

Installation Manual

Viega Combiflex

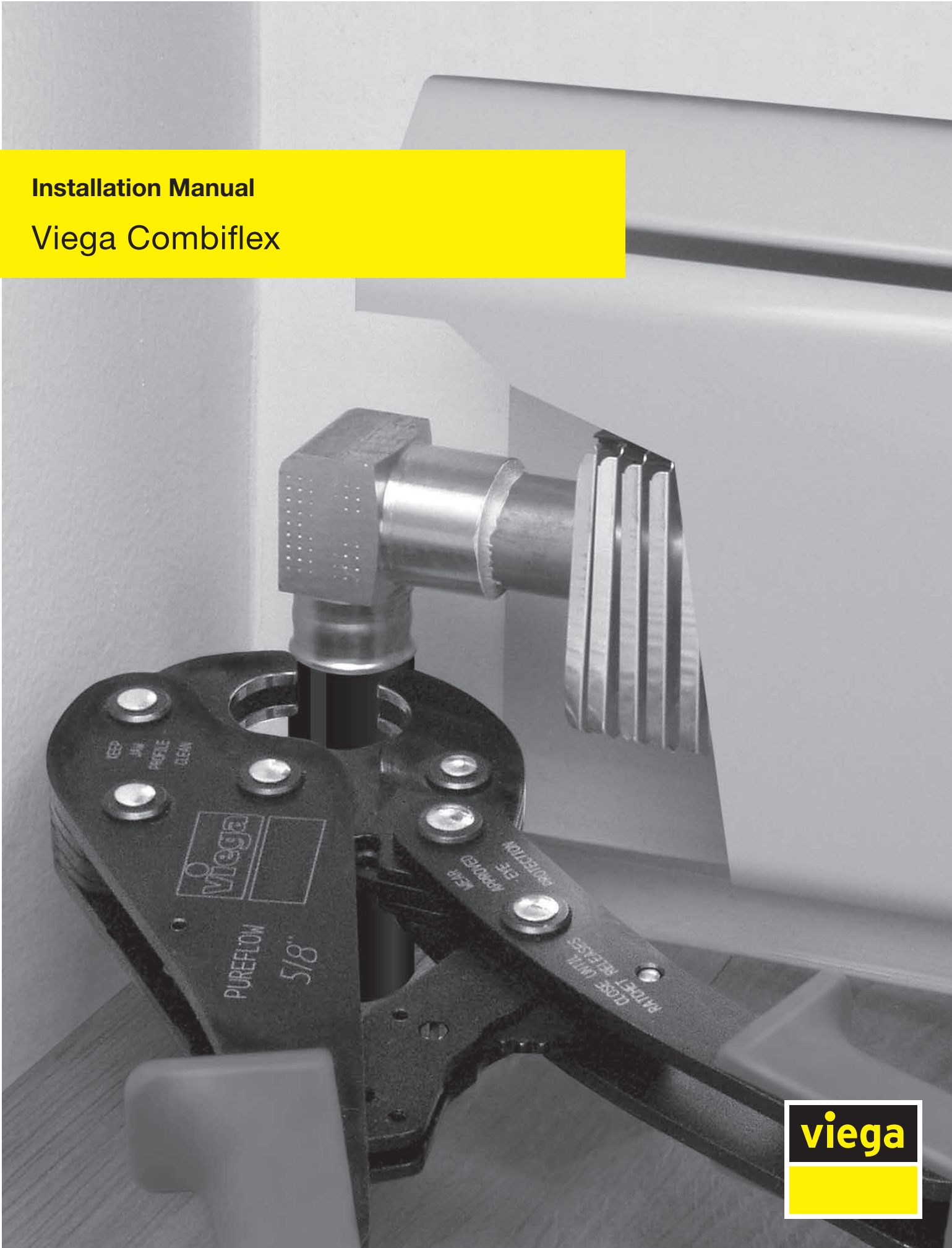


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1 About this Document

1.1 Disclaimers



This document is subject to updates. For the most current Viega technical literature please visit www.viega.us.



Viega products are designed to be installed by licensed and trained plumbing and mechanical professionals who are familiar with Viega products and their installation. **Installation by non-professionals may void Viega LLC's warranty.**

1.2 Symbols Used

The following symbols may be used within this document:



DANGER!

This symbol warns of possible life-threatening injury.



WARNING!

This symbol warns of possible serious injury.



CAUTION!

This symbol warns of possible injury.



NOTICE!

This symbol warns of possible damage to property.



Notes give additional helpful tips.

2 Product Description

2.1 Combiflex System Concept

Viega's Combiflex system offers greater efficiency and comfort over traditional high temperature systems through the use of:

- Innovations in piping technology
- Integration of manifolds
- Use of controls

2.1.1 Piping

The combiflex system uses Viega Barrier PEX tubing in lieu of copper tubing for hydronic piping. The stability, strength, and flexibility of Viega's PEX tubing allows for fewer joints behind walls, floors, and ceilings, which creates a quicker, more secure installation. Viega Barrier PEX tubing utilize Viega's press technology so there are no fittings to sweat, no flame required, and every press connection is leak free.

2.1.2 Manifolds

One easy and common piping arrangement used in efficient radiant systems is a manifold system. Using Viega Barrier PEX tubing and a manifold system eliminates additional fittings, valves, and pumps. By incorporating manifolds in a high temperature hydronic system, balancing and zoning are simplified. Remote manifolds may be utilized to decrease the amount of pipe needed.

2.1.3 Controls

Another means to increase efficiency and comfort on a traditional high temperature hydronic system is through constant circulation and outdoor reset control. Outdoor reset is the term used to describe a modulating water temperature system. As the outdoor temperature increases the water temperature decreases and vice versa. By using constant circulation, expansion and contraction noises are eliminated.

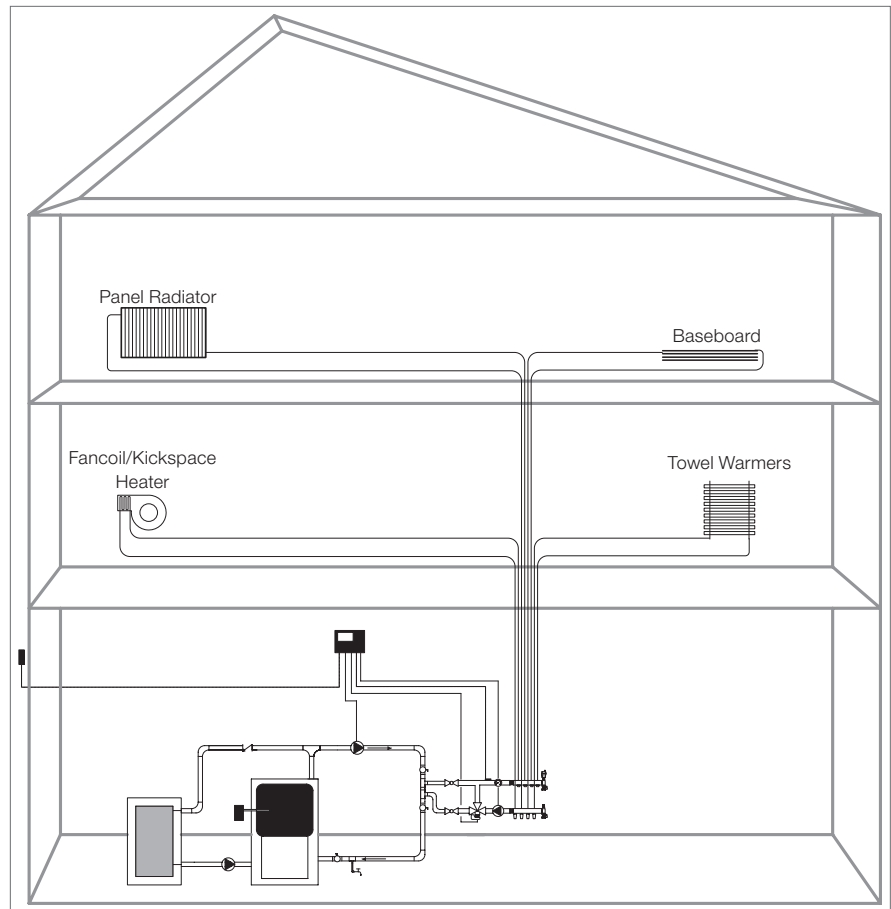
2.2 Application Benefits

2.2.1 Applications

- Baseboard
- Radiators
- Kickspace heaters
- Fan coil units
- Towel warmers

2.2.2 Advantages

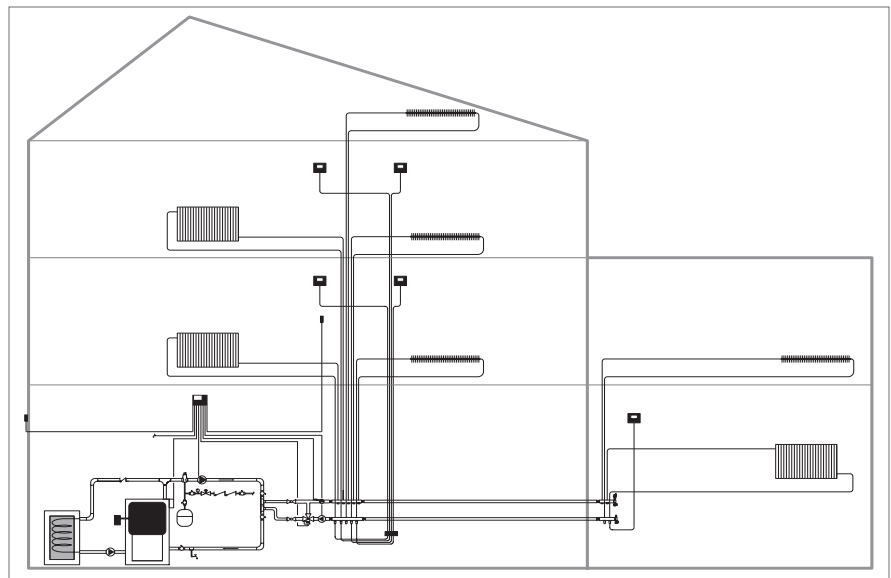
- Reduced installation time
- Fewer joints and potential leaks hidden in walls, floors, and ceilings
- Press connections assure secure, leak-proof connections
- Zoning advantages
- Minimizes contraction and expansion noise
- 30 year warranty on Viega tubing
- Eliminates zone pumps
- Same temperature for every heat emitter



3 Combiflex System Design

3.1 Piping and Controls

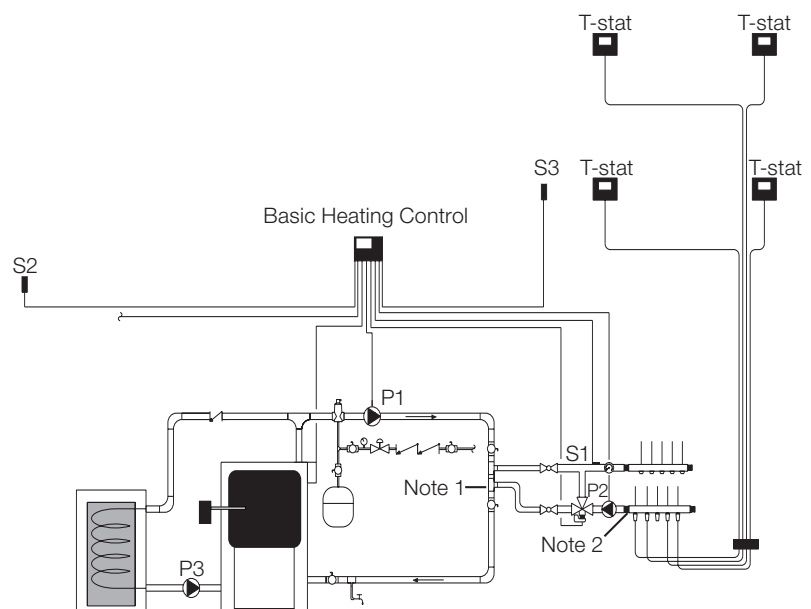
The combiflex system is used in traditional hydronic heating installations. The use of flexible Viega Barrier PEX tubing in lieu of copper or steel offers labor saving and security advantages for both the consumer and the hydronic heating contractor.



S1 = Supply Sensor
 S2 = Outdoor Sensor
 S3 = Indoor Sensor
 P1 = Primary Loop
 P2 = System Pump
 P3 = DHW Pump
 T-stat = Room Thermostats

Note 1: Maximum distance between primary loop tees less than 4 x O.D. of primary loop diameter.

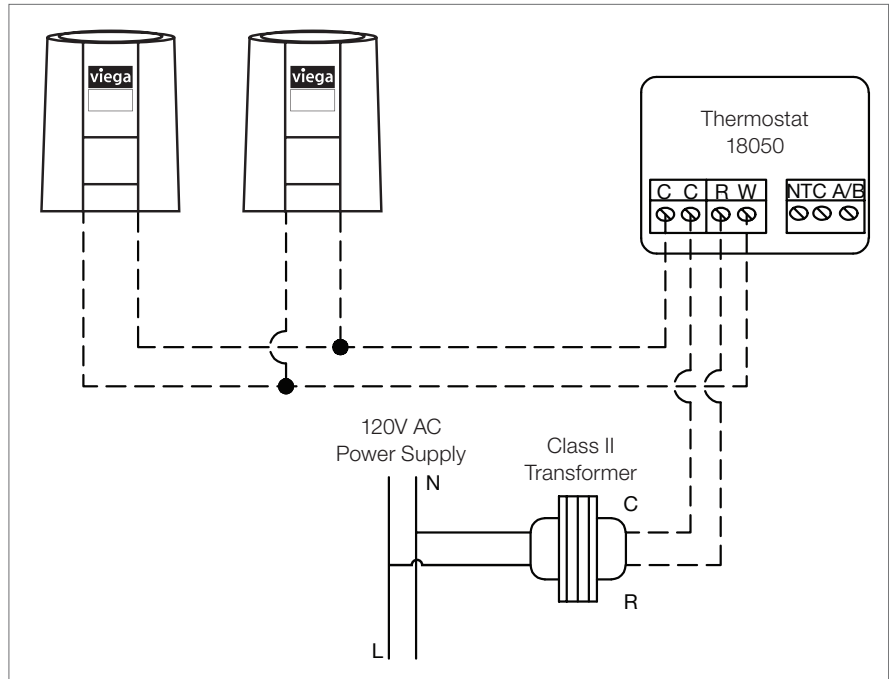
Note 2: Leave one circuit constantly operating solely off outdoor reset.



3.2 Wiring Schematics

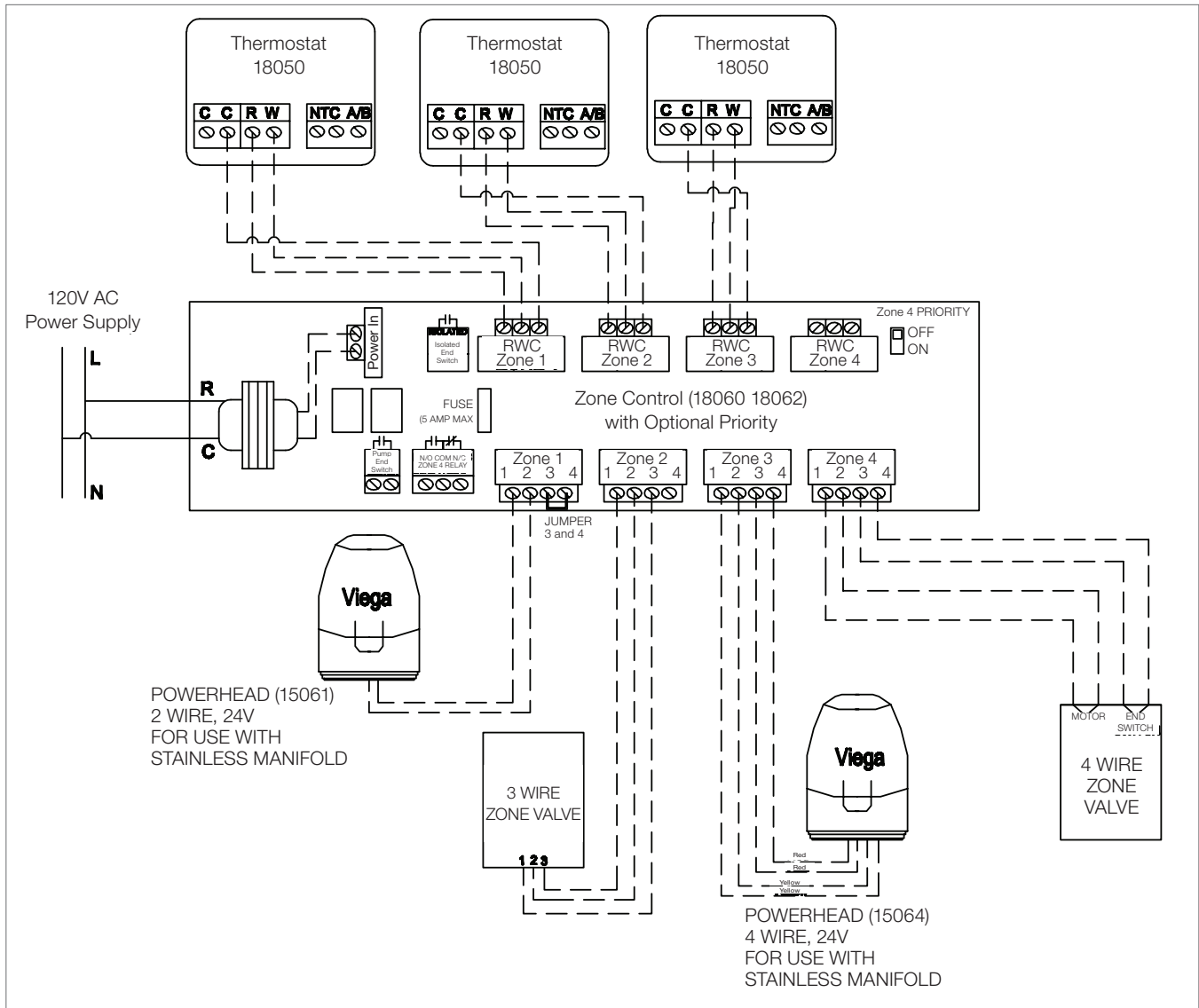
A manifold system allows any one or more of the circuits to be adapted for control by a thermostat. By adding powerheads to a manifold it will allow for individual control over that circuit/circuits. The following are some typical zone wiring schematics.

3.2.1 Single Zone Application

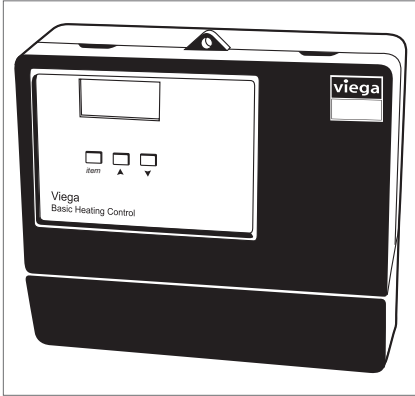


Installation by a licensed electrician is recommended. Installation and use of this equipment should be in accordance with provisions of the U.S. National Electric Code, applicable local code, and pertinent industry standards.

3.2.2 Multi-Zone Application



3.3 Basic Heating Control

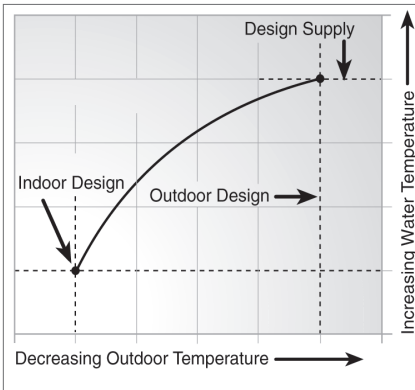


The ViEGA basic heating control is designed to control the supply water temperature within a hydronic system in order to provide outdoor reset. The basic heating control uses a floating action actuator mounted on a diverting valve to regulate the supply water temperature.

Additional Functions:

- User comfort adjustment to increase or decrease building space temperature.
- Advanced settings for fine tuning building requirements.
- Optional indoor sensor for room air temperature control.
- Test sequence to ensure proper component operation.
- 120V AC power supply.
- Powered system pump output.
- CSA C US certified (approved to applicable UL standards).

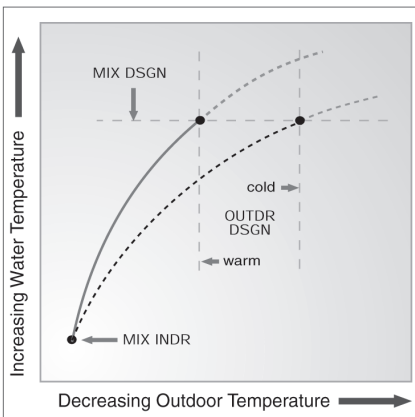
3.3.1 Outdoor Reset



The basic heating control calculates a mixing supply water temperature based on outdoor air temperature. The control uses an outdoor sensor and a water supply sensor for the calculation. It utilizes a floating action actuator to control the mixing supply temperature. In the combiflex system, the actuator is mounted on the three-way diverting valve of the mixing station.

3.4 Programming the Basic Heating Control for the Combiflex System

3.4.1 Adjusting the Heating Curve



The basic heating control adjusts the mixed supply water temperature based on outdoor air temperature. The relation between the outdoor air temperature and the water supply temperature is characterized by the heat curve. Since different types of heat emitters require different adjustments of the water supply temperature, the heat curve has to be adjusted to the heat emitter used.

	Terminal Unit			
	Baseboard	Radiator	Towel Warmer	Fancoil
MIX DSGN	180° F	160° F	180° F	180° F
MIX MAX	190° F	180° F	200° F	200° F

Table 1: Terminal Unit

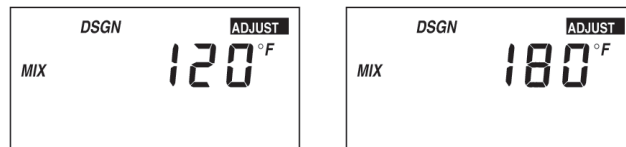
3.4.2 Adjust Menu Display Settings to Change Heat Curve

To make an adjustment to a setting in the control, press and hold simultaneously for 1 second, the Item, ▲ and ▼ buttons. The display will then show the word ADJUST in the top right corner. Select the desired item using the Item button. Finally, use the ▲ and / or ▼ button to make the adjustment. See sections 3.2 and 3.3 (pages 6 and 7) of the basic heating control operation manual for further discussion on these items and their effect on control operation.

Example:

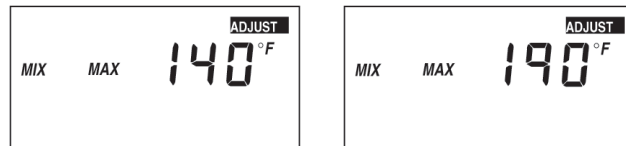
Heat Emitter: Baseboard

MIX DSGN



Adjust the mix design supply temperature from 120° F to 180° F.

MIX MAX



Adjust the maximum supply temperature for the mixing system from 140° F to 190° F.



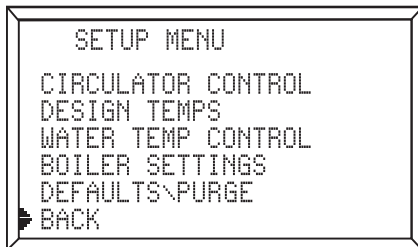
This display setting is only visible with the Advanced/Installer DIP switch set to Advanced.






3.5 The Hydronic Mixing Block for the Combiflex System

3.5.1 Hydronic Mixing Block

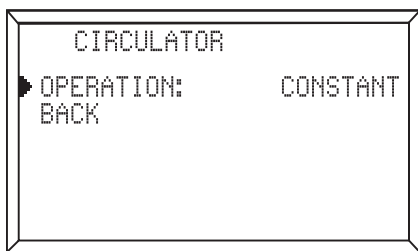
Viega's hydronic mixing block may also be used to supply fluid to a combiflex system. It can be used to control, mix, pump, and provide outdoor reset all in one easy to use package.

3.5.1.1 Setup Menu



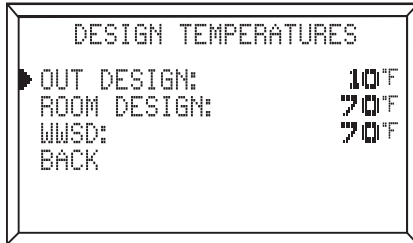
1. The SETUP MENU is used for entering the design values, as well as assigning different control options to the circulator and boiler. To access the SETUP MENU, push the middle rectangular button  on the STATUS MENU. Use the up  and down  arrow keys to scroll through the various settings.
2. To select an item, align the cursor arrow  with the item you wish to select and press the middle rectangular button . The arrow will become solid, which indicates that an item has been selected.
3. Once adjustment is complete, push the middle rectangular button. This will deselect the item.
4. To go to the previous screen, select BACK and press the middle rectangular button.
5. If the SETUP MENU is left idle for more than 90 seconds, the display will change to the STATUS MENU and the hydronic mixing block will begin operating.

3.5.1.2 Circulator Control



OPERATION: CONSTANT — The circulator is constantly on and will only be shut off with warm weather shut down (WWSD). CONSTANT circulation is usually used with RESET mode.

3.5.1.3 Design Temps



OUT DESIGN — Outdoor temperature used to calculate heat loss. This temperature is based on location and can be obtained from the Radiant Wizard or outdoor design charts.

- Range: -40° F to 70° F
- Default: 10° F
- Set to your local requirements

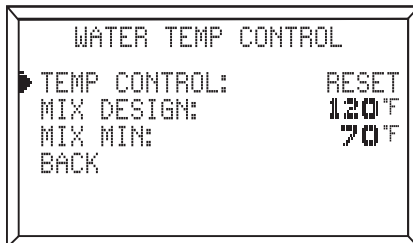
ROOM DESIGN — Desired room temperature used in heat loss calculation.

- Range: 35° F to 120° F
- Default: 70° F
- Set to your local requirements

WWS D — Temperature at which the building does not need heat and the control will no longer activate the circulator.

- Set to your local requirements
- Range: 35° F to 120° F
- Default: 70° F
- Set to your local requirements

3.5.1.4 Water Temp Control



TEMP CONTROL: RESET — Water temperature will adjust based on outdoor temperature; as the outdoor temperature increases, the water temperature will decrease, and vice versa. By using this type of control strategy, the output of the system will meet the load of the structure, resulting in an energy savings for the building owner.

- Set to: RESET

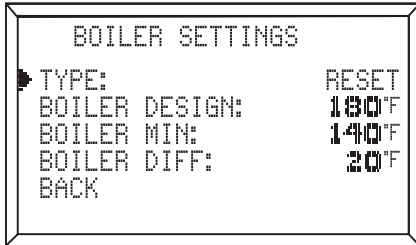
MIX DESIGN — The design water temperature specified by the design. This is the maximum water temperature that will be supplied.

- Range: 50° F to 180° F
- Default: 120° F
- Set to 180° F

MIX MIN — The minimum supply temperature for the mixing system.

- Range: 50° F to 180° F
- Default: 70° F
- Keep set to 70° F

3.5.1.5 Boiler Settings



TYPE: RESET — This setting allows for the boiler to change supply water temperature based on outdoor temperatures.

- If you would like to RESET your boiler, set this to RESET

BOILER DESIGN — The water temperature needed on design day.

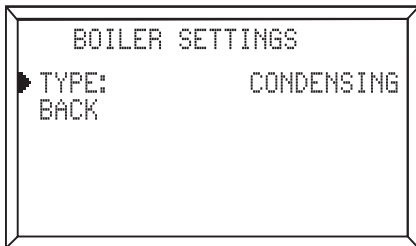
- Range: 70° F to 200° F
- Default: 180° F
- Set to 200° F

BOILER MIN — Lowest temperature the boiler is allowed to supply. This temperature needs to be set high enough for the boiler to be able to maintain mixed water temperatures.

- Range: 70° F to 200° F
- Default: 140° F
- Keep set to 140° F if using RESET

BOILER DIFF — Determines turn on and shut off temperatures. This setting will allow the boiler to go above the boiler target by half of this setting. Example: if the BOILER DIFF is set at 20° F, the boiler will run until the temperature is 10° F above the boiler target setting, and turn on when the temperature is 10° F below the boiler target temp.

- Range: 10° F to 50° F
- Default: 20° F
- Keep set to 20° F



TYPE: CONDENSING — Used when the boiler is a condensing boiler that maintains its own temperature settings. If you would like to allow the boiler to maintain its own temperature, set this to CONDENSING.



These are the recommended settings for the hydronic mixing block when using it with a combiflex system. For additional information about installation, programming, or troubleshooting, please see the complete hydronic mixing block product instructions or contact Technical Services 1-877-843-4262 ext. 350.

3.6 Viega Barrier PEX Tubing and Pump Sizing

Use the table below to help design your Combiflex system.

Procedure

1. Find the heat output needed in the Btu/h column.
2. Follow the row to the right and read the recommended pump and tubing pressure drop under the column representing the length of the Viega Barrier PEX tubing used.



If insulation is not used, select a pump in the non-shaded area. In the shaded area without pipe insulation the temperature drop in the tubing is greater than 10° F.



Assumed a median value of 550 Btu/h per linear foot of baseboard at 180° F supply water temperature with a 10° F maximum temperature drop through the Viega Barrier PEX. Pump curve information was based on Viega's low head 3-speed circulator, part number 12126, and Viega's high head circulator, part number 12127. Shaded blocks indicate a temperature drop greater than 10° F in uninsulated Viega Barrier PEX supply and return lines.

Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)	Total Tubing Length (ft)							
			50	100	150	200	250	300	350	400
10000	1	18 (0.07)	Low (0.8)	Low (1.6)	Low (2.4)	Low (3.2)	Low (4.0)	Low (4.9)	Low (5.7)	Low (6.5)
20000	2	36 (0.47)	Low (2.7)	Low (5.5)	Low (8.2)	Low (11.0)	High (13.8)	High (16.5)	High (19.2)	High (22.0)
30000	3	54 (1.44)	Low (5.6)	Low (11.2)	High (16.8)	High (22.4)				
40000	4	72 (3.15)	Low (9.3)	High (18.6)						

Table 2: Combiflex Sizing

Pump selection for 5/8" Viega Barrier PEX tubing (pressure drop through tubing in feet of head)

See Appendix C for pump selection when using 1/2", 3/4", or 1" Viega Barrier PEX tubing.



The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.

Example

Output needed: 20,000 Btu/h
 Flow rate: 2 gpm
 Tubing size: 5/8"
 Total tubing length: 40 ft +10 ft = 50 ft
 Feet of baseboard needed: 36 ft
 Pump selected: Low head

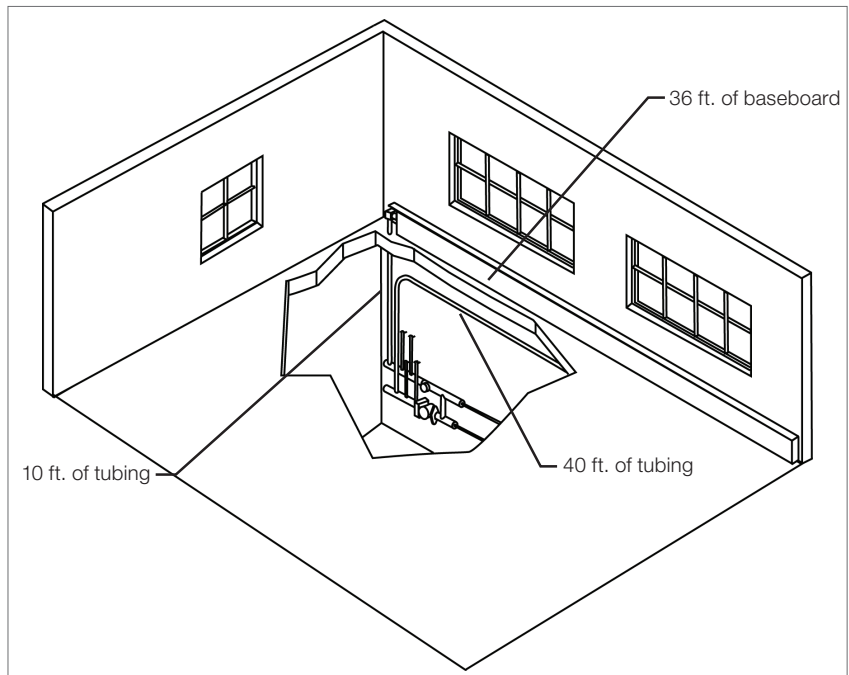
Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)	Total Tubing Length (ft)							
			50	100	150	200	250	300	350	400
10000	1	18 (0.07)	Low (0.8)	Low (1.6)	Low (2.4)	Low (3.2)	Low (4.0)	Low (4.9)	Low (5.7)	Low (6.5)
20000	2	36 (0.47)	Low (2.7)	Low (5.5)	Low (8.2)	Low (11.0)	High (13.8)	High (16.5)	High (19.2)	High (22.0)
30000	3	54 (1.44)	Low (5.6)	Low (11.2)	High (16.8)	High (22.4)				
40000	4	72 (3.15)	Low (9.3)	High (18.6)						

Table 3: Combiflex Sizing Example
 Pump selection for 5/8" Viega Barrier PEX tubing (pressure drop through tubing in feet of head)

See Appendix C for pump selection when using 1/2", 3/4", or 1" Viega Barrier PEX tubing.

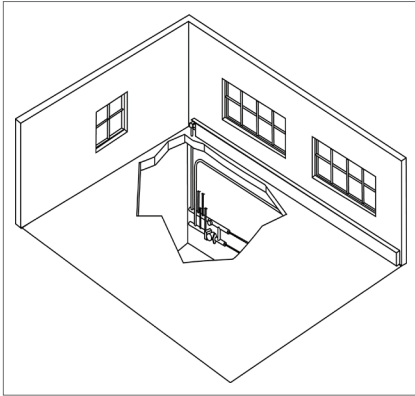


The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.



4 Combiflex Installation

4.1 Baseboard Connections

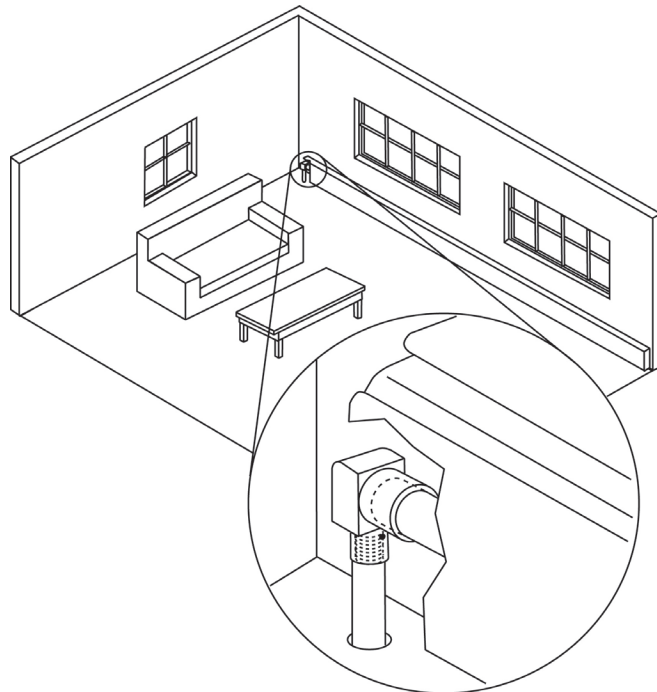


A Viega mixing station / hydronic mixing block with manifolds installed in the mechanical room is the combiflex distribution starting point. Viega Barrier PEX tubing supply and return lines for various high temperature zones are run to each room where baseboard, radiators, kickspace heaters, or fan coil units are used.

A secure, leak-proof connection is made with a Viega ProPress baseboard kit or Viega PureFlow press x solder elbow. Insulate supply and return lines with pipe insulation in unheated basements to prevent heat loss.



Soldering connection to the baseboard must be done prior to making the press connection.



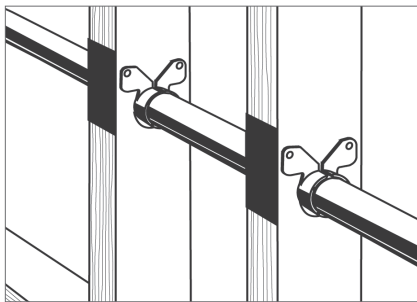
4.2 Handling PEX Tubing

The properties of PEX tubing make it very easy to work with. Some care must be taken to prevent damage to the tubing before and during installation:

- Do not store PEX tubing outdoors where it may be exposed to UV light.
- Viega Barrier PEX tubing has a 6 month UV rating.
- Use care to protect PEX tubing from physical damage during storage and installation. Keep the tubing away from sharp objects, open flames, etc., and do not place heavy objects on the tubing.
- Damaged sections of tubing should be cut out and discarded.

4.3 Wood Frame Construction

Viega Barrier PEX tubing are ideal for use in wood frame construction. The ability to bend the tubing around corners and obstacles greatly simplifies installation. This system eliminates the expensive and time-consuming use of fittings where tubing turns within a wall, and it eliminates the potential fire hazard of soldering close to exposed framing members.

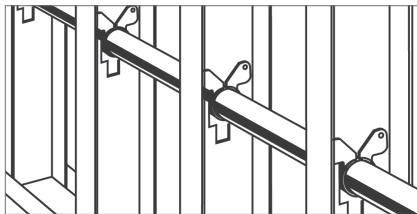


Nailing plates protect tubing passing through studs and joists from nails.

A few rules should be followed when running tubing in wood frame construction:

- Use nailing plates to protect the tubing from nails and screws where it passes through studs.
- Suspension clips are required for metal studs and optional for wooden studs.

4.4 Steel Construction



Suspension clip fasteners used to protect tubing from abrasion when passing through steel studs

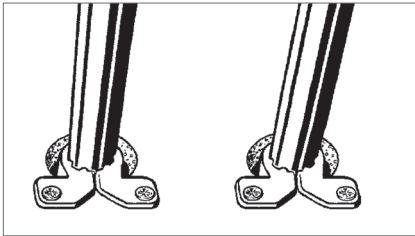
Viega Barrier PEX tubing works as well in steel frame construction as it does in wood. Where tubing runs through metal studs, suspension clip fasteners must be used to protect tubing from sharp stud edges (see illustration to the left). Follow the same guidelines for fastening and supporting the tubing as for wood frame construction.

4.5 Supporting PureFlow PEX Tubing



CAUTION!

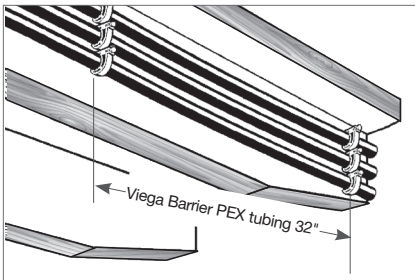
Use only plastic or plastic-coated tubing supports. Metal supports may damage tubing.



Suspension clips support tubing in joist penetrations or anywhere abrasion is a concern.

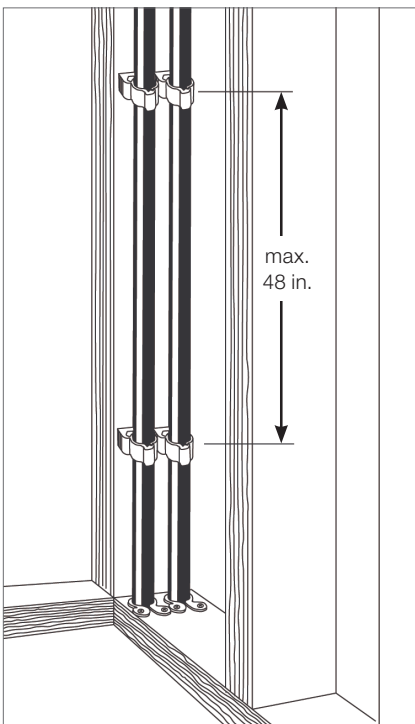
When running tubing, leave a small amount of slack between fasteners to account for tubing contraction.

Tubing should be allowed freedom to move slightly as it expands and contracts. Do not clip it tightly into place or locate it where it will be tightly constrained. Use suspension clips where tubing passes through studs or joists where abrasion and noise is a concern (see illustrations to left).



Tubing supported with lock clip fasteners on horizontal runs

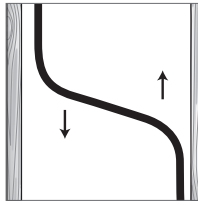
Tubing must be fastened at 32" intervals in horizontal runs. Use Viega lock clips for easy alignment of multiple lines. The stand off design of the clips keeps tubing away from ceilings and subfloors.



Lock clip fasteners support tubing in vertical runs between floors

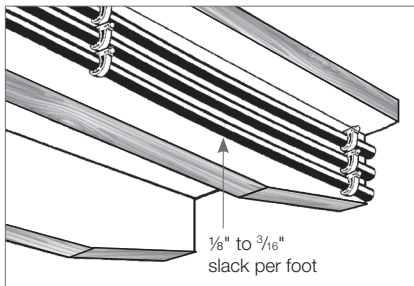
On vertical runs, Viega Barrier PEX tubing should be fastened at intervals of a maximum of 48". The lock clips stand off design keeps the tubing away from studs.

4.6 Tubing Expansion and Contraction



Offsets also provide room for tubing expansion.

A slight amount of slack should be left in each run to allow for this contraction without stressing the fittings. Fasteners should not grip tubing tightly so that the tubing can move slightly as expansion takes place. Offsets will give tubing a place to expand and contract without stressing fittings.

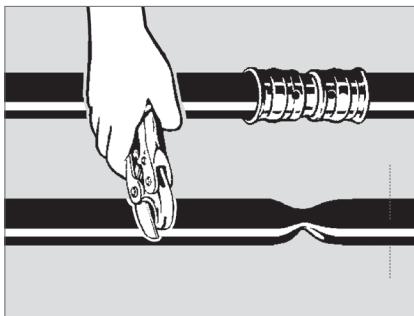


Allow some slack in all runs to prevent damage from tubing contraction.

4.7 Electric Grounding

Viega Barrier PEX tubing may not be used as an electrical ground. Consult the NEC for recommended grounding method when plastic pipe is used.

4.8 Repairs



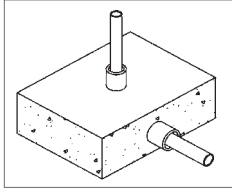
Sections of damaged or kinked tubing should be repaired by cutting out the damaged section and installing a repair coupling. If the repair will be contained within a slab it should be protected with Viega's repair coupling wrap.

See the [Coupling Repair Wrap Product Instructions](#) for more information.



Concrete pour will not affect sealant's bonding process.

4.9 Concrete Construction



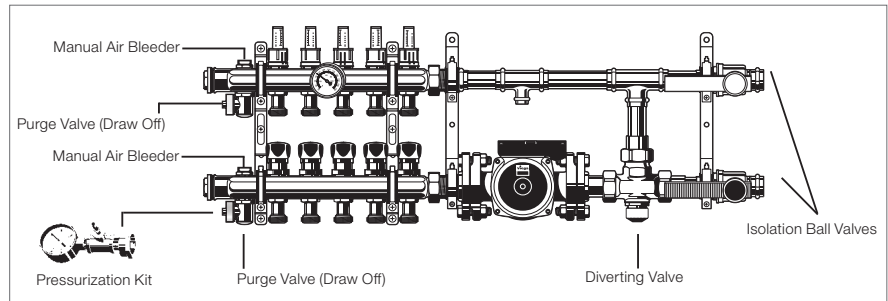
Viega Barrier PEX tubing may be run within concrete slabs or below grade where necessary. All penetration points must be sleeved to prevent tubing damage (entry/exit points, expansion joints, etc.). Penetrations in walls, etc., may be sealed with silicone caulk. Do not use oil-based caulk. Best practice dictates that only continuous lengths of tubing should be run within the slab. Viega does not recommend the installation of fittings within a slab as part of a design. Fittings should only be used in a slab if they are necessary to make a repair. If the use of fittings buried in concrete are necessary for repairs, all such fittings must be wrapped with insulation, noncorrosive tape (no adhesives), or sleeved to prevent corrosion. The wrap shall be a self-fusing, formaldehyde-free, fully cured silicone tape with a minimum of 0.020" thickness. The wrap is available from Viega (part number 15320). Contact a Viega representative for additional information on approved wrapping materials.

Below grade, support tubing on a firm, packed base and allow sufficient slack for expansion and contraction.

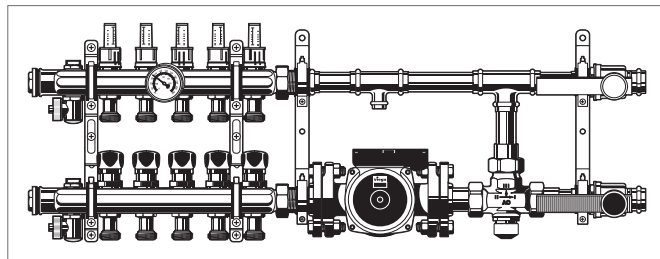
5 Mixing Equipment

5.1 Mixing Station

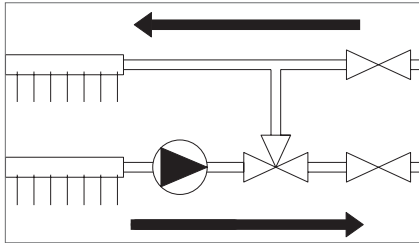
Viega’s mixing stations, once assembled to a manifold, provide a simple solution for water supply modulation. The station comes pressure tested and pre-assembled making job site installation easy, fast, and reliable. The station is equipped with either a low or high head pump. The 1¼" stainless steel manifold includes air vents and purge valves. Two 1" isolation ball valves are on the boiler supply and return side to allow connection to any primary loop or boiler. For zoning, the return header is fitted with shut off valves to accommodate 24V powerheads. The flow rate of each individual circuit can be adjusted at the balancing valves which are located on the supply header. In a combiflex system Viega Barrier PEX can be connected to the manifold with Viega’s PureFlow press or compression adapters.



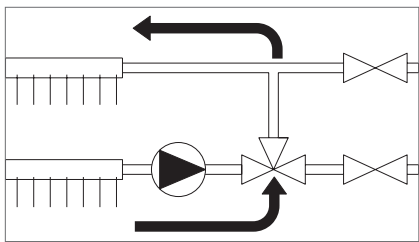
The stainless manifolds are available with compression (COM), press (PPS), PureFlow press (PRS), or copper (male) (COP).



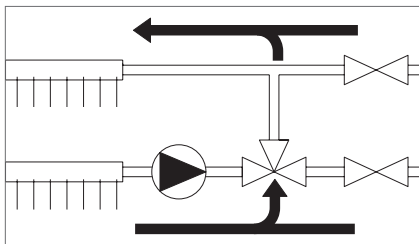
5.1.1 Water Supply Modulation



Diverting valve open



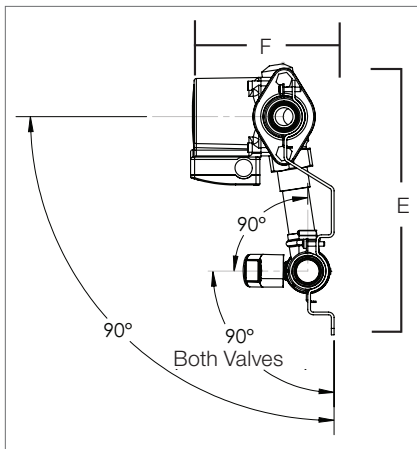
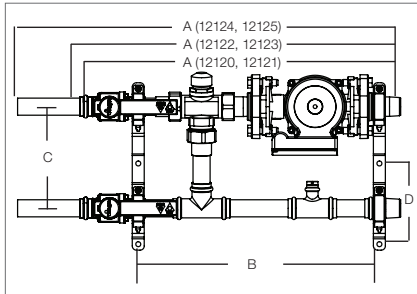
Diverting valve closed



Diverting valve modulating between open and closed position

The diverting valve in Viega’s mixing station is located on the system return side of the station. It can direct the system's return flow out of the system (open position) or it can recirculate it back into the system (closed position). When the valve is fully open and the system return flow is diverted to the boiler return side, 100% boiler supply flow will consequently enter the system. If the valve is fully closed, the return flow will recirculate in the system. In combination with Viega’s basic heating control and three position actuator, the diverting valve modulates the system return flow between the open and closed position which causes a mix of boiler supply and system return flow. Another feature of the diverting valve is the integrated high limit which controls the maximum system water supply temperature.

5.2 Specifications for the Base Mixing Station



Number of Outlets	Mixing Station Stainless Manifold
2 outlets	28.89 ^{**}
3 outlets	30.89 ^{**}
4 outlets	32.89 ^{**}
5 outlets	34.79 ^{**}
6 outlets	36.79 ^{**}
7 outlets	38.79 ^{**}
8 outlets	40.69 ^{**}
9 outlets	42.69 ^{**}
10 outlets	44.69 ^{**}
11 outlets	46.59 ^{**}
12 outlets	48.59 ^{**}

^{**}Dimensions based off stock code 12120/12121. When using stock code 12122/12123, add .98". When using stock code 12124/12125, add 4.27".

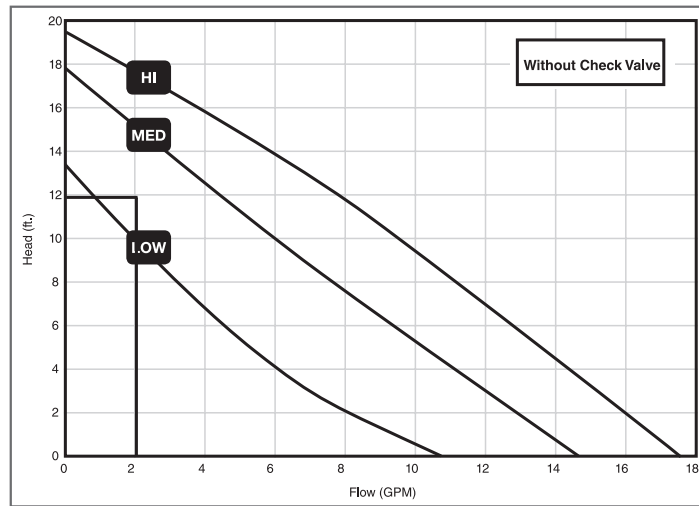
Table 4: Base Mixing Station

Part #	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)
12120	20.69	16	6.69	5.31	11.72	6.14
12121	20.69	16	6.69	5.31	11.72	6.98
12122	21.67	16	6.69	5.31	11.72	6.14
12123	21.67	16	6.69	5.31	11.72	6.98
12124	24.78	16	6.69	5.31	11.72	6.14
12125	24.78	16	6.69	5.31	11.72	6.98

Table 5: Base Mixing Station Dimensions

5.2.1 Three Speed Low Head Circulator Pump

- Flow Range: 0 - 17.5 U.S. GPM
- Head Range: 0 - 19 feet
- Motor: 2 Pole, Single Phase, 120V
- Maximum fluid temperature: 230° F (110° C)
- Minimum fluid temperature: 36° F (2° C)
- Maximum working pressure: 145 psi

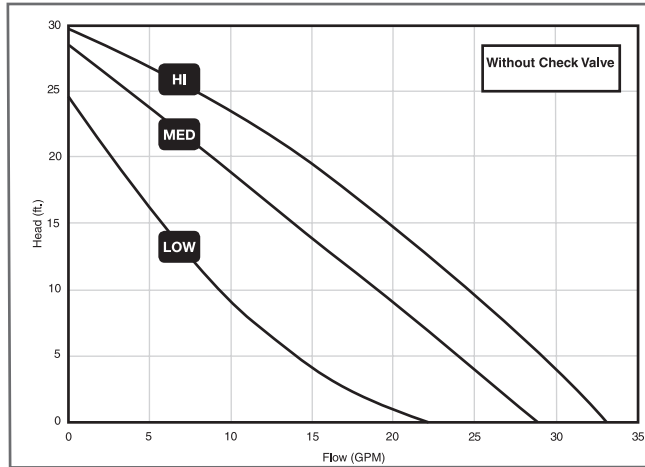


Part Number	Speed	Amps	Watts	HP
12126	HI	0.75	87	1/25
	MED	0.66	80	1/25
	LOW	0.55	60	1/25

Table 6: Pump 12126

5.2.2 Three Speed High Head Circulator Pump

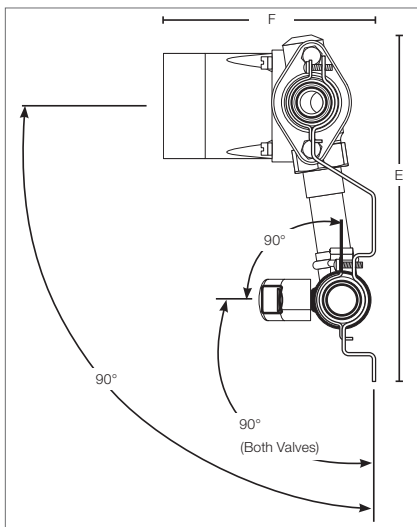
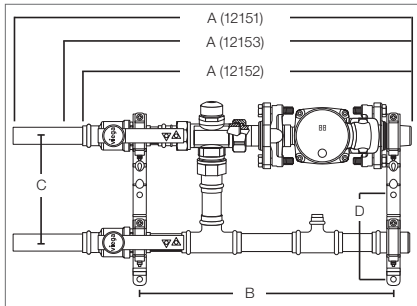
- Flow Range: 0 - 34 U.S. GPM
- Head Range: 0 - 30 feet
- Motor: 2 Pole, Single Phase, 120V
- Maximum fluid temperature: 230° F (110° C)
- Minimum fluid temperature: 36° F (2° C)
- Maximum working pressure: 145 psi



Part Number	Speed	Amps	Watts	HP
12127	HI	1.8	197	1/6
	MED	1.5	179	1/6
	LOW	1.3	150	1/6

Table 7: Pump 12127

5.3 Specifications for the Enhanced Mixing Station



Number of Outlets	Mixing Station Stainless Manifold
2 outlets	28.96
3 outlets	30.96
4 outlets	32.96
5 outlets	34.86
6 outlets	36.86
7 outlets	38.86
8 outlets	40.76
9 outlets	42.76
10 outlets	44.76
11 outlets	46.66
12 outlets	48.66

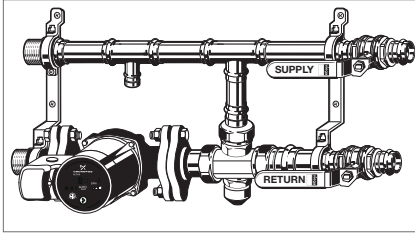
*Dimensions based off stock code 12152. When using stock code 12153 add .98". When using stock code 12151 add 4.04".

Table 8: Enhanced Mixing Station

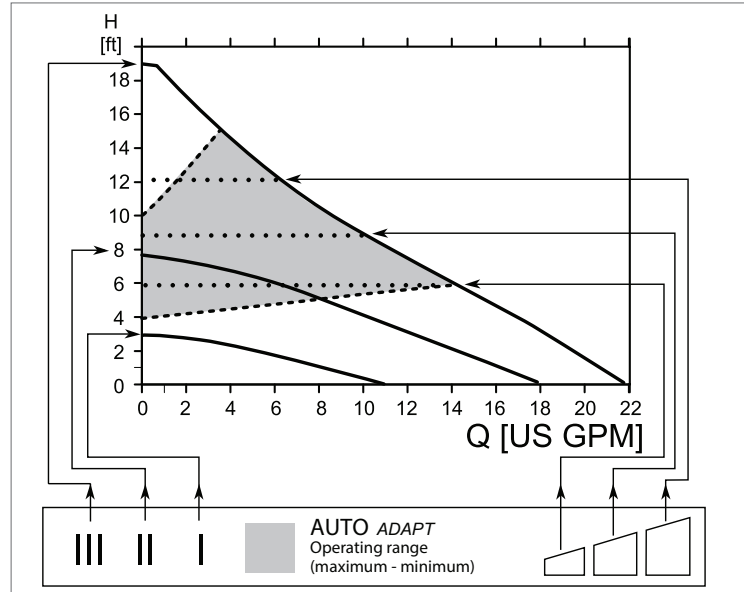
Part #	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)
12151	24.79	16	6.69	5.31	11.72	7.39
12153	21.73	16	6.69	5.31	11.72	7.39
12152	20.75	16	6.69	5.31	11.72	7.39

Table 9: Enhanced Mixing Station Dimensions

5.3.1 Enhanced Mixing Station Pump Performance



Performance* and operation mode selection



*Hydraulic performance without check valve

- Flow Range: 0 - 34 U.S. GPM
- Head Range: 0 - 22 feet
- Motor: 2 Pole, Single Phase, 120V
- Maximum fluid temperature: 230° F (110° C)
- Minimum fluid temperature: 36° F (2° C)
- Maximum working pressure: 150 psi

Speed Setting	Position	Minimum	Maximum
High fixed speed	III	39W	45W
Medium fixed speed	II	15W	30W
Low fixed speed	I	5W	8W
Constant pressure		8W	45W
Constant pressure		14W	45W
Constant pressure		22W	45W
AutoADAPT		5W	45W

Table 10: Power Usage (Approximate)






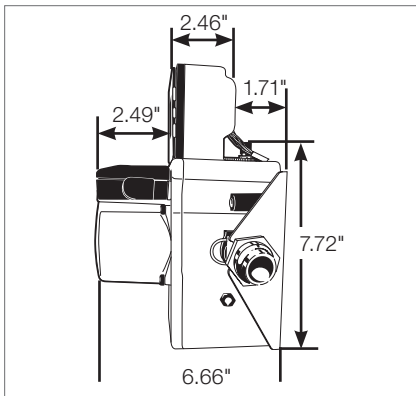
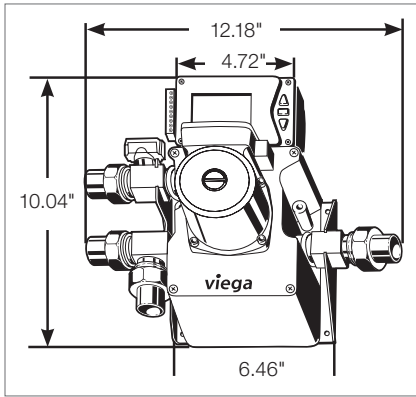
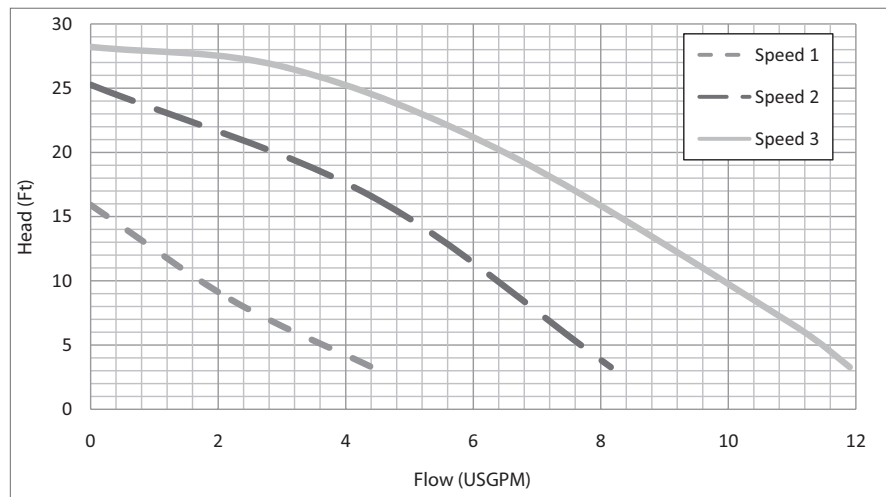
Position	Description
	<ul style="list-style-type: none"> ■ Push-button for selection of pump setting. ■ Every time the push-button is pressed, the circulator setting is changed.
III	<p>High Fixed Speed Runs at a constant speed and consequently on a constant curve. In Speed III, the pump is set on the maximum curve under all operating conditions. Quick Vent of the pump can be obtained by setting the pump to Speed III for a short period.</p>
II	<p>Medium Fixed Speed Runs at a constant speed and consequently on a constant curve. In Speed II, the pump is set on the medium curve under all operating conditions.</p>
I	<p>Low Fixed Speed Runs at a constant speed and consequently on a constant curve. In Speed I, the pump is set on the minimum curve under all operating conditions.</p>
	<p>Constant Pressure I The duty point of the pump will move left and right along the lowest constant-pressure curve depending on water demand in the system. The pump head (pressure) is kept constant, irrespective of the water demand.</p>
	<p>Constant Pressure II The duty point of the pump will move left and right along the middle constant-pressure curve depending on water demand in the system. The pump head (pressure) is kept constant, irrespective of the water demand.</p>
	<p>Constant Pressure III The duty point of the pump will move left and right along the highest constant-pressure curve depending on water demand in the system. The pump head (pressure) is kept constant, irrespective of the water demand.</p>
	<p>AutoADAPT (Factory Setting) This function controls the pump performance automatically within the defined performance range (shaded area). AutoADAPT will adjust the pump performance to system demands over time.</p>

Table 11: Position Descriptions

5.4 Specification for Hydronic Mixing Block



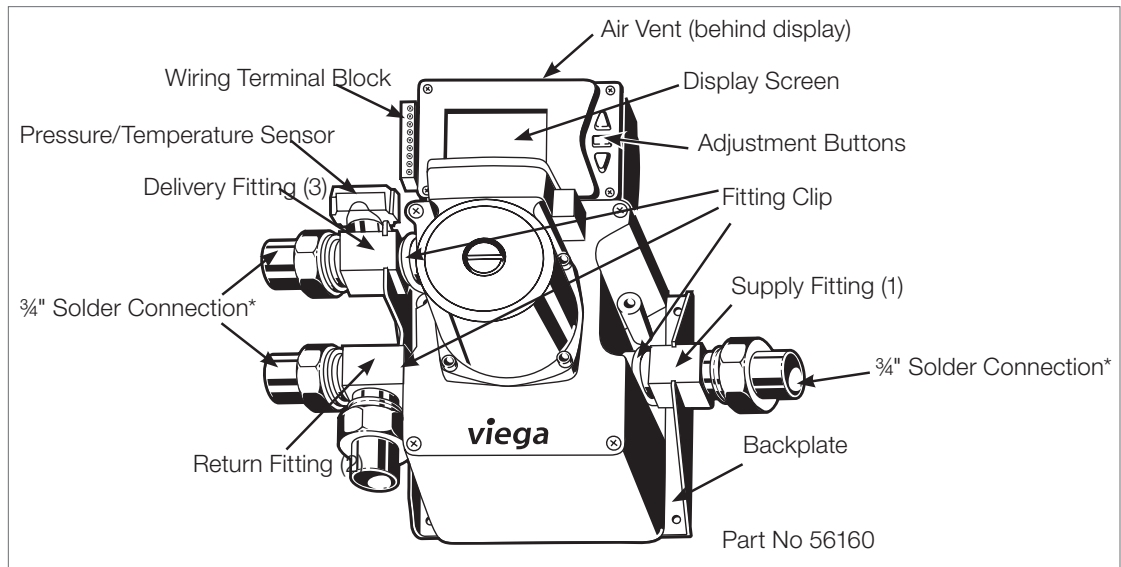
Input Voltage / Current	120V AC \pm 10% 60 Hz, 2A
Sensors	(2) 10 k Ω thermistors - 1 boiler sensor, 1 outdoor sensor Sensor wiring may be extended up to 500 ft. Use 18 gauge wire when extending
Boiler Relay	24V AC 1.0 MAX AMPS
Circulator Relay	24V AC 1.0 MAX AMPS
Microprocessor	8 Bit, 32 MHz
Fluid	Water Propylene or Ethylene glycol to 50% concentration
Temperature	Maximum Temperature: 203° F
Pressure	Maximum Working Pressure: 45 psi Maximum Test Pressure: 100 psi
Weight	10 lbs.
Dimensions	12.18" W x 10" H x 6.7" D
ETL Listings	Meets CSA C22.2 No. 24 Meets UL Standard 873 ETL Control No. 3068143
Part #	56160



Pump curve for hydronic mixing block

6 System Start-Up

6.1 System Start-Up for Hydronic Mixing Block



6.1.1 Pressure Testing

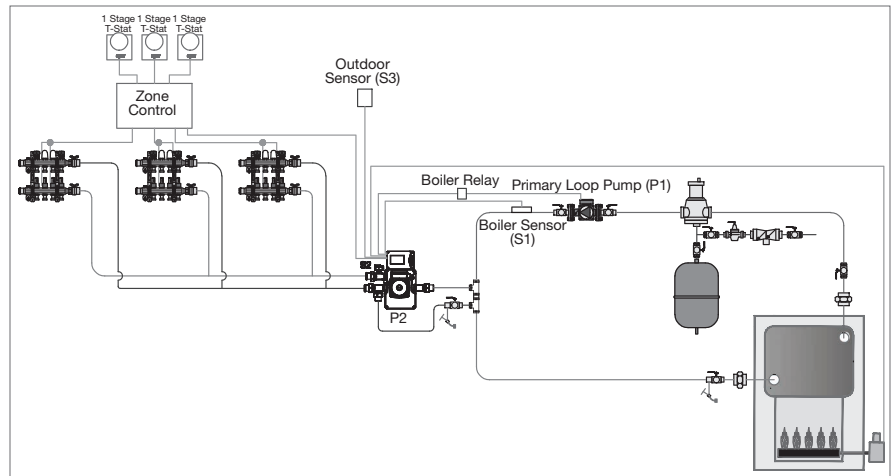
When piping is complete, test the hydronic mixing block.

1. Ensure air vent cap is tight before testing.
2. Pressurize the system to a maximum of 100 psi for one hour.
3. Once the system maintains 100 psi for one hour, carefully remove air pressure from the system and fill with fluid.
4. Inspect all piping and fitting joints for leaks.











6.1.2 Filling and Purging

When testing is complete, purge the hydronic mixing block.

1. Allow the hydronic mixing block to be filled with fluid from the supply side piping.
2. Close the valve on the return piping to the boiler.
3. Open the purge valve to allow trapped air to be eliminated.
4. Continue to allow fluid to run into the block and out the purge valve until all air is removed from the system.
5. Open the air vent cap to allow air to escape under normal operation.



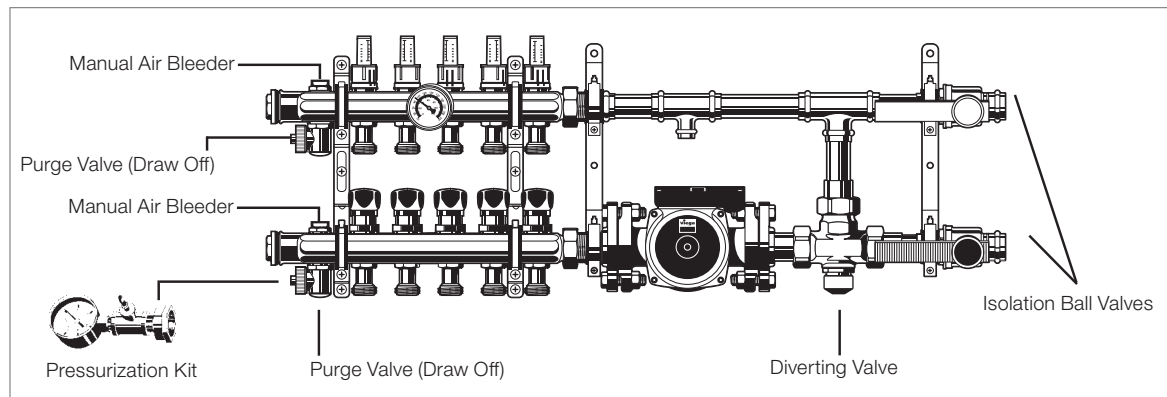
Legend: 4-Way Mixing Valve and Motor

	Hydronic Mixing Block		Pressure Differential Bypass Valve
	Spring check		Stainless Manifold with Flow Gauges
	Circulator		Baseboard Zone(s)
	Draw Off (Purge Valve)		Diaphragm-Type Expansion Tank
	Make-up Water		Zone Valve

Piping

- This drawing shows system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
- Size header piping for maximum flow velocity of 2 ft./sec.
- All other piping should be sized for a maximum flow velocity of 4 ft./sec.
- Install a minimum of 12 diameters of straight pipe upstream of all circulators and check valves.
- Install isolating flanges or isolating valves on all circulators.
- Install purging valve(s) on all circuits.
- All closely spaced tees shall be within 4 pipe diameter center-to-center spacing.
- Install minimum of 6 pipe diameters of straight pipe upstream and downstream of all closely spaced tees.
- Differential pressure bypass valve prevents flow noise under partial load conditions (some zone valves closed).
- Set differential pressure bypass valve to delta P of distribution system with all zones open + 1 psi
- Not all components may be required depending on control strategy (i.e. constant circulation).

6.2 System Start Up for Mixing Stations



6.2.1 Pressure Testing

Before the finish floor is installed and during concrete pouring the radiant system must be pressure tested. Air or water may be used as the medium. The following procedure is recommended by Viega. Check the local building code for compliance or additional test requirements.

1. Double check all connections to manifold to ensure proper seal.
2. Connect manifold pressurization kit (1) to any purge valve (2).
3. Pressurize the system to 100 psi to detect potential nail or screw penetrations.
4. The system should hold the 100 psi for a minimum of 1 hour.

6.2.2 Filling and Purging

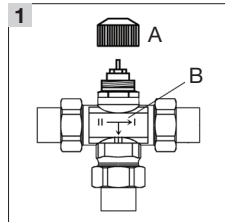
1. Attach drain hose to purge valve hose connection on return header and open valve.
2. Close all but one circuit. Close isolation ball valve on boiler return line. Remove plastic dust cap or temperature controller from 3-way valve, and make sure that high limit kit is fully open.
3. Open boiler fast fill valve to purge circuit. After purging first circuit, close red balancing valve and open next one. Continue with one circuit at a time until all circuits have been purged.
4. Close purge valve and open all balancing and boiler valves. Reset high-limit kit, and reinstall temperature controller or actuator onto 3-way valve.
5. Any remaining air pockets in the system will be eliminated through the automatic air vent after a few hours of constant circulation.



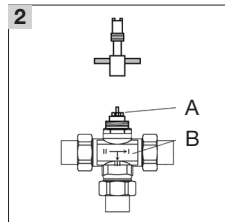
If the system must be purged again in the future for any reason, the high limit kit must be re-opened during purging for full flow.

6.3 Adjusting the High-Limit Kit (Mixing Station)

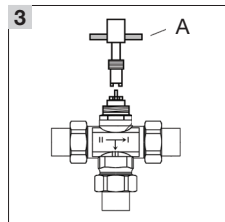
Viega stations (base, assembled, and enhanced) are provided with a pre-installed temperature high-limit kit. This kit is installed into the diverting valve to allow a maximum supply water temperature to be set. This kit must be unscrewed when purging the system and should then be set according to the following instructions.



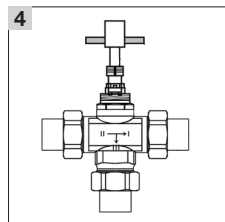
1. Remove (A) gray plastic cap from (B) valve body. (This cap can be used to adjust the water temperature manually.)



2. Loosen up (A) hex lock nut from the (B) valve body with brass key tool.



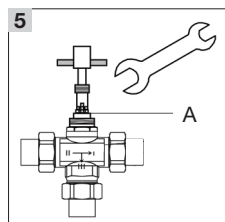
3. Use opposite side of (A) brass key tool and turn inner adjustment screw (slotted) clockwise until valve spring resistance is felt. To lower water temperature turn key clockwise; turn counterclockwise to raise it.



4. Turn adjustment screw further clockwise until desired supply water temperature is obtained and count quarter turns for reference. This has to be done carefully and slowly because each quarter turn of the adjustment screw will result in approximately 15°F temperature reduction. Wait until desired water temperature stays consistent.



This calibration must be done with the boiler at its highest temperature, the circulator running and all zones open



5. Tighten (A) hex lock nut with wrench. Do not overtighten. To secure high limit adjustment: hold slotted adjustment screw with brass key while tightening nut.

7 Appendix A: Additional References

7.1 Making a PureFlow Press Connection

To make a fitting connection with Viega Barrier PEX tubing, see the [PureFlow Press Fittings Product Instructions](#) on the Viega website.

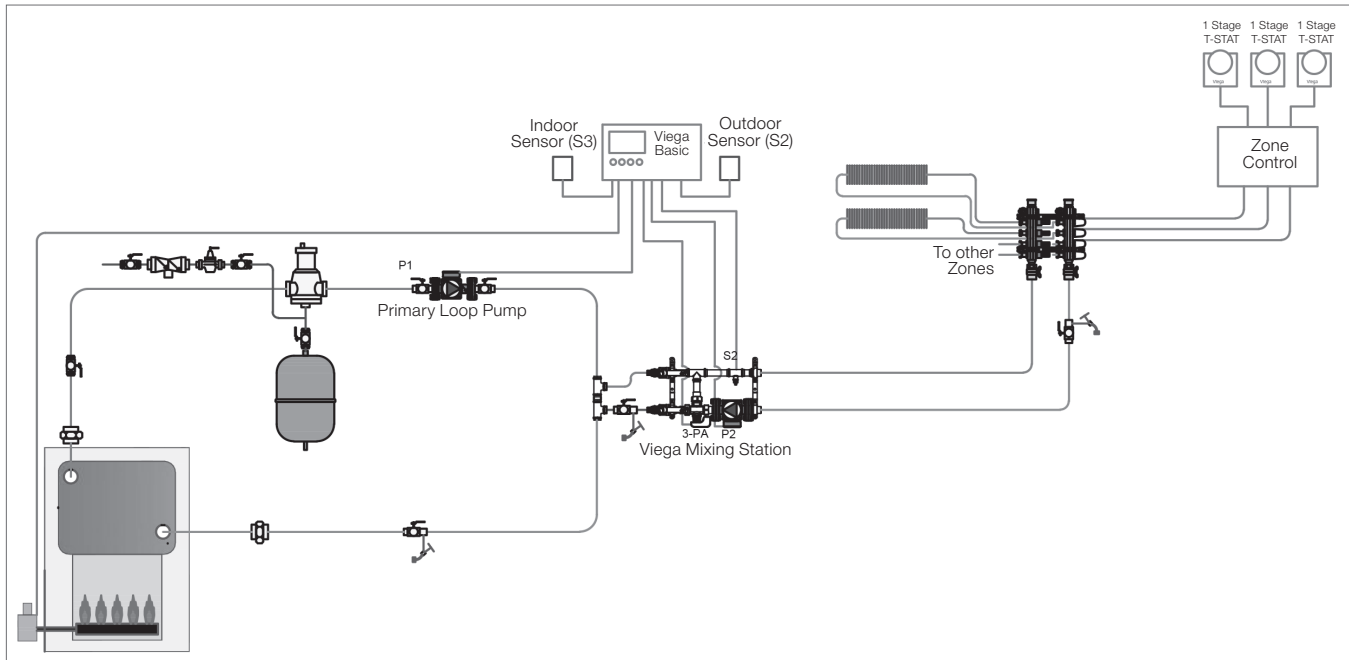
7.2 SVC Press Adapter

To make an SVC press adapter connection to a manifold or fitting, see [SVC Press Adapter Product Instructions](#) on the Viega website.

7.3 SVC Compression Adapter

To make an SVC compression adapter connection, see [SVC Compression PEX Adapter Product Instructions](#) on the Viega website.











8 Appendix B: Mixing Equipment Piping/Wiring

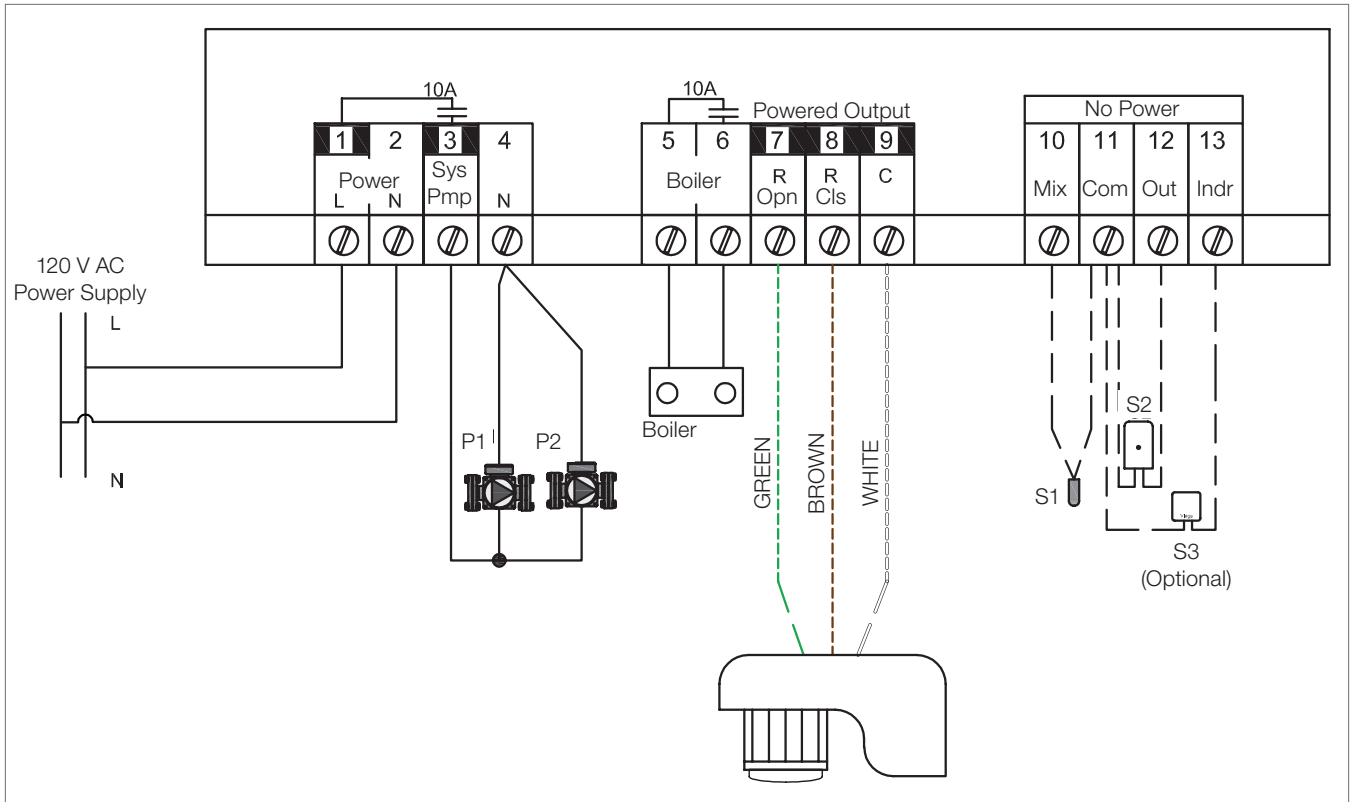


Piping of mixing stations for high temperature applications:

- This drawing shows system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
- Size header piping for maximum flow velocity of 2 ft./sec.
- All other piping should be sized for a maximum flow velocity of 4 ft./sec.
- Install a minimum of 12 diameters of straight pipe upstream of all circulators and check valves.
- Install isolating flanges or isolating valves on all circulators.
- Install purging valve(s) on all circuits.
- All closely spaced tees shall be within 4 pipe diameter center-to-center spacing.
- Install minimum of 6 pipe diameters of straight pipe upstream and downstream of all closely spaced tees.
- Differential pressure bypass valve prevents flow noise under partial load conditions (some zone valves closed).
- Set differential pressure bypass valve to delta P of distribution system with all zones open + 1 psi
- Not all components may be required depending on control strategy (i.e., constant circulation).

Legend: Mixing Station

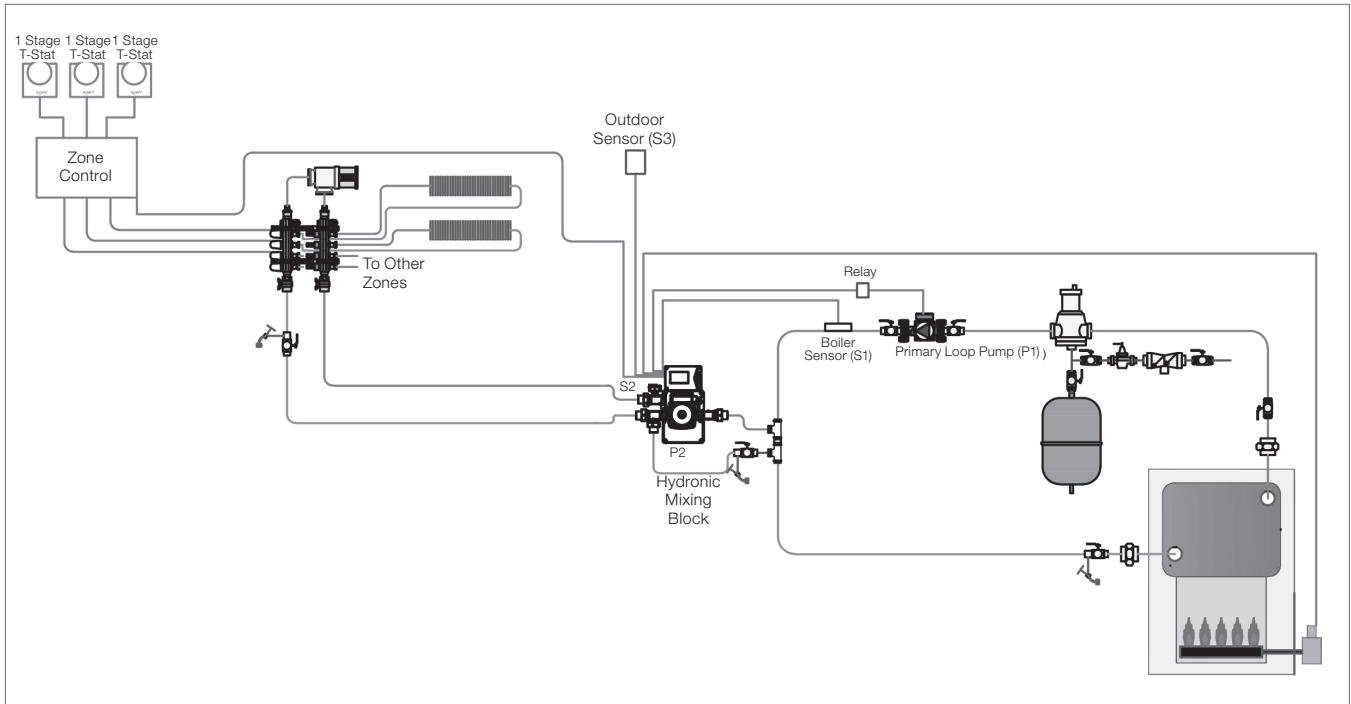
	Mixing Station
	Spring Check
	Circulator
	Draw Off (Purge Valve)
	Make-Up Water
	Pressure Differential Bypass Valve
	Stainless Manifold with Flow Gauges
	Baseboard Zone(s)
	Diaphragm-Type Expansion Tank
	Zone Valve



Wiring of mixing stations for high temperature applications:

- This drawing shows system wiring concept only. Installer is responsible for all equipment and detailing required by local codes.
- All wiring shall be in conformance with the latest edition of the National Electrical Code.
- Maximum current rating of Hydronic Mixing Block Relay is 1 amp, Basic and Advance Snow Melting Control Relay is 5 amps, maximum current rating of Zone Control Relays is 5 amps, if circulator draw exceeds this use pilot relay with 120V AC coil operated by Viega Control.
- Consult with control / boiler manufacturer for limitations and installation instructions.
- Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the control and not to earth ground. Use 18 AWG copper wiring for all sensor wiring. Sensors should be located 12" down stream of mixing point.
- DHW priority relay must be rated to handle full amperage load of zone circulator relay center.
- Other configurations are possible, but all space heating zone circulators must turn off when DHW mode is on or heat source needs to be sized for multiple loads.

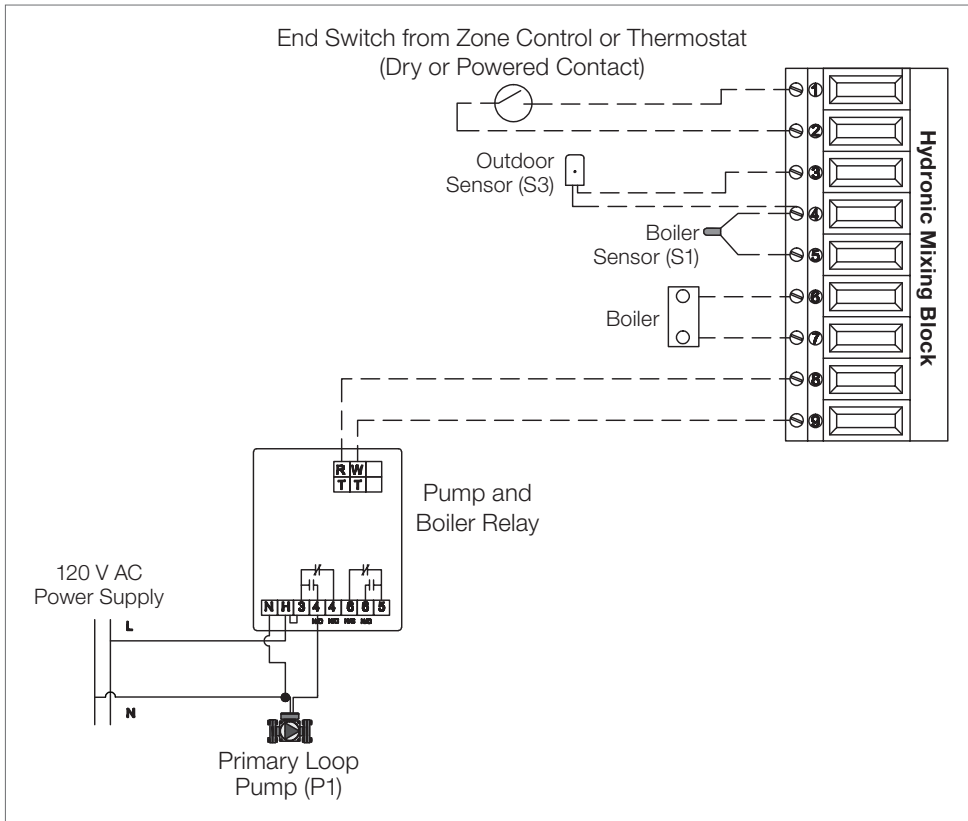
Legend: Mixing Station	
— — — — —	Sensors
-----	Low Voltage
—————	Line Voltage
P1	= Primary Loop Circulator
P2	= Mixed Temperature Circulator
S1	= Mix Sensor
S2	= Outside Sensor
S3	= Inside Sensor



Piping of the hydronic mixing block for high temperature applications:

- This drawing shows system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
- Size header piping for maximum flow velocity of 2 feet /second.
- All other piping should be sized for a maximum flow velocity of 4 feet/second.
- Install a minimum of 12 diameters of straight pipe upstream of all circulators and check valves.
- Install isolating flanges or isolating valves on all circulators.
- Install purging valve(s) on all circuits.
- All closely spaced tees shall be within 4 pipe diameter center-to-center spacing.
- Install minimum of 6 pipe diameters of straight pipe upstream and downstream of all closely spaced tees.
- Differential pressure bypass valve prevents flow noise under partial load conditions (some zone valves closed).
- Set differential pressure bypass valve to delta P of distribution system with all zones open + 1 psi.
- Not all components may be required depending on control strategy (i.e., constant circulation).

Legend: Hydronic Mixing Block	
	Hydronic Mixing Block
	Spring Check
	Circulator
	Draw Off (Purge Valve)
	Make-Up Water
	Pressure Differential Bypass Valve
	Stainless Manifold with Flow Gauges
	Baseboard Zone(s)
	Diaphragm-Type Expansion Tank
	Zone Valve



Wiring of the hydronic mixing block for high temperature applications:

- This drawing shows system wiring concept only. Installer is responsible for all equipment and detailing required by local codes.
- All wiring shall be in conformance with the latest edition of the National Electrical Code.
- Maximum current rating of Hydronic Mixing Block Relay is 1 amp, Basic and Advance Snow Melting Control Relay is 5 amps, maximum current rating of Zone Control Relays is 5 amps, if circulator draw exceeds this use pilot relay with 120V AC coil operated by Viega Control.
- Consult with control / boiler manufacturer for limitations and installation instructions.
- Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the control and not to earth ground. Use 18 AWG copper wiring for all sensor wiring.
- DHW priority relay must be rated to handle full amperage load of zone circulator relay center.
- Other configurations are possible, but all space heating zone circulators must turn off when DHW mode is on or heat source needs to be sized for multiple loads.

Legend: Hydronic Mixing Block

— — — —	Sensors
-----	Low Voltage
————	Line Voltage
P1	= Primary Loop Circulator
P2	= Mixed Temperature Circulator
S1	= Boiler Sensor
S2	= Mix Sensor
S3	= Outdoor Sensor

9 Appendix C: Pump Sizing

9.1 Combiflex Sizing: Pump Selection for ½" Tubing

BTU/h	Flow Rate (gpm)	Total ft. of Baseboard (Pressure drop, ft. of hd)	Total Tubing Length (ft.)							
			25	50	75	100	125	150	175	200
10000	1	18 (0.07)	Low (0.8)	Low (1.9)	Low (2.9)	Low (3.8)	Low (4.8)	Low (5.7)	Low (6.7)	Low (7.6)
20000	2	36 (0.47)	Low (3.8)	Low (7.5)	Low (11.3)	High (15.0)	High (18.8)	High (22.5)	High (26.3)	
30000	3	54 (1.44)	Low (7.0)	High (14.0)	High (21.0)					
40000	4	72 (3.15)	High (11.0)	High (22.0)						

The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out in yellow above. For ¾" refer to "3.6 Viega Barrier PEX Tubing and Pump Sizing" on page 17.

Table 12: Pump Selection for ½" Viega Barrier PEX Tubing
(pressure drop through tubing in feet of head)

9.2 Combiflex Sizing: Pump Selection for ¾" Tubing

BTU/h	Flow Rate (gpm)	Total ft. of Baseboard (Pressure drop, ft. of hd)	Total Tubing Length (ft.)							
			50	100	150	200	250	300	350	400
10000	1	18 (0.07)	Low (0.5)	Low (1.0)	Low (1.5)	Low (2.0)				
20000	2	36 (0.47)	Low (1.4)	Low (2.8)	Low (4.2)	Low (5.6)	Low (7.0)	Low (8.4)	Low (9.8)	Low (11.2)
30000	3	54 (1.44)	Low (2.8)	Low (5.5)	Low (8.3)	Low (11.0)	High (13.8)	High (16.5)	High (19.3)	High (22.0)
40000	4	72 (3.15)	Low (4.5)	Low (9.0)	High (13.5)	High (18.0)	High (22.5)			

The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out in yellow above. For ¾" refer to "3.6 Viega Barrier PEX Tubing and Pump Sizing" on page 17.

Table 13: Pump Selection for ¾" Viega Barrier PEX Tubing
(pressure drop through tubing in feet of head)

9.3 Combiflex Sizing: Pump Selection for 1" Tubing

BTU/h	Flow Rate (gpm)	Total ft. of Baseboard (Pressure drop, ft. of hd)	Total Tubing Length (ft.)							
			50	100	150	200	250	300	350	400
10000	1	18 (0.07)	Low (0.1)	Low (0.2)	Low (0.4)	Low (0.5)	Low (0.6)	Low (0.7)	Low (0.8)	Low (0.9)
20000	2	36 (0.47)	Low (0.4)	Low (0.8)	Low (1.2)	Low (1.6)	Low (2.0)	Low (2.4)	Low (2.8)	Low (3.2)
30000	3	54 (1.44)	Low (0.8)	Low (1.6)	Low (2.4)	Low (3.3)	Low (4.1)	Low (4.9)	Low (5.7)	Low (6.5)
40000	4	72 (3.15)	Low (1.4)	Low (2.7)	Low (4.0)	Low (5.4)	Low (6.7)	Low (8.0)	Low (9.4)	High (10.8)

The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out in yellow above. For %" refer to "3.6 Viega Barrier PEX Tubing and Pump Sizing" on page 17.

Table 14: Pump Selection for 1" Viega Barrier PEX Tubing
(pressure drop through tubing in feet of head)

10 Limited Warranty

10.1 Limited Warranty for Viega Heating and Cooling Solutions

Hydronic Radiant Heating/Cooling and Snow Melt

Subject to the conditions and limitations in this Limited Warranty, Viega LLC (Viega) warrants to property owners in the United States with hydronic radiant heating/cooling and/or snow melt systems (the systems) properly installed by Viega trained contractors that its Viega Barrier PEX tubing, under normal conditions of use and properly maintained, will be free from failure caused by manufacturing defect for a period of thirty (30) years from date of installation.

In addition, Viega warrants that Viega PEX press metal and polymer fittings properly installed in the systems with the above listed tubing, to include protected PEX press metal and polymer fittings used in slab, will be free from failure caused by manufacturing defect for a period of thirty (30) years from date of initial installation; warrants that any accessible metal compression or metal/polyalloy crimp fittings, manifolds and panels sold by Viega and used in the systems will be free from failure caused by manufacturing defect for a period of five (5) years, and warrants that any controls, mixing stations, or electrical components sold by Viega and used in the systems will be free from failure caused by manufacturing defect for a period of two (2) years from date of initial installation.

Power tools and jaws used with press fittings are warranted by the manufacturer and Viega extends no separate warranty on those tools or jaws. Viega warrants that PEX press hand and pneumatic PEX hammer tools sold by Viega, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of two (2) years from date of sale.

Under this limited warranty, you only have a right to reimbursement if the failure or leak resulted from a manufacturing defect in the products covered by this warranty and the failure or leak occurred during the warranty period. You do not have a remedy or right of reimbursement under this warranty and the warranty does not apply if the failure or any resulting damage is caused by (1) components in the systems other than those manufactured or sold by Viega or components not recommended for use in the systems (2) not installing, inspecting, or testing the products covered by this warranty in accordance with Viega's installation instructions at the time of the installation, applicable code requirements and accepted industry practices (for example, guidelines of the Radiant Professionals Alliance); (3) improper design, including determining proper heat-load of the system, or improper maintenance of the system; (4) exposure to unauthorized solvents or chemicals, antifreeze, rust inhibitor or other treatment fluids; freezing; or by failure to appropriately limit recommended water temperature levels or other misuse or abuse of the

tubing in the handling of the tubing prior to or during installation or by other construction activity on the property; (5) acts of nature such as earthquakes, fire, flood, wind, or lightning.

In the event of a leak or other failure in the system, it is the responsibility of the property owner to obtain and pay for the repairs. Only if the warranty applies will Viega be responsible for reimbursement under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of any claimed bills for which you claim reimbursement. Within a reasonable time after notification, Viega will investigate the reasons for the failure, which includes the right to inspect the product at Viega and reasonable access to the site of the damage in order to determine whether the warranty applies. Viega will notify you in writing of the results of its review.

In the event that Viega determines that the failure or leak and any resulting damages were the result of a manufacturing defect in the products covered by this warranty and occurred during the first ten years of the time period covered by this warranty, Viega will reimburse the property owner for reasonable repair or replacement charges resulting from the failure or leak and, additionally will reimburse damages to personal property resulting from the failure or leak. After the first ten years of the time period covered by this warranty, the EXCLUSIVE and ONLY remedy will be reimbursement for repair and replacement of the product covered by this warranty. VIEGA SHALL NOT BE LIABLE FOR CONSEQUENTIAL ECONOMIC LOSS DAMAGES UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF FOUND APPLICABLE, ANY IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF ANY TIME LIMITS SET OUT IN THIS WRITTEN WARRANTY. Other than this limited warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products. This written warranty applies for the full term of the applicable warranty regardless of any change of ownership of the property.

In the event that the tubing or fittings covered by this warranty are used in potable water plumbing systems, the Viega Limited Warranty for Viega PEX Water Systems will apply.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on the duration of implied warranties in certain types of transactions, so the above exclusion or limitations may not apply to you. This limited warranty gives you specific legal rights and you also may have other rights which vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed.

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