HUG HYDRONICS

Radiant Plumbing Made Simple

USER MANUAL

A Product of
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Table of Contents

Introduction & Overview

What is HUG Hydronics

HUG Hydronics is a novel, patent pending, hydronic fluid distribution system, ideal for heated floors. This system design eliminates the need for expansion tanks, bubble removers, pressure regulators, fill valves, drain valves, pump isolation valves, temperature and pressure safety valves, zone valves, manifold valves, and manifolds. HUG Hydronics also eliminates all pipe joints and associated complications and failure rates that go with all those components.

Summary of Operation

The Hydronic controller is an indoor use, floor-mounted system, powered by a 120V single phase to 12VDC power supply. The controller uses conventional/heating thermostats, water temperature and water level sensors to control the fluid distribution in a radiant floor system.

Models Available

- 1090-03-AF - starter kit - includes 3 pumps (expandable up to 10)
- 1090-06-AF - includes 6 pumps (expandable up to 10)
- 1090-10-AF - includes 10 pumps

Key Features

- Simple and understandable
- Easy to troubleshoot, LEDs and alarms warn of any faults.
- Quick & easy installation and repair; replace any part without tools.
- Safe to work with: no water pressure and low voltage.
- Compact, tough, modern, attractive design.
- Easily works with up to 3 heat sources; such as electric, gas, solar, wood.
- Supports up to 4 thermostats, (4 zones).
- Compatible with both traditional and smart thermostats.
- Any heat loop can be assigned to any zone by simply moving a jumper.
- Supports external relay control for heat sources or pumps.

Why it is Easy to Set-up and Maintain

This system is one of the easiest to set-up and maintain because it offers quick installation that only requires basic tools that most do-it-yourselfers have on hand. In addition it is designed to have far fewer valves, joints, and other typical parts meaning you can use our high quality silicone hoses that just push onto the pipes and eliminating most opportunities for leaks. We have also added convenient LEDs to help you recognize and diagnose system issues such as low water, excessive temps, or a failed component. Plus, most of the replacing of failed components can be done without any tools. If you would prefer an audio alarm there is also an optional alarm board that provides a buzzing noise to notify you even when the unit is out of sight.

Specifications

Overall Dimensions	16.75 ” deep; 22” tall; 34” wide with power supply; 42.5cm deep; 56 cm tall; 87cm wide
Power Supply Unit Input Voltage	120/240 VAC 50/60Hz @ 6A max
Tank Size	11 gallons max (water/glycol*); (8 gallons minimum) 41.5 liters max (water/glycol*); 30 liters minimum *NOTE: Glycol MUST be rated for heating applications
Tank Temperature Settings	5 steps from 85˚F (29˚C) to 160˚F (71˚C) 170˚F (77˚C) tank maximum temperature
Ambient Operating Temperature	32˚F to 10˚F outside tank (+0˚C to 50˚C outside tank) (Above 32˚F(0˚C) for 100% water)
Thermostat Zones	Up to 4 Zones (with 1 low priority via jumper) Supports Thermostats that require 24VAC (refer to page #26 in the manual)
Max Number of Pumps	10
Max Number of Heat Source Loops	3
Max Number of Heat Load Loops	9 (with one heat source) up to 18 with “Y” adaptors
Intertek Certified to Meet UL/CSA Standards	UL60335-2-40/CSA C22.2 60335-2-40, and UL 60335-1/CSA C22.2 60335-1 (Intertek Certified)

Environmental Pollution Rating (IEC 60947–1)	Low - Pollution Degree 2. Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation may be expected.

Individual Pump Specs	
Power	12V, 4.5A max (0.9 A nominal @ low speed; 2.5A @ MED)
Max Static Lift	19.5 feet (6 meters)
Max Flow Rate	5.5 GPM (1260 l/h)
Flow in Typical Hydronic Loop	300 ft. (½" ID tubing) Speed at MED 341 l/h (1.39 GPM)
Pump Life	More than 20,000 hours

Power Supply Specs	
Power Supply Unit Input	120 VAC @ 6A max
Power Supply Output	12 VDC @ 26A Max
Power Supply Operating Temperature	32˚F to 120˚F (0˚C to 50˚C)
Meantime between Failure	140,000 hours

Safety Notices

Installation, Operating and Safety Instructions - The following instructions are for the safe installation and use of this product

- This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the product.
- The product is only to be used with the power supply unit provided. A damaged cord is to be replaced with one supplied by HUG or the manufacturer and not a repaired cord.
- This product is to be installed in accordance with national, state, and local wiring regulations.

- The minimum dimensions of the space necessary for correct installation of the product including the minimum permissible distances to adjacent structures must be adhered to for safe operation. Please refer to the installation section of this manual.
- A wiring diagram with a clear indication of the connections and wiring of the product is provided at the end of this manual.
- Information regarding the method of connection of the product to the supply mains and interconnection of separate product components are provided in the installation section of this manual.
- Details of the type and ratings of replaceable fuses are provided in the service section of this manual.
- Information regarding the maximum and minimum water operating temperatures are provided in the specification section of this manual.
- Information regarding the purpose of the product controls are found in the operation section of this manual.
- Information regarding the product ambient temperature range is provided in the specification section of this manual.

Take particular note of the NOTICE and CAUTION symbols when they appear. This information is important for the safe and efficient installation and use of the HUG Hydronics System.

NOTICE signals a situation where potential damage to the equipment could occur.

CAUTION signals a situation where potential harm or risk of minor injury could occur if instructions are not followed.

- Hazards include electrical and hot water
- Take precautions when opening the lid as the water may be hot
- Allow the system to cool before replacing submersible pumps or draining the tank.

IMPORTANT Local Electrical and Plumbing Codes ***must*** be followed. Please refer and adhere to all appropriate state & local applicable codes for the installation. The product is to be installed in accordance with national wiring regulations.

Quickstart Installation Guide

SCAN ME

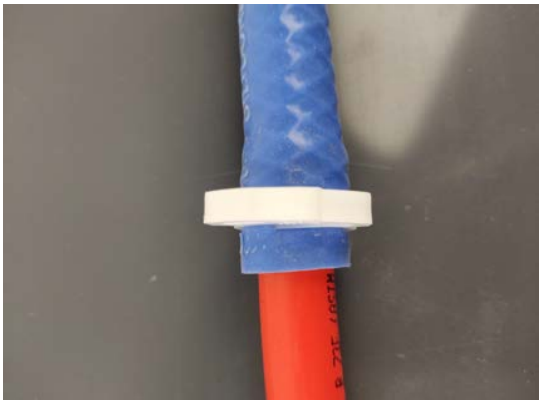
This guide is intended for those who have the standard factory assembled version. If your system requires extra preparation, please refer to the installation manual for further instructions.

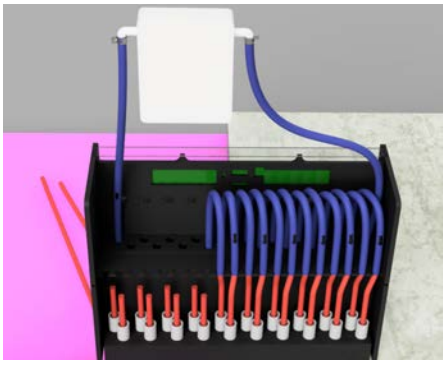
The following checklist assumes that the following items are completed or available:

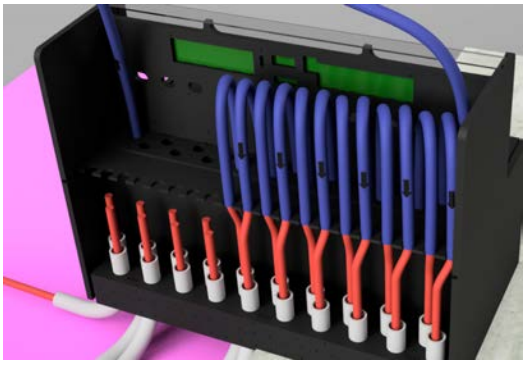
- ☐ The heat source is installed and ready for operation.
- ☐ The radiant PEX pipes are installed in the floor and the pipe ends are trimmed at 14-16 inches above the floor, and behind where the tank will be located.
- ☐ The water connections coming from the heat source have ½ inch hose barbs on them.
- ☐ A 15 amp 120 volt AC GFCI electrical outlet is installed within 4 feet of the tank.
- ☐ The thermostats are installed and the thermostat wires are run to the tank location.
- ☐ The correct amount of distilled water and antifreeze (0.92 gallons per 100ft of ½” PEX)
- ☐ Required Tools:
- ☐ Small flat-head screwdriver
- ☐ Hose cutter or shear.
- ☐ The HUG Hydronic Package should include:
- ☐ Tank assembly, with pumps, hoses, and power supply installed
- ☐ User Manual with installation instructions
- ☐ HUG Holey Hose Holder ™ (Optional)

Step 1: Connect the Plumbing

- ☐ A) Remove the tank from the package and remove all the packing materials, including the cardboard braces from inside the tank.
  - ☐ Ensure that all pumps are properly seated in their respective grooved holders.
- ☐ B) Connect the (optional) hose to the overflow port.
  - ☐ The port is located on the backside of the tank. It fits ½" ID tubing.
  - ☐ Note* *The optional overflow hose is only used to guide accidental overflow to a safe place.*
- ☐ C) Place the tank 6 - 10 inches (15 - 25 cm) in front of the PEX pipes.
- ☐ D) Connect source and return hoses to the PEX loop pipes.
  - ☐ Hoses come out of the tank in 2 rows. The hoses marked with an arrow are source lines to the loop. The unmarked hoses are for return lines.
  - ☐ Trim hoses as needed to match the Pex pipes.
  - ☐ Firmly push & twist the silicone hoses at least 1 inch (25mm) onto the respective (PEX) pipes for the source and return lines.
  - ☐ Add the clamp to firmly secure the joint



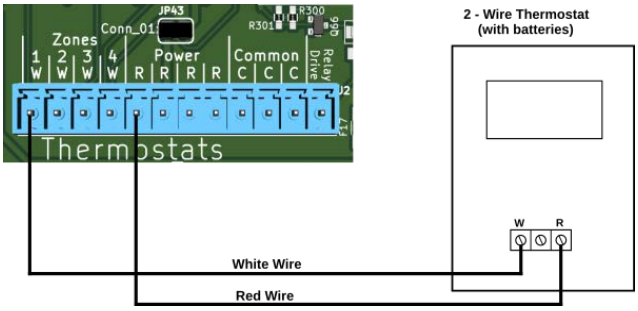




☐ E) Connect the water heater hoses.

- ☐ Hoses with an arrow are cold water into the heater
- ☐ The rightmost hose from the rear is the hot water from the heater
- ☐ Trim hoses as needed to match the heater connections
- ☐ Firmly push the 2 long hoses onto the heater inlet and hot outlet accordingly
- ☐ Add recommended clamp to firmly secure the joint

Step 2: Thermostat Wires

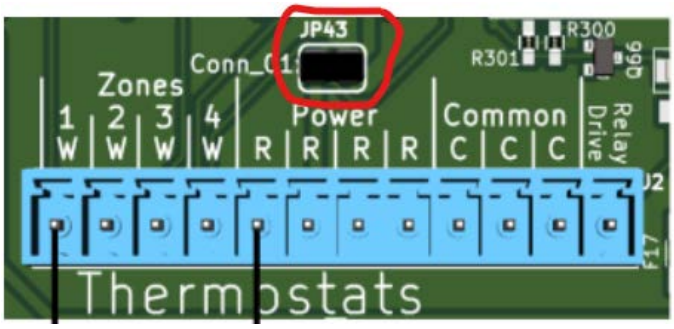


☐ A) Connect the thermostat wires:

This system can support up to 4 zones

- Your thermostat will wire to the 12 pin connector at the bottom center of the board.
- Thermostat 1 connects from Zone 1 to 12V Power (pins 1 and 5 in figure)
- Thermostat 2 connects from Zone 2 to 12V Power (pins 2 and 6 in figure)
- Thermostats 3 & 4 connect to Zone 3 & 4 to 12V Power accordingly

Note: If a smart thermostat is used, it will require a 24VAC. (See thermostat manual.) Jumper JP43 must be in place for 12V thermostats & removed for 24VAC.



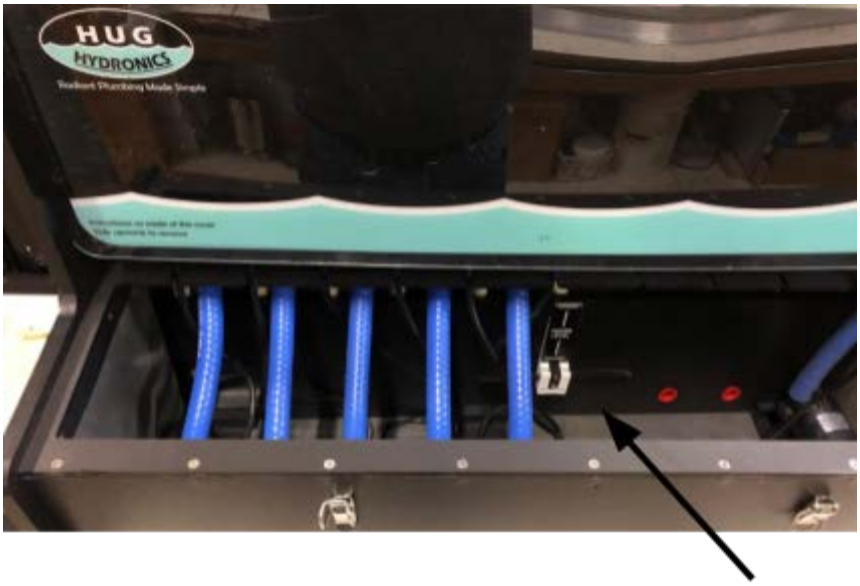
☐ B) Replace cover shield in front of the control board

Congratulations! The HUG System is now installed and ready to Start-Up!

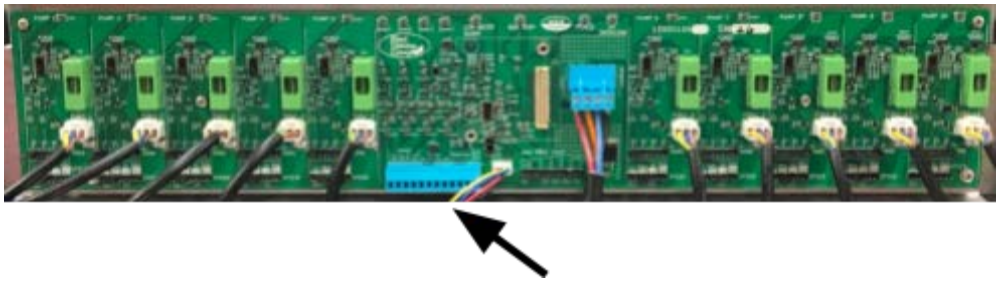
Step 3: Initial Start-up Procedure - Fill and Purge Tank

☐ A) Pour water or a water/glycol mixture into the tank until it is between the low and full marks. This usually takes about 8 gallons of water.

**Note: Distilled or Reverse Osmosis water is recommended to minimize scaling.*



☐ B) Remove the cover and unplug the thermostat connector.



NOTICE **Important**! Make sure that any unused pumps are unplugged.

☐ C) Plug in the tank power supply into the 120 volt outlet. Do **NOT** turn on the heat source.

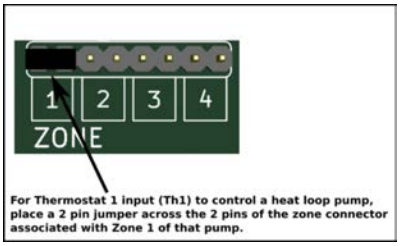
☐ D) Turn on the power supply power switch.

- ○ The green “Power” light at the center top of the control board should illuminate.
- ○ All pump lights with pumps plugged in should be dim green.
- ○ There should be NO red or blue lights on, unless you already have warm water. If so, then the aqua “Max temp” light might come on

Step 4: Prepare the Pumps & Pump Settings

- ☐ A) Purge air out of the heater and pipes.
  - **Only purge one pump at a time.**
  - Place a spare jumper on the “Purge” pins for pump 10.
  - The pump light should be illuminated bright yellow.
  - Let the pump run until gurgling sounds in the water tank cease.
  - Repeat the purging for each pump that is in use.
  - The water level in the tank will drop during this process, so add more water to maintain the level between “Low” and “Full.”

    **Note: Each 300 foot PEX loop holds about 3 gallons of water.*
  - Return the spare jumper when complete.
- ☐ B) Power up the heat source and set the desired temperature (120°F (49°C) to 140°F (60°C) is a typical setting) on the heat source.
- ☐ C) Plug in the thermostat connector and turn up thermostats higher than the current ambient room temperature.
  - Each active thermostat should show a blue “Zone” light at the top of the control board above the thermostat connector.
  - All pumps should be active, indicated by a corresponding green light. The green light will get brighter.
- ☐ D) Assign the zones.
  - All pumps are initially assigned to zone 1, except pump 10. Pump 10 is for the heat source and is pre-assigned to all 4 zones.
  - Note* if there is only one zone, the zone jumpers are already set.
  - For each pump, move the zone jumper to the corresponding thermostat zone.



Step 5: Adjust Heat Source & Thermostats

- ☐ A) Re-adjust heat source temperature to the desired temperature.
  - See the user manual heat source section.
  - Lower water temps may make the heater last longer; and gently heat your floor.
  - Higher water temps transfer more heat. Increase the water temperature if your floor doesn’t stay as warm as the thermostat setting.

Step 6: Final Checks

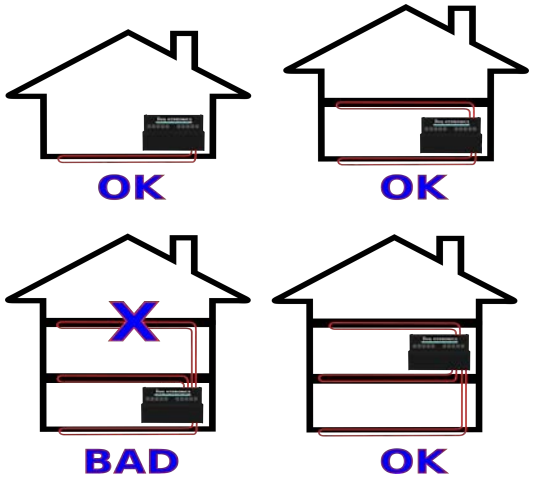
- ☐ A) Fill the water tank level to the full mark
  - *Note: *Add a calendar reminder to check the water level every 6-months.*
- ☐ B) Reinstall and latch the tank cover. **Water may be hot.** ⚠CAUTION
- ☐ C) Complete a final check with the thermostat(s) calling for heat:

  - Check that the indicator lights for the appropriate pump(s) are working.
  - Check that the heat inlet hose(s) to the tank are warming. (The hose should be warm to the touch.)
  - Close the cover shield over the control board.

Congratulations! Startup is Complete!

Planning the Installation

- Placement in Building
  - The pumps in this system run at lower pressures, which affects the optimal placement in a building. Place the unit so it only has to lift water two floors above or below it.



- Footprint and Mounting
  - The HUG system footprint typically extends about 18 inches (46cm) from the wall, is about 33 inches (84cm) wide, and 22 inches (56cm) tall - depending on the PEX location.
  - Allow about 1 inch (25mm) on each side from other objects to safely install the unit.
  - The recommended floor space required is 36” wide (91cm) x 18” (56cm) deep plus 24” (63cm) in front of the tank to service.
  - About 12” (30.5 cm) is needed above the tank for cover removal.
  - While most commonly installed on the floor, it could be installed on a wall by constructing a shelf capable of holding 200 lbs.
  - When installed on a concrete floor the system produces less than 45dB at one yard.
  - The only minimum distance required behind the unit to the wall is about 1 inch (25mm) plus the space needed for the PEX connections which ideally fit within the footprint.
  - The added space required for the hydronic heat source varies depending on the source(s) selected. Please check the manufacturer’s heater specifications for the recommended space requirements.

- Planning Heat Load Loops + Heat Sources
    - One pump will be required per heat source.
    - One pump will be required per heat loop.
    - One unit may house up to ten pumps, if more than ten pumps are required, you will need to install a second system.

- Planning pumps needed for in-floor loops

Each pump can service a standard loop of ½" (25.4mm) PEX tubing, up to approximately 300 ft (91m) in length. A 10 pump unit with one heat source can service 9 heat load loops. Most radiant floors are installed at 1 linear ft of tubing per square foot of floor, and 300 ft per loop. Therefore, In an average insulated home, 9 pumps can service up to 2700 sq ft of heated floor space. (For radiant floors with 3.4 linear meters of tubing per square meter of floor and 91m per loop, 9 pumps can service up to 250 square meters of heated floor space.) For more energy-efficient buildings, the square footage coverage can be increased.
**Note: Contact HUG Hydronics for assistance in calculating coverage.*

For buildings over 2700 sq ft it is recommended to utilize pump splitters. Each pump can accommodate one splitter to double the square feet from 300 to 600 square feet. The picture below has 2 sets of pump splitters. A full system can heat up to just over 5,000 sq feet with 9 sets of pump splitters.

***Note:** The silicon tubing for each pump requires ½" (12.7mm) PEX or a fitting with an O.D. of ¾" (19mm). If other than ½"(12.7mm) PEX tubing is installed PEX adaptor couplers (2) can be used per pump that have a ¾" (19mm) fitting for the Silicon hose.*

● Planning zones

The HUG-Hydronics system supports up to 4 thermostats per unit. Each thermostat controls the temperature in a different zone of your house. You may want the bedrooms at a different temperature from the living room and kitchen. Or you may want the garage at a radically different temperature.
Any one pipe loop is usually laid out to heat one kind of living area.
You can easily assign any pipe loop to any of the thermostat zones by moving the corresponding jumpers on the control board.

● Selecting Heat Sources & Sizing

- The HUG-Hydronics system will support up to 3 heat source loops. Any source of hot water can be used, such as electric or gas water heaters, wood boilers, solar hot water, waste engine heat, etc. The heat source should be an open loop that requires no system pressure. If a hot water source is not able to operate as an open loop, a flat plate heat exchanger should be installed between the heat source and the HUG hydronic system.

- A tankless water heater that is dedicated to heating is a good example of an open loop heat source. A dual use (domestic hot water and space heating) tankless water heater is not an open loop and should have a plate heat exchanger added to isolate the pressurized domestic water from the space heating system.

- An outdoor wood boiler generally is not a simple open loop and should have a heat exchanger to isolate the outdoor water from the indoor hydronics.

- **The simplest heat source** is a dedicated tankless electric water heater. Off-peak electricity can be comparable to gas costs so we recommend that you check your local power utility for off-peak availability and rates as the first heat source option.

- A dedicated tankless gas water heater is the next level up in skills required. It needs to be properly installed for gas and exhaust connections.

- Any other heat source may require more plumbing skills. Please contact your local plumbing and heating professionals if you need additional help installing a heat source.

Suggested water heater(s):

State or AO Smith Model - 12.2KW version

AO Smith 240-Volt 12-kW
The AO Smith Signature is a 12-kilowatt 1.1-GPM (3.8GPM) point of use tankless electric water heater ideal for low pressure/flow applications.

This water heater unit has low flow resistance so it works well with the pumps in this system.
NOTE *When selecting any other on-demand water heater, or other heating source, it must not have restricted water flow through in order to transfer the amounts of heat required at low pressure.*

- ## Other options

1. Other electric water heaters
2. Gas water heaters (NG & LP)
3. Wood/solid fuel boilers
4. Electric Boilers
5. Gas boilers (NG & LP)
6. Gas combination boilers (NG & LP)
7. Solar thermal water heaters
8. Geothermal water-to-water heat pumps
9. Air source to water heat pumps

Heat transfer from tank to floor:

Table 2: KBTU's per hour range (Low, Med, High Max speed) per loop and temp drop.

Temp Drop (F)	Number of Floor Loops									Pump Speed
	1	2	3	4	5	6	7	8	9	
	4	8	13	17	21	25	30	34	38	Low
	7	14	20	28	35	42	49	56	63	Med
	8	17	25	34	42	51	59	68	76	High
10F	8	17	25	34	42	51	59	68	76	Max
	9	17	26	34	43	51	60	68	77	Low
	14	28	42	56	70	84	97	111	125	Med
	17	34	51	68	85	102	119	136	153	High
20F	17	34	51	68	85	102	119	136	153	Max
	13	26	38	51	64	77	89	102	115	Low
	21	42	63	84	104	125	146	167	188	Med
	26	51	77	102	128	153	179	204	230	High
30F	26	51	77	102	128	153	179	204	230	Max
	17	34	51	68	85	102	119	136	153	Low
	28	56	84	111	139	167	195	223	251	Med
	34	68	102	136	170	204	238	272	306	High
40F	34	68	102	136	170	204	238	272	306	Max

Table 2 Notes:

1. These are maximum heat transfer calculations based on flow tests run with 300 feet of ½ inch PEX pipe with water as the medium. Other pipes may have different flow rates.
2. The actual number of BTUs transferred will be limited by actual heater output.
3. The typical heater size required under normal insulation standards is 6K BTU per 300' loop.
4. The values in Table 1 are KBTU's for the low, medium and max pump speed settings. To convert the KBTU to KWatts, divide the KBTU's by 3.4.
5. The temp drop is the tank temp minus the floor return. For example, if the tank is at 100F and the return temp is 80 then the drop is 20F.
6. The factory setting for the pump speed is low.
7. The default pump speed if no jumper is installed is Med.
8. When using Glycol, decrease the BTU calculations by 27% for 33% glycol and 35% for 40% glycol.

HUG Hydronics (™) Heat Out Per Loop Pump

BTUs Delivered Per Loop				
	Pump speed	**BTUs per hour plain Water**	**BTUs per hour 30% glycol**	**BTUs per hour 50% glycol**
This assumes 300 ft PEX loops. The numbers represent the maximum heat transferred with the conditions described above.	low	9,000	7,000	5,000
	med	14,000	11,000	8,000
	hi	17,000	13,000	10,000
	max	17,000	13,000	10,000

Notes:

1. On a per loop basis
2. Low speed is the recommended setting
3. 20 degree temperature drop of fluid through the floor
4. 300 ft Length of 1/2" Pex tubing
5. Depends on Pump Speed and Antifreeze blend
6. Derate by 10% for loops on a splitter

Heat transfer from heater to tank

Table 3: KBTU's per hour for Pump Speed (low, medium, high & max) and Temp Rise

These are maximum heat transfer calculations based on flow tests run with an AO Smith electric heater with water as the medium. Other heaters may have different flow rates. Low is the factory default setting.

Pump Speed	Temp Rise (F)							
	10	20	30	40	50	60	70	80
Low	11	22	33	44	55	66	77	88
Med	18	36	54	72	90	108	126	144
High	22	44	66	88	110	132	154	176
Max	22	44	66	88	110	132	154	176

Table 3 Notes:

1. The actual number of BTUs transferred will be limited by actual heater output.
2. The Temp rise is the heater output temperature minus the floor return temp.
3. To convert the KBTU to KWatts, divide the KBTU's by 3.4.
4. See link for Table calculations (Heat Flow Calculators)
5. When using Glycol, decrease the BTU calculations by 27% for 33% glycol and 35% for 40% glycol.

HUG Hydronics (™) Heat Source Ratings

Maximum BTU Available per Heater on Heat Source Pump						
	Heaters					
Working Fluid	Electric 12.2KW	Electric 18KW	Gas 120 kBTU	Gas 199 kBTU Set to 140F	Gas 199 kBTU Set to 160F	Heat Exchanger 8 GPM, 175F source
Water	41,000	61,000	75,000	76,000	102,000	120,000
2:1 Antifreeze 33% Glycol	41,000	61,000	57,000	57,000	76,000	90,000
1:1 Antifreeze 50% Glycol	41,000	61,000	43,000	43,000	57,000	67,200

- We've tested the above units and arrived at these maximum BTUs
- Heat is limited by flow rate of the water through the heaters
- Another limit is the max temperature the water heater can put out
- Deratings highlighted for using antifreeze
- Derate additionally for heating floors that require hotter water like wooden floors
- To get results the heat source pumps were set to max.
- Up to 3 heat sources can be used simultaneously
- Antifreeze assumed to be propylene glycol

Heater Sizing Examples for the system

Some of the information needed to select the required heater size include the square feet, climate temperature zone, other heat sources and insulation quality.

Example 1: 2,100 sq foot home with PEX in the concrete to be heated using polypropylene glycol using an electric heater. Average home insulation in a Northern climate zone.

Step 1. Determine number of loops: Using 300 feet per loop the 2,100sq feet will require 7 loops.

$$Square\ Feet\ /\ Length\ of\ Loop\ =\ Number\ of\ Loops$$
$$2,100\ /\ 300\ =\ 7$$

Step 2. Determine the BTU's required: As a rule 20 BTU's is required per square foot in Northern heating zones assuming average insulation. So, a 40,400 BTU heater is required for 2,100 square feet. Converting the BTU to KW using 3.41 BTU per watt implies 11,488 watts.

$$Square\ Feet\ *\ Required\ BTU\ per\ Square\ Foot\ =\ Heater\ BTU$$
$$Heater\ Size\ /\ 3.41\ =\ Heater\ Wattage$$
$$2,100\ *\ 20\ =\ 40,400\ BTU$$
$$40,400\ /\ 3.41\ =\ 11,848\ W\ =\ 11.8\ KW$$

Notes:

If this is the only heat source it is recommended to size up the heater. So for this example the recommended heater might be 14KW to 18KW. However, if the heater is supplemental then the heater could be sized at 12.2KW.

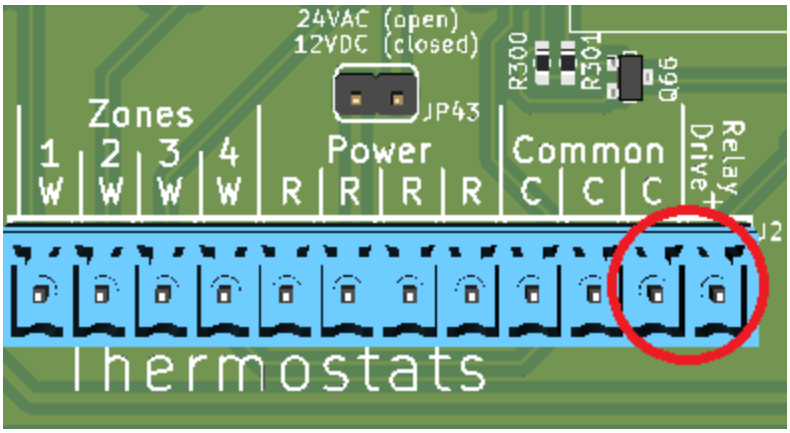
Step 3: Select the HUG Hydronics model required for the number of loops and heaters. For the 7 loops and single heater 8 sets of hoses are required. The recommended system would be the 1090-10-AF that includes 10 pumps. Using Table 2 above for 7 loops implies the heat source pump would need to be set to at least to medium speed.

Since the system is using propylene glycol the pump speeds may need to be set to max versus medium to deliver the required heat. Also, the heater temperature may need to be adjusted to 140F to transfer the heat. If the heater has unwanted noise then turn down the heater temperature.

Relay driver output

For special applications and unusual heat sources, the HUG-hydronics system has an onboard relay driver that is intended to operate a customer supplied RIB (Relay in a Box) or a solid state relay that can turn on larger external pumps and valves, or even heaters. It turns on anytime that any zone is calling for heat.

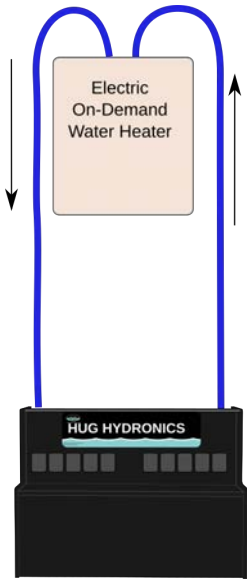
Wire the two rightmost terminals on the thermostat connector to the control side of a 12VDC activated relay.



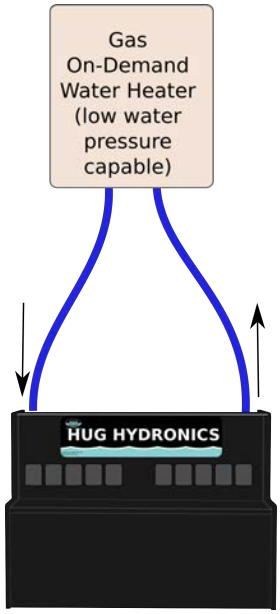
Water Heater Connection Diagrams

These diagrams are conceptual only. Please refer to the specific requirements for the heat source you actually have, as well as the applicable plumbing codes for your area..

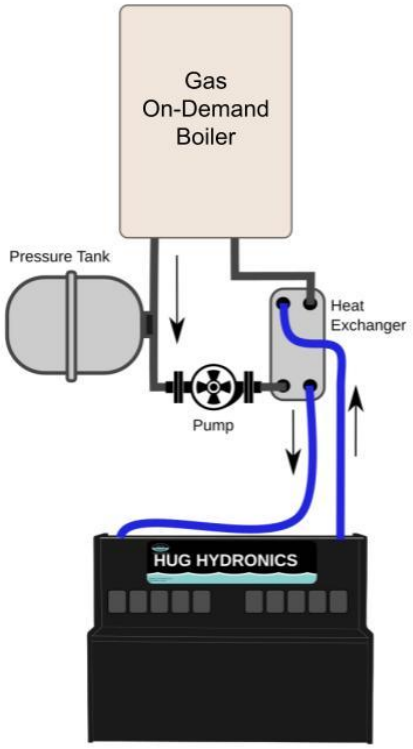
Dedicated Electric On Demand Water Heater



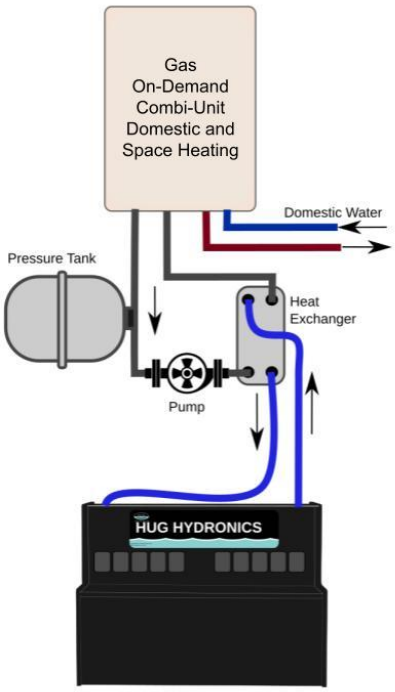
Dedicated Gas On-Demand Water Heater (low water pressure capable)



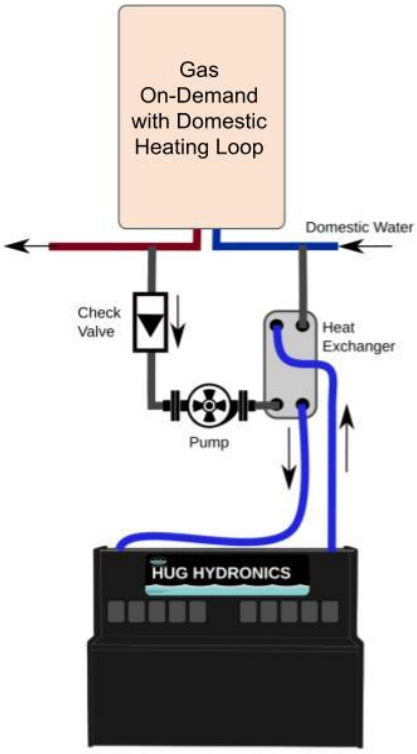
Gas On-Demand Water Heater or Boiler (requiring higher pressure circulation loop)



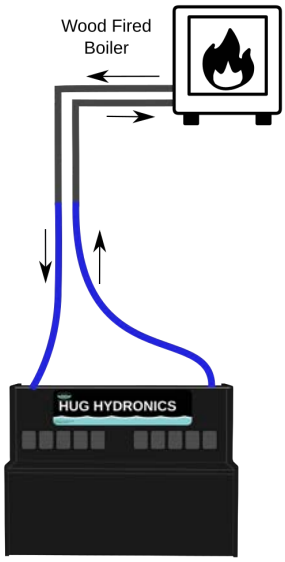
Gas On-Demand Combination Boiler (requiring higher pressure circulation loop)



Gas On-Demand Boiler With Domestic Hot Water Loop

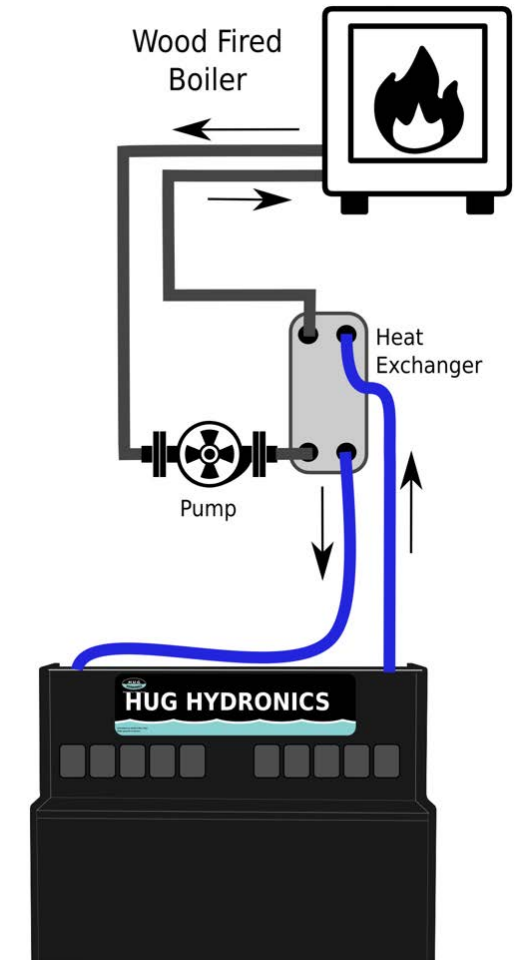


Wood Boiler Heater with open loop configuration.



Wood Stove Direct. (Special case of an open loop at same level as tank)

Wood Stove with heat exchanger option

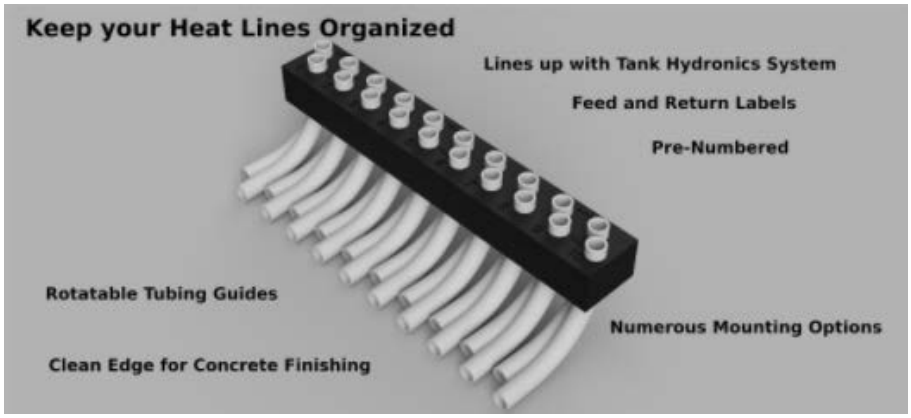


New construction

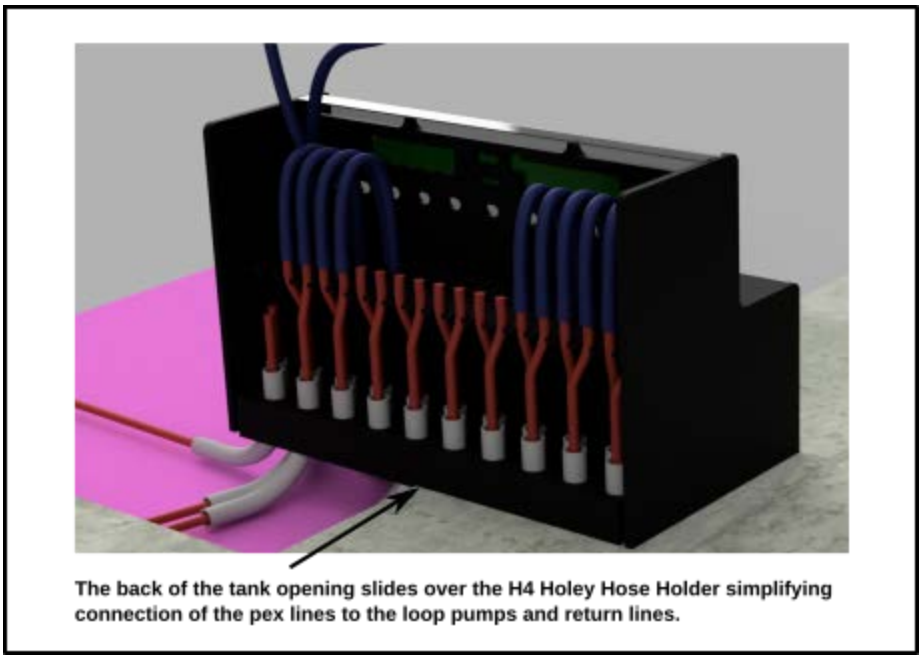
For new construction determine the total number of PEX loops required and then download the Tubing Guide template from our website to aid in ideal hose placement. We also offer rigid guides that can be installed prior to concrete pour to facilitate ideal PEX placement. (See Below)

Holey Hose Holder

The Holey Hose Holder (p/n 1111-01-AF) is an excellent option for organizing the PEX lines that feed into the HUG Hydronics system.



The picture below shows how the Holey Hose Holder allows for a clean and organized connection of PEX heat loops to the Hydronic system. It also makes it very easy to do a clean concrete finish near the pipes. More importantly, it protects the PEX pipes. Unprotected PEX pipes have a tendency to get stressed and fail right at the point where they enter the concrete.



The back of the tank opening slides over the H4 Holey Hose Holder simplifying connection of the pex lines to the loop pumps and return lines.

See section H4 Holey Hose Holder Installation of this manual for detailed instructions on mounting and use of the Holy Hose Holder.

Retrofit installation

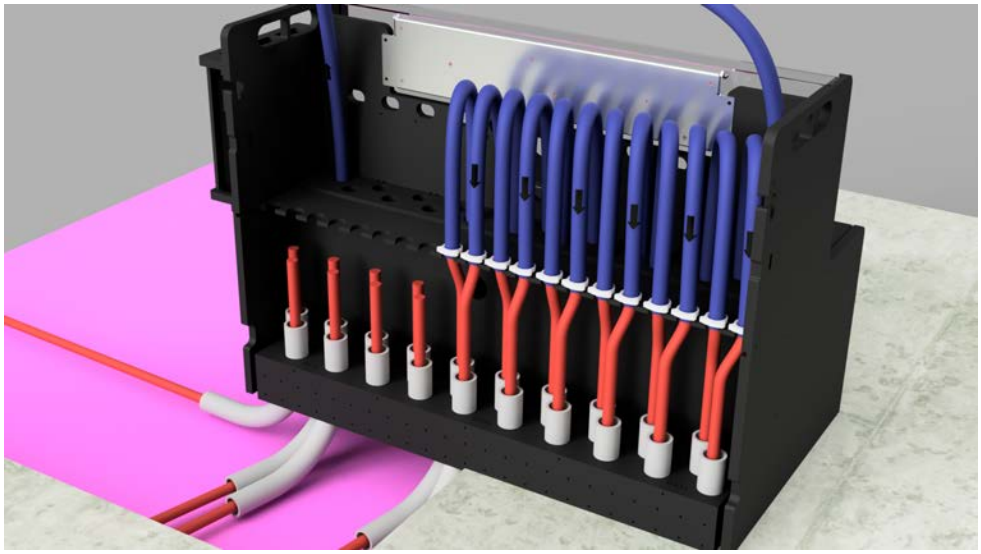
- The HUG system can be retrofitted into existing in-floor heat systems that can be open loop.
- See section 4a above for space requirements.
- We offer a selection of adapters and hose options to mate our system to an existing installation when replacing an older Hydronic system.

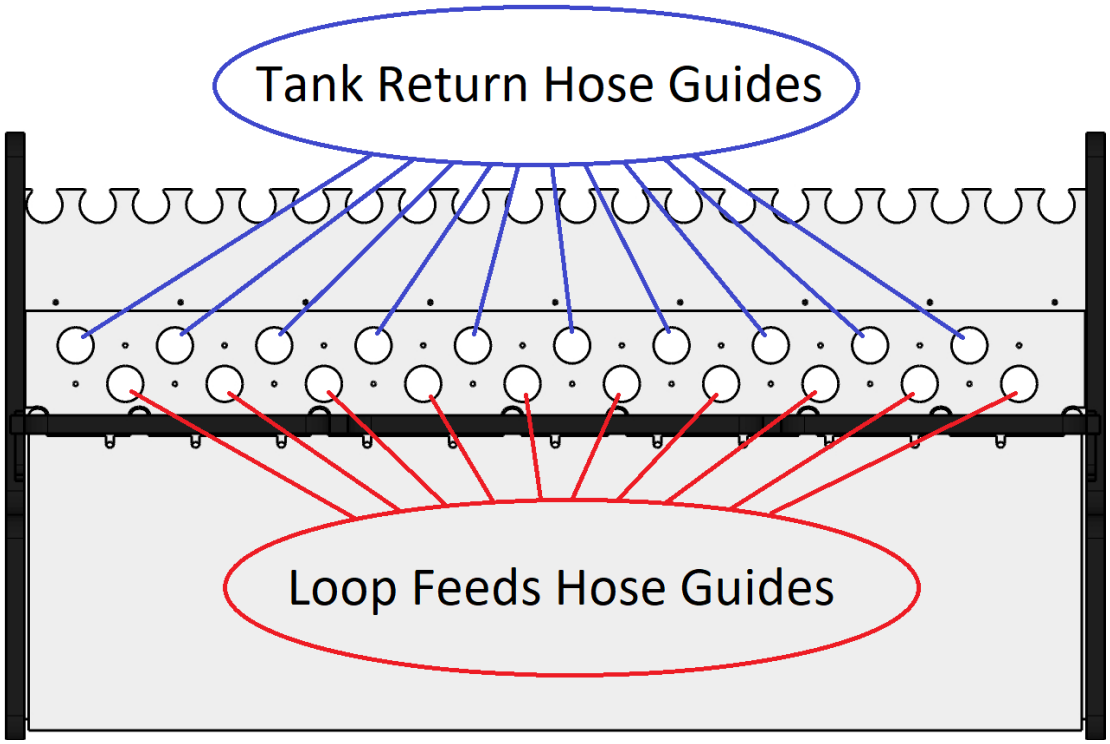
Installation & Setup

- Remove the tank from the package and remove all the packing materials, including the cardboard braces from inside the tank. Ensure that the pumps are seated in their respective cradles.
- Optional: Remove rubber cap from overflow port and connect the drain hose.
    - Port is behind the tank.
    - *note* Optional hose is just to guide accidental overflow to a safe place, in the unlikely event of an accidental overfill.
- Place the tank in front of the PEX pipes about 6-10 inches (15-25cm) away.

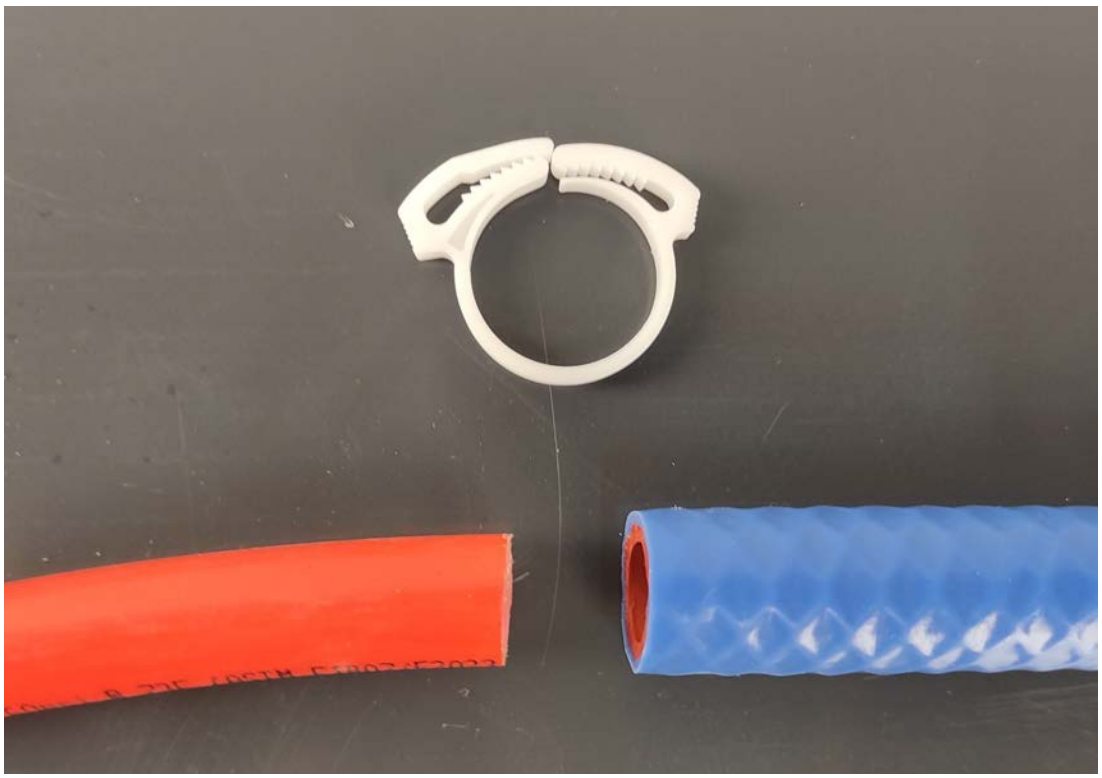
Connect source and return hoses to the PEX

- Hoses come out of the tank in 2 rows. The hoses marked with an arrow are source lines to the loop. The unmarked hoses are for return lines.
- Trim hoses as needed to match the Pex pipes.
- Firmly push & twist the silicon hoses as far as you can (at least 1 inch (25mm)) onto the (Pex) pipes accordingly for the source and return lines.

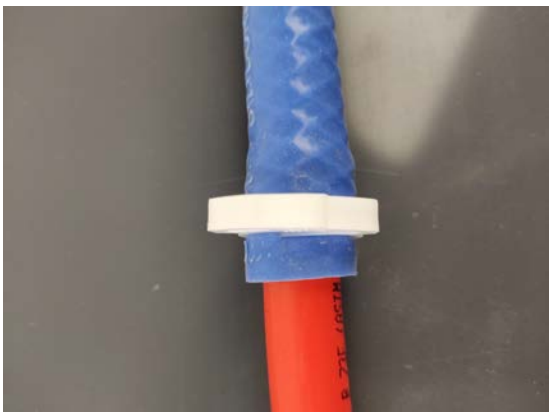




- Securing hoses to Pex Lines
    - The provided hose lengths mate easily with existing PEX lines. Hose clamps are provided (HDW-0000031).



Step 1 - Connect the return side tubes.
Push the end of the tube over the return end of the PEX tube loop in the floor. Secure with a hose clamp with a smooth inner surface such as the Hellermann SNP18A10C2 sold by HUG (HDW-0000031).



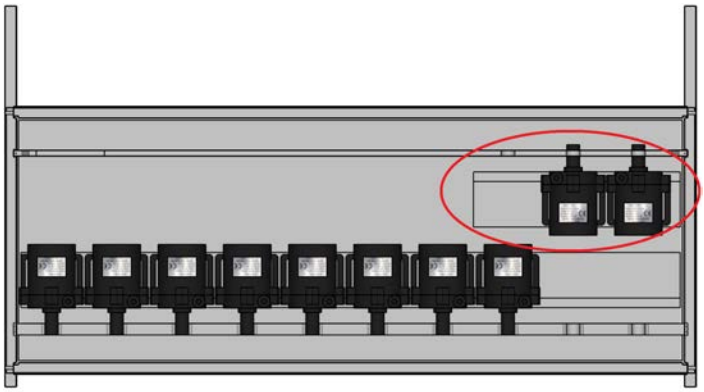
Silicone hoses are pre-cut for normal installations. For unusual pipe layouts, The silicone hose is available in bulk and you can cut it to fit your needs.

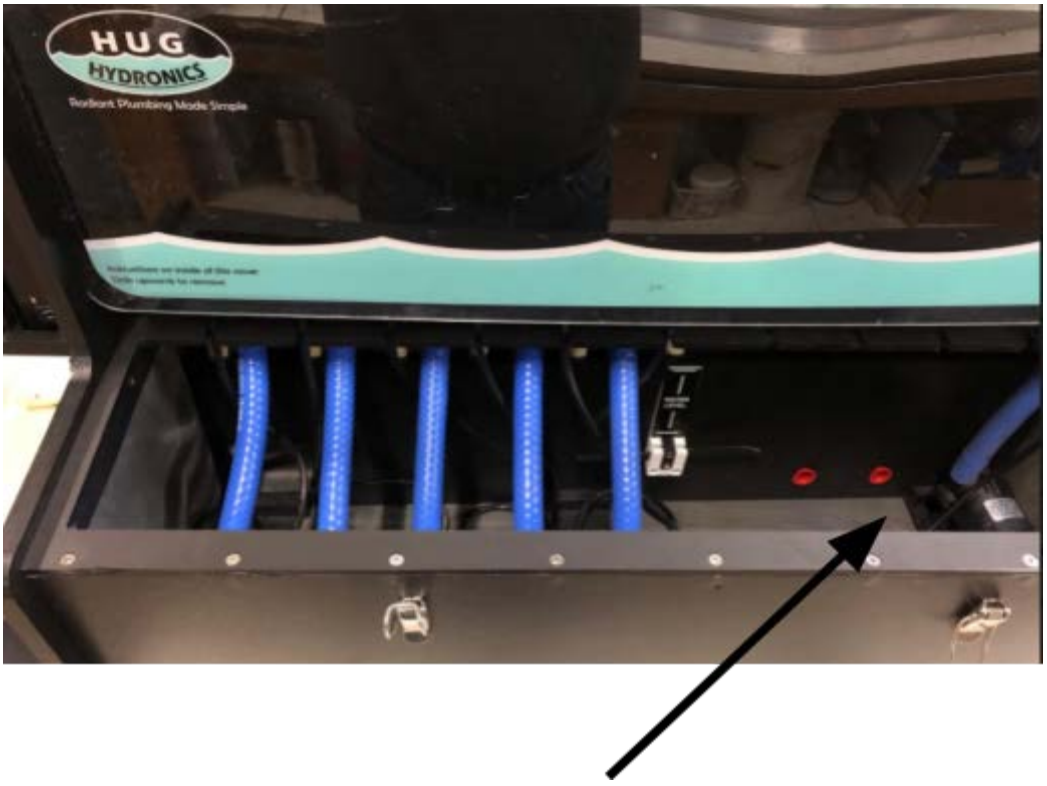
Installing heat source

Any heat source that heats water may be used and should be installed per manufacturer recommendations. It should heat water to no more than 194°F (90ºC); for your safety, a lower temperature is recommended. The preferred temperature is between 118°F to 160°F (48ºC and 70ºC).

Connecting pumps and installation for heat sources or loads

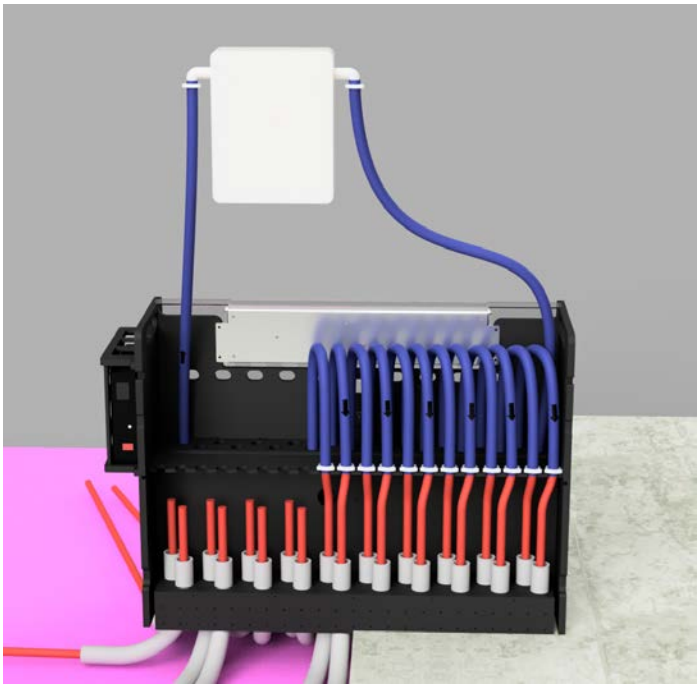
Heat source pumps should be installed so that they are facing into the cold water return as shown below.





Connect the water heater hoses

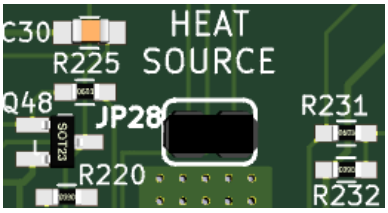
- Connect the heat source pump outlet to your heat source inlet and run your heat source outlet line back to the tank return.
    - The heater should be fitted with ¾ inch (19mm) PEX fittings.
    - The rightmost hose from the front with an arrow is cold water into the heater
    - The leftmost hose from the front is the hot water from the heater
    - Trim hoses if needed to match the heater connections
    - Firmly push the 2 long hoses onto the heater inlet and hot outlet accordingly
    - Secure hose with a hose clamp with a smooth inner surface such as the Hellermann SNP18A10C2 sold by HUG (HDW-0000031).



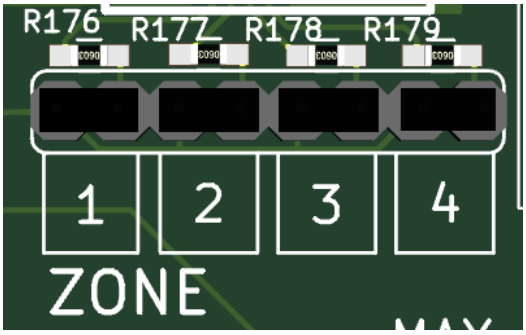
In this diagram the left hose is the outlet and the right hose is the inlet.

In the below diagram these hoses are reversed.

A jumper should be placed on each of the 2-pin “Heat Source” connectors for the pumps that will be used as heat source pumps.



In the case of a single heat source pump, jumpers should be placed on all 4 heat zones for the heat source pump. This is so any zone calling for heat will activate the heat source pump.



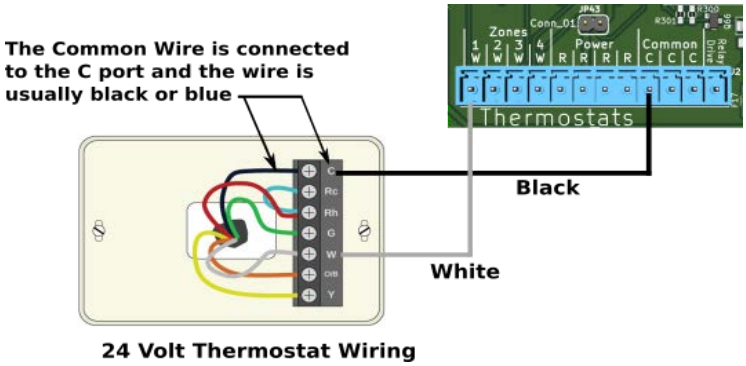
When there are multiple heat source pumps, they can be assigned to activate for different zones by placing jumpers on the heat zone header for each heat source pump to select the desired zones.

Another option for multiple heat sources would be to prioritize them. If you are interested in how to set up your heat sources for prioritized use, see section 6 to learn how zone 4 can be set as a low priority zone.

The medium speed setting is recommended for the heat source pumps, and no jumper is needed on the SPEED connector to obtain that setting. Higher flow will transfer more heat. If you need to transfer more or less heat than the medium setting is capable of, set the jumper to the speed that works best for your application.

Connecting thermostats

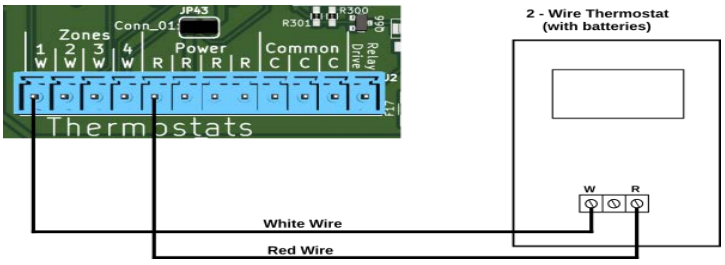
- Wiring pinout
    1. Various wiring options for different thermostat types
        a. Wiring to an existing 24VAC Thermostat system.



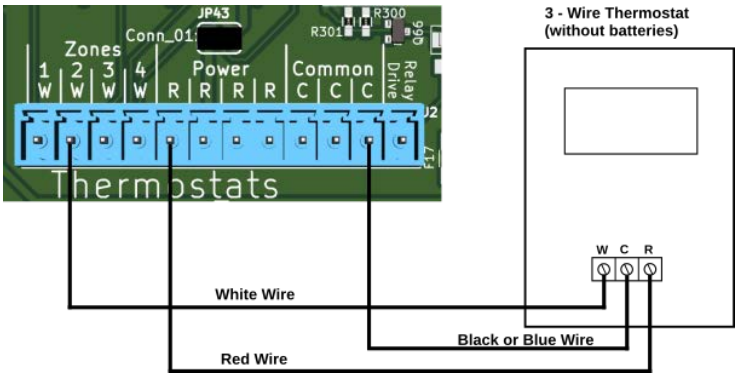
24 Volt Thermostat Wiring

b. Note: The control board can accept 24VAC from an existing heating system if jumper JP43 is removed. When needed, an external 24VAC transformer (HUG part number XFR-0000002) can be added to the system to power Smart Thermostats.

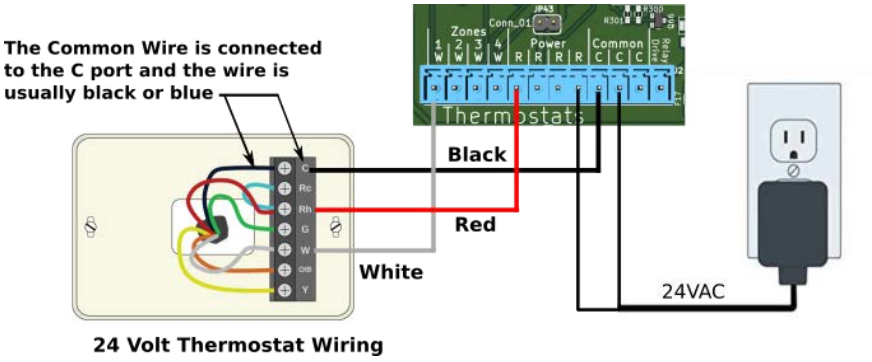
c. Wiring to a new mechanical contact, 2 - wire thermostat powered with batteries. Note: *JP43 jumper is in place*.



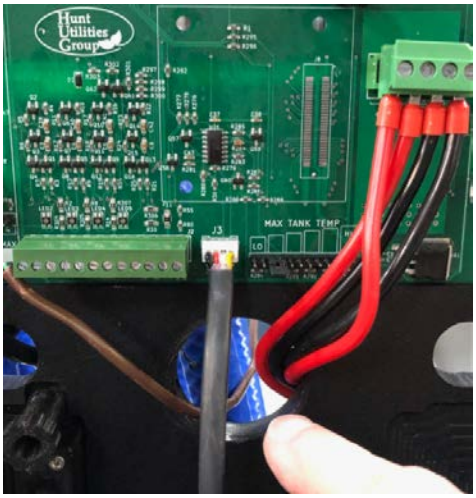
d. Wiring to a 12VDC thermostat, 3 - wire connection without batteries. Note: *JP43 Jumper is in place.*



e. Wiring to a 24VAC thermostat, 3 - wire connection without batteries. Note: *JP43 Jumper is not in place.*

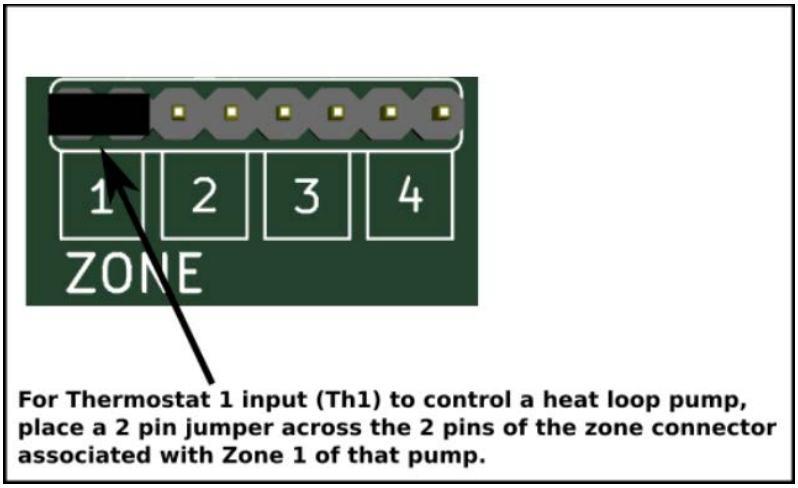


- Routing the thermostat wires:



The wires for the thermostats should be routed through the opening for the Pump 5 connector wires.

- Jumper configuration to connect thermostats to pumps
  The control board has inputs for 4 separate thermostats (Th1 - Th4) each controlling its own zone. Each pump can be activated by any zones you choose, by putting the pump's ZONE jumpers on the appropriate pins.

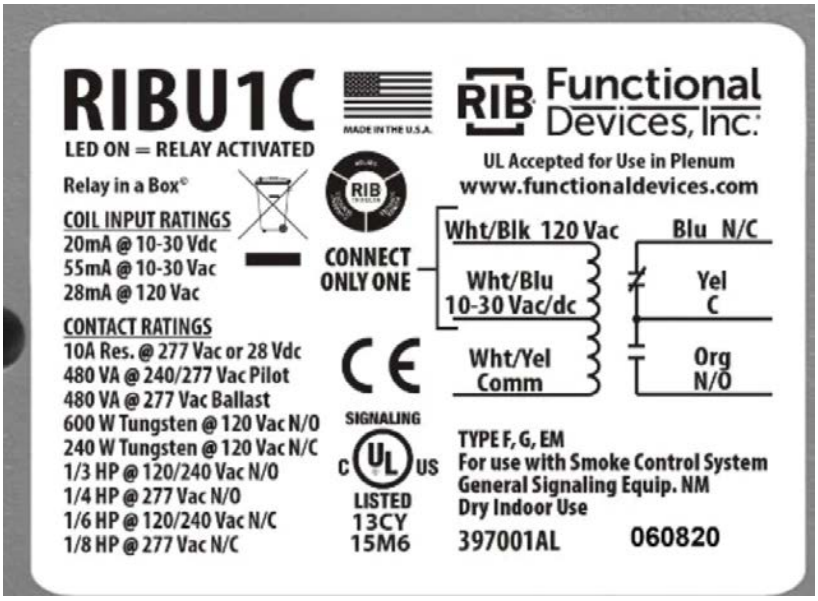


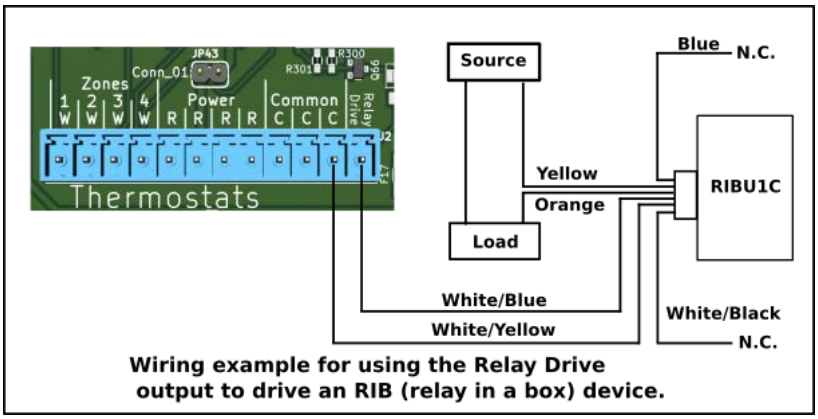
The pump will then turn on when the selected zones are active.

In most cases, heat source pumps should have all of the zone jumpers installed on their connectors so that a call for heat by any thermostat activates the heat source pump.

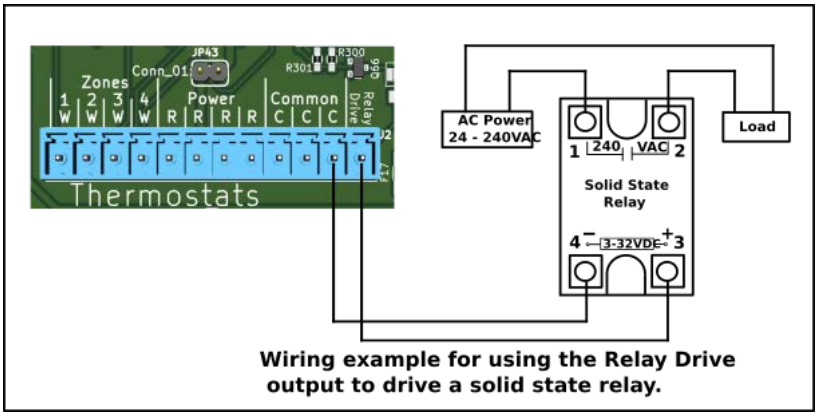
- Relay Drive Output

The “Relay Drive” output on pin 1 of the J2 Thermostat connector is provided for driving an RIB (Relay in a Box) or a solid state relay. The relay drive signal is active when any of the thermostat zones are calling for heat. The illustration below shows how the relay is wired to make use of this signal.





Wiring example for using the Relay Drive output to drive an RIB (relay in a box) device.

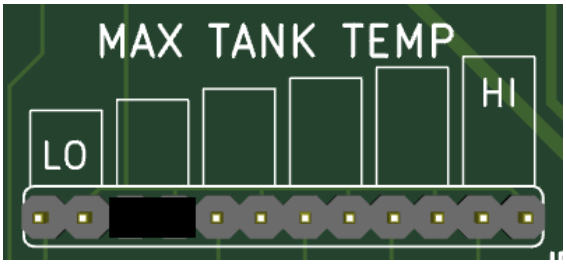


Wiring example for using the Relay Drive output to drive a solid state relay.

Setting Tank Max Water Temperature

- Overly heated water is hard on components, and will cause hot and cold spots in your floor. The tank limits water temperature by slowing the heat source pumps when the water is hot enough.

    - Place a jumper on the temperature selection header next to your selected tank temperature. No jumper will default to the 100 degrees Fahrenheit range. The MAX temp light glows aquamarine when the tank temperature is near the max temperature setting, when this occurs the heat source pump slows down or stops to reduce the amount of hot water coming into the tank. Hot water will, however, continue to be circulated to the zones calling for heat.



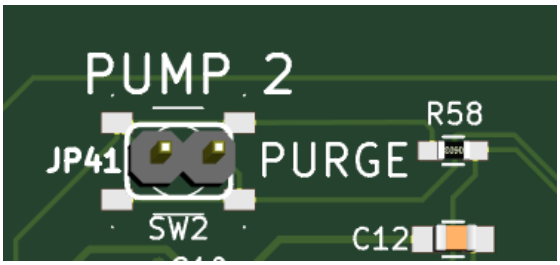
Filling the system

- Min/Max Water Level
    1. Fill to the level of the divider in the tank. To do this, open the lid and pour in clean, (preferably distilled) water. *See section on Fluid Selection.*
    2. If antifreeze or other conditioners and additives are needed, They may also be added
    3. As the water is pumped into new lines the water level in the tank will go down. Refill to the level of the divider.

    *Note: *(½ inch (12,7mm) PEX pipes hold about 1 gallon (3.8L) per 100 feet (30m) of pipe)*

Purging the lines of air bubbles

- To remove air from the lines at start up, use the “Purge” jumper for each pump. When the Purge 2 pin header has a jumper installed, it runs that pump at max speed, regardless of thermostat settings, to help flush the air bubbles out. Heat source pumps will still slow down if the tank water is too hot. The pumps will not run if there is a low water alarm.



- When the pumps have been purged, be sure to check the water level in the tank and refill to the level of the divider if necessary.

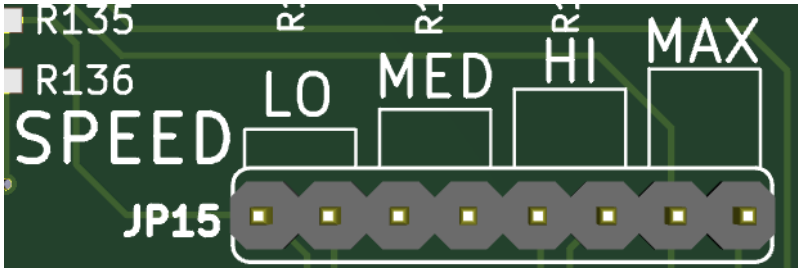
How to drain water out of the tank

The water in the tank may be very hot. It should be allowed to cool before attempting to drain the tank.

- Using a pump & Purge Button
    1. Disconnect one of the pump lines and direct it into a drain or bucket. Alternatively, disconnect the tubing from one of the pumps and add a new piece that goes to a drain or a bucket.
        a. If the system contains antifreeze or other additives, there may be restrictions on its disposal. Please check with any applicable laws and guidelines before draining.
    2. Place a jumper on the “Purge” header for that pump on the control board, turning the pump on max.
    3. When the water level goes down to the intake of the pump, remove the jumper from the Purge header and finish draining the water out in another fashion. Try tipping the tank.
- Setting pump speed
    - Why choose a different pump speed?
        1. Low or medium speed is quieter, more energy efficient, and provides a longer system life. Medium is the recommended speed for most loops.
        2. Set to high or max if the tank is plenty warm but the floor is not getting enough heat. (very rare.)
        3. Set to low if you have loops shorter than standard, or your area is exceptionally well insulated.
        4. Heat source pumps are often set to higher speeds.
        5. Do not set all pumps at high speed.

Setting all pumps to HI or MAX will result in a power supply reducing the voltage output causing all pumps to operate at lower speed.

- No jumper on the speed setting will result in the pump operating at Medium speed, as will a jumper in that position. This is the value that should normally be used for maximum pump life. In some applications this setting will not transfer enough heat so the jumper should then be set to HI or MAX.



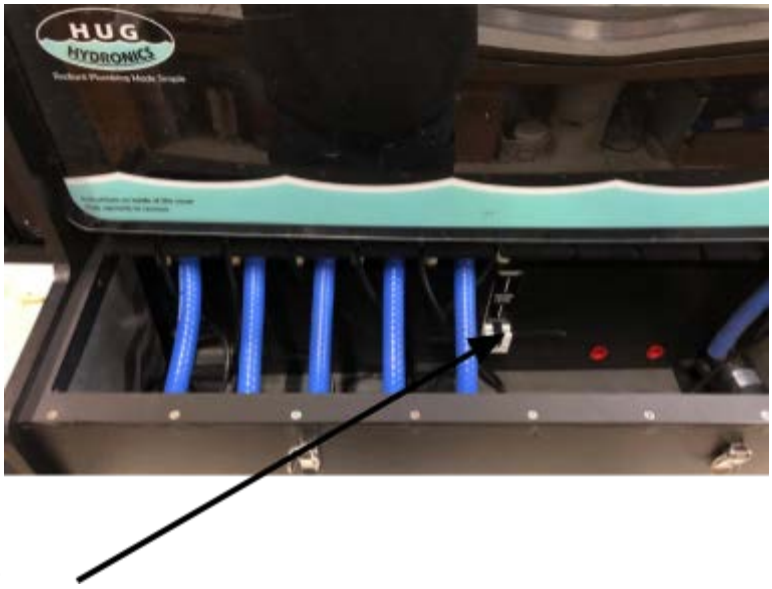
Normally all of the pumps should be run at medium or low, however different speed configurations are allowed as long as the maximum continuous use is 21 Amps or less.

Pump Setting	Lo	Med	Hi	Max
Current Use (Amps)	0.7	2.1	3.5	4.3

No combination of pump settings should result in more than 21 Amps.

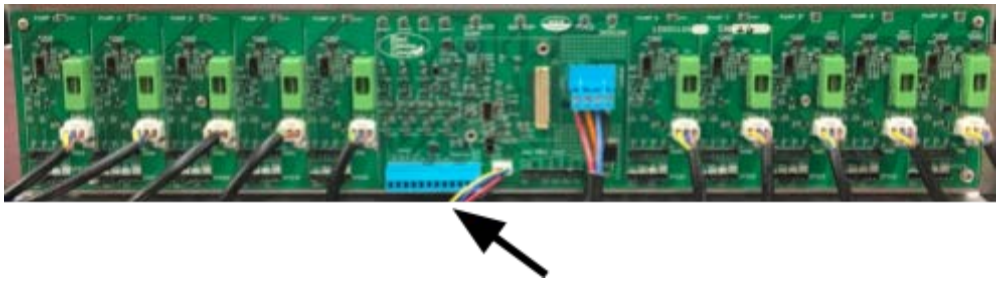
Initial Start-up Procedure

- Pour water or water/glycol* mixture into the tank until it is between the full and low marks.
  *See section on **Polypropylene Glycol AntiFreeze Option**
  - *Usually About 8 gallons to start.*



  - *Fill water to line*

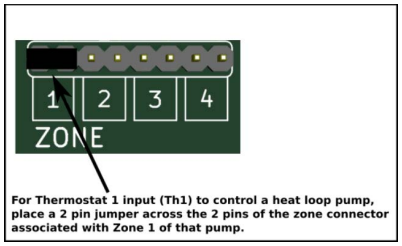
- Remove cover and unplug the thermostat connector.



- **NOTICE** Make sure that any unused pumps are unplugged.
- Plug in the tank power supply into the 120 volt outlet. Do **NOT** turn on the heat source.
- Turn on the power supply switch.
  - The green “Power” light at the center top of the control board should be on.
  - All pump lights with pumps plugged in should be dim green.
  - There should be NO red or blue lights on, unless you already have warm water in the tank, then blue lights may come on
- Purge air out of the heater and pipes.
  - Place a spare jumper on the “Purge” pins for pump 10.

- The pump light should become bright yellow.
- Let the pump run until gurgling sounds in the water tank cease.
- Repeat the purging for each pump that is in use. Only purge one pump at a time.
- If the tank becomes low during this process, add more water to the tank as needed.
  *Note: *Each 300 foot (90m) PEX loop holds about 3 gallons (11l) of water. Return the spare jumper when complete*.

- Power up the heat source & set the desired temperature *(Typical temperature settings vary from 120°F (50°C) to 140°F (60°C))*
- Plug in the thermostat connector and turn up thermostats to call for heat.
  - Each active thermostat should show a blue light at the top of the board above the thermostat connector.
  - All pumps should be active, each indicated by its green light getting brighter.
- Assign the zones.
  - All pumps are initially assigned to zone 1, except pump 10. It is for the primary heat source and is assigned to all 4 zones.
  - Note: *If you only have one zone you are already set for zones*.
  - For each pump, move the zone jumper to the thermostat zone that you want it assigned to.



- Re-adjust heat source temperature to desired temperature.
  - See the user manual heat source section.
  - Lower water temps may make the heater last longer; and gently heat your floor.
  - Higher water temps transfer more heat. Turn up the temperature if your house doesn't stay as warm as the thermostat setting.
- Check and service the water level in the tank. *Note: *Add a calendar reminder to check the tank level every 6-months*
- Reinstall and latch the tank cover. ⚠CAUTION **Water may be hot.**
- Complete a final check with the thermostat(s) calling for heat:

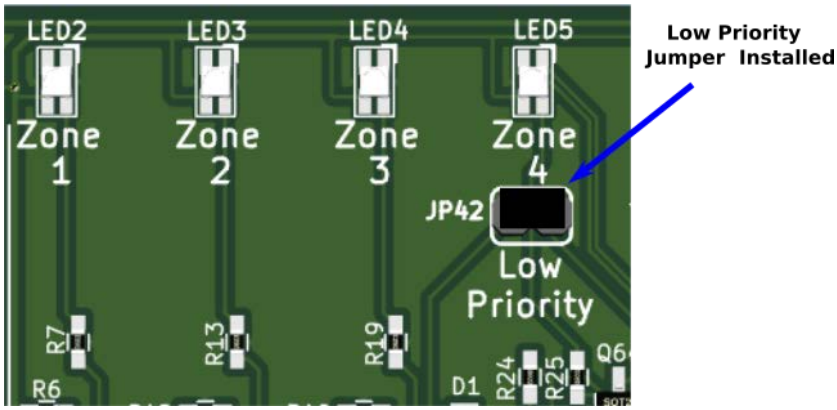
  - Check that the indicator lights for the appropriate Pump(s) are working.
  - Check that the heat inlet hose(s) to the tank are warming. These hoses should be warm to the touch.
  - Reinstall the cover shield over the control board.

- 
HUG

Prioritizing Heat Sources

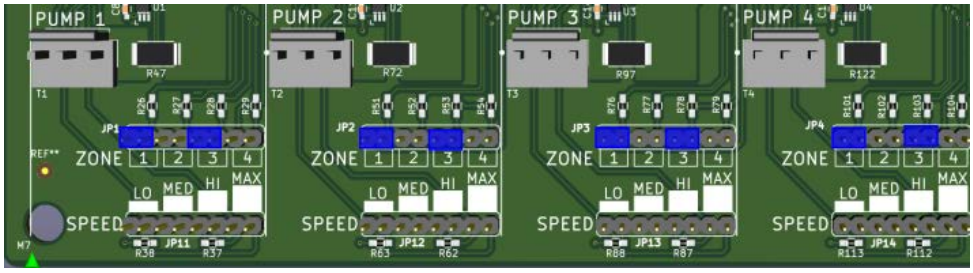
Prioritizing heat sources may not be applicable to some installations. It is useful anytime that a user wants to heat primarily with one source and use a second heat source to keep up with heat demand when the primary source can't keep up, such as off-peak and dual-fuel applications. Also, it is useful when a user wants a secondary zone to heat up after the other zones such as for a garage or outdoor space.

Thermostat 4 has a "Low priority" jumper. When this jumper is in, Zone 4 will be disabled if any other zone is active. If Zone 4 is calling for heat while any other zone is calling, the "Zone 4" LED will glow dim yellow to indicate that it wants to heat now, but it is overridden.

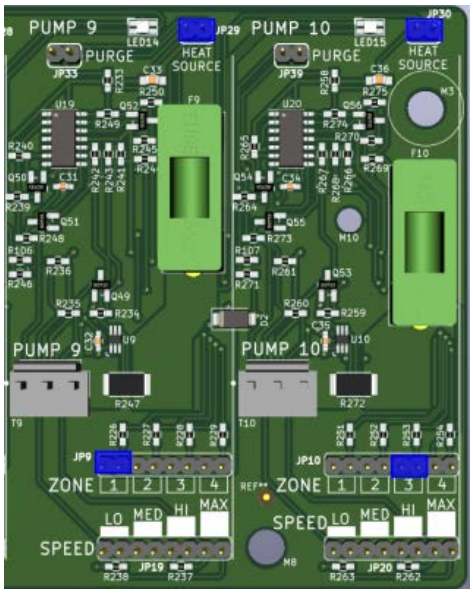


If one low priority zone is not enough, an additional way to set up prioritizing heat sources is to use 2 thermostats or a thermostat with 2 heat settings. Place all applicable heating loops on TWO zones each. When hooking up the two heat sources to be prioritized, put heat sources on ONE zone each. Then set the primary heat source zone to your desired target temperature and set the secondary heat source zone to a couple degrees lower than the primary heat source. In the event that the primary heat source doesn't keep up, the temperature will drop below the target temp and the secondary heat source will turn on. Because both systems are utilizing a shared tank the secondary source will get the water up to temperature and then smoothly let the primary source keep up as long as it is able.

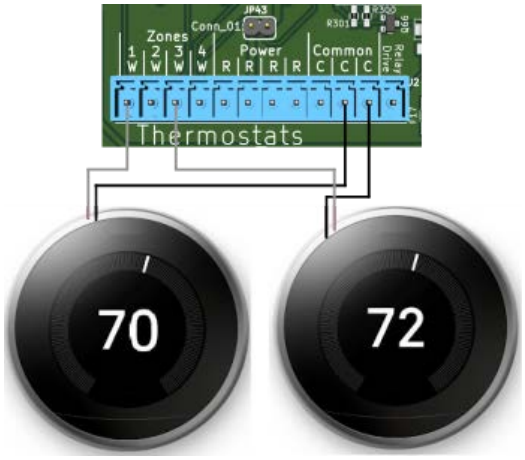
In the image below, pumps 1-4 are set up on zone 1 and 3.



Pump 9 is set up as a heat source on zone 1 and pump 10 is set up as a heat source on zone 3.



Zone 3 is our primary and set to a target of 72 degrees (22°C). If it fails to keep up and the temperature drops to 70 degrees (21°C), then Zone 1 will come on and heat the tank up to our target temperature. This setup allows us to get all the heat our primary source, Zone 3 can deliver and use our secondary, Zone 1 for makeup heat as needed.



Operation

Logic is built into the board to manage the pump operation. Once the system has been set up with the heat source, thermostats, the water tank is filled, the power supply connected and the pumps purged, it is ready for use. The heat loop pumps and the heat source pumps are controlled by the logic built into the control board. The inputs to the board logic are the water level, the water tank temperature sensor and the thermostats.

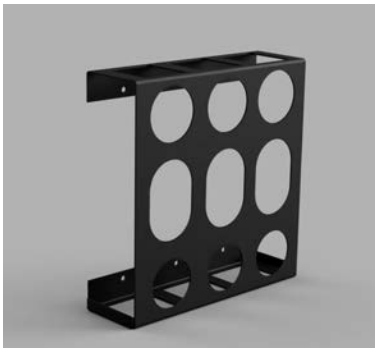
When a zone thermostat calls for heat, the heat source pump starts, unless the temperature of the water in the tank is already at the maximum tank temperature or the water level is too low.

- Low Water Alarm light
    1. The low water level light is normally off. It glows red if the water level in the tank is too low. When the light is on, all pumps are automatically shut down for their own protection.

    *Note: *An optional alarm module is available to provide an audible warning or signal a remote alarm.*
- Max Temp Light
    1. The Max Temp light is normally off. It glows aqua-marine when the tank temperature is near the max temperature setting. When this occurs, the heat source pump slows down or stops to reduce the amount of heat coming into the tank.
    2. The floor loop pumps, with the jumper set for the zone calling for heat, also begin pumping water through their zone. They continue pumping warm water at the selected speed setting until the thermostat for their zone is no longer calling for heat or the low water alarm is active.
    3. When no thermostat is calling for heat, the heat source pump(s) are turned off along with the heat loop pumps. The pumps remain inactive until the next time one or more thermostats call for heat.

Hydronic pump power supply

The power supply is a MeanWell ENP-360-12 and it is capable of supplying 26A at +12VDC. The power supply affixes easily to either side of the body of the tank with the provided hardware. The hardware consists of a mounting bracket and 8 screws.



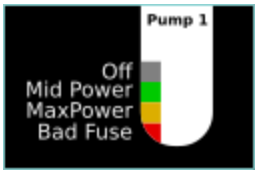
If moving the power supply just affix the mounting bracket to the other side of the tank with the screws provided. The picture below shows the power supply bracket mounted on the right side of the tank (default position).

The power supply then simply slides into the mounting bracket from the rear until it drops down into place. Next, plug the +12VDC power connector into the control board.

Troubleshooting

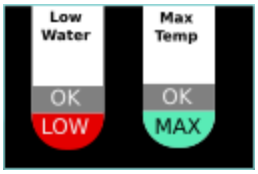
Troubleshooting the HUG system is as easy as reading the lights

Pump light behavior and meanings



- If the light is very dim, it means that the pump is off.
- The pump light is normally dim green, as current draw goes up it becomes a brighter green, as current nears the high end of the range the light turns yellow and then orange.
- If the fuse associated with the pump is blown, the light glows red.
- When the Purge pins have a jumper installed, the pump goes to maximum speed and the pump light is yellow or orange.

The Low-Water light

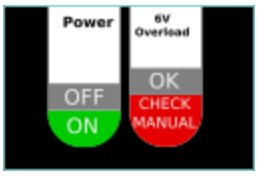


- The low water level light is normally off.
- If it glows red the water level in the tank is too low. When the light is on, all pumps are automatically shut down for their own protection.

Max Tank Temp light

- The Max Tank Temp light glows aquamarine when the tank temperature is near the maximum temperature setting. When this occurs, the heat source pump slows down or stops to reduce the amount of heat coming into the tank.

Power light



- The power light should always glow green whenever 12V is applied to the board.
- Note: If the Control fuse F10 blows then the 12V green light will be out.

6V Overload light

- Normally off. If this light is red, try unplugging the water sensor. If the light goes off, the water sensor or the alarm board may need to be replaced, contact support.

Thermostat/ Zone lights

- Each of the four thermostat lights glows blue when its respective thermostat is actively calling for heat.
- Without the low priority jumper installed, thermostat 4 behaves normally as stated above.
- When the low priority jumper is installed and thermostat 4 is the only one calling for heat, it behaves normally.
- When the low priority jumper is installed and any one of the other thermostats is calling for heat, zone 4 is low priority. If thermostat 4 is calling for heat when zone 4 is set to low priority, the thermostat 4 light will glow dim yellow indicating that thermostat 4 is calling for heat, but zone 4 is disabled because another zone is calling for heat at present. When no other zones are calling for heat, then zone 4 will resume operation.

Checking fuses

- Each pump is protected by a 5A 5x20mm slow blow Bel fuse.

- The pump fuses can be checked by examining the pump light on a running system (example: LED6 for Pump 1). If the light associated with a pump is glowing red, then that fuse is blown.
- Turn off the 12V power supply and replace the blown fuse. Turn the 12V power supply back on and check the pump light again.
- If the new fuse is immediately blown and the pump light is red, you will need to replace the pump and install a new fuse. *NOTE: *See the Repair & Maintenance section for instructions on replacing the pump.*
- If the pump light is off, test the pump by putting a jumper on the Purge pins for that pump.
  - It should start pumping water and the light should be yellow or orange. This means the pump is okay and the system can be returned to service.

Checking the water level sensor

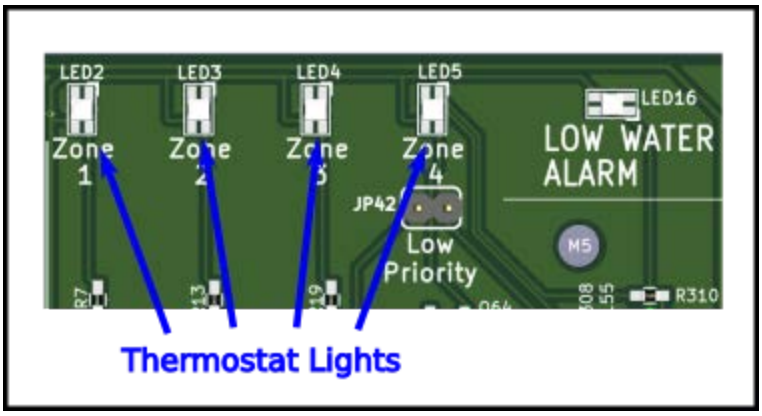
To check the operation of the water level sensor, you may need to remove the tank lid.

The water in the tank may be hot. Carefully remove the tank lid.

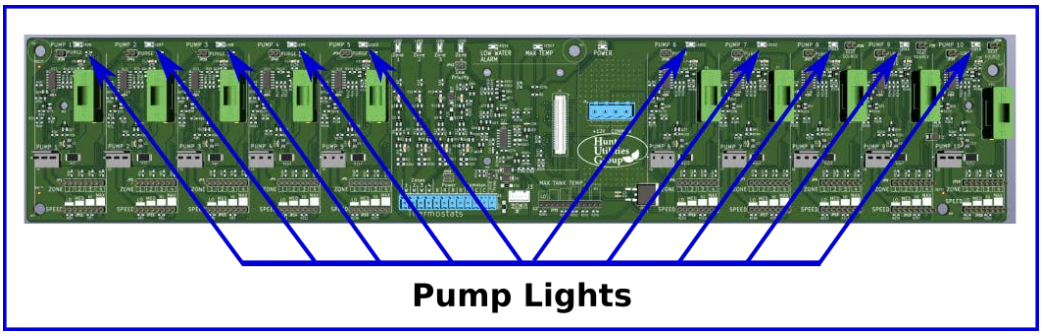
- Pull the sensor probe up so it is not touching water or anything other than plastic.
    - After 10 to 20 seconds, the low water light should come on.
- Checking the high temp sensor
    - To check the operation of the high temp sensor,
    - Set the Max Tank Temp jumper to low.
    - Pull the probe out of the tank.
    - Set it in a cup of cold water to cool it off.
        - The Max Temp light should be off.
    - Set it in a cup of hot water.
        - The Max Temp light should turn on.
    - If after 10 or 20 seconds the High Temp light has not come on, see the Repair & Maintenance section on replacing the Water Level / High Temp sensor.

Checking the control board

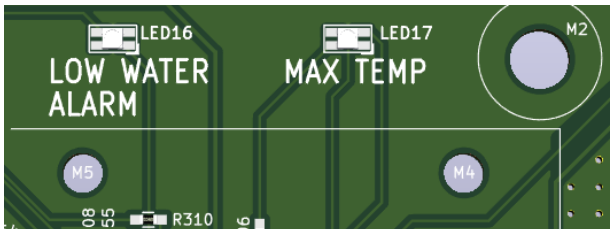
The first step in checking the control board is to bring the system to its resting state (i.e none of the pumps are running). If one or more of the thermostats are calling for heat, turn the thermostats down until the active blue thermostat lights go out.



Check the pump lights to verify that they are all dim. If a pump light is red, you will need to follow the procedure in this section on checking the fuse and then continue checking the control board.



Check to see that the low water alarm light is off.



If it is not, check the water level in the tank and if it is low, refill to the level of the divider in the tank. If the water level is okay and the low water alarm light is still on, you will need to follow the procedure in this section on checking the water level sensor. If changing the water level/high temp sensor does not correct the low water alarm condition, the problem is in the control board. See the Repair & Maintenance section on replacing the control board.

If it is off, then continue with the test.

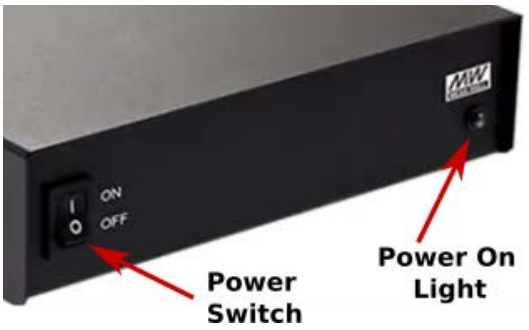
Now, turn up the thermostat for an active zone until the blue light for that thermostat comes on.
If the light does not come on, check to make sure the correct thermostat has been turned up and the thermostat wire connections are good. If both of those conditions are met and the thermostat active light is still not on, the problem is in the control board. Follow the instructions in the Repair & Maintenance section on replacing the control board.
If the light does come on, the thermostat is calling for heat and the pumps for that zone and the heat source pump should start pumping and the pump lights will be brighter green.

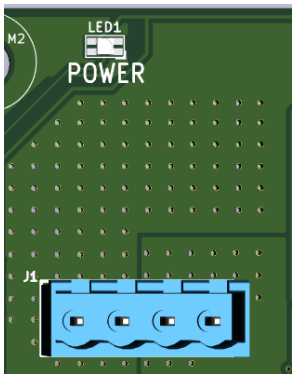
If a pump light fails to come on when the thermostat light is blue and there is a call for heat, check to make sure the zone jumper is correct for the pump you are checking. Also, check to see if the “Low Water Alarm” light is on. If it is, refill the tank with water to the level of the divider. If the zone jumper is correct, the water level is okay and the pump light is not on, there is a problem with the control board. Follow the instructions in the Repair & Maintenance section on replacing the control board.

Checking the power source

To check the power supply, make sure the AC power cord is plugged into a 120VAC outlet. Make sure the +12VDC connector is plugged into the control board.

Move the power switch for the supply to the “ON” position and verify that the power light comes on. If the power on light on the power supply module fails to come on, first check the 120VAC outlet to see that there is power. If there is power, see the Repair & Maintenance section on replacing the power supply.



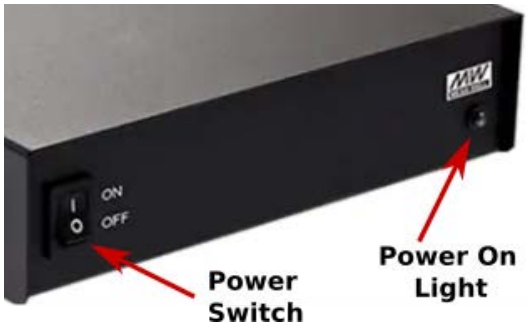


If the “Power” light on the control board is bright green, the control board is on and the power supply is functioning properly. If the “Power” light on the control board is not on and the Power Supply Light is on, then the F10 fuse on the control board may be blown. See the procedure in this section on “Checking the Fuses”.

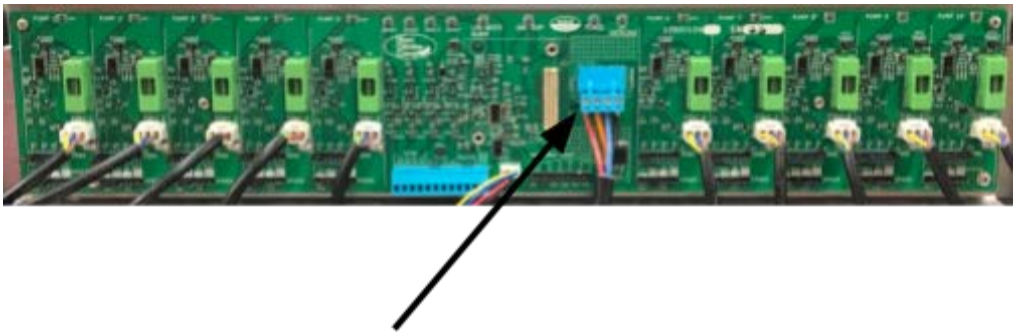
Repair & Maintenance

Replacing the Power Supply

Begin by turning off the power supply module. Check to make sure the “Power light” on the control board and the “Power light” on the power supply module are both off.



Unplug the power supply connector from the control board.



Unplug the AC power cord from the 120VAC outlet and remove the power supply module from the mounting bracket.
Place the new power supply module into the mounting bracket with the power switch and power light facing the front of the system.

Give a tug to each of the wires on the back of the supply, reseat and tighten with a small phillips screwdriver if necessary. You may first have to loosen the terminal screws.
Plug the power supply connector into the control board connector J1 and plug the AC power cord back into the 120VAC outlet. The system is now ready to be powered up and put back into service.

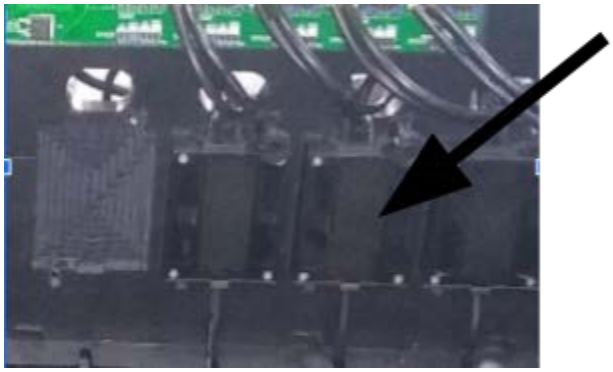
Replacing the Pump

Begin by turning off the power supply module. Check to make sure the “Power” light on the control board is off.

The water in the tank may be hot. Carefully remove the tank lid and allow the water to cool before attempting to replace a pump.

Remove the clear control board cover by sliding it up and out of the guides. Unplug the pump connector. Reach into the tank, lift out the motor and remove the supply tube. Next, remove the thumb screw holding the pump control module and lift it out of the recessed

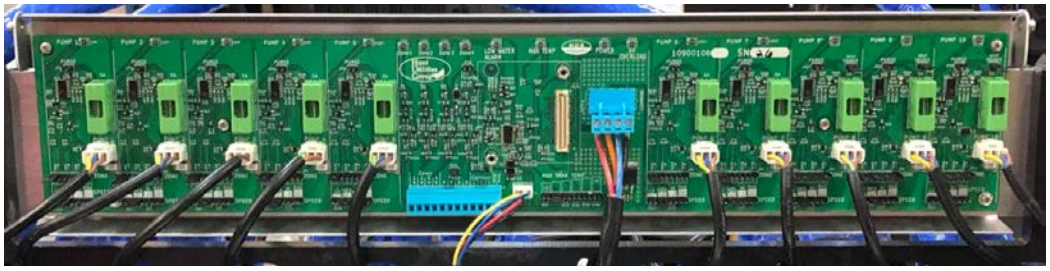
cavity. Set the old pump assembly aside and start installing the new pump by setting the control module in the recessed cavity.



Put the thumb screw for holding the control module back in place. Run the cable that connects to the control board into the opening provided and plug in the connector.
Lower the pump into the water tank, reconnect the supply tube and place the new pump back in the mount.
Finally, power up the system and purge the heat loop for the new pump by following the procedure in the section for purging the lines of air bubbles.

Replacing the Control Board

Begin by turning off the power supply module. Check to make sure the “Power” light on the control board is off. Remove the clear control board cover by sliding it up and out of the guides. Unplug the power connector, the pump connectors, the thermostat connector and the water level/ temp sensor connector.



Remove the four thumb screws that hold the control board in place. Tip the board slightly toward yourself and lift out.

Note the jumper settings on your old control board for the Tank Temperature, Zone, Speed and Heat Source headers. Set the jumpers on the new control board to match.
Tilt the new control board slightly toward yourself and place it in the recessed opening making sure the lower edge goes cleanly into the guide slot. Re-install the three thumb screws to hold the board in place.
Plug in the pump connectors, the water level/ temp sensor connector, the thermostat connector and finally the power connector. Replace the clear control board cover by sliding it into the guides. The system is now ready to be powered up and put in service.

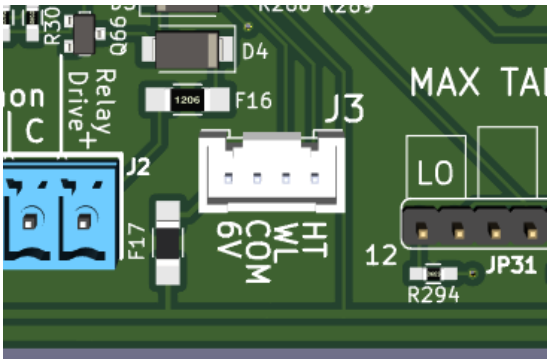
Replace Water Level/High Temp Sensor

Use only part number: 1113-03-AF Water Sensor for replacement.
Begin by turning off the power supply module. Check to make sure the “Power” light on the control board is off.

The water in the tank will be hot. Carefully remove the tank lid and allow the water to cool before attempting to replace the sensor.

Unplug the Water Level/High Temp sensor. Remove the probe from the tank and replace it with the new probe.

Plug the sensor connector into the J3 jack on the control board.



Put the tank lid back into place and turn on the power supply module to return the system to service.

Fix hose connection

Because there is virtually no water pressure, most of the opportunities for leaks are eliminated. However, it may become necessary to fix one of the hose connections.
Start by turning off the power supply module. Check to make sure the “Power” light on the control board is off.

The water in the tank will be hot. Carefully remove the tank lid and allow the water to cool before attempting to repair a hose connection.

Pull the silicone hose and the PEX water line for the faulty connection apart. Trim the ends of both lines and push the silicone hose back over the PEX line.

Put the tank lid back into place and turn on the power supply module to return the system to service.

Tank Leak

In the event of a tank leak please contact your registered dealer or our customer service department for information on how to receive a replacement tank.

Fluid Selection

There are two options for what to fill your hydronics system with: Water (distilled, deionized or reverse osmosis) or Glycol Antifreeze that is rated for heating. This section explains the advantages and requirements for each.

Water:

Summary:

Lower product cost, less required maintenance, <u>decreased</u> protection against the system freezing

Using plain water (distilled, deionized or RO) offers lower product cost, better heat transfer, and lower required system maintenance. (Use only distilled, de-ionized or RO water because it contains virtually no nutrients. Nutrients could promote biological activity or cause corrosion.)

Water Maintenance:

Check the pH of water systems annually using test strips (MSC-0000097), for a pH target of 9-10 to minimize corrosion, and biology. If pH adjustments are required please use a pH adjuster rated for hydronics use or contact the HUG Hydronics support team.

For water applications, HUG recommends Hercules® Sludgehammer™ be added to the hydronics system as directed by the manufacturer to protect against the possibility of developing microbes and corrosion. Every 7 years, it is recommended that the water be flushed and replaced.

Glycol Antifreeze:

Summary:

<u>Increased</u> protection against system freezing, with higher cost and level of required maintenance.

If there is a chance the hydronics system could freeze, HUG recommends using a <u>propylene glycol-based antifreeze</u>. Glycol antifreeze should be tested annually to determine if an additive is required. Antifreeze manufacturers typically recommend that it be checked periodically and replaced every 5 years, or so.

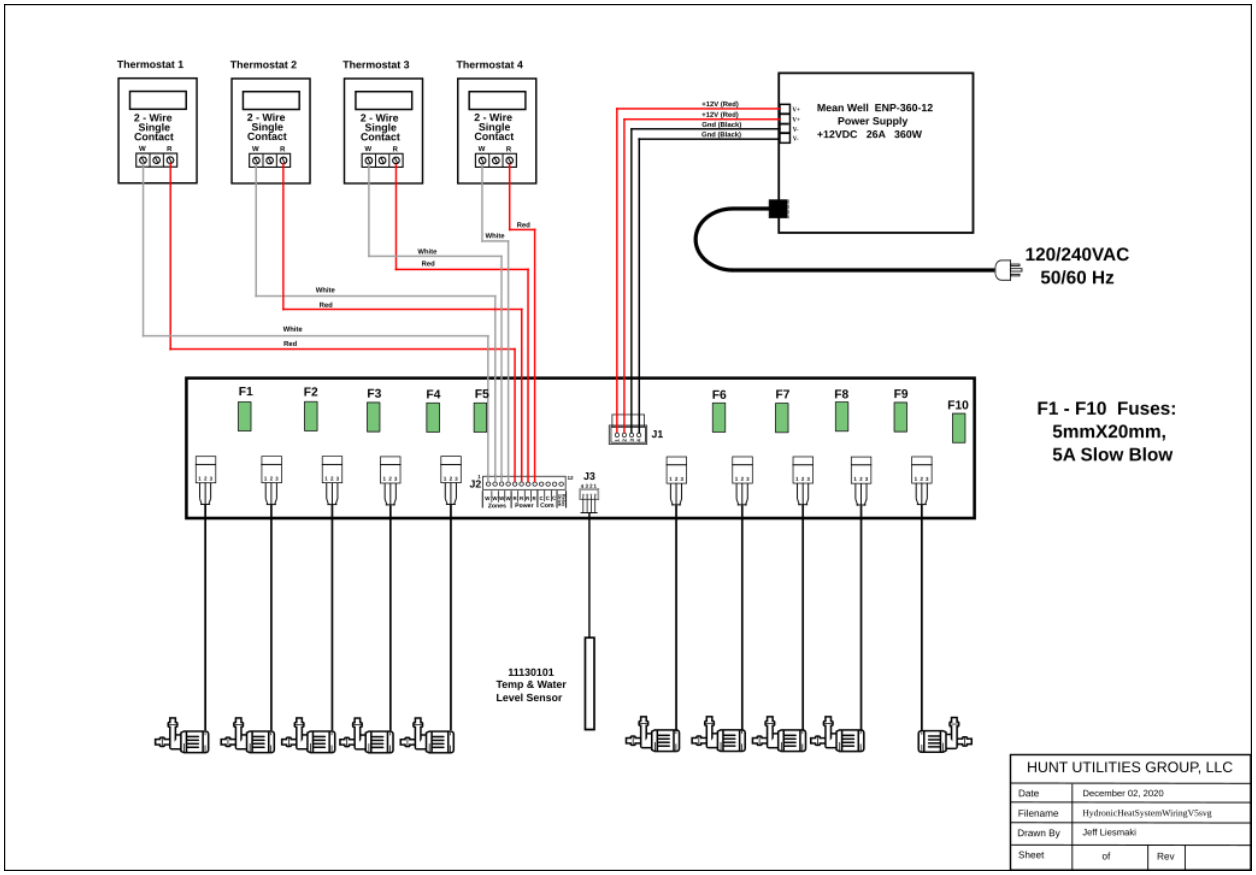
- Use only propylene glycol antifreeze intended for HVAC use and rated for heating applications. HUG recommends Cryo Tek-100 and RhoGard brand antifreezes. (Follow manufacturer's instructions.)
- Do not mix glycol brands.
- **Never** use ethylene glycol or RV Antifreeze.

Annual Maintenance of Fluid:

It is recommended the pH of both water and glycol antifreeze systems be checked annually. Refer to the antifreeze manufacturer for specifics. Cryotek has test strips that indicate performance level of the antifreeze. Check our website for additional information and supplies.

Please dispose of used propylene glycol responsibly and in accordance with local laws and regulations.

Wiring Diagram & Fuse Schedule



Parts List - exploded view

Spare Pumps

HUG Part number: HDW-0000001

Power Supply

HUG Part number: 1090-03-AS

Water Level/High Temp Sensor

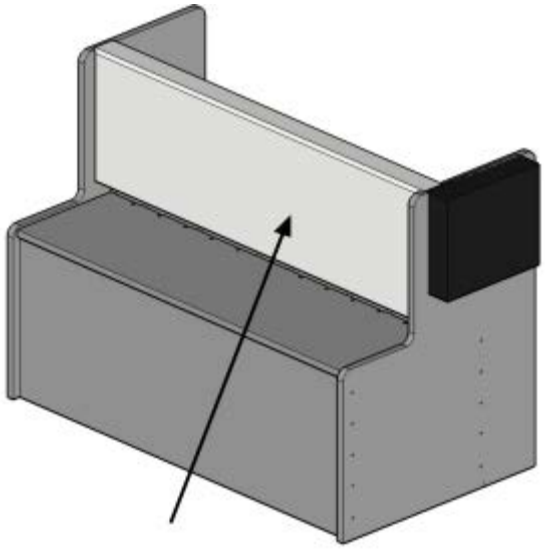
HUG Part number: 1113-03-01-AF

Control Board Replacement with Enclosure

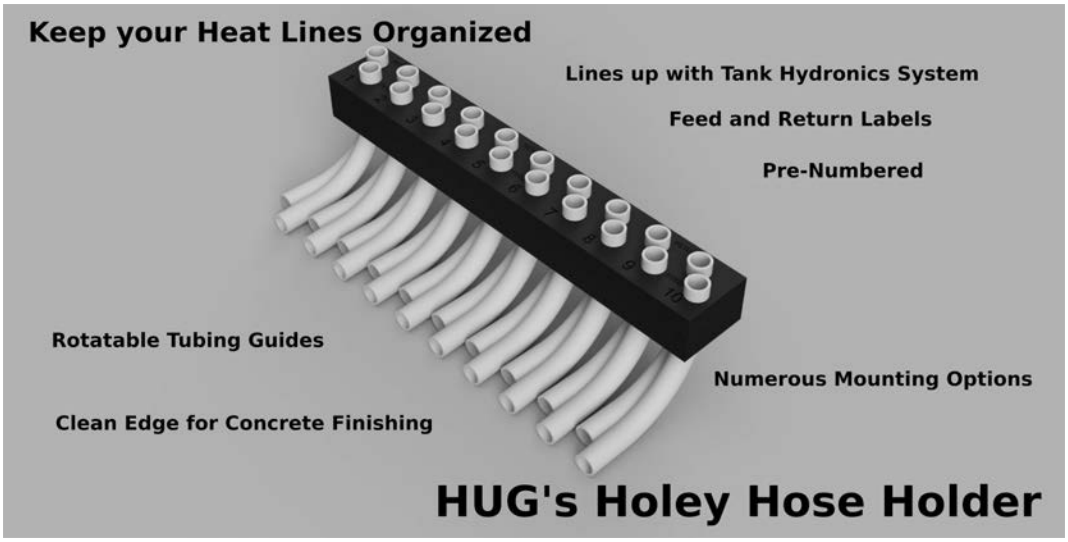
HUG Part number: 1090-41-AS

Optional Front Cover Shield

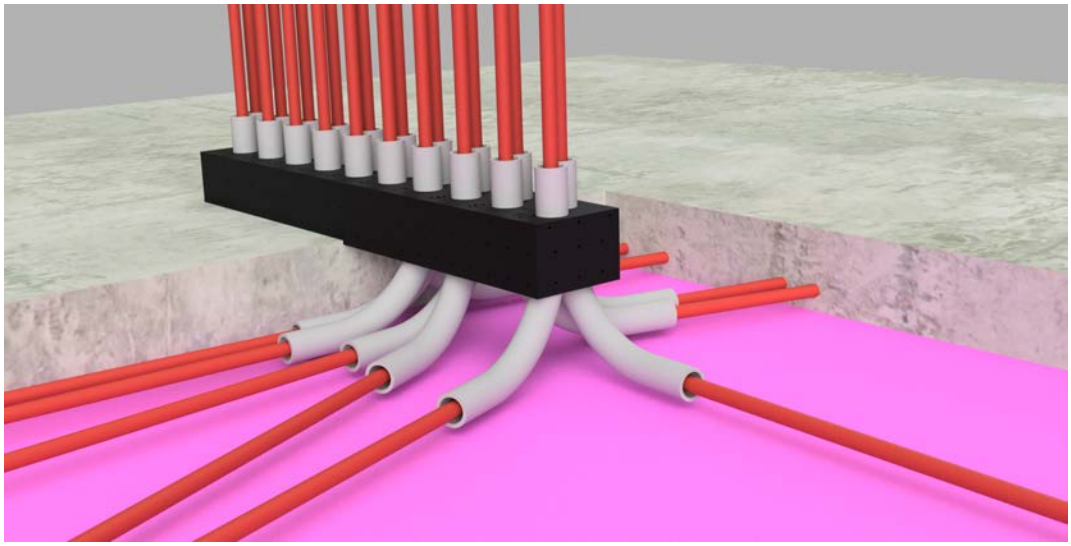
HUG Part number: 1090-04-AS



H4 Holey Hose Holder Installation (optional)



The Holey Hose Holder (p/n 1111-01-AF) is designed to be mounted before the concrete floor is poured. The PEX heat loops are run to the location planned for the Hydronic Heater tank. The position of the holder is set by attaching boards cut to the proper height. The individual heat loops are run through the tubing guides with one end going through a feed hole and the other through the matching return hole. The tubing guides are free to rotate within the holder to allow a smooth feed through path for the PEX lines.

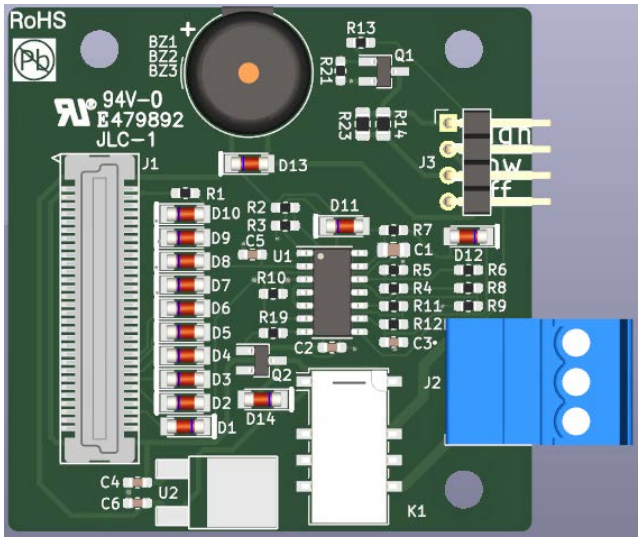


The above picture shows how wood forms can be attached to set the position of the Holey Hose Holder for the pouring of the concrete floor.

Alarm Board Option (HUG p/n 1118-01-AS)

Alarm board for the HUG Hydronics system. Alarm board option provides a buzzer and dry contacts for remote alarming.

The buzzer will sound when certain conditions are met that require the owner to be aware.



Key Features

- Alarm Buzzer with soft or loud buzzer setting
- Alarms when there is low water in the tank
- Alarms when any of the fuses blow
- Dry contact relay for remote alarming when power is lost to the system

SPECIFICATIONS

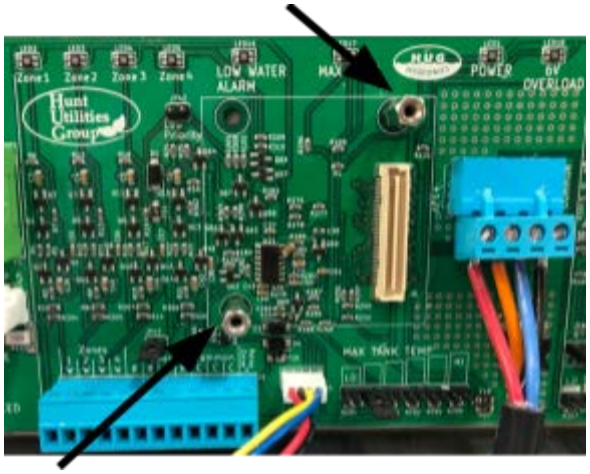
Overall Dimensions & Weight	2” long x 2” wide x 0.44” tall (50.7mmx50.7mm); <0.1lb
Power Input	12VDC
Relay Voltage	30VDC; 24VAC
Relay Contact Ratings	2A at 30 VDC
Relay type	1 Normally open and 1 normally closed
Buzzer settings	Soft or loud buzzer setting

Part number	1118-01-AF

Visit https://www.hugllc.com/tankhydronics to learn more.

ALARM BOARD INSTALLATION STEPS

1. Remove the two screws in the alarm board area of the control board and insert the two 15mm stand-offs provided.



2. Mount the alarm on the stand-offs re-using the 2 screws.

3. Adjust volume of the buzzer using the J3 jumper. Jumpering Pins 1 to 2 provides the loudest setting, Pins 2 to 3 the softest setting and Pins 3 to 4 are for off.

4. Connect wires to the J2 connector for remote alarm (optional). Pin 3 is open during an alarm, Pin 2 is the common and Pin 1 is closed during an alarm.

Smart Thermostat (HUG p/n MSC-00000016)

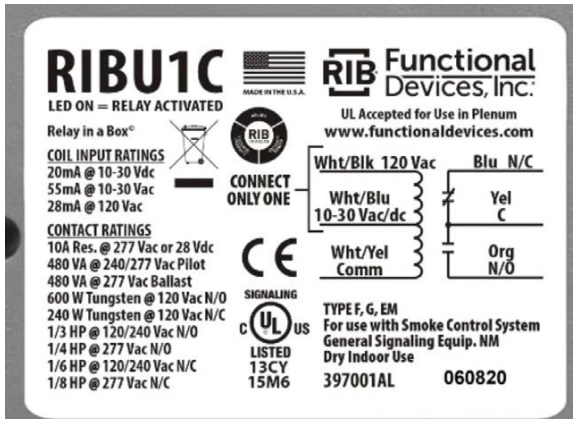
Wi-Fi VisionPRO 8000 Programmable, 3H/2C, Touchscreen Thermostat can be used with the HUG system in conjunction with a 24VAC transformer. When an alarm board is supplied it can be alerted of a system issue if the thermostat is configured for a heat pump and the alarm wires are connected for heat pump alarming.

Overview:

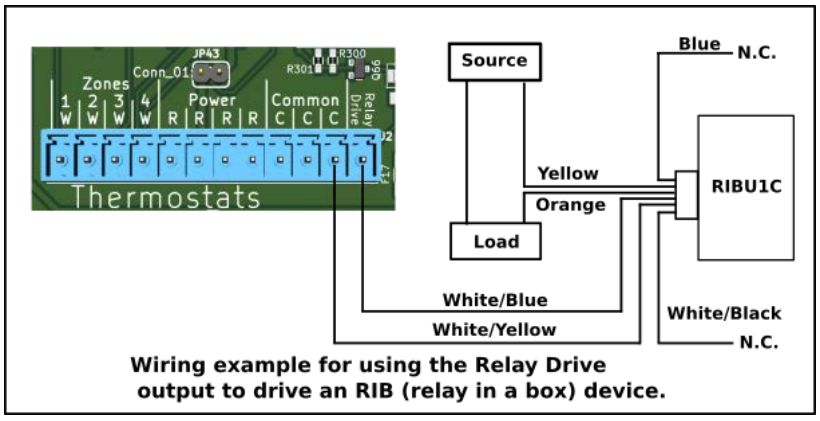
- Residential or commercial use
- Remote control via computer, tablet or smartphone
- Works on systems up to 3H/2C heat pump and 2H/2C conventional - including dual fuel.

Optional RIB Relay (HUG p/n SWI-00000003)

The RIB relay provides dry contact for interfacing with pumps and systems.



The relay drive signal is active when any of the thermostat zones are calling for heat. The illustration below shows how the relay is wired to make use of this signal.



Optional 24VAC Wall Transformer (HUG part number XFR-0000002):

The optional 24VAC Wall transformer, 20VA is used to power some smart thermostats. This is not needed with traditional contact thermostats.

Optional Thermostat

HUG part number: THT-00000001

Heat Only Non Programmable Thermostat

- Heat only manual thermostat
- Simple worry free operation
- Bimetal temperature sensor
- Decorative back plate included
- Mercury free

Polypropylene Glycol AntiFreeze Option

HUG part number: MSC-00000020

Provides Freeze Protection Down to -70°F. Please refer to Cryo-Tek-100 datasheet for mixing ration details. Mix only with distilled or RO water.