

PRO-BALANCE[®] 1 IN. BRASS MANIFOLD

PRODUCT INSTRUCTIONS

SCOPE

This guide provides instruction regarding PRO-BALANCE 1 in. manifold installation and operation. Manifolds may only be installed, adjusted and maintained by an appropriately licensed installer of radiant systems.

Throughout this document, the signal word **NOTICE** is used to help you avoid property damage. We cannot warn of all hazards; you must also use your own good judgment.

ABOUT PRO-BALANCE 1 IN. MANIFOLDS

PRO-BALANCE 1 in. manifolds are used for distributing and regulating the volume of flow in radiant systems. The PRO-BALANCE 1 in. manifold is equipped with integrated flow gauge/shutoff valves and circuit balancing isolation valves which allow individual complete circuit isolation. Note the following:

- Must be operated using heating water, which is free of corrosive particles or other contaminants that can damage the manifold
- Maximum permissible continuous operating pressure is 87 psi (6 bar) at 176°F (80°C)
- Maximum permissible test pressure is 145 psi (10 bar) at water temperature < 86°F (30°C) and maximum ambient temperature 104°F (40°C)
- Use manifolds only as intended in order for REHAU's PEXa Limited Warranty to apply.

NOTICE: A damaged manifold may leak, causing system failure and property damage.

- Do not expose manifold to harmful chemicals, aggressive water conditions or any external influences that may cause damage to manifold materials.
- Use appropriate antifreeze agents when below freezing conditions exist.
- Properly insulate manifold and/or locate manifold so as to avoid condensation.
- Do not install the manifold using connectors or accessories made by other manufacturers.

Impact of System Fluid on Manifold and System Components

The installer must have an understanding of local water conditions and how the makeup of the system fluid can impact the lifetime and performance of the system components. The composition of the system fluid has a major impact on the potential for corrosion within the complete system. The likelihood of corrosion and failure of system components can be greatly reduced by using suitable water quality and ensuring proper system operation.

The local installer and design engineer must have an understanding of the potential for water-side corrosion. In certain cases, various forms of corrosion can occur which include functional impairments to the system, system leakage, clogging of system components, impairment of heat transmission and flow noise.

Field experience has shown that risk of corrosion damage is greatly reduced by the following measures:

- System must be completely sealed and operated with heating water without additives. If water treatment is necessary, the contractor should ensure that the additives to the system including antifreeze, corrosion inhibitors and system flushing chemicals do not lead to corrosion of the system components.
- Propylene glycol and ethylene-based glycols at maximum 50% concentration are recommended within temperature pressure ratings as shown in Fig. 2 in case freeze protection of system is necessary. Alcohol-based glycols are not permitted because they can lead to system failure.
- Materials such as wax or mineral oils, threading oils or incompatible air compressor oils must not be introduced into the system.
- Installer must review the complete list of water-contact materials in the PRO-BALANCE 1 in. manifold (see Table 1) to ensure compatibility with the flushing fluid, system fluid and additional make-up water.
- Manifold must be installed in a non-corrosive environment.
- If there are known local conditions that could lead to corrosion of the system components, the installer must consult with a water quality expert experienced in corrosion control of piping systems. If there are no known standards for ensuring proper water quality, then the German engineering standard, VDI 2035 *Prevention of Damage in Water Heating Installations*, should be referenced. (English version of VDI 2035 available for purchase at www.beuth.de or contact REHAU for assistance.)
- System fluid should also comply with RPA guidelines for hydronic radiant heating systems.

Manifold Components

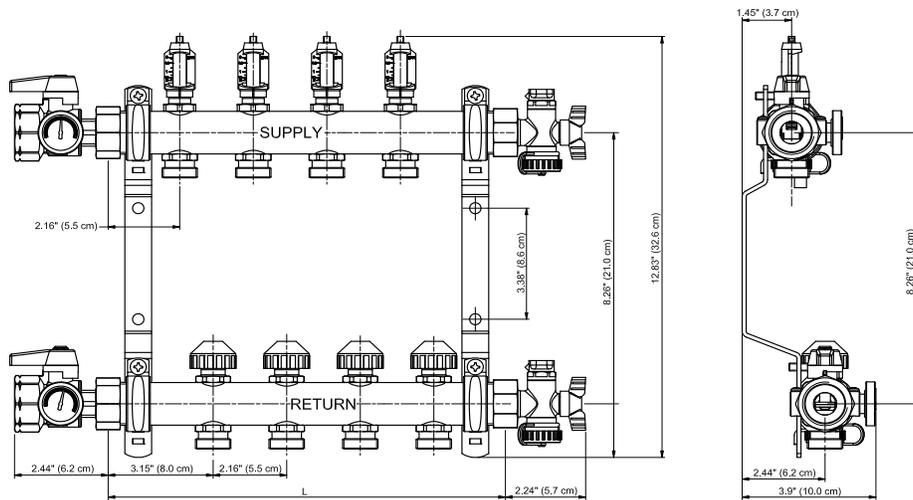
Each PRO-BALANCE 1 in. manifold comes complete with the following:

- Installation instructions
- 1 in. NPT supply and return manifold isolation valves with gaskets and mini thermometers
- Air vent drain valves with gaskets
- Visual flow gauges/isolation valves (0-2 GPM) on supply side
- Circuit balancing/isolation valves on return side
- Mounting brackets
- Four drywall screws and four sheet metal screws
- Vent keys
- Manifold circuit chart

In addition, you will need:

- R20 connectors for the size of RAUPEX® you are using
- Adjustable wrench
- 1 1/4 in. (32 mm) wrench for 3/8, 1/2 and 5/8 in. fittings
- 1 1/2 in. (38 mm) wrench for 3/4 in. fittings
- 1 7/16 in. (36 mm) wrench

Manifold Technical Data



Manifold Specifications

Number of Outlets	Manifold Length (L)	
	in	cm
2	7.48	19.0
3	9.65	24.5
4	11.81	30.0
5	13.98	35.5
6	16.14	41.0
7	18.31	46.5
8	20.47	52.0
9	22.64	57.5
10	24.80	63.0
11	26.97	68.5
12	29.13	74.0

Fig. 1: Manifold dimensions

Table 1: Manifold Specifications

Materials

Headers	Brass (CW 508L)
Ball valve casing and end piece set	Brass (CW 617N)
Valve casing, lower valve part and flow indicator casing	Brass (CW 614)
Valve shaft	Nickel-plated brass (CW 614)
Valve spring and flow indicator spring	Stainless steel 1.430
O-ring washers	EPDM
Valve disk and valve head	EPDM
Connection ball valve/end piece	AFM 34 Synthetic fiber based material
Transparent flow indicator	Polyamide 12
Plunger in flow indicator	Polyoxymethylene

Connections

Header ends	1 in. BSP parallel (straight) threads
Outlets	R-20 BSP parallel (straight) outside threads
Isolation valve	1 in. NPT female threads

Temperature / Pressure Capabilities

Maximum operating temperature	176°F (80°C) @ 87 psi (6 bar)
Minimum operating temperature	14°F (-10°C) @ 145 psi (10 bar)
Maximum water test pressure (24 hrs. < 86°F (30°C) @ max. ambient temperature 104°F (40°C))	145 psi (10 bar)

Flow Rates

Maximum flow rate	2.0 USGPM per circuit; 20 USGPM total (0.13 l/s per circuit; 1.27 l/s total)
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NOTICE: Exposure to some fluids may damage manifold materials. Contractor must confirm compatibilities of system fluids such as antifreeze, corrosion inhibitors and system flushing chemicals with water contact components of manifolds.

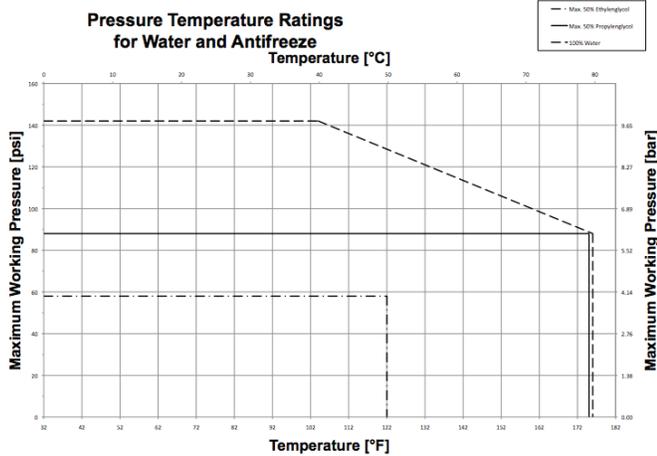


Fig. 2: Manifold temperature and pressure capabilities

Note: Operating temperature and pressure must stay below corresponding line for appropriate fluid type.

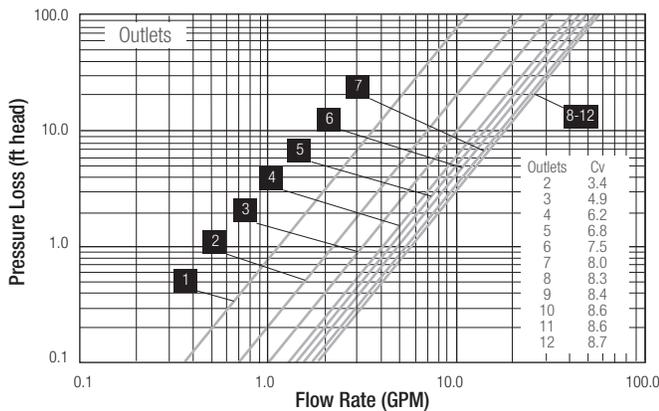


Fig. 3: Pressure loss through manifold

To use the diagram in Fig. 3, choose the flow rate that is the total flow rate for the entire PRO-BALANCE 1 in. manifold – the total of all circuits (e.g., 3 GPM). Plot a vertical line upwards to intersect with the line for the size of the manifold (e.g., 3 outlets). From that point, move to left to find pressure loss in feet of head (e.g., 3 GPM, 3 outlets = 0.9 ft. head). This is the total pressure (head) loss through the manifold's header pipes, the 1 in. isolation valves, the circuit balancing valves (when fully open) and the flow gauges.

MOUNTING THE MANIFOLD

NOTICE: An improperly installed manifold can leak, causing system failure and property damage. To minimize risk of leaks:

- Must use included steel mounting brackets, which provide a secure mount, proper alignment and isolation of vibration and noise.
- Do not use thread sealant tape or pipe dope on the manifold outlets.
- Do not over tighten connections.

1. Install the manifold in its final position prior to connecting the RAUPEX pipes.
 - Manifold may be installed in a REHAU steel heating manifold cabinet, on a wall or on a temporary support frame.
 - Manifold may be mounted in any orientation (i.e., inverted, horizontal, sideways).
 - Manifold must be level and have adequate clearance on the sides for pipe connections.
 - Minimum clearance is 16 in. (40 cm) between the bottom of the manifold and the top of the finished floor.
 - Steel mounting bracket and screws are provided.
2. Attach the 1 in. isolation ball valves and the air vent drain valves by sliding the flange nut over the large tab on the flange, then over the small tab. Hand tighten the nut onto the end of the header.
 - Red-handle valve goes on the supply header.
 - Blue-handle valve goes on the return header.
 - Use the slip flanges and flat gaskets provided.
 - Align valves with the thermometer housings facing the front.

Note: If you will be using an air test, slightly wet the flat gaskets with water before attaching each valve.

3. Gently tighten the nuts with a 1 7/16 in. (36 mm) wrench, without crushing the flat gaskets (1/4 to 1/2 turn).
4. Close the 1 in. isolation valves for pressure testing and to keep out foreign objects.

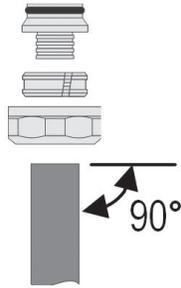
INSTALLING RAUPEX PIPES

RAUPEX pipes are connected to the manifold using REHAU R20 manifold compression fittings (sold separately).

- For 3/8, 1/2, 5/8 and 3/4 in. fittings, the R20 connector includes insert with O-ring, split brass ring and compression nut
- For 3/4 in. fittings, the R20 connector also includes an R20 x 1 in. bushing

It is easiest to connect each pipe to the manifold working left to right and starting with the upper (supply) header first.

Note: If using PVC bend guides, make sure guides are slid over pipe and adjusted to the proper height before attaching the R20 connector.

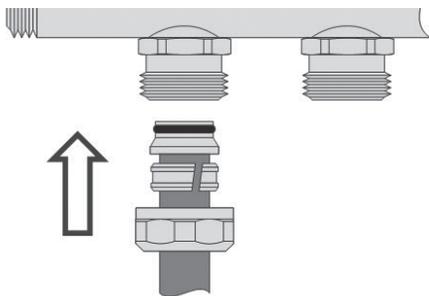


1. Cut pipe squarely using a pipe cutter.

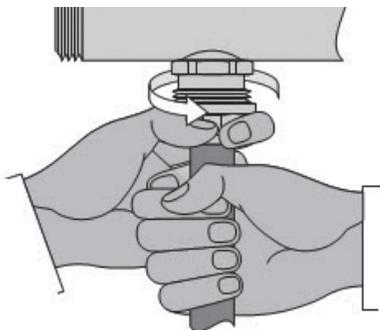


2. Slide the R20 compression nut and split ring over the pipe.
Then push in the insert fitting all the way to the top of the pipe.

NOTICE: Do not use any damaged R20 connectors or rubber O-rings. Damaged parts may cause leakage.

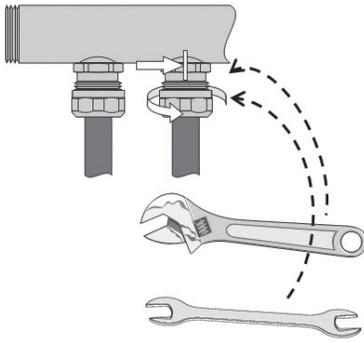


3. Push the conical end of the R20 connector all the way into the appropriate outlet of the manifold. For 3/4 in. fittings, first attach the R20 x 1 in. bushing to the manifold outlet with the hex end of the bushing closest to the header. This should be done hand tight.



4. Hand tighten the compression nut, making sure the pipe and fitting are pushed all the way in.

NOTICE: Do not use thread sealant tape or pipe dope on the manifold outlets. These materials may prevent a proper seal, causing leaks.



5. While holding the hex end of the manifold outlet with an adjustable wrench, turn the compression nut no more than a half turn beyond hand tight.
 - For 3/8, 1/2 and 5/8 in. connections, use a 1 1/4 in. (32 mm) wrench.
 - For the 3/4 in. connections, use a 1 1/2 in. (38 mm) wrench.

NOTICE: Do not over tighten. Use approximate force of 12 Nm or 9 lb ft. Over tightening will damage the O-ring or the manifold outlet, causing leaks.

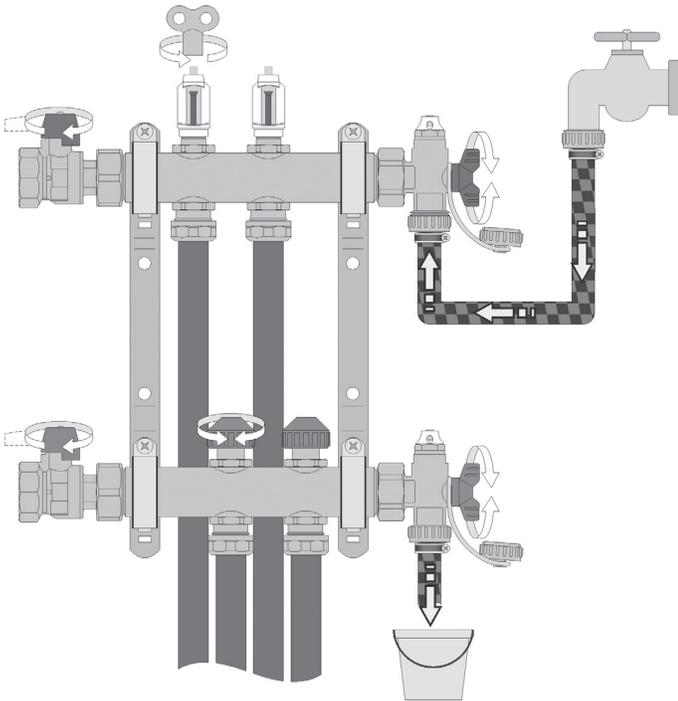
6. If you have unused circuit outlets on the manifold, refer to section on Isolating an Individual Circuit.

FLUSHING AND FILLING RADIANT CIRCUITS

Use the air vent drain valves to fill, purge and bleed the system.

- Threaded connection is for 3/4 in. garden hose threads.

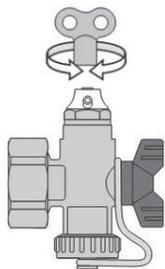
Note: System must be filled through the supply header and drained through the return header.



To fill and purge the system:

1. Close the 1 in. ball valves on the supply and return headers.
2. Make sure all flow meters are completely open by turning the vent key counter clockwise.
3. Close all balancing valves by turning the blue cap clockwise.
4. Open each drain valve by turning the handle 90° degrees to be aligned with the valve body.
5. Attach a garden hose to each valve.
6. Turn on supply of water and begin filling manifold.
7. Open the first circuit balancing valve and flow water until no more air comes out.
8. When this circuit is purged, close the valve and repeat this process for the remaining circuits.
9. When purging is complete, close the return drain valve first, then close the supply drain valve.
10. Remove hoses and install the protective caps.

The manual air vent on the top of each valve may be used to bleed trapped air from the system. These manual air vents may be replaced with the automatic air vent (sold separately) for automatic venting of trapped air.



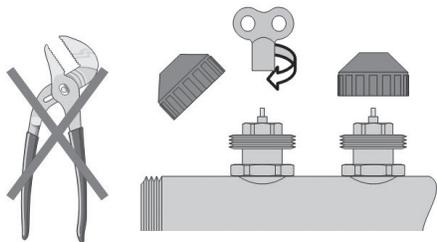
Operation of manual air vents:

1. To open the air vent, turn the square portion of the valve with the 1/4 in. vent key at least half turn.
2. Turn the white housing by hand to aim the air, mist or fluid that comes out.
3. When air is bled from the system, close the air vent by turning it clockwise.

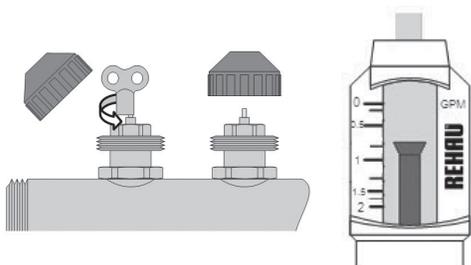
NOTICE: Make sure air vent is completely closed after system is bled. If vent is not closed, valve will leak.

BALANCING THE MANIFOLD

The circuit shutoff and balancing valves are located on the return header.



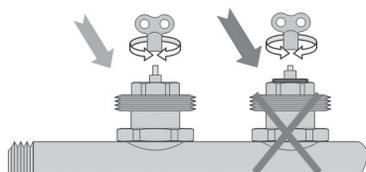
1. Remove blue protector cap of the circuit valve and close the valve by turning the vent key clockwise until it stops. This should shutoff the circuit 100%.



.75 gallons / minute

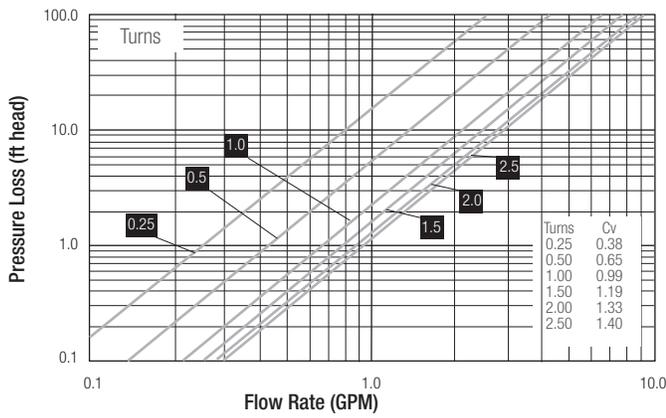
2. Set the circuit flow (GPM) by turning the control spindle counter-clockwise.
 - Start with the circuit valve with the lowest flow requirement and set to the required flow plus approximately 50%.
 - Read the actual value from the corresponding flow meter on the supply header.

Note: The flow meter should not be used for adjusting flow.



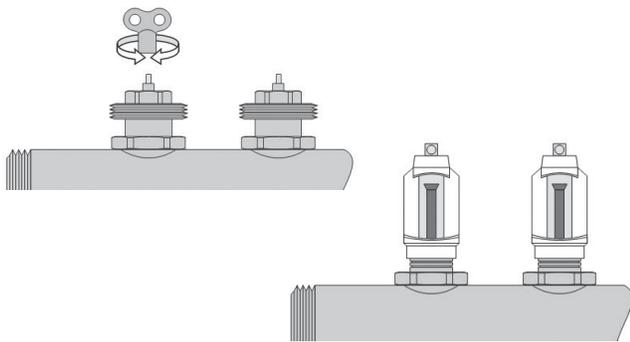
3. Proceed by adjusting the remaining circuit valves.

NOTICE: The valve is fully opened with 2 1/2 to 3 counterclockwise turns. Do not allow the fine thread of the control spindle to project above the hexagon nut or leakage will occur.



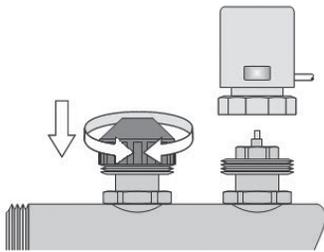
To use diagram in Fig. 4, use the flow rate (e.g., 1 GPM) of the circuit that needs to be balanced and plot a vertical line upward. Next, plot a horizontal line from the necessary pressure loss (e.g., 2 ft.head) needed to achieve the same head loss for all circuits. The intersection of the two plotted lines indicates the number of turns necessary to achieve the required pressure loss (e.g., 1 GPM, 2 ft.head loss equals approximately 1 turn).

Fig. 4: Number of turns to achieve pressure loss and flow rate



- After setting all circuit valves, check the flow values on the flow meter of all circuits. Readjust as necessary.
 - To reduce flow, turn the circuit valve clockwise.
 - To increase flow, turn the valve counter clockwise.
 - Turn the valve slowly to see the change in flow on the flow gauge.

Note: Do not allow the fine thread of the control spindle to project above the hexagon nut or leakage will occur.



- After balancing the manifold, thread the blue protective cap back on a half turn.
 - The cap prevents the valves from accidental adjustment and from getting dirty.
 - Threading the cap completely on will close the valve, but it will not change the initial balancing adjustment of the valve.

If you are using manifold actuators, mount these in place of the blue caps.

PRO-BALANCE® MNIFOLD
CIRCUIT CHART

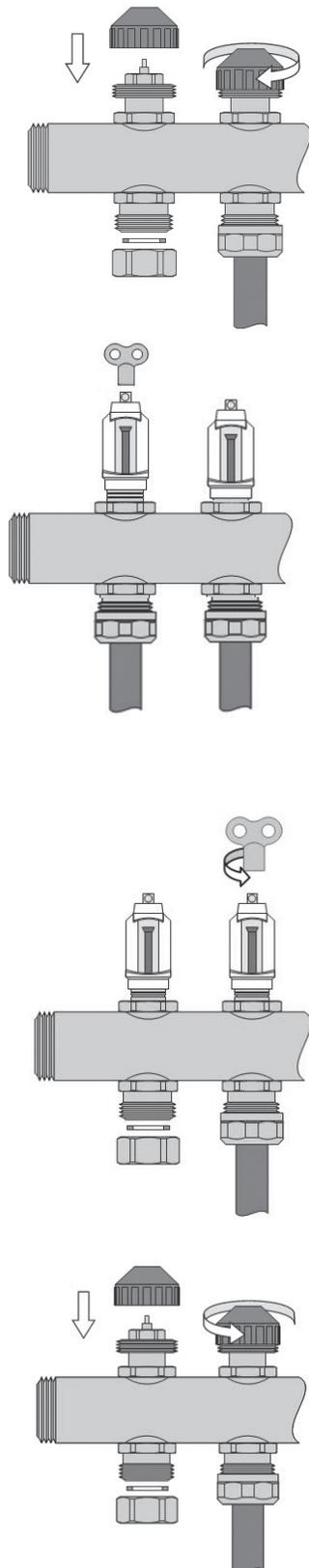
Circuit No.	Room Name	Pipe Size	Starting Pressure	Ending Pressure	Control Length	Average Area Sq. Ft.
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Installer: _____ Street Address: _____
 City/State: _____ Phone #: _____
 Circuit No.: _____ Other Address: _____
 Installation Date: _____ Submitter's Date: _____

- Fill in the PRO-BALANCE Manifold Circuit Chart and post it next to the manifold.

ISOLATING AN INDIVIDUAL CIRCUIT (If Required)

The PRO-BALANCE 1 in. manifold allows for complete isolation of individual circuits by using the shutoff valve integrated within the flow meter on the supply header and corresponding balancing valve on the return header.



To close a circuit:

1. On the return header, close the circuit balancing valve by turning the blue cap clockwise until it stops. If the circuit has a REHAU valve actuator installed, replace it with a blue cap.

Note: Do not use the vent key to close the circuit as this will change the balancing of the system.

2. On the corresponding flow meter, use the vent key to turn the shutoff valve clockwise until it stops.

NOTICE: The flow meter should not be used for adjusting flow. The flow meter should be completely open during filling and purging the circuits as well as during normal operation mode.

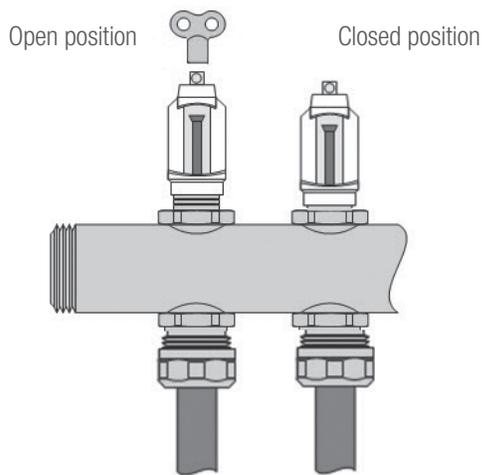
Note: For permanent shut-off, attach an R20 brass circuit outlet cap with gasket to the manifold outlet. Also, ensure balancing valve and flow meter shutoff valve are completely closed.

To open a closed circuit:

1. To reopen a circuit, turn the flow meter with the vent key counterclockwise until it stops and turn blue protection cap counterclockwise to release cap from the valve.

2. If you are using a manifold actuator, completely remove the blue cap, then reinstall manifold actuator. If you are not using a manifold actuator, thread the blue protective cap back on a half turn.

CHECKING POSITION OF FLOW METER SHUTOFF VALVE



To verify that the flow meter with integrated shutoff valve is fully open:

- Place the vent key completely on top of the flow meter and check that the top of the white housing is flush with the bottom of the vent key. If not, simply slide the white housing up so that it is flush with the bottom of the vent key.
- When the flow meter shutoff valve is fully open, the distance between the white scale and the hex is approximately 1/4 in. (6 mm). In addition the groove underneath the white scale is visible.

If the flow meter is fully closed, the white housing will sit approximately 1-2 mm (1/25-2/25 in.) above the top of the hex. When the flow meter is fully closed a slight resistance will be felt. Damage to the flow meter will occur if over tightened.

TESTING AND MAINTAINING THE MANIFOLD

Once installation of manifold and pipes is complete, the system should be pressure tested with air or water to ensure there are no leaks.

The manifold should be inspected periodically during system operation to ensure none of the connections have loosened or are leaking.

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