



Installation Manual & Operation Guide

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Thank You

Congratulations on the purchase of your new HEAT₂O geothermal water heater. Your geothermal water heater was assembled using the highest quality components and workmanship. Proper installation and maintenance will help insure your geothermal water heaters efficient operation for years to come.

Safety

Electrical Warning: Disconnect the power source to the unit before servicing or performing maintenance operations on the system. Failure to do so may cause personal injury and/or damage to the equipment.

Domestic water storage tank: We recommend the use of a tempering valve in all domestic hot water installations.

Injury and Damage Disclaimer: The information contained in this guide is intended for use by individuals possessing knowledge of and experience with electrical and mechanical devices and practices. The manufacturer or seller cannot assume any liability for its interpretation or use. It is the responsibility of the installer to comply with national, state and local codes when installing this equipment in any application. Any attempt to repair or install a geothermal water heater product may result in personal injury and/or property damage.

Work Safer and Smarter: Read the installation manual before starting the installation in the field. Follow all safety codes. Wear safety glasses and work gloves. Have a fire extinguisher available.

Unit Inspection

Upon arrival, inspect your HEAT₂O packaging for damage. Review carrier's bill of lading to insure that you have received all of the items that are listed. Note any damage or items that are missing on the bill of lading. In the event of damage or shortage *the purchaser* is responsible for filing a claim with the shipper.

If HEAT₂O has been purchased from a retailer or distributor inspect for damage immediately. Concealed damages must be reported within 24 hours. Damage claims not reported within 24 hours may be refused.

Storage and Moving

Leave the HEAT₂O in its original packaging until it is ready to be installed. Store the unit in a clean, dry location. Units should be stored and moved in the normal upright orientation of the packaging. Do not store or stack other items on the unit.

Location

The HEAT₂O should be installed in a dry, indoor, conditioned area with a minimum temperature of 50 degrees F. The unit should be located within close proximity to the water heater or hot water storage tank. Make sure to leave sufficient space so that access panels can be removed to facilitate future service and to allow adequate room for water and electrical connections.

Installation and Mounting

The HEAT₂O should be mounted on a vibration absorbing pad slightly larger than its base. This will minimize vibration that may be transmitted through the floor. The unit should be installed on a flat and level surface and does not need to be anchored or secured. A drain pan should be installed beneath the unit when water damage from a leak could occur.

Electrical

All electrical wiring and connections (high and low voltage) must comply with local and national codes. Verify that the available power is within the operating voltage range and phase indicated on the unit serial plate. All 208/230 volt units are factory wired to operate at 230 volts. Verify that fuse or circuit breakers are sized appropriately for circuit protection. Max fuse size can be found on the unit model plate. Also, you can refer to electrical data below. The factory enclosure is supplied with an opening to feed wiring conduit to the internal wiring harness. Always connect the ground wire to the ground terminal found in the unit case. Connect power terminal as indicated in the supplied wiring diagram.

Control Sensor Mounting and Location

Locate the sensing bulb and wire coiled below the temperature control. Cut the leads to the sensing bulb and extend a minimum of 18gauge thermostat wire to the sensor location (100' max length). Mount the sensor securely near the top of the storage tank by creating a small cavity between the metal tank and insulation. Confirm that the sensor is making good contact with metal and is completely covered by insulation. Protect the wire from damage where conductors pass through the metal jackets. Splice the wires with permanent wire nuts or other permanent mechanical fasteners. Optionally, the sensor can be mounted in a 3" - 5" well in the top of the storage tank (use thermal grease in well). Control is factory set with a 118 degree cut in and a 123 degree cut out.

Load Piping (to hot water heater or storage tank)

If the HEAT₂O is located next to the hot water heater or storage tank, the connecting pipe must be $\frac{3}{4}$ " inside diameter and may include copper, CPVC, pex, PE pipe or flexible hose. If the distance between the tank and the HEAT₂O is greater than 5' then the piping *must be 1"*. The distance between the unit and the tank *must not exceed 20'*. When using flexible hoses make sure that the inside diameter is equal in size to the unit connections. Never use flexible hoses that have an inside diameter smaller than the unit connections. Flexible hose kits and barbed fittings may be used between a flow center and the source connections only.

Source Piping

The supply and discharge water lines *must be insulated*. Failure to insulate these lines may result in damage due to condensation. All manual flow valves *must be full port ball valves*. Ball valves should be installed in the supply and return lines. Ball valves will allow for unit isolation,

water flow control and balancing. The recommended water flow rates should *NOT* be exceeded. Failure to maintain water flow rates in the recommended range could lead to system damage and malfunction.

Note: Damage caused by improper piping, improper use of flow valves or improper pump installation or sizing will void the unit's warranty.

Once all the piping connections are made, leak test the system. After repairing any water leaks, retest the system. Use appropriate connection practices for the piping material you are using.

Note: Use a back-up wrench when connecting water piping to the HEAT₂O.

Open well (Well Water Systems)

Flow Rate: Flow rate should be maintained between 2.25 GPM and 3 GPM. The water should be of good quality and the temperature of the entering source water should be at 40° F or greater.

Flow rate can be checked by measuring the pressure drop across the heat exchanger or with a flow meter. Water pressure must be maintained across the heat exchanger, which is achieved by installing a water control valve on the outlet of the unit.

It is recommended that a spin-down water filter be installed between the ball valves on the source water line. Do not power the water control valve with the unit's 24V transformer. This may cause the transformer to overheat and burn out. Mount an independent 24V transformer near the water control valve to be utilized as its power source.

The discharge water from the unit can be disposed of in various ways depending on the local building codes. Some possible examples of disposal are: a discharge well, dry well, storm sewer, drain field, stream or pond. Consult your local building and zoning department for compliance issues or questions.

Source side options for open well applications include:

1. Pump from one well to another.
2. Single well pump from bottom and return to top.
3. Pump from well and discharge into drain field.

Note: Minimum GPM is based on temperature.

Note: Freeze stat and cupronickel coil must be ordered for all open well applications. Not using a freeze stat and cupronickel coil may cause property damage and will void the warranty.

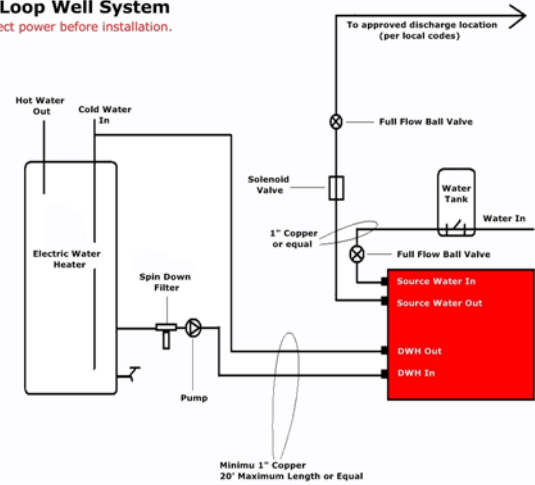
Source side options for closed well applications include:

1. Vertical trenching for piping.
2. Horizontal drilling for piping.

Note: Earth loop pump size depends on loop configuration.

Open Loop Well System

*Disconnect power before installation.



All water piping to be insulated in unconditioned spaces.
 Insulate existing water storage tanks; new storage tanks should have a minimum of R-15 insulation.
 Insulate piping between HEAT₂O unit and storage tank.
 Remove flow control device from cold water dip tube in water tank (where applicable).
 Disconnect and remove lower heating element of the water tank; install pipe from this location to "DHW In" adapter.
 Wire nut remaining heater element wires after removal of the element.

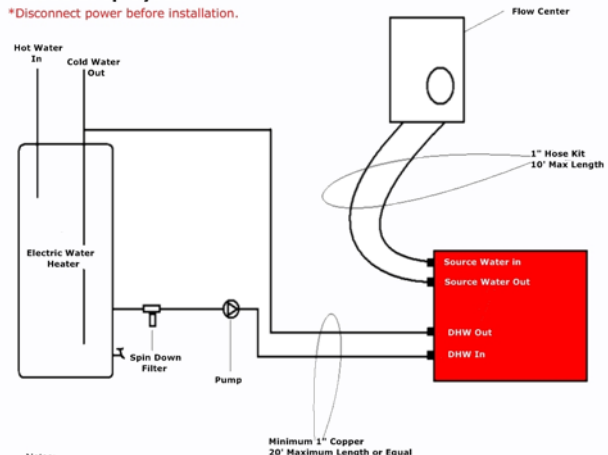
Closed Loop (Earth Coupled Systems)

Systems utilizing closed loop may require pipe fusing inside the mechanical space. We recommend consulting and/or hiring a qualified dealer to handle these aspects of the installation.

Complete proper piping between the unit, flow center and the earth loop. Once this is completed the system will need to be purged and charged. Using a flush cart (with a 1.5 HP minimum pump) purge the system and ground loop of air and dirt particles. Pressurize the loop to a static pressure of 30-50 psi. Check to make sure that the flow center is allowing adequate water flow by measuring the pressure drop across the heat exchanger. Antifreeze solutions can now be added to prevent freezing where entering loop temperatures may drop below 40° F or ground loops are installed in areas subject to freezing.

Closed Loop System

*Disconnect power before installation.



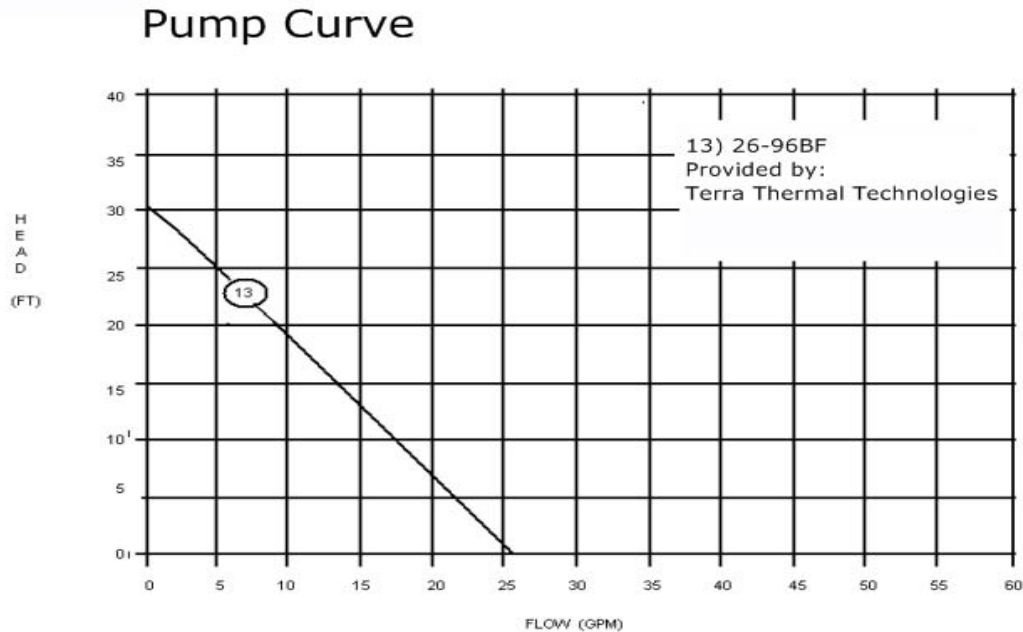
Notes:
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 Insulate piping between HEAT₂O unit and storage tank.
 Remove flow control device from cold water dip tube in water tank (where applicable).
 Disconnect and remove lower heating element of the water tank; install pipe from this location to "DHW In" adapter.
 Wire nut remaining heater element wires after removal of the element.

Water Quality

Domestic water quality (load and source side) of the HEAT₂0 is extremely critical. The acidity (PH) level must be between 6.4 and 8.2 and the iron level must be below 6 PPM. Dissolved solids (hardness) maximums vary depending on water temperature. Testing may be necessary to determine the water quality of your well. Consult with a water treatment specialist. Units are available with an optional cupronickel condenser. Cupronickel condenser units should be used in all open well installations or where water quality levels do not meet the above stated minimums.

Note: It is the responsibility of the installer to properly test and verify the water quality level. Not meeting the water quality requirements will void the warranty.

Domestic Hot Water Pump Curve



Technical Data

| Electrical Specifications | | | | | | | | | |
|----------------------------------|--------------------|------------|------------|----------------------------------|------------------------|-----------------------|-------------------|-----------|----------|
| Unit Size | Volts | Phase | Compressor | | Total | Source | Branch Circuit | Load Pump | Max Fuse |
| | | | RLA | LRA | FLA | Pump Fuse | Selection Current | Fuse | (HACR) |
| DWH0181CUVX | 208/230 | 1 | 7.4 | 48.0 | 7.4 | 5A | 13.0 | 5A | 20 |
| Heating Performance Data | | | | | | | | | |
| Entering Source Temp | Entering Load Temp | Source GPM | Load GPM | Total Water Heating Capacity BTU | Heat of Absorption BTU | Total Heat Pump WATTS | C.O.P. | | |
| 32 | 101 | 3 | 5.5 | 27,552 | 23,090 | 1304 | 6.1 | | |
| 40 | 69 | 3 | 5.5 | 27,700 | 22,571 | 1190 | 6.8 | | |
| 45 | 122 | 3 | 5.5 | 27,797 | 23,071 | 1386 | 6.5 | | |
| 50 | 121 | 3 | 5.5 | 29,999 | 24,262 | 1680 | 5.2 | | |

Pre-start Up Checklist

Complete the checklist below prior to powering up the unit.

- ✓
- Supply voltage is 208/230.
- Breakers/fuses sized correctly.
- Field wiring correctly sized.
- All electrical connections secure.
- Low voltage wiring correct.
- Water piping completed.
- All piping connections secure and leak tested.
- Ball valves installed in correct locations.
- Water flow rate is correct.
- System has been cleaned and flushed. If the unit is on a closed loop make sure the system has been purged with the correct ration of anti-freeze and water solution.
- Loop pumps and load pumps are wired properly.
- Access panels installed and secured in place.

Unit Start-Up

- ✓
- Apply power to the system and check voltage.
- Verify that the circulators are running and that the temperature controller display reads the correct temperature.
- After a five (5) minute delay, if the temperature controller is below the minimum set temperature (118 degrees F), the compressor will start.
- Verify that the pumps and compressor are operating.
- By using the pressure gauge and thermometer through the pressure/temperature ports, calculate the flow rate and establish the heat of extraction as follows:

GPM flow rate X Delta T (temperature) X 500 =

- Check for vibrations, leaks and proper insulation.
- Instruct the owner on unit operation.

Trouble Shooting Guide

1. Compressor will not operate:

1. Fuse or circuit breaker open – no power to unit.
2. Check ALL power (low and high) in the unit. Make sure all connections are tight.
3. Check operation of the digital thermostat. Make sure water temperature is below the minimum set point of 120 degrees F. The set button on the controller can be pushed to verify that the upper set point is 125 degrees F. These set points can be changed for radiant heat application. Consult factory on the procedure.
4. Start & Run capacitors may be defective.
5. Overload safety in compressor is open. Allow the compressor to cool before restarting.
6. Defective compressor: check for motor windings – grounded or open using an OHM meter.

2. Low pressure light is on:

1. Failed source side heat exchanger or low water flow.
2. Source side water is too cold.
3. Low refrigerant.

3. High pressure light is on:

1. Failed load side heat exchanger or low water flow.
2. Source water too warm.
3. Digital thermostat allowing load water to get too warm.

4. Freeze indicator light is on:

1. Source water too cold.
2. Low flow through heat exchanger source

5. Lengthy water recovery time:

1. Calculate unit output as follows:

$\text{GPM (8.34)} \times \text{DELTA T} \times 60 = \text{BTU Heat out put.}$

Insure that the performance is close to specifications.

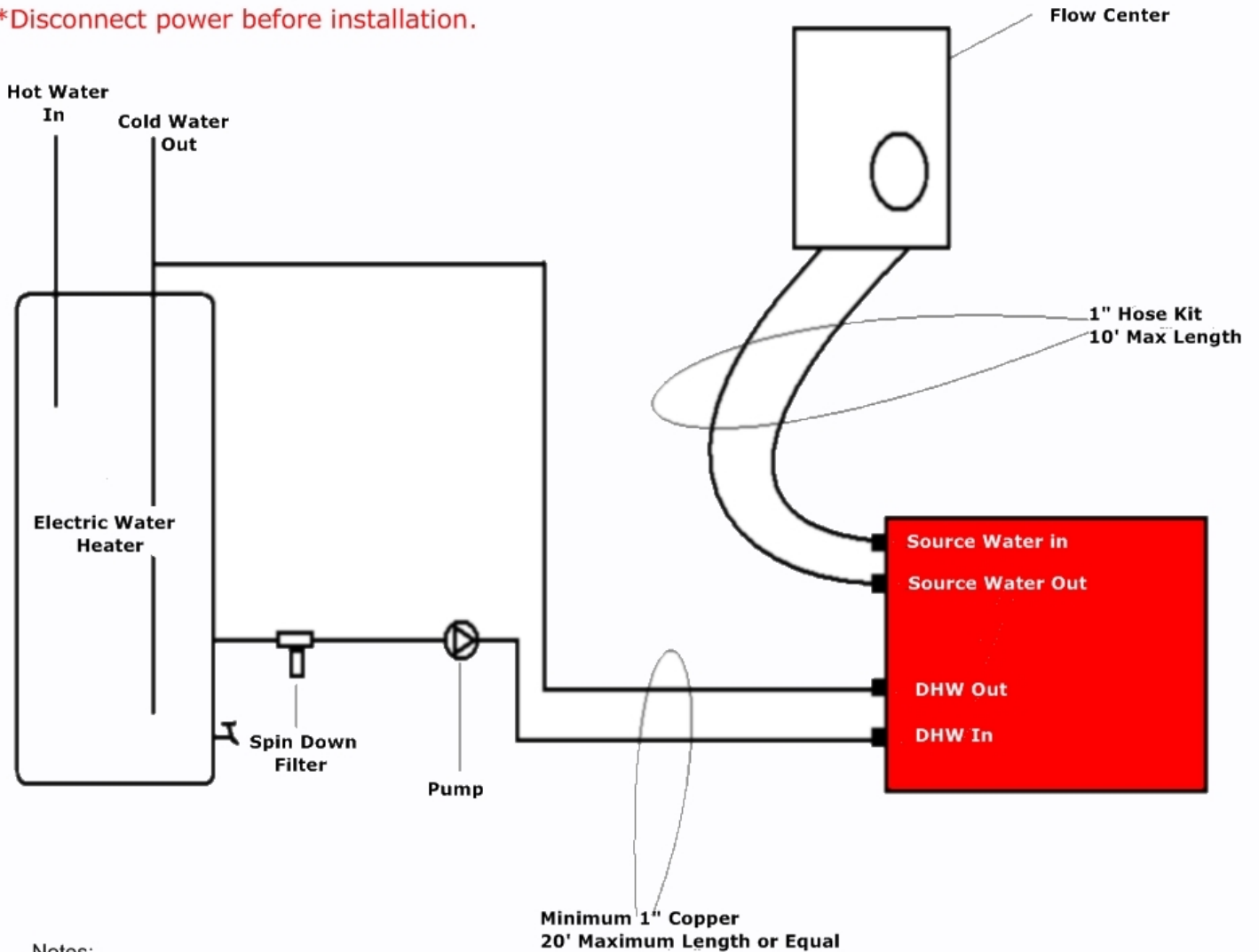
Contact Information:

www.terrathermaltech.com

info@terrathermaltech.com

Closed Loop System

*Disconnect power before installation.



Notes:

All water piping to be insulated in unconditioned spaces.

Insulate existing water storage tanks; new storage tanks should have a minimum of R-15 insulation.

Insulate piping between HEAT20 unit and storage tank.

Remove flow control device from cold water dip tube in water tank (where applicable).

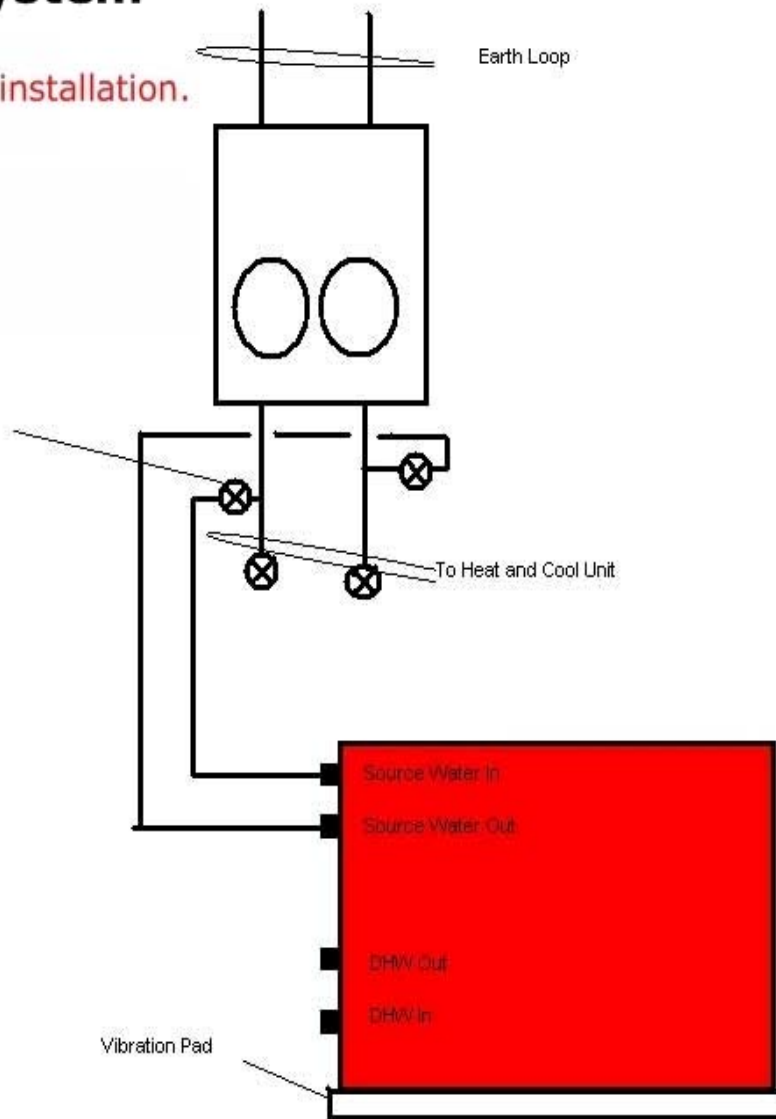
Disconnect and remove lower heating element of the water tank; instal pipe from this location to "DHW In" adapter.

Wire nut remaining heater element wires after removal of the element.

Earth Coupled System w/Shared Flow Center

*Disconnect power before installation.

Full Flow Ball Valves
Balance to 3 G.P.M. Minimum
Flow at the Heat20 unit.

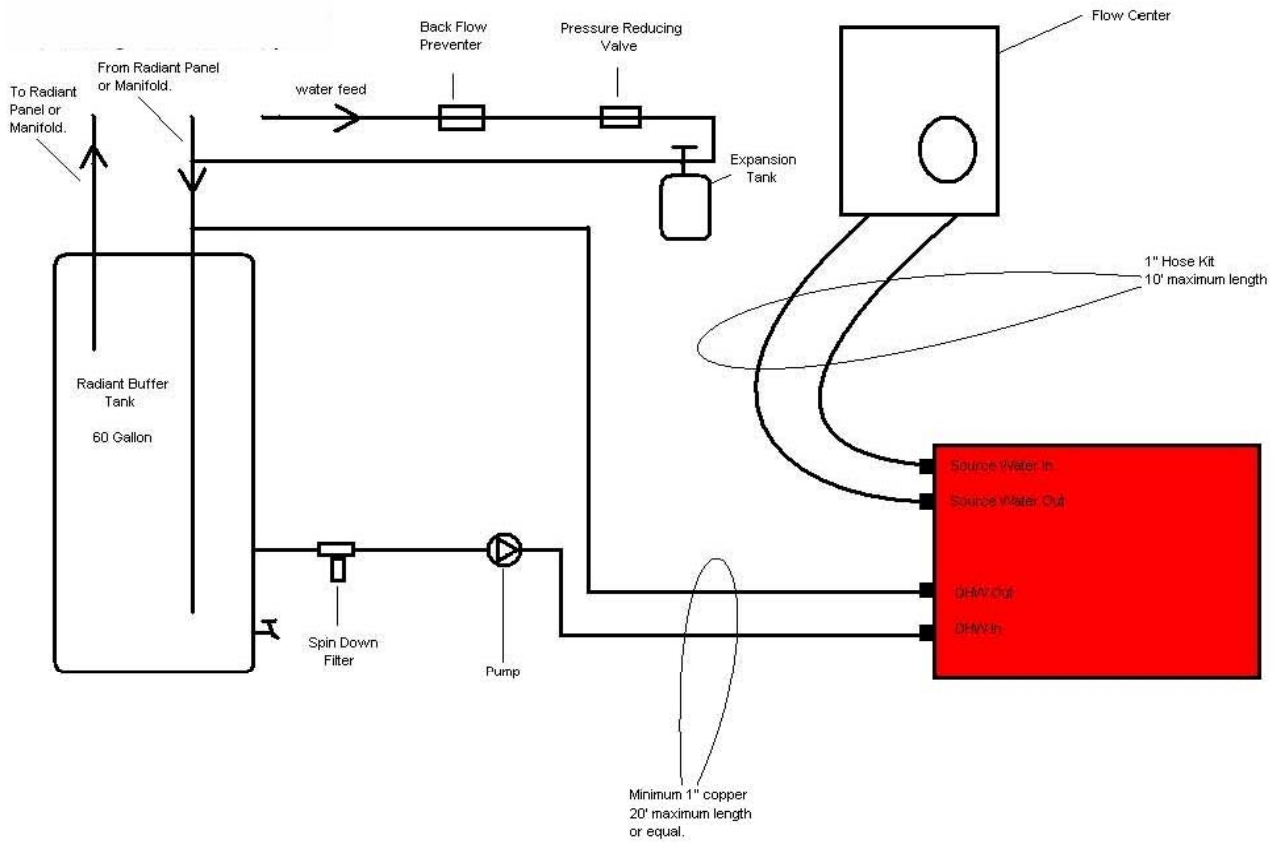


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- Remove flow control device from cold water dip tube in water tank (where applicable).
- Disconnect and remove lower heating element of the water tank; instal pipe from this location to "DHW In" adapter.
- Wire nut remaining heater element wires after removal of the element.

Radiant Floor Heating

(18,000 BTU nominal capacity - 120 F max temp)

*Disconnect power before installation.



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Insulate piping between HEAT20 unit and storage tank.

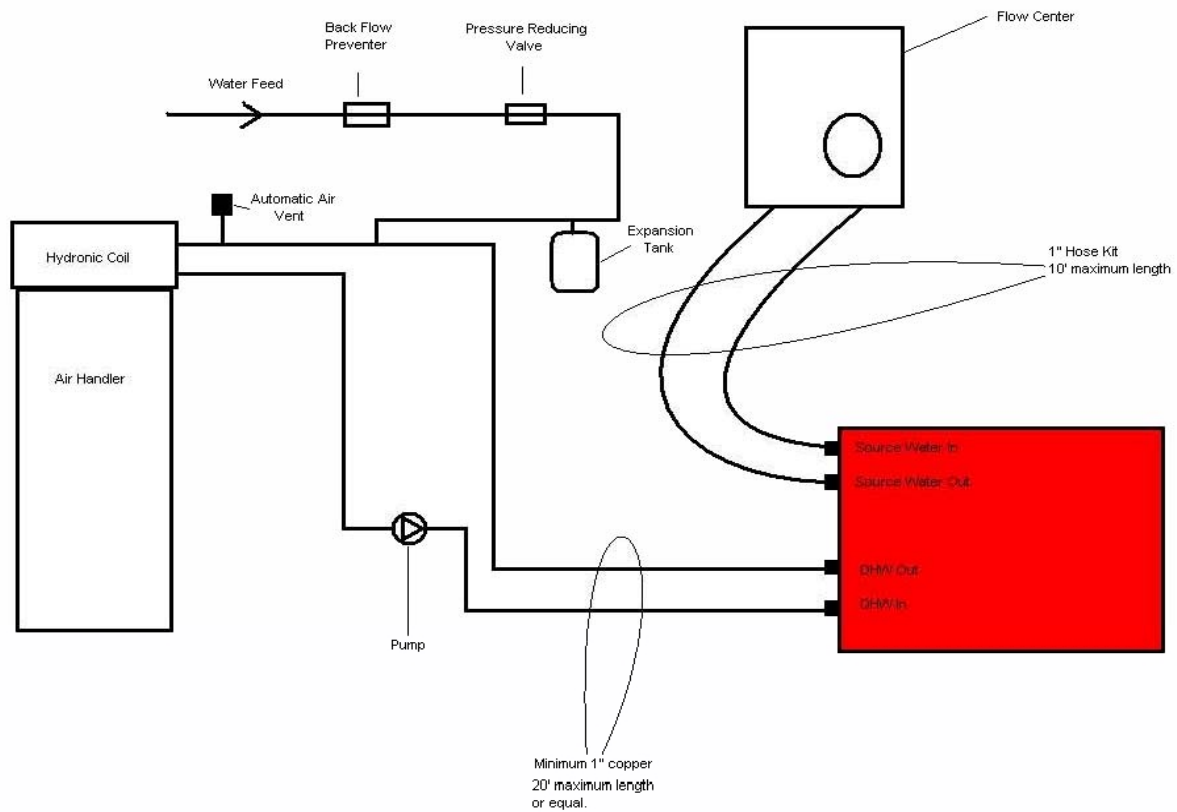
Remove flow control device from cold water dip tube in water tank (where applicable).

Disconnect and remove lower heating element of the water tank; instal pipe from this location to "DHW In" adapter.

Wire nut remaining heater element wires after removal of the element.

Hydronic Coil w/Air Handler (18,000 BTU nominal capacity)

*Disconnect power before installation.



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Insulate existing water storage tanks; new storage tanks should have a minimum of R-15 insulation.

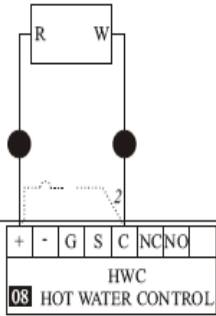
Insulate piping between HEAT20 unit and storage tank.

Remove flow control device from cold water dip tube in water tank (where applicable).

Disconnect and remove lower heating element of the water tank; instal pipe from this location to "DHW In" adapter.

Wire nut remaining heater element wires after removal of the element.

Remote Thermostat Wiring



- Step 1: Turn power to unit off.
- Step 2: Remove the permanent wire nut from wire #2.
- Step 3: Route the + end of wire #2 to the R terminal of the heating thermostat with a minimum of 18 gauge TSTAT wire.
- Step 4: Route the C end of wire #2 to the W terminal of the heating thermostat with a minimum of 18 gauge thermostat wire.

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| 1899A THERMIST TECHNOLOGY FIG. 001/021 DAVIDSONVILLE, MD 21038 | | This drawing is the property of IBM, Boeing or Lockheed Martin. It is not to be used, reproduced, or disseminated in any form without the express written permission of the originator. If you are not an authorized recipient, you should not disseminate this information. | | | | | | REV. 01 |
| STANDARD AND PRACTICALITY | | DATE | | JOB NO. | | SCALE | | |
| DATE | DESIGNER | DATE | JOB NO. | SCALE | | | | |
| 08/2007 | GEO | 08/2007 | | | | | | |
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| PRACTICALITY 1.064 | | PRODUCT DEVELOPMENT | | Addendum Page #1 | | | | |
| 2 PL. DEC. :01 | | MFG. QUALITY ASSURANCE | | Remote Thermostat Wiring | | | | |
| 3 PL. DEC. :005 | | MFG. QUALITY ASSURANCE | | HEAT20r5.CDR Page 6 | | | | |
| ANGULAR : 1/2 | | MFG. QUALITY ASSURANCE | | | | | | |
| SERIAL DRAWING | | MFG. QUALITY ASSURANCE | | | | | | |
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