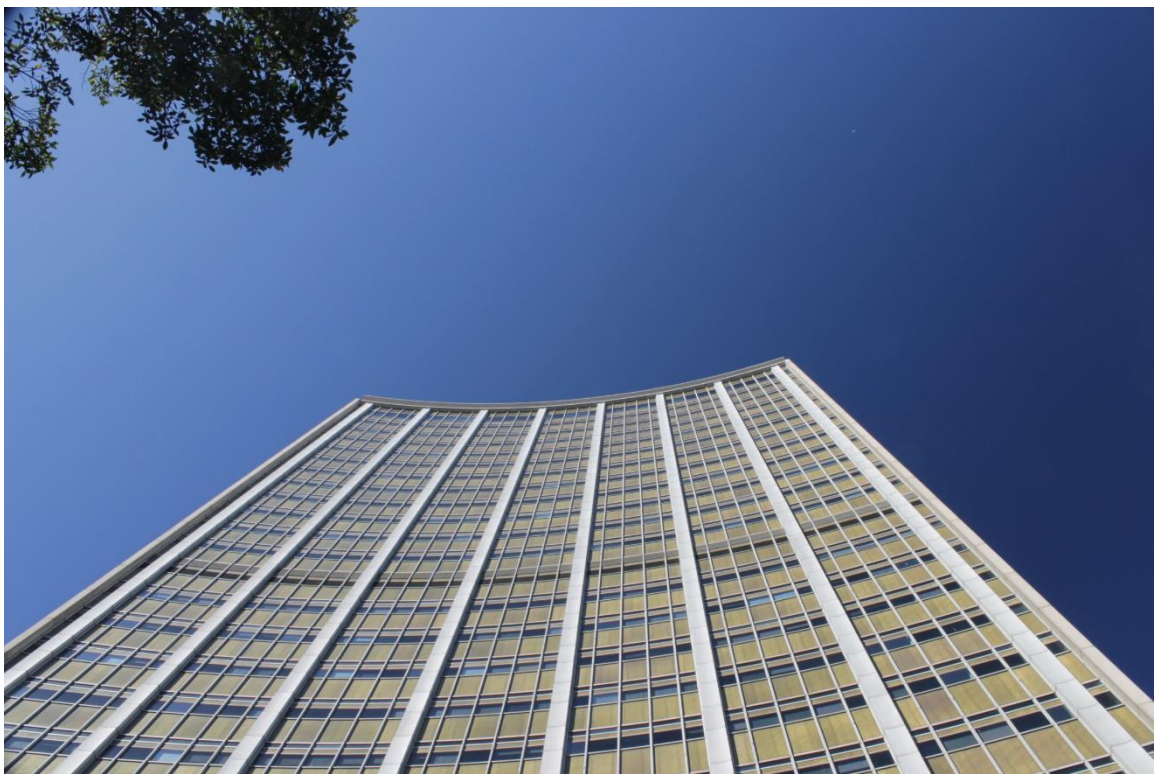




Rheem Air to Water Heat Pump Applications Guideline

Rev B



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System Description

This heat pump system is designed to heat water using free energy from the air. This system can be installed in many different ways combining with boost systems that offers designers the flexibility to use and meet the specific requirements of each project.

The system comprises one or multiple heat pumps, connected to one or multiple storage tanks, which serves as the energy source to heat the potable water supply, via one circulating pump per heat pump.

Boosting can be conducted using a variety of energy types including gas, electric water heaters and electric resistance heating. These boosting options can be integrated in a variety of ways including in-tank or auxiliary heating directly into the same storage or in-series boosting.

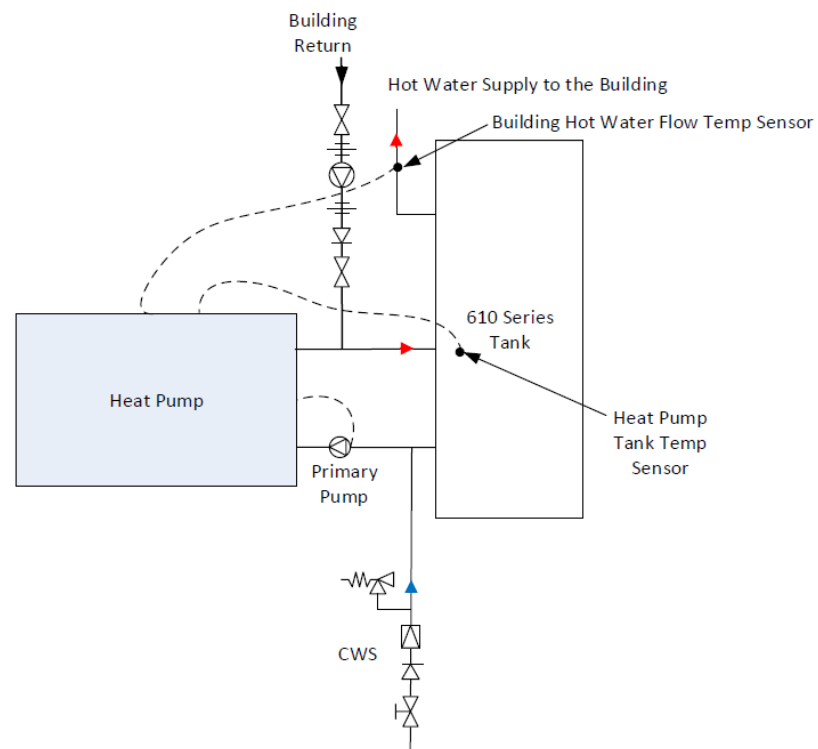
Further iterations are possible incorporating 3 way diverter valves to maximize heat pump contribution.

The guide provides basic plumbing schematics as well as wiring diagrams specific to the application type, however should be read in conjunction with the Heat Pump Owners Guide and Installation Instructions.

This guide cannot cover every conceivable combination, however covers the most common systems encountered by Rheem. If an application is outside the scope of this guide, please contact Rheem. We will endeavour to provide a solution that meets the project needs and can then add it to this guide.

If in doubt, please consult your Rheem representative, who can provide the right guidance which will save both time and project costs.

1. Heat pump with 610 tanks

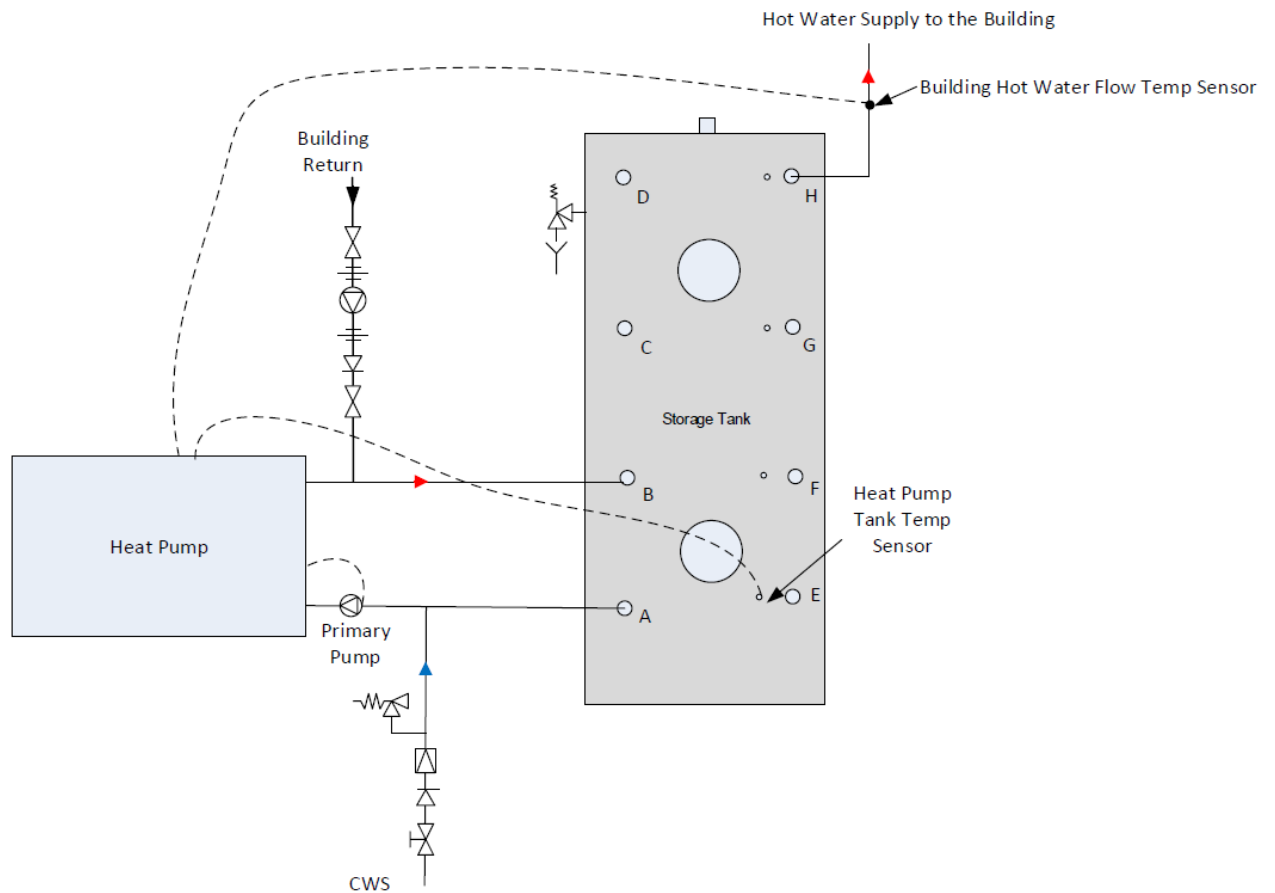


Notes:

- This is a typical diagram of single heat pump installation with 610 series tanks.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.

2. Heat pump with RT tanks

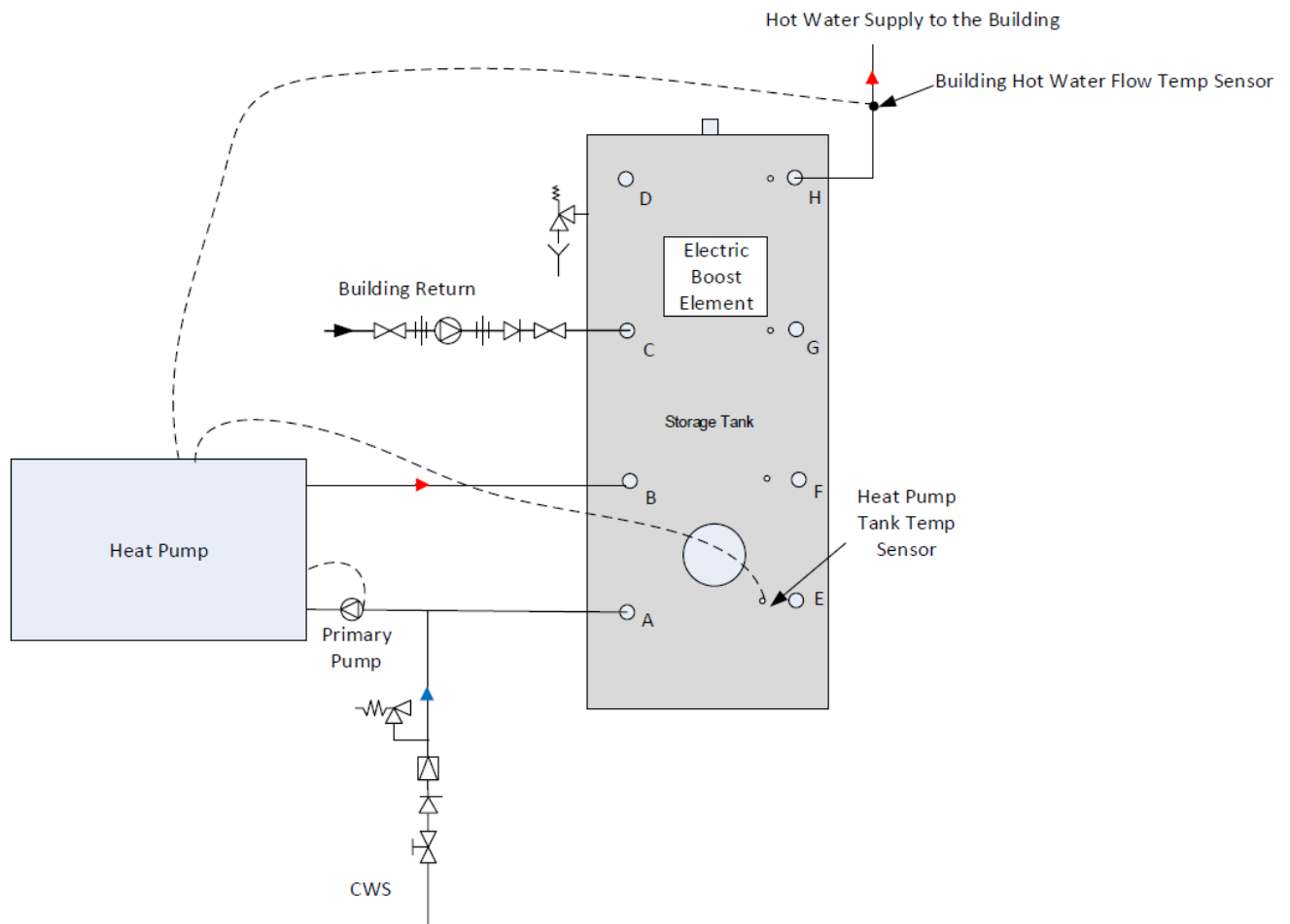
a) Without heating unit



Notes:

- This is a typical diagram of single heat pump installation with 610 or RT series tanks.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram. Note there is a dip tube at fitting A/E so the tank sensor position provides the same performance outcomes as the 610 series position.

b) With heating unit on top flange of RT tank

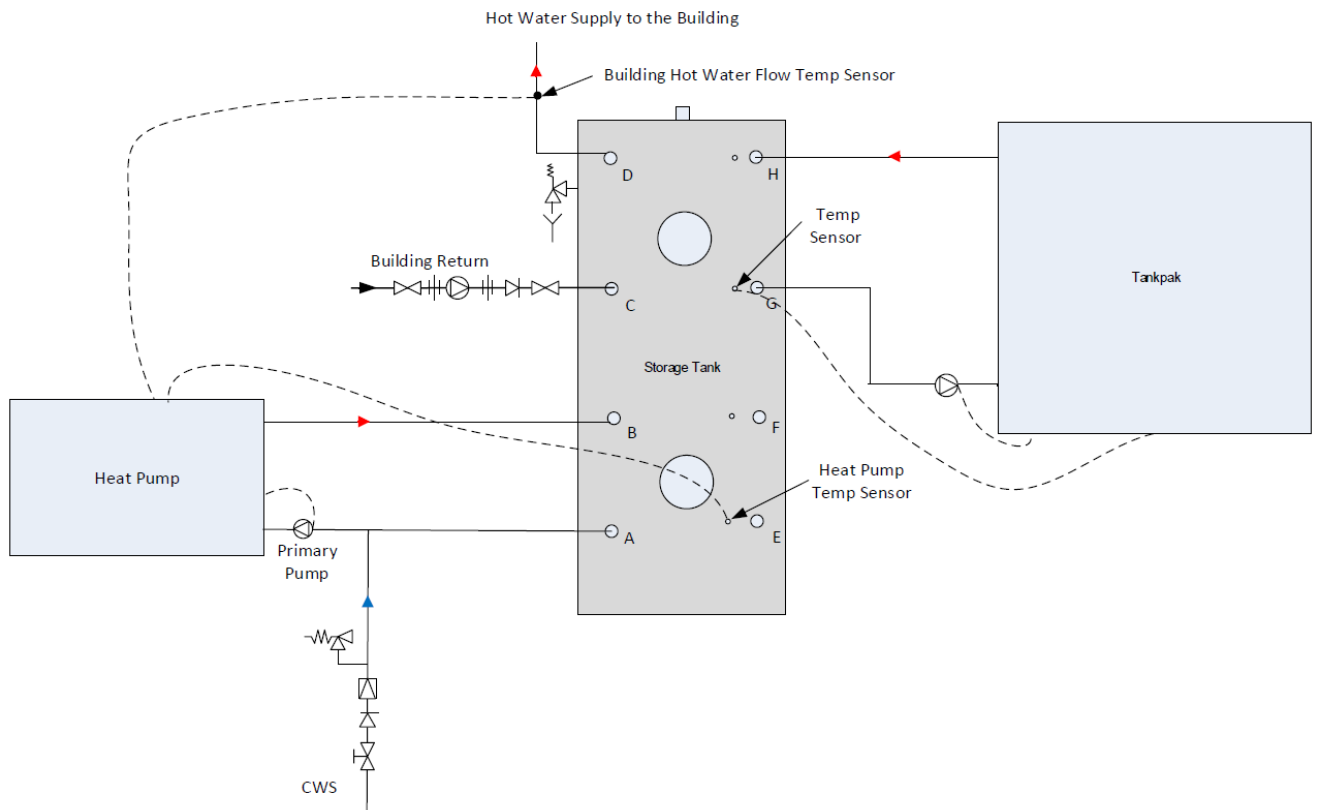


Notes:

- The heating unit (electric boost element) will maintain the top 1/3 of the tank at the temperature set on the heating unit thermostat.
- Operation of heating unit is totally independent of the heat pump.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- The auxiliary boost should be set to 60°C.
- Power for heating unit is supplied separately.
- Building return pump returns into fitting C/G to prevent the heating unit from heating the bulk of the storage.

3. Heat pump with in-tank external boost

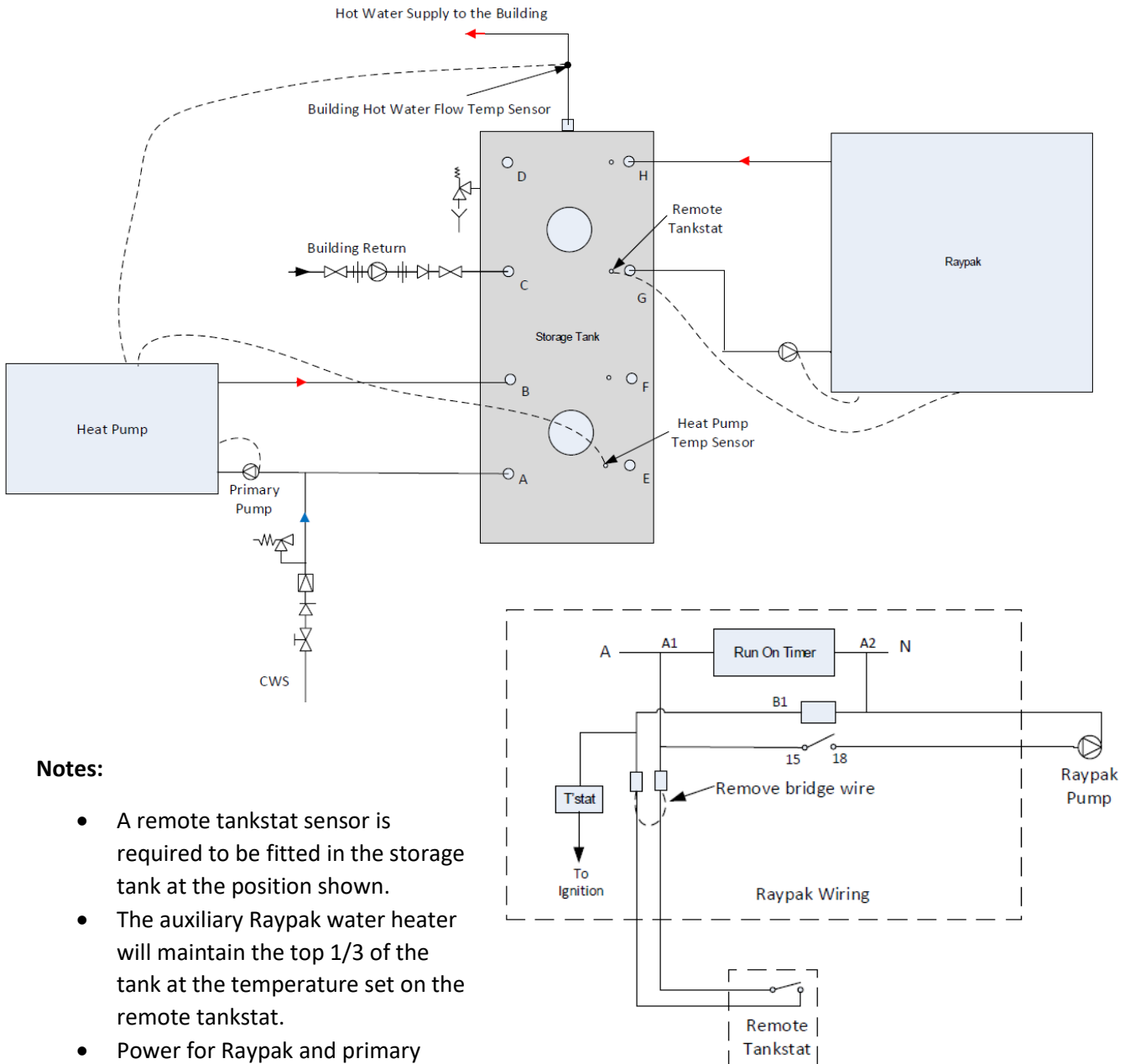
a) In-tank external boost with Tankpak



Notes:

- The auxiliary Tankpak will maintain the top 1/3 of the tank at the temperature set on the Tankpak controller.
- Operation of Tankpak is totally independent of the heat pump.
- Power for Tankpak and primary circulating pump is supplied separately from the power for heat pump.
- CFWH should be set to 65°C. Tankpak controller should be set to 60°C.
- Building return pump returns into fitting C/G to prevent the auxiliary boost from heating the bulk of the storage.

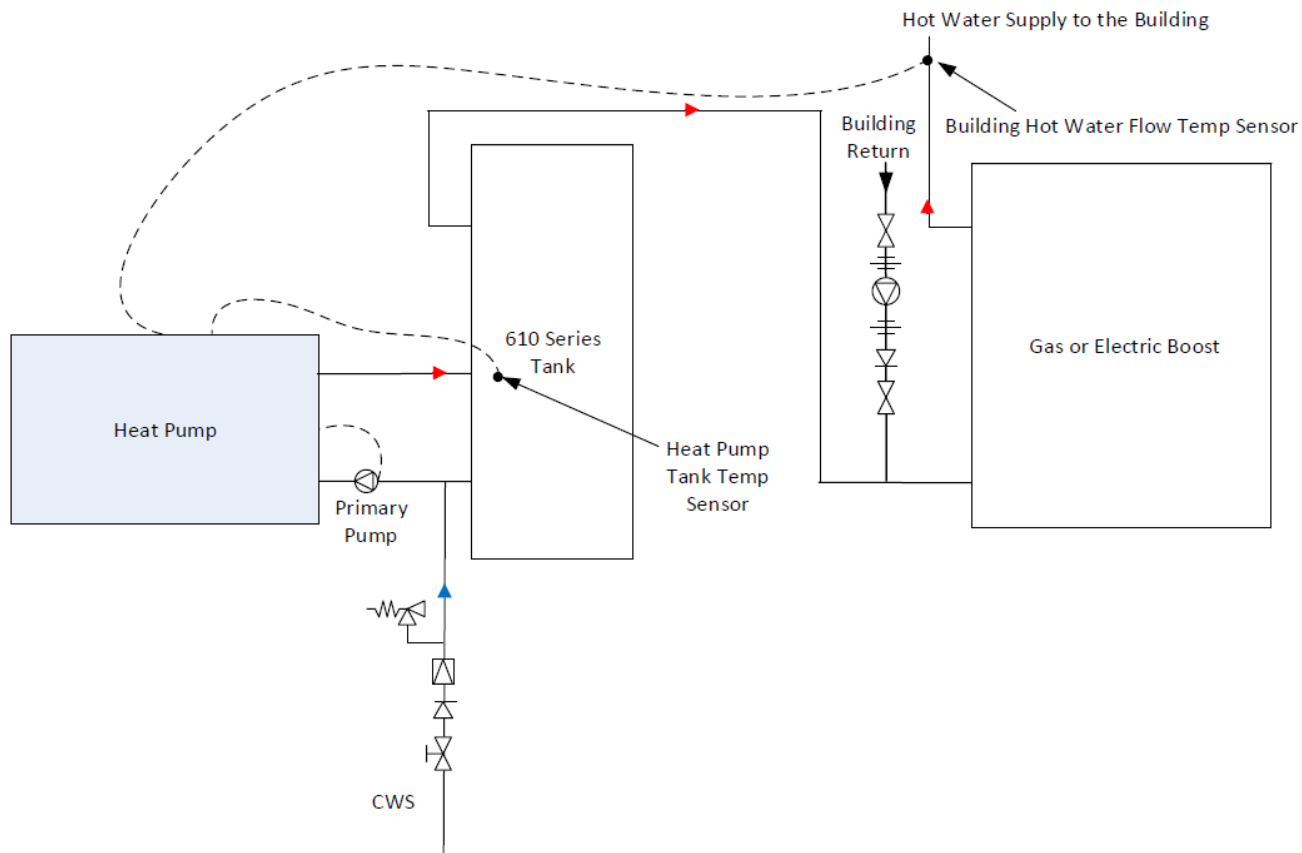
b) In-tank external boost with Raypak



Notes:

- A remote tankstat sensor is required to be fitted in the storage tank at the position shown.
- The auxiliary Raypak water heater will maintain the top 1/3 of the tank at the temperature set on the remote tankstat.
- Power for Raypak and primary circulating pump is supplied separately from the power for heat pump.
- Run On Timer Kit is required for On/Off Raypak. Remove bridging wire on terminals located within Raypak electrical cover and connect to remote tankstat terminals as shown above.
- Hot water supply must be connected at the top fitting of the RT tank for Raypak boost system to maintain stratification.
- Raypak controller should be set to 60°C.
- Building return pump returns into fitting C/G to prevent the auxiliary boost from heating the bulk of the storage.

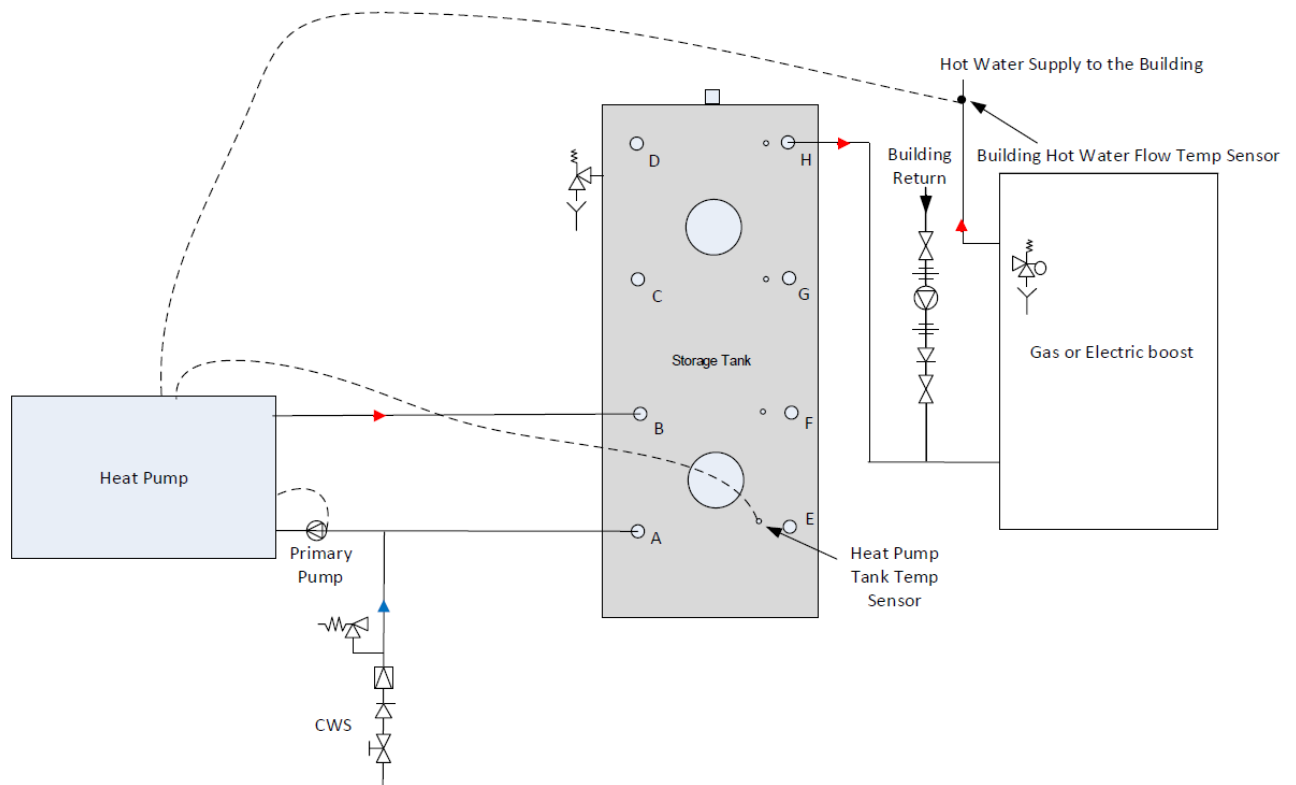
b) In-series boost (heavy duty gas or electric) with 610 series



Notes:

- The in-series boost plant must be able to meet the peak demands of the application in terms of temperature at required flow rate.
- During a demand situation, the in-series boost plant will deliver a constant temperature to the building and building return water will come back to the bottom of the boost plant.
- Operation of the in-series boost plant is independent of the heat pump.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- The auxiliary boost should be set to 60°C.

c) In-series boost (heavy duty gas or electric) with RT

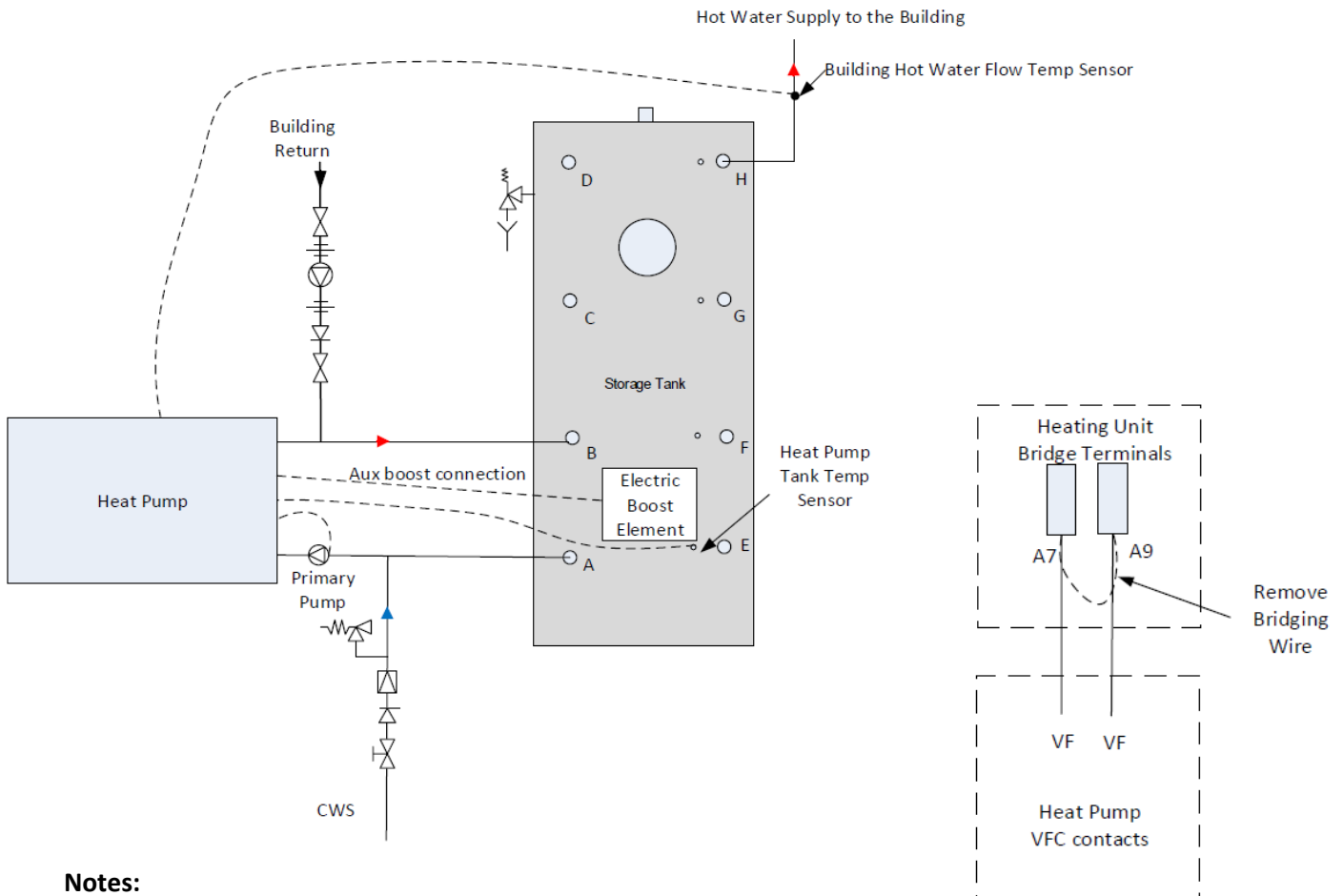


Notes:

- The in-series boost plant must be able to meet the peak demands of the application in terms of temperature at required flow rate.
- During a demand situation, the in-series boost plant will deliver a constant temperature to the building and building return water will come back to the bottom of the boost plant.
- Operation of the in-series boost plant is independent of the heat pump.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- The auxiliary boost should be set to 60°C.

5. Low ambient aux boost- controlled by heat pump

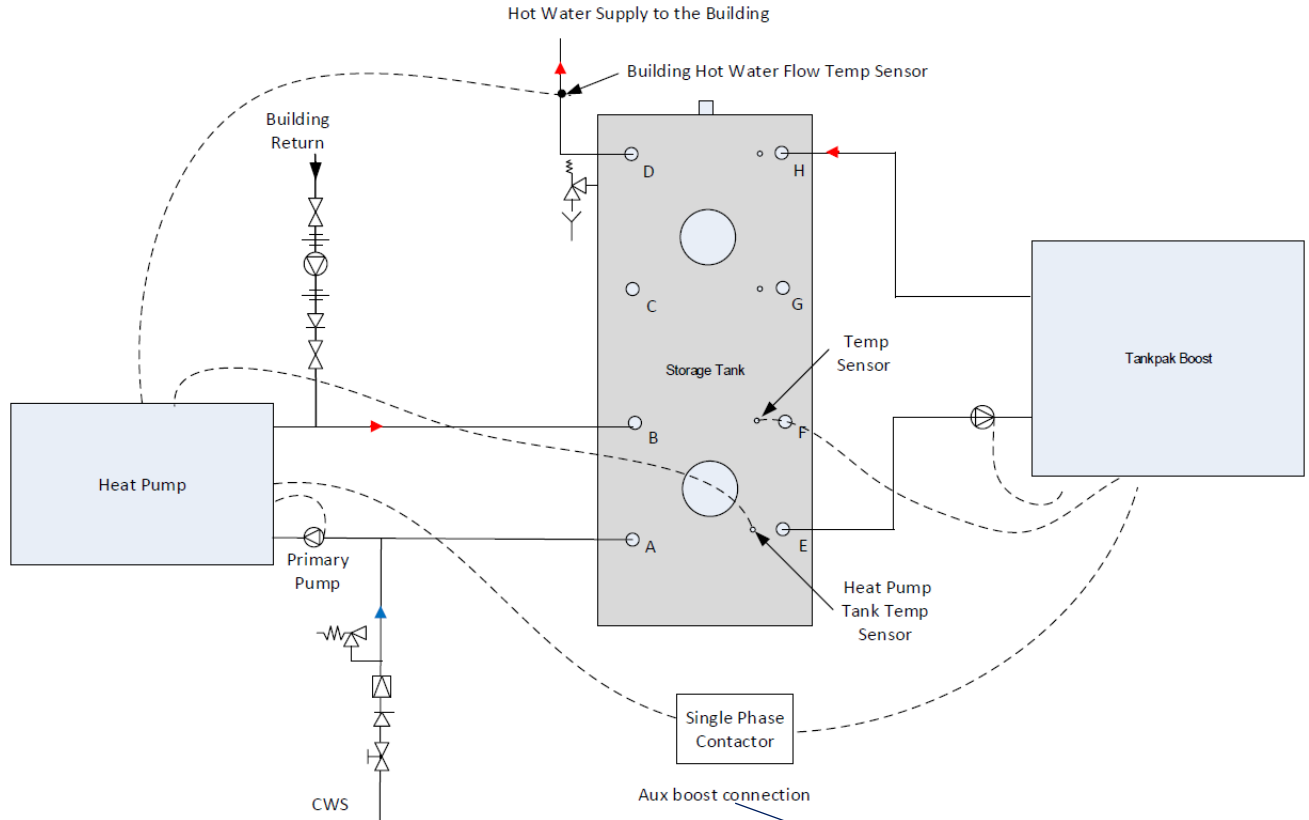
a) With heating unit on bottom flange of RT tank- controlled by heat pump



Notes:

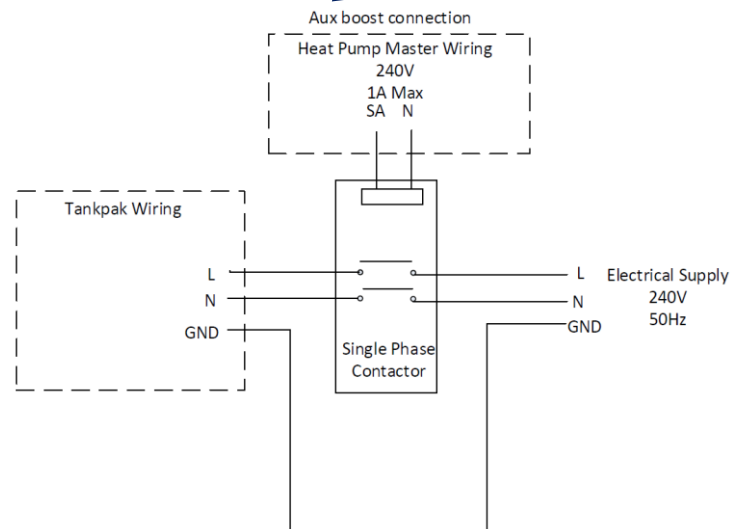
- The auxiliary boost heating unit will operate in two scenarios-
 - If the heat pump is in fault. The auxiliary boost heating unit will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. Auxiliary heater will operate and remain active until the air temperature reaches 7°C.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- The auxiliary boost should be set to 60°C.
- Remove bridging wire on terminals located within heating unit electrical cover and connect to VFC terminals in heat pump enclosure, as shown above.
- Power for heating unit is supplied separately.
- For multiple heat pumps/heating units refer to section 6 (c) or 7(c).

b) In-tank external boost with Tankpak- controlled by HP

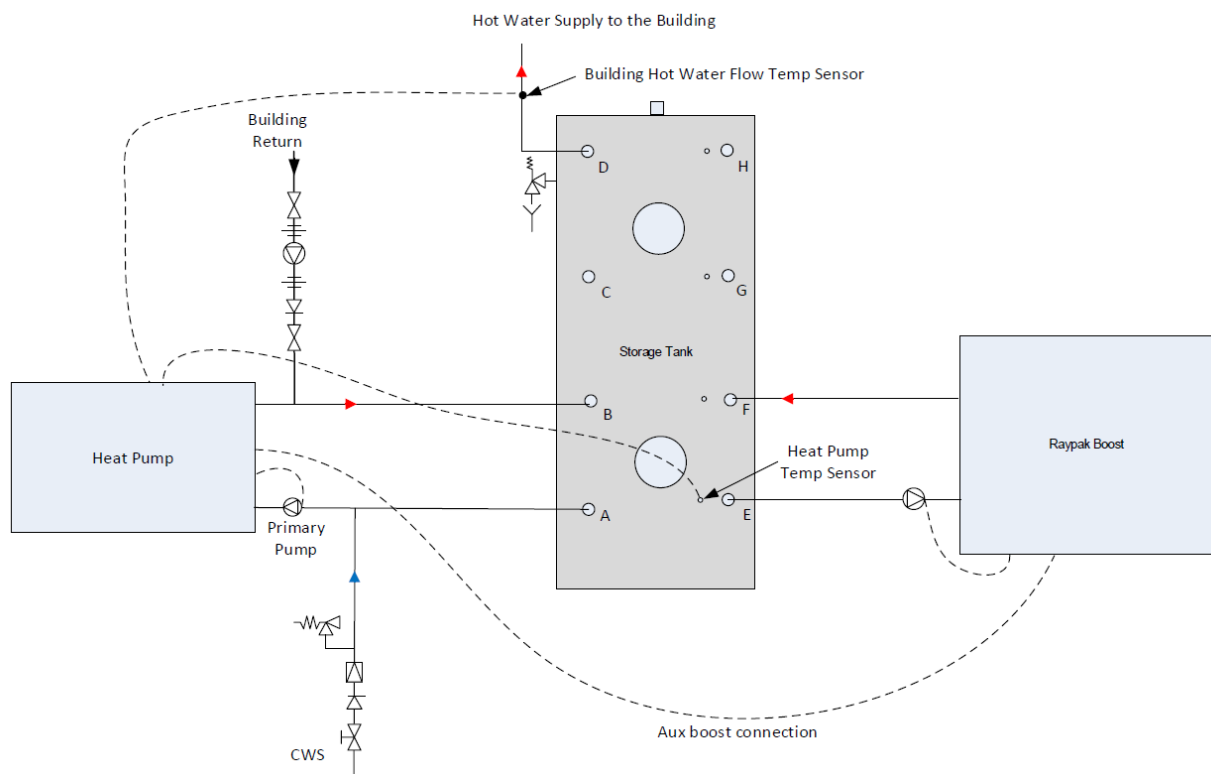


Notes:

- The auxiliary Tankpak boost will operate in two scenarios-
 - If 50% or more of the heat pumps are in fault. The Tankpak boost will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. Tankpak boost will operate and remain active until the air temperature reaches 7°C.
- Where multiple heat pumps are used, they must be LAN connected (refer to section 7). Control of the boost heater is via the Master HP.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- The Tankpak boost should be set to 60°C.
- A double pole single throw DPST single-phase contactor (not supplied by Rheem) needs to be connected to the Tankpak boost heater and to the terminals in heat pump enclosure, as shown above.
- Power for Tankpak boost is supplied separately via the contactor.

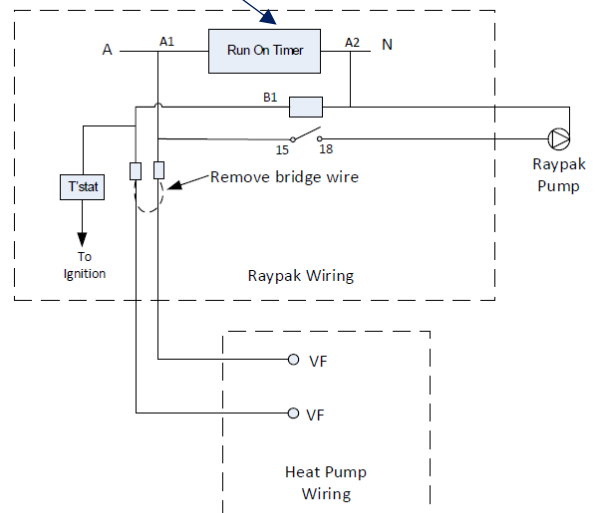


c) In-tank external boost with Raypak- controlled by HP

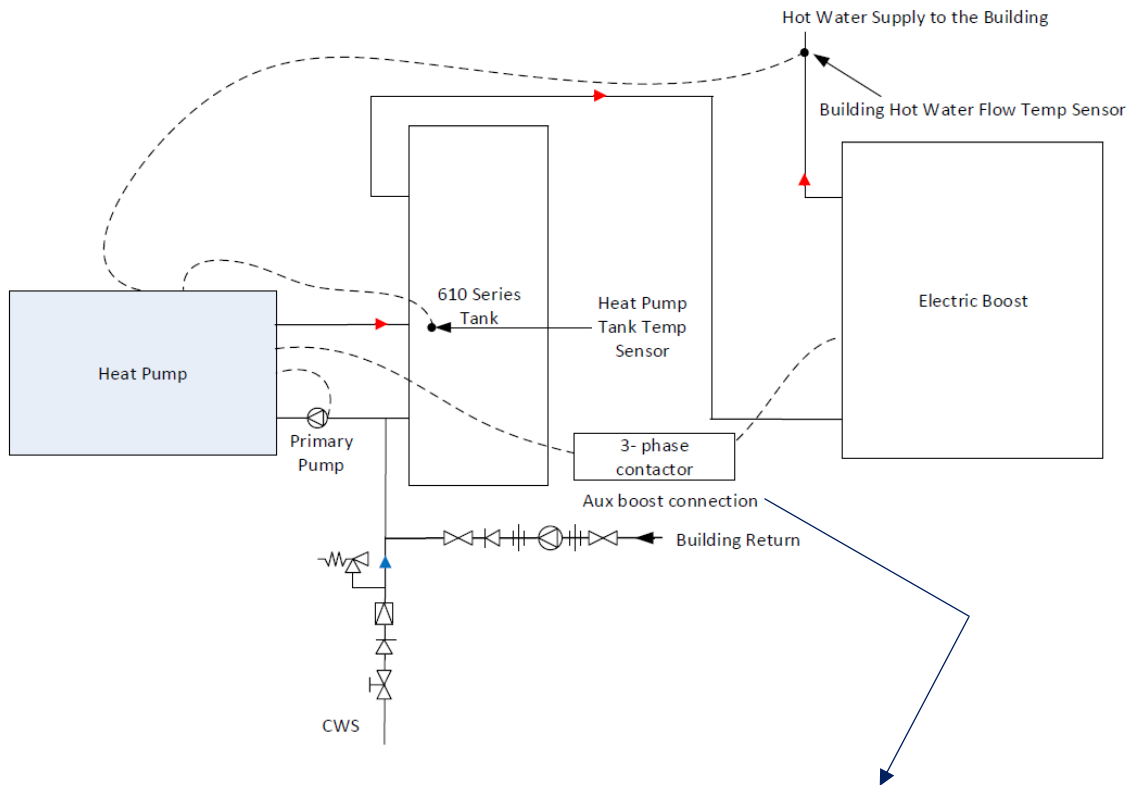


Notes:

- The auxiliary Raypak boost will operate in two scenarios-
 - If 50% or more of the heat pumps are in fault. The Raypak boost will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. Raypak boost will remain active until the air temperature reaches 7°C.
- Where multiple heat pumps are used, they must be LAN connected (refer to section 7). Control of the boost heater is via the Master HP.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- The Raypak internal t'stat should be set to 60°C.
- On/Off Raypak models are wired as depicted above with the installation of kit 56076874 (supplied separately).
- Remove bridging wire on terminals located within Raypak electrical cover and connect to VFC terminals in heat pump enclosure, as shown above.
- Power for Raypak boost is supplied separately.

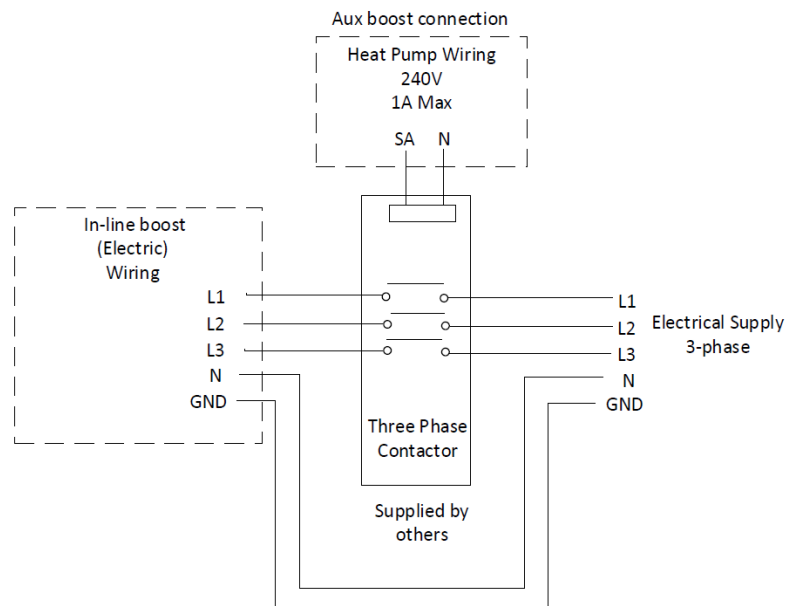


d) In-series external boost (heavy duty electric) controlled by HP



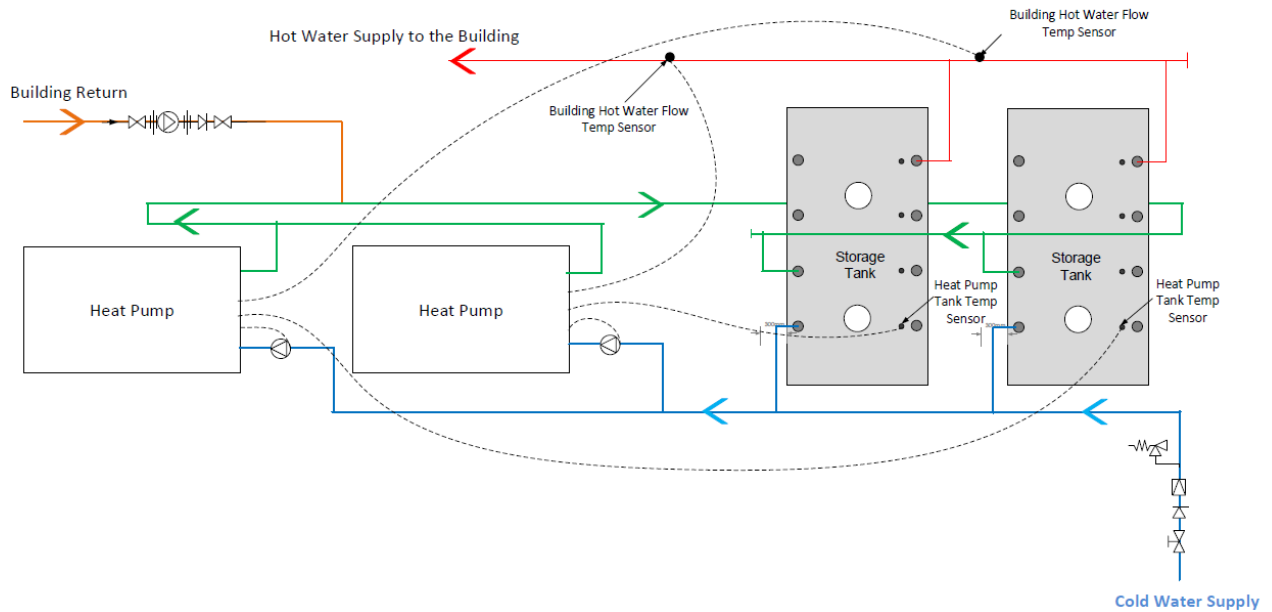
Notes:

- **This method is a fix for a sub-optimal installation and is not to be used as a primary option**
- The in-series boost will operate in two scenarios-
 - If 50% or more of the heat pumps are in fault. The in-series boost will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. In-series boost will operate and remain active until the air temperature reaches 7°C.
- Heat pump tank temperature sensor must be connected to the tank as shown in the diagram.
- A Three-phase contactor (not supplied by Rheem) needs to be connected to the three-phase boost heater and to the terminals in heat pump enclosure, as shown above.
- Where multiple heat pumps are used, they must be LAN connected (refer to section 7). Control of the boost heater is via the Master HP. Multiple contactors may be operated from the Master HP as long as the current draw does not exceed 1A. Power for boost heater is supplied separately.



6. Multiple standalone heat pumps with no LAN

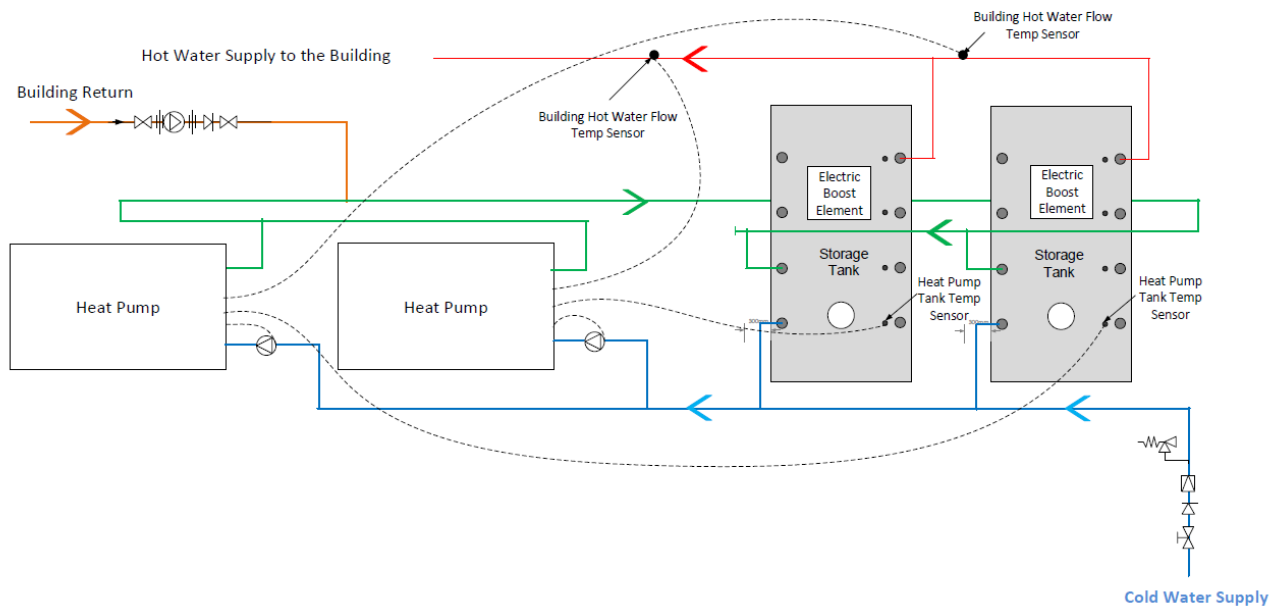
a) Standalone HP without aux boost



Notes:

- All tank temperature sensors must be connected and fitted to a tank otherwise an error message will be displayed and the HP will not operate.
- All building flow temperature sensors must be connected, otherwise an error message will be displayed.
- Building flow temperature sensor can be located anywhere e.g. in hot flow or return line for additional measurement values.
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

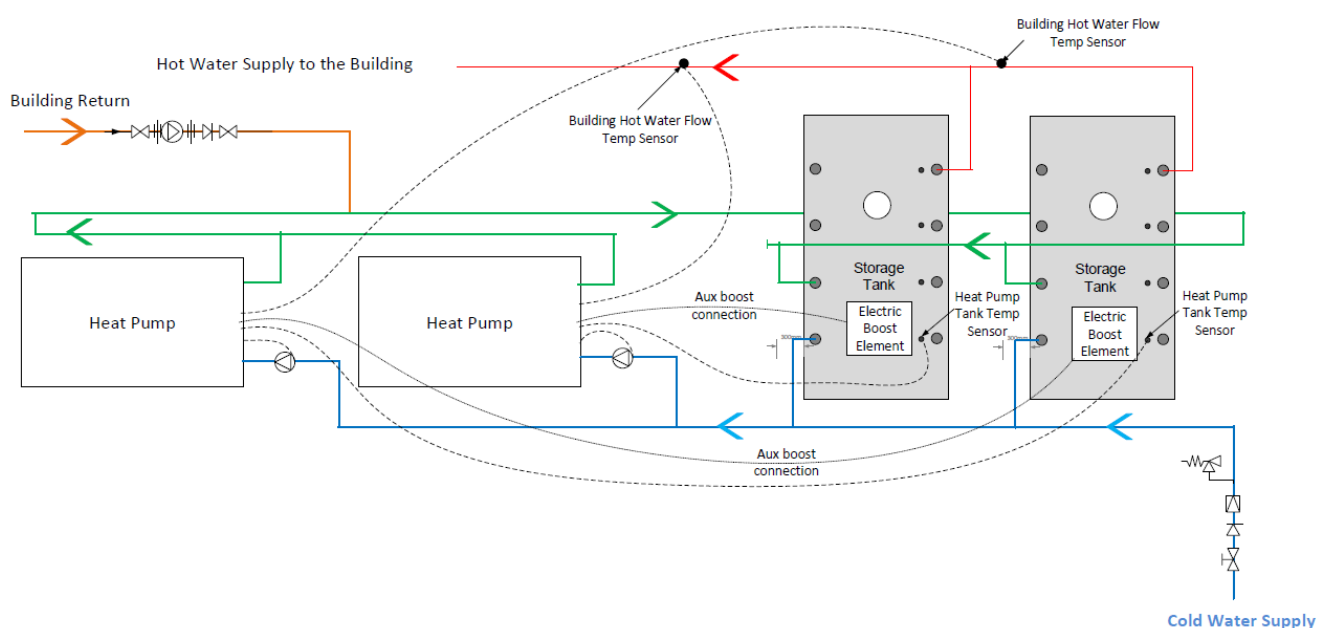
b) Standalone HP with in tank HU aux boost top flange



Notes:

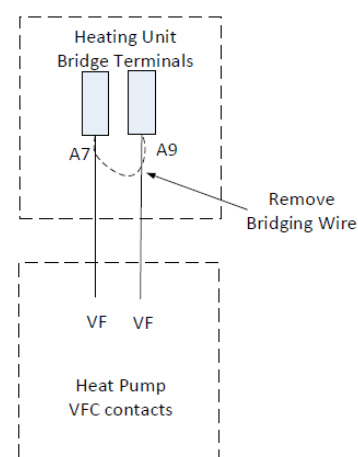
- All tank temperature sensors must be connected and fitted to a tank otherwise an error message will be displayed and the HP will not operate.
- All building flow temperature sensors must be connected, otherwise an error message will be displayed.
- Building flow temperature sensor can be located anywhere e.g. in hot flow or return line for additional measurement values.
- The auxiliary boost should be set to 60°C.
- Power for heating unit is supplied separately.
- Operation of heating unit is totally independent of the heat pump.
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

c) Standalone HP with in tank HU aux boost bottom flange controlled by HP



Notes:

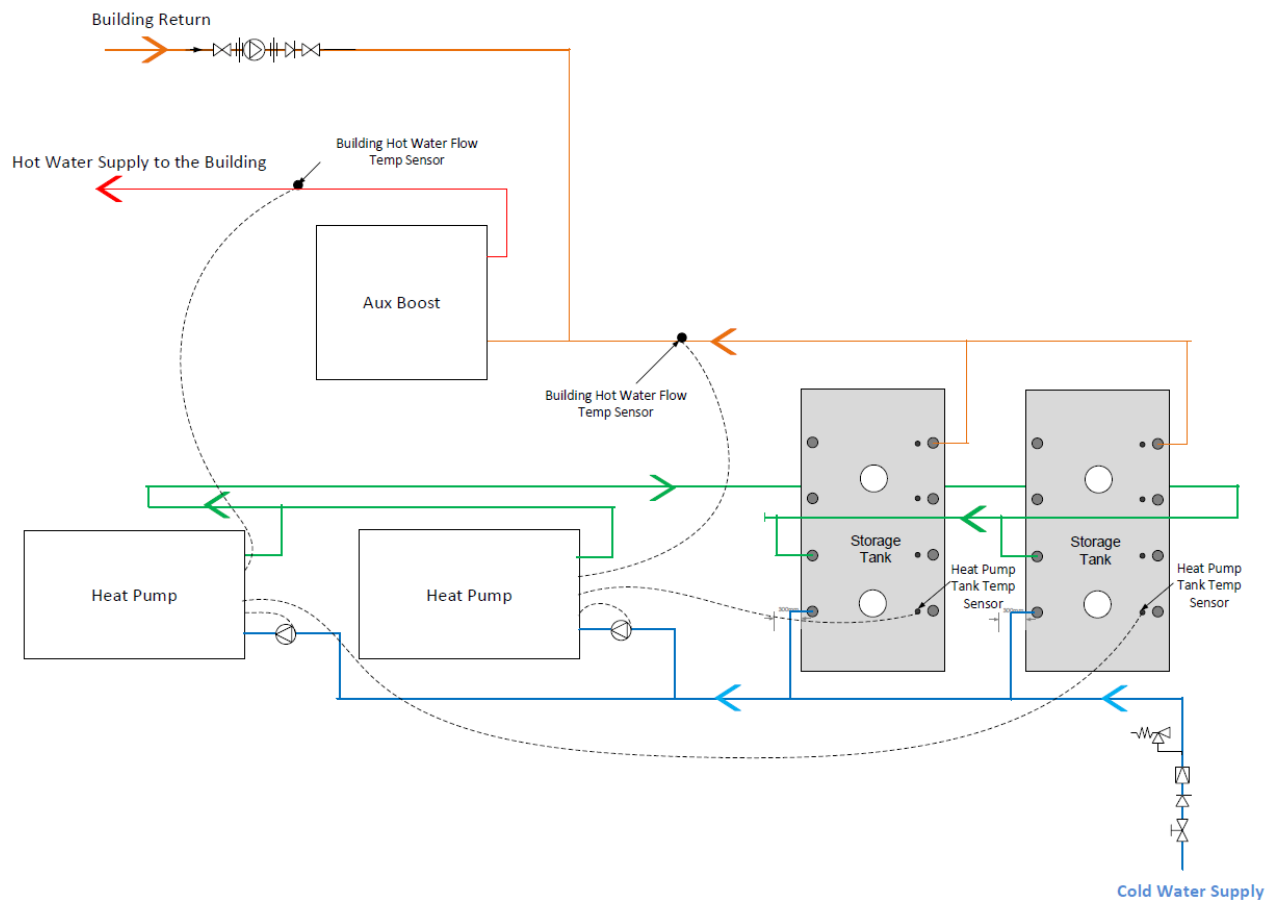
- All tank temperature sensors must be connected and fitted to a tank otherwise an error message will be displayed and the HP will not operate.
- All building flow temperature sensors must be connected, otherwise an error message will be displayed.
- Building flow temperature sensor can be located anywhere e.g. in hot flow or return line for additional measurement values.
- The auxiliary boost heating unit will operate in two scenarios-
 - If any heat pump is in fault. The auxiliary boost heating unit connected to that heat pump will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. Auxiliary heater will operate and remain active until the air temperature reaches 7°C.



Note: each heat pump has its own ambient air sensor and aux boost operation is relevant to that heat pump

- The auxiliary boost should be set to 60°C.
- Remove bridging wire on terminals located within each heating unit electrical cover and connect to VFC terminals in each heat pump enclosure, as shown above.
- This configuration is useful where the number of tanks/heating units equals the number of heat pumps. Where this is not possible, refer to section 7 – Multiple HP with LAN as Master/Slave.
- Power for each heating unit is supplied separately.
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

d) Standalone HP with in series aux boost

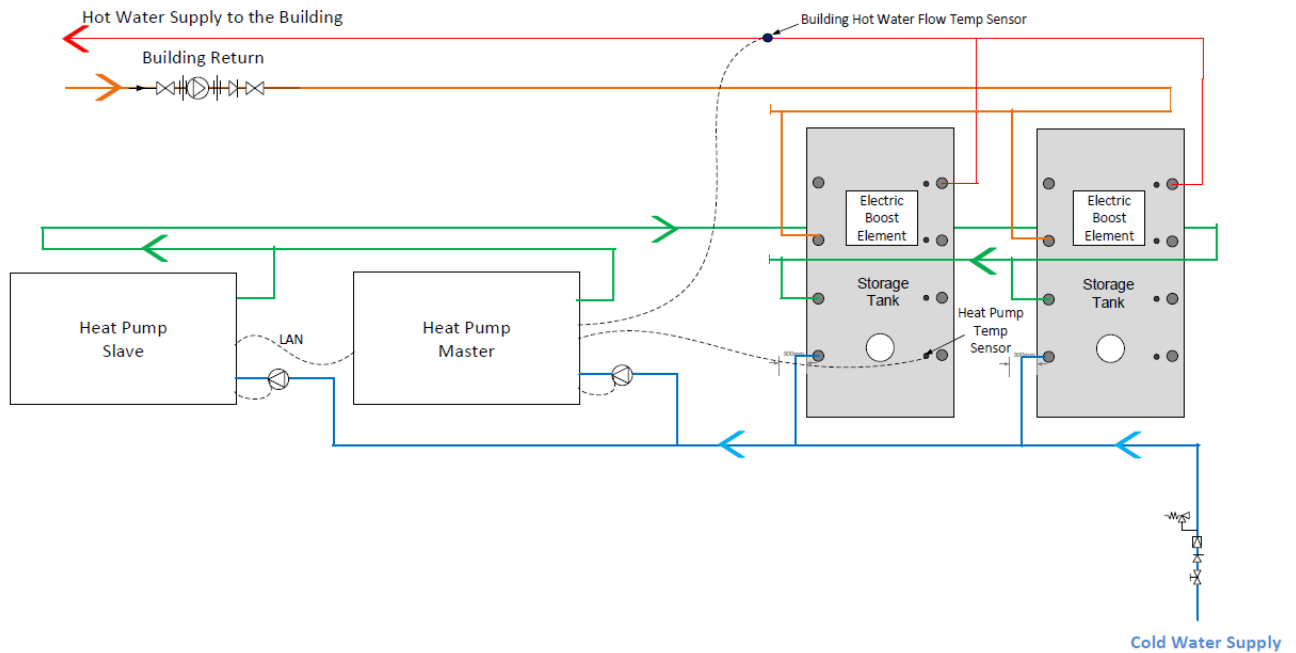


Notes:

- All tank temperature sensors must be connected and fitted to a tank otherwise an error message will be displayed and the HP will not operate.
- All building flow temperature sensors must be connected, otherwise an error message will be displayed.
- Building flow temperature sensor can be located anywhere e.g. in hot flow or return line for additional measurement values.
- The auxiliary boost should be set to 60°C.
- Power for boost heater is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

7. Multiple HP with LAN as Master/Slave

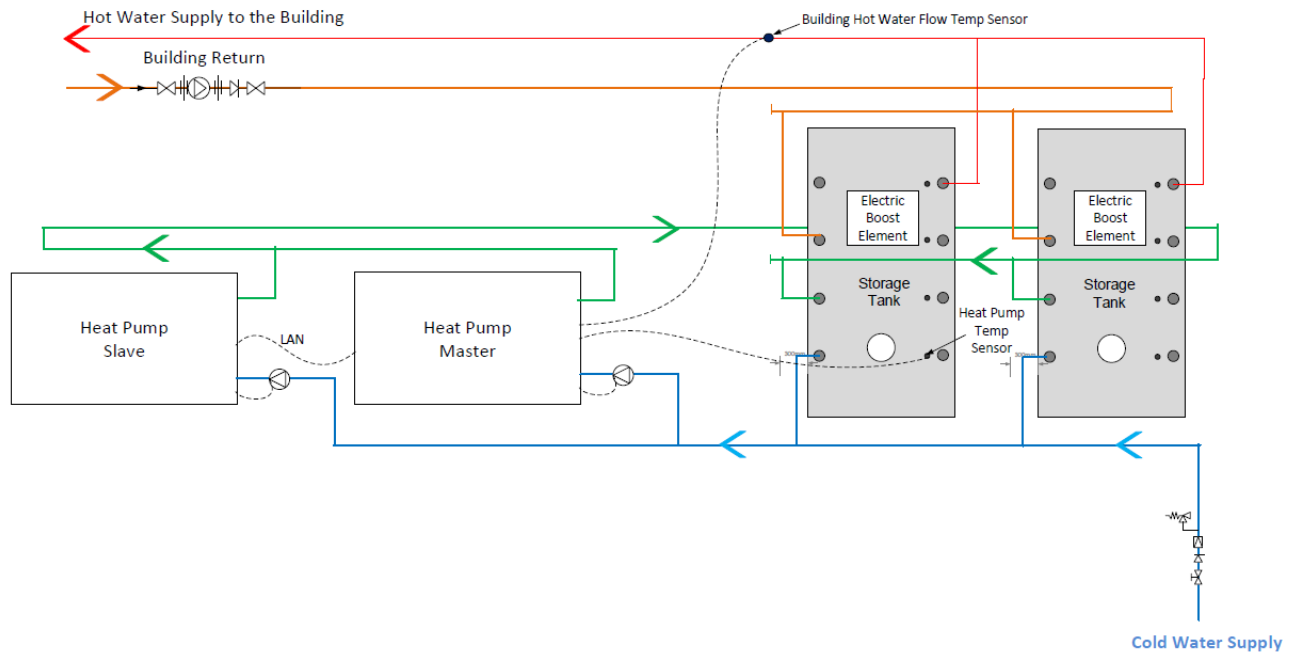
a) HP as Master/Slave without aux boost



Notes:

- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- All HP will operate as a single unit. Note: there may be a slight delay between HP on start up
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

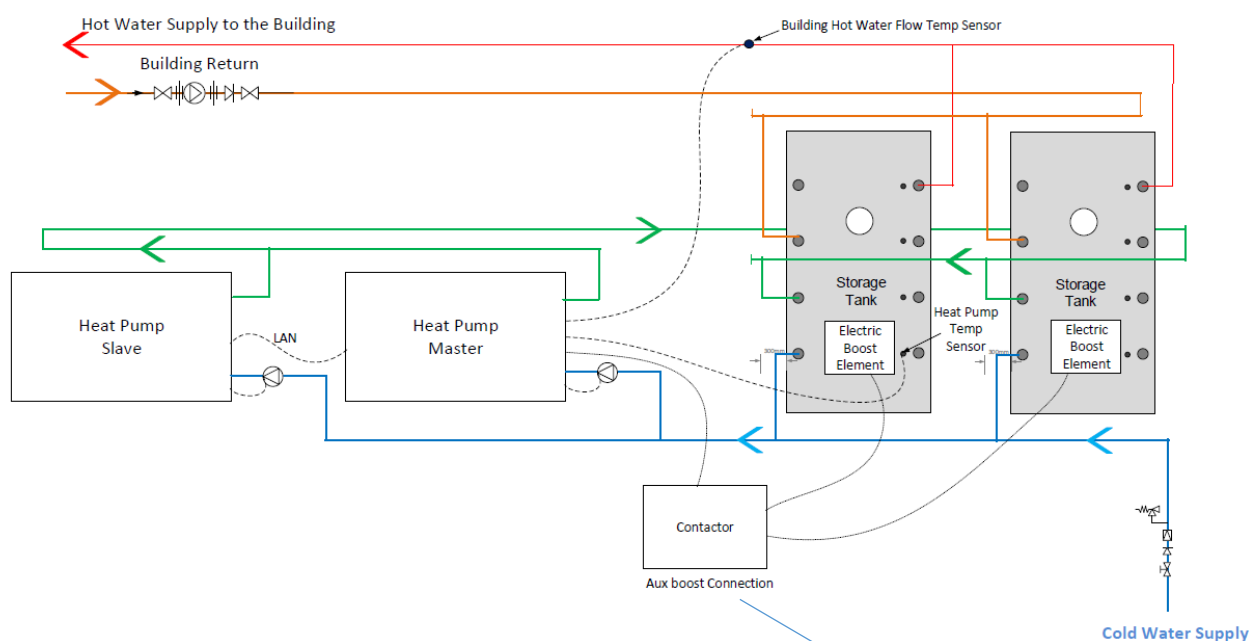
b) HP as Master/Slave with in tank HU aux boost



Notes:

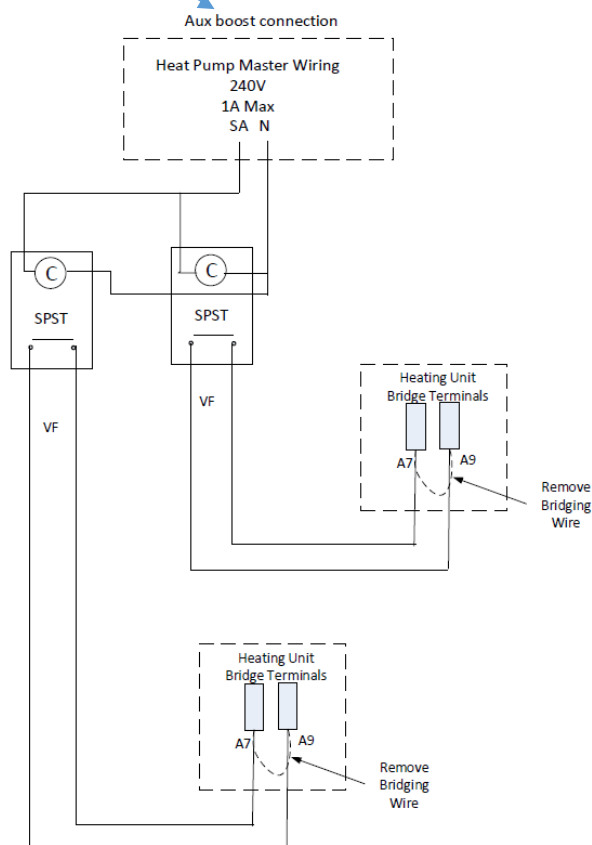
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- All HP will operate as a single unit. Note: there may be a slight delay between HP on start up
- The auxiliary boost should be set to 60°C.
- Power for each heating unit is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

c) HP as Master/Slave with Multiple in tank HU aux boost bottom flange controlled by HP

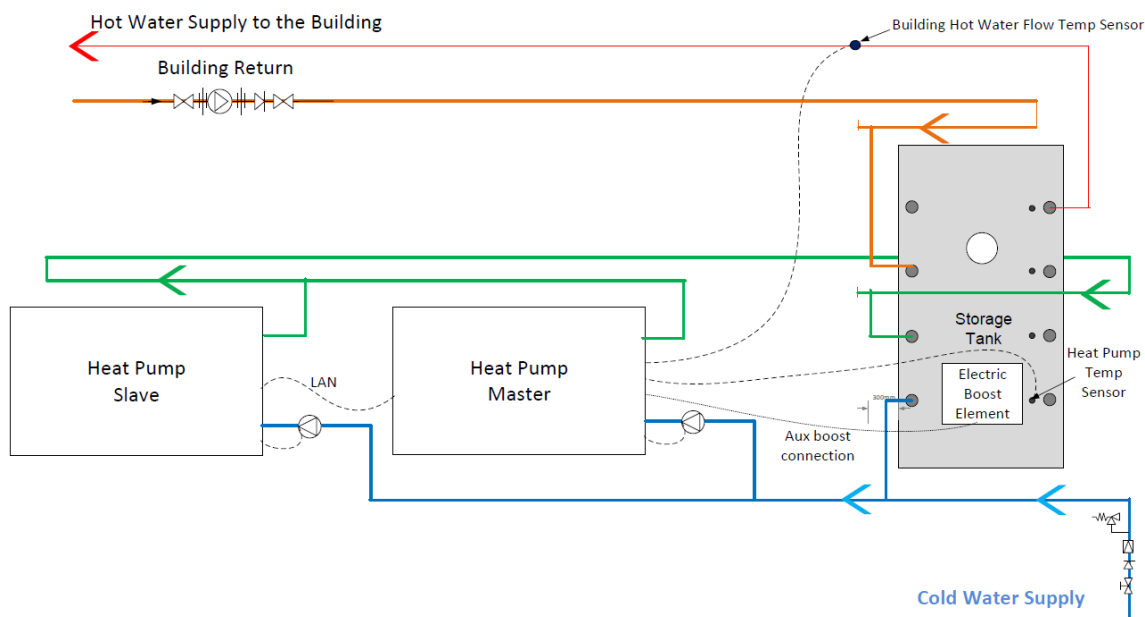


Notes:

- This configuration is useful where the number of tanks/heating units does not equal the number of heat pumps. The number of tanks and heating units must be matched.
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- All HP will operate as a single unit. Note: there may be a slight delay between HP on start up
- The auxiliary boost heating units will operate in two scenarios-
 - If 50% or more heat pumps are in fault. All auxiliary boost heating units will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. All auxiliary heater will operate and remain active until the air temperature reaches 7°C.
- The auxiliary boost should be set to 60°C.
- Power for each heating unit is supplied separately.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

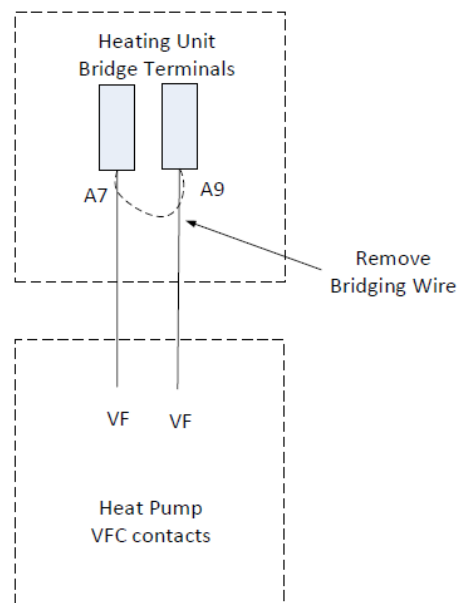


d) HP as Master/Slave with 1 x in tank HU aux boost bottom flange controlled by HP

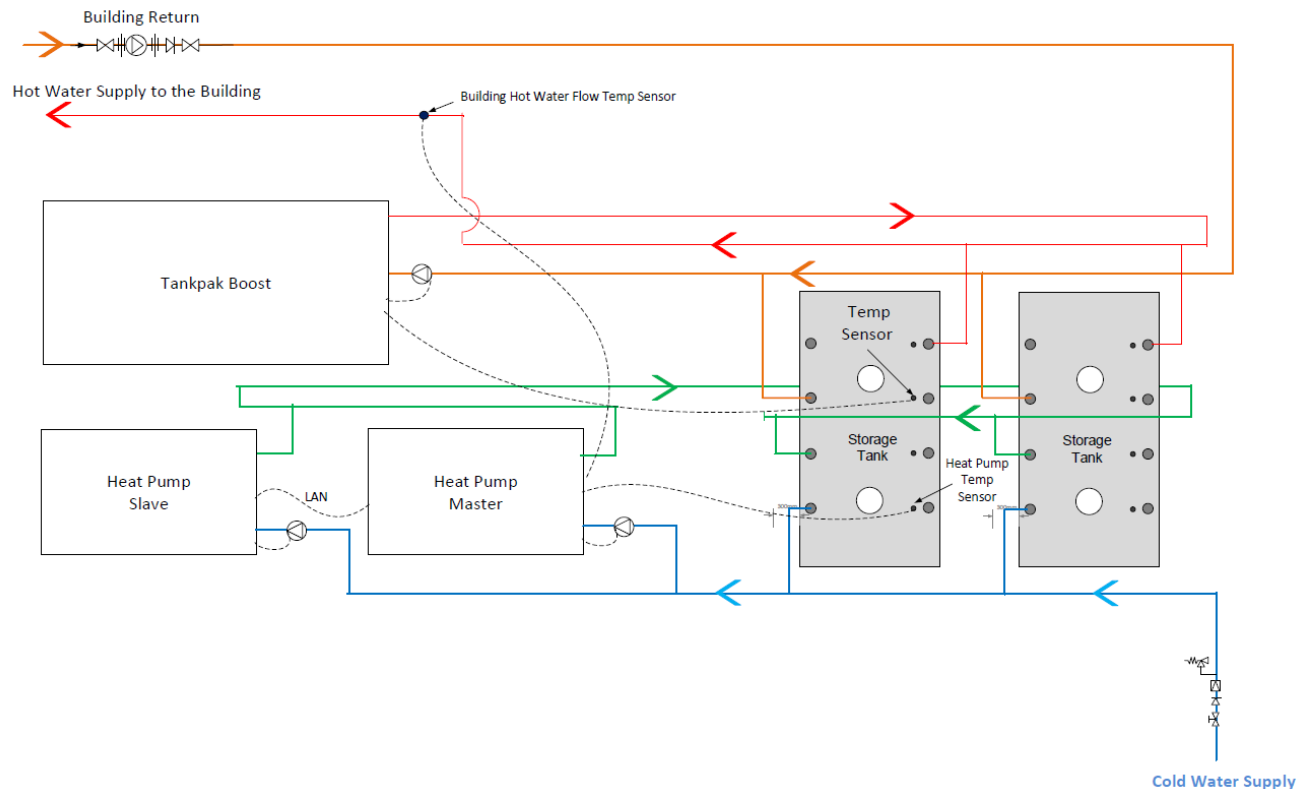


Notes:

- This configuration is useful where the single tank/heating unit is available for the number of heat pumps. The number of tanks and heating units must be matched.
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- All HP will operate as a single unit. Note: there may be a slight delay between HP on start up
- The auxiliary boost heating unit will operate in two scenarios-
 - If 50% or more heat pumps are in fault. The auxiliary boost heating unit will operate until the set temperature is reached.
 - If ambient temperature falls below 5°C. The Auxiliary boost heating will operate and remain active until the air temperature reaches 7°C.
- The auxiliary boost should be set to 60°C.
- Power for heating unit is supplied separately.
- Refer to the 'Rheem Air to Water Heat Pump Applications Guideline' procedure for Multiple HP with LAN as Master/Slave and board connections on **page 30**.
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.



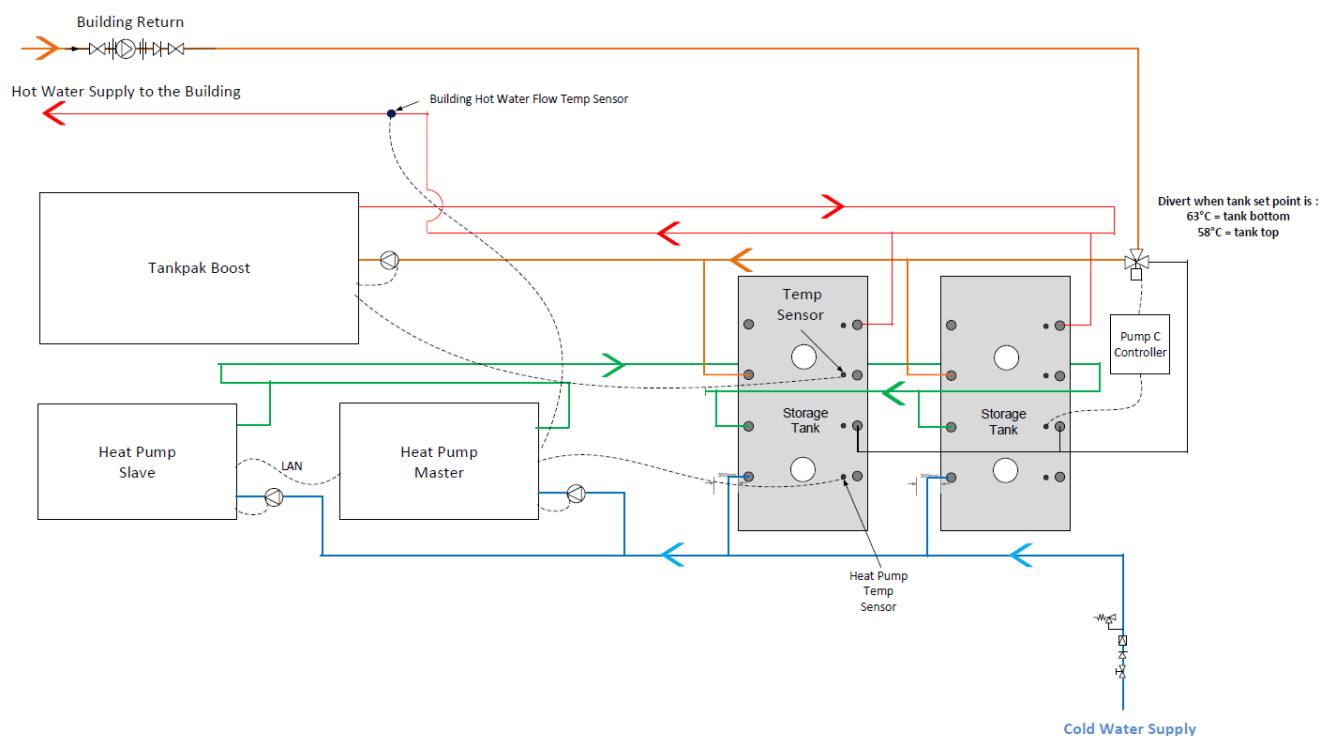
e) HP as Master/Slave with in tank Tankpak aux boost without diverter valve



Notes:

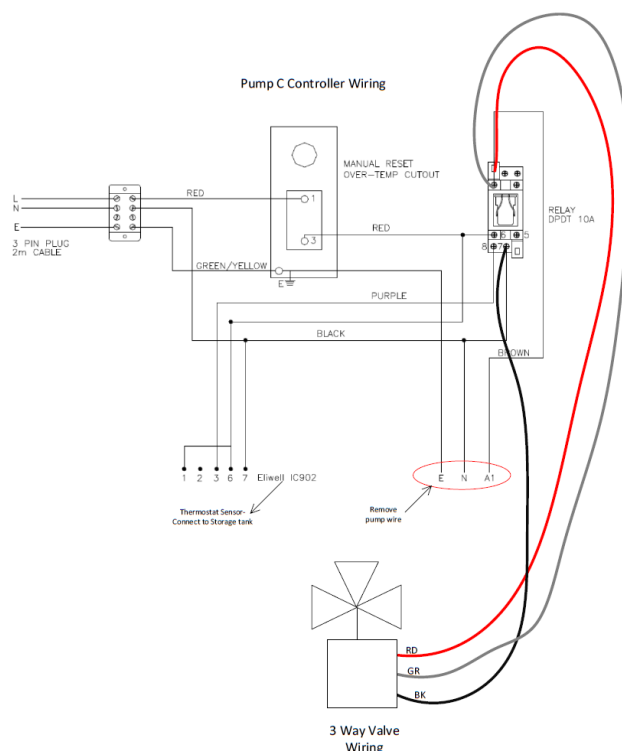
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- The auxiliary boost should be set to 60°C.
- Power for auxiliary boost is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

f) HP as Master/Slave with in tank Tankpak aux boost with diverter valve

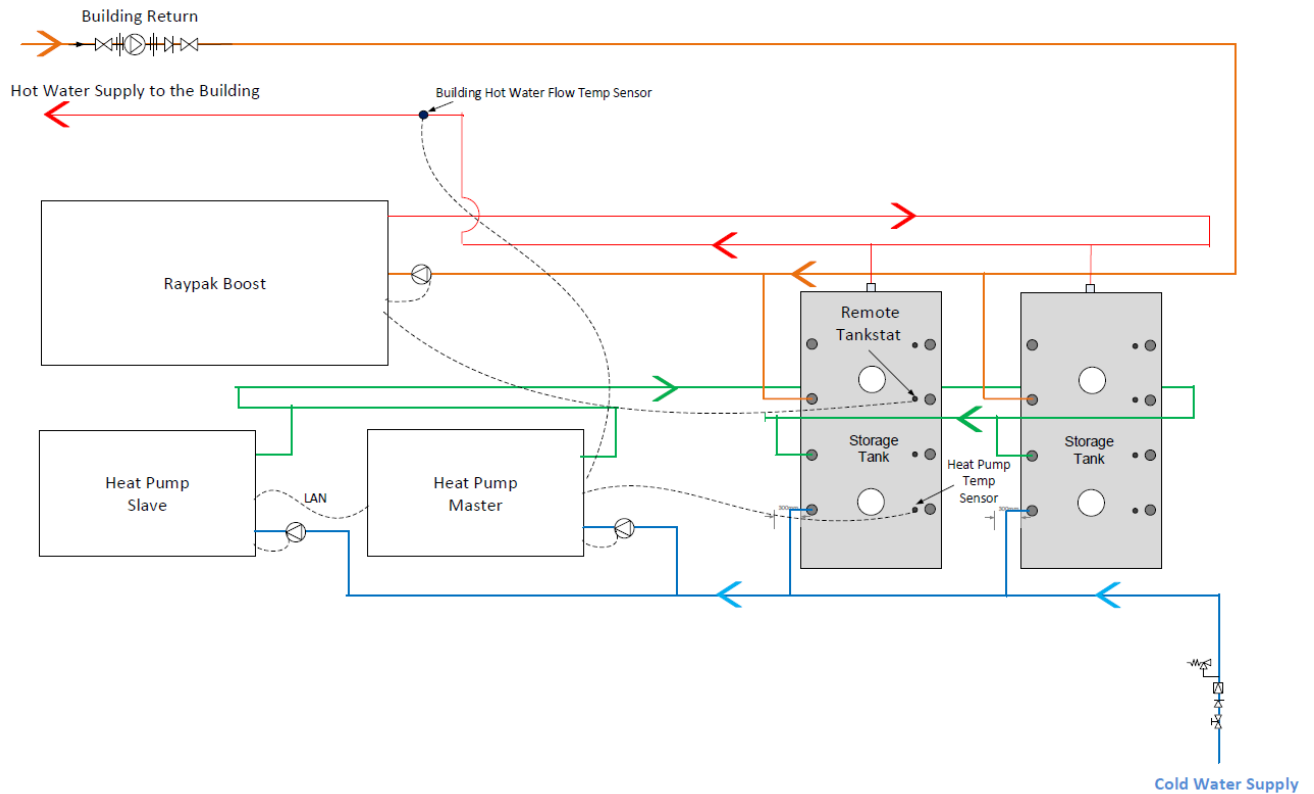


Notes:

- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- The auxiliary boost CFWH should be set to 65°C. The Tankpak controller should be set to 60°C with a 3K differential.
- The Pump C controller should be set to divert water to the top of the tank when the set point is 63°C and to the bottom of the tank when the set point is 58°C, ie 5K differential.
- Power for auxiliary boost is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on **page 30.**
- Refer to the 'Owners Guide and Installation Instr



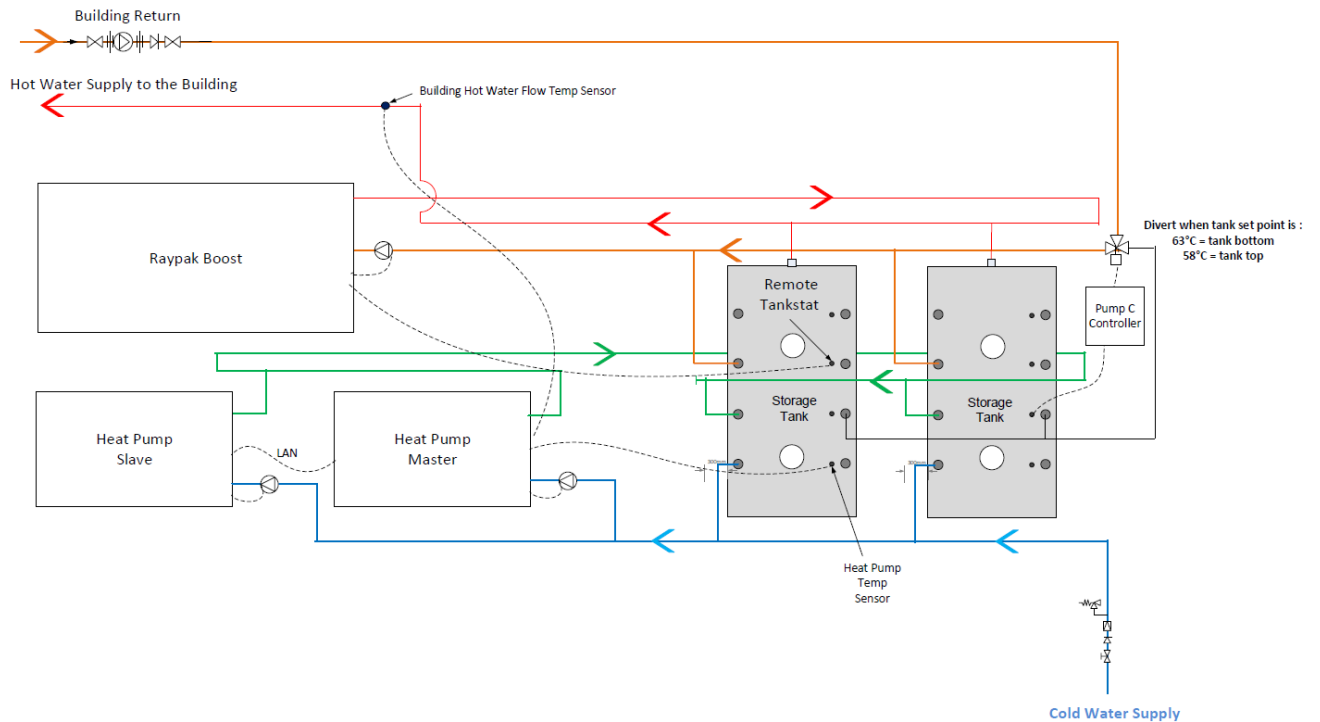
g) HP as Master/Slave with in tank Raypak aux boost without diverter valve



Notes:

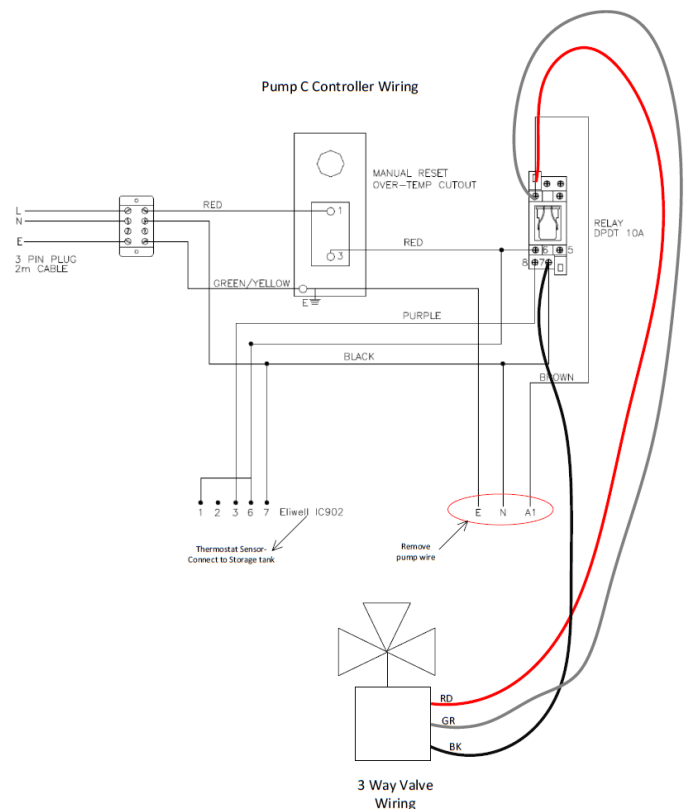
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- The auxiliary boost should be set to 60°C.
- Power for the auxiliary boost is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on **page 30**.
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

h) HP as Master/Slave with in tank Raypak aux boost with diverter valve

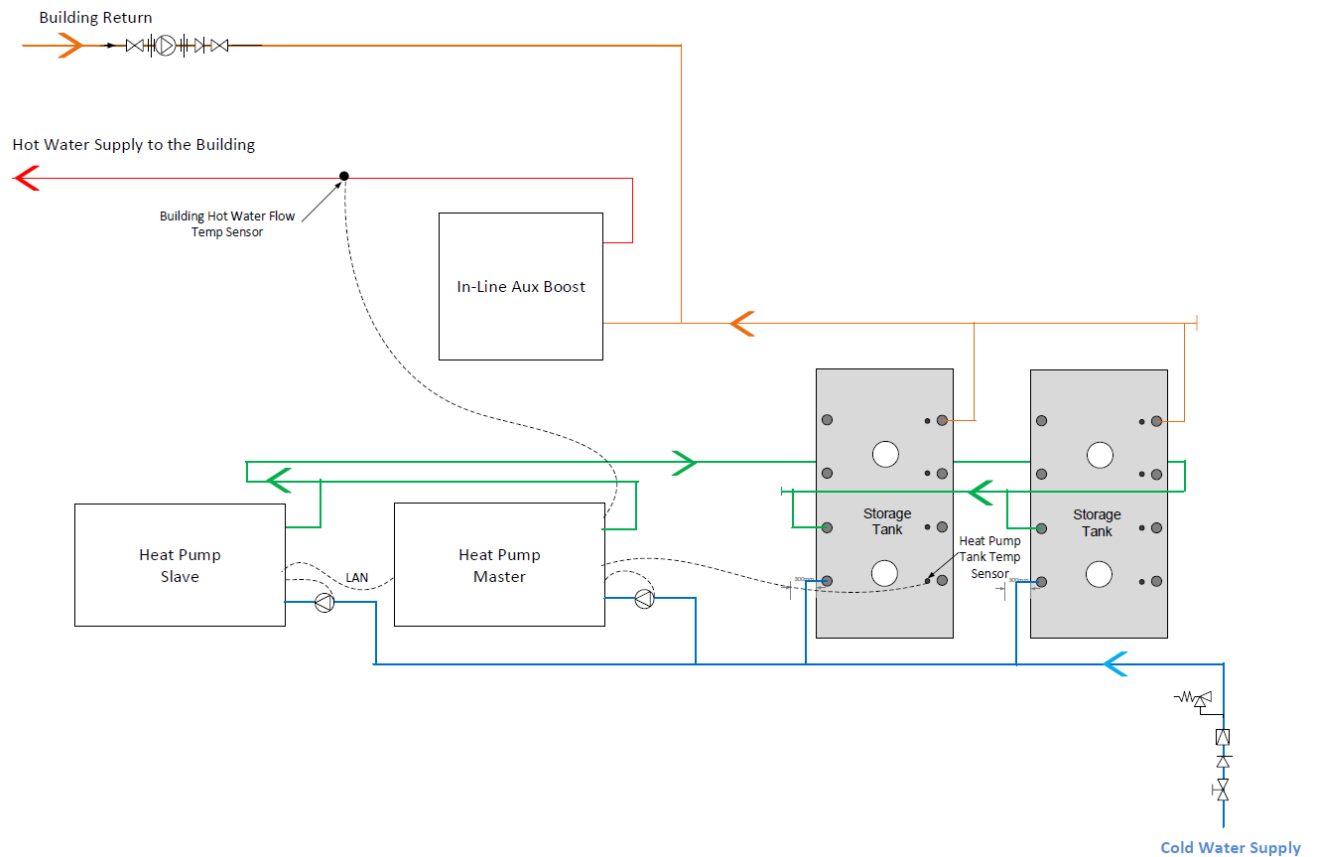


Notes:

- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and the HP will not operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- The auxiliary boost should be set to 60°C.
- Power for each heating unit is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.



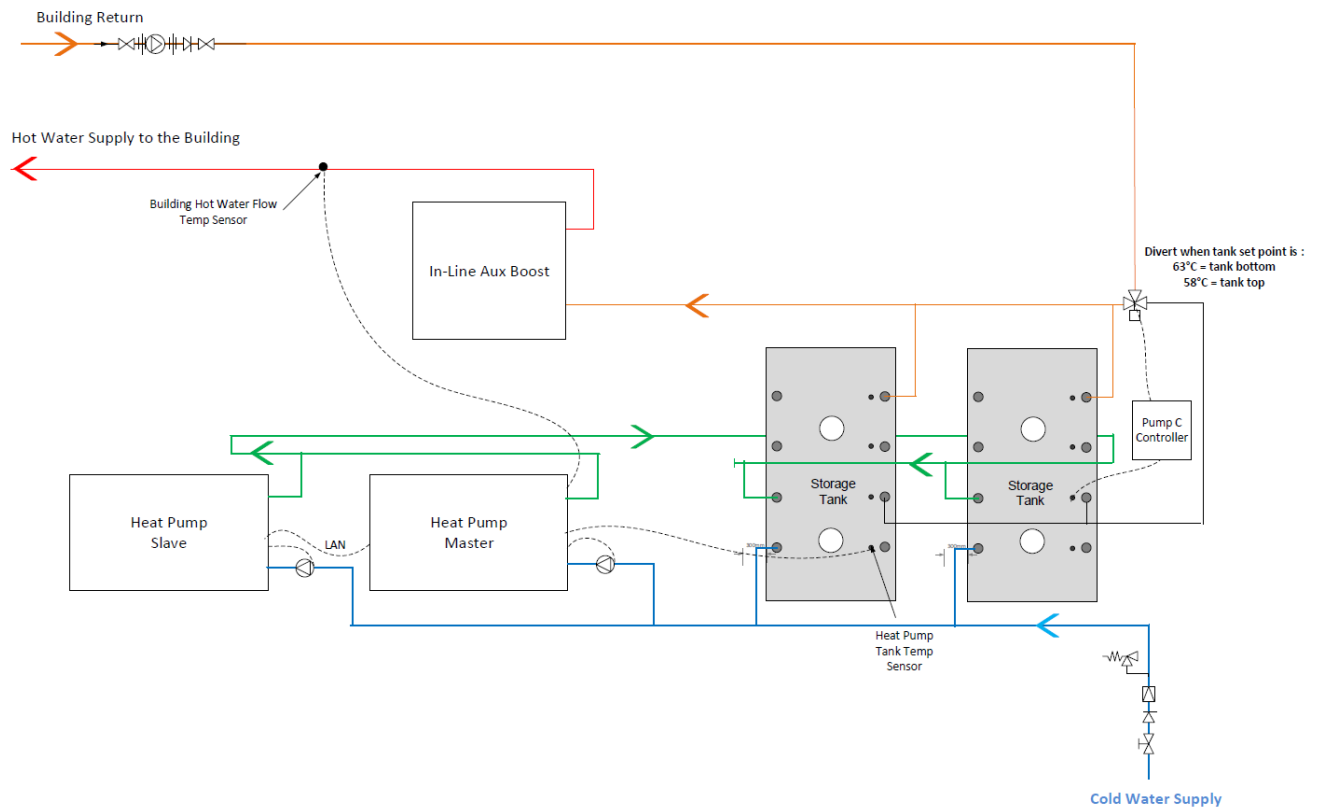
i) HP as Master/Slave with in line aux boost without diverter valve



Notes:

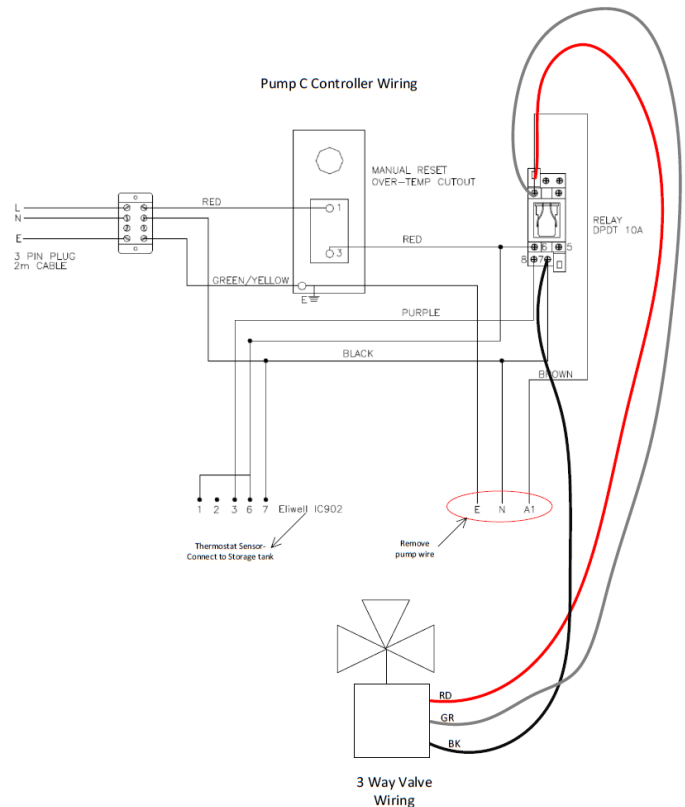
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- The auxiliary boost should be set to 60°C.
- Power for the auxiliary boost is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.

j) HP as Master/Slave with in line aux boost with diverter valve



Notes:

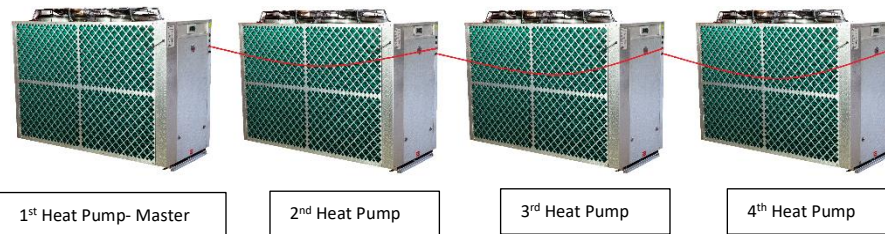
- Master HP temperature sensor must be connected and fitted to a tank otherwise an error message will be displayed and no HP will operate.
- Master HP building flow temperature sensor must be connected, otherwise an error message will be displayed.
- The auxiliary boost should be set to 60°C.
- Power for the auxiliary boost is supplied separately.
- Operation of auxiliary boost is totally independent of the heat pump.
- Refer to the procedure for Multiple HP with LAN as Master/Slave and board connections on [page 30](#).
- Refer to the 'Owners Guide and Installation Instructions' for commissioning procedure.



8. Multiple HP with LAN as Master/Slave and board connections

Up to four heat pumps can be interconnected by daisy chaining the LAN cables for operation as shown below. LAN cable is available as an accessory (part number: 17534).

Step 1:



Interconnect the heat pumps as shown above by using the LAN cables. Determine the 1st heat pump as Master. Route the cables neatly to prevent damage and trip hazards. Do not route across access panels.

Note: Any of the two LAN connections on the heat pump will be acceptable.

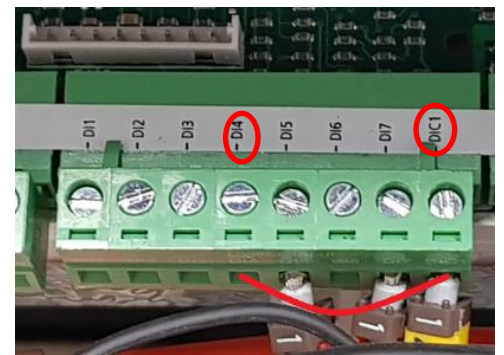
Step 2:

In 2nd heat pump enclosure: Connect “DI3” with “DIC1”. Connect “DIC1” with the existing wire as shown in the picture.

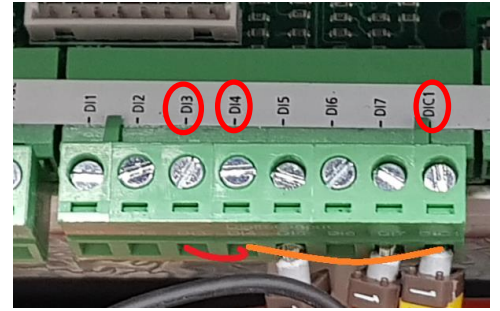
Note: Terminal plug can be removed for ease of making connections by pulling downwards as shown in the picture.



In 3rd heat pump enclosure: Connect “DI4” with “DIC1”. Connect “DIC1” with the existing wire as shown in the picture.



In 4th heat pump enclosure: Connect “DI3” with “DI4” and “DIC1”.
Connect “DIC1” with the existing wire as shown in the picture.



Note

- Tank temperature sensor for the Master heat pump must be connected, otherwise an error will be shown the heat pumps will not operate due to fault. There is no need to connect tank temperature sensors for Slave heat pumps.
- Building temperature sensor for the Master heat pump must be connected otherwise an error will be shown. There is no need to connect building temperature sensors for Slave heat pumps.
- Ignore the values for tank and building temperature sensors on the display of Slave heat pumps as these are not connected.

9. Multiple HP with BMS

Heat pumps can be connected to a BMS or BAS system via interface cards (Modbus or BACnet), available as an accessory.

Based on site requirement, a suitable interface card needs to be connected to Rheem IQ control panel as shown in the diagram below.



a) Multiple standalone heat pumps without LAN

- If the system is comprised of single or multiple standalone heat pumps, each heat pump will have its own BMS card.
- Insert the BMS card into the connector for each heat pump, taking care that the card is firmly placed as shown in red circle.

b) Multiple heat pumps with LAN as Master/Slave

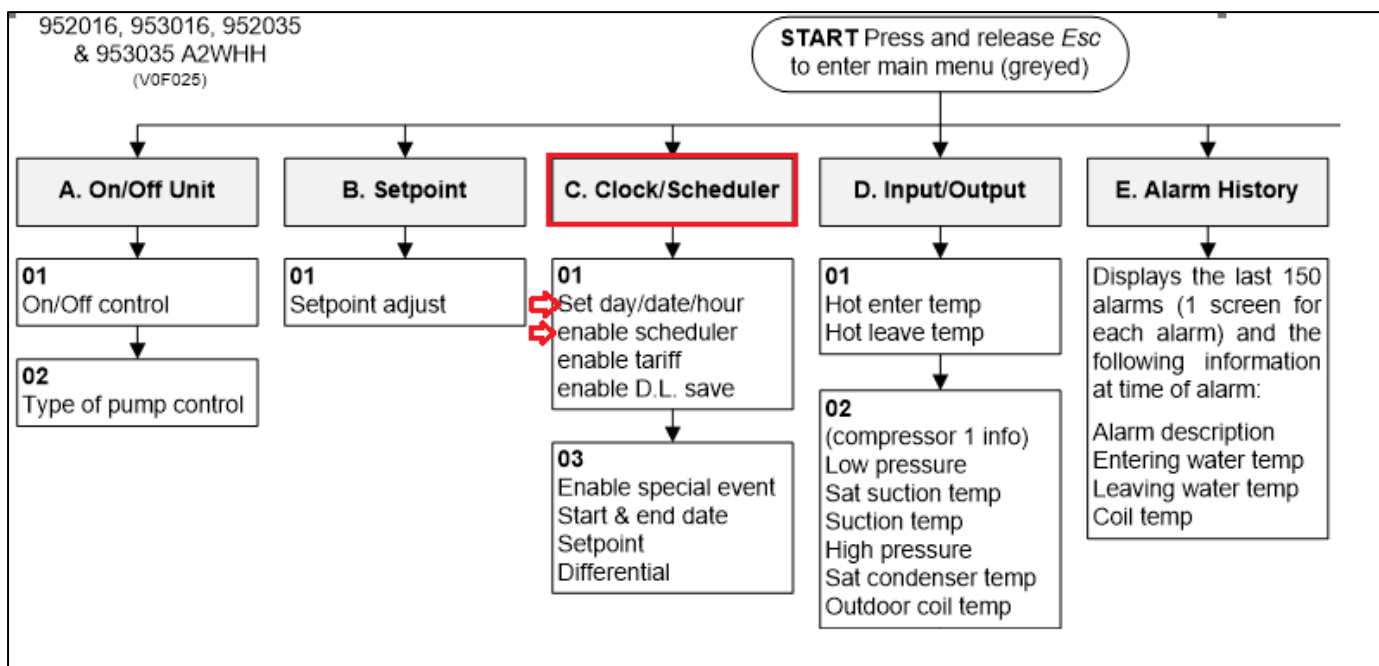
- If the system is comprised of multiple heat pumps for Master/Slave operation, only master heat pump will have a BMS card and the slave heat pumps will be connected via LAN cables.
- Follow the instruction on [page 30](#) for Interconnecting Multiple Heat Pumps from step 1 to step 2.
- Insert the BMS card into the connector for master heat pump, taking care that the card is firmly placed as shown in red circle.

10.Heat Pump with Clock Scheduler Control

When the controller has been programmed and enabled for scheduler control, the heat pump will operate according to the programmed scheduler ON and OFF time periods provided the heat pump is manually turned ON by the keypad.

Note: The current date and time must be set correctly for the heat pump to be able to operate according to scheduler time periods.

- After commissioning the heat pump, go to Main menu (Main menu>Clock Scheduler>Set day/date/hour) and set current date and time.



- Next, go to 'enable scheduler' and set to "Yes".
- Then go back to the Main Menu and go to Clock Scheduler again.
- Press 'Down' arrow to go to the next page and set the desired schedule to turn ON and OFF the heat pump.



For example: MON 07:00 to 17:30 would represent an ON time of 7:00 am and an OFF time of 5:30 pm on Mondays. Only one ON and OFF time can be set for each day.

