


FIGURE 6. Steam Trap

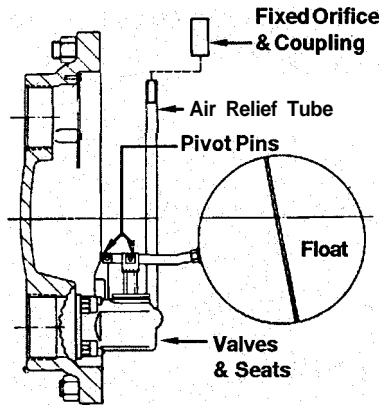


FIGURE 7. Condensate Controller

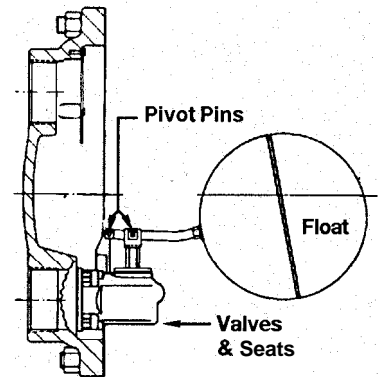


FIGURE 8. Liquid Drainer

FIGURE 9. Bolt Tightening Sequence

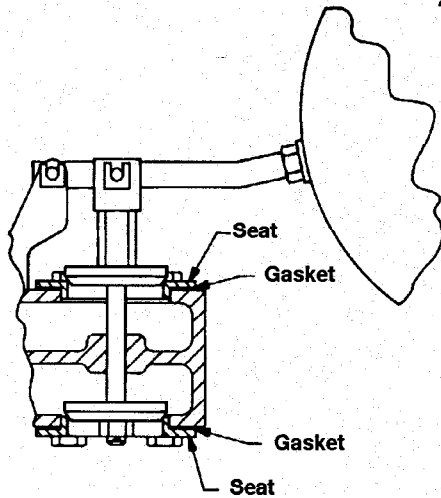
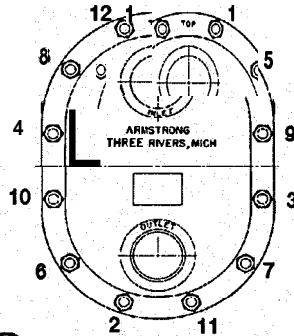


FIGURE 10. Cap Extension and Valve Assembly
OLD STYLE TRAP

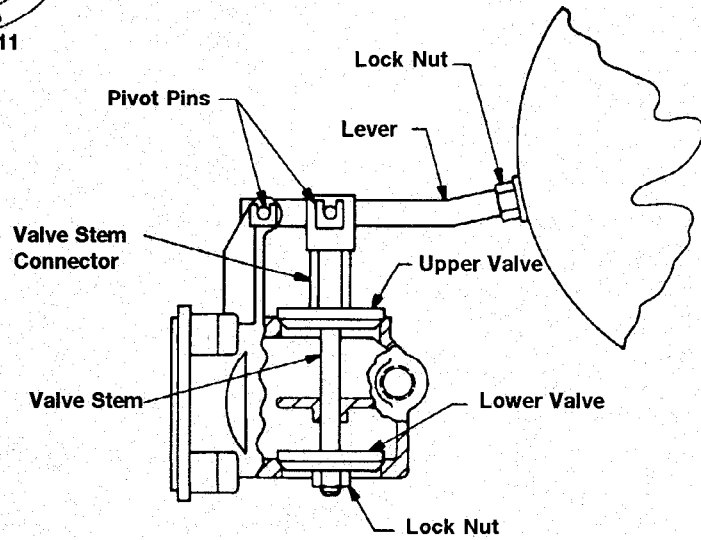


FIGURE 11. Integral Seat Assembly
NEW STYLE TRAP



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