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Geo-Flo Hydro-Connect™ Buffer Tank/Control System Installation and Application Manual



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NOTES:

This guide provides the installer with instructions specific to the Geo-Flo Hydro-Connect System. Please refer to your heat pump manufacturer’s instructions or IGSHPA guidelines for additional detailed application and installation information. Please review the entire document before proceeding with the installation.

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Applications

Overview

A geothermal water-to-water heat pump almost always needs a buffer tank to allow for heat pump flow rates that are different from hydronic system flow rates. For example, a 3 ton water-to-water heat pump typically requires about 9 GPM (34 l/min) for the ground loop (“source” heat exchanger) and for the hydronic side (“load” heat exchanger). Dropping below 7 GPM (26 l/min) could cause refrigeration circuit problems. However, the hydronic heating or cooling system connected to the load heat exchanger may require much less flow, especially multi-zone systems like radiant floor heating, where a signal zone using 1/2” (13mm) PEX piping may require only 1.5 GPM (6 l/min). A buffer tank “de-couples” the heat pump flow requirements from the hydronic system flow requirements.

Modulating-condensing boilers can also benefit from a buffer tank to reduce short cycling. For example, when a mod-con has a 150,000 BTU/hour (44 kW) capacity with a 5:1 turn down ratio, it could be firing at 30,000 BTU/hour (9 kW) to satisfy a load of just 10,000 BTU/hour (3 kW) when the heat loss is lower at warmer outdoor temperatures (or when only one radiant zone is calling), causing the boiler to short cycle. The two worst times in the combustion cycle are startup and shutdown, when the flue gas is at its dirtiest. The boiler will burn more fuel and create wear and tear on all components, shortening the life expectancy of the heat exchanger when installed without a buffer tank.

Buffer tanks have been used in the geothermal heat pump industry for many years, but not without some difficulty. A complete system requires the tank, as well as a pump(s) between the heat pump and buffer tank, pumps or zone valves for the hydronic system, fittings/adapters/manifolds, and controls to tie all of the components together. Problems arise when components from various manufacturers are installed on a single application, often due to the lack of compatibility. It is not uncommon for a system to have three or four transformers and multiple voltages for components (typically 24 VAC, 115 VAC, and 230 VAC). Additional relays and interconnecting wiring are usually required to complete the system. When chilled water is used for fan coil units, more challenges arise. Most buffer tanks are not insulated adequately for chilled water. Plus, zone boards and controllers/aqua-stats may be designed for heating only systems or very limited cooling applications.

Geo-Flo’s Hydro-Connect system solves these issues by integrating a foam-insulated composite tank with all of the controls needed for a variety of heating/cooling zones, including fan coils, as shown in Figure 1.

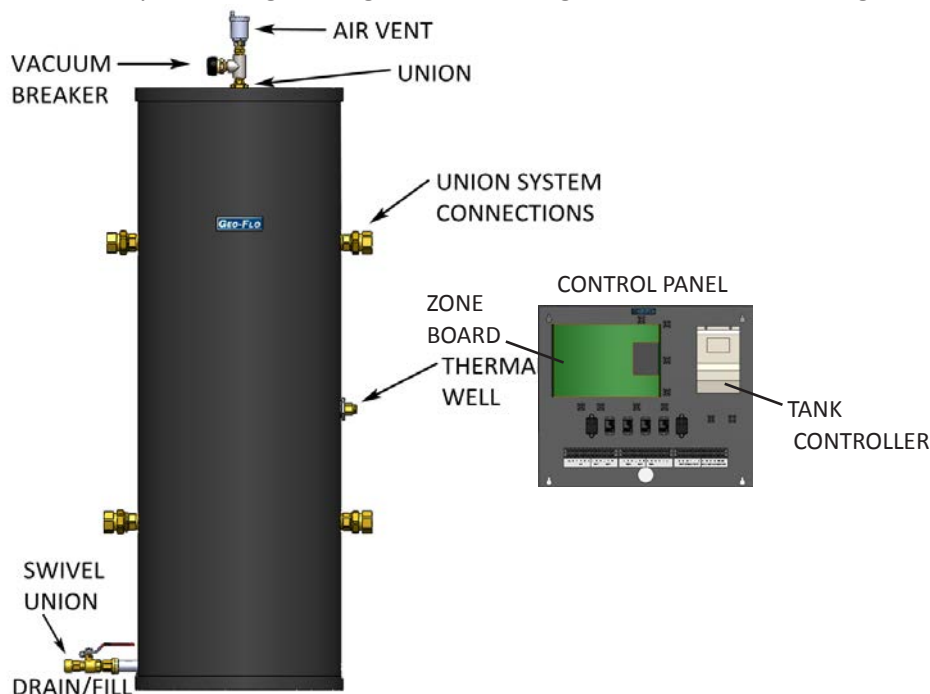


Figure 1: Hydro-Connect system

The key to the integrated design is the single point for connecting all of the system components. Figure 2 illustrates the layout of the control panel. The Hydro-Connect System consists of three components 1) A buffer tank (HCT) 2) A control panel (HCC and optional HCE) and 3) Distribution components (pumps and/or zone valves).

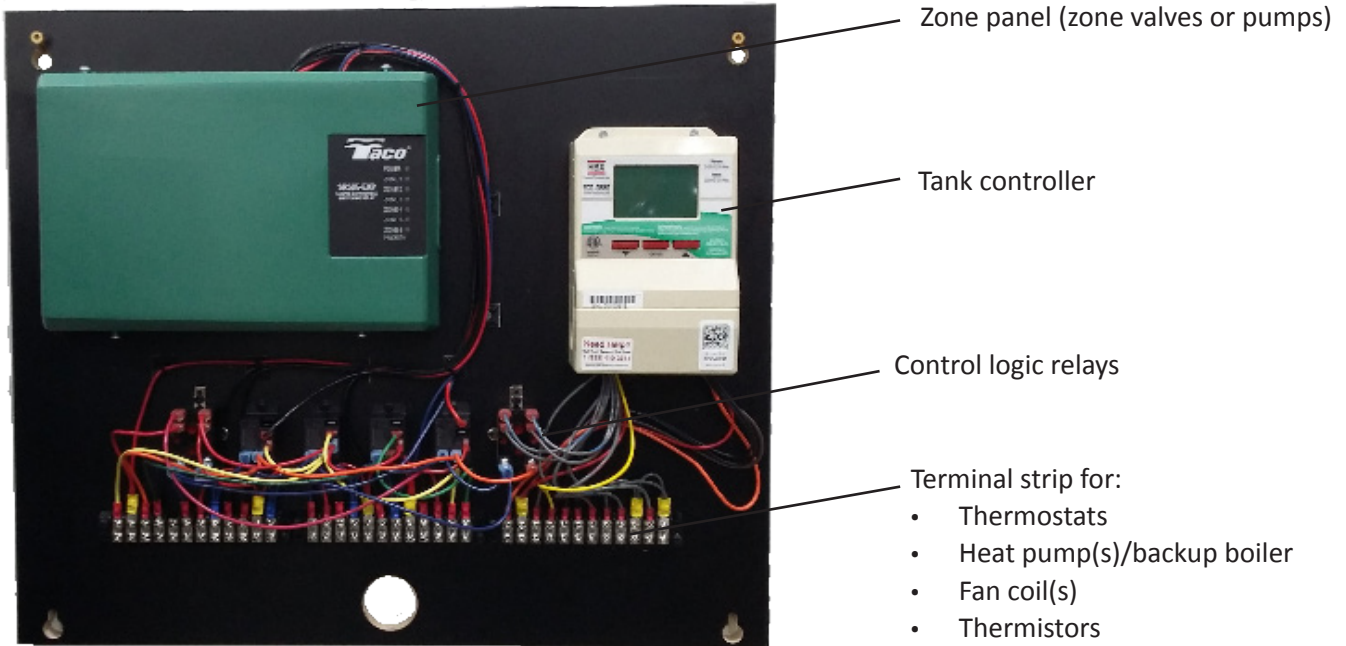
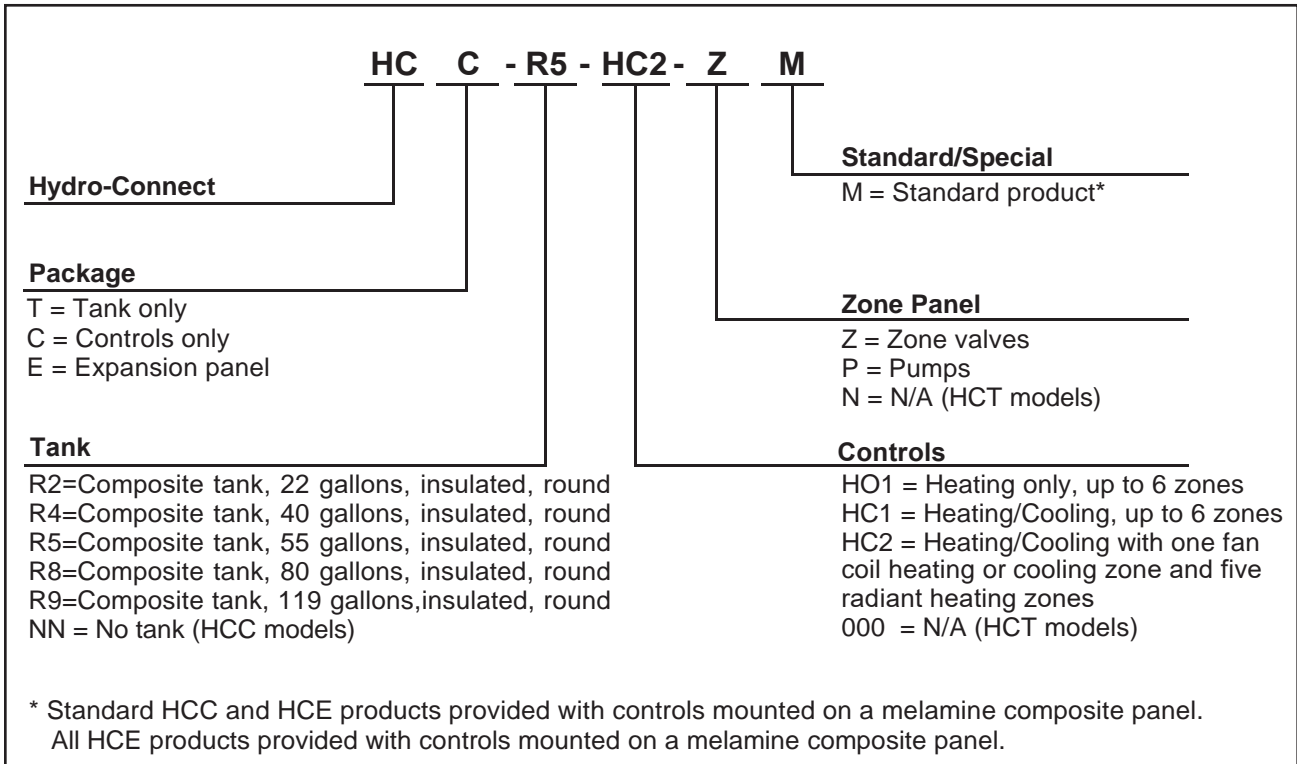


Figure 2: Hydro-Connect control panel

Model Nomenclature



Control Features and Options

The Hydro-Connect system has three control package options: Heating Only, and Heating/Cooling, and Heating/Cooling with Fan Coil Zone. Each of the three options is available with either pump control or zone valve control. Depending upon the heat pump and the distribution system, one panel may be more suited than another for the particular application. Below is a summary of controls available. Table 1 on page 6 provides a basic comparison of the available models.

All Hydro-Connect Controls (Standard Features): All control packages include a tank temperature controller, zone panel for up to six zones, and terminal strips for connection to external devices. Hydro-Connect controls are standard with the following features:

- Outdoor Temperature Reset
- CWSD and WWSD (Cold Weather Shutdown and Warm Weather Shutdown)
- Central wiring: All thermostats, heat pump(s), and zone valves or pumps are wired to the control panel
- Up to 3 stages of heating/2 stages of cooling, including backup boiler output
- Color controller display, indicating heating/cooling demand, operation mode, and input/output status
- External indicator lights for zone operation
- Pump exercise operation (when zoning with pumps)
- Fused zone board
- Choice of zoning with pumps or zone valves (2, 3, or 4 wire valves)
- Expansion capability

Heating Only Controls (-HO1 systems):

The typical application for the Heating Only control package is a radiant floor heating system with a separate cooling system (cooling system is not connected to the Hydro-Connect controls) and a geothermal water-to-water heat pump or modulating condensing boiler for heating. This control package also works well for floor warming in up to six zones with a separate forced air heating and cooling system. Other applications, such as combination heat pumps work better with the Heating/Cooling control package.

All thermostats (up to six zones) are wired to the control panel, as well as the heat pump(s) and optional backup boiler. If more than 6 zones are needed, a HCE-NN-HO1 panel can be added. When a zone calls for heating, a pump or zone valve is activated by the zone panel, distributing heated water from the buffer tank to the appropriate zone. When the tank drops below set point (based upon immersion-type tank thermistor reading), the tank controller energizes the heat pump(s) and/or boiler (if installed) based upon controller settings (temperature differential, backup time, and backup temperature). The controller can provide up to three stages of heating. If WWSD (Warm Weather Shutdown) is enabled, the tank temperature will no longer be maintained if outdoor temperature is above WWSD temperature for the specified time (0 to 48 hours, based upon controller setting). The outdoor sensor provides input to the tank controller to adjust buffer tank set point based upon outdoor temperature if outdoor design temperature is specified. If set to "OFF," outdoor temperature reset is disabled.

Heating/Cooling Controls (-HC1 systems):

The typical application for the Heating/Cooling control package is a radiant floor heating system with fan coils for heating and/or cooling, using a geothermal water-to-water heat pump to generate hot and chilled water. This control package also works well for systems using fan coils for both heating and cooling and for combination heat pumps (forced air heating/cooling and hot water heating).

All thermostats (up to six zones) are wired to the control panel, as well as the heat pump(s) and optional backup boiler. If more than 6 zones are needed, a HCE-NN-HC1 panel can be added. Zone 1 thermostat is the master thermostat, determining if the system will be in heating or cooling. When Zone 1 is in heating (terminal "O" not

energized), the tank controller will condition the tank to the heating set point. When Zone 1 is in cooling (terminal “O” energized), the tank controller will condition the tank to the cooling set point.

Hydro-Connect -HC1 controls allow Zones 2 through 6 to be set up as heating, cooling, or heating/cooling zones (Zone 1 is the master zone, and will determine tank operation, hot water or chilled water). Zones 2 through 6 provide terminals Rh and Rc at each zone to specify whether the zone will be heating only (connect Rh to the R terminal at the thermostat), cooling only (connect Rc to the R terminal at the thermostat), or both (jumper Rh and Rc, and connect to the R terminal at the thermostat). Zones 1 to 3 are isolated from Zones 4 through 6 by relay contacts. Therefore, if the Rh and Rc terminals are jumpered in Zones 2 or 3, Zones 4 through 6 are not affected. Likewise, if the Rh and Rc terminals are jumpered in Zones 4 through 6, Zones 2 and 3 will not be affected. NOTE: If Rh and Rc are jumpered (allowing a call for heating and cooling), there is potential to distribute water through a radiant floor zone. Caution must be exercised when the potential exists. To eliminate this potential, use the -HC2 panel. The wiring diagrams in the Installation section of this manual provide detailed operation notes regarding heating, cooling, and heating/cooling zones.

In heating, when a thermostat calls for heating, a pump or zone valve is activated by the zone panel, distributing heated water from the buffer tank to the appropriate zone (typically a radiant floor zone or fan coil zone). All thermostats connected to terminal Rh will be allowed to call for heating; thermostats connected to Rc will not be active in the heating mode (i.e. Rc will be de-energized) when Zone 1 is in heating mode. In cooling, when a thermostat calls for cooling, a pump or zone valve is activated by the zone panel, distributing chilled water from the buffer tank to the appropriate zone (typically a fan coil zone). All thermostats connected to terminal Rc will be allowed to call for cooling; thermostats connected to Rh will not be active in the cooling mode (i.e. Rh will be de-energized) when Zone 1 is in cooling mode.

In heating, when the tank drops below set point (based upon immersion-type tank thermistor reading), the tank controller energizes the heat pump(s) and/or boiler (if installed) based upon controller settings (temperature differential, backup time, and backup temperature). The controller can provide up to three stages of heating. If WWSD (Warm Weather Shutdown) is enabled, the tank temperature will no longer be maintained if outdoor temperature is above WWSD temperature for the specified time (0 to 48 hours, based upon controller setting). The outdoor sensor provides input to the tank controller to adjust buffer tank set point based upon outdoor temperature if outdoor design temperature is specified. If set to “OFF,” outdoor temperature reset is disabled.

In cooling, when the tank rises above set point (based upon immersion-type tank thermistor reading), the tank controller energizes the heat pump(s). The controller can provide up to two stages of cooling. If CWSD (Cold Weather Shutdown) is enabled, the tank temperature will no longer be maintained if outdoor temperature is below CWSD temperature for the specified time (0 to 48 hours, based upon controller setting). The outdoor sensor provides input to the tank controller to adjust buffer tank set point based upon outdoor temperature if outdoor design temperature is specified. If set to “OFF,” outdoor temperature reset is disabled.

For systems using fan coils with the Heating/Cooling control option (Panel HC1), attention must be given to transformer wiring (see Figure 9 and/or Appendix A). Important notes are shown in the wiring diagrams to avoid transformers being out of phase. If only one fan coil is being used for cooling, the Heating/Cooling with Fan Coil Zone control option -HC2 should be used (below).

Heating/Cooling with Fan Coil Zone Controls (-HC2 systems):

This application is used when one fan coil provides a single Zone of cooling or heating via forced air duct work for the system, and heating is provided by up to five zones of radiant heating. If more than 6 zones are needed, a HCE-NN-HC2 panel can be added. Zone 1 controls the fan coil, and therefore all cooling; Zones 2 through 6 control up to five radiant zones, and therefore all heating. The *Heating Thermostat Interrupt* feature included with this control package disables (i.e. de-energizes) the heating thermostats if Zone 1 is in cooling to avoid any possibility of sending chilled water through a radiant floor zone. Zone 1 must be a heat pump thermostat. All other thermostats should be heating only thermostats (or thermostats programmed as such). All thermostats, as well as the heat pump(s) and optional backup boiler, are wired to the control panel. When Zone 1 is in heating (terminal “O” not energized), the tank controller will condition the tank to the heating set point. When Zone 1 is in cooling (terminal “O” energized), the tank controller will condition the tank to the cooling set point.

In heating, when the tank drops below set point (based upon immersion-type tank thermistor reading), the tank controller energizes the heat pump(s) and/or boiler (if installed) based upon controller settings (temperature differential, backup time, and backup temperature). The controller can provide up to three stages of heating. If WWSD (Warm Weather Shutdown) is enabled, the tank temperature will no longer be maintained if outdoor temperature is above WWSD temperature for the specified time (0 to 48 hours, based upon controller setting). The outdoor sensor provides input to the tank controller to adjust buffer tank set point based upon outdoor temperature if outdoor design temperature is specified. If set to "OFF," outdoor temperature reset is disabled.

In cooling, when the tank rises above set point (based upon immersion-type tank thermistor reading), the tank controller energizes the heat pump(s). The controller can provide up to two stages of cooling. If CWSD (Cold Weather Shutdown) is enabled, the tank temperature will no longer be maintained if outdoor temperature is below CWSD temperature for the specified time (0 to 48 hours, based upon controller setting). The outdoor sensor provides input to the tank controller to adjust buffer tank set point based upon outdoor temperature if outdoor design temperature is specified. If set to "OFF," outdoor temperature reset is disabled.

Pump/Zone Valve Options

The Hydro-Connect system controls the pumps and/or zone valves on both sides of the tank. The distribution system (e.g. radiant floor, fan coils, etc.) is connected to one side, and the heat pump/backup boiler to the other.

Distribution System:

The Hydro-Connect system has two zoning options, zoning with zone valves (digit 12 = Z), and zoning with pumps (digit 12 = P). When zoning with zone valves, each zone has a zone valve that is controlled by the thermostat for that particular zone. Typically, a variable speed pump using differential pressure control (e.g. Grundfos Magna3) provides water flow based upon the number of zone valves open. As the number of open zone valves increases, the pump speed increases. Likewise, as zone valves close, the pump speed decreases (NOTE: See Figure 14 on page 13) for wiring the variable speed pump to avoid dead heading the pump when all zone valves are closed). When zoning with pumps, each zone utilizes a small wet rotor circulator that is controlled by the thermostat for that particular zone. When the zone thermostat calls for heating or cooling, the pump energizes, providing water flow to the zone.

Heat Pump/Backup Boiler:

The Hydro-Connect system energizes the heat pump(s)/backup boiler when the tank temperature is below set point (heating) or above set point (cooling). In most cases, the "load side" pump between the buffer tank and the heat pump is energized when the heat pump compressor is energized. For constant speed pumps, the pump should be wired to the "T" side of the compressor contactor (or pump terminals if provided). Variable speed pumps (UPMXL) must be wired to the "L" side of the contactor (i.e. always powered) to eliminate control problems with the pump and/or pre-mature compressor contactor failure.

The heat pump/backup boiler pumps should be selected based upon the pressure drop of the piping between the heat pump/boiler, including the heat pump/boiler heat exchanger pressure drop. Consult online Design Calculators at www.geo-flo.com for pressure drop calculation and pump sizing.

Expansion Panels

HCE expansion panels are available to allow an additional six zones per panel to be added to the standard HCC panels. The HCE-HO1 (Heating Only) panel consists only of the Taco zone panel, and does not need to be wired to the main panel. The HCE-HC1 and HCE-HC2 expansion panels function like their main “parent” panels, and must be wired to the main panel. The main panel controls the tank temperature, and therefore the function of the expansion panel.

Model Comparison

Model	Heating	Cooling	Total Zones	Possible Radiant Zones	Possible Fan Coil Cooling Zones	Fan Coil Transformer Isolation Included	Heating Thermostat Interrupt Included*	Expansion Panel
HCC-NN-HO1-PM	Y	N	6	6	0	N/A	N/A	HCE-NN-HO1-PM
HCC-NN-HO1-ZM	Y	N	6	6	0	N/A	N/A	HCE-NN-HO1-ZM
HCC-NN-HC1-PM	Y	Y	6	6	6	N	N	HCE-NN-HC1-PM
HCC-NN-HC1-ZM	Y	Y	6	6	6	N	N	HCE-NN-HC1-ZM
HCC-NN-HC2-PM	Y	Y	6	6	1	Y	Y	HCE-NN-HC2-PM
HCC-NN-HC2-ZM	Y	Y	6	6	1	Y	Y	HCE-NN-HC2-ZM

Table 1. Feature comparison of HCC models.

*The Heating Thermostat Interrupt feature disables (i.e. de-energizes) heating/radiant thermostats in all zones if Zone 1 is in cooling to avoid any possibility of sending chilled water through a radiant floor zone.

Selection Examples

The following examples are provided to show how one or more panels can be selected to provide controls for a complete system.

1. **System:** Two fan coils used for cooling only, and 6 radiant heating zones. Pumps will provide distribution to the fan coils and radiant zones.

Solution: Select (1) HCC-NN-HC2-PM and (1) HCE-NN-HC2-PM. The thermostat wired to Zone 1 of the HCC-NN-HC2-PM is the master thermostat, controls the first fan coil, and determines whether the system is in heating or cooling. The second fan coil is wired to Zone 1 of the expansion panel (HCC-NN-HC2-PM). The radiant zones can be wired to Zones 2 through 6 on either panel, depending on physical panel and distribution component (pumps) locations.

2. **System:** Two fan coils used for heating and cooling, and 5 radiant heating zones. Pumps will provide distribution to the fan coils and radiant zones.

Solution: Selection is exactly the same as (1) above. However, Zone 1 on both panels will need to be field modified with a factory supplied jumper to allow heating and cooling on these zones.

3. **System:** Two fan coils used for cooling only, and 3 radiant heating zones. Pumps will provide distribution to the fan coils and radiant zones.

Solution: There are two choices for this system, depending on what features you wish to include. Solution 1: Select (1) HCC-NN-HC2-PM and (1) HCE-NN-HC2-PM. The thermostat wired to Zone 1 of the HCC-NN-HC2-PM is the master thermostat, controls the first fan coil, and determines whether the system is in heating or cooling. The second fan coil is wired to Zone 1 of the expansion panel (HCE-NN-HC2-PM). The three radiant zones can be wired to Zones 2 through 6 on either panel, depending on physical panel and distribution component (pumps) locations. Note that this selection includes the Heating Thermostat Interrupt feature, and complete fan coil transformer isolation. Solution 2: Select (1) HCC-NN-HC1-PM. The thermostat wired to Zone 1 is the master thermostat, controls the first fan coil, and determines whether the system is in heating or cooling. The second fan coil is wired to Zone 2, but an additional field supplied relay must be installed to provide transformer isolation between the two units. The three radiant zones are wired to Zones 4-6. Note that special consideration must be taken to prevent chilled water from being pumped through the three radiant zones since this panel allows a call from these zones when Zone 1 is in cooling (i.e. tank contains chilled water).

Installation

Tank Installation

Refer to the Geo-Flo Hydro-Connect Buffer Tank IOM (document PN 4731) for information regarding tank installation.

Panel Installation

The HCC panel should be mounted to a wall or mounting stand adjacent to the HCT tank. The tank temperature sensor is pre-wired to the terminal strip and taped to the panel for shipping. This sensor should be placed into the bulb well and secured (such as with a cable tie). The well/well entry should then be insulated. Additional wire can be added to the sensor for longer reach. The HCC also includes an additional sensor that can be used for remote temperature monitoring (for example, to allow for outdoor temperature reset). This sensor is not pre-wired to the terminal strip. After mounting, the controls panel should be wired according to the wiring diagrams on the following pages.

Wiring Diagrams (High Voltage)

The Hydro-Connect system includes two field connections for high voltage. Follow the steps below for connections to the HBX tank controller and Taco Zone controller.



WARNING: OPEN THE POWER SUPPLY DISCONNECT SWITCH AND SECURE IT IN AN OPEN POSITION PRIOR TO PERFORMING ELECTRICAL WORK. VERIFY THAT POWER HAS BEEN DISCONNECTED PRIOR TO WIRING THE CONTROLLER. FAILING TO SECURE THE ELECTRICAL SUPPLY COULD RESULT IN SERIOUS INJURY OR DEATH. THIS EQUIPMENT SHOULD BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL ONLY.

1. Install field-supplied wiring and disconnect from HBX controller to breaker/fuse panel. Follow all applicable codes for wire size/type, disconnect requirements, and breaker/fuse size.
2. Install field-supplied wiring and disconnect from Taco zone controller to breaker/fuse panel. Follow all applicable codes for wire size/type, disconnect requirements, and breaker/fuse size. NOTE: High voltage connections are shown to the right. For the zone panel with circulators, the high voltage connections are at the "INPUT 120VAC" terminals on the zone board. For the zone panel zone valves, high voltage connections are at the primary side of the transformers. Both transformers should be connected to the field wiring.

NOTE: See Appendix A for important wiring considerations if connecting fan coils.

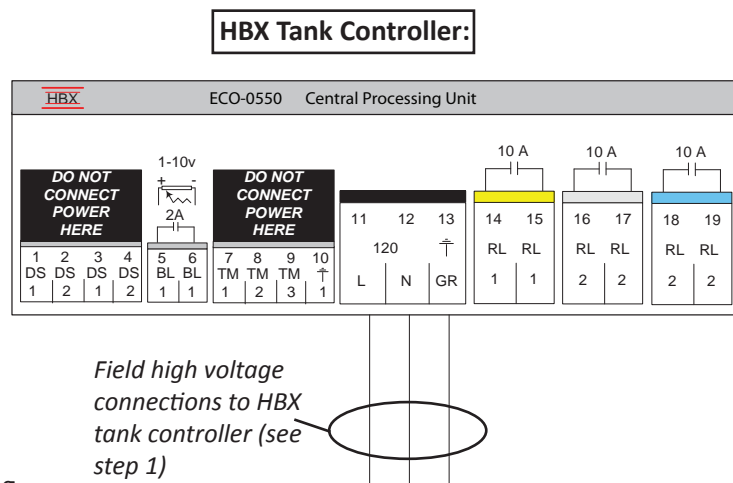
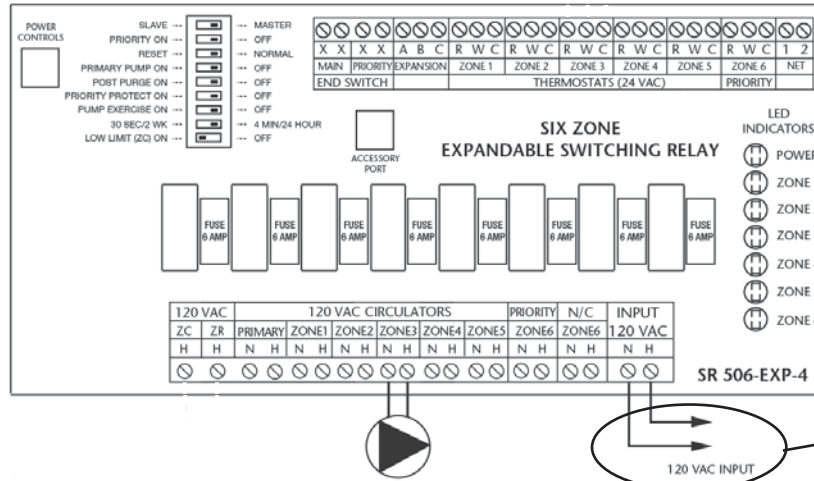


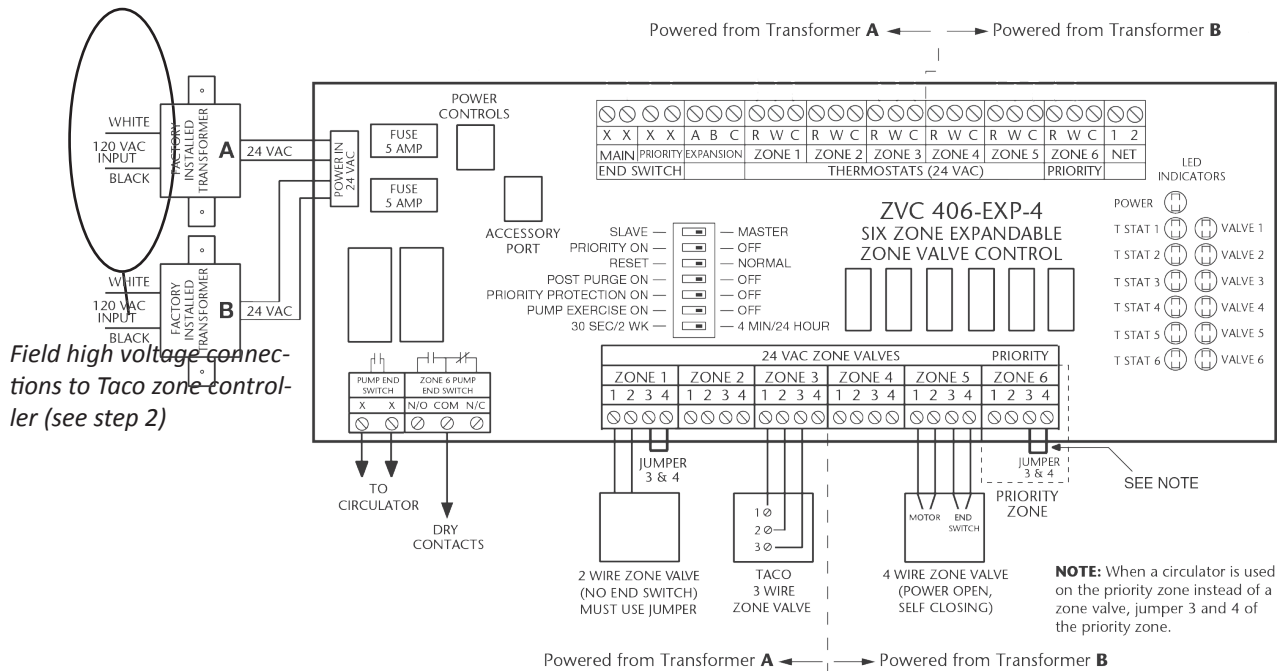
Figure 4: HBX high voltage wiring

Taco Zone Panel for Circulators: (SR-506)



Field high voltage connections to Taco zone controller (see step 2)

Taco Zone Panel for Zone Valves: (ZVC406)



Field high voltage connections to Taco zone controller (see step 2)

NOTE: When a circulator is used on the priority zone instead of a zone valve, jumper 3 and 4 of the priority zone.

Figure 5: Taco high voltage wiring

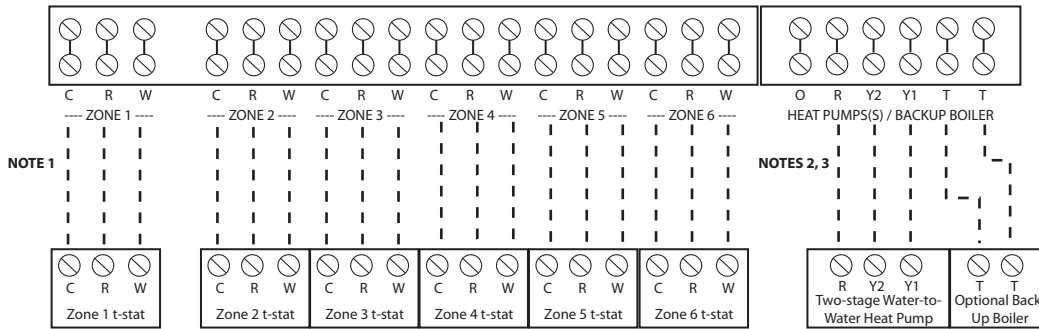
Wiring Diagrams (Low Voltage)

The Hydro-Connect system may be applied to many different types of heating and cooling systems. Below are some common wiring diagrams for the most popular applications.



WARNING: OPEN THE POWER SUPPLY DISCONNECT SWITCH AND SECURE IT IN AN OPEN POSITION PRIOR TO PERFORMING ELECTRICAL WORK. VERIFY THAT POWER HAS BEEN DISCONNECTED PRIOR TO WIRING THE CONTROLLER. FAILING TO SECURE THE ELECTRICAL SUPPLY COULD RESULT IN SERIOUS INJURY OR DEATH. THIS EQUIPMENT SHOULD BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL ONLY.

Hydro-Connect Control Panel- Model HO1

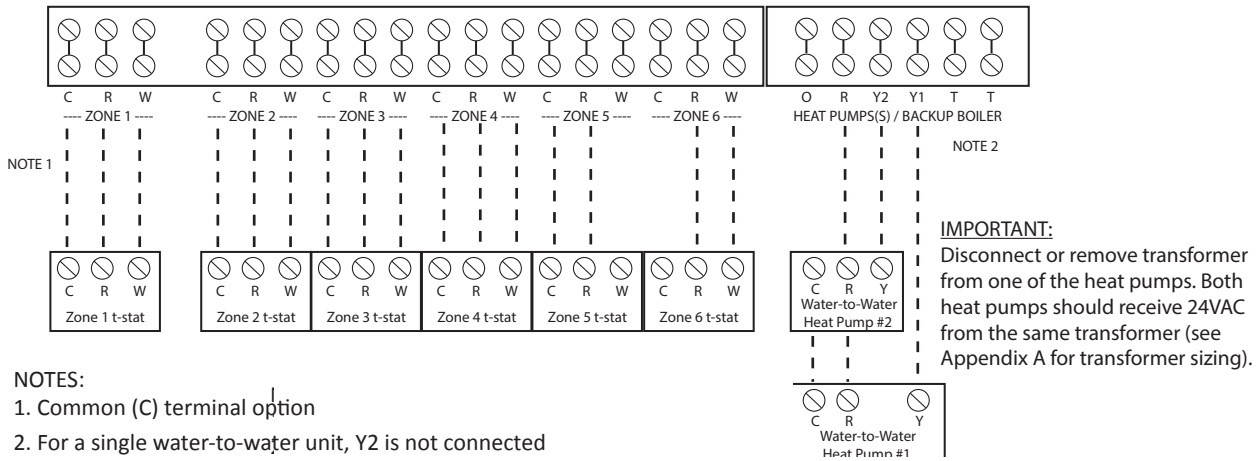


NOTES:

1. Common (C) terminal option
2. For a single water-to-water unit, Y2 is not connected
3. For two water-to-water heat pumps, see Figure 7 (Backup boiler connections may also be used for a second heat pump (connect R to T on the left and Y to T on the right).)

Figure 6: Radiant Floor Heating Only, Up to Six Zones (optional separate cooling system)*

Hydro-Connect Control Panel- Model HO1



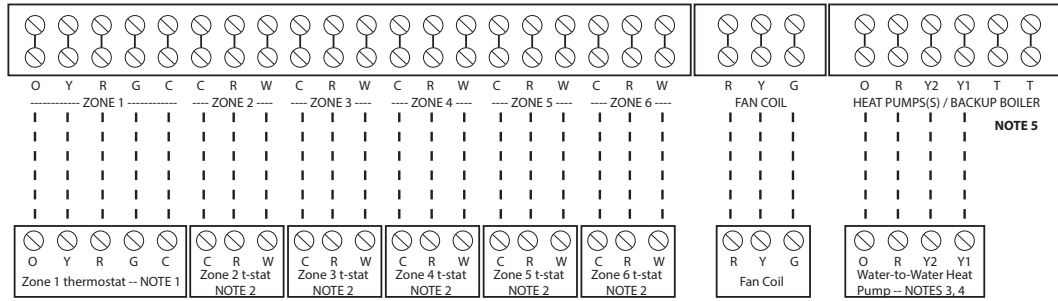
NOTES:

1. Common (C) terminal option
2. For a single water-to-water unit, Y2 is not connected
3. For two water-to-water heat pumps, see Figure 6 (Backup boiler connections may also be used for a 2nd/3rd heat pump (connect R to T on the left and Y to T on the right).)

Figure 7: Radiant Floor Heating Only, Up to Six Zones Two Water-to-Water Heat Pumps (optional separate cooling system)*

*If zoning with fan coils, use panel HC1 or HC2

Hydro-Connect Control Panel- Model HC2

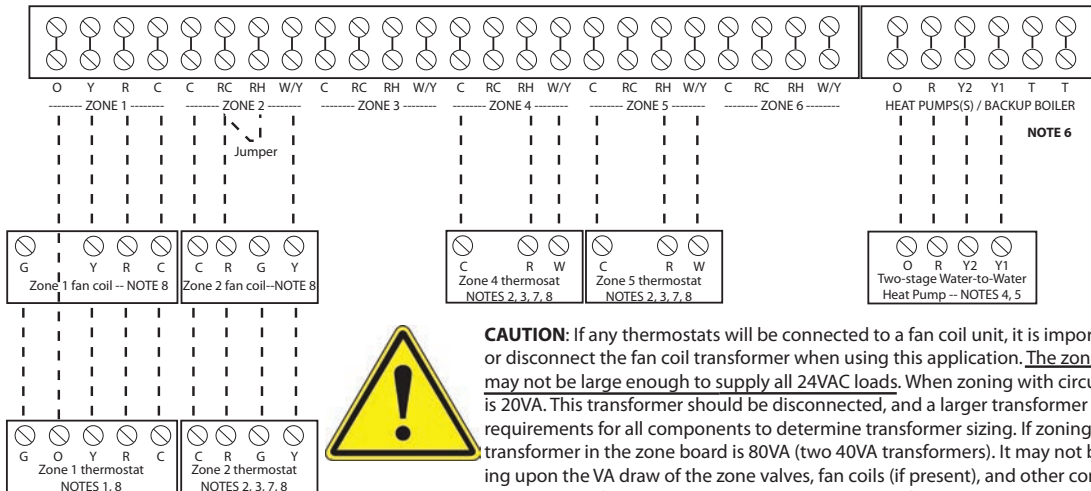


NOTES:

1. Heat pump thermostat required for Zone 1. Zone 1 is the master thermostat for heating/cooling mode for a system. Zone 1 is factory shipped a cooling only zone and controls the fan coil for cooling. See wiring diagram for changing Zone 1 to a heating and cooling zone.
2. Common (C) terminal optional
3. For a single stage water-to-water unit, Y2 is not connected
4. For two water-to-water heat pumps, see Figure 7
5. For backup boiler wiring, see Figure 6

Figure 8: Up to Five Radiant Floor Heating Zones; One Fan Coil Heating/Cooling Zone

Hydro-Connect Control Panel- Model HC1

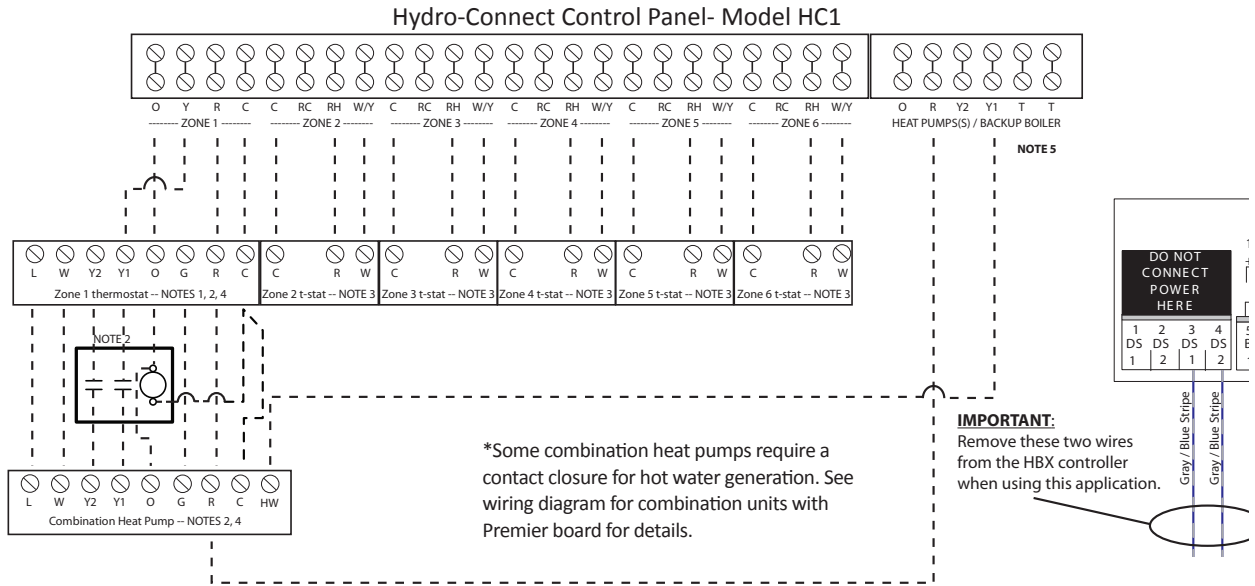


CAUTION: If any thermostats will be connected to a fan coil unit, it is important to remove or disconnect the fan coil transformer when using this application. The zone board transformer may not be large enough to supply all 24VAC loads. When zoning with circulators, the transformer is 20VA. This transformer should be disconnected, and a larger transformer installed. Add up the VA requirements for all components to determine transformer sizing. If zoning with zone valves, the transformer in the zone board is 80VA (two 40VA transformers). It may not be large enough, depending upon the VA draw of the zone valves, fan coils (if present), and other components. Add up the VA requirements for all components to determine transformer sizing (see Appendix A).

NOTES:

1. Heat pump thermostat required for Zone 1. Zone 1 is the master thermostat for heating/cooling mode for a system. Zone 1 is a heating and cooling zone.
2. Zones 2 through 6 may be either heating or cooling or both. Use RH for heating zones (i.e. connect R from the thermostat to RH); Use RC for cooling zones (i.e. connect R from the thermostat to RC); for zones that are both heating and cooling, jumper RC to RH, and connect R from the thermostat to either terminal. **IMPORTANT:** Zones 2 and 3 and Zones 4-6 are switched as a block. Therefore, if one zone is setup as both heating and cooling (RH and RC jumpered), the other zones in that block will also be setup as both heating and cooling. For example, if RC and RH are jumpered in Zone2, Zone 3 will be a heating and cooling zone, but zones 4-6 will not be affected, since those three zones are switched as a separate block.
3. Common © terminal optional
4. For a single stage water-to-water unit, Y2 is not connected
5. For two water-to-water heat pumps, see Figure 7
6. For backup boiler wiring, see Figure 6
7. In the above example, Zone 3 is skipped, since it is a heating/cooling zone due to the jumper at Zone 2 between RC and RH. Zones 4-6 are not affected by the Zone 2 jumper, and may be used as heating only or cooling only zones.
8. Review **CAUTION** notice (above) next to fan coil connections if any zone will be using a fan coil. Radiant floor zones are not affected. For additional information, see Appendix A.

Figure 9: Heating and Cooling, Up to Six Zones (Example shown for multiple fan coils and multiple radiant floor or floor warming zones)



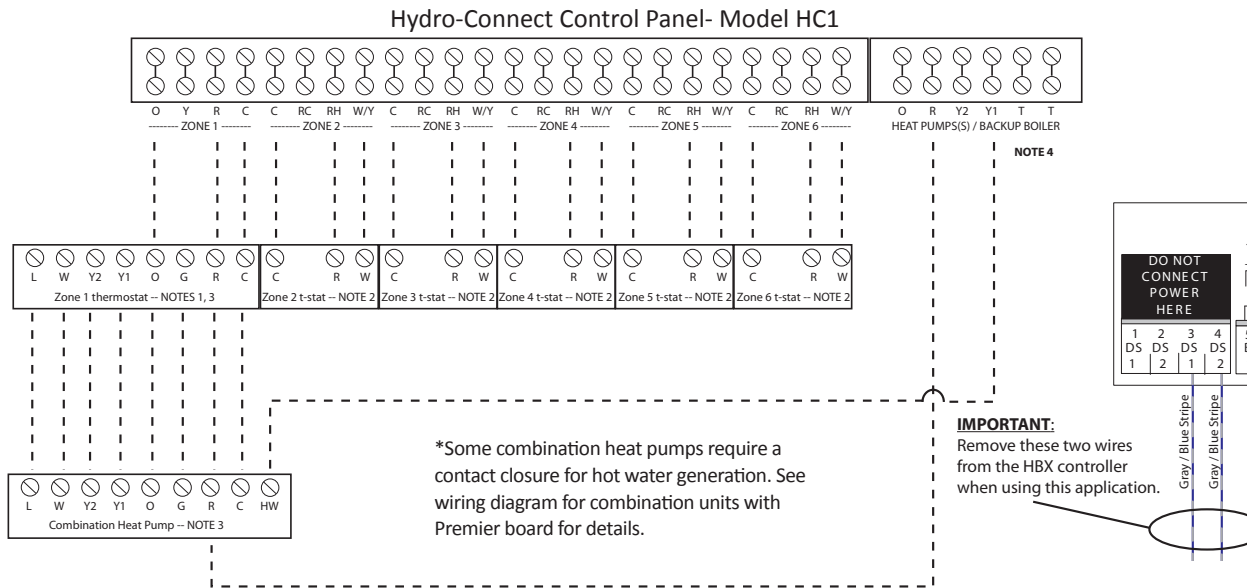
NOTES:

1. Heat pump thermostat required for Zone 1. Zone 1 is the master thermostat for heating/cooling mode for a system.
2. Field provided/installed DPST or DPDT relay required
3. Common (C) terminal optional
4. Review IMPORTANT notices and warnings
5. For boiler backup wiring, see Figure 6



CAUTION: Remove or disconnect the heat pump transformer when using the application. The zone board transformer may not be large enough to supply all 24VAC loads. When zoning with circulators, the transformer is 20VA. This transformer should be disconnected, and a larger transformer installed. Add up the VA requirements for all components to determine transformer sizing. If zoning with zone valves, the transformer in the zone board is 80VA (two 40VA transformer). It may not be large enough, depending upon the VA draw of the zone valves, heat pump, and other components. Add up the VA requirements for all components to determine transformer sizing (see Appendix A).

Figure 10: Combination Heat Pump* Radiant Heating / Forced Air Cooling



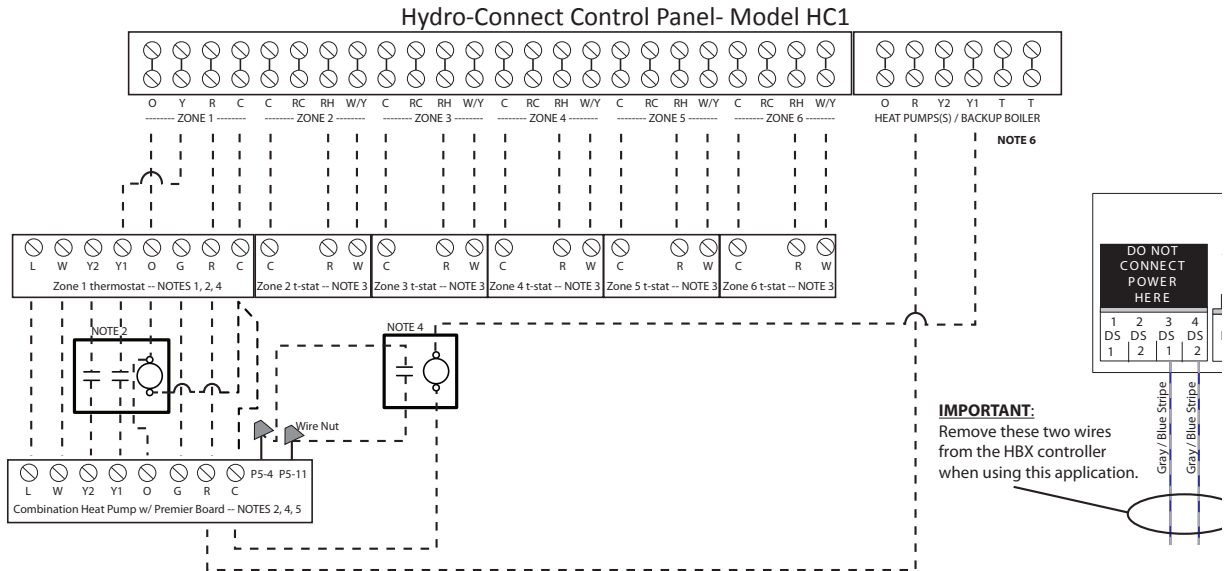
NOTES:

1. Heat pump thermostat required for Zone 1. Zone 1 is the master thermostat for heating/cooling mode for a system.
2. Field provided/installed DPST or DPDT relay required
3. Common (C) terminal optional
4. Review IMPORTANT notices and warnings
5. For boiler backup wiring, see Figure 6



CAUTION: Remove or disconnect the heat pump transformer when using the application. The zone board transformer may not be large enough to supply all 24VAC loads. When zoning with circulators, the transformer is 20VA. This transformer should be disconnected, and a larger transformer installed. Add up the VA requirements for all components to determine transformer sizing. If zoning with zone valves, the transformer in the zone board is 80VA (two 40VA transformer). It may not be large enough, depending upon the VA draw of the zone valves, heat pump, and other components. Add up the VA requirements for all components to determine transformer sizing (see Appendix A).

Figure 11: Combination Heat Pump* Forced Air Heating & Cooling, Zone 1/Radiant Heating, Zones 2 through 6



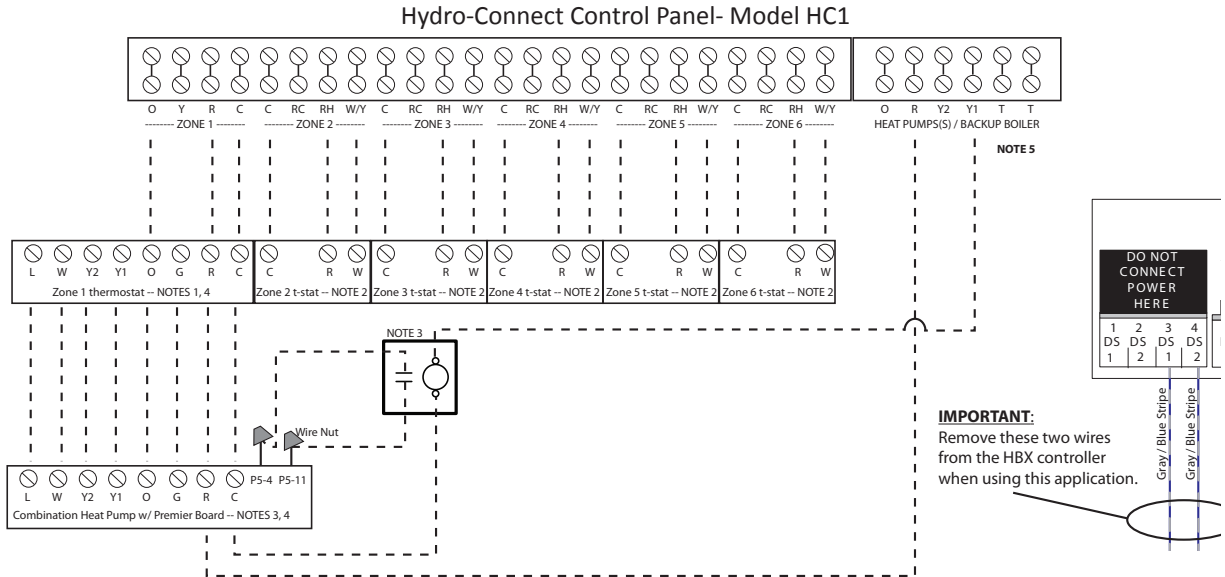
NOTES:

1. Heat pump thermostat required for Zone 1. Zone 1 is the master thermostat for heating/cooling mode for a system.
2. Field provided/installed DPST or DPDT relay required
3. Common (C) terminal optional
4. Review IMPORTANT notices and warnings
5. For boiler backup wiring, see Figure 6



CAUTION: Remove or disconnect the heat pump transformer when using the application. The zone board transformer may not be large enough to supply all 24VAC loads. When zoning with circulators, the transformer is 20VA. This transformer should be disconnected, and a larger transformer installed. Add up the VA requirements for all components to determine transformer sizing. If zoning with zone valves, the transformer in the zone board is 80VA (two 40VA transformer). It may not be large enough, depending upon the VA draw of the zone valves, heat pump, and other components. Add up the VA requirements for all components to determine transformer sizing (see Appendix A).

Figure 12: Combination Heat Pump with Premier board Radiant Heating / Forced Air Cooling



NOTES:

1. Heat pump thermostat required for Zone 1. Zone 1 is the master thermostat for heating/cooling mode for a system.
2. Field provided/installed DPST or DPDT relay required
3. Common (C) terminal optional
4. Review IMPORTANT notices and warnings
5. For boiler backup wiring, see Figure 6



CAUTION: Remove or disconnect the heat pump transformer when using the application. The zone board transformer may not be large enough to supply all 24VAC loads. When zoning with circulators, the transformer is 20VA. This transformer should be disconnected, and a larger transformer installed. Add up the VA requirements for all components to determine transformer sizing. If zoning with zone valves, the transformer in the zone board is 80VA (two 40VA transformer). It may not be large enough, depending upon the VA draw of the zone valves, heat pump, and other components. Add up the VA requirements for all components to determine transformer sizing (see Appendix A).

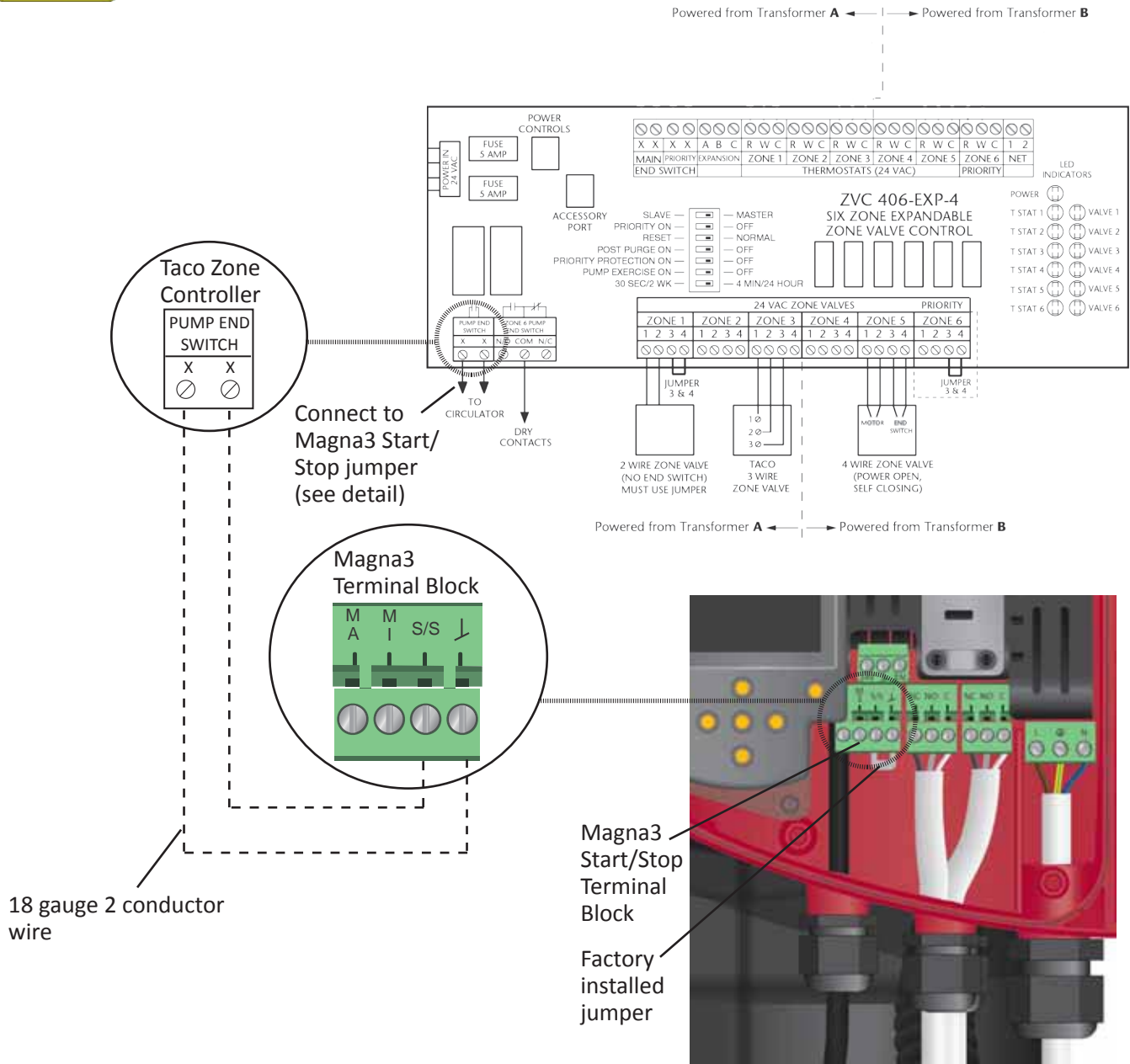
Figure 13: Combination Heat Pump with Premier board Forced Air Heating & Cooling, Zone 1/Radiant Heating, Zones 2 through 6

Wiring Diagrams -- Zoning with Zone Valves (Variable Speed Pump Enable)

When zoning with zone valves, it is important to avoid dead-heading the pump when all zone valves are closed. Figure 14 illustrates wiring from the Taco Zone Controller pump end switch to the Grundfos Magna3 Start/Stop jumper. When any zone calls, the pump end switch contacts close, enabling the variable speed pump via the Start/Stop jumper. If all zone valves are closed, the pump end switch contacts open, stopping the pump.



WARNING: OPEN THE POWER SUPPLY DISCONNECT SWITCH AND SECURE IT IN AN OPEN POSITION PRIOR TO PERFORMING ELECTRICAL WORK. VERIFY THAT POWER HAS BEEN DISCONNECTED PRIOR TO WIRING THE CONTROLLER. FAILING TO SECURE THE ELECTRICAL SUPPLY COULD RESULT IN SERIOUS INJURY OR DEATH. THIS EQUIPMENT SHOULD BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL ONLY.



18 gauge 2 conductor wire

Remove factory installed jumper, and connect thermostat wire from Magna3 to Taco Controller.

Figure 14: Variable Speed Pump Enable Control



Instruction Sheet

ZVC406-EXP-4 Zone Valve Control

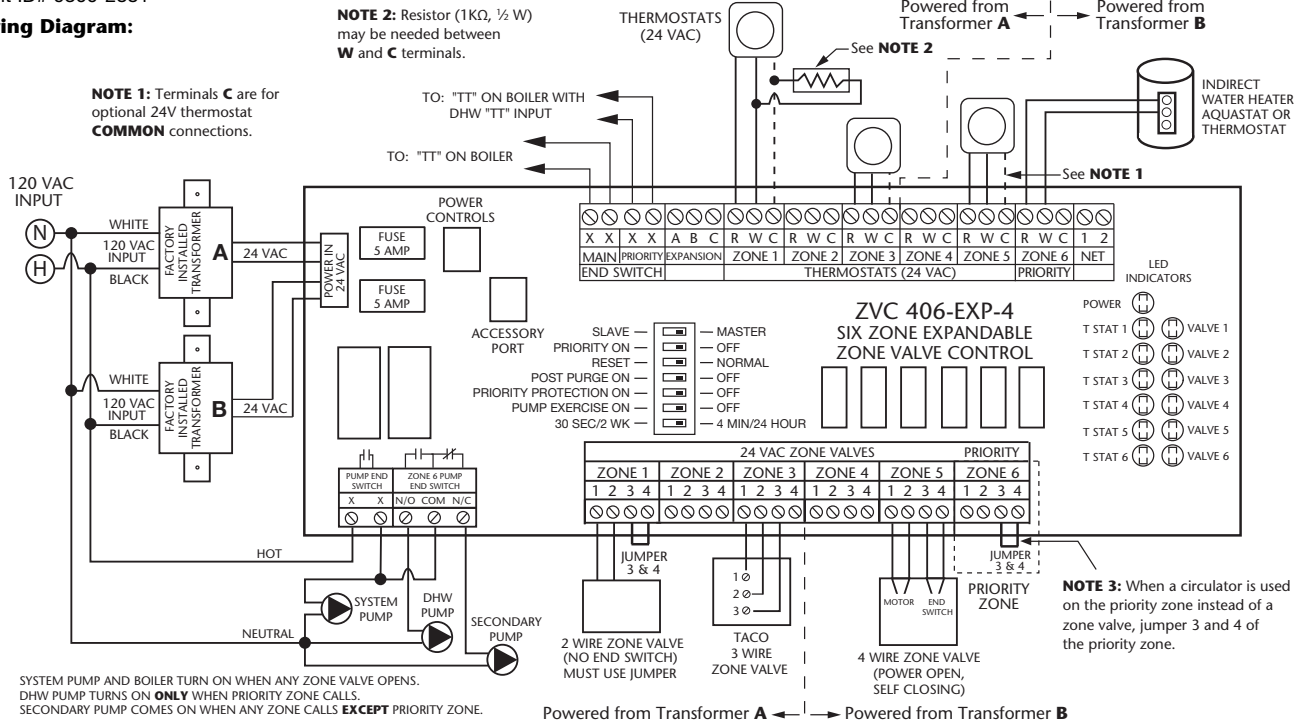
102-367

SUPERSEDES: March 1, 2013

EFFECTIVE: December 20, 2013

Plant ID# 9300-2881

Wiring Diagram:



Operation/External Diagnostics: When any thermostat calls for heat, the appropriate zone valve is energized and the yellow light goes on. When the zone valve is fully open, the red light goes on and energizes the end switch relay. The green light should always be on, indicating that power is connected.

Priority Operation: When the priority dip switch is set to ON and the priority zone is actuated, all other zones will stop operation until priority zone is satisfied. When not switched to priority, all zones will operate independently.

Mode Operation: When the dip switch is set to NORMAL, the end switch relay will be energized if any zone is in operation. When the switch is set to RESET, the end switch relay will only be energized if the priority zone is in operation, or through the operation of a plug-in reset control.

Post Purge Operation: When the dip switch is set to ON, the priority zone output will stay energized for 2 minutes after its thermostat or aquastat is satisfied, but not operate the boiler.

Priority Protection Operation: When the dip switch is set to ON, and if the priority zone calls continuously for more than one hour, power is returned to all the other zones, allowing each zone to function independently. Once the priority zone is satisfied, the control's auto-reset is activated and the priority zone is again allowed to have priority for up to one hour starting from when it calls next.

Pump Exercise Operation: When the dip switch is set to ON, the solid state timer cycles all the zone valves and circulating pumps that are attached to the Expandable Zone Valve Control at the selected time interval. The time interval can be set for the valves and pumps to run for either 30 seconds every 2 weeks or for 4 minutes every 24 hours.

End Switches (Dry Contacts): The main end switch closes when any zone thermostat calls for heat and the mode switch is set to NORMAL. The main end switch also closes when the mode switch is set to RESET and a PC Series boiler reset power control is calling for heat. The priority end switch closes only when the priority zone thermostat or aquastat is calling for heat.

PRODUCT NUMBER	NUMBER OF ZONES	INPUT VOLTAGE	MAX 24 VAC OUTPUT @ 25°C	TYPE 1 ENCLOSURE WIDTH	HEIGHT	DEPTH
ZVC406-EXP-4	6 with Priority	120/60/1 VAC, 3A	24 VA per Zone 40 VA per Transformer	12 1/4"	8"	3"

The pump end switches are rated 1/8 hp, 5 amps at 120 VAC. The main and priority end switch connections are rated 24 VAC, 1 amp. All thermostat and zone valve connections supply a 24 VAC class 2 output.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Expansion Connections: Set the expansion switch to MASTER on the switching relay that has the designated priority zone or is utilizing the PC Series plug-in option. Set all other daisy chained controls to SLAVE. Using thermostat wire (18-22 gauge) connect between terminals A, B, C on the master control to the corresponding A, B, C on the SLAVE control(s). Controls may be daisy chained up to 20 zoning panels using any combination of -EXP controls (120 zones if all are 6 zone panels).

Thermostat Input (24 vac):

- R** Hot side of transformer. Connect to **R** on thermostat.
- W** Switched **R** signal from thermostat. Connect to **W** on thermostat.
- C** Common side of transformer. Connect to **COM** on thermostat (optional).
- NET** Network terminals 1 & 2 are tied together for wiring convenience when using communicating style thermostats (optional).

Power Input (120 vac):

- Connect neutral (white) leads on transformers to 120 volts ac neutral power supply.
- Connect hot (black) leads on transformers to 120 volts ac hot power supply.

Pump End Switch (Dry Contacts):

- Connect hot power supply to the right side of the pump end switch terminal on board.
- Connect hot input lead of the circulator to the left side of the pump end switch terminal on board.

Zone 6 Pump End Switches (Dry Contacts): See Diagram.

- N/O** Normally open terminal of the priority zone relay.
- COM** Common terminal of the priority zone relay.
- N/C** Normally closed terminal of the priority zone relay.

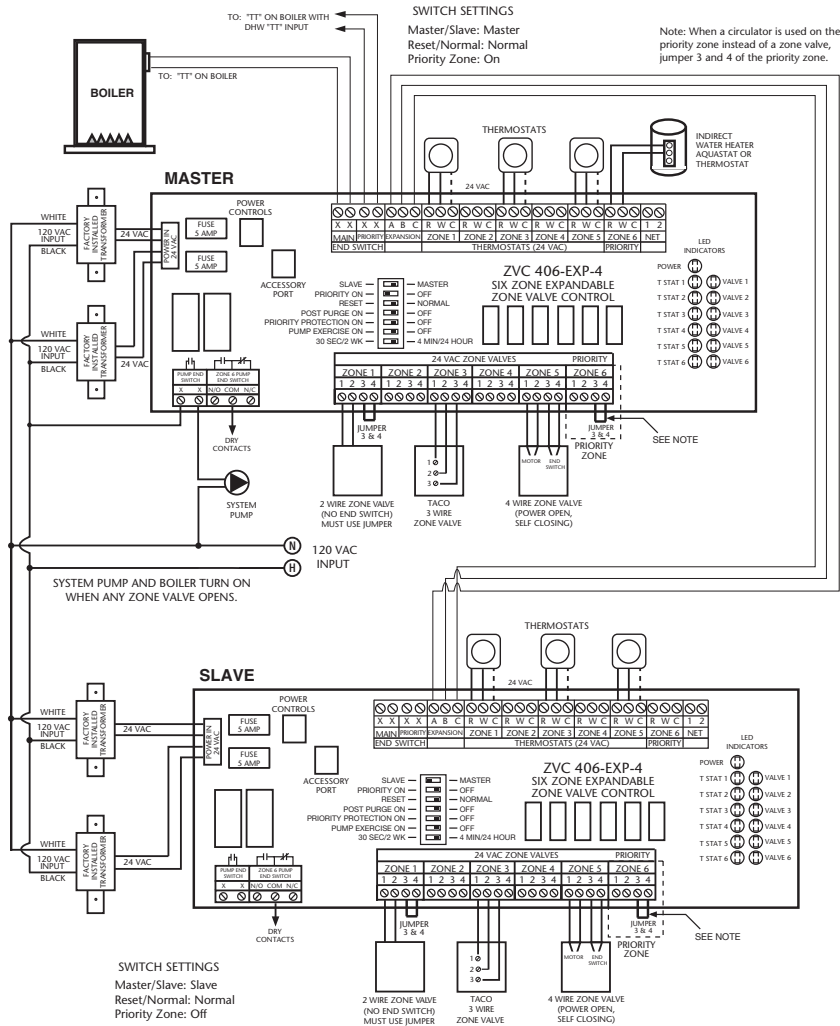
End Switch Pump Neutral Connections:

Connect neutral power supply directly to neutral lead on circulator(s).

WARNING: Wiring connections must be made in accordance with all applicable electrical codes. Use copper wire only. 120 VAC wiring must have a minimum temperature rating of 75°C. Failure to follow this instruction can result in personal injury or death and/or property damage. 12-18 gauge wire recommended for 120 VAC connections, 14-22 gauge wire for thermostat connections, and 14-22 gauge wire for 24 VAC source connections.

This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2 EXP Zone Valve Controls Connected Together with System Pump



Troubleshooting:

- Problem:** Digital thermostats do not work correctly when connected to a zone valve control.
- Solution:** Some thermostats are a "Power Stealing" type which means they are powered by the zone control with just 2 wires (**R** & **W**). A resistor may be needed in order to have the thermostat work properly. This resistor should be placed between the **W** & **C (common)** terminals of the zone control. If the thermostat manufacturer does not supply a resistor, a 1000 ohm 1/2 watt resistor has proven to work with most models and is readily available at electronic supply outlets (e.g. Radio Shack). If the thermostat is battery powered, then check that the batteries are fresh and installed correctly.
- Problem:** No heat in a zone or room of building.
- Solution:** LED diagnostic lights will help find a component that is not working properly. The green LED should always be on, indicating that power is connected and the fuse is good. When there is a call for heat, the yellow LED will come on indicating power to the zone valve. This indicates the thermostat is working correctly. When the zone valve fully opens and its end switch makes contact, the red LED will come on, the boiler turns on and a circulator will start if connected to the zone control.

For information on Taco's Zone Valve Controls (ZVC) including catalog sheet, instruction sheets, Visio stencils and our highly praised Zone Controls Wiring Guide, scan the QR code to the right or go to our website: <http://www.taco-hvac.com>.



Dip Switch Settings

SLAVE	<input type="checkbox"/>	MASTER
PRIORITY ON	<input type="checkbox"/>	OFF
RESET	<input type="checkbox"/>	NORMAL
POST PURGE ON	<input type="checkbox"/>	OFF
PRIORITY PROTECTION ON	<input type="checkbox"/>	OFF
PUMP EXERCISE ON	<input type="checkbox"/>	OFF
30 SEC/2 WK	<input type="checkbox"/>	4 MIN/24 HOUR

Optional power stealing thermostat resistor part number: SRTR-001RP (Value: 1000 Ohms, 1/2 watt or higher)

Taco®

Instruction Sheet

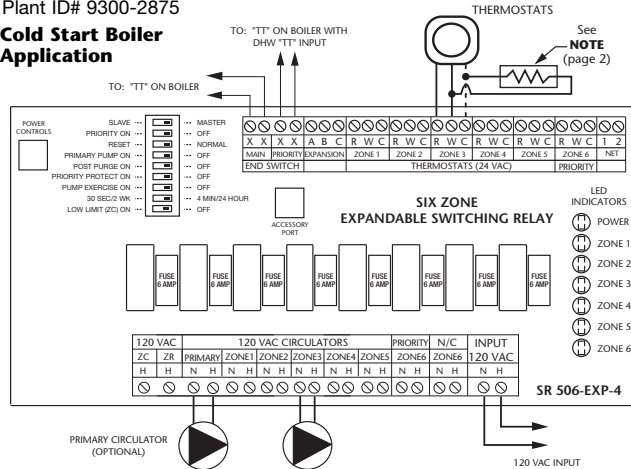
SR506-EXP-4 Switching Relay

102-365

SUPERSEDES: March 1, 2013
Plant ID# 9300-2875

EFFECTIVE: December 20, 2013

Cold Start Boiler Application



For Cold Start Boiler Application

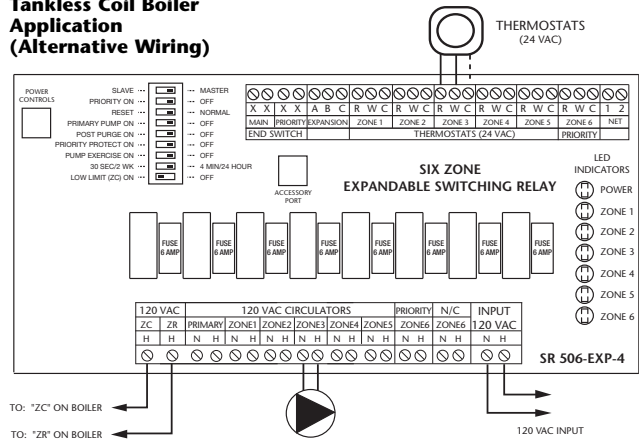
Operation: When any thermostat calls for heat, the appropriate circulating pump is energized and the isolated end switch (X and X) will start the boiler.

For more wiring diagrams, visit www.taco-hvac.com.



For information on Taco's Switching Relays (SR) including catalog sheet, instruction sheets, Visio stencils and our highly praised Zone Controls Wiring Guide, scan the QR code to the left or go to our website: <http://www.taco-hvac.com>.

Tankless Coil Boiler Application (Alternative Wiring)



For Tankless Coil Boiler Application (Alternative Wiring)

Operation: When any thermostat calls for heat, the boiler will be enabled and appropriate circulating pump is energized when the boiler temperature is above the set low limit and low limit (ZC) dip switch is set to on.
ZC and ZR Terminals: Connect terminal ZC to ZC terminal on the aquastat control. Connect ZR to ZR terminal on the aquastat control. Confirm polarity is consistent between boiler aquastat and switching relay.

WARNING: When using Alternative Wiring diagram, wiring instructions must be followed so power originates from the boiler aquastat. Failure to follow these wiring instructions may result in a secondary source of power being connected to the boiler that may activate it under certain circumstances, causing injury or death.

For Both Cold Start Boiler Application and Tankless Coil Boiler Application (Alternative Wiring)

Priority Operation: When the priority dip switch is set to ON and the priority zone is actuated, all other zones will stop operation until priority zone is satisfied. When not switched to priority, all zones will operate independently.

Mode Operation: When the dip switch is set to NORMAL, the end switch relay will be energized if any zone is in operation. When the switch is set to RESET, the end switch relay will only be energized if the priority zone is in operation, or through the operation of a plug-in reset control.

Primary Pump Operation: When the dip switch is set to OFF, the primary circulating pump output will energize when any zone calls for heat, except the priority zone. When the dip switch is set to ON, the primary circulating pump output will energize when any zone calls for heat.

Post Purge Operation: When the dip switch is set to ON, the priority zone output will stay energized for 2 minutes after its thermostat or aquastat is satisfied, but not operate the boiler.

Priority Protection Operation: When the dip switch is set to ON, and if the priority zone calls continuously for more than one hour, power is returned to all the other zones, allowing each zone to function independently. Once the priority zone is satisfied, the control's auto-reset is activated and the priority zone is again allowed to have priority for up to one hour starting from when it calls next.

Pump Exercise Operation: When the dip switch is set to ON, the solid state timer cycles all the circulating pumps that are attached to the Expandable Switching Relay at the selected time interval. The time interval can be set for the pumps to run for either 30 seconds every 2 weeks or for 4 minutes every 24 hours.

Low Limit (ZC) Operation: When the dip switch is set to ON and the boiler drops below the set low limit (terminal ZC connected to boiler),

all zone circulating pumps will stop. When the boiler rises above the set low limit, the zone circulating pumps are allowed to operate.

End Switches (Dry Contacts): The main end switch closes when any zone thermostat calls for heat and the mode switch is set to NORMAL. The main end switch also closes when the mode switch is set to RESET and a PC Series boiler reset power control is calling for heat. The priority end switch closes only when the priority zone thermostat or aquastat is calling for heat.

Expansion Connections: Set the expansion switch to MASTER on the switching relay that has the designated priority zone or is utilizing the PC Series plug-in option. Set all other daisy chained controls to SLAVE. Using thermostat wire (18-22 gauge) connect between terminals A, B, C on the master control to the corresponding A, B, C on the SLAVE control(s). Controls may be daisy chained up to 20 zoning panels using any combination of -EXP controls (120 zones if all are 6 zone panels).

Thermostat Input (24 vac):

- R** Hot side of transformer. Connect to **R** on thermostat.
- W** Switched **R** signal from thermostat. Connect to **W** on thermostat.
- C** Common side of transformer. Connect to **COM** on thermostat (optional).
- NET** Network terminals 1 & 2 are tied together for wiring convenience when using communicating style thermostats (optional).

120 VAC Connections (N is Neutral, H is Hot):

- Power Input** Connect 120 Volt AC power
- Primary** Primary Pump (optional)
- Zone 1-5** Circulator Zones
- Priority Zone 6** Priority Zone (if enabled) or Zone 6
- N/C Zone 6** Normally closed terminals for the Priority Zone. Will deactivate on a Priority Zone call.

Specifications:

PRODUCT NUMBER	NUMBER OF ZONES	INPUT VOLTAGE	MAXIMUM COMBINED LOAD	TYPE 1 ENCLOSURE WIDTH	HEIGHT	DEPTH
SR506-EXP-4	6 with Priority	120/60/1 VAC	20 amps	12 1/4"	8"	3"

All circulator relay connections, including ZC/ZR, are rated 1/3 hp (6 FLA, 36 LRA) at 120 VAC. End switch connections are rated 24 VAC, 1 amp. All thermostat connections supply a 24 VAC class 2 output.

WARNING: Wiring connections must be made in accordance with all applicable electrical codes. Use copper wire only. 120 VAC wiring must have a minimum temperature rating of 75°C. Failure to follow this instruction can result in personal injury or death and/or property damage. 12-18 gauge wire recommended for 120 VAC connections, 14-22 gauge wire for thermostat connections, and 14-22 gauge wire for 24 VAC source connections.

Dip Switch Settings:

SLAVE	—	<input type="checkbox"/>	—	MASTER
ZONE PRIORITY ON	—	<input type="checkbox"/>	—	OFF
RESET	—	<input type="checkbox"/>	—	NORMAL
PRIMARY PUMP FUNCTION ON	—	<input type="checkbox"/>	—	OFF
POST PURGE ON	—	<input type="checkbox"/>	—	OFF
PRIORITY PROTECTION ON	—	<input type="checkbox"/>	—	OFF
PUMP EXERCISE ON	—	<input type="checkbox"/>	—	OFF
30 SEC/2 WK	—	<input type="checkbox"/>	—	4 MIN/24 HOUR
LOW LIMIT (ZC) ON	—	<input type="checkbox"/>	—	OFF

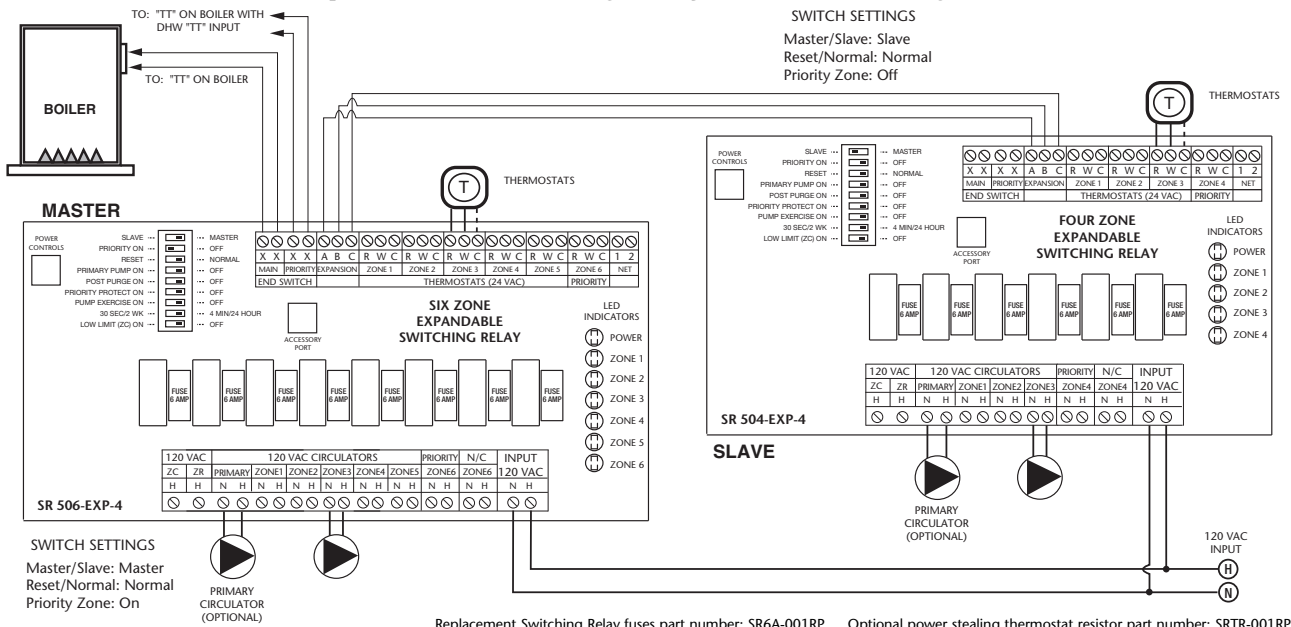
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: Resistor (1KΩ, 1/2 W) may be needed between **W** and **C** terminals.

Troubleshooting:

- Problem:** Digital thermostats do not work correctly when connected to a switching relay.
- Solution:** Some thermostats are a "Power Stealing" type which means they are powered by the switching relay with just 2 wires (**R** & **W**). A resistor may be needed in order to have the thermostat work properly. This resistor should be placed between the **W** & **C (common)** terminals of the switching relay. If the thermostat manufacturer does not supply a resistor, a 1000 ohm 1/2 watt resistor has proven to work with most models and is readily available at electronic supply outlets (e.g. 8the batteries are fresh and installed correctly).
- Problem:** No heat in a zone or room of building.
- Solution:** LED diagnostic lights will help find a component that is not working properly. The green LED should always be on, indicating that power is connected and the solid-state fuse is good. When there is a call for heat, the red LED will come on indicating power to the zone circulator. This indicates the thermostat is working correctly. If the red LED does not come on, then check the thermostat and thermostat wiring for errors.

2 Expandable Switching Relays Connected Together





HBX ECO-0550 Geothermal Control
Version 2.00

HBX ECO-0550 GEOTHERMAL CONTROLLER

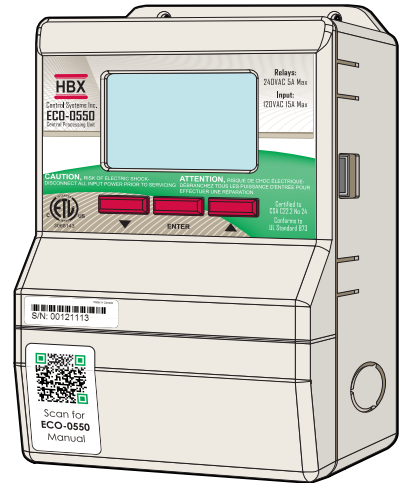
INTRODUCTION

This manual will help with the installation, parameter setting, troubleshooting and general maintenance requirements for the controller. To guarantee the safe and reliable operation of this control, you must first read this manual in detail and take particular note to any and all warnings or caution directives prior to connecting to AC power.

Please consult and install the geothermal appliance in accordance with manufacture’s recommendations.

DESCRIPTION

The ECO-0550 is designed to be a stand-alone Outdoor Reset Control device. The purpose and function of the ECO-0550 is to provide control for Geothermal applications. It can manage single tank applications as well as applications with separate hot and cold tanks.



WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

SAFETY SYMBOLS & WARNINGS



Extreme Hazard

This action poses a serious threat that could result in personal injury or death, as well as permanent damage to the equipment. Proceed with caution.



Moderate Hazard

This action may cause personal injury or have adverse effects on the installation process if handled incorrectly.



Disconnect Power Source

The presence of low voltage(24VAC) or high voltage(120VAC) could result in personal injury or permanent damage to components or equipment.



Point of Interest

This point clarifies pertinent information, or brings your attention to an action that may have adverse effects on the installation process.



Drawing Reference

Refer to the specified electrical or mechanical drawing at the back of the manual.



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



Use only copper conductor supply wire suitable for at least 105 °C



The HBX ECO-0550 is a microprocessor based controller and as such is not to be regarded as a safety (limit) control. Please consult and install the heating or cooling appliance in accordance with the manufacturer’s recommendations.

RECEIPT & INSPECTION

After receiving, inspect the unit for any possible physical damage that may have occurred during transportation.

After unpacking the unit make sure the box contains:

- 1 x Remote Outdoor sensor (Part #OUT-0100)
- 2 x Universal sensors (Part #029-0022)
- 1 x Terminal Screwdriver (2.5mm)
- 2 x Cable ties
- 1 x Manual



WIRING

Wiring

NOTE: Geo-Flo factory wires all HBX Controllers. Information below provided for reference.

All signal wiring must be with a minimum of 18AWG wire at a maximum of 500ft.

1, 2: Demand Signal 1

Apply heat demand from a dry contact, or 24VAC.

3, 4: Demand Signal 2

Apply cool demand from a dry contact, or 24VAC.

5, 6: Heat Pump 1

Heat Pump 1 Output.

Sensor Inputs

7, 10: Hot Tank temperature in dual tank mode, or Tank Temperature in single tank mode.

8, 10: Cold Tank temperature. If the cold tank sensor is not connected, the control assumes single tank operation. If connected, the control will operate in dual tank mode.

9, 10: Outdoor temperature.

14, 15: Relay 1

This relay is generally a second Heat Pump, or can be used as System Pump output.

16, 17: Relay 2

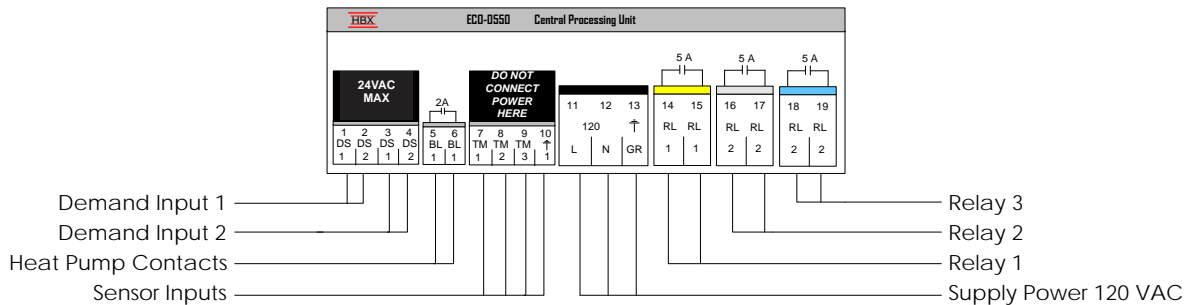
Generally used as a Third stage or Backup Boiler.

18, 19: Relay 3

Used as a Reversing Valve and/or 3 way diverting valves.



(Relays 1, 2 and 3 are dry contacts and rated for a maximum of 5 Amps.)





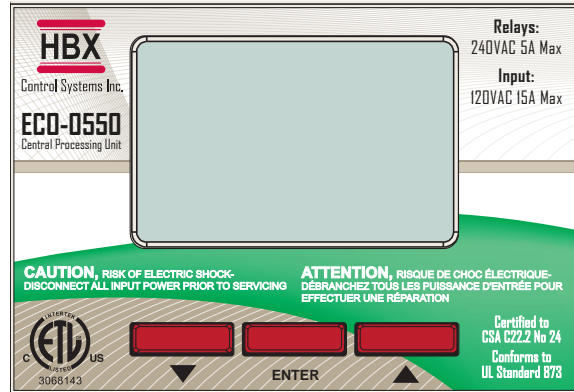
NAVIGATING THE ECO-0550

All programming steps within the ECO-0550 are achieved by using the three buttons (and combination thereof) located below the screen.

The ▼ button is used to scroll down in menu screens and decrease a value within specific options.

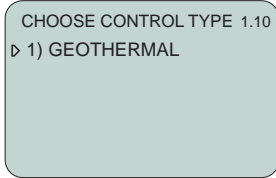
The ▲ button is used to scroll up in menu screens and increase a value in specific options.

The ENTER button is used to access the setpoint menu and select a setting.



CONTROL MODE

The programming instructions for the ECO-0550 are currently selectable in the mode listed below. When the control is first plugged in you are asked to select which control mode you would like your ECO-0550 to operate in. To select your control mode simply use the ▲ or ▼ buttons to select the correct mode then wait five seconds to accept your selection.



Geothermal Mode

Programming for this mode can be found on pages 7 through 15. This mode is used when running heat pumps/chillers or geothermal related installations. The control will run up to 3 stages of heat pumps, a reversing valve for heating and cooling applications, as well as single or dual tanks. This mode also allows for a built-in backup feature.



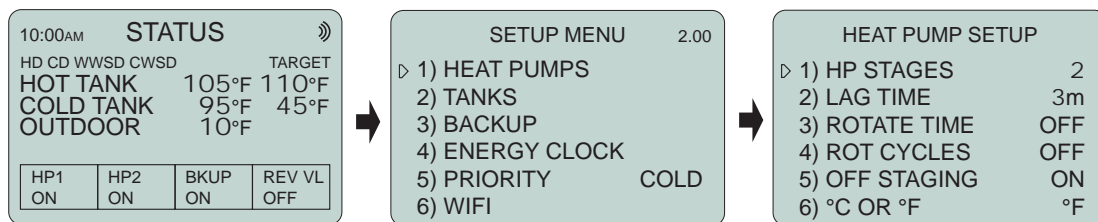
SETUP MENU

The SETUP menu is used for entering the design values, as well as assign different control options. To access the setup menu, push the **ENTER** button on the STATUS screen. Use the **▲** or **▼** buttons to scroll through the various settings.

To select a parameter, align the cursor arrow **▷** with the desired parameter and press the **ENTER** button. The arrow will become solid **▶**, which indicates that a parameter has been selected.

Adjust the setting to the desired value with the **▲** or **▼** buttons. Once the correct value is set, push the **ENTER** button. This will deselect the parameter.

To go to the previous screen, push and hold the **ENTER** button. If the SETUP menu is left for more than 90 seconds, the display will change to the STATUS screen and the control will resume operation.





GEO THERMAL MODE

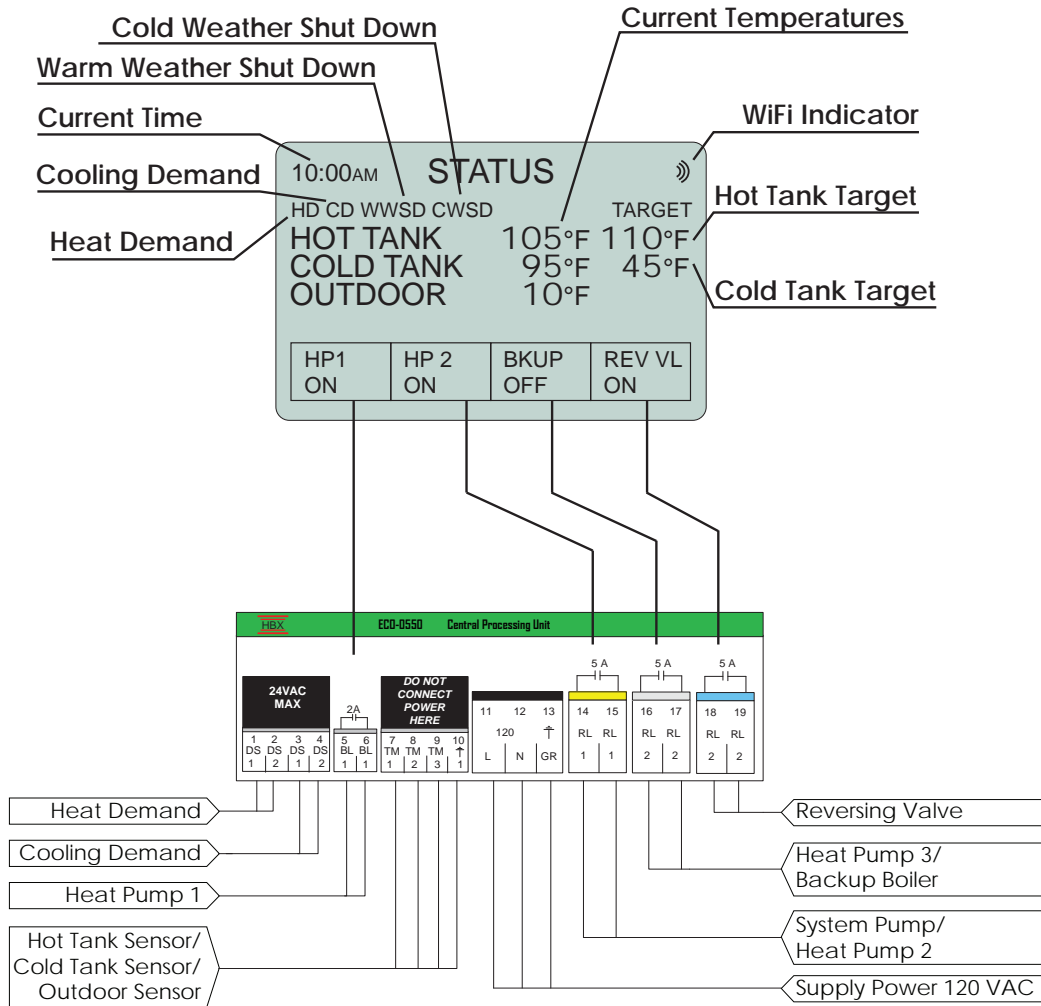
Multicolour backlit Display

The Multicolour Backlit Display is one of the key features of the HBX Controls stand-alone ECO-0550 Control. Depending on which mode of operation is selected the screen color will change to indicate information about the status of the system.

Screen Colors

- Light Blue - No Heat Demand
- Red - Demand and heat pumps running (Heating Mode)
- Green - Demand ON, no heat pumps running
- Dark Blue - Demand ON and heat pumps running (Cooling Mode)
- Purple - Demand ON and Backup Only running (EcoSwitch Mode)

Status Screen





HBX ECO-0550 Geothermal Control
Version 2.00

GEOTHERMAL MODE PROGRAMMING GUIDE

1) HEAT PUMPS

SETUP MENU	2.00
▶ 1) HEAT PUMPS	
2) TANKS	
3) BACKUP	
4) ENERGY CLOCK	
5) PRIORITY	COLD
6) WIFI	

Heat Pump Setup

This setting is used to configure the heat pump staging component in your system.

HEAT PUMP SETUP

HEAT PUMP SETUP	
▶ 1) HP STAGES	1
2) LAG TIME	3m
3) ROTATE TIME	OFF
4) ROT CYCLES	OFF
5) OFF STAGING	ON
6) °C OR °F	°F

Stages

This setting will allow you to select the number of heat pump stages that are attached to the control.



If Backup is being used, you can only have a maximum of 2 stages.

(1 to 3) Default:

NOTE : Stages set to "2" at Geo-Flo. This setting should not be changed to "1" for single speed compressor units. Connect compressor demand to Y1 only on the Hydro-Connect Control Panel terminal strip. Setting Stages to "1" changes the function of Relay #1 (contacts 14/ 15) on the ECO0550 causing it to close during a demand call to start a load-side pump.

HEAT PUMP SETUP	
1) HP STAGES	1
▶ 2) LAG TIME	3m
3) ROTATE TIME	OFF
4) ROT CYCLES	OFF
5) OFF STAGING	ON
6) °C OR °F	°F

Lag Time

When the heat pump is set for more than 1 stage, this setting will be set for the minimum lag time between heat pump stages. This is a time delay between stages. Even if the differential has been exceeded this time must elapse before that stage can come on.

(1m to 240m) Default: 3m

HEAT PUMP SETUP	
1) HP STAGES	1
2) LAG TIME	3m
▶ 3) ROTATE TIME	OFF
4) ROT CYCLES	OFF
5) OFF STAGING	ON
6) °C OR °F	°F

Rotate Time

The time of rotation between heat pumps. This setting is in hours of run time. This means that the heat pumps are going to rotate when the first heat pump exceeds the second by the rotate time.

(OFF/1H to 99H) Default: OFF

HEAT PUMP SETUP	
1) HP STAGES	1
2) LAG TIME	3m
3) ROTATE TIME	OFF
▶ 4) ROT CYCLES	OFF
5) OFF STAGING	ON
6) °C OR °F	°F

Rotate Cycles

Set the number of cycles at which you would like to rotate the heat pumps. One cycle is described as the heat pump going on and then off.

(OFF/1 to 240) Default: OFF

HEAT PUMP SETUP	
1) HP STAGES	1
2) LAG TIME	3m
3) ROTATE TIME	OFF
4) ROT CYCLES	OFF
▶ 5) OFF STAGING	ON
6) °C OR °F	°F

Off Staging

This feature is used to set how you would like to stage the heat pumps off. If set to ON the heatpumps will stage off normally, based off of tank temperature and differential settings. If set to OFF the heat pumps will all stage off at the same time, based off of tank temperature and differential settings.

(OFF/ON) Default: ON



HBX ECO-0550 Geothermal Control
Version 2.00

1) HEAT PUMPS (CONT.)

HEAT PUMP SETUP		Celsius or Fahrenheit
HEAT PUMP SETUP		
1) HP STAGES	1	This setting is used to set the temperatures displayed on the control in either Celsius or Fahrenheit. Default: °F
2) LAG TIME	3m	
3) ROTATE TIME	OFF	
4) ROT CYCLES	OFF	
5) OFF STAGING	ON	
▶ 6) °C OR °F	°F	

2) TANK SETUP

SETUP MENU 1.10	TANK SETTINGS
1) HEAT PUMPS	▶ 1) HOT TANK
▶ 2) TANKS	2) COLD TANK
3) BACKUP	3) CWSD/WWSD TIME 0H
4) ENERGY CLOCK	
5) PRIORITY COLD	
6) WIFI	

Hot Tank Setup

This setting is used to set the desired temperature in the hot tank when there is a heat demand present.

HOT TANK SETUP WITHOUT OUTDOOR RESET											
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">HOT TANK SETUP</th> </tr> </thead> <tbody> <tr> <td>▶ 1) WWSD</td> <td>65°F</td> </tr> <tr> <td>2) OUTDOOR</td> <td>OFF</td> </tr> <tr> <td>3) HOT DIFF</td> <td>6°F</td> </tr> <tr> <td>4) TANK TEMP</td> <td>115°F</td> </tr> </tbody> </table>	HOT TANK SETUP		▶ 1) WWSD	65°F	2) OUTDOOR	OFF	3) HOT DIFF	6°F	4) TANK TEMP	115°F	<p>Warm Weather Shut Down</p> <p>This setting is used to set the temperature in which the ECO-0550 will go into WWSD. If the system rises above this temperature, the system will be shut off. In WWSD the heat pumps and backup boiler will shut off.</p> <p>(OFF/35°F to 119°F) Default: 65°F</p>
HOT TANK SETUP											
▶ 1) WWSD	65°F										
2) OUTDOOR	OFF										
3) HOT DIFF	6°F										
4) TANK TEMP	115°F										
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HOT TANK SETUP											
1) WWSD	65°F										
▶ 2) OUTDOOR	OFF										
3) HOT DIFF	6°F										
4) TANK TEMP	115°F										
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HOT TANK SETUP											
1) WWSD	65°F										
2) OUTDOOR	OFF										
▶ 3) HOT DIFF	6°F										
4) TANK TEMP	115°F										
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HOT TANK SETUP											
1) WWSD	65°F										
2) OUTDOOR	OFF										
3) HOT DIFF	6°F										
▶ 4) TANK TEMP	115°F										

Dual Tank Setup

Single Tank Setup



HOT TANK SETUP WITH OUTDOOR RESET

HOT TANK SETUP	
▶ 1) WWSD	65°F
2) OUTDOOR	11°F
3) HOT DIFF	6°F
4) MIN TANK TEMP	80°F
5) MAX TANK TEMP	115°F

Warm Weather Shut Down

This setting is used to set the temperature in which the ECO-0550 will go into WWSD. If the system rises above this temperature, the system will be shut off. In WWSD the heat pumps and backup boiler will shut off.

(OFF/35°F to 119°F) Default: 65°F

HOT TANK SETUP	
1) WWSD	65°F
▶ 2) OUTDOOR	11°F
3) HOT DIFF	6°F
4) MIN TANK TEMP	80°F
5) MAX TANK TEMP	115°F

Outdoor Temperature (Design)

This is used in the outdoor reset design calculation. This option should be set to reflect your specific city or region.

(OFF/-40°F to 120°F) Default: OFF

HOT TANK SETUP	
1) WWSD	65°F
2) OUTDOOR	11°F
▶ 3) HOT DIFF	6°F
4) MIN TANK TEMP	80°F
5) MAX TANK TEMP	115°F

Hot Tank Differential

Set this temperature to be the desired hot tank differential. A differential of 4°F will allow for 2 degrees above and/or 2 degrees below the desired temperature before a demand is present.

(2°F to 100°F) Default: 6°F

HOT TANK SETUP	
1) WWSD	65°F
2) OUTDOOR	11°F
3) HOT DIFF	6°F
▶ 4) MIN TANK TEMP	80°F
5) MAX TANK TEMP	115°F

Minimum Tank Temperature

This setting is the bottom of the heat curve. The target will hit this temperature as the Outdoor Temperature approaches the WWSD.

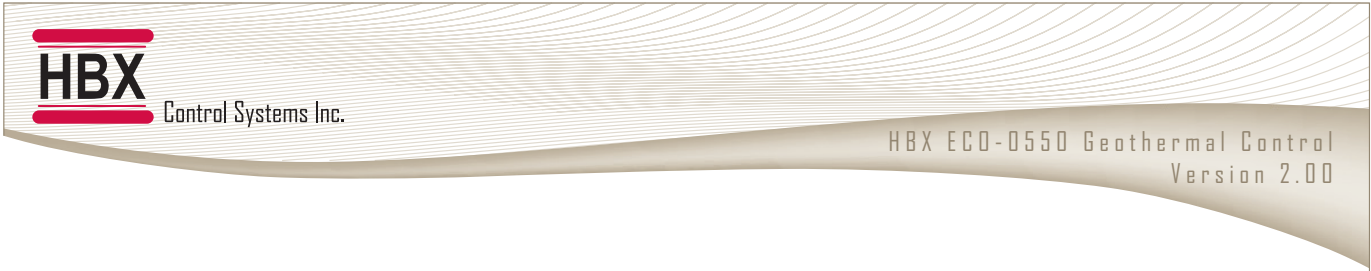
(50°F to 200°F) Default: 80°F

HOT TANK SETUP	
1) WWSD	65°F
2) OUTDOOR	11°F
3) HOT DIFF	6°F
4) MIN TANK TEMP	80°F
▶ 5) MAX TANK TEMP	115°F

Maximum Tank Temperature

This setting is the top of the heat curve. The target will hit this temperature as the Outdoor Temperature approaches the Design Outdoor Temperature.

(50°F to 200°F) Default: 115°F





SETUP MENU 2.00	
1) HEAT PUMPS	
▶ 2) TANKS	
3) BACKUP	
4) ENERGY CLOCK	
5) PRIORITY	COLD
6) WIFI	

TANK SETTINGS	
1) HOT TANK	
▶ 2) COLD TANK	
3) CWSD/WWSD TIME	0H

Cold Tank Setup

This setting is used to set the desired temperature in the cold tank when there is a cooling demand present.

COLD TANK SETUP WITHOUT OUTDOOR RESET											
<table border="1"> <thead> <tr> <th colspan="2">COLD TANK SETUP</th> </tr> </thead> <tbody> <tr><td>▶ 1) CWSD</td><td>75°F</td></tr> <tr><td>2) OUTDOOR</td><td>OFF</td></tr> <tr><td>3) COLD DIFF</td><td>8°F</td></tr> <tr><td>4) TANK TEMP</td><td>45°F</td></tr> </tbody> </table>	COLD TANK SETUP		▶ 1) CWSD	75°F	2) OUTDOOR	OFF	3) COLD DIFF	8°F	4) TANK TEMP	45°F	<p>Cold Weather Shut Down This setting is used to set the temperature in which the ECO-0550 will go into CWSD. If the system goes below this temperature, the system will be shut off. In CWSD the heat pumps will shut off. (OFF/35°F to 119°F) Default: 75°F</p>
COLD TANK SETUP											
▶ 1) CWSD	75°F										
2) OUTDOOR	OFF										
3) COLD DIFF	8°F										
4) TANK TEMP	45°F										
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COLD TANK SETUP											
1) CWSD	75°F										
▶ 2) OUTDOOR	OFF										
3) COLD DIFF	8°F										
4) TANK TEMP	45°F										
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COLD TANK SETUP											
1) CWSD	75°F										
2) OUTDOOR	OFF										
▶ 3) COLD DIFF	8°F										
4) TANK TEMP	45°F										
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COLD TANK SETUP											
1) CWSD	75°F										
2) OUTDOOR	OFF										
3) COLD DIFF	8°F										
▶ 4) TANK TEMP	45°F										



COLD TANK SETUP WITH OUTDOOR RESET

COLD TANK SETUP	
▶ 1) CWSD	75°F
2) OUTDOOR	90°F
3) COLD DIFF	8°F
4) MIN TANK TEMP	45°F
5) MAX TANK TEMP	60°F

Cold Weather Shut Down

This setting is used to set the temperature in which the ECO-0550 will go into CWSD. If the system goes below this temperature, the system will be shut off. In CWSD the heat pumps will shut off.

(OFF/35°F to 119°F) Default: 75°F

COLD TANK SETUP	
1) CWSD	75°F
▶ 2) OUTDOOR	90°F
3) COLD DIFF	8°F
4) MIN TANK TEMP	45°F
5) MAX TANK TEMP	60°F

Outdoor Temperature (Design)

This is used in the outdoor reset design calculation. This option should be set to reflect your specific city or region.

(OFF/0°F to 119°F) Default: OFF

COLD TANK SETUP	
1) CWSD	75°F
2) OUTDOOR	90°F
▶ 3) COLD DIFF	8°F
4) MIN TANK TEMP	45°F
5) MAX TANK TEMP	60°F

Cold Tank Differential

Set this temperature to be the desired cold tank differential. A differential of 4°F will allow for 2 degrees above and/or 2 degrees below the desired temperature before a demand is present.

(2°F to 100°F) Default: 8°F

COLD TANK SETUP	
1) CWSD	75°F
2) OUTDOOR	90°F
3) COLD DIFF	8°F
▶ 4) MIN TANK TEMP	45°F
5) MAX TANK TEMP	60°F

Minimum Tank Temperature

This setting is the bottom of the cooling curve. The target will hit this temperature as the outdoor temperature approaches the Outdoor Design Temperature.

(50°F to 200°F) Default: 45°F

COLD TANK SETUP	
1) CWSD	75°F
2) OUTDOOR	90°F
3) COLD DIFF	8°F
4) MIN TANK TEMP	45°F
▶ 5) MAX TANK TEMP	60°F

Maximum Tank Temperature

This setting is the top of the cooling curve. The target will hit this temperature as the Outdoor Temperature approaches the CWSD.

(50°F to 200°F) Default: 60°F

COLD/WARM WEATHER SHUT DOWN TIME SETUP

TANK SETTINGS	
1) HOT TANK	
2) COLD TANK	
▶ 3) CWSD/WWSD TIME	0H

Cold/Warm Weather Shut Down Time

This setting is used as a lagtime for CWSD and WWSD. This will hold the control from entering CWSD or WWSD until this time has elapsed. The timer starts when the outdoor temperature hits the CWSD or WWSD. This setting is useful in the shoulder seasons when there are large outdoor temperature swings.

(0H to 48H) Default: 0H



Control Systems Inc.

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3) BACKUP SETUP

SETUP MENU	2.00
1) HEAT PUMPS	
2) TANKS	
▶ 3) BACKUP	
4) ENERGY CLOCK	
5) PRIORITY	COLD
6) WIFI	

Backup Setup

This setting is used to configure the boiler backup component in your system.

BACKUP SETUP									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center; background-color: #e0e0e0;">BACKUP SETUP</th> </tr> <tr> <td>▶ 1) BACKUP TIME</td> <td>OFF</td> </tr> <tr> <td>2) BACKUP TEMP</td> <td>OFF</td> </tr> <tr> <td>3) BACKUP DIFF</td> <td>OFF</td> </tr> </table>	BACKUP SETUP		▶ 1) BACKUP TIME	OFF	2) BACKUP TEMP	OFF	3) BACKUP DIFF	OFF	<p>Backup Time This setting will be set for the minimum lag time between heat pump stages and the backup boiler. This is a time delay between the heat pump stages and the backup boiler. Even if the differential has been exceeded this time must elapse before that stage can come on.</p> <p>(OFF/1m to 240m) Default: OFF</p>
BACKUP SETUP									
▶ 1) BACKUP TIME	OFF								
2) BACKUP TEMP	OFF								
3) BACKUP DIFF	OFF								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center; background-color: #e0e0e0;">BACKUP SETUP</th> </tr> <tr> <td>1) BACKUP TIME</td> <td>OFF</td> </tr> <tr> <td>▶ 2) BACKUP TEMP</td> <td>OFF</td> </tr> <tr> <td>3) BACKUP DIFF</td> <td>OFF</td> </tr> </table>	BACKUP SETUP		1) BACKUP TIME	OFF	▶ 2) BACKUP TEMP	OFF	3) BACKUP DIFF	OFF	<p>Backup Temperature Set this temperature to the desired outdoor temperature that will allow the backup to come on. When the temperature resides above this value, the backup will not be allowed to come on. Only when the Outdoor Temperature falls below this value can the backup come on.</p> <p>(OFF/2°F to 100°F) Default: OFF</p>
BACKUP SETUP									
1) BACKUP TIME	OFF								
▶ 2) BACKUP TEMP	OFF								
3) BACKUP DIFF	OFF								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center; background-color: #e0e0e0;">BACKUP SETUP</th> </tr> <tr> <td>1) BACKUP TIME</td> <td>OFF</td> </tr> <tr> <td>2) BACKUP TEMP</td> <td>OFF</td> </tr> <tr> <td>▶ 3) BACKUP DIFF</td> <td>OFF</td> </tr> </table>	BACKUP SETUP		1) BACKUP TIME	OFF	2) BACKUP TEMP	OFF	▶ 3) BACKUP DIFF	OFF	<p>Backup Differential This setting can be used with the backup temperature and backup time or on its own to bring the backup on. This setting is used to set a differential on the tank at which you would like the backup to come on. This setting will override the backup temperature and backup time settings.</p> <p>(eg. Tank temperature of 115°F and a backup differential of 10°F. The backup boiler will come on at 105°F providing all of the heat pumps are already on.)</p> <p>(OFF/2°F to 100°F) Default: OFF</p>
BACKUP SETUP									
1) BACKUP TIME	OFF								
2) BACKUP TEMP	OFF								
▶ 3) BACKUP DIFF	OFF								



Control Systems Inc.

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4) ECOSWITCH ENERGY CLOCK SETUP

SETUP MENU	2.00
1) HEAT PUMPS	
2) TANKS	
3) BACKUP	
▶ 4) ENERGY CLOCK	
5) PRIORITY	COLD
6) WIFI	

Energy Clock Setup

This EcoSwitch feature allows you to lock out your heat pumps and run only the backup boiler on a timed schedule, allowing you to save on energy and lower your utility bills during peak time periods.



Energy Clock is only applicable if Backup is selected in setup.

ENERGY CLOCK SETUP - TIME

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">ENERGY CLOCK</td> </tr> <tr> <td>▶ 1) SET TIME</td> <td>10:00 am</td> </tr> <tr> <td>2) TIME ZONE</td> <td>MOUNTAIN</td> </tr> <tr> <td>3) WEEKDAY SETUP</td> <td></td> </tr> <tr> <td>4) WEEKEND SETUP</td> <td></td> </tr> </table>	ENERGY CLOCK		▶ 1) SET TIME	10:00 am	2) TIME ZONE	MOUNTAIN	3) WEEKDAY SETUP		4) WEEKEND SETUP		<p>Set Time Adjust time, year, day, and day of the week for EcoSwitch schedule. This time will appear on the Status Screen.</p>				
ENERGY CLOCK															
▶ 1) SET TIME	10:00 am														
2) TIME ZONE	MOUNTAIN														
3) WEEKDAY SETUP															
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SET TIME															
▶ 1) YEAR	2017														
2) MONTH	JUL														
3) DAY	5														
4) DOW	FRI														
5) HOUR	10AM														
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SET TIME															
1) YEAR	2017														
▶ 2) MONTH	JUL														
3) DAY	5														
4) DOW	FRI														
5) HOUR	10AM														
6) MIN	00														
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SET TIME															
1) YEAR	2017														
2) MONTH	JUL														
▶ 3) DAY	5														
4) DOW	FRI														
5) HOUR	10AM														
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SET TIME															
1) YEAR	2017														
2) MONTH	JUL														
3) DAY	5														
▶ 4) DOW	FRI														
5) HOUR	10AM														
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SET TIME															
1) YEAR	2017														
2) MONTH	JUL														
3) DAY	5														
4) DOW	FRI														
▶ 5) HOUR	10AM														
6) MIN	00														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">SET TIME</td> </tr> <tr> <td>1) YEAR</td> <td>2017</td> </tr> <tr> <td>2) MONTH</td> <td>JUL</td> </tr> <tr> <td>3) DAY</td> <td>5</td> </tr> <tr> <td>4) DOW</td> <td>FRI</td> </tr> <tr> <td>5) HOUR</td> <td>10AM</td> </tr> <tr> <td>▶ 6) MIN</td> <td>00</td> </tr> </table>	SET TIME		1) YEAR	2017	2) MONTH	JUL	3) DAY	5	4) DOW	FRI	5) HOUR	10AM	▶ 6) MIN	00	<p>Minute This setting allows you to adjust the current minute.</p>
SET TIME															
1) YEAR	2017														
2) MONTH	JUL														
3) DAY	5														
4) DOW	FRI														
5) HOUR	10AM														
▶ 6) MIN	00														



HBX ECO-0550 Geothermal Control
Version 2.00

ENERGY CLOCK SETUP - TIME ZONE SETUP

ENERGY CLOCK	
1) SET TIME	10:00 am
▶ 2) TIME ZONE	MOUNTAIN
3) WEEKDAY SETUP	
4) WEEKEND SETUP	

Time Zone Setup

This setting allows you to setup the timezone for your current location.

Default: Mountain Standard Time

ENERGY CLOCK SETUP - WEEKDAY SETUP

ENERGY CLOCK	
1) SET TIME	10:00 am
2) TIME ZONE	MOUNTAIN
▶ 3) WEEKDAY SETUP	
4) WEEKEND SETUP	

Weekday Setup

Adjust time and demand type options for weekday setup. The ECO-0550 is flexible and can be programmed for different schedules to run your heat pumps or backup boiler only for weekdays.

WEEKDAY SETUP	
▶ 1) 12:00A	BACKUP ONLY
2) 8:00A	HEAT PUMPS
3) 4:00P	HEAT PUMPS
4) 11:00P	HEAT PUMPS

Device Set Time (1-4)

Adjust the schedule times for your heating devices. Time can be adjusted in 15 minute increments.

WEEKDAY SETUP	
1) 12:00A	▶ BACKUP ONLY
2) 8:00A	HEAT PUMPS
3) 4:00P	HEAT PUMPS
4) 11:00P	HEAT PUMPS

Heating Device Options

Set which devices will activate at set times.

Heat Pumps: If Heat Pumps selected, control will operate Heat Pumps and Backup Boiler (Normal Operation) as programmed by user until next scheduled time.

Backup Only: If Backup Only selected, control will operate the Backup Boiler only during a heat call until next scheduled time.

ENERGY CLOCK SETUP - WEEKEND SETUP

ENERGY CLOCK

1) SET TIME 10:00 am

2) TIME ZONE MOUNTAIN

3) WEEKDAY SETUP

▶ 4) WEEKEND SETUP

WEEKEND SETUP

▶ 1) 12:00A BACKUP ONLY

2) 8:00A HEAT PUMPS

3) 4:00P HEAT PUMPS

4) 11:00P HEAT PUMPS

WEEKEND SETUP

1) 12:00A ▶ BACKUP ONLY

2) 8:00A HEAT PUMPS

3) 4:00P HEAT PUMPS

4) 11:00P HEAT PUMPS

Weekend Setup
Adjust time and demand type options for weekend setup. The ECO-0550 is flexible and can be programmed for different schedules to run your heat pumps or backup boiler only for weekends.

Device Set Time (1-4)
Adjust the schedule times for your heating devices. Time can be adjusted in 15 minute increments.

Heating Device Options
Set which devices will activate at set times.

Heat Pumps: If Heat Pumps selected, control will operate Heat Pumps and Backup Boiler (Normal Operation) as programmed by user until next scheduled time.

Backup Only: If Backup Only selected, control will operate the Backup Boiler **only** during a heat call until next scheduled time.

5) PRIORITY SETUP

SETUP MENU 2.00

1) HEAT PUMPS

2) TANKS

3) BACKUP

4) ENERGY CLOCK

▶ 5) PRIORITY COLD

6) WIFI

Priority Setup

This setting will prioritize the option selected.

Single Tank Setup:

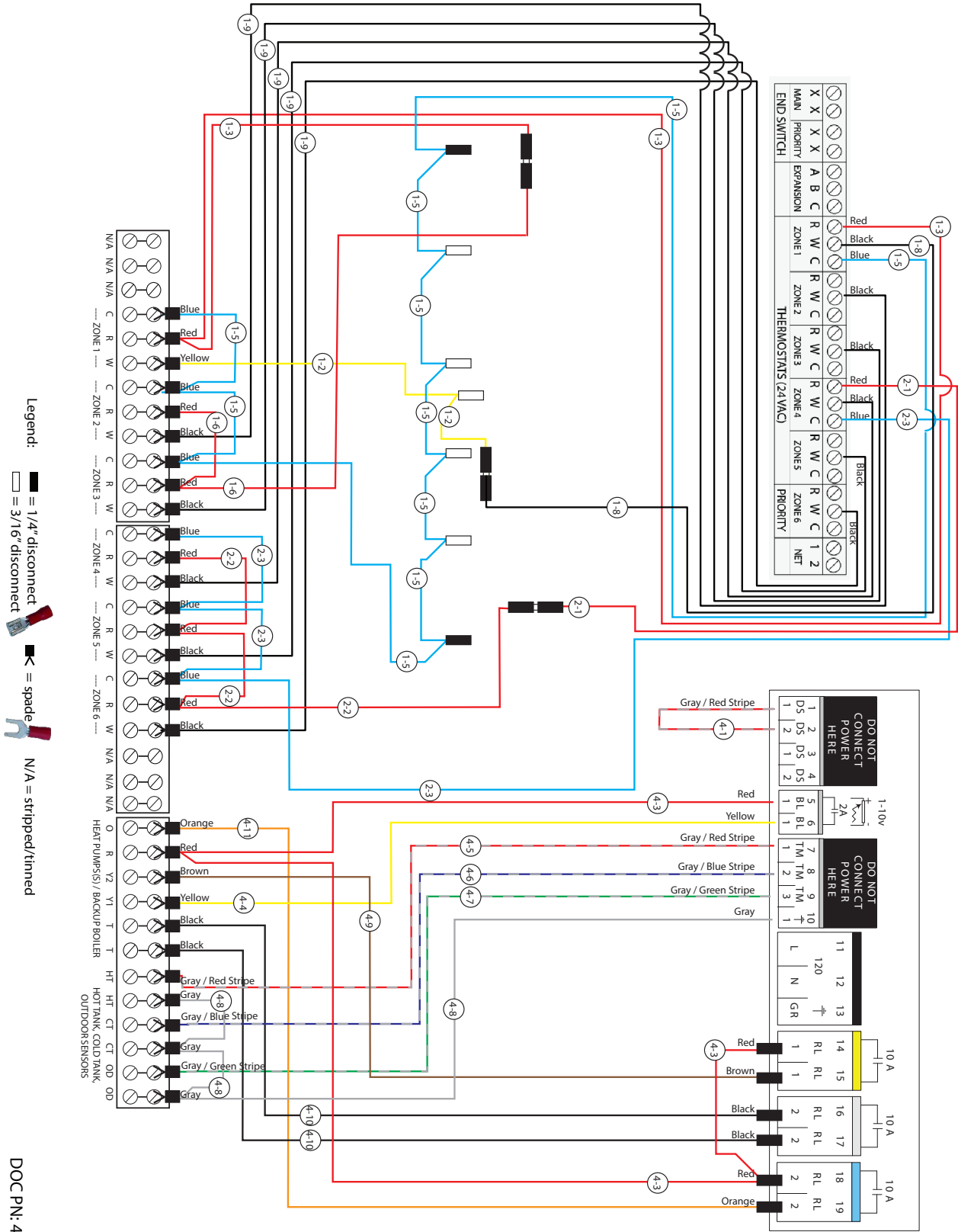
When the control is in this mode and there is a heat demand and cooling demand simultaneously, the control will disregard the call that is not priority until the priority is satisfied.

Dual Tank Setup:

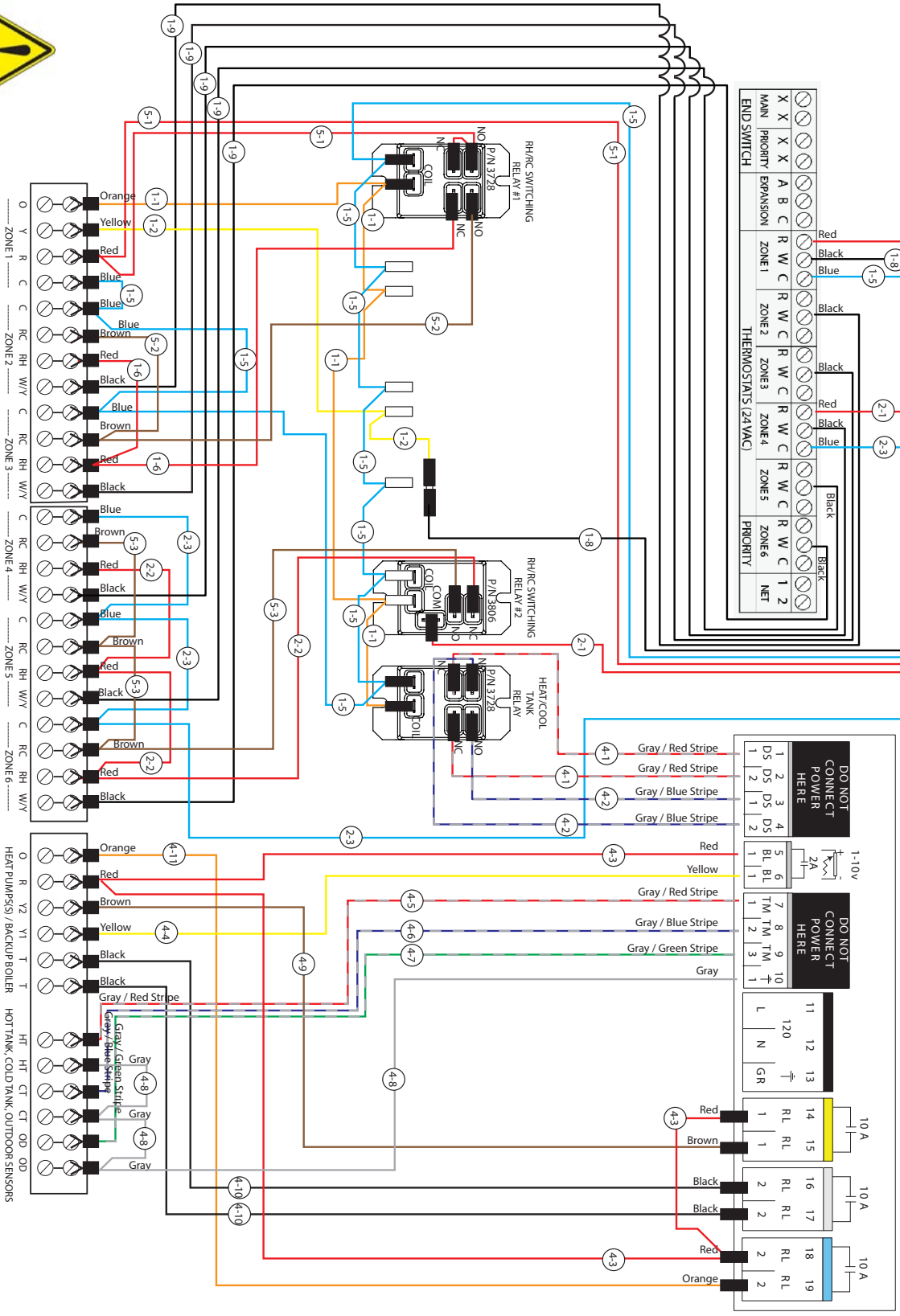
When the control is in this mode and there is a heat demand and cooling demand simultaneously, the control will satisfy the priority tank before switching to the non-priority tank.

(HOT/COLD) Default: **COLD**

**Wiring Diagram "HCC", Control Panel for "HO1",
Single Buffer Tank, Zoning - Pumps or Zone Valves Up to Six Zones Radiant Heating (Separate Cooling)**



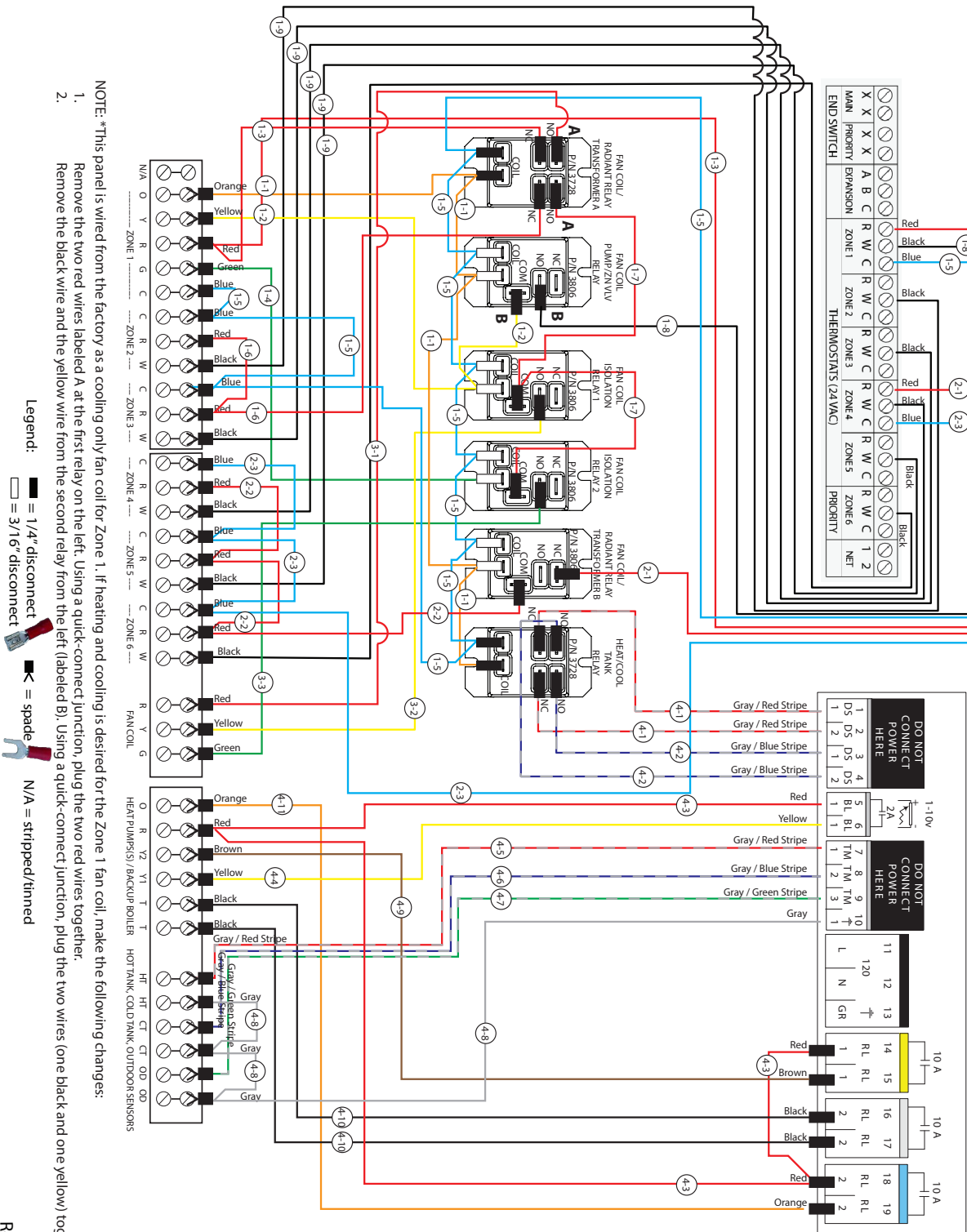
**Wiring Diagram "HCC", Control Panel for "HC1",
Single Buffer Tank, Zoning - Pumps or Zone Valves Up to Six Zones Heating or Cooling (All Zones)
(Heating/Cooling T-stat Option)**



CAUTION: See Appendix A for important notes about transformer sizing/isolation.

Legend:
 = 1/4" disconnect
 = 3/16" disconnect
 = spade
 = N/A = stripped/tinned

Wiring Diagram "HC2", Control Panel for "HC2", Single Buffer Tank, Zoning - Pumps or Zone Valves Up to Five Zones Radiant Heating; One Fan Coil Cooling Zone (Heating T-stat Interrupt Option*)

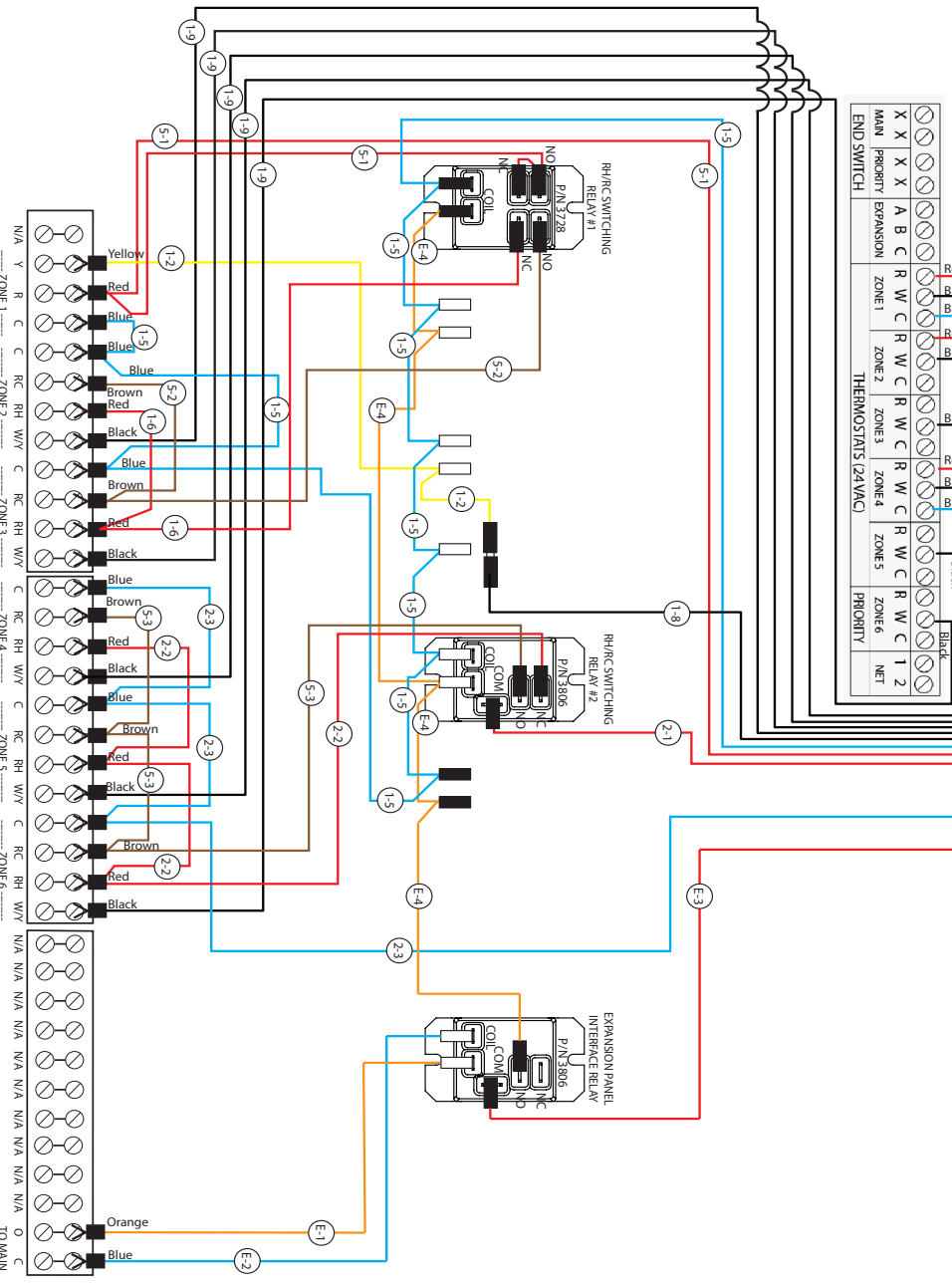


NOTE: *This panel is wired from the factory as a cooling only fan coil for Zone 1. If heating and cooling is desired for the Zone 1 fan coil, make the following changes:
 1. Remove the two red wires labeled A at the first relay on the left. Using a quick-connect junction, plug the two red wires together.
 2. Remove the black wire and the yellow wire from the second relay from the left (labeled B). Using a quick-connect junction, plug the two wires (one black and one yellow) together.

Wiring Diagram "HCE", Expansion Panel for "HC1"
Single Buffer Tank, Zoning - Pumps or Zone Valves Up to Six Zones Heating or Cooling (All Zones) (Heating/Cooling T-stat Option)



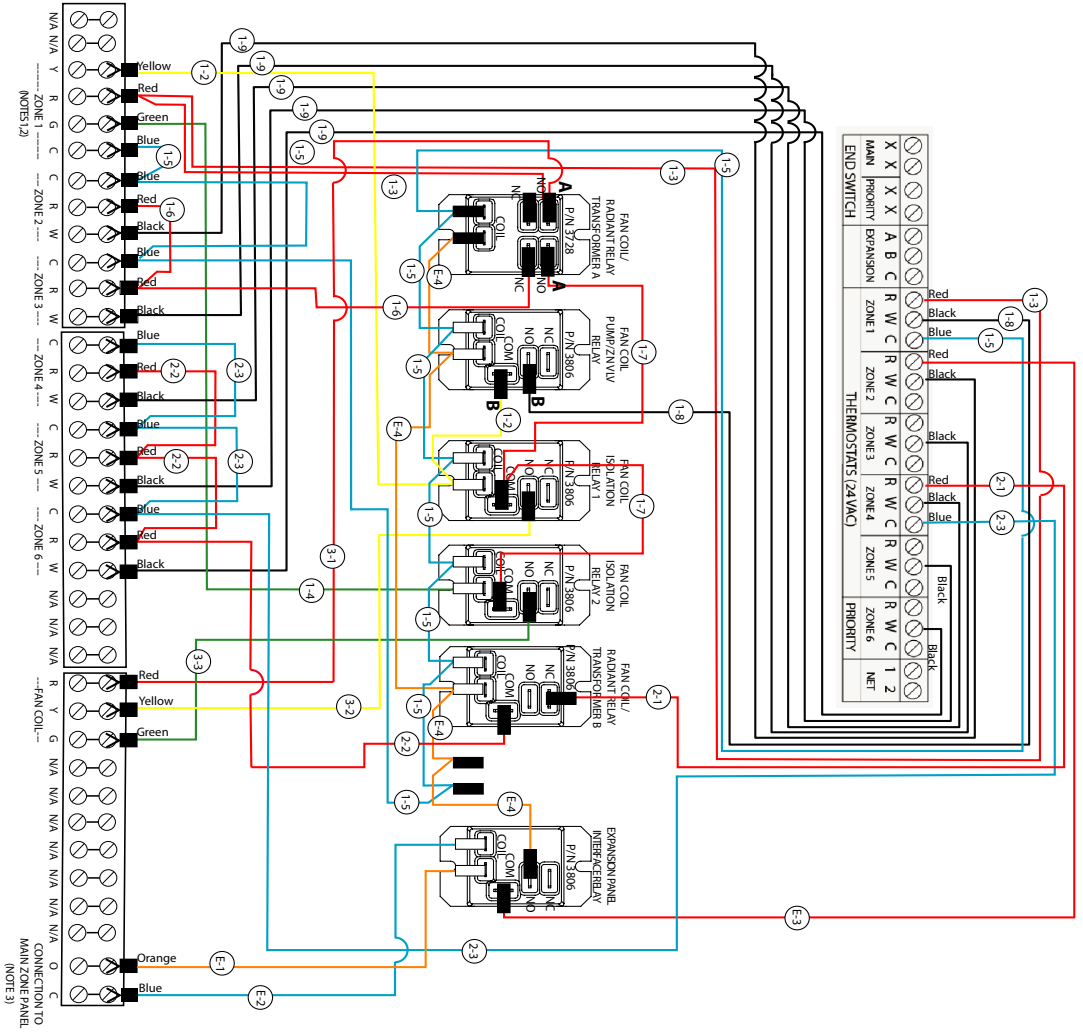
CAUTION: See Appendix A for important notes about transformer sizing/isolation.



- NOTES:**
1. Zone 1 (fan coil) thermostat must be a heat pump thermostat. Heating/cooling mode is determined by the main zone panel. Therefore, the O terminal is not used for this thermostat.
 2. To tie the main panel to this expansion panel, terminal O on this panel must be connected to terminal O on the main panel (Zone 1) and terminal C on this panel must be connected to terminal C on the main panel (Zone 1).

Legend:
 = 1/4" disconnect
 = 3/16" disconnect
 = spade
 = N/A = stripped/trimmed

**Wiring Diagram "HCE", Expansion Panel for "HC2"
One additional Fan Coil Zone, Five Additional Radiant Zones**



NOTES:

1. Zone 1 (fan coil) thermostat must be a heat pump thermostat. Heating/cooling mode is determined by the main zone panel. Therefore, the O terminal is not used for this thermostat.
2. The expansion panel is wired from the factory as a cooling only fan coil for Zone 1. If heating and cooling is desired for the Zone 1 fan coil, make the following changes: A. Remove the two red wires labeled A at the first relay on the left. Using a quick-connect junction, plug the two red wires together; B. Remove the black wire and the yellow wire from the second relay from the left (labeled B). Using a quick-connect junction, plug the two wires (one black and one yellow) together.
3. To tie the main panel to this expansion panel, terminal O on this panel must be connected to terminal O on the main panel (Zone 1) and terminal C on this panel must be connected to terminal C on the main panel (Zone 1).

Legend: = 1/4" disconnect
 = 3/16" disconnect
 = spade
 = stripped/finned

Technical Specifications- Tank

See Document# 4731 Buffer Tank IOM for tank specifications

Technical Specifications- Taco Zone Valve Control & Switching Relay

Product Number: ZVC406-EXP-4
Number of Zones: 6 with Priority
Input Voltage: 120/60/1 VAC
Max 24 VAC Output at 25°C: 24 VA per Zone; 40 VA per Transformer
Type 1 Enclosure

Product Number: SR506-EXP-4
Number of Zones: 6 with Priority
Input Voltage: 120/60/1 VAC
Max Cabinet Load: 20 amps
Type 1 Enclosure

All circulator relay connections, including ZC/ZR, are rated 1/3 hp (6 FLA, 36 LRA) at 120 VAC. End switch connections are rated 24 VAC, 1 amp. All thermostat connections supply a 24 VAC class 2 output.

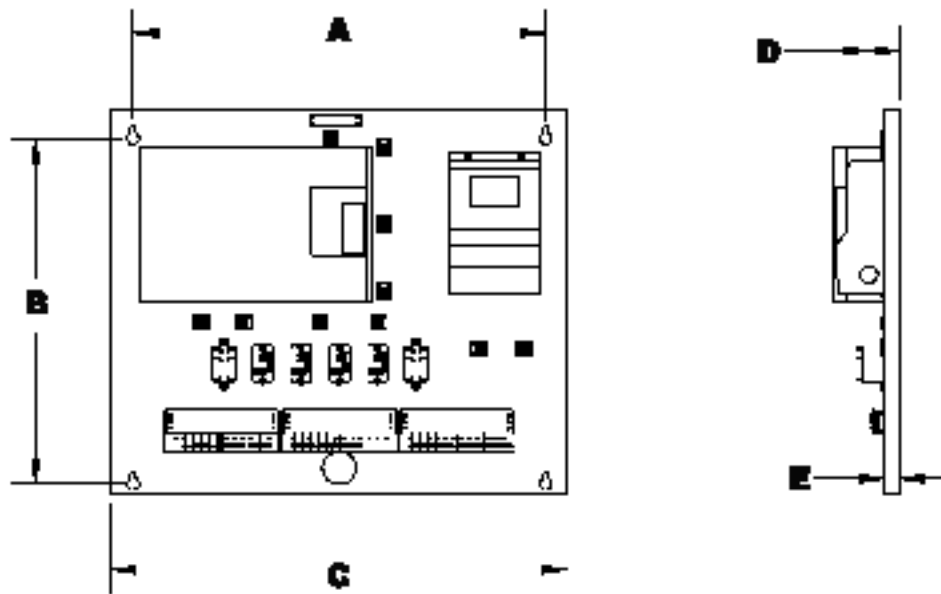
Technical Data- HBX Controller

3X Thermistor Input
(10K Ohm)
2X Miscellaneous Input Signal
3X Relay Outputs (240VAC 5Amps) Dry Contacts
1X 2Amp Dry Contact
Input: 120VAC ±10% 50/60Hz 15A Max
FCC ID: 2AHMR-ESP12S

ETL Listings:
Meets CSA C22.2 No. 24
Meets UL Standard 873
ETL Control No. 3068143
Storage:
50°F to 104°F (10°C to 40°C)

Dimensional Data

See Document# 4731 Buffer Tank IOM for tank specifications



A	B	C	D	E
21-1/2"	18"	23-3/4"	3-1/2"	3/4"

1. Dimensional data provided for informational purposes and is rounded to nearest 1/8"

Buffer Tank Sizing

Information on buffer tank sizing can be found in the Geo-Flo Hydro-Connect Buffer Tank Installation and Operating Manual (Document# 4731)

Appendix A: Transformer Sizing and Isolation

Panel HC2 (Heating/Cooling with up to 5 radiant heating zones and one fan coil heating/cooling zone) includes transformer isolation for one fan coil, the zone panel, heat pump(s), and boiler (if applicable). However, panel HC1 (Heating/Cooling with up to 6 zones, heating or cooling) can be used if there is more than one fan coil. Multiple fan coils (or in some cases combination heat pumps) may present challenges if the various transformers are out of phase.

Figures 15 through 19 include notes about removing/disconnecting the fan coil or heat pump transformers. This approach allows the use of one transformer for all 24VAC controls, which solves the potential problem of transformers being out of phase. Using one transformer for all devices, however, may overload the zone panel transformer. The zone panel used with circulators for zoning has a 20VA transformer; the zone panel used with zone valves for zoning has two 40VA transformers (80VA total). There are two acceptable solutions for alleviating transformer issues, namely: 1) Replace the transformer in the zone panel with a larger transformer; 2) Install isolation relays at the fan coils. Below are examples of both options.

Option 1: Calculate transformer size for a larger transformer at the zone board

1. Observe the transformer size in the fan coil (40VA is typical) or combination heat pump (75VA is typical).
2. Multiply the number of fan coils by the transformer size required. If a combination heat pump is connected to the zone panel, note the size of the transformer in the heat pump.
3. Include the transformer needed for the zone panel (20VA for circulators, 80VA for zone valves).
4. Add all of the requirements.

Example 1: Panel HC1, 2 fan coil heating/cooling zones, 2 radiant floor heating zones (like Figure 15)

Each fan coil has a 40VA transformer.

2 fan coils x 40VA = 80VA

Zoning is with zone valves (80VA for zone panel)

Total requirement is 160VA (80 + 80)

Disconnect both zone panel transformers, and connect to a 160VA transformer (or two 80VA transformers in parallel).

Example 2: Panel HC1, 1 combination heat pump (heating/cooling), 5 radiant floor heating zones (like Figure 17)

Combination heat pump has a 75VA transformer

Zoning is with circulators (20VA for zone panel)

Total requirement is 95VA (75 + 20)

Disconnect zone panel transformer, and connect to a 95VA transformer (or two 50VA transformers in parallel).

Option 2: Installing isolation relays at the fan coils.

Installing isolation relays at the fan coil units eliminates the need to up-size the zone panel transformer, and in some cases may be preferable to avoid modifying the zone panel. The first fan coil requires two isolation relays (one for the Y/W signal, and one for the O signal), and each subsequent fan coil needs one isolation relay (Y/W signal). Figure A1 on the next page shows typical wiring for a two fan coil application. It is generally not practical to use isolation relays with a combination heat pump (5 relays would be needed: Y1, Y2, W, O, G), and therefore the transformer should be up-sized in this case.

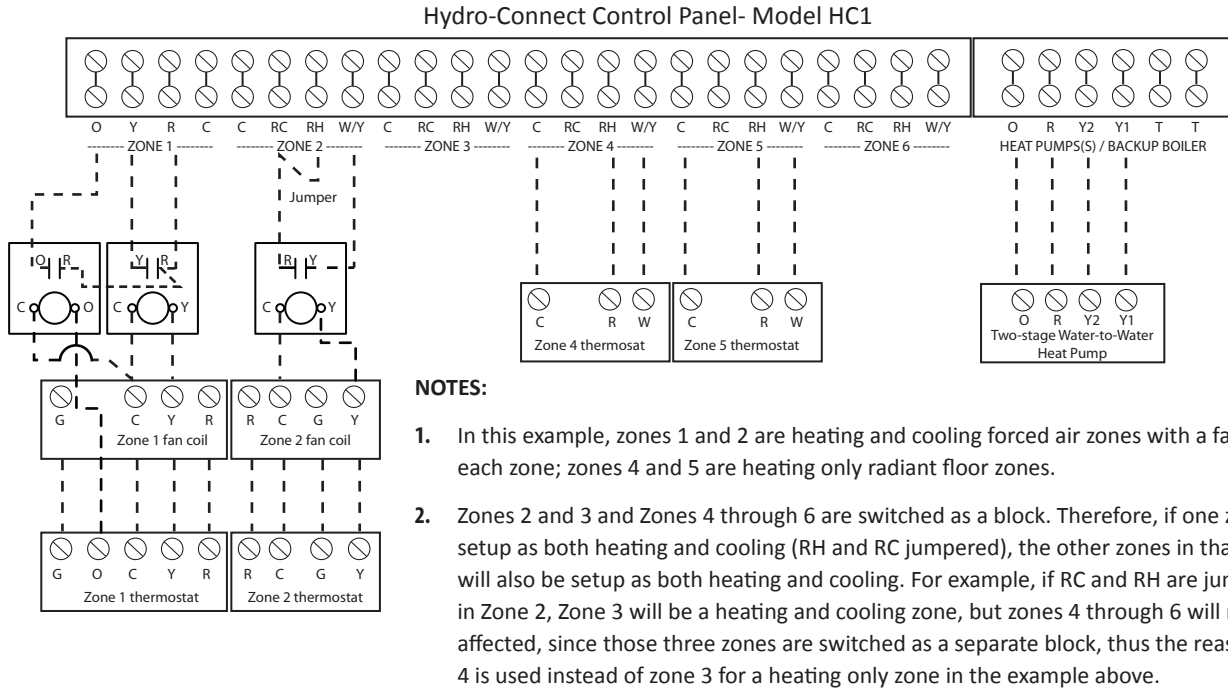


Figure A1: Example wiring diagram for isolation relays installed at two fan coil units*

*Two relays are needed for the first fan coil (Y and O); one isolation relay (Y) is needed for each additional fan coil. If isolation relays are added to the fan coil units, the zone board transformer does not need to be replaced with a larger transformer.

Manual Updates Table

Date	Description of Changes	Pages
03OCT2019	Corrected typo in Table 1	6
25SEPT2019	Added notes 1 & 2 to HCC-NN-HC2 wiring diagram	34
19SEPT2019	Updated Front cover and back cover templates	Front/Back
	Switched stainless tank to composite options	various
	Updated with the latest version of the Taco Instruction Sheet	14-17
	Updated with the latest version of the HBX ECO-0550 manual	18-31
07DEC2018	Added note to Heat Pump Setup: Stages	27
23OCT2018	Updated with the latest version of the HBX ECO-0550 manual	21-33
20AUG2015	Added reference to Figure 15 and Appendix A with regard to fan coils and Heating/Cooling control option (HC1)	4
	Updated part number of insulated pump (1286CV)	7
	Added note about wiring considerations for fan coils	13,14,15
	Added notes about zoning with fan coils to Figures 12 & 13	16
	Updated Figures 15, 16, 17, 18, 19 with notes on transformers	17,18,19
	Updated to the latest IOM for the HBX ECO-0550 controller	21-33
	Added Caution notes to wiring diagrams	38,39,40
	Added Appendix A to address transformer sizing/isolation	41
18MAY2015	First published	All

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