

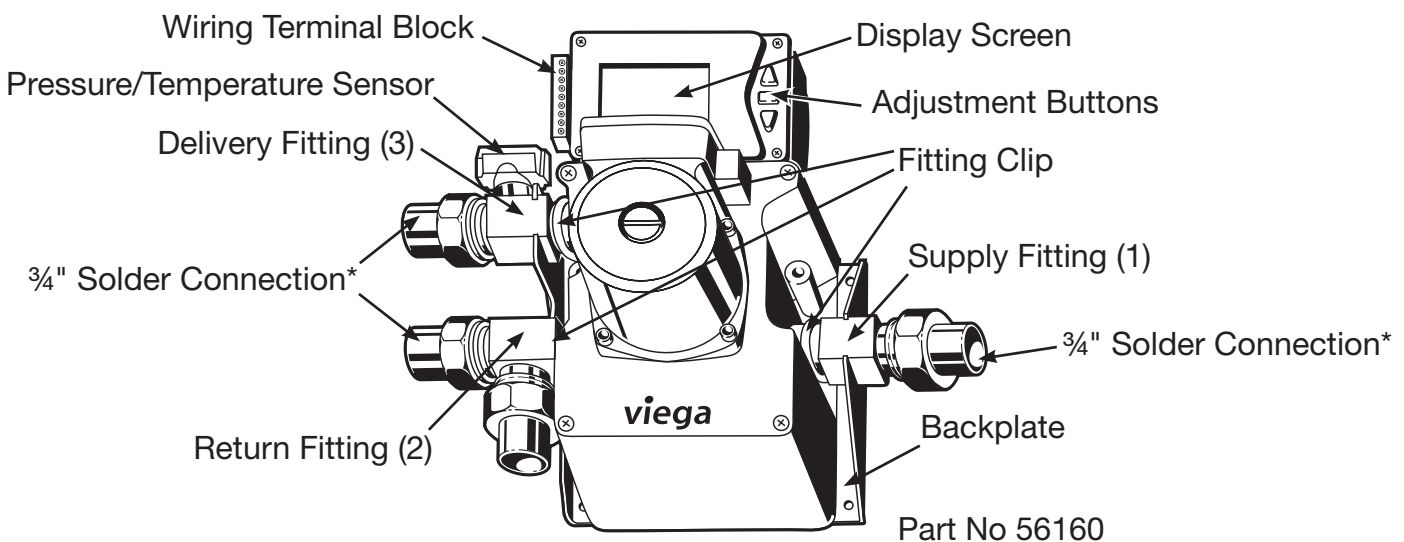
Product Instructions

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Hydronic Mixing Block

Version 1.104

The Hydronic Mixing Block is a mixing device and boiler control, with a built in circulator and system controller. The block can provide either a fixed or reset water temperature via start/stop or constant fluid circulation. The following pages outline step by step instructions for the installation, piping/wiring, and programming of the Hydronic Mixing Block.



* ProPress tailpieces may be used in place of solder connections. ProPress tailpieces are available for sale separately. See page 5 for recommendations.



Only suitably qualified individuals with formal training in electrical and HVAC controls should attempt the installation of this equipment. Incorrect wiring and installation will affect the warranty provided with this unit. Wiring must be completed in accordance with the codes and practices applicable to the jurisdiction for the actual installation.



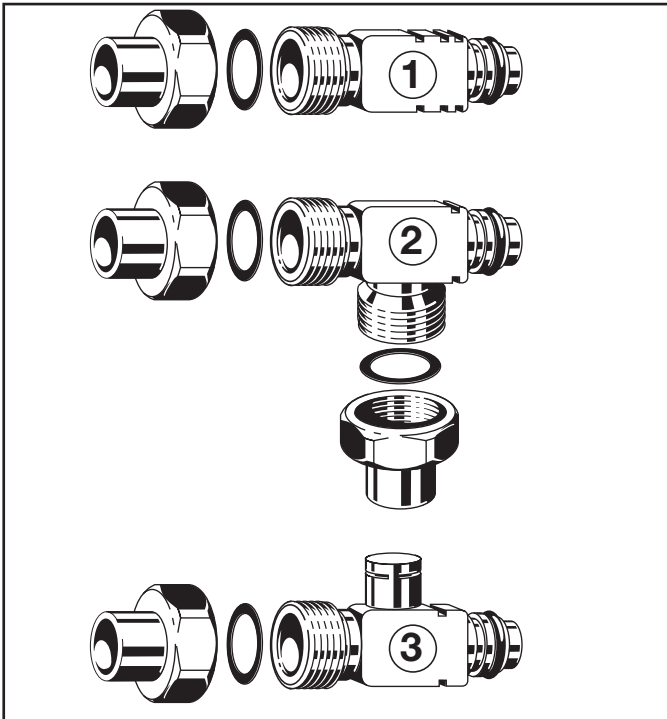
The Hydronic Mixing Block is a microprocessor based controller and as such is not to be regarded as a safety (limit) control. Please consult and install the heating or cooling appliance in accordance with the manufacturer's recommendations.

Product Instructions

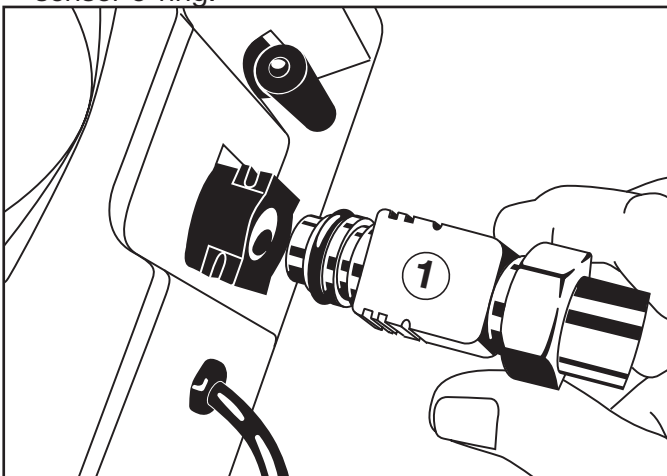
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Installation

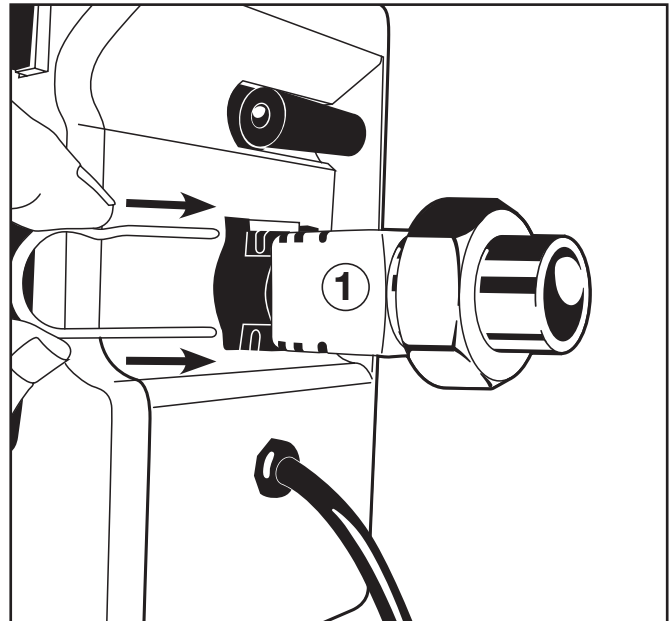
1. Assemble the Hydronic Mixing Block fittings.



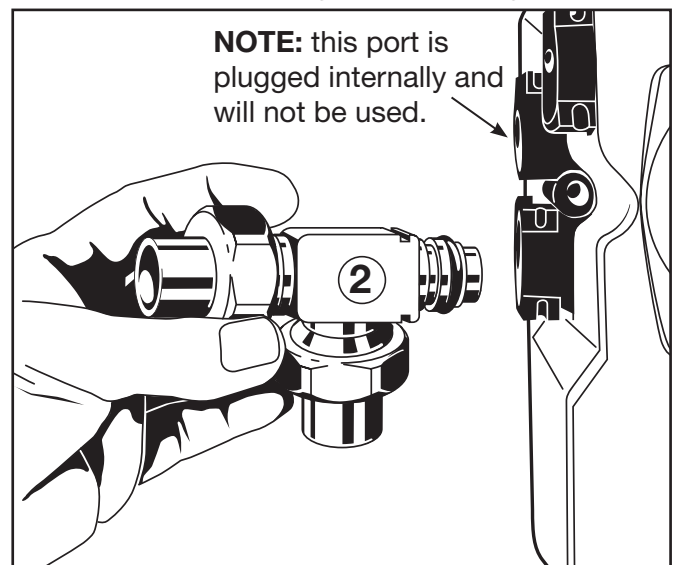
2. Insert fitting labeled “fitting 1” into port labeled “port 1” on the lower right of the Hydronic Mixing Block. Firmly twist and press the fitting until fully seated. **NOTE:** Water can be used as a lubricant on the fitting o-rings and the pressure/temperature sensor o-ring.



3. Once a Hydronic Mixing Block fitting is fully seated, slide the fitting clip into the groove in the port, securing the fitting to the block.



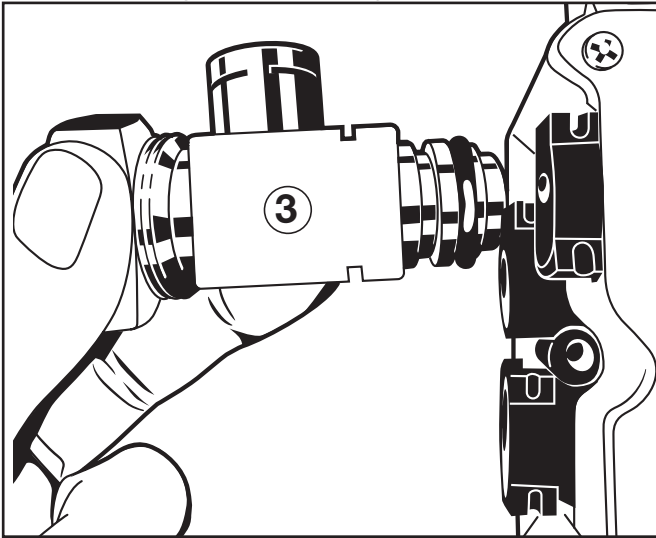
4. Insert fitting labeled “fitting 2” into “port 2” on the lower left of the Hydronic Mixing Block. Firmly twist and press the fitting until fully seated. Repeat Step 3 to install fitting clip for “fitting 2.”



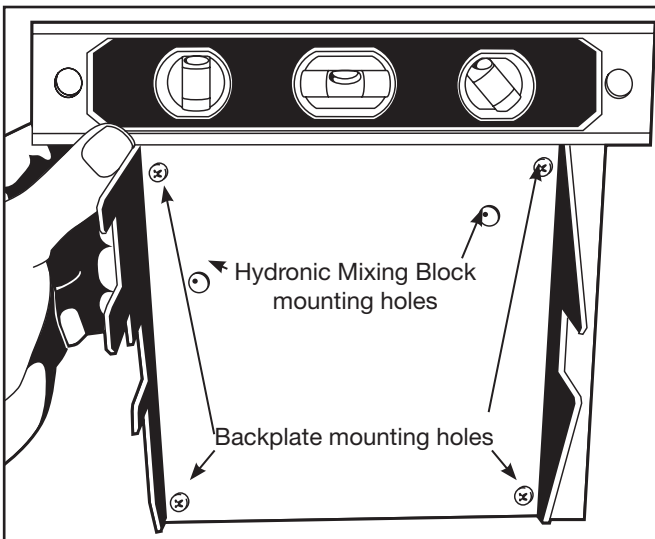
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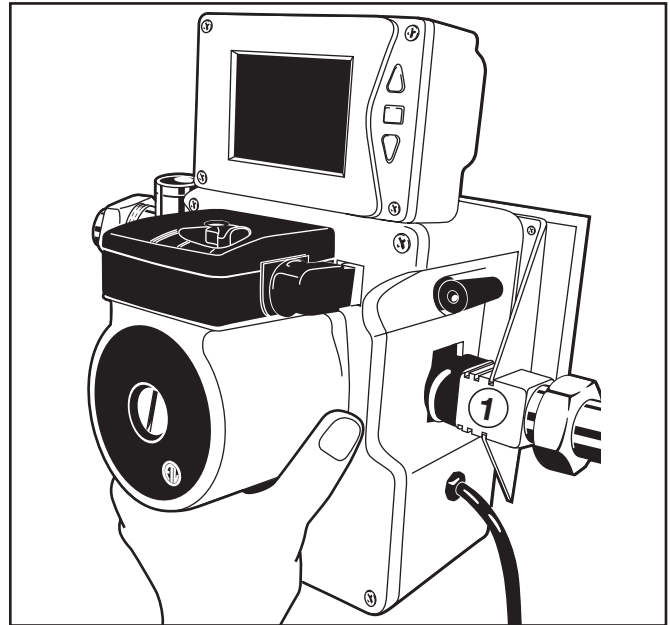
5. Insert fitting labeled "fitting 3" into port labeled "port 3" on the upper left. Firmly twist and press the fitting until fully seated. Repeat Step 3 to install fitting clip for "fitting 3."



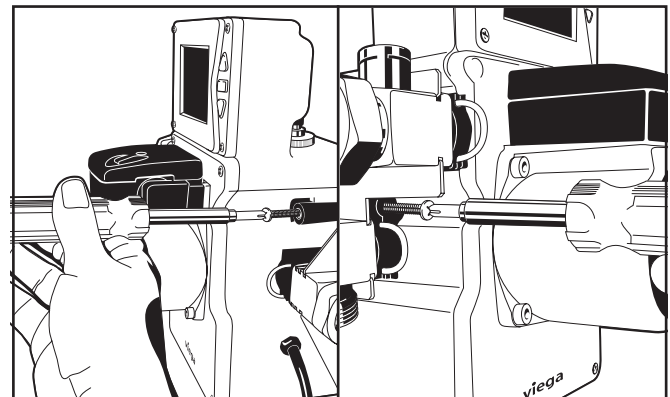
6. Attach the backplate to the wall using the four screw mounting holes. Level the backplate.
NOTE: The backplate should be secured to a solid backing surface such as plywood, or directly through drywall into wall studs. Drywall anchors or hollow wall anchors should not be used. Use flat head screws or #6 or smaller pan head screws for mounting the backplate. If mounting directly into wood backing, use 1" screws. If mounting through sheet rock, use 1½" screws (screws not included).



7. Slide the Hydronic Mixing Block into the backplate. The backplate will slide into the grooves in the supply fitting (fitting 1), return fitting (fitting 2) and delivery fitting (fitting 3).



8. Once the Hydronic Mixing Block has been fully inserted into the backplate, secure it to the wall using the two screws provided. The backplate has two mounting points, one on each side of the block.

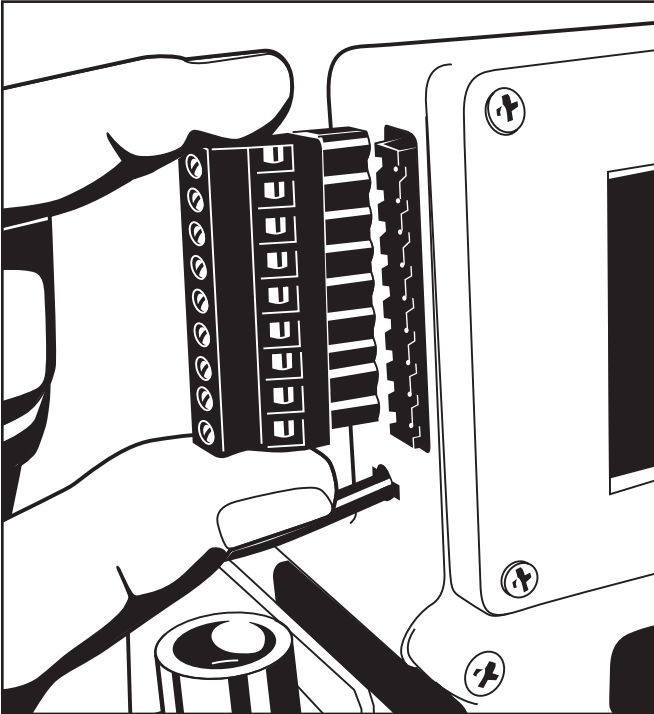


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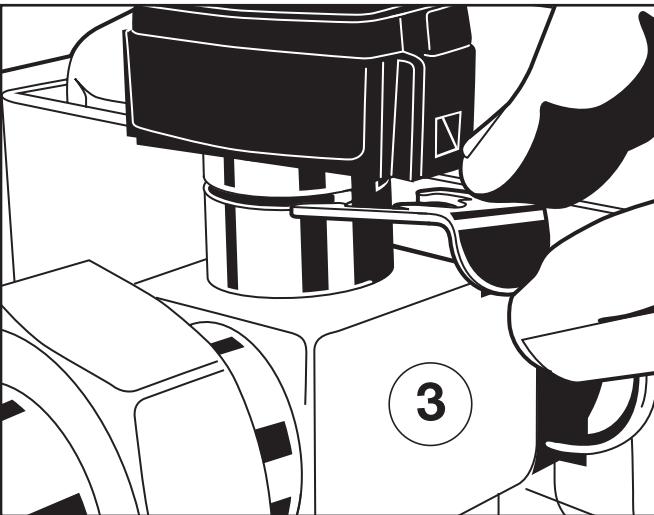
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9. Insert the wiring terminal block into the left side of the display screen. Firmly push inwards until fully seated.

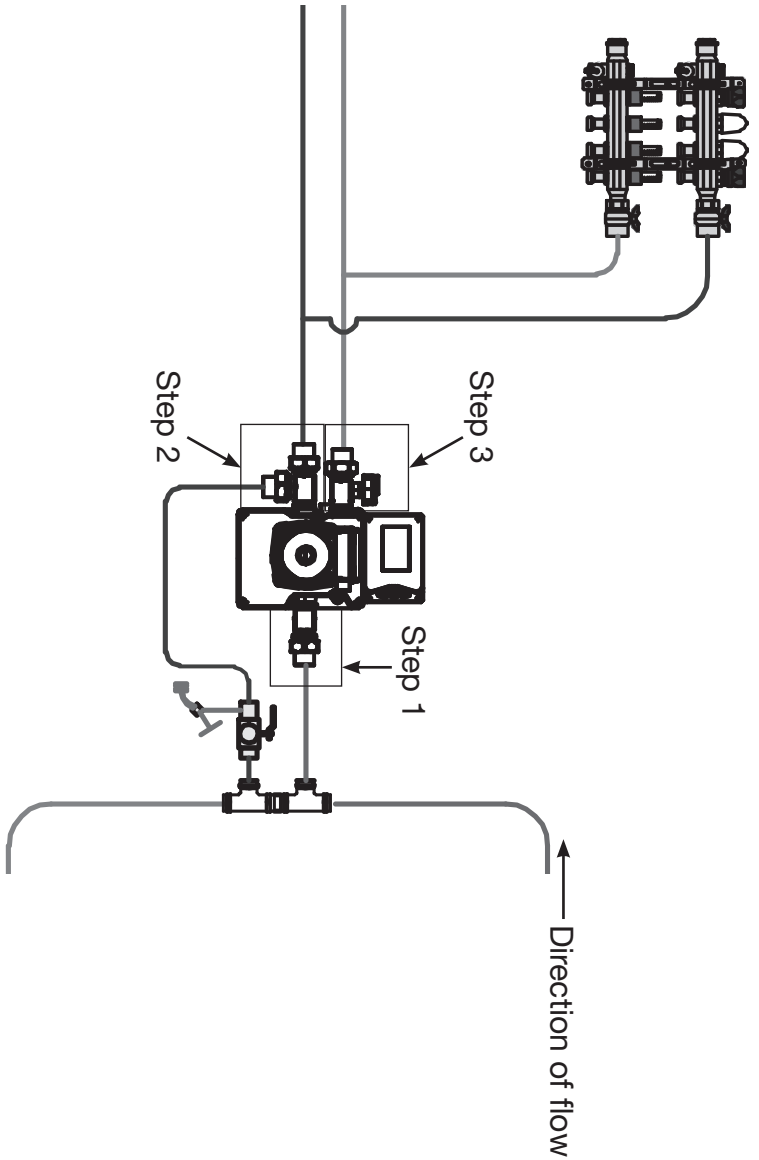


10. To install the pressure/temperature sensor into the delivery fitting (3), firmly push down until seated and secure with the stainless steel sensor clip. Install clip with the lip facing down.



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Connecting the Hydronic Mixing Block to the Primary Loop

1. Connect the Supply Fitting (fitting 1) on the Hydronic Mixing Block to the supply tee on the primary loop.
2. Connect the Return Fitting (fitting 2) to the return piping from the manifold. The branch connection on the Return Fitting (fitting 2) should connect to the return tee on the primary loop.
3. Connect the Delivery Fitting (fitting 3) to the supply piping to the manifold.

ProPress tailpieces may be used when connecting piping to the Hydronic Mixing Block. Sold separately.



* Available while supplies last. Tailpieces are listed P X Female union BSP.

ProPress Tailpieces for Use with Hydronic Mixing Block			
Part No	Dimension	Zero Lead	*Bronze
79800	1/2" x 1"	X	
79805	3/4" x 1"	X	
79810	1" x 1"	X	
77753	1/2" x 1"		*X
77758	3/4" x 1"		*X
77763	1" x 1"		*X

NOTE: Make sure to disassemble the fittings before soldering. The solder cup should not be attached to the gasket or Hydronic Mixing Block when soldering. Allow soldered fittings to cool to room temperature before re-assembly.

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Wiring

Connecting to the wiring terminal block

All wiring shall be done through the wiring terminal block. The wiring terminal block has 9 terminals and should be connected as follows:

Terminal 1,2 - Thermostat or end switch (terminal 1 and 2 can accept a dry contact or 24v powered contact)

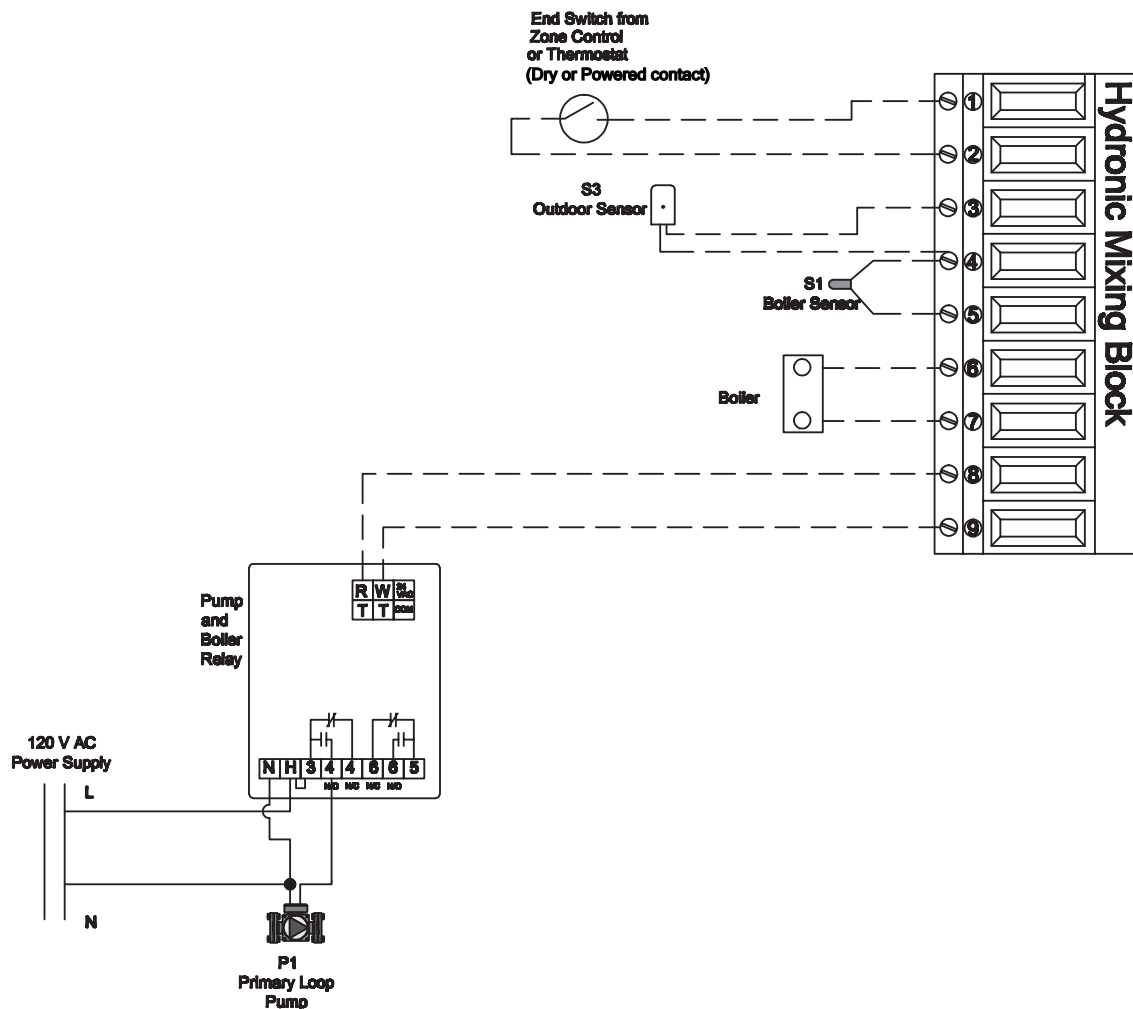
Terminal 3,4 - Outdoor sensor

Terminal 4,5 - Boiler sensor

Terminal 6,7 - Boiler contact (TT) relay rated for 24VAC 1.0 Max AMPS

Terminal 8,9 - Internal relay rated for 24VAC 1.0 Max Amps. With the addition of a pump and boiler relay this contact can be used for low head primary loop pump control.

Plug cord into 120 VAC Standard wall outlet (altering the cord will void the warranty).



Product Instructions

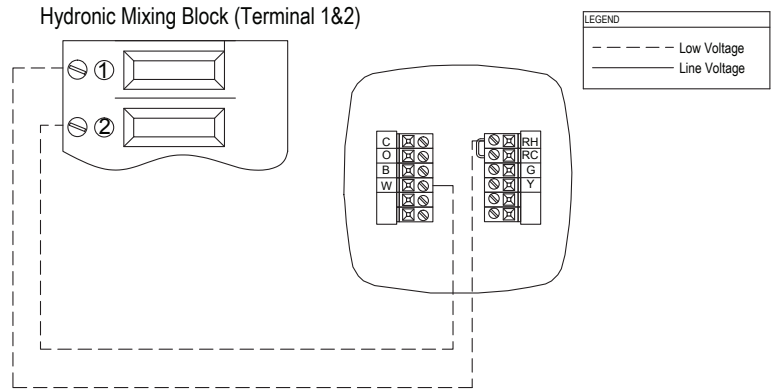


Connecting a Thermostat

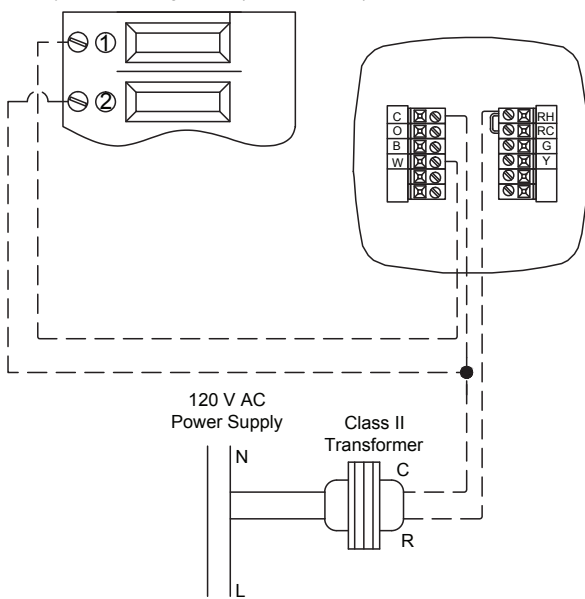
Two wire with battery thermostat wiring schematic for part numbers 15116, 15117, 15118:

1. Connect RH terminal on thermostat to terminal 1 on the Hydronic Mixing Block
2. Connect W terminal on thermostat to terminal 2 on the Hydronic Mixing Block (Part number 15118 W terminal is labeled W/E)

NOTE: Thermostat batteries must be installed and working for this configuration.



Hydronic Mixing Block (Terminal 1&2)

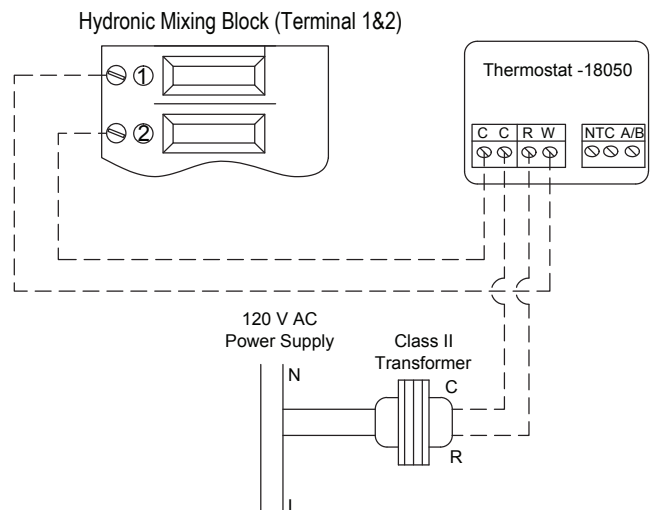


Three wire thermostat wiring schematic for part numbers 15116, 15117, 15118:

1. Connect R from the transformer to the RH terminal on the thermostat
2. Connect the C from the transformer to the C terminal on the thermostat
3. Connect the W terminal on thermostat to terminal 1 on the Hydronic Mixing Block (Part number 15118 W terminal is labeled W/E)
4. Connect terminal 2 from the Hydronic Mixing Block to the C terminal on the thermostat/transformer

Three wire thermostat wiring schematic for part number 18050:

1. Connect R from the transformer to the R terminal on the thermostat
2. Connect C from the transformer to C terminal on the thermostat
3. Connect W terminal on the thermostat to terminal 1 on the Hydronic Mixing Block
4. Connect C terminal on the thermostat to terminal 2 on the Hydronic Mixing Block



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Sensor Wiring

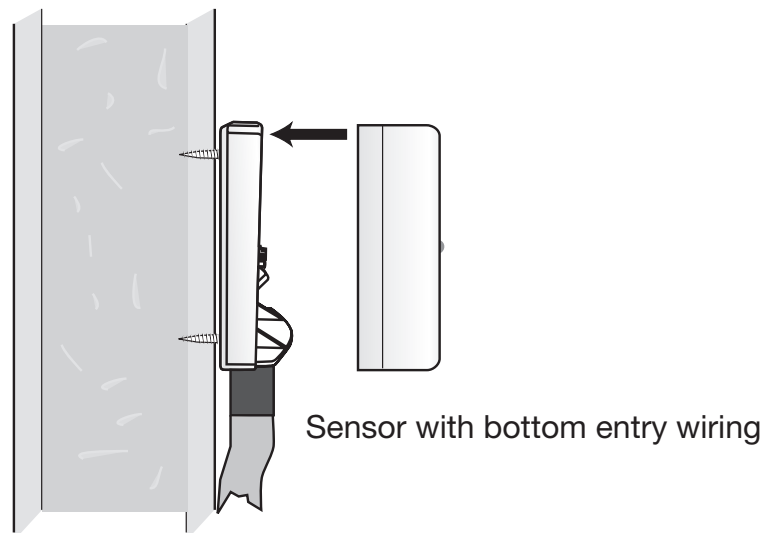
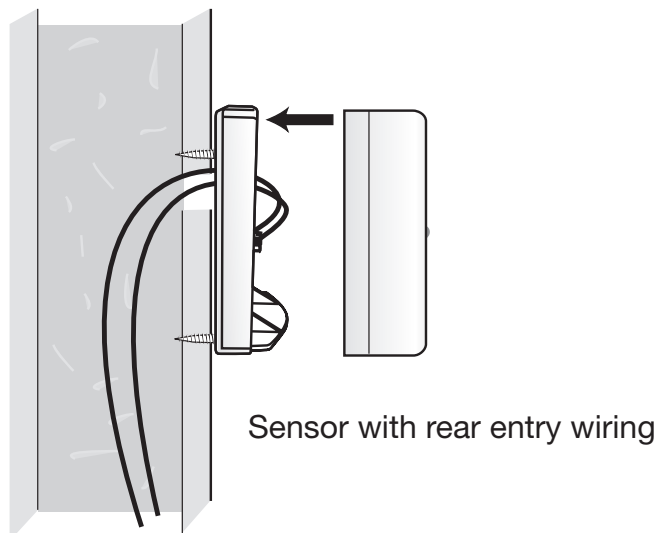
Installing the Outdoor Sensor

The Viega Hydronic Mixing Block includes an outdoor sensor with 10 k Ω thermistor which provides an accurate measurement of the outdoor temperature. The Outdoor Sensor is protected by a white UV resistant ABS plastic enclosure.

Mounting the Sensor

NOTE: The temperature sensor (thermistor) is built into the Outdoor Sensor enclosure.

1. Remove the screw and pull the front cover off the sensor enclosure.
2. Mount the Outdoor Sensor to a wall, with the wiring entering either through the back or bottom of the enclosure. Do not mount the Outdoor Sensor with the conduit knockout facing upwards as rain could enter the enclosure and damage the sensor.
3. The Outdoor Sensor should be mounted on a wall which best represents the heat load on the building (a northern wall for most buildings and a southern facing wall for buildings with large south facing glass areas). The Outdoor Sensor should not be exposed to heat sources such as ventilation or window openings.
4. The Outdoor Sensor should be installed at an elevation above the ground that will prevent accidental damage, tampering or snow/ice build up.



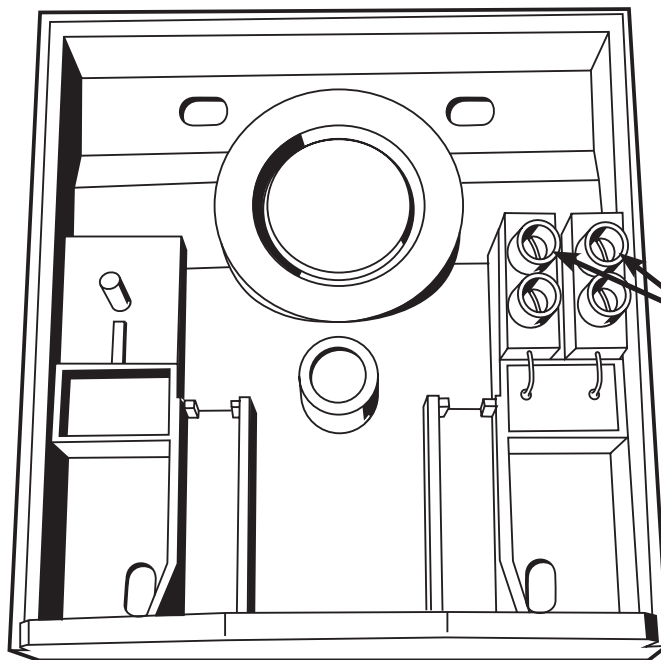
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1. Connect 18 AWG or similar wire to the two terminals provided in the enclosure and run the wires from the Outdoor Sensor to terminal 3 and 4 on the wiring terminal block. Do not run the wires parallel to telephone or power cables. If the sensor wires 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.

2. Replace the front cover of the sensor enclosure.

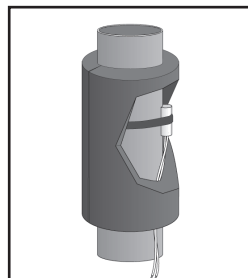
NOTE: Maximum wire length from control to sensor is 500 ft.



Wiring connection for
outdoor sensor wires
(terminal 3 and 4)

Installing the Boiler Sensor

1. Attach wires to terminal 4,5 on wiring terminal block.
2. Run the sensor back to the supply side of the primary loop. Attach to the supply piping before the closely spaced tees with the included zip tie. Cover the sensor with insulation for accurate reading.



NOTE: If used in BOILER AQUASTAT mode there is a choice to put sensor on the supply or return. CONDENSING or RESET boiler modes require the boiler sensor to be installed on the supply.

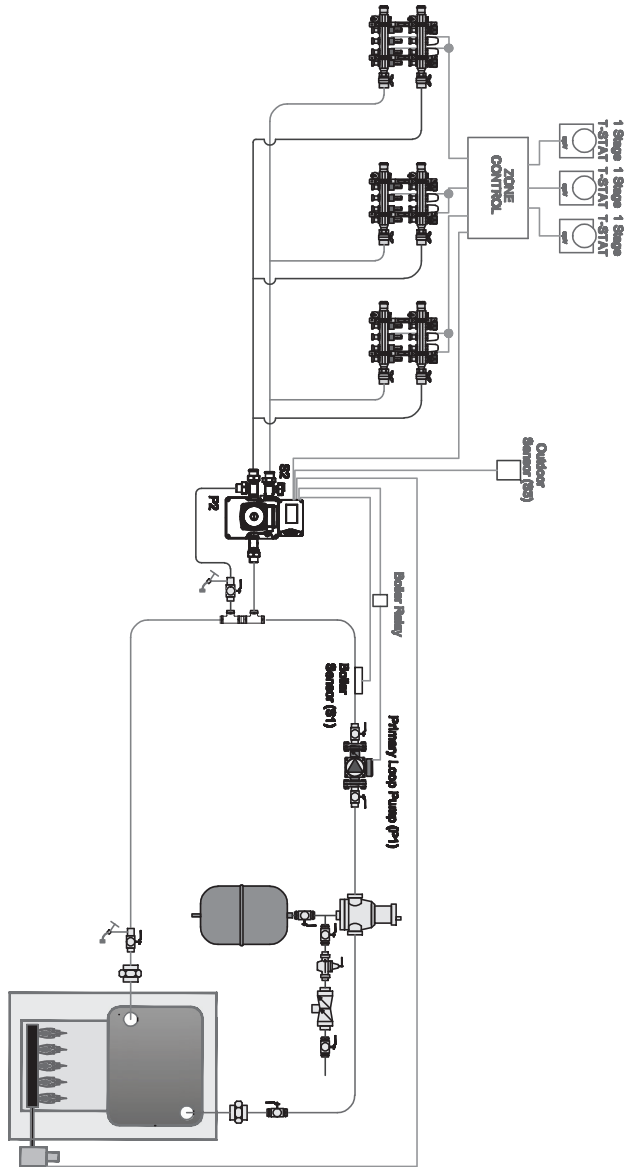
NOTE: When extending sensor wires, use 18 gauge wire and do not extend over 500'.

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Conceptual Piping Diagram



LEGEND: Hydronic Mixing Block	
	Hydronic Mixing Block
	Spring check
	Circulator
	Draw Off (Purge Valve)
	Make - Up Water
	Pressure Differential Bypass Valve
	Stainless Manifold w/ Flow Gauges
	Bandboard Zone (e)
	Diaphragm-Type Expansion Tank
	Zone Valve

Piping

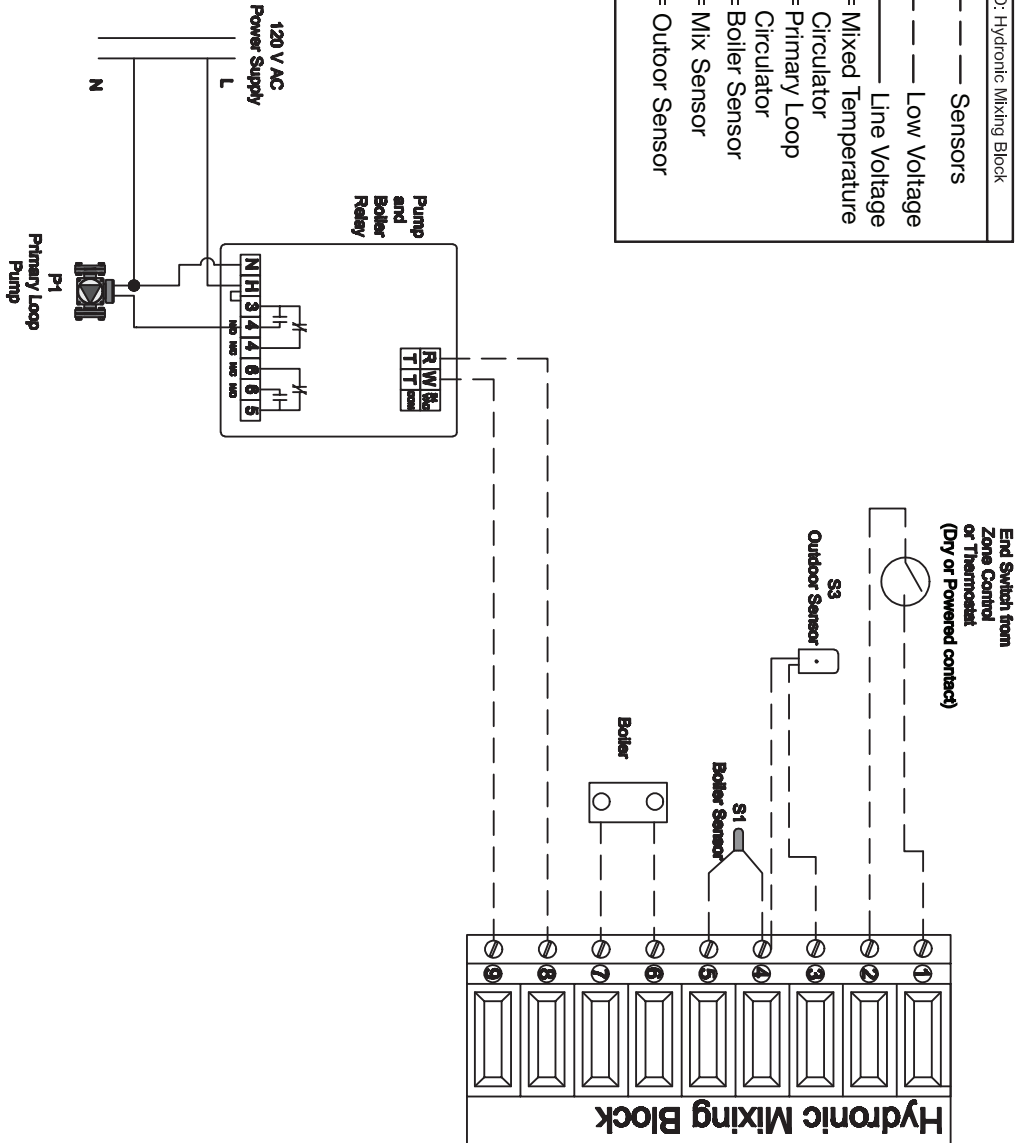
1. This drawing shows system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
2. Size primary loop piping for maximum flow velocity of 2 feet/second.
3. All other piping should be sized for a maximum flow velocity of 4 feet/second.
4. Install a minimum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

Product Instructions



Conceptual Electrical Schematic

LEGEND: Hydronic Mixing Block	
— — — — —	Sensors
— — — — —	Low Voltage
— — — — —	Line Voltage
— — — — —	P1 = Mixed Temperature Circulator
— — — — —	P2 = Primary Loop Circulator
— — — — —	S1 = Boiler Sensor
— — — — —	S2 = Mix Sensor
— — — — —	S3 = Outdoor Sensor



Wiring

1. This drawing shows system wiring concept only. Installer is responsible for all equipment and detailing required by local codes.
2. All wiring shall be in conformance with the latest edition of the National Electrical Code.
3. Maximum current rating of the Hydronic Mixing Block is 1 AMP.
4. Consult with control / boiler manufacturer for limitations and installation instructions.
5. 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 Sen terminal on the control and not to earth ground. Use 18 AWG copper wiring for all sensor wiring. Sensors should be located before the closely spaced tees.

Product Instructions

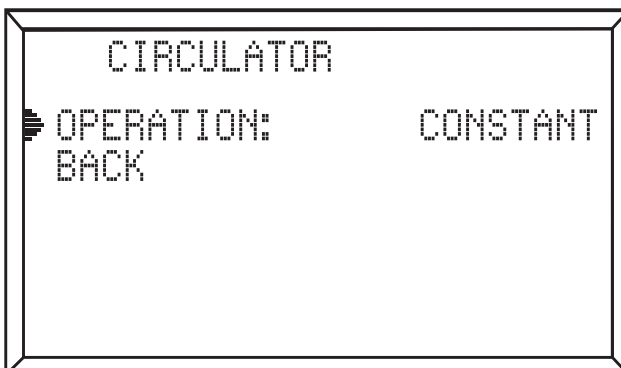
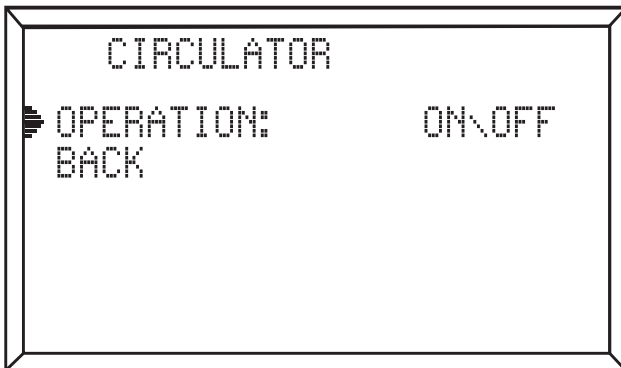
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




Programming

SETUP MENU



CIRCULATOR CONTROL



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 de-select 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.

- **OPERATION: ON/OFF** — The circulator is turned on/off as demand requires. Default is set to ON/OFF.

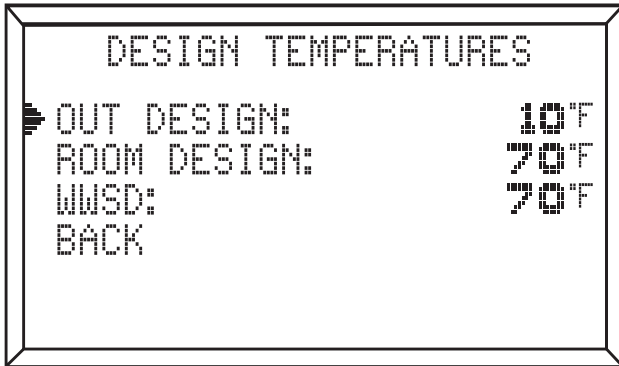
- **OPERATION: CONSTANT** — The circulator is constantly on and will only be shut off with warm weather shut down (WWSD). Usually used with RESET mode.

NOTE: This function is not available with BOILER AQUASTAT mode.

Product Instructions

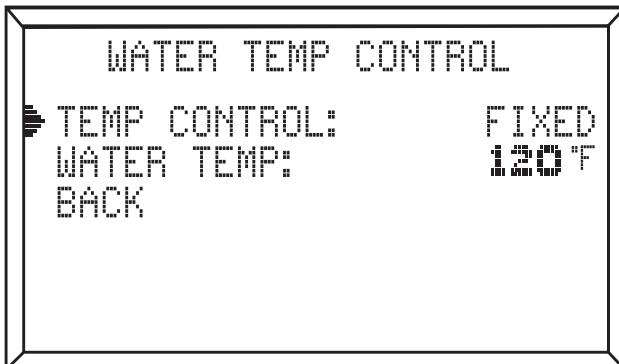
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DESIGN TEMPS

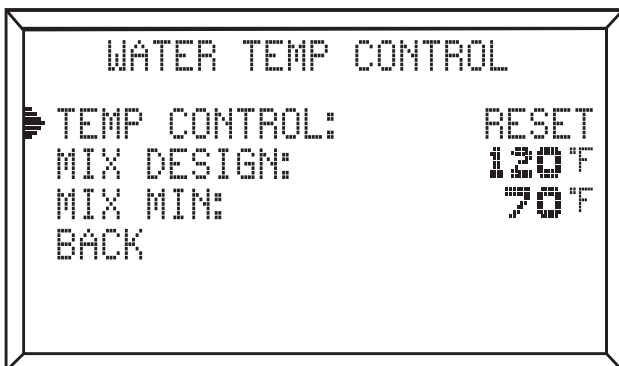


- **OUT DESIGN** — Outdoor temperature used to calculate heat loss. This temperature is based on location and can be obtained from outdoor design charts.
Range: -40°F to 70°F
Default: 10°F
- **ROOM DESIGN** — Desired room temperature used in heat loss calculation.
Range: 35°F to 120°F
Default: 70°F
- **WWSD** — Temperature at which the building does not need heat and the control will no longer activate the circulator.
Range: 35°F to 120°F
Default: 70°F

WATER TEMP CONTROL



- **TEMP CONTROL: FIXED** — The control will maintain a constant (FIXED) water temperature.
- **WATER TEMP** — The fixed water temperature.
Range: 50°F to 180°F
Default: 120°F



- **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 radiant system will meet the load of the structure, resulting in an energy savings for the building owner. Default: Reset
- **MIX DESIGN** — The design water temperature specified by the radiant design. This is the maximum water temperature that will be supplied.
Range: 50°F to 180°F
Default: 120°F
- **MIX MIN** — The minimum supply temperature for the mixing system.
Range: 50°F to 180°F
Default: 70°F

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BOILER SETTINGS

```
BOILER SETTINGS
TYPE: RESET
BOILER DESIGN: 180°F
BOILER MIN: 140°F
BOILER DIFF: 20°F
BACK
```

- **TYPE: RESET** — This setting allows for the boiler to change supply water temperature based on outdoor temperatures.
- **BOILER DESIGN** — The water temperature needed on design day.
Range: 70°F to 200°F
Default: 180°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
- **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° below the boiler target temp.
Range: 10°F to 50°F
Default: 20°F
- **TYPE: AQUASTAT** — Used when the boiler is a non-condensing boiler that maintains its own temperature settings. **This mode is not available with constant circulation.**
- **SENSOR** — Installed on either SUPPLY or RETURN. Installation must be properly identified in this setting.
- **SUPPLY MIN/RETURN MIN** — Minimum supply/return temperature.
Range: 70°F to 200°F
Default: 140°F
- **TYPE: CONDENSING** — Used when the boiler is a condensing boiler that maintains its own temperature settings.

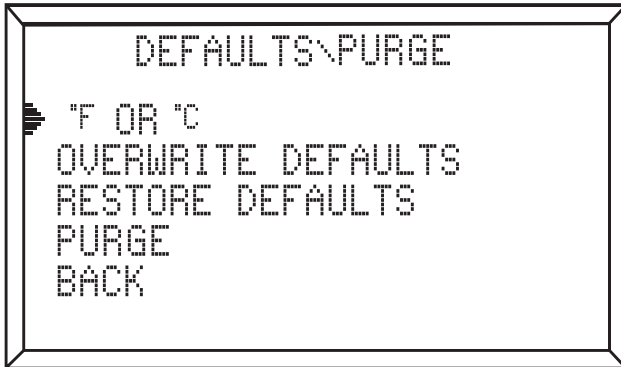
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BOILER SETTINGS
TYPE: AQUASTAT
SENSOR: SUPPLY
SUPPLY MIN: 140°F
BACK
```

```
BOILER SETTINGS
TYPE: CONDENSING
BACK
```

Product Instructions

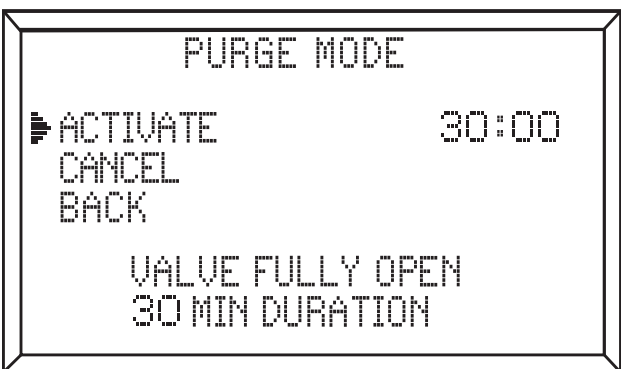
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DEFAULTS\PURGE



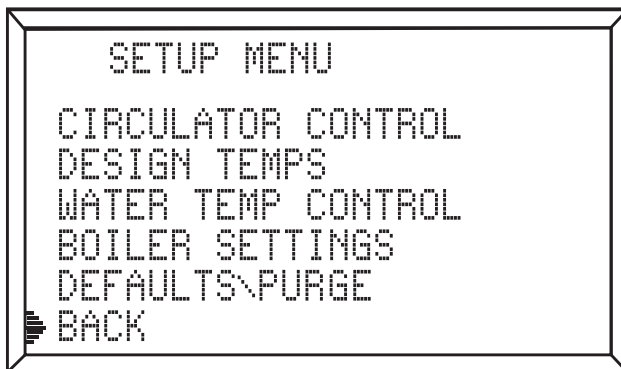
- **F OR C** — Select between FAHRENHEIT or CELSIUS.
Default: Fahrenheit
- **OVERWRITE DEFAULTS** — Will allow you to change the DEFAULTS within the control.
- **RESTORE DEFAULTS** — RESTORE the current DEFAULTS.
- **PURGE** — Selecting this feature will bring you to PURGE MODE.



PURGE MODE



- **ACTIVATE** — Will open the internal valve for 30 minutes to allow for purging.
- **CANCEL** — Will end the PURGE MODE, end the timer and close the internal valve.

SETUP MENU



- To view the STATUS screen, select BACK with the cursor arrow  in the SETUP MENU and push the middle rectangular button. 

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STATUS SCREEN

STATUS		
HEATING		TARGET
BOIL SUP	68°F	166°F
SYSTEM	72°F	103°F
OUTDOOR	30°F	
PRESSURE	17.6 PSI	
VALVE POSITION		
BOILER	40%	PROTECT

The STATUS screen shows the actual temperatures as read by the sensors and the target temperatures the control is trying to obtain.

- **HEATING** — If the display screen is red and heating is displayed on the upper left corner of the STATUS menu, the control is in heating mode and there is a boiler demand. If the display screen is blue, it means there is a heating demand but the boiler is off. If the screen is white, there is no heating demand.
- **BOIL SUP/RET** — The temperature of the boiler supply/return. This will be dictated by the sensor location. If on the supply this will read: BOIL SUP. If on the return it will read BOIL RET. When the boiler sensor is bad or there is a broken/shorted wire, it will be represented by 5 dashes ----- in the supply field and the control display will blink red. The block will supply 80°F to the floor/emitter to keep the system from freezing.
- **SYSTEM** — The mixed water temperature that the Hydronic Mixing Block will supply. This symbol: ----- present in the field means the sensor the sensor is bad or the wire is broken or shorted.
- **OUTDOOR** — The outdoor temperature as read by the outdoor sensor.
- **PRESSURE** — The system pressure is read by the temperature/pressure sensor located to the left of the display screen. The number displayed in this field is the system pressure. If the words LOW are present in the pressure field for one minute, the control will shut the block down to prevent damage. If the symbol: ----- is present it indicates the sensor is bad or the wire is broken or shorted.
- **VALVE POSITION** — Identifies the position of the internal valve.
- **BOILER PROTECT** — If the display screen is yellowish/green and BOILER PROTECT is present in the lower left and right of the screen, the boiler is in protection mode.

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Screen Color Indicator	Status
Light Blue/Gray	No Heat Demand
Solid Red	Heat demand, boiler running
Yellow/Green	Heat demand, boiler running but in boiler protection mode
Dark Blue	Heat demand, boiler satisfied
Blinking Red	Failed boiler sensor or broken/shorted wire. Under this condition the block will supply 80°F fluid to the floor/emitter to keep the system from freezing
Blinking Purple	PURGE MODE, will open valve for 30 min duration to allow for purging


Testing the Hydronic Mixing Block

When piping is complete, test the Hydronic Mixing Block and system piping.

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.

Purging

When testing is complete, purge the Hydronic Mixing Block.

1. Shut the power off to the boiler.
2. Purge with only cool water, if the boiler is hot it should be cooled down prior to purging, this is done to protect the floor coverings from surface temperatures above 85°F.
3. Plug in the Hydronic Mixing Block, allow it to run through its initial setup and bring you to the STATUS screen.
4. From the STATUS screen push the middle rectangular button. 
5. DEFAULTS/PURGE
6. Select PURGE
7. Select ACTIVATE
 - Selecting ACTIVATE will cause the screen to turn purple, at which time the internal valve will open, once the valve is open the screen will blink purple and start a 30 minute timer to allow for purging
 - If more time is needed, ACTIVATE may be selected as many times necessary to complete system purging
 - If less time is needed purge can be cancelled by selecting CANCEL
8. Allow the Hydronic Mixing Block to be filled with fluid from the supply side piping.
9. Close the valve on the return piping to the boiler.
10. Open the purge valve to allow trapped air to be eliminated.
11. Continue to allow fluid to run into the block and out the purge valve until all air is removed from the system.
12. Once purging is complete, return all valves to normal operating position.
13. Open the air vent cap to allow air to escape under normal operation.

NOTE: See page 9 for piping and purge valve configurations.

14. Once the Hydronic Mixing Block, boiler and piping has been purged and properly pressurized, restart the boiler.

Testing the Sensors

OUTDOOR SENSOR / BOILER SENSOR

- 1a. Outdoor Sensor
 - Use a thermometer to read the outdoor temperature.
- 1b. Boiler Sensor
 - Use an infrared or digital thermometer to read the temperature where the boiler sensor attaches.
2. Using an ohm meter capable of measuring 10kΩ, measure the resistance present at the sensor.
3. Using the resistance chart on page 18, compare the measured temperature/ ohm reading to what is in the chart. If reading is off by ± 5% the sensor is bad.

NOTE: Do not apply voltage to the sensors as this will damage them.

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Product Instructions

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Sensor Resistance Chart

Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	90	32	7,334
-45	-43	405,710	95	35	6,532
-40	-40	336,606	100	38	5,828
-35	-37	280,279	105	41	5,210
-30	-34	234,196	110	43	4,665
-25	-32	196,358	115	46	4,184
-20	-29	165,180	120	49	3,760
-15	-26	139,402	125	52	3,383
-10	-23	118,018	130	54	3,050
-5	-21	100,221	135	57	2,754
0	-18	85,362	140	60	2,490
5	-15	72,918	145	63	2,255
10	-12	62,465	150	66	2,045
15	-9	53,658	155	68	1,857
20	-7	46,218	160	71	1,689
25	-4	39,913	165	74	1,538
30	-1	34,558	170	77	1,403
35	2	29,996	175	79	1,281
40	4	26,099	180	82	1,172
45	7	22,763	185	85	1,073
50	10	19,900	190	88	983
55	13	17,436	195	91	903
60	16	15,311	200	93	829
65	18	13,474	205	96	763
70	21	11,883	210	99	703
75	24	10,501	215	102	648
80	27	9,299	220	104	598
85	29	8,250	225	107	553

Product Instructions

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Technical Data

Input Voltage/Current

120 VAC \pm 10% 60 Hz, 2A

Sensors

(2) 10k Ω - 1 boiler sensor, 1 outdoor sensor
Sensor wiring may be extended up to 500'
Use 18 gauge wire when extending

Boiler Relay

24VAC 1.0 MAX AMPS

Circulator Relay

24VAC 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

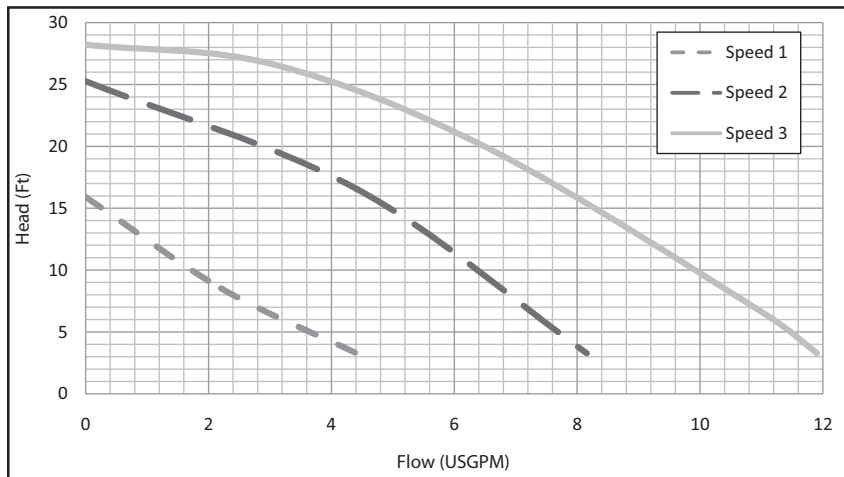
ETL Listings

Meets CSA C22.2 No. 24
Meets UL Standard 873
ETL Control No. 3068143

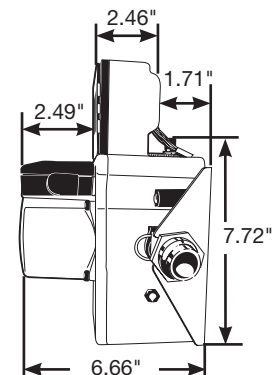
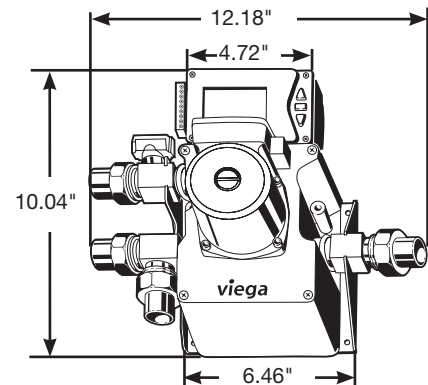
Part No

56160

Pump Curve for Hydronic Mixing Block



Dimensions



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