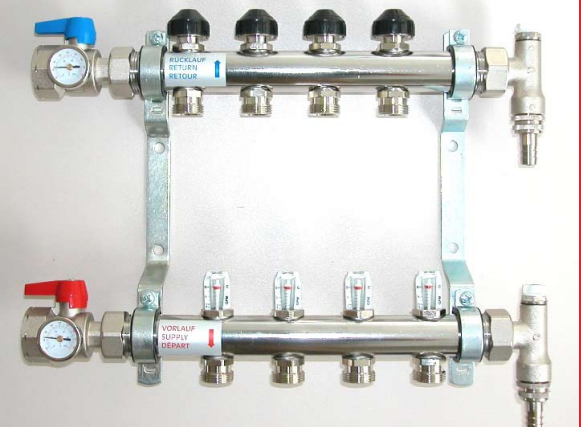


Installation Guide

Manifold Systems

A better
approach to
radiant Heating
systems



Radiant Heating and Snowmelting products

ComfortPro Systems
AquaHeat

System Design and Installation

The Mains

PEX pipe mains are recommended to reduce labor and architectural impact. For a slab-on-grade installation, the mains can be buried below or within the slab. For below slab installation refer to insulated supply and returns like ComfortPro Systems Microflex product range. For a wet or dry on plywood application, the mains can be installed within the joist cavity. Always allow for the expansion and contraction of the mains, as the temperature fluctuates. It is recommended that the pipe be allowed free movement and is not fastened directly to the floor joists.

Requirements of a hydronic control system

The intent of a hydronic heating control system is to achieve heating comfort, system protection, energy saving and ease of use.

Heating comfort is achieved by:

- keeping proper system temperatures
- directing the right amount of heat when and where you want it

System protection is achieved by:

- protecting the primary heat source (e.g. boiler) from corrosion and thermal shock
- reducing equipment cycling

Energy saving is achieved by:

- running the system at the lowest water temperature possible
- turning off the system when no heat is demanded
- minimizing boiler short cycling.

Ease of use is achieved by:

- running automatic functions in lieu of manual settings
- providing easy and consistent wiring and installation procedures

AquaHeat Installation Guide Philosophy

A hydronic system can get quiet complicated and with the rapid introduction higher integrated solutions keeping up is challenging more than ever. To keep the basic installation order we have build this guide to reflect the typical steps in the implementation of a project. Please note that references to other guides out of the series are reflecting chapters:

Chapter 1 - Hydronic floor installation

Chapter 2 - Manifold installations

Chapter 3 - Boiler room installations

Chapter 4 - Control system installation

Chapter 5 - General Heating System Considerations, System start-up, warranty requirements and maintenance

Chapter 2 - AquaHeat Manifold Systems

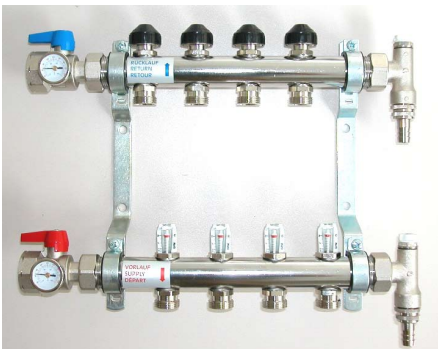
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AquaHeat series manifolds consist of a line of plastic and stainless steel manifolds for every budget. In the following chapter we will cover the technical background and the installation instructions for each manifold type. In addition, the ProMix accessory installation, and at the end of the chapter the pressure test is explained.

AquaHeat Manifolds Selection



ProLock Series (P/N 76040) - Modular plastic manifold with supply and return modules with flow indicator for closed loop radiant heating applications. Convenient assembly of the manifold is via a 1/8 turn locking mechanism on each module.



ProMix series (P/N 2013xx, 2015xx) - Stainless Steel flow balancing manifolds with 2 to 6 ports. This manifold series comes either as 1" diameter for residential and light commercial applications or 1 1/4" diameter for heavy duty commercial applications.



ProMix Isotherm Manifold Control (P/N 201344) Module with pump connectors (here shown with installed pump).



ProMix Manifold By-Pass Set (P/N 201345)

General Guidelines

- AquaHeat manifolds can be mounted in any position necessary. However, the automatic air vent provided must be mounted vertically, facing up, to be operative.
- Manifolds use a unique three-part brass PEX connecting system. Be certain to install the manifold nut, retaining ring, and compression ring over the tubing end before making up to the barbed connection. Be certain to face the beveled side of the retaining ring towards the crimp ring. Failure to seat properly will cause leakages in operation.

ProLock Manifold (P/N 76040)



Fig 1 - ProLock Manifold Kit and Modules

Starter kit includes (2) mounting brackets, (2) 1-1/4" threaded modules, (2) air vents, (2) end modules, and (2) thermometers.

Features

- Return modules include balancing valve with flow meter
- Supply modules includes isolation valve
- 1/8 turn connection of additional manifold blocks can accommodate additional loops
- Buildable from 1 to 20 circuits.

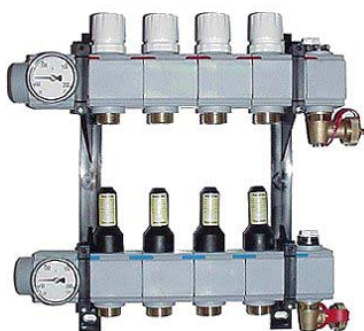


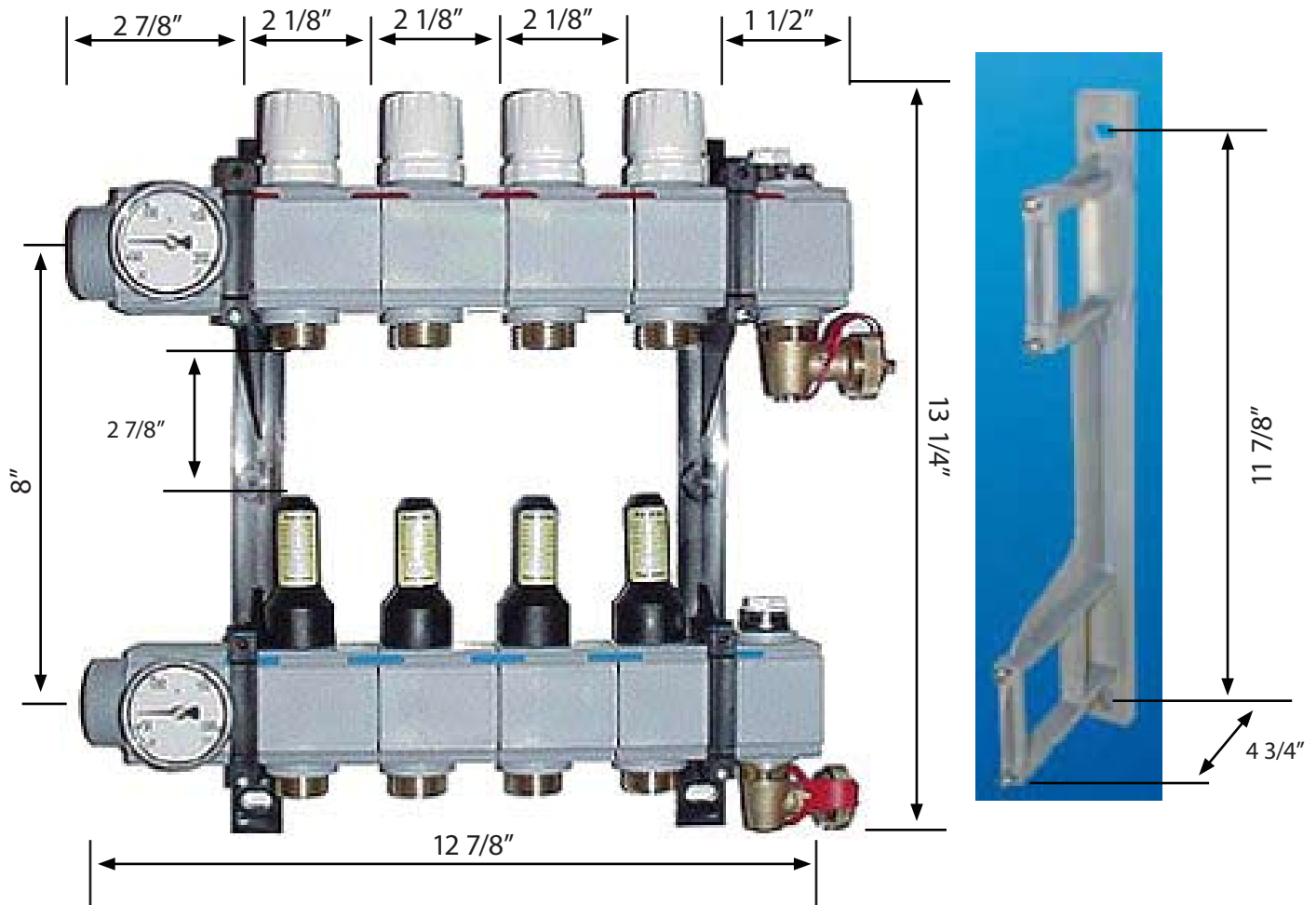
Fig 2 - ProLock Manifold assembled

Technical Data	
Maximum water temperature	170°F
Maximum operating pressure	72 psi
Maximum flow per loop	1.05 gpm
Flow meter range	0-1.05 gpm
Manifold material	Plastic
Allowable Fluid	Water or a mixture of water and propylene/glycol
Acceptable tubing	SDR 9
Manifold fittings	Sold Separately Available from 3/8 to 3/4 inch

Assembling the ProLock modular manifold (P/N 76040)

Note: Prior to assembly, inspect and clean any debris from O-Rings and insertion end of each module.

1. Slide one locking key into each module (Red is supply and Blue is return)
2. Align tabs to adjoining slots of the other module and push together until they are firmly seated.
3. Turn the module 1/8 of a turn until they click into place and are flush.
4. Repeat for remaining modules.
5. When fully assembled, slide locking keys between modules to prevent accidental opening.
6. Insert thermometers into threaded manifold supply and return modules.
7. Manifold assembly should be mounted a minimum of 18" above floor.



6

Fig 3 - ProLock Manifold Dimensions

Connecting PEX tubing

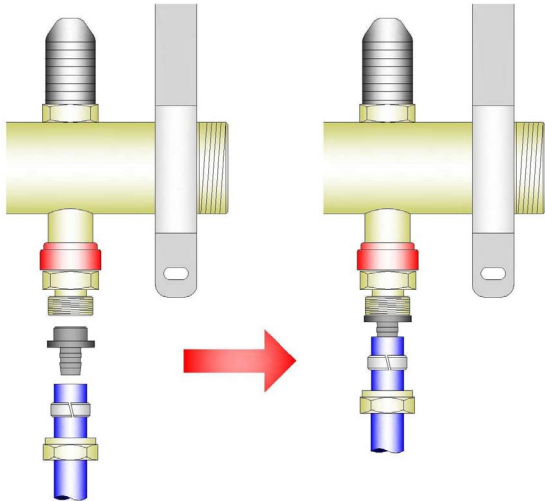


Fig 4 - PEX to Manifold Connection

The ProLock PEX fitting (Part # 76020 series) consists of three pieces – insert fitting, split ring and nut. Prior to assembly of the fitting, the tubing must have a clean and perpendicular cut.

1. Slide nut over PEX tubing followed by split ring.
2. Push insert fitting completely into manifold port.
3. Tighten the nut onto the manifold.

Adjusting the flow rate for Manifold loops

If the manual shut-off valve adjustment cap instead of an actuator is used in the application, please follow the balancing steps below

System Balancing

1. With manifold circulator on, fully open supply shut-off knobs.
2. Remove black protective cap off the return manifold to reveal the flow meter. The red piston indicator will move up and down in response to the flow.
3. Rotate flow indicator clockwise or counter-clockwise to achieve the appropriate flow for the loop. Refer to table flow rate adjustment below.

Correlation of flow rate to setting as noted on the black protective cap is shown in table 2.

Setting	Flow Rate (GPM)
1	0.15
2	0.31
3	0.47
4	0.68
5	1.05

Table 2 - Flow Rate Adjustment

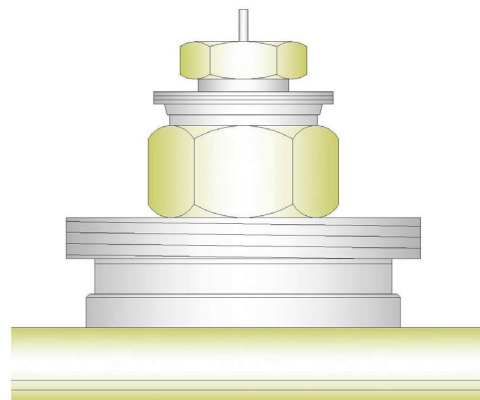
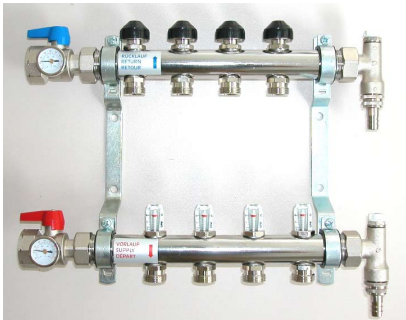


Fig 5 - ProLock Manifold Balancing

ProMix Stainless Steel Flow Balancing Manifold (P/N 2013xx, 2015xx)

ProMix stainless steel manifolds come in two diameters to cover residential and commercial building applications.



ProMix Manifold	Diameter	Max. Flow Rate	Application
2013xx	1"	12 GPM	Residential and light commercial
2015xx	1 1/4"	14 GPM	Commercial and snow melt

Table 3 - ProMix Applications

Fig 6: ProMix 1" SS Flow Balancing manifold

ProMix Manifold Dimensions

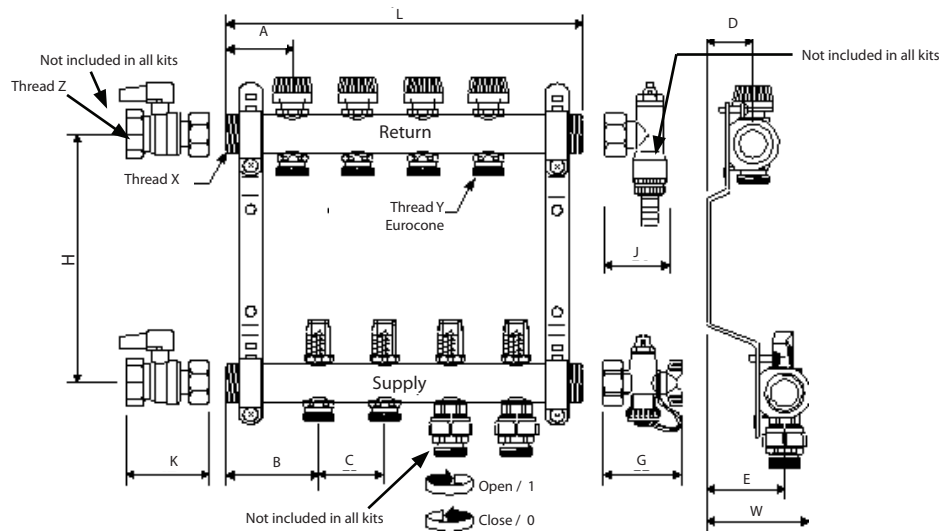


Fig 7: ProMix 1" and 1 1/4" manifold dimensions

Manifold Model\ Dimensions	Manifold										Threads		
	H	A	B	C	D	E	W	G	J	K	X	Y	Z
ProMix 2013 Stainless	~8 1/4"	2 3/16"	~3 1/8"	2 3/16"	~1 1/2"	~2 1/2"	~3 3/8"	2 1/2"	~1 3/8"	2 1/2"	1"	3/4"	1"
ProMix 2015 Stainless	~8 1/4"	2 3/16"	3 1/8"	2 3/16"	1 7/8"	2 3/4"	3 3/4"	N/A	1 11/16"	3 7/8"	1 1/4"	3/4"	1 1/4"

Manifold zones	2	3	4	5	6	7	8	9	10	11	12	13	14
Length [in]	7 1/4"	9 1/4"	11 1/4"	13 1/4"	15 1/8"	17 1/8"	19 1/8"	21 1/16"	23"	25"	27"	29"	31"

Table 4 - ProMix Manifold Dimensions

Technical Data	
Max. operating temperature	194°F
Min. operating temperature	4°F
Max. operating pressure	87psi
Fitting	Heat-forged brass Ms58 - Ni plated
#2013 Flow Rate Per Loop	0 - 2 GPM
#2015 Flow Rate Per Loop	0 - 4 GPM
Manifold tube	Stainless steel 1.4301
Flowmeter	Glass fiber reinforced and temperature -resistant
Spring	Stainless steel
O-Ring Seals	CPDM elastomeres
Flat Seals	AFM34 (asbestos - free)
Valve Seats	PTFE

Table 5 - Technical Data Promix Manifolds

Installation

The highly compact design, with flat seals throughout, ensures safe and easy mounting even where space is extremely limited. The unit can even be installed in wall thicknesses of 3 1/2" or in a manifold box without any problem.

The ProMix 2013/2015 heating manifold can be connected either from the left or the right. The flat-seal male thread ensures easy mounting of various accessories such as ball valves, filling, purging and venting end pieces along with other modular accessories (e.g. thermostatic control sets, manifold control stations, BTU meter mounting sets, etc.).

The heat insulation cladding made of EPP available as an optional extra, serves both as a temperature - resistant heat protection system as well as secure transport packaging. If the heating manifold is used as a cooling ceiling manifold, the cladding partially prevents condensation from forming on the manifold assembly.

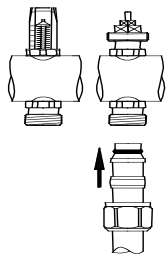
Tube Installation



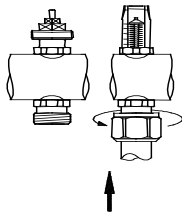
Cut off the plastic / copper tube at a right angle and de-burr. Ensure your cut is square to tubing . Push the sleeve nut over the tube.



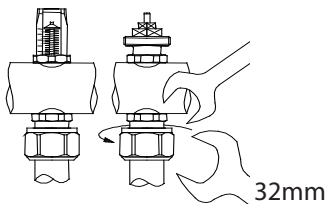
Push the clamping ring over the pipe and insert the brass PEX-to-manifold connector.



Insert the pre-assembled pipe into the screw connection.

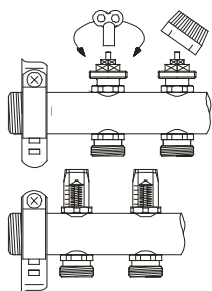


Screw on the clamping ring nut by hand. Push the plastic pipe up to the stop.



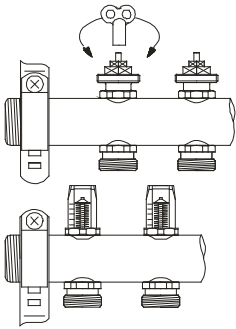
Counter the outlet screw connection using an open-ended wrench and tighten the clamping ring nut using an open-ended 32mm wrench. Force approx. 18 lbs ft (Force approx. 25-30 Nm)

Setting the flow control

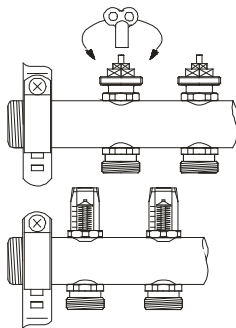


Remove the plastic cap and close the valve by turning to the right using a bleed key (close = smallest volume).

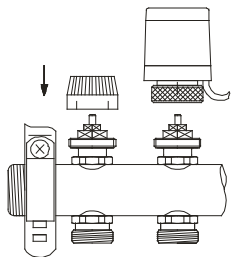
Setting of the flow control



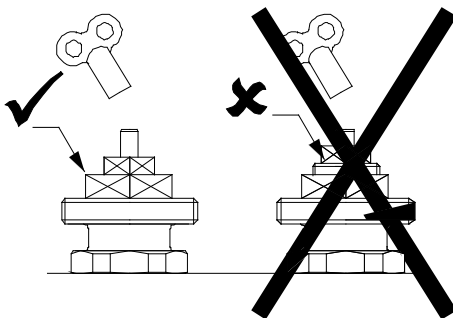
Adjust the required flow volume by turning the regulation spindle to the left.



Adjust the flow volume by turning the spindle. The actual flow volume can be viewed on the supply-side flowmeter.



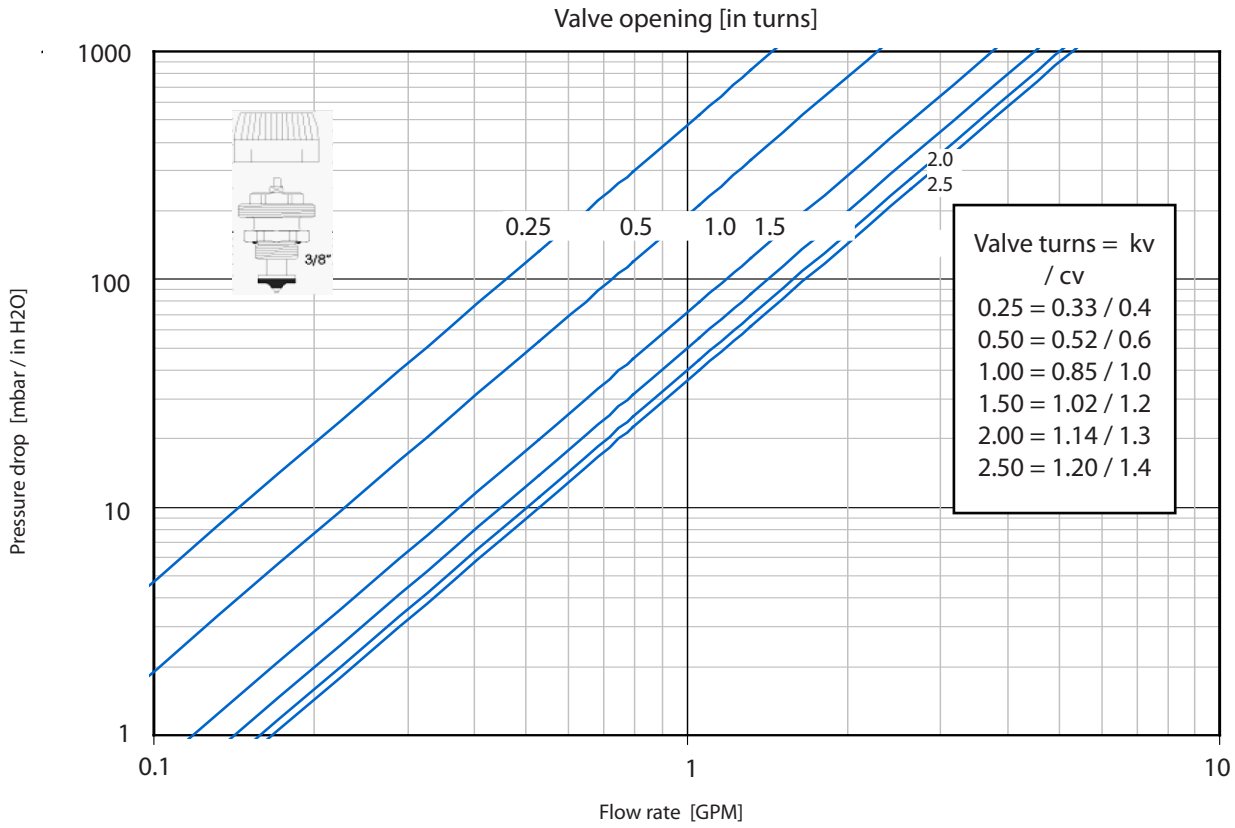
After adjusting the flow volume put the dust cap or the actuator back over the valve spindle to avoid dust contamination or damage to the valve.



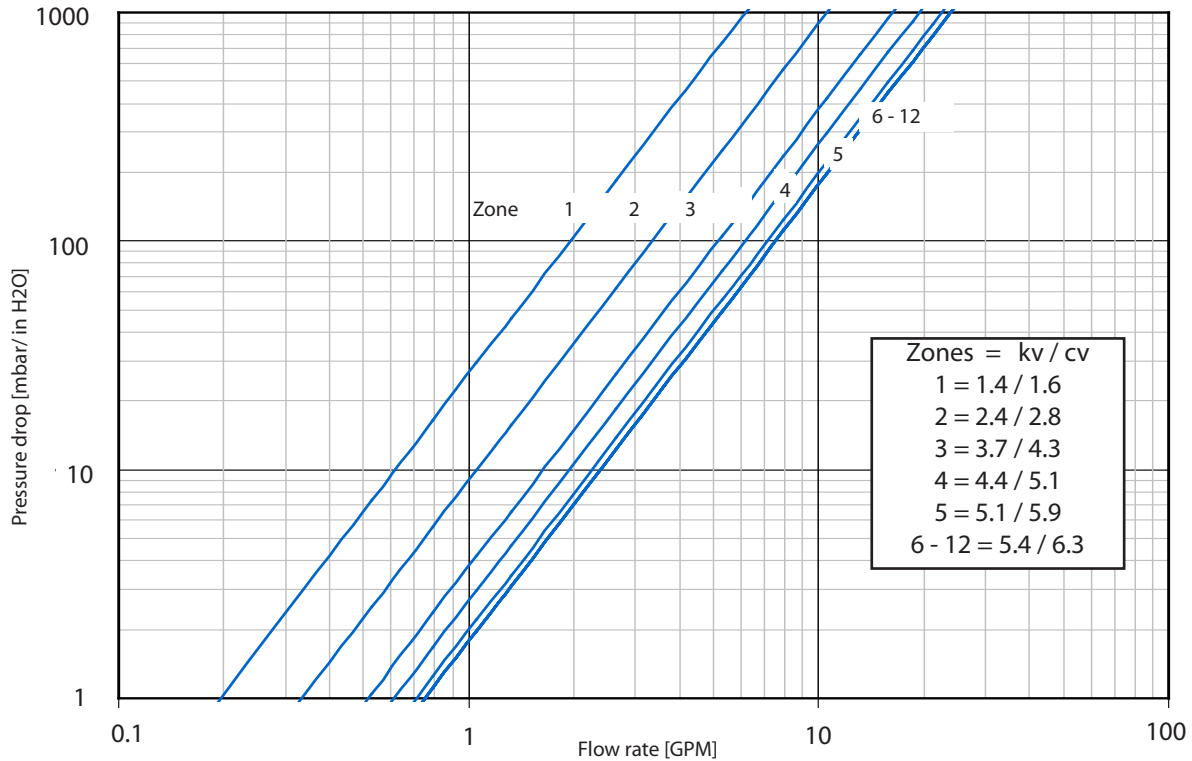
The fine thread of the adjusting spindle must not be seen above the edge of the size 19 hex! Based on closed status, the valve is open (full flow) after 2 1/2 - 3 turns to the left.

Note: If proportional drives are used, the regulating spindle must be opened at least 0.5 to 1 revolution irrespective of the adjusted flow volume. The room temperature is then regulated via the actuator.

Adjustment of regulation valves (1" Stainless Steel Manifold)



Total pressure drop (ProMix 2013/2015 Stainless Steel Manifold w/ Flowmeter)



ProMix Isotherm manifold Control Module (P/N 201344)

AquaHeat ProMix Isotherm manifold accessories are union pump modules with a by-pass set to mix incoming and return water from the manifold loops and the boiler loop. The Isotherm module connects seamlessly with the 1" ProMix manifold.

Application

ProMix Isotherm products are used in floor heating environments where the floor needs to be protected from overheating like in wood flooring projects or susceptible stone floors. The ProMix Isotherm module protects the under floor circuits from getting high temperature water straight out of the boiler loop without mixing the cooler return water into the manifold and thus limits the flow of high temperature water to the manifold.

Operation

High temperature water flows from the pump to the thermostatic injection valve. The injection valve regulates the flow volume per preset opening with the return flow from the by-pass. The injected high temperature water is mixed with the return low temperature water from the return side of the manifold by pumping the mixed water into the supply side of the manifold. Excess water out of the pump volume flows back to the boiler.

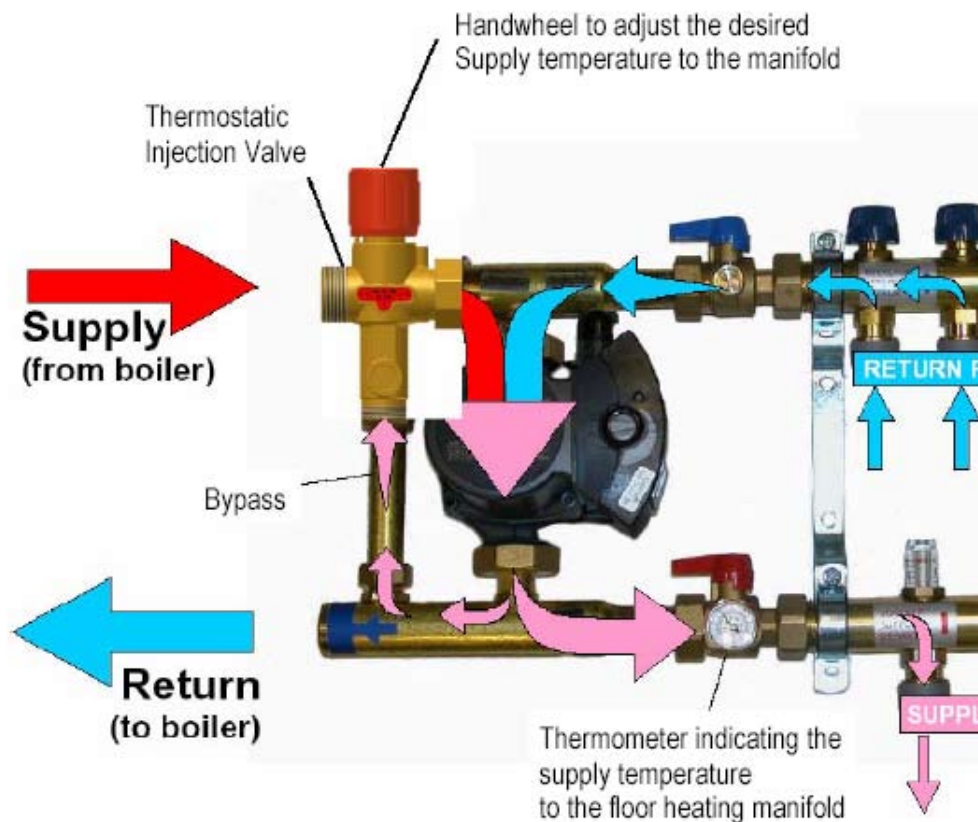


Fig 8 - ProMix Isotherm general Flow Directions

Installation Instructions

1. Connect the union pump used in the application (third party) with flow direction away from the injection valve.
2. Make sure to connect manifold return side to return flow side of the Isotherm module (pipe directly attached to Injection valve).
3. Adjust width between supply and return pipe for ProMix 1" manifold.
4. Preset temperature (see below)

Technical Data	
Max operating temperature	194°F (90°C)
Max operating pressure	145 psi (10bar)
Temp setting range	113°F - 140°F (45°C - 60°C)
Preset Injection valve	131°F (55°C)
Seals	EPDM
Full heat capacity	51000 BTU/h (15KW)
Union Pump	5 1/8" (130mm)
Temp sensor	Electrothermic switch

The boiler supply temperature must be set to at least 158°F (70°C) to obtain the full heat capacity of 51000 BTU/h (15kW).

Temperature adjustment



Make the pilot pin flush with hand wheel face to obtain the basic factory setting of approximately 131°F.



Decrease the temperature by turning clockwise. Each click is an approximate 2°F temperature decrease. The pilot pin will raise above the hand wheel face.

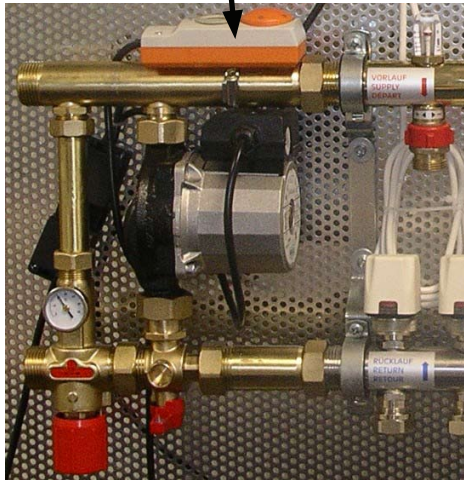


Increase the temperature by turning counter-clockwise. Each click represents an approximate 2°F temperature increase. The pilot pin will drop below the hand wheel face.

Fig 9 - ProMix Isotherm Manual Temperature Adjustment

Electrical Operation

Adjustment thermostat for fine regulation of max. manifold temperature



If the manifold control system requires more heat it turns on the boiler loop circulator. Should too much heat flow into the manifold supply the Isotherm adjustment thermostat switches on the by-pass mixing pump and regulates the supply temperature of the manifold by mixing manifold supply with manifold return water.

Fig 10 - ProMix Isotherm Installation Example with pump and electrical control

Electrical Wiring

The ProMix Isotherm module comes with a cabling tree and male/female connector as outlined below. The thermostat is mounted on the manifold supply side to measure the supply temperature and switch the module's mixing pump on and off.

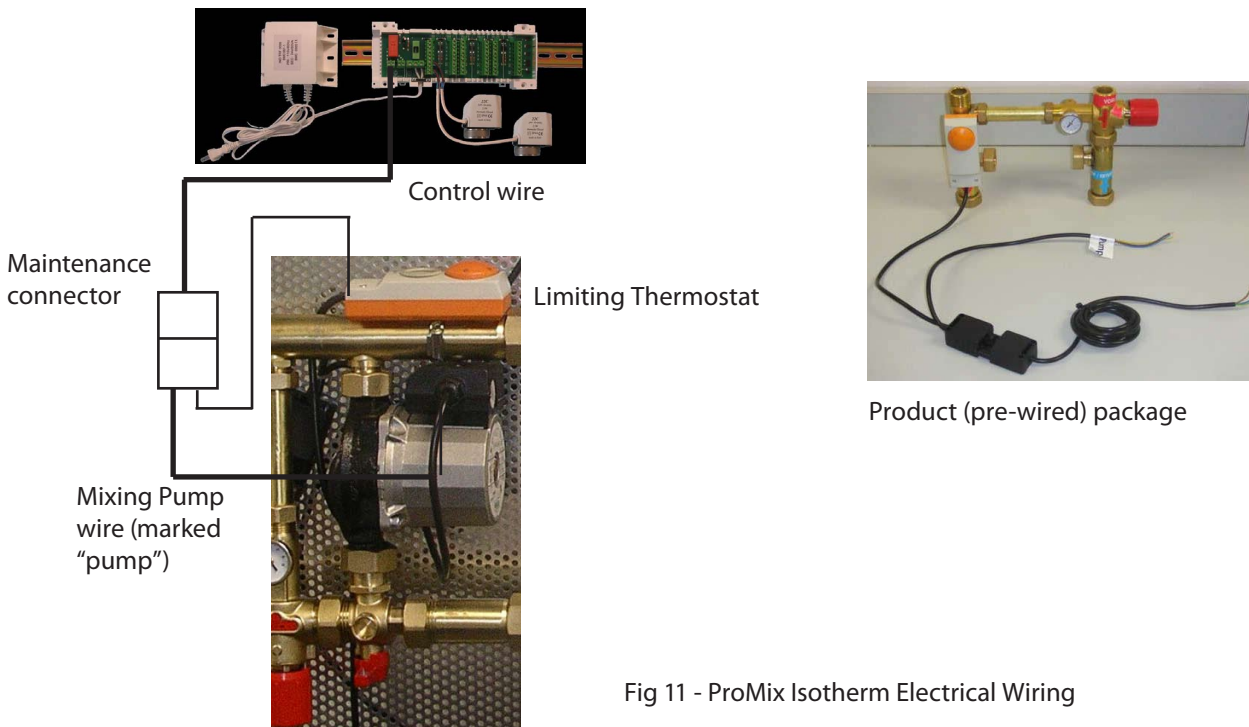


Fig 11 - ProMix Isotherm Electrical Wiring

ProMix differential manifold by-pass set (P/N 201345)



ProMix differential manifold by-pass set is an essential part to regulate the flow pressure through the manifold. The by-pass seamlessly fits onto ProMix 1" manifolds and can be adapted for 1 1/4" ProMix manifolds.

Application

ComfortPro Systems recommends using a differential pressure by-pass set wherever no by-pass path is inserted between the primary injection or boiler loop and the manifold. Due to the strongly varying flow characteristics through a manifold it is necessary to divert the pressure away from closed manifold loop valves.

Adjustment

The ProMix differential by-pass set can be regulated through the differential by-pass valve located in the by-pass loop.

Installation

The by-pass set is readily assembled and is screwed on either directly right or left of the ProMix 1" manifold.

AquaHeat PEX Testing Procedure

General

Every radiant or snow melting system should be tested while all piping is still fully exposed to insure that there are no leaks in the tubing system. This is a common sense step in any application of piping. Further, it is a Warranty Requirement for all AquaHeat PEX installations. If this step is omitted, there is no warranty from the manufacturer of the tubing.

Timing

The pressure test must be performed after installation of all tubing circuit installations are completed. The manifold and tubing system should be tested as an assembly. There is no practical way to pressure test each individual circuit. The shutoff valves on the manifold will not shut off against an 80 psig differential. If walls or a permanent installation point for the manifold is not available, a temporary support should be fabricated. The tubing ends and the manifold location will not change once installed, so the manifold should be fastened to the temporary support at the correct elevation for the permanent location.

Air or Water

The tubing system can be tested with either air pressure or hydrostatically with water. Depending on the climatic conditions, the correct medium should be selected. Once water is put in a radiant system it is almost impossible to drain it 100%. Unless it is certain that no freezing temperatures will be experienced before system fill and activation, air pressure is the safest selection. The automatic air vent that is supplied with each manifold should be removed and a plug put in its place during the testing procedure.

Test Procedures

The manifold assembly must be completely isolated from the system piping during testing. In order to test the manifold and in-floor pex tubing, the manifold must be isolated from the supply and return feeds, by using a ball valve in front of both the supply and return manifold modules. The 1" return manifold end should be fitted with a nipple and drain valve. The supply manifold should be fitted with a nipple and charging valve to introduce and pressurize either the air or water. A pressure gauge should be fitted to either side of the manifold to monitor charge and retain pressure in the tubing system. The pressure gauge should be at least 4" diameter so movement of the indicating needle can be easily read.

Note: ProMix manifolds come with a ball valve kit, ProLock manifolds do not.

Once pressure tight and ready, air or water should be introduced into the system. If air is used, the system should simply be charged to a pressure of at least 80 psig. If water is used, the system should be filled and bled through the return manifold drain valve. Each loop must be bled individually to make certain all air has been removed. Any residual air left in the tubing will be absorbed into the test water and result in a false indication of a leak.

The bonnets on the charging and drain valve should be tightened down securely for the lockdown period of the test. Minute leaks at these valves can also falsely indicate tubing leakage.

Verification and Time

Once the system is fully charged at 80 psig, the contractor should demonstrate the pressure readings to the project manager, engineer on site, or other authority having jurisdiction. The time of the inspection should be noted. The pressure charge must remain on the system for a minimum of 24 hours. The installer and the verifying agent should inspect the gauge and verify the pressure reading on the gauge. A small amount of pressure reduction is normal, just from the gauge movement. A maximum of 5 psig drop over a 24 hour period is acceptable. Any more pressure drop below the original charge pressure must be thoroughly investigated and all leakage eliminated. Once the leaks are corrected, the entire testing procedure must be repeated to assure a totally tight system before covering.

For the protection of the Owner and the Installers a report should be recorded for each manifold test. The manufacturer will require these records in the event of a warranty claim.

AquaHeat



ComfortPro Systems LLC
 Phone: 1-800-968-8905
 www.comfortprosystems.com

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