

INSTALLATION GUIDE

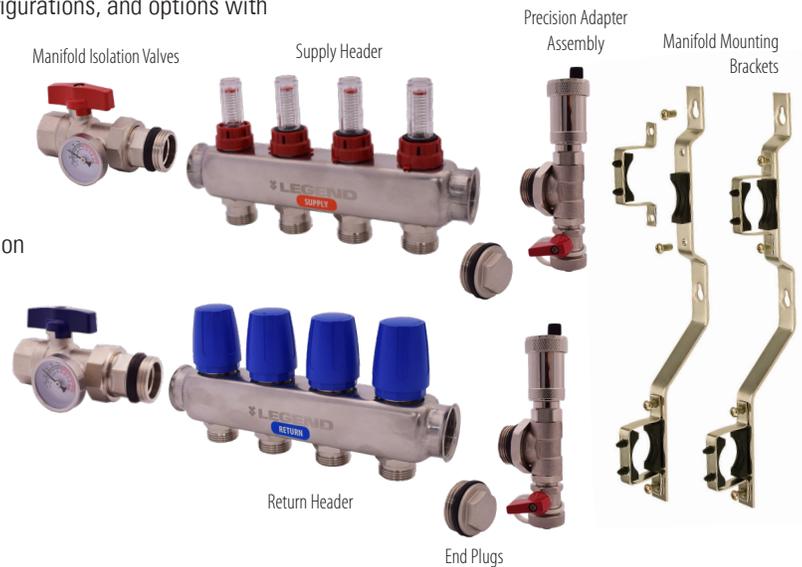
M-8330 STAINLESS STEEL MANIFOLD SERIES

INTRODUCTION

The M-8330 Stainless™ Manifolds are designed for use in Hydronic radiant panel heating and cooling applications. They are available in various sizes, configurations, and options with many accessories. Consult your local Representative for project specific requirements.

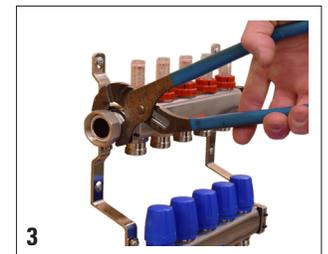
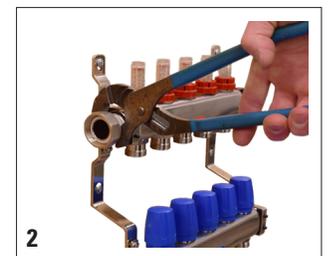
The manifold components are packaged in the box and must be assembled before mounting it and before attaching the radiant tubing or performing system start-up procedures. Therefore, we are recommending the following sequence for complete installation of the manifold.

- A. Assemble the Manifold Components
- B. Mount Manifold
- C. Connect the Radiant Tubing
- D. Pressure Test
- E. Fill & Purge the System
- F. Balance the Manifold



ASSEMBLE MANIFOLD COMPONENTS

1. A complete manifold consists of both a **Supply** and **Return Header (1)**, each with a **Precision Adapter Assembly** (M-8330P manifolds) or **End Plug** (M-8330 manifolds), **Header Isolation Valve** and **Manifold Mounting Brackets**. Follow steps 2 through 5 below, to assemble. The Headers (1) in the M-8330 Stainless Manifold Series are one piece, formed, stainless steel tubing with built-in loop isolation valves (supply & return) and flow gauges (supply only) that require no assembly or tightening.
2. **Manifold Isolation Valves.** Thread the male end of the **Tail Piece Nipple** until tight¹, into the end of the manifold header that is to receive the system supply / return distribution piping to / from the mechanical room. The Tail Piece Nipple can be tightened with a standard channel locks or crescent wrench (2). The **Valve Body** is then threaded on to the other end of the Tail Piece Nipple with the union nut, until tight¹. Orient the valve body so that the handle can be operated comfortably once the manifold is mounted (3). The Manifold Isolation Valves are normally sold in pairs, the red-handle valve is for the supply manifold header and the blue-handle valve is for the return manifold header; both are installed the same way.
3. **Precision Adapter Assembly.** The Precision Adapter Assembly (included with M-8330P manifolds) consists of the **Adapter**, an **Automatic Air Vent** and a **Fill/Purge Valve**. They are normally sold in pairs; one for the supply manifold header and one for the return manifold header. They are identical and can be installed on either header and assembled following the procedures below (a through c).



¹**Note:** These components seal together and to the manifold with an EPDM gasket (o-ring). One quarter (1/4) turn beyond "hand-tight" is normally sufficient to seal properly. If turning beyond 1/4 turn is required to align gauges and handles then do so, up to one (1) full turn beyond "hand-tight".

Caution: Do Not use thread sealant tape or paste on these threads.

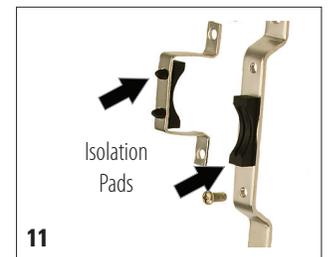
- a) Thread the male end of the Adapter, into the end of the manifold header opposite the end to receive the Header Isolation Valve (4). The Adapter has a “captive nut” that can be tightened once the desired position has been reached (5). The Adapter should be properly aligned (oriented) so that the Air Vent port is facing up (vertical position).
- b) The Air Vent should always be installed in a vertical position. Thread the male threads of the service check (tt) and air vent (7) into the top port of the Adapter until tight¹.
- c) Thread the male end of the Fill/Purge Valve into the lower port of the Adapter, opposite the Air Vent, until tight¹. Orient the Fill/Purge Valve so that the handle can be operated comfortably once the manifold is mounted (8). The opposite end of the Fill/Purge Valve has a 3/4” male garden hose thread (GHT) port and includes a brass cap with rubber tether. The brass cap, with EPDM gasket included, should be threaded on to the GHT port of the Fill/Purge Valve until ready to use.



OR

4. **End Plugs.** Thread the male end of the End Plug until tight¹, into the end of the manifold header opposite the Manifold Isolation Valve (9). Repeat for both the supply (upper) and return (lower) manifold.
5. The M-8330 stainless steel manifold is normally shipped already installed in the brackets. If needed, follow steps a through d below to install the manifold headers into the **Manifold Mounting Brackets** before mounting the brackets to the wall. Each Mounting Bracket includes two (2) sets of collars, for both the supply (upper) and return (lower) manifold headers (10). The Mounting Brackets are sold in pairs and every manifold should use both brackets for proper stabilization. The steel brackets are provided for secure mounting, proper alignment and isolation of vibration and noise. Do not install the manifold without these brackets.

- a) Install the rubber isolation pads (included) on the inside of the Mounting Bracket collars and the front face of the mounting bracket behind where the collar attaches to the bracket (11).
- b) Set the manifold header onto the rubber isolation pads of the mounting brackets. The isolation pads should be positioned around the manifold header at each end where the header narrows down outside of the loop ports.
- c) Attach the collar around the manifold header to the bracket by threading the screw down through the collar into the threaded hole on the bracket (12).
- d) Repeat steps (a) through (c) above for both sets of collars - upper (supply) and lower (return)—on each bracket until the manifold is completely attached to the Manifold Mounting Brackets (13).

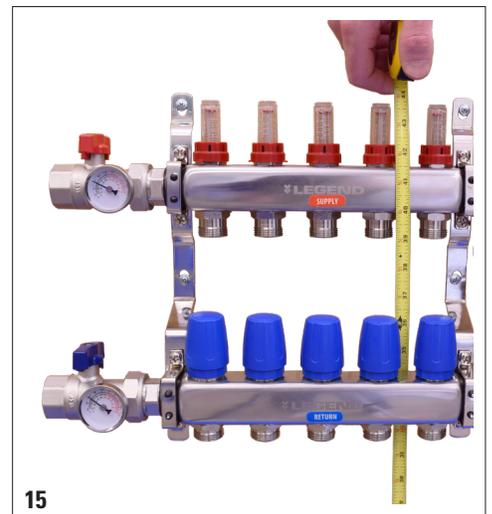
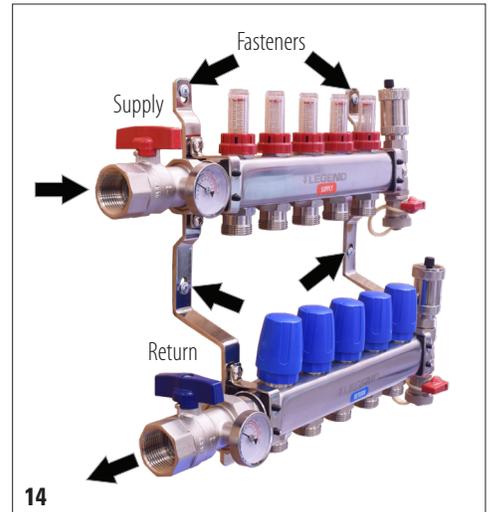


Note: The Precision Adapter Assembly, Manifold Isolation Valves and/or End Plugs may already be attached to the manifold, in this case verify that they are tightly sealed. These components seal together and to the manifold with an EPDM gasket (o-ring). One quarter (1/4) turn beyond “hand-tight” is normally sufficient to seal properly. If turning beyond 1/4 turn is required to align gauges and handles then do so, up to one (1) full turn beyond “hand-tight”.

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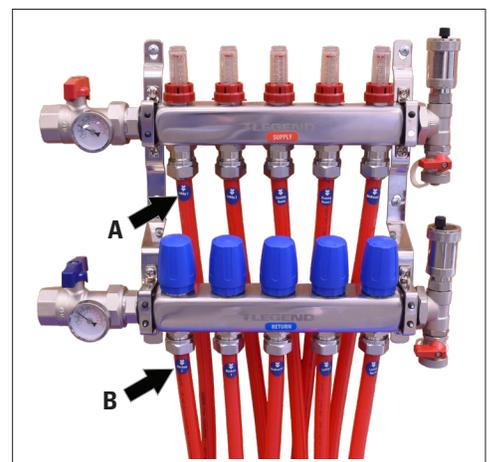
MOUNT THE MANIFOLD

1. The manifold location is normally determined during project design prior to installation. If the location was not previously selected or the selected location is no longer suitable due to project changes; a new location can be chosen based upon the following criteria: It should be located near the area (radiant panel) where the tubing is to be installed in order to avoid long circuit tails. It should be located so that it is accessible during and after project construction for initial start up procedures (Sections D through F) and periodic system maintenance and/or troubleshooting.
2. The manifold may be mounted in any orientation: vertical, horizontal, or even inverted; the only exception being that the header with the flow gauges must always be the supply header; receiving flow from the mechanical room and distributing it into the radiant panel (floor, ceiling, etc.) **(14)**. The best orientation for installation access and later maintenance and/or troubleshooting is in a vertical position on a wall.
3. The manifold should be installed using appropriate fasteners for the mounting surface and sized to fit the mounting holes in the steel brackets **(14)**. The manifold should be mounted in its permanent location prior to installing the radiant tubing; adjustments after the tubing is connected, concrete is poured or floor coverings are installed, are very difficult. A temporary support may be built if the walls are not yet in place. Ensure that the manifold is level and has adequate clearance on the sides for the distribution piping connections to/from the mechanical room. The minimum clearance is 20" (40 cm) between the bottom of the manifold and the top of the finished floor (right). Ideally, the manifold will be mounted with the upper (supply) header 40" (1.0m) above the floor **(15)**.
4. The manifold should never be mounted without the proper steel brackets. The M-8330 Stainless Manifolds are normally sold with the brackets. The steel brackets are provided for secure mounting, proper alignment and isolation of vibration and noise. Do not install the manifold without these brackets.



CONNECT THE RADIANT TUBING

1. Slide the end of the tubing through the appropriately sized Tube Bend Support (800-305 for 3/8" & 1/2" tubing or 800-304 for 5/8" & 3/4" tubing) before attaching the manifold connector **(16)**. Position the 90° bend support on the tubing as it turns out of the floor, up into the manifold, typically 3 to 4 feet below the mounted manifold **(17)**. At this approximate location, the bend support should extend several inches vertically above the finished floor height. Tubing Bend Supports protect the tubing as it transitions to and from the thermal mass (radiant floor) and help align the convergence of several tubing loop ends at the manifold location for a neat, professional appearance.
2. Manifold tube connectors are **not** included with the manifold; they are sold separately. Use the appropriate tube connectors for the type and size (below a through g/h) of radiant tubing. Tube Connectors (830-142, -143, -144, -145) are for PEX or PE-RT tubing manufactured in compliance with ASTM F 876 (PEX) or ASTM F 2623 (PE-RT). Composite Tube Connectors (830-142C, -143C, -144C, -145C) are for PEX-AL-PEX tubing manufactured in compliance with ASTM F 1281.
3. After the manifold is securely mounted in its final position, begin to connect the radiant tubing. The tubing should be connected to the manifold as it is being installed. For the best results, start each loop by attaching the tubing to the upper (supply) header **(A)**.



Note: The Legend, M-8000 Modular Brass or M-8200 Precision Brass series tube connectors (and all other manufacturers' tube connectors) are not compatible with the M-8330 Stainless Steel Manifold series manifolds.

4. Try to avoid crossing loops by attaching the end of the loop to the header port on the side (end) of the manifold closest to the area to be covered by that loop. It is also recommended to attach both ends of each loop to corresponding supply and return header ports on the manifold. For example, port 1 (to the far left as facing the manifold) on both the supply **(A)** and return header **(B)** should have attached the beginning and end of the same loop.
5. Each loop on the manifold should be labeled (with the supplied adhesive labels) according to the area or room it covers on the project for future trouble shooting purposes. The installed length of each loop should also be noted on the manifold and recorded on the project plans for output and balancing calculations (see Section F; Balance the Manifold). Sticker labels are provided with M-8330 Stainless Manifolds.

CAUTION: Do not use thread sealant tape or paste on these threads. These are parallel threads; sealing is achieved by the tapered brass threading and integral o-rings.

CONNECT THE RADIANT TUBING CONT.

For 5/16", 3/8", 1/2" & 5/8" radiant tubing

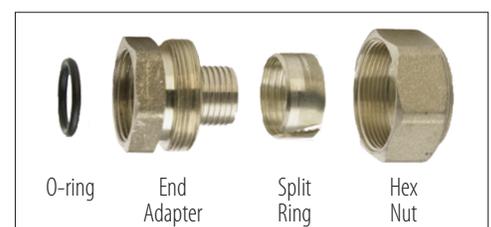
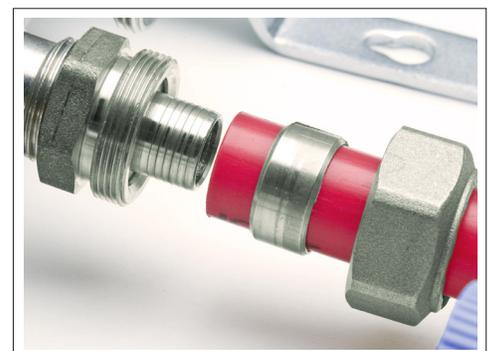
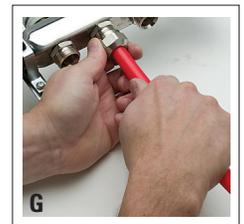
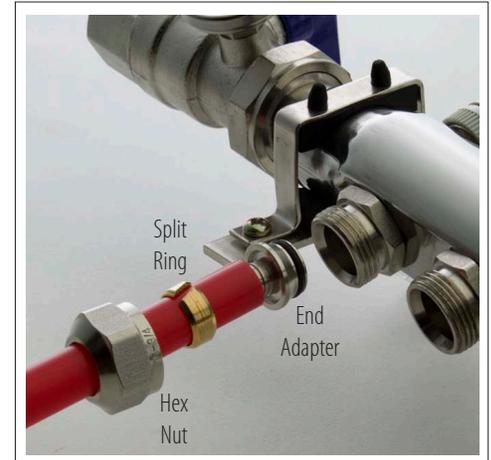
(Tube & Composite Tube Connectors) connections:

- a) Ensure that the tubing is cut squarely using a proper tube cutter.
- b) Slide the **hex nut** (with the threads towards the manifold) onto the tubing.
- c) Slide the **split ring washer** onto the tubing.
- d) Insert the **barbed end adapter** into the tubing until flush with the end of the tubing.
- e) Place the end adapter into the selected port ensuring that the o-ring is seated properly into the manifold port.
- f) Hand-tighten the hex nut onto the male threads of the manifold port while supporting the tube and keeping the end adapter square in the port. It should turn on smoothly as the fitting is aligned.
- g) Once the hex nut is hand tight, use a 1-1/8" (29mm) wrench and turn it no more than 1/2 turn. Do not over tighten, as this may destroy the integral o-ring.

For 3/4" radiant tubing (Tube & Composite Tube Connectors) connections:

- a) Ensure that the tubing is cut squarely using a proper tube cutter.
- b) Install the o-ring in the 3/4" adaptor. Attach the 3/4" adaptor to the selected manifold port (the hex end of the bushing closest to the header) ensuring that the o-ring is seated properly into the manifold port. Thread the adaptor onto the port by hand until it stops, and then no more than 1/2 turn with a wrench.
- c) Slide the hex nut (with the threads towards the manifold) onto the tubing.
- d) Slide the split ring washer onto the tubing.
- e) Insert the barbed end adapter into the tubing until flush with the end of the tubing.
- f) Place the end adapter into the manifold bushing.
- g) Hand-tighten the hex nut onto the male threads of the manifold bushing while supporting the tube and keeping the end adapter square in the manifold bushing. It should turn on smoothly as the fitting is aligned.
- h) Once the hex nut is hand tight, use a 1-1/2" (38mm) wrench and turn it no more than 1/2 turn. Do not over tighten, as this may destroy the integral o-ring.

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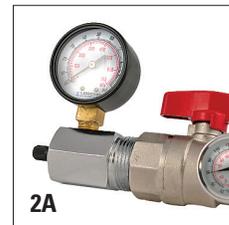
Note: The Legend, M-8000 Modular Brass or M-8200 Precision Brass series tube connectors (and all other manufacturers' tube connectors) are not compatible with the M-8330 Stainless Steel Manifold series manifolds.

PRESSURE TEST

1. After the radiant tubing has been installed, but before it is covered, a pressure test should be performed on the manifold with all Circuit Isolation and Balancing Valves (both supply and return header) open so that the tubing and manifold connections can be checked for leaks. This pressure test can be performed with either air or water depending upon availability and/or local code requirements and is typically done prior to connecting the system supply/return distribution piping to/from the mechanical room.

2. Air Pressure Test

- Thread the male end (1" NPT threads) of the Air Pressure Tester (T-820; sold separately) into the female end of the installed supply Manifold Isolation Valve (red handle) (right). The use of thread sealant (Teflon tape or paste) will help ensure that this connection is air tight. Make sure the supply Manifold Isolation Valve is open and the return Manifold Isolation Valve is closed so that the manifold and radiant tubing system is sealed closed. If using Precision Adapters with Fill/Purge Valves (included with M-8330P manifolds), make sure these valves (both supply and return) are also in the closed position **(2A)**.
- Remove the check-stopped air vent prior to pressurizing the system. Replace the vent once the pressure test is complete.
- Fill the system with air through the Schrader valve on the Air Pressure Tester (T-820) to the required test pressure (continue to step 3 below for recommended test pressures) **(2B)**.



OR

2. Water Pressure Test² (Manifolds utilizing Precision Adapter with Fill/Purge Valve; included with M-8330P manifolds)

- Follow steps 3 through 10 in the "Fill & Purge the System" section of these instructions to purge the air out of the system.
 - Once all of the air has been purged, fill the system with water to the required test pressure (continue to step 3 below for recommended test pressures).
- Initially fill the system to a pressure the greater of 1.5 times the maximum operating pressure or 100 psi for 30 minutes. Check for leaks, especially at the connections. As the radiant tubing expands, restore pressure, first at 10 minutes into the test and again at 20 minutes. At the end of 30 minutes, a pressure drop of more than 7 psi indicates there is a leak in the system.
 - After 30 minutes, restore the system to test pressure (if necessary), and then maintain pressure for a minimum of 2 hours. At the end of 2 hours, a pressure drop of more than 5 psi indicates there is a leak in the system.
 - After 2 hours, reduce the system pressure to 30 – 40 psi, and then maintain this pressure during the remainder of building construction up to the time at which the system is filled. The system should be monitored during installation of the thermal mass, floor coverings and/or any time where floor penetrations may be necessary.
 - If a leak is present as determined by any step above (3 through 5), visually inspect the system to identify the location and then perform the necessary repairs. A soap and water mix solution can be poured onto the outside of the tubing and connections at potential leak areas to help identify leaks in systems under air pressure test. Upon completion of repairs, repeat the pressure test procedures from the beginning.

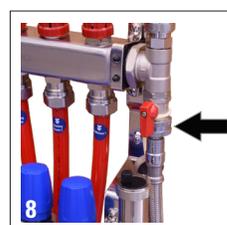
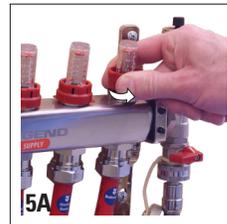
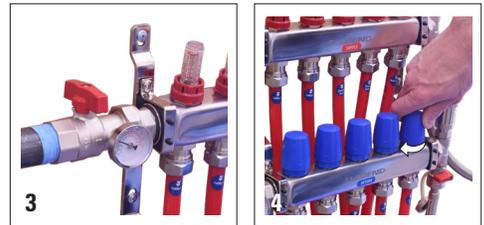
²CAUTION: When pressure testing with water, ensure that all precaution is taken to prevent the water from freezing or pipe damage may result.

FILL & PURGE THE SYSTEM

Manifolds Utilizing Precision Adapter with Full / Purge Valve; Typically M-8330P

1. Before the system is ready for operation it must be filled with the proper fluid media and purged of air. The proper fluid is determined during design of the system, typically clean, de-ionized water or a water and glycol mixture depending upon the required level of freeze protection and/or corrosion inhibitors. If using a water/glycol solution, mix the glycol into the water thoroughly prior to filling the system. Follow the glycol manufacturer's instructions for proper usage and installation.

2. A complete system fill/purge procedure normally starts in the mechanical room with the boiler and near boiler piping, followed by the distribution (zone) piping to/from the radiant manifolds. In smaller system the manifolds and radiant tubing can be filled and purged with the distribution piping from the mechanical room. Larger systems, especially those with zones on upper levels, require that the manifold and radiant tubing is filled and purged at the manifold one loop at a time. These instructions are for operation of the manifold during the fill and purge of the manifold and radiant tubing.
3. Make sure the Manifold Isolation Valves (both supply and return) are closed so that the manifold and radiant tubing is isolated from the rest of the system **(3)**.
4. Close all Circuit Isolation Valves on each loop of the return header, by turning the large blue handle clockwise until it stops **(4)**.
5. Verify that all Balancing Valves on each loop of the supply header are fully open (they are normally shipped in the open position). To open the Balancing Valves: Remove the protective red cover **(5A)**. Flip the red cover over and place back on the flow meter **(5B)**. Turn the flow gauge counter-clockwise until it is un-threaded to its outer most position **(5C)**.
6. Make sure the Fill/Purge Valves on the Precision Adapters (both supply and return) are closed. Un-thread (counter-clockwise) the chrome plated brass cap from the GHT ports **(6)**.
7. Attach a fill hose from the water supply source to the GHT port on the Fill/Purge Valve of the supply header. Attach a drain hose to the corresponding port on the Fill/Purge Valve of the return header **(7A)**. Place the end of the drain hose in a bucket **(7B)**.
8. Turn on the water supply and open the Fill/Purge Valve on the supply header and then open the Fill/Purge Valve on the return header.
9. Purge the air out of each loop in a logical order, one at a time, closing each loop after it has been purged, before opening the next. Open the Circuit Isolation Valve for the first loop, by turning the large blue handle counter-clockwise until it stops **(9)**. Air should start to "sputter" out of the drain hose. When the sputtering stops and a steady stream of water flows out of the drain hose; close the Circuit Isolation Valve of the first loop.
10. Repeat step 9, for each of the remaining loops. After the last loop has been purged, open the Circuit Isolation Valve for all of the loops and let any residual air purge out of the manifold.
11. Close the Fill/Purge Valve of the return header and let the system fill to operating pressure, typically 12 to 15 psi; then close the Fill / Purge Valve on the supply header **(11)**. Turn off the water supply source.
12. Make sure also, that the Automatic Air Vents (if used; typically M-8330P) on the Precision Adapters are open so that any small pockets of air remaining in the system are vented during normal operation. The Automatic Air vents can be opened by turning the cap counter-clockwise **(12)**.
13. Disconnect the fill and drain hoses and cover the GHT ports on the Fill / Purge Valves (both supply and return) with the chrome plated brass cap by threading it on (clockwise) **(13)**. The Manifold Isolation Valves can now be opened and the system is ready for operation and/or balancing.



Note: Manifold Actuators (830-200, sold separately) should not be mounted on the manifold until after the system has been filled, purged and balanced. They should be mounted as the very last step before system operation. Their installation requires the removal of the Circuit Isolation Valve handles on the return header. Follow the installation instructions provided with the Actuators.

BALANCE THE MANIFOLD

1. The required flow rate for each loop is calculated during system design directly from the heat output (Btu/hr) and ΔT (delta T; temperature difference beginning to end) requirements of that loop. In order for the system to function properly (to be “balanced”), the fluid flow rates in each loop must be set to match the system design flow rates. The design flow rates of a given manifold may or may not be the same on each loop, therefore, “balancing the manifold” does not necessarily mean that the gauges on each loop should be set to the same reading (flow rate), as often construed.
 2. To set the flow rate for each loop, follow steps 3 through 9, below. The system must be filled, purged and generally ready for operation, with the exception of manifold actuators³, if required. All pumps for all zones in the system must be operational for these procedures, but it is not necessary to have heated or chilled fluid in the system.
 3. Turn the entire system on and set the controls (thermostats, zone controls, relays, etc. . .) so that all zones are calling (all pumps are running and/or all zone valves are open) to simulate full design conditions.
 4. Make sure the Manifold Isolation Valves, both supply and return (4) are open and that the manifold and radiant tubing are receiving full flow.
 5. Make sure all Circuit Isolation Valves on each loop of the return header are open. They can be opened by turning the large blue handle counter-clockwise until about three threads are visible (5).
 6. Remove the protective, red, plastic covers on each gauge. (6A) Verify that all Balancing Valves on each loop of the supply header are fully open (they are normally shipped in the open position). To open the Balancing Valves: Flip the red cover over and place back on flow meter. (6B) turn the flow GAUGE balancing valve counter-clockwise by hand, until about three threads are visible (6C). **Do not use a wrench.**
 7. The flow rate of each loop is indicated on its corresponding flow gauge, located on the top of the supply header. The scale on each gauge reads from 0 to 2 gpm with 0 gpm at the top of the gauge. The red colored indicator rests at the top of the gauge with no flow and lowers down the scale as the flow increases (7).
 8. Adjust the flow rate of each loop by closing (clockwise, to reduce flow) and opening (counterclockwise, to increase flow) the flow gauge by hand (8-9). The total range of the Balancing Valve from fully open to fully closed, is 2-1/2 to 3 turns. Be careful to not over tighten the valve when closing.
- CAUTION: Do not use a wrench to adjust the flow meters. Damage may occur.**
9. Start with the loop that requires the lowest flow rate and set that loop to the required flow plus 50%. Proceed to the loop with the next highest flow requirement and set that loop as close as possible to the required flow rate (8-9). Continue to the next loop in similar fashion until all loops have been set to their required flow rates. Note that after each loop is adjusted, the flow rates previously set for other loops may change. It is common for each loop to require multiple adjustments before all loops on the manifold are properly balanced (8-9).
 10. Repeat the balancing procedures as outlined in steps 3 through 9 above for all manifolds in the system. The manifold is now ready for operation and/or installation of zone actuators³, as required.
 11. Flip the red lock shield over and install back over the flow meters (11).

³Note: Manifold Actuators (830-200, sold separately) should not be mounted on the manifold until after the system has been filled, purged and balanced. They should be mounted as the very last step before system operation. Their installation requires the removal of the Circuit Isolation Valve handles on the return header. Follow the installation instructions provided with the Actuators.

