

Honeywell

SUBMITTAL
DATA/INSTRUCTION
SHEET SD/IS 150

EFFECTIVE
September 2004
Supercedes March 3, 2004

AM-1 SERIES™



**ANTI-SCALD PROPORTIONAL THERMOSTATIC MIXING AND DIVERTING VALVE
PATENTED, WITH DUAL ASSE 1016 AND 1017 CERTIFICATION, IAPMO, AND
CSA APPROVAL IN ONE VALVE**

SUBMITTAL DATA APPROVAL SHEET

For: _____
Job: _____
Date submitted: _____ by: _____
Date approved: _____ by: _____
Model number: _____ quantity: _____
Model number: _____ quantity: _____
Model number: _____ quantity: _____

INSTALLER

1. Write hand wheel setting on CAUTION label and sign in space provided.
2. Attach CAUTION label to AM-1 Valve.
3. Explain CAUTION label to owner.
4. Deposit this instruction sheet with owner.

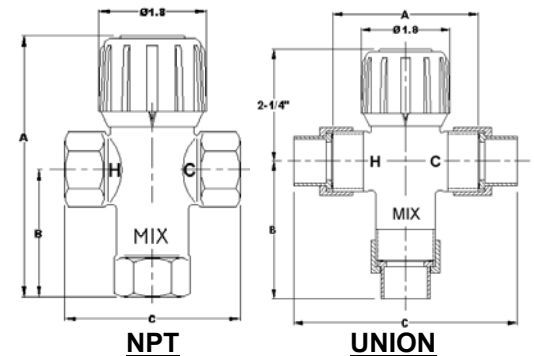
ASSE 1016 APPLICATIONS-POINT OF USE:

Individual showers, baths, or a combination of both, automatic faucets, nursing homes, public facilities and wherever ASSE 1016 valves are required.

ASSE 1017 APPLICATION-SOURCE OF HOTWATER:

MASTER MIXING OR DIVERTING Any application requiring accurate control of water temperature based on mixing of hot and cold water such as:

Domestic Water	Nursing Homes	Heat Pump Systems
Space Heating	Greenhouses	Hydronic Heat
Radiant Heating	Photo Processing	Combo Heating
Public Facilities	Solar Hot Water	Industrial Applications



PRODUCT INFORMATION:

PRODUCT NUMBER	SIZE	MAX FLOW * GPM	Cv	TEMP. RANGE	A	B	C	WT. LBS.	CERT. TO ASSE STD
AM100-1	1/2"	8	3.2	100-145 °F	5.0	2.7	3.0	1.2	1016
AM101-1	3/4"	12	3.8			2.7	3.0	1.3	AND
AM102-1	1"	16	4.3			2.7	3.3	1.6	1017
AM100-US-1	1/2"	8	3.9	100-145 °F	3.15	2.7	4.4	1.6	1016
AM101-US-1	3/4"	12	3.9			2.9	4.9	1.7	AND
AM102-US-1	1"	16	3.9			3.5	6.1	1.9	1017
AM100-UT-1	1/2"	8	3.9	100-145 °F	3.15	2.9	4.8	1.8	1016
AM101-UT-1	3/4"	12	3.9			3.8	6.5	2.1	AND
AM102-UT-1	1"	16	3.9			3.9	7.0	2.3	1017
AM100B-1	1/2"	8	3.2	60-100 °F	5.0	2.7	3.0	1.2	N/A
AM101B-1	3/4"	12	3.8			2.7	3.0	1.3	
AM102B-1	1"	16	4.3			2.7	3.3	1.6	
AM100B-US-1	1/2"	8	3.9	60-100 °F	3.15	2.7	4.4	1.6	N/A
AM101B-US-1	3/4"	12	3.9			2.9	4.9	1.7	
AM102B-US-1	1"	16	3.9			3.5	6.1	1.9	
AM100B-UT-1	1/2"	8	3.9	60-100 °F	3.15	2.9	4.8	1.8	N/A
AM101B-UT-1	3/4"	12	3.9			3.8	6.5	2.1	
AM102B-UT-1	1"	16	3.9			3.9	7.0	2.3	
AM100C-1	1/2"	8	3.2	80-120 °F	5.0	2.7	3.0	1.2	1016
AM101C-1	3/4"	12	3.8			2.7	3.0	1.3	AND
AM102C-1	1"	16	4.3			2.7	3.3	1.6	1017
AM100C-US-1	1/2"	8	3.9	80-120 °F	3.15	2.7	4.4	1.6	1016
AM101C-US-1	3/4"	12	3.9			2.9	4.9	1.7	AND
AM102C-US-1	1"	16	3.9			3.5	6.1	1.9	1017
AM100C-UT-1	1/2"	8	3.9	80-120 °F	3.15	2.9	4.8	1.8	1016
AM101C-UT-1	3/4"	12	3.9			3.8	6.5	2.1	AND
AM102C-UT-1	1"	16	3.9			3.9	7.0	2.3	1017
AM100R-US-1	1/2"	8	3.9	80-180 °F	3.15	2.7	4.4	1.6	N/A
AM101R-US-1	3/4"	12	3.9			2.9	4.9	1.7	
AM102R-US-1	1"	16	3.9			3.5	6.1	1.9	
AM100R-UT-1	1/2"	8	3.9	80-180 °F	3.15	2.9	4.8	1.8	N/A
AM101R-UT-1	3/4"	12	3.9			3.8	6.5	2.1	
AM102R-UT-1	1"	16	3.9			3.9	7.0	2.3	

*Maximum recommended flow rate.

Connections **-US** models: Union Sweat; **-UT** models: Union NPT (Female). All other valves are NPT (Female).

*Teflon is a registered trademark of Dupont

APPLICATION INFORMATION:

SPECIFICATION:

- Dual certification ASSE 1016 – T and ASSE 1017
- IAPMO Approved
- CSA Approved
- Constant water temperature under different operating conditions.
- Proportional valve (simultaneous control of hot and cold water).
- Anti-scald, Anti-chill thermal shock protection at correct setting.
- Temperature high limit or low limit range restriction, (Except R models).
- Nickel plated brass/bronze construction, EPDM o-rings.
- Straight thru design (hot and cold at same level).
- Maximum working pressure 150 psi (1034 kPa).
- Maximum hot water supply temperature 212 ° F (100°C).
- Designed for easy maintenance and element replacement. See page 6.
- Union Sweat, Union Threaded, and NPT (Female) connections available, 1/2" through 1".
- Teflon® coated spool and body to prevent mineral buildup and extend life.
- Minimum required temperature difference between hot and mix 3°F.
- Patent No. 6,079,625
- Made in USA.

FEATURES:

- Energy savings through lower supply temperatures.
- Dual purpose mixing or diverting valve.
- NRECA and Gas Research Institute recommended.
- Trapping valve not recommended.

TEMPERATURE RANGE SELECTION: Select the correct temperature range for application.

Temperature Range	Model	Application
60°F - 100°F (16°C – 38°C)	B	Special <u>low temperature</u> service. (eliminates condensation on Water Closets, greenhouse root feeding, photographic process etc.)
80°F - 120°F (27°C – 49°C)	C	Anti-scald code valve for <u>domestic hot water</u> service.
100°F - 145°F (38°C – 63°C)	STD	<u>Domestic hot water and heating</u> applications.
80°F - 180°F (27°C – 82°C)	R	<u>Baseboard and radiant heat</u> applications. (No temperature lock)

For domestic hot water applications, use only “C” models (80° - 120° F) with maximum 120°F temperature, or standard models (100° - 145° F) with the mix temperature upper limit set to 120° F.

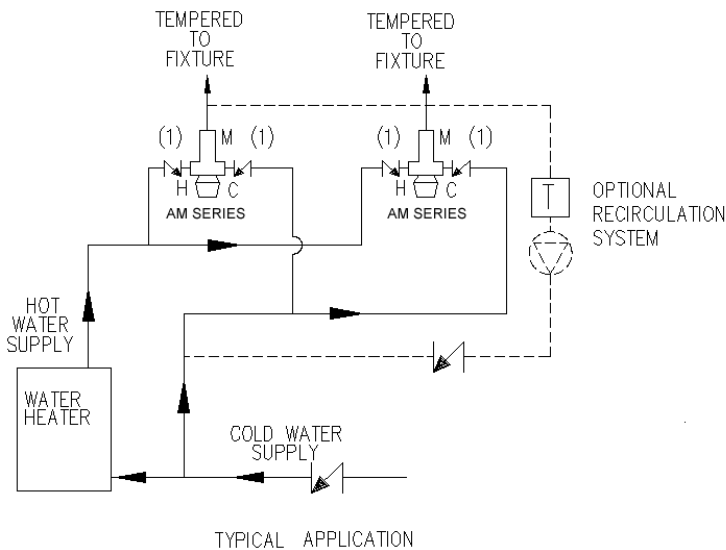
NOTE TO INSTALLER: This product should be installed by a qualified individual, in accordance with local codes and ordinances. It is the responsibility of the installer to properly select, install and adjust these devices as specified in these instructions. For installations, which require compliance with Building/Mechanical/Plumbing Codes, the appropriate AM-1 Series Valve must be chosen and installed, and the discharge temperature set and locked according to these instructions. AM-1 Series Models with the following temperature ranges, 80°F - 120°F and 100°F - 145°F, are ASSE 1016-T AND ASSE 1017 certified, CSA, and IAPMO approved. In addition, these models comply with the requirements of ASTM F 444, and ASTM F 445. These models shall be used to supply water to tubs, showers, bathing facilities and other outlets. These valves should be installed where they will be accessible for cleaning, servicing or adjustment. For point of use applications use Honeywell AM-1 models (ASSE 1016-T certified)

TEMPERATURE SETTING ASSE CERTIFIED MODELS: Set per table at right. Table is based on 60°F cold water. For other cold water temperatures, correct mixed temperature by 1°F for every 10°F deviation from 60°F, up or down.

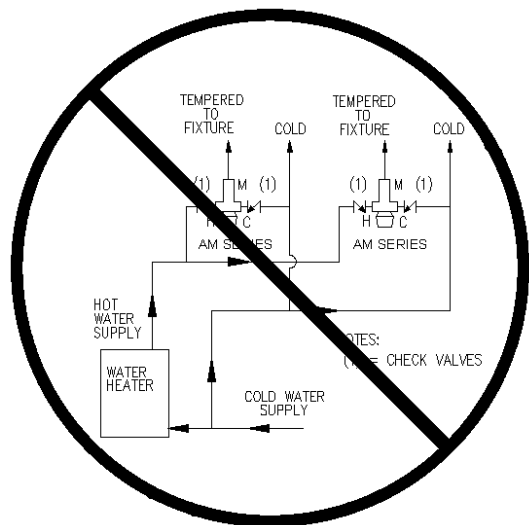
Note: Temperatures given in table are **AVERAGE VALUES**. Pressure difference between Hot and Cold ports should not exceed 10 psi.

HOT Supply Temperature	100° - 145° F Mixed Water Temperature (F) Position Number					80° - 120°F Mixed Water Temperature (F) Valve Position No.				
	° F	0	1	2	3	4	0	1	2	3
120	96	104	116	117	117	79	86	96	104	116
140	98	106	118	130	137	81	88	98	106	118
160	100	108	120	132	145	83	90	100	108	120
180	102	110	122	134	147	85	92	102	110	122

INSTALLATION ASSE 1016-T APPLICATIONS: These AM-1 models can be installed in any position consistent with the intended use. The AM-1 shall be installed as shown in the following figure. Check valves, as indicated, may be installed, to prevent migration of hot water into the cold branch, and cold water into the hot branch through the AM-1 Valve. **Sweat union connections (if used) should be soldered prior to assembly to the valve, or without the sealing gasket or optional plastic check valve present. After the joint has cooled, the sealing gasket and / or check valves may be installed.**



AM SERIES ASSE 1016 CORRECT APPLICATION



INCORRECT APPLICATION
DO NOT USE WHERE FURTHER BLENDING WITH COLD WATER WILL OCCUR. THIS TYPE OF INSTALLATION IS PROHIBITED.

INSTALLATION OF ASSE 1017 APPLICATIONS: These AM-1 Series models can be installed in any position consistent with the intended use. For **domestic hot water supply**, the valve must be installed as shown in figures 1.1, 1.2 or 1.3. There shall be no shut-off valves installed between the cold water line and the cold water connection on the AM-1 Series valve. Check valves, as indicated, shall be installed. A cold water service valve may be installed, as indicated in figures 1.1, 1.2 or 1.3, between the cold water supply line to the distribution system and the cold water line supplying both the water heater and the AM-1 Series valve. Sweat union connections (if used) should be soldered prior to assembly to the valve, or without the sealing gasket or optional check valve present. After the joint has cooled, the sealing gasket and/ or check valves may be installed.

OPERATION: The AM-1 Series valve provides for automatic operation through the use of a thermostatic element in the product. The element will control the mixing of the hot and cold supply waters to provide a mixed, tempered, water to connected fixtures. This provides constant water temperature under different working conditions.

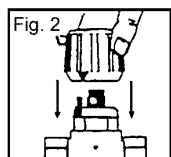
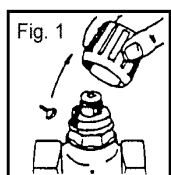
ANTI-SCALD & ANTI-CHILL PROTECTION: In domestic hot water applications, loss of either hot or cold water to the AM-1 Series valve will result in a reduction in flow from the valve to less than .5 GPM within seconds of the loss.

TEMPERATURE SETTING NON-ASSE MODELS: Set per tables below. Line up number on valve cap with arrow on valve body. Each valve is calibrated at the factory with 160°F hot and 60°F cold water. Tables below are based on 60°F cold water. For other cold water temperatures, correct mixed temperature by 1°F for every 10°F deviation from 60°F, up or down. Note: Temperatures given in table are average values.

Pressure difference between Hot and Cold ports should not exceed 10 psi. Valves require a minimum difference of 3°F between the Hot and Mixed temperatures for proper operation.

HOT Supply Temperature ° F	60° - 100°F Mixed Water Temperature (F) Valve Position No.					80° - 180°F (To set down to 80° F move below position 1) Mixed Water Temperature (F) Valve Position No.											
	0	1	2	3	4	1	3	5	7	9	11	13	15	17	19	21	23
120	57	69	82	91	98	74	81	90	97	103	110	118	118	118	118	118	118
140	59	71	84	93	100	76	83	92	99	105	112	120	128	136	136	136	136
160	61	73	86	95	102	78	85	94	101	107	114	122	130	138	148	159	159
180	63	75	88	97	104	80	87	96	103	109	116	124	132	140	150	161	180

LIMITING TEMPERATURE RANGE: (Excluding R model)



- It is possible to limit the temperature range. To use this feature:
1. Turn hand wheel to selected temperature setting lining up with arrow on valve body.
 2. Pierce center circle of nameplate with screwdriver and unscrew slotted screw. Remove hand wheel. (fig. 1)
 3. To limit the high temperature range at a set maximum (less than pos. 1 to pos. 4): Place arrow on hand wheel as closely as possible to the left of the L-slot bracket (Facing arrow).
 4. To limit the low temperature range at a set minimum (higher than pos. 1 to pos. 4): Place arrow on hand wheel as closely as possible to the right of the L-slot bracket (facing arrow). (fig. 2)
 5. SAFETY CHECK: To make sure above procedure has been followed correctly; ascertain that actual mixed temperatures maximum or minimum are set at the desired limit.

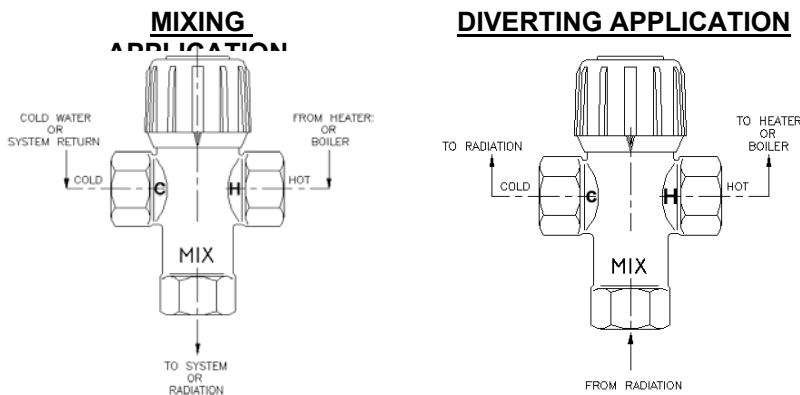
NOTE: After adjusting for limited temperature hand wheel position numbers, no longer agree with Table on page 1.

BASIC WAYS TO USE AM-1:

1. **Mixing of domestic hot and cold water.**
2. **Maintaining a constant supply temperature in a closed heating system.**
3. **Maintaining a constant return temperature in a closed heating system.**

In applications 2 and 3 water is not used up. It is continuously recirculated acting as a heat transfer medium only.

Applications 1 and 2 require piping as a mixing valve and 3 as a diverting valve.



General Note: There are many more ways to use AM-1 Series valves. The important thing to remember is that the valve seeks to maintain a constant temperature at the Mix (M) port. Please consult factory.

Caution: Some low water content boilers require a minimum flow of water whenever the burner is firing in order to avoid operating problems. This minimum flow rate is often larger than the flow in a single zone. In this case, install a bypass loop or other means recommended by the boiler manufacturer.

SIZING FOR DOMESTIC HOT WATER

Table 1 Fixture Units	
Lavatory	1
Kitchen Sink	2
Bath	2
Shower	2
Clothes Washer	2
Dish Washer	1

Table 2 Capacity	
Size	Fixture Units
1/2"	14
3/4"	22
1"	30

Procedure:

1. Determine type & number of fixtures.
2. Read fixture units from table 1.
3. Calculate number x fixture units for each fixture type.
4. Calculate total units of all fixtures.
5. Select appropriate valve size.

Example: 5 lavatories, 1 kitchen sink, 1 bath, 2 showers, 1 clothes washer, 1 dishwasher.
Total fixture units = 16. Select a 3/4" AM-1 Series Mixing Valve.

TYPICAL SPECIFICATION: Thermostatic Mixing Valve Certified to ASSE 1016-T and ASSE 1017, CSA, and IAPMO approved with Anti-scald capability. Temperature Setting Range (as required see page one), Maximum Pressure rating of 150 PSI, Maximum Hot inlet temperature of 212°F, Nickel plated Brass/Bronze construction, Teflon coated valve body wear surface, Teflon coated brass shuttle, EPDM o-rings, proportional design (simultaneous control of hot and cold ports), with either sweat union, NPT (female) union or NPT (female) connections. Valve for domestic hot water applications shall have temperature lock. Design shall be straight thru, with hot and cold ports at the same level. The design shall permit easy access for maintenance, with replaceable thermostatic element.

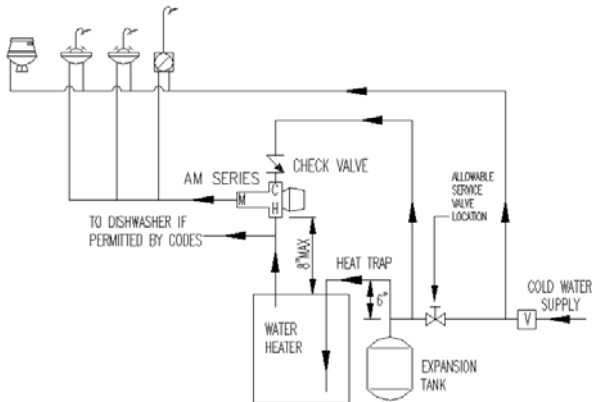
The AM-1 Series valves are "in-line" plumbing components (NSF 61 Section 8) in the context of ANSI/NSF 61, Drinking Water System Components - Health Effects. They are not end point devices (NSF 61 Section 9). They are all made of various metals, none of which exceeds 8% lead content, which is the limit imposed by NSF 61 for lead content. They all therefore comply with the Safe Drinking Water Act of 1974, as amended in 1996.

TYPICAL INSTALLATION DIAGRAMS:

1. DOMESTIC WATER MIXING (TEMPERING) (ASSE1017)(SOURCE OF HOT WATER)

Use when water temperature produced by heater is hotter than designed at point of use. Many codes require that water supplied to the system be limited to 120°F max. For such applications use a "C" type AM-1, which has a max. setting of 120°F. For other codes which permit a higher temperature, the Standard (100° - 145° F) AM-1 Series valve installed with the valve set and locked at the appropriate Mixed outlet temperature, is recommended.

1.1 WATER HEATER WITHOUT RECIRCULATION



SYMBOLS

1 = Check Valve/Flow Check

2 = Alternate Pump Location

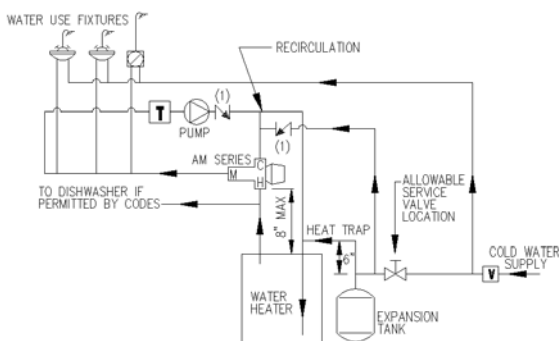
V = Any device which turns the domestic water system into a closed system such as; backflow preventers, check valves or pressure reducing valves.

T = Pump Control Thermostats

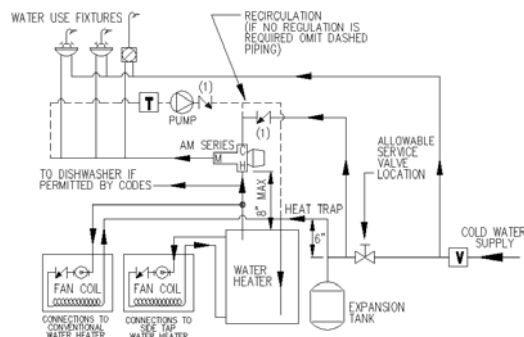
NOTES:

- "V" is optional depending on local codes. If a "V" type valve is used, it is mandatory that a thermal expansion tank be installed as shown. Otherwise, dangerously high pressures could result or water heater safety relief valve will frequently expel water. If no "V" device is used, the thermal expansion tank is not required.
- Install recirculation pump between last fixture and water heater, as shown in 1.2 and 1.3.
- Use a pump control thermostat where shown. recirculation pump should not run continuously.

1.2 WATER HEATER WITH RECIRCULATION



1.3 WATER HEATER USED FOR DOMESTIC WATER AND HEATING

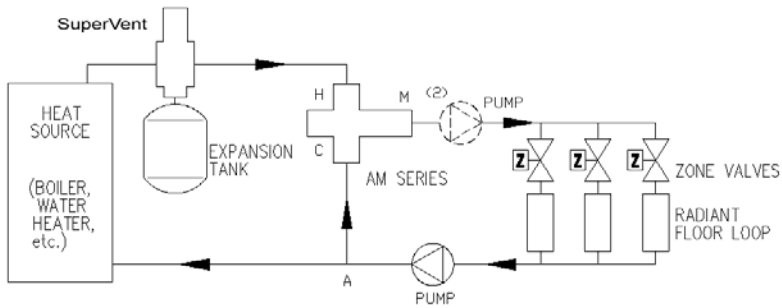


SPACE HEATING

Boiler must operate at a water temperature higher than the desired temperature in the heating system in order to perform at maximum efficiency. Example: Radiant floor heating.

2.1 MIXING APPLICATIONS (CONSTANT SUPPLY TEMPERATURE)

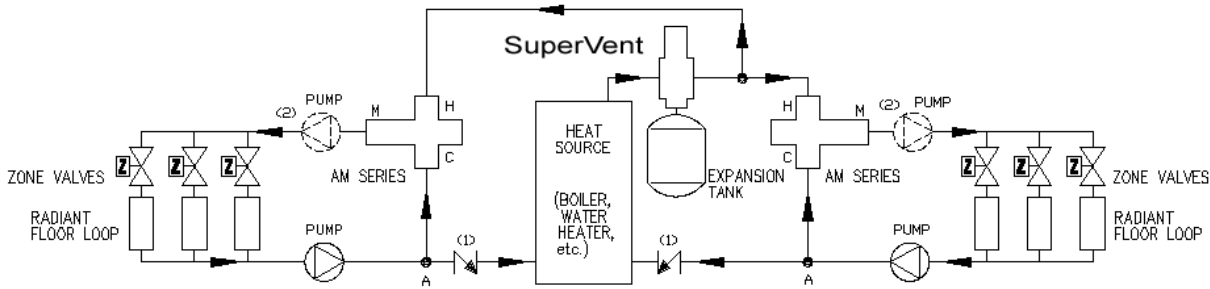
2.1.1 SINGLE LOOP



CAUTION: DO NOT INSTALL PUMP BETWEEN CONNECTION "A" AND HEAT SOURCE.
The installation of the pump at this point would result in NO FLOW through the radiation loop(s).

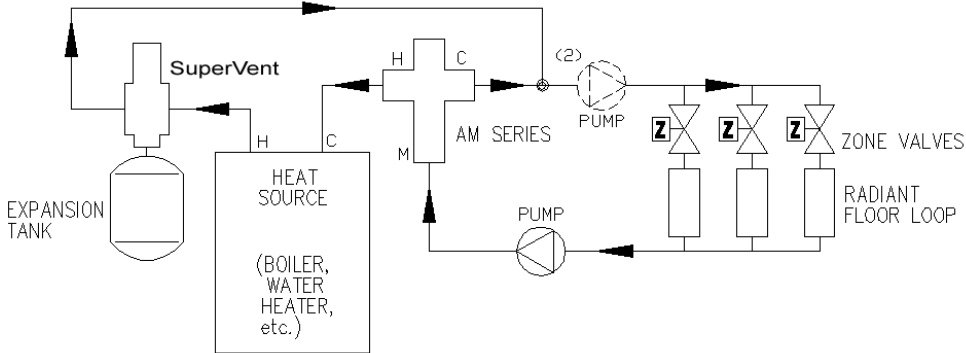
2.1.2 MULTIPLE LOOPS

Each loop operates at a different temperature.

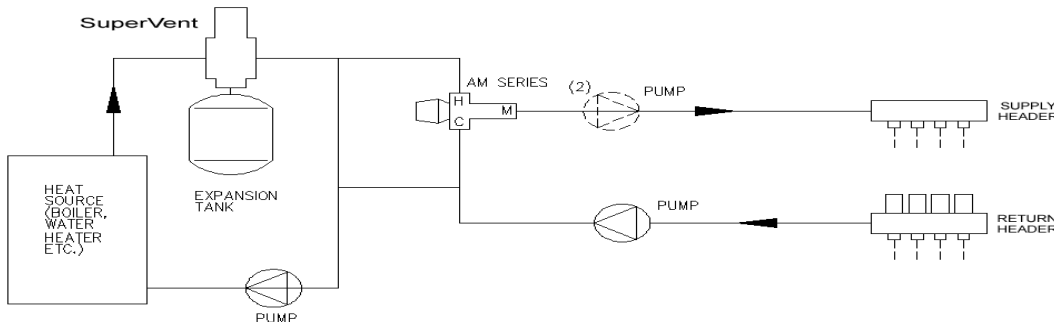


2.2 DIVERTING APPLICATION (CONSTANT RETURN TEMPERATURE)

2.2.1 SINGLE LOOP. FOR MULTIPLE LOOPS REFER TO 2.1.



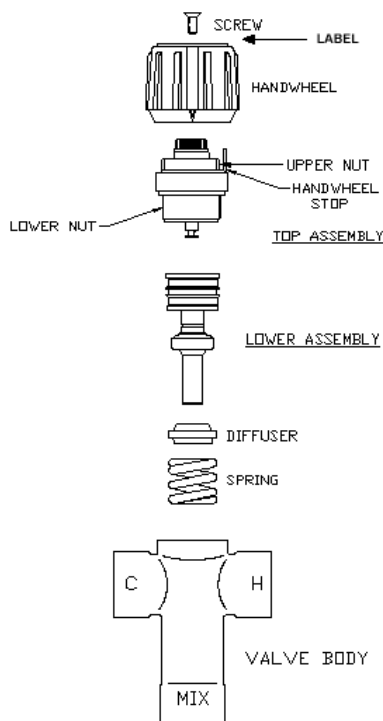
2.3 AM-1 PRIMARY / SECONDARY APPLICATION



**AM-1 SERIES
VALVE
MAINTENANCE
OR ELEMENT
REPLACEMENT**

Hard water conditions may result in scale deposits causing binding of internal parts in extreme cases. Cleaning the internal parts will usually restore the valve to proper operating conditions. In some cases it may be necessary to replace the lower assembly.

To clean and/or replace the lower assembly, shut off water and:



1. Pierce center circle of nameplate with a screwdriver and remove screw and hand wheel.
2. Loosen upper nut (do not remove) to allow engaging an adjustable wrench on lower nut. Unscrew lower nut (counter clockwise). This removes top assembly.
3. Brass top assembly will pop up. Remove lower assembly, diffuser and spring.
4. Carefully remove any scaling (calcium deposits) or foreign particles from valve seat and other internal parts. Use vinegar to remove calcium. Soak parts until calcium becomes soft and can be scrubbed and washed off. Do not use solvents or scratch metallic / Teflon coated surfaces.
5. Replace cleaned spring, diffuser and lower assembly following instructions below or use new replacement kit assembly. For correct kit number, see table below.
 - A. Insert spring onto diffuser.
 - B. Insert diffuser with spring end first into body.
 - C. Fit valve top assembly into lower assembly and insert into valve. Tighten lower nut. Line up arrow on Handwheel Stop with raised arrow on body and hold while tightening upper nut.
 - E. Turn plastic star wheel clockwise until it stops, then back as shown in table.
 - F. Place hand wheel on position 1 over raised arrow and insert screw. Turn hand wheel to desired temperature setting.

Calibration of AM-1 Series Valves when testing apparatus is not available. (Field Calibration)

Model	Lower Assembly Replacement Kit	With handwheel removed, turn stem clockwise as far as possible. Then turn counterclockwise by the amount shown below and install handwheel so that #1 is in-line with red arrow on body.
60°- 100° F ("B")	AM-1-020 RP	3/4 turn
80°-120° F ("C")	AM-1-020 RP	1 turn
100°-145° F	AM-1-025 RP	3/4 turn
80°-180° F ("R")	AM-1-025 RP	NO BACK OFF SET HANDWHEEL AT # 24

Field calibration is less accurate than calibration performed on the testing apparatus.

SAFETY TEST FOR ANTI-SCALD PROTECTION It is important that the element replacement is done exactly as indicated above to prevent malfunction, temperature range inaccuracies or possible scalding.

Field element replacement or exchange does not guarantee accurate factory calibration and the AM-1 valve may be off by a few degrees. To test the calibration, set position 1 marked on the hand wheel over the raised dot or arrow on the valve body; run water for two minutes and measure the temperature with a thermometer. If the measured temperature does not agree with the temperature shown in column 1 of the tables on page 3, reposition the hand wheel (without disturbing the setting of the spindle) so that the number shown on the table lines up with the dot or arrow. Example: You have an AM 101C-1. The supply hot temperature is 160°F. The thermometer reads 90°F. The table says that for 90°F the hand wheel number should be 1. Therefore, lift the hand wheel off the spindle and turn it until the dot or arrow on the body is at the number 1 marking, then reinstall the hand wheel.

Note: If you do not know the exact temperature of the hot water, assume that it is 160°F when using the table on page 1.

If the valve is used as an anti-scald device, the mix temperature must be verified with a thermometer. Please consult the factory if you need further assistance.