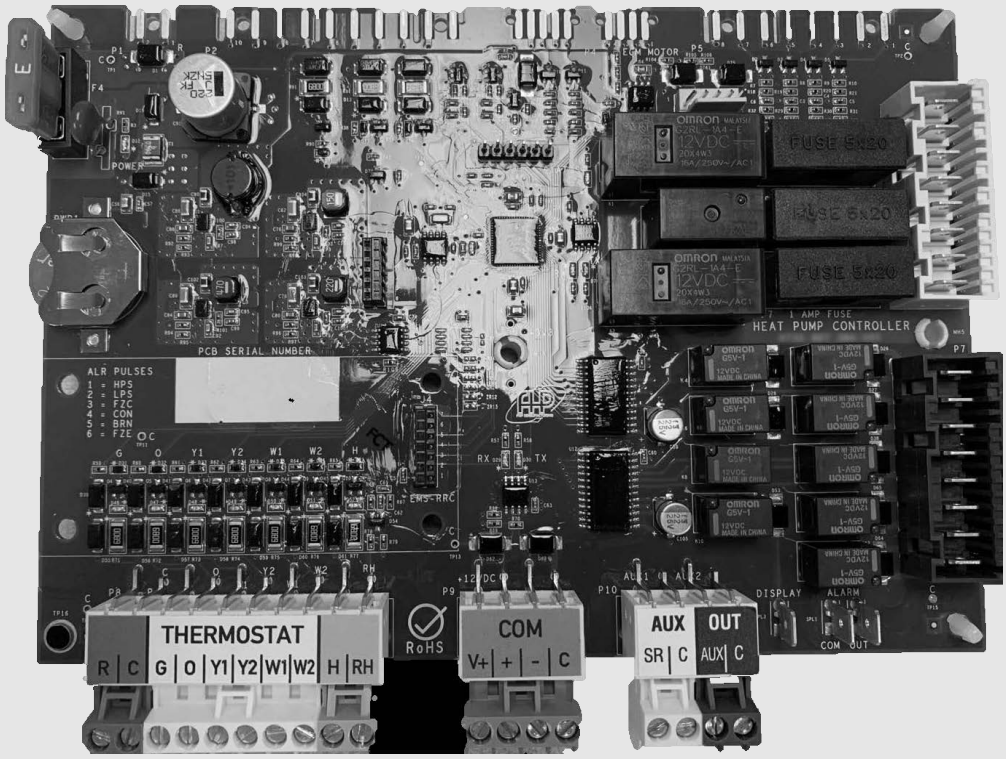


HPC

Heat Pump Controller

BOSCH

Installation, Operation, and Maintenance Manual

8733832999 (2022/07)

CONTENTS

DOCUMENT CONVENTIONS

Key to Symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a gray background. Keywords at the start of the warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- **DANGER** indicates a hazardous situation that, if not avoided, will result in death or serious injury.
- **WARNING** indicates a hazardous situation that, if not avoided, could result in death or serious injury.
- **CAUTION** indicates a hazardous situation that, if not avoided, could result in minor to moderate injury.
- **NOTICE** is used to address practices not related to personal injury.

Important Information

This symbol indicates important information where there is no risk to property or people.

SAFETY WARNINGS

IMPORTANT: Read the entire instruction manual before starting installation.

DANAGER: **PERSONAL INJURY HAZARD**
Installation and servicing of this equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service the equipment.

DANGER: ELECTRIC SHOCK
Before performing service or maintenance operations on the system, turn off main power to the unit. Electrical shock could cause personal injury or death.

WARNING: PERSONAL INJURY HAZARD
This product can expose you to chemicals including Lead and Lead components, which are 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.

CAUTION: PERSONAL INJURY HAZARD
When working on equipment, always observe precautions described in the literature, tags, and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing, and place a fire extinguisher close to the work area.

INTRODUCTION

Product Description

The Heat Pump Controller (HPC) as shown in Fig. 1, is a Printed Circuit Board Assembly (PCBA) that interfaces with the thermostat to ensure desired functionality. It is designed to protect the condenser coil, evaporator coil, compressor, and blower motor by monitoring different states of its switches and sensors.

This device provides time delays to prevent the system from operating under extreme and potentially hazardous conditions. The HPC provides useful information to service personnel for diagnosing unit operating conditions and faults when they arise via the Bosch EasyStart app interface.

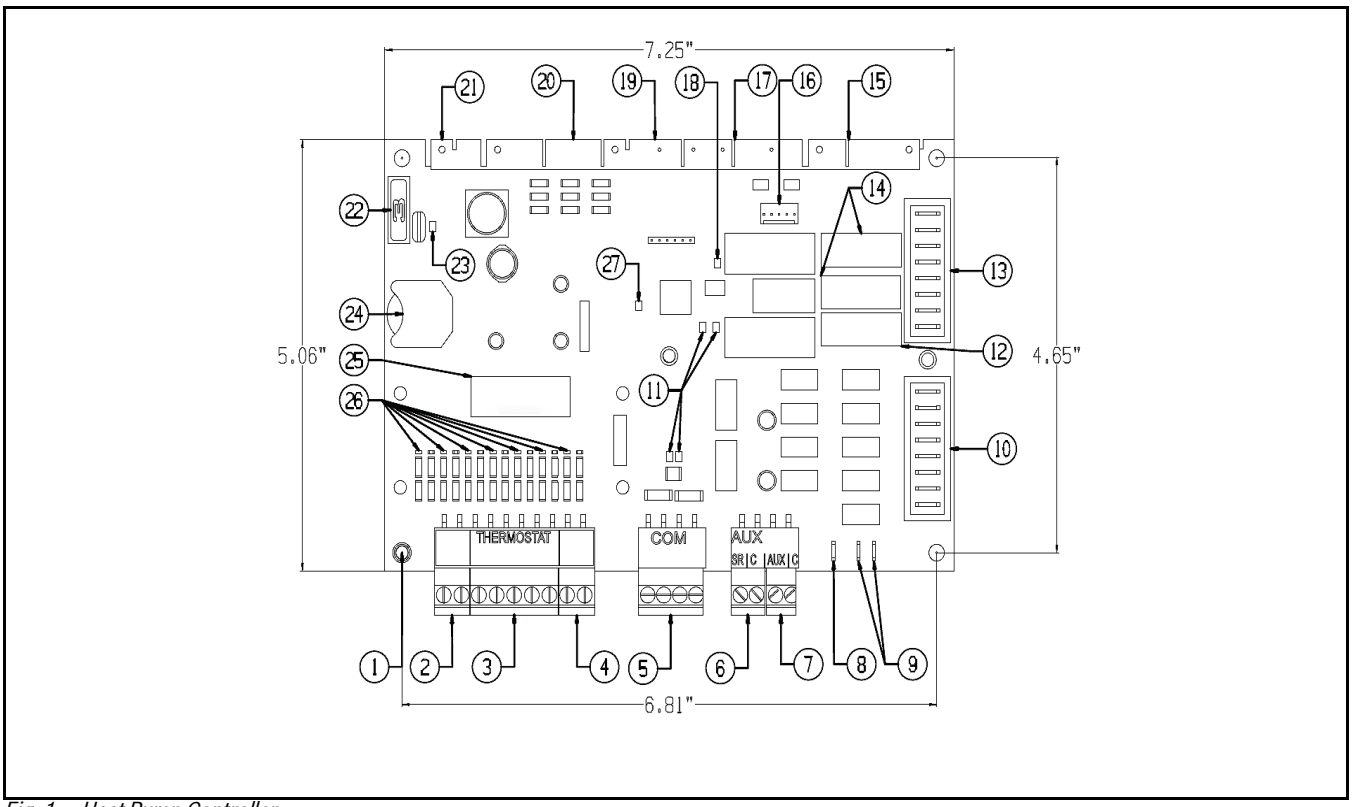


Fig. 1 Heat Pump Controller

Item No.	Description
1	HPC Ground Standoff
2	Thermostat Power Source
3	Thermostat Control Signals
4	Humidistat Control Signals
5	Comm Port RS 485
6	Electric Heat 1 Output
7	Electric Heat 2 Output
8	Display Output
9	Alarm Output (Dry N.O.)
10	Heat Pump Control Output
11	COMM Port Status LEDs
12	HRP Fuse (1 AMP)
13	High-Voltage Pump Outputs
14	Loop Pump Fuses (5 AMP)
15	P5 Termistor Input Plug

Item No.	Description
16	Wi-FI Service Port
17	P4 ECM Motor Control Plug
18	Unit Status LED
19	P3 HRP Termistor Plug
20	P2 Heat Pump Safety Plug
21	P1 24VAC Power Supply Plug
22	Class II Voltage Fuse (3 AMP)
23	Power Status LED
24	Backup Battery (CR2032)
25	PCB Serial Number
26	Thermostat Control Signal LEDs
27	Heartbeat LED

Table 1 Available Fault Snapshots

Bosch EasyStart App

The Bosch EasyStart app is a digital interface that allows access to information from the HPC making commissioning, configuring, and troubleshooting easier. This application is available in the Google Play Store, the Apple App Store, as well as the Bosch Pro HVAC website (www.boschprohvac.com). Search for “Bosch EasyStart” in the appropriate store for your device to download and launch the app. Once launched, navigate through the legal information, and then the user guide displays, explaining how to connect the App and the heat pump, as well as how to explore the features of the Bosch EasyStart app.

The Bosch EasyStart app will only work on the following devices: Android tablets with Android 4.0 operating system or higher, Apple iPads with iOS 8 or higher, and Windows 7.0 or higher laptops/PCs. It is recommended to always use the latest operating system for your device.

For more information refer to the website list in the Bosch EasyStart app IOM.

Features

Thermostat (24VAC Rated) Digital Inputs

- Fan call (G) signal
- Reversing valve (O) signal
- Compressor Stage One (Y1) signal
- Compressor Stage Two (Y2) signal
- Electric heat Stage One (W1) signal
- Electric heat Stage Two (W2) signal
- Electric heat Emergency (W2/EM) signal
- Dehumidification call (H) signal

Analog Inputs

The following sensors are Type II (10 KΩ @ 77°F) thermistors:

- Freeze Coax Sensor (FZC)
- Freeze Evaporator Sensor (FZE)
- Discharge Air Temperature (DAT)
- Return Air Temperature (RAT)
- Entering Water Temperature (EWT)
- Leaving Water Temperature (LWT)
- Discharge Refrigerant Temperature (DRT)
- Domestic Water Temperature (DWT)

For Type II (10 KΩ@ 77°F) thermistor temperature curve, refer to Fig. 12 and Table 9.

Digital Outputs (Rated 24VAC)

- Compressor 1st step control (CC1)
- Compressor 2nd step control (CC2)
- Reversing valve control (RV)
- Auxiliary Output1 Aux Heat control (AUX1)
- Auxiliary Output2 Aux Heat control (AUX2)
- Alarm purposes dry contact normally open (NO) (Pulse or Constant) (ALM)

Digital Outputs (Rated 208/230 VAC)

- Loop valve/pump control (5 Amp Max)
- Heat recovery pump control (3 Amp Max)

Blower Control Output

PWM 24VDC 80Hz

Service Communications (COMM) Ports (RS-485)

J1 WiFi

Visual Status LED Indicators

- Power status indication
- Alarm status indication
- Controller heartbeat indication
- Thermostat demand indication
- RS-485 RX/TX indication

Voltage Protection

- Surge and transient protection circuitry
- Brownout protection mode

Safeties Monitoring

- High Pressure Switch (HPS)
- Low Pressure Switch (LPS)
- Monitoring of multiple sensors

Certification

ETL 101071399CRT-011

Field Updates

The HPC software can be updated in the field via the Bosch EasyStart app.

Specifications

Power

24 VAC ± 25%, 50-60 Hz, 2 VA of standby power consumption (single class II 75 VA or 100 VA option available).

Physical Description

Printed circuit board and plastic standoffs

Environmental Operating Range

-40°F to 176°F (-40°C to 80°C); 10% to 90% relative humidity, non-condensing. All controls are conformal coated for environmental protection.

Weight

0.54 lbs. (0.25 Kg)

Overall Dimensions

- 7.25" (width) by 5.06" (height) by 3" (recommended panel depth)
- 184mm (width) by 129mm (height) by 76mm (recommended panel depth)

Mounting Hole Dimensions

Four (4) mounting holes in rectangular pattern with dimensions between them as follows:

- 6.81" (width) by 4.65" (height).
- 173mm (width) by 118mm (height).

DANAGER: ELECTRIC SHOCK

CHASSIS GROUND

Ensure metal standoff is properly secured to the chassis of the unit through a fastener. The HPC will obtain a chassis ground by way of a metal standoff connected to both the (C-GND) and (C) terminals of the Printed Circuit Board (PCB). Improper grounding could result in potential electrical shock and/or Equipment malfunction. Electrical shock could cause personal injury or death.

Loop Pump Control (former Pump Valve Relay Kit)

A loop pump control relay has been integrated into the HPC board. The loop pump control can be used to energize a field-installed pump or solenoid valve when there is a call for compressor operation. This loop pump control relay is used to switch 208/240 VAC signals ON/OFF (depending on the supply voltages).

NOTICE: The loop pump control relay output is 208/240 VAC at 5 A; ensure the pump or valve being connected is rated to this specification.

UNIT CONFIGURATION

Settings

The Bosch EasyStart app is used to configure available features of the HPC as follows:

HPC Settings		Default Settings
Freeze Protection Strategy	15°F–26°F	26°F
Cooling CFM per TON	300–450	400 CFM/Ton
Heating CFM per TON	300–450	375 CFM/Ton
Fan Only CFM reduction	50–100%	80%
Dehumidification CFM reduction	15–40%	15%
Heat Recover Package	Enabled or Disabled	Disabled
Heat Recovery Setpoint	110°F–140°F	120°F
Heat Recovery Sample Rate	2–6 Samples/Hr	3 Samples/Hr
Electric Heat Size	None, 5kW, 10kW, 15kW, 20kW	None
Low Loop Water Protection	Enabled or Disabled	Disabled
Low Loop Control Setpoint	20°F–50°F	34°F
Loop Pump Compressor Delay	30–240 seconds	30s
Mode of Compressor Operation	Comfort or Economy	Comfort
Down-Staging	Latched or Unlatched	Unlatched
Number of Lockouts	2–4 Strikes	3 Strikes
Lockout Reset	(Y1) signal or (R)	(Y1)
Units of Temperature	°F or °C	°F
Alarm Type	Constant or Pulse	Pulse
Date	MM/DD/YYYY	
Time	HH:MM	
High Efficiency Mode	Enable or Disabled	Disabled
Compressor Runtime Reset	Write Only	
Model Number (from the Unit Data Plate)	SM036-1VTC-FRTADC-CMGXXXXXD7HXXX4XXXXSNA	
Serial Number (from the Unit Data Plate)	1234-567-891011-1213141516	

Table 2 HPC Settings

Refer to the “Updating the Firmware and Configuring Unit Settings” section on page #26 for details on accessing these settings.

NOTICE: Keep the HRP configuration setting set to disabled if there is no domestic water supply available.

Alarm Mode

The HPC has a fault alarm that can be configured (via the Bosch EasyStart app) as constant or pulsed. Constant configuration will energize and latch the alarm output. The pulse alarm setting will allow the alarm relay to pulse the alarm in sync with the status LED indicator.

To exit a hard lockout, power must be reset at the (Y) terminal (factory setting) or (R) terminal (configurable via the Bosch EasyStart app). The alarm, display, and status LED indicator outputs should only pulse the latest fault. Once the latest fault is cleared, the HPC will pulse for any remaining faults recorded.

Refer to “Alarm Terminal Wiring” on page #34.

Configurable Hard Lockout

The controller can be configured from two to four faults for a hard lockout condition (configurable via the Bosch EasyStart app). If the controller senses the same fault for the number of times configured within one hour from the first fault, the controller will enter a hard lockout. Example: When configured to four strikes, if the control experiences four of the same faults within one hour then the controller will enter a hard lockout.

Clearing a Hard Lockout

To clear a hard lockout condition, power to the (R) terminal may be reset at the circuit breaker panel, or the heat/cool call to the (Y1) terminal may be reset from a connected thermostat (default). The HPC can be configured for either reset option using the Bosch EasyStart app.

Fan Motor

The installer can modify the total Cubic Feet per Minute (CFM)/Ton via the Bosch EasyStart app as shown in the table below.

State	Max Installer CFM per Ton	Min Installer CFM per Ton	Step	Installer CFM Default
COOLING	450	300	25	400
HEATING	450	300	25	400

Table 3 CFM Configure

The controller calculates the required flow rate (CFM) based on the unit’s model and size. The controller has a cooling CFM/Ton lower limit of 270. If effective CFM is lower than this value, the controller will override the effective CFM with the verified CFM preventing it from being lower than 270 CFM/Ton. The cooling verified CFM will apply to the cooling and the dehumidification modes of the operation.

The controller has a heating CFM/Ton low limit of 400 for electric heat operation. If the effective CFM is lower than this value the controller will override the effective CFM with the verified CFM value and latch it to 400 Cubic Feet per Minute (CFM)/Ton. The controller has a “Most Efficient Mode” configuration. The function of this is to enable the unit to run at the most efficiently-rated CFM values as tested in our labs.

Fan Motor Table

The Fan motor is specified in the third and fourth digits of the code string nomenclature.

- SM024 = 2 Ton 2-step unit
- SM036 = 3 Ton 2-step unit
- SM048 = 4 Ton 2-step unit
- SM060 = 5 Ton 2-step unit
- SM070 = 6 Ton 2-step unit

SYSTEM OPERATION

Timers and Faults

Random Start-Up Delay (Power)

This delay prevents multiple units sharing the same electrical circuit or network from starting at the same time. It ensures that the Heat Pumps connected to the same electrical circuit do not demand a high inrush of current simultaneously when starting up after a power failure. The random start time delay is in the range of 200–300 seconds. In test mode, the random start time delay is reduced to 10 seconds. Random Start-Up delay only runs during start up or after power has been completely removed. It does not take effect after a brownout condition.

Test Mode

Test mode decreases all delay timers to 10 seconds. Test mode is only for testing purposes and serves no function to the end user of the equipment. In test mode, the alarm relay and display relays will pulse during both soft lockout and hard lockout. If a soft lockout alarm is cleared, both relays will stop pulsing. The controller will exit test mode after 20 minutes or upon a power cycle.

The test mode command can only be set via the Bosch EasyStart app.

If the controller is set to “TEST” mode via Bosch EasyStart app, the safety delays will be reduced to 10 seconds. The controller will automatically exit test mode after 20 minutes.

Anti-Short Cycle Delay (ASC)

This feature protects the compressor from short cycling if the (Y1) call is removed and set or if a refrigerating circuit level fault is sensed to the point that the compressor shuts down. The ASC is 300 seconds during normal operation and 10 seconds in test mode. The ASC will not be in effect during a Random Start-Up delay.

Snapshot Record

The controller constantly monitors all thermostat sensors and thermostat demand values. The controller also has an additional feature where the latest fault snapshot will be saved to the controller. When a new fault occurs the snapshot will be saved and overwrite the previous snapshot. The following faults in the table below will be available in the snapshot record.

Available Fault Snapshots
High-Pressure Hard Lockout Fault
Low-Pressure Hard Lockout Fault
Freeze Coaxial Hard Lockout Fault
Condensate Overflow Hard Lockout Fault
Brownout Voltage
Freeze Evaporator Hard Lockout Fault
Freeze Evaporator Temp Sensor Open
Freeze Coaxial Temp Sensor Open
Freeze Evaporator Temp Sensor Open
High Leaving Water Temperature Fault
Fan Motor Hard Lockout Fault
Fan Motor Soft Lockout Fault
Freeze Evaporator Soft Lockout Fault
Freeze Coaxial Soft Lockout Fault
High-Pressure Soft Lockout Fault
Low-Pressure Soft Lockout Fault

Table 4 Available Fault Snapshots

Sequence of Operation

Cooling Mode

Energizing the “O” terminal energizes the unit reversing valve thus placing the unit into cooling mode. The fan motor starts when the “G” terminal is energized.

The fan motor will take 30 seconds to ramp up to operating speed and will run at fan only rated air flow as long as there is no call for compressor or heater operation.

When the thermostat calls for first-stage cooling (Y1) the loop pump or solenoid valve, if present, is energized and the first stage of the compressor capacity starts. The fan ramps up to the first stage of cooling air flow in 30 seconds.

Some options will have a built in delay, so compressor operation is not immediate.

When the thermostat calls for second-stage cooling (Y2) the second stage (or full compressor capacity) is initiated. The fan ramps up to full cooling air flow.

Once the thermostat is satisfied, the compressor shuts down and the fan ramps down to either fan-only mode or off over a span of 30 seconds.

Note that a fault condition initiating a lockout will de-energize the compressor irrespective of which stage is engaged.

Heating Mode

The first two stages of heating (Y1 & Y2) operate in the same manner as cooling but with the reversing valve de-energized. On a call for auxiliary heat (W1), the fan ramps up to auxiliary heat air flow immediately and the electric heater package is energized along with the compressor.

As the thermostat is satisfied, the heaters will shut off as soon as W1 is de-energized, and the compressors will remain on until the thermostat stages are satisfied.

If the unit compressor locks out for any reason at this time, the electric heaters will continue to function normally.

Once the thermostat is satisfied, the compressor shuts down and the fan ramps down either fan-only mode or off over a span of 30 seconds. If the thermostat has two different output points, one for Auxiliary Heat and a different one for Emergency Heat the two outputs must be terminated on W1 units equipped with one stage of electric heat.

When using a 2-cool, 3-heat thermostat both the W1 & W2 on the Heat Pump and W2 & EM on the thermostat must be connected together via a jumper.

Fan Operation

The fan starts anytime the fan command signal (G) or a demand for cooling/heating is received on the thermostat interface block. The fan will run at its minimum factory speed of 80% in fan-only mode. The fan remains on during lockouts if there is a demand from the thermostat. The fan motor will take 10 seconds to ramp up to operating speed.

The fan will be commanded to run at fan-only air flow as long as there is no call for mechanical heating/cooling or electric heating operations.

The fan can be configured via the Bosch EasyStart app to run in a range of CFM from 300 to 450 in 25 CFM increments. The controller has airflow profiles (CFM) for both heating and cooling operations.

Loop Pump Operation

The Loop Pump (LP) energizes 30 seconds (configurable from 30 seconds to 240 seconds via the Bosch EasyStart app) prior to compressor operation during a mechanical heating or cooling demand. The LP remains on during low loop water temperature protection and a high Leaving Water Temperature (LWT) warning. The loop pump stays off for the following faults and delay timers:

- High Pressure Switch fault
- Low Pressure Switch fault
- Freeze Coaxial Coil fault
- Freeze Evaporator Coil fault
- Brownout fault
- Condensate Overflow fault
- Anti-Short Cycle delay
- Flow delay

HPC will command the Loop Pump (LP) output to energize the pump motor whenever a heating or cooling command (Y1) is received.

The Loop Pump output of the HPC will energize the pump directly. 230 VAC to 208 VAC on the HPC pump outputs will be present (voltage dependent on supply).

WARNING: Before performing service or maintenance operations on the system, turn off the main power to the unit. Electrical shock could cause personal injury or death.

Reversing Valve Operation

The Reversing Valve (RV) is energized when the controller receives a command on the (O) terminal. The unit will run in cooling mode when the (RV) is energized and heating when the (RV) is not energized. The HPC checks for an (RV) demand every 30 seconds.

Comfort Mode

In comfort mode the controller satisfies demand as call is presented, regardless of energy consumption, to satisfy space comfort levels. In comfort mode, after the first stage of cooling/heating the system turns on the second stage of cooling/heating, with a 10-second delay, following a call for second stage of cooling/heating.

Economy Mode

In economy mode the controller satisfies demand as call is presented, taking energy consumption into consideration to operate the compressor. In economy mode after the first stage of cooling/heating, the second stage is initiated by calculating progress of the current state, regardless of a call for the second stage of cooling/heating. If there is gradual progress with first stage, the controller will not initiate second stage of the compressor. Economy mode is only available if the Discharge Air Temperature (DAT) sensor is functional.

If the DAT sensor fails, a warning message will broadcast to the Bosch EasyStart app and economy mode will be disabled.

Emergency Heating Mode

Emergency heating mode is an electrical heating feature that is used in place of mechanical heating when the mechanical heating (Y1 or Y2) is not available. The unit will initiate the first stage of electric heat immediately and will start the next stage of electric heat (stage 2) after a 180-second delay.

Heat Recovery Package (HRP)

The HRP can be used to heat potable water during unit operation (heat that would otherwise be wasted from the compressor discharge gas). The HRP consists of three major components:

- Double wall, vented refrigerant to water heat exchanger
- HRP pump
- Control circuit

Conditions for the HRP to operate are as follows:

1. Discharge Refrigerant Temperature (DRT) is at least 10°F greater than the domestic hot water temperature (DWT). The DWT set point is configurable between 110–140°F, via the Bosch Easy Start app.
2. Loop Pump (LP) and compressor are both energized.
3. Domestic water temperature drops 2°F below set point (default is 120°F). The controller will run the pump until the demanded set point is satisfied. The pump will run four times/hour via (configurable from two to six times/hour via the Bosch EasyStart App) in 90-second intervals to determine whether or not demand for hot water is needed.

The temperature of the discharge gas from the compressor will be monitored once compressors are energized. Once discharge gas is hot enough to provide useful heat to the domestic water tank, the circulating pump will be enabled, drawing water from the tank, through the HRP heat exchanger and the depositing the heated water back into the tank. If the water temperature reaches the set point (default is 120°F), the circulating pump is disabled to prevent over heating of the domestic water. The HRP is provided with an on/off switch in case the end user desires that the HRP be inactivated (typically during the winter months when space heating is most important).

In case of DWT/DRT sensor failure, the HRP operation will be disabled.

NOTICE: Keep the HRP configuration setting set to disabled if there is no domestic water supply available.

WARNING: Before performing service or maintenance operations on the system, turn off the main power to the unit. Electrical shock could cause personal injury or death.

Dehumidification

During cooling operation only, if the controller senses a signal on the (H) terminal of the thermostat interface block the fan CFM output will be reduced by 15% (adjustable). The fan CFM reduction percentage is adjustable from 15% to 40% reduction from nominal via the Bosch EasyStart app.

The controller has a minimum 270 CFM/Ton requirement. The controller will not allow the CFM/Ton to fall below this minimum even If the reduction percentage calls for a lower CFM/Ton amount.

Latching Mode Operation

The latching feature enforces how a HPC stages down the multiple stages of heating and cooling. A WSHP condenser coil uses water as medium for exchanging heat with the refrigerant. Controlling the stage down process will result in benefits to the performance and efficiency of the system. As the name implies, the maximum demanded stage is latched on until the thermostat is satisfied at which time all heating or cooling calls are terminated. Many thermostats are designed for Air Source appliances and the medium for exchange (air) can usually provide heat exchange; however, for ground loops used in WSHP can become saturated after long run times. Latching is used in WSHP applications as a means to “rest” the ground loop between cooling and heating cycles thus increasing the capacity for heat exchange. Performance, efficiency, and comfort provided by a WSHP will largely be maintained by preventing the degradation of the loop’s physical heat exchange properties.

During latching mode operation, the unit will fasten the two compressor outputs together until the demand is satisfied. If the thermostat removes the second-stage demand, the HPC will keep the second stage of compressor enabled until demand is satisfied.

Unlatching Mode (Factory Default)

During unlatching mode the unit will cycle the compressor outputs according to the thermostat demand. The unit will downstage from second-stage compression to first stage when the demand for second stage is dropped by the thermostat (Y2 and Y1 call to only Y1 call).

SYSTEM PROTECTION

Consumer Enhanced Security

The unit has been engineered according to Bosch consumer information protection standards, and it has built-in security features that prevent unauthorized users from changing unit configuration and other settings.

Compressor Demand (Y1 Call)

The HPC will monitor the thermostat interface P8. Upon receiving a (Y1) demand from the thermostat, it will verify that all safety switches are in normal condition prior to initiating the compressor start sequence.

Pressure Protection

High Pressure Switch (HPS)

The HPS prevents the unit from running in a condition of high-refrigerant pressure. If the HPS is open upon a cooling or heating call, the HPC will not energize the compressor output. If the compressor is already running in normal operation and the HPS opens, the HPC will shut down the compressor output and will keep it off until the switch closes and the Anti-Short Cycle (ASC) delay has expired.

The Status Indicator will flash one time and the controller will keep track of the number of times the HPS opens. If within one hour the HPS strike counter exceeds the configured soft-lockout counter (set via the Bosch EasyStart app, see page #5) the HPC will shutdown the compressor and enter a hard lockout.

When the HPC enters lockout the LED flashes the alarm code in such a way the observer can count the number of flashes. The alarm code is represented by a grouping of successive flash with a two second pause in between the flash sequence. The sequence or flash grouping will be repeated until the fault is cleared. The LED will only flash one error code until it is cleared. See “Clearing a Hard Lockout” on page #8.

Low Pressure Switch (LPS)

The LPS prevents the unit from running in a condition of low refrigerant pressure. If the LPS is open, the compressor will not energize even if there is a demand for heating or cooling and the status indicator will flash two times during an LPS fault. If the compressor is running during normal operation and the LPS is opened, the HPC will keep the compressor running for two minutes. If the LPS remains open after two minutes, the compressor will shutdown and the unit will enter a soft lockout. The compressor will not energize until the LPS closes and the ASC delay expires.

The controller will keep track of the number of times the switch opens. If within one hour the LPS strike counter exceeds the configured soft lockout counter (set via the Bosch EasyStart app) the HPC will shut down the compressor and enter a hard lockout.

When the HPC enters lockout the LED flashes the alarm code in such a way the observer can count the number of flashes. The alarm code is represented by a grouping of successive flash with a two second pause in between the flash sequence. The sequence or flash grouping will be repeated until the fault is cleared. The LED will only flash one error code until it is cleared. See “Clearing a Hard Lockout” on page #8.

Operating Envelops of the Pressure Switches

Operating envelopes of both switches are shown in the table below.

High Pressure Switch	
Open Circuit	600±15 PSI
Closed Circuit	420±15 PSI
Low Pressure Switch	
Open Circuit	40±5 PSI
Closed Circuit	60±5 PSI

Table 5 Pressure Switches

Brownout Protection

The HPC controller will constantly monitor the power supply. If the nominal voltage supplied to the HPC drops below 18 VAC, the unit will enter brownout protection mode. All outputs will be de-energized, the controller will enter the soft lockout mode, and the status LED indicator will flash five times as an error code. ASC is engaged when de-energized. The controller will pulse the brownout code at the display and alarm outputs for 20 seconds. The unit's brownout fault history can be found in the Fault Log when connected with the Bosch EasyStart app.

Low Loop Water Protection Control (LLWPC) (Boilerless Control)

The LLWPC prevents a condition of low loop water during heating operation. The HPC constantly monitors the Leaving Water Temperature (LWT sensors) and Entering Water Temperature (EWT sensors). If the EWT falls below 34°F (configurable between 20°F to 50°F via the Bosch EasyStart app) the controller will disable compressor operation for 15 minutes to allow the loop to warm up to the operational temperature range. If a call for heating is still present, the unit will run auxiliary heat by energizing AUX1 and AUX2. The controller will resume mechanical heating operation when EWT has increased at least 10°F from the temperature at which the fault occurred and a 15-minute timer has expired. LLWPC is disabled if the EWT or the LWT sensors are out of their operational range.

If the EWT or LWT sensor fails, a warning message will be broadcast to the Live Monitor screen on the Bosch EasyStart app and LLWPC mode will be disabled.

Water Flow Detection

The HPC constantly monitors the Freeze Coaxial (FZC), EWT, and LWT sensors to diagnose potential problems associated with water flow. The HPC will enter a hard lockout when it senses a condition of no water flow. See "Clearing a Hard Lockout" on page #8.

Cooling Mode

The controller evaluates the following after the unit has run in cooling mode for 90 seconds:

- If LWT is 5°F to 15°F higher than the EWT, the unit is running in nominal operating conditions.
- If LWT and EWT are the same and the compressor is enabled (CS1), the FZC and Freeze Evaporator Coil (FZE) temperatures are sampled every 10 seconds for 30 seconds. Rapid temperature changes on the freeze sensors will be used by the controller to report a "No Water Flow" fault and de-energize all compressor outputs.
- If the LWT is at least 20°F higher than the EWT, the FZC in and out temperatures are sampled every 10 seconds for 30 seconds. The rapid temperature changes on the freeze sensors will be used by the controller to report a low water flow fault.

Heating Mode

The controller evaluates the following after the unit has run in heating mode for 90 seconds:

- If LWT is 4°F to 12°F lower than the EWT, the unit is running in nominal operating conditions.
- If LWT and EWT are the same and the compressor is enabled (CS1), rapid temperature changes on the freeze sensors will be used by the controller to report a "No Water Flow" fault and de-energize all compressor outputs.
- If the LWT is at least 20°F lower than the EWT.

If the EWT or LWT sensor fails, a warning message will be broadcast to the Live Monitor screen on the Bosch EasyStart app and LLWPC mode will be disabled.

Sensor Monitoring

Condensate Overflow Sensor

The Condensate Overflow Sensor monitors the condensation present in the drain pan. When the condensation reaches the overflow level (water touching the sensor) the HPC will enter a hard lockout and de-energize the compressor outputs. The status LED indicator will flash four times, and the alarm output will pulse four times as well, if configured to do so. (See the Alarm Mode section on page #7.) The compressor will remain off until the ASC delay has expired and the condensate fault has been removed. See "Clearing a Hard Lockout" on page #8. Location of the Condensate Overflow Sensor is shown in Fig. 2.

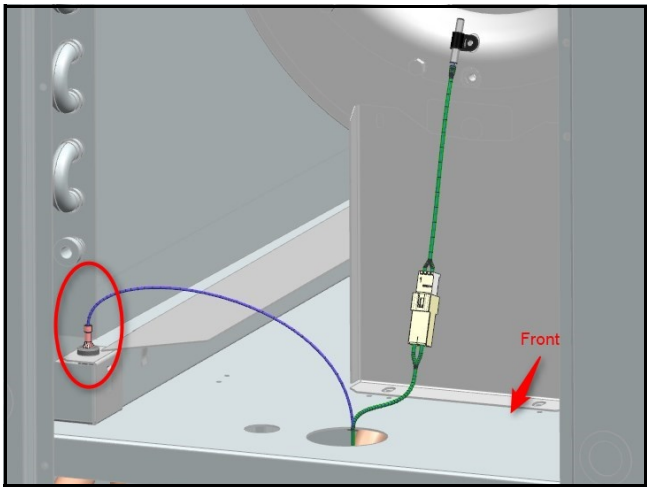


Fig. 2 Condensate Overflow Sensor Location

Discharge Air Temperature (DAT) Sensor

The DAT sensor is installed at the inlet attached to a motor mount (leg) and connected to the HPC. It reads the supplied air temperature to determine whether the unit is operating in the correct state (Heating or Cooling) per the thermostat demand. The DAT works together with the Return Air Temperature (RAT) sensor to determine if there is a heating/cooling fault. These faults will appear on the monitor interface when paired with the Bosch EasyStart app. Location of the DAT Sensor is shown in Fig. 3.

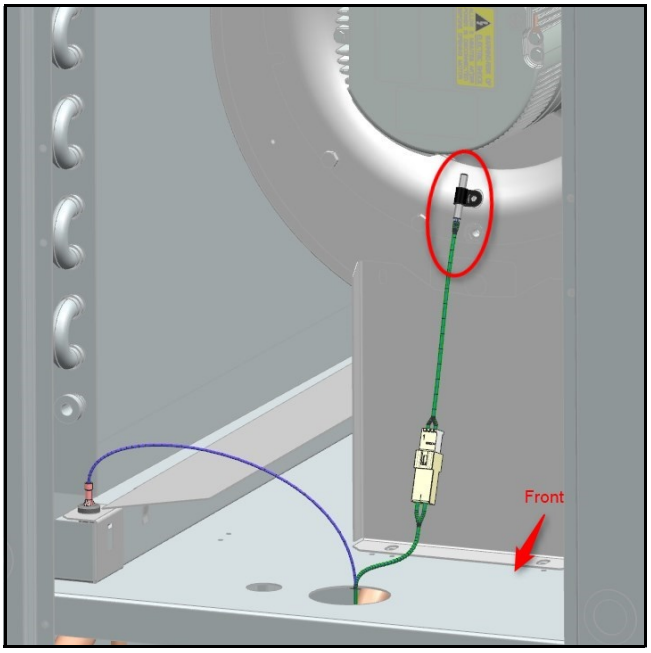


Fig. 3 DAT Sensor Location

Return Air Temperature (RAT) Sensor

The RAT sensor is installed in front of the filter (bottom-right corner) and connected to the HPC. It reads the RAT to determine whether the unit is operating in the correct state according to the thermostat demand. The RAT works together with the DAT sensor to determine if there is a fault either Not Cooling, Heating with Cooling Demand, Not Heating, or Cooling with Heating Demand. This information will appear on the monitor interface when paired with the Bosch EasyStart app.

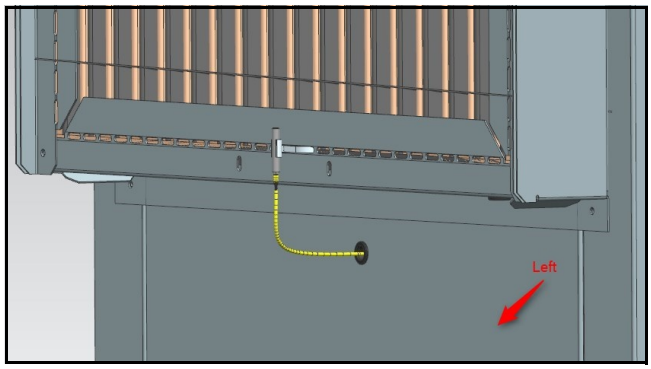


Fig. 4 RAT Sensor Factory Location

Proper operation of the unit requires field modification the RAT sensor location by removing the sensor from the provided clip, drilling a ~1/4" hole 12"–18" from the evaporator coil in the ductwork, and securing the RAT sensor in this hole for the most accurate RAT readings as shown below in Fig. 5.

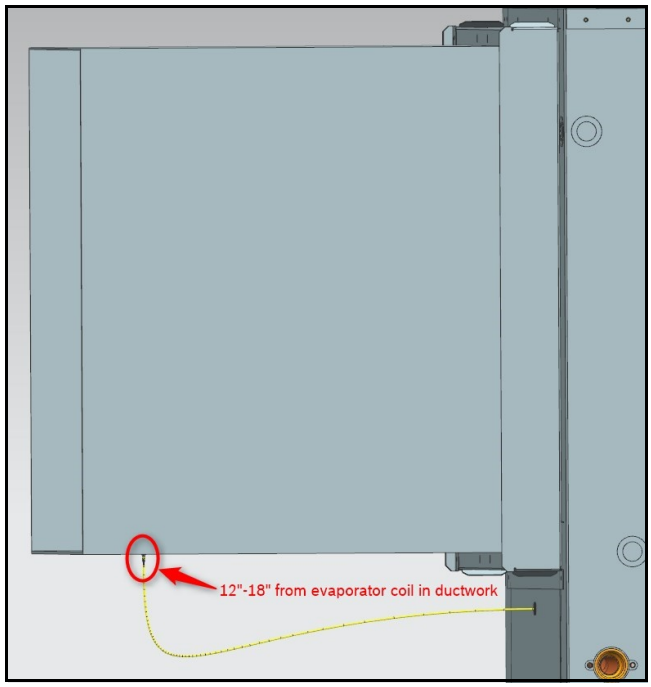


Fig. 5 RAT Sensor Field Location

Leaving Water Temperature (LWT) Sensor

The LWT sensor is installed on the Leaving Water pipe of the coaxial water coil. The location of the LWT Sensor is shown on Fig. 6.

In the case of a high LWT, above 125°F for one minute, the HPC will issue a warning and save it to memory. The compressor and loop pump will remain running. Once the LWT decreases below 100°F, the warning will be cleared and the compressor and loop pump will remain running. The HPC will record this condition in memory without impeded operation.

Cooling Mode

During cooling operation, if the LWT is equal to or less than the EWT, the HPC will issue a warning that the unit is not cooling.

Heating Mode

During heating operation, if the LWT is equal to or greater than the EWT, the HPC will issue a warning that the unit is not heating.

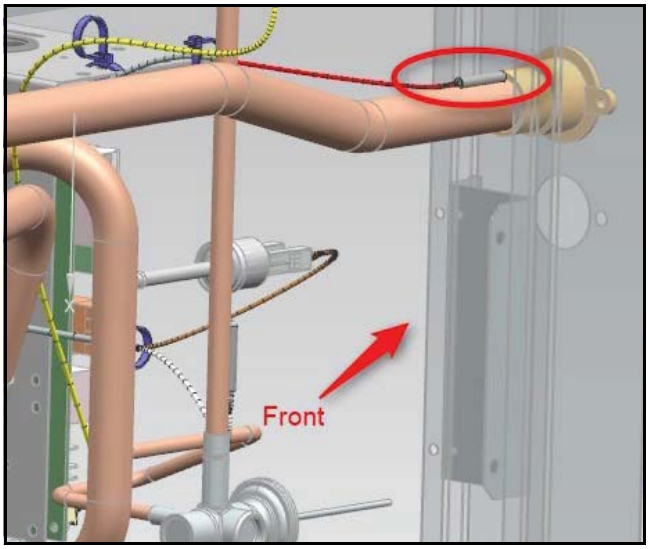


Fig. 6 LWT Sensor Location

Entering Water Temperature (EWT) Sensor

An EWT sensor is installed on the entering water pipe of the coaxial water coil. The location of the EWT sensor is shown on Fig. 7.

Cooling Mode

High EWT, above 110.5°F for one minute, will result in a warning message indicating an high EWT fault without impeded operation. This fault will reset when EWT drops below 105°F.

Heating Mode

Low EWT activates the LLWPC. Low EWT can only occur when the EWT is low during heating operation. Refer to Low Loop Water Protection Control (LLWPC) on page #14.

There is no EWT freeze-limit trip. However, If the application has both electric heat and LLWPC enabled, the controller will have a low limit for EWT. (Refer to the LLWPC section on page #14.) Otherwise, there is no EWT low-limit trip. (If EWT is frozen/cold, another fault will likely occur such as FZC trip/No water flow, High Pressure, etc.)

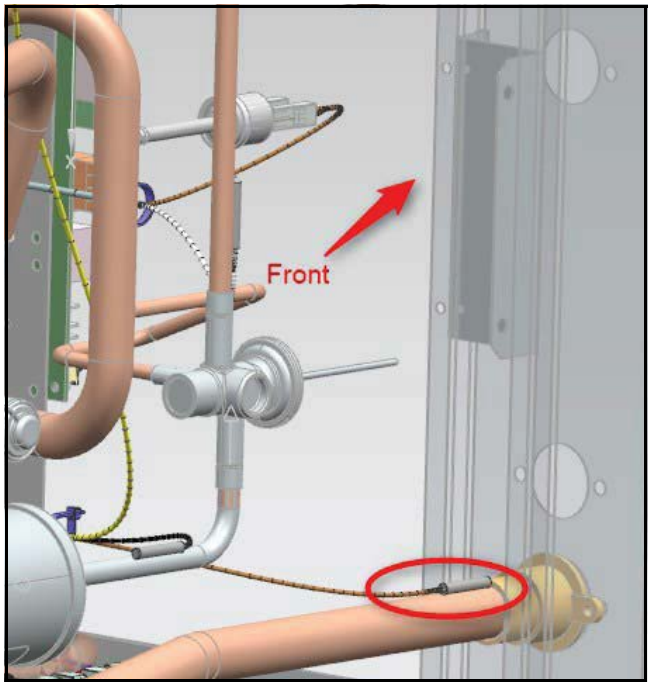


Fig. 7 EWT Sensor Location

Coaxial Water Coil Freeze (FZC) Sensor

The Freeze Coaxial (FZC) Water Coil sensor is installed on the refrigerant pipe of the coaxial water coil between coaxial coil and TXV. The location of the FZC sensor is shown on Fig. 8.

The freeze limit trip is factory set for open-loop protection (26°F) but can be set for all values between (26°F) and (15°F) via the Bosch EasyStart app. If the temperature drops below or remains constant at the configured freeze point for more than 30 seconds after the compressor is energized, the control will shutdown the compressor to prevent the water coil from freezing. The compressor will not be re-energized until the temperature increases 10°F above the configured freeze limit and the ASC delay has expired.

Lockout

If the number of freeze faults detected exceeds two to four times (based on configuration set via the Bosch EasyStart app) within one hour, the controller will go into hard lockout. The status LED indicator will flash three times and the alarm relay will pulse three times as well, if configured for pulse. See Table 7:Status LED Information on page #20. Also see “Clearing a Hard Lockout” on page #8.

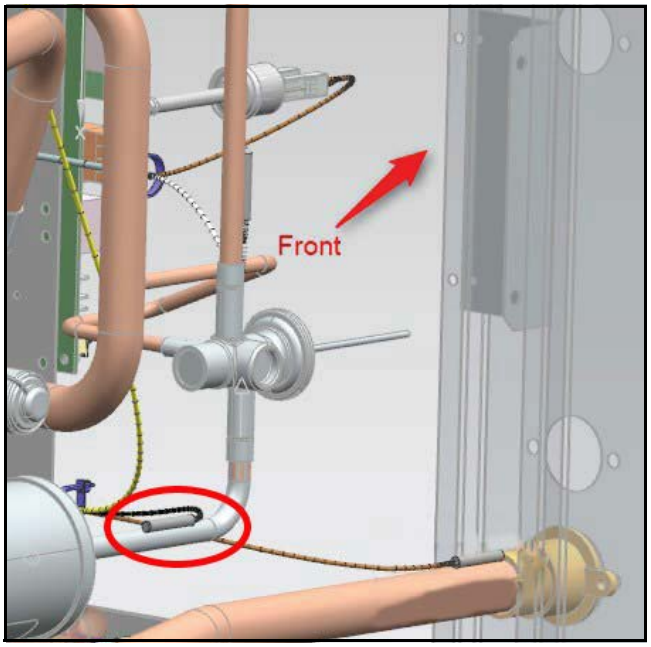


Fig. 8 FZC Location

Evaporator Air Coil Freeze (FZE) Sensor

The Freeze Evaporator Coil (FZE) is installed on the entering refrigerant pipe after the thermal expansion device and before the air coil. The location of the FZE is shown on Fig. 9.

The freeze limit trip is set to factory default at 30°F. If the temperature drops below or remains constant at the freeze point for more than 30 seconds after the compressor is energized, the controller will shut down the compressor to prevent freezing the air/evaporator coil. The compressor will not be re-energized until the temperature increases 10°F above the freeze limit and the ASC delay has expired.

If the number of freeze faults detected exceeds two to four times (configurable via the Bosch EasyStart app) within one hour, the controller will go into hard lockout. The status LED indicator will flash six times, alarm relay will pulse six times as well, if configured for pulse. See Table 7:Status LED Information on page #20. Also see “Clearing a Hard Lockout” on page #8.

The Freeze Evaporator sensor limit trip is not configurable.

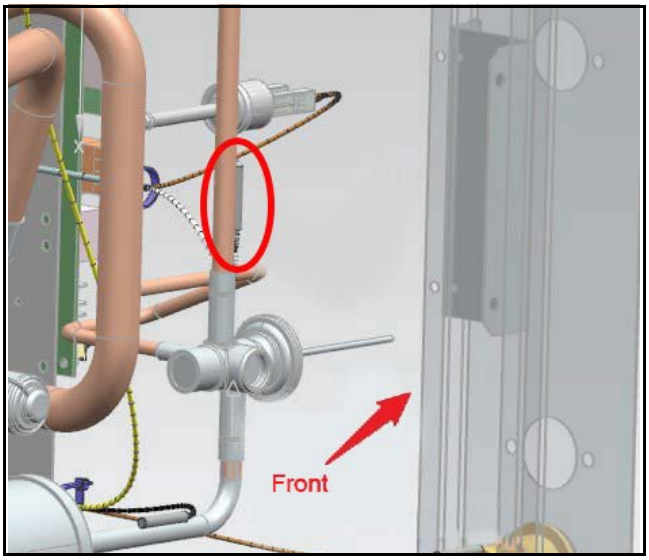


Fig. 9 FZE Sensor Locations

Discharge Refrigerant Temperature (DRT) Sensor

The Heat Recovery Package (HRP) controller will monitor the DRT sensor and only allow the HRP pump to run when the DRT is suitable for hot water production or enabled via the Bosch EasyStart app. The HPC will issue a warning if the DRT sensor is invalid or not within range (via the live monitor screen on the Bosch EasyStart app).

NOTICE: Keep the HRP configuration setting set to disabled if there is no domestic water supply available.

If the DRT sensor fails at any time during normal unit operation, HRP operation will be terminated.

The location of the DRT sensor is shown on Fig. 10. It is mounted on the discharge line of the compressor.

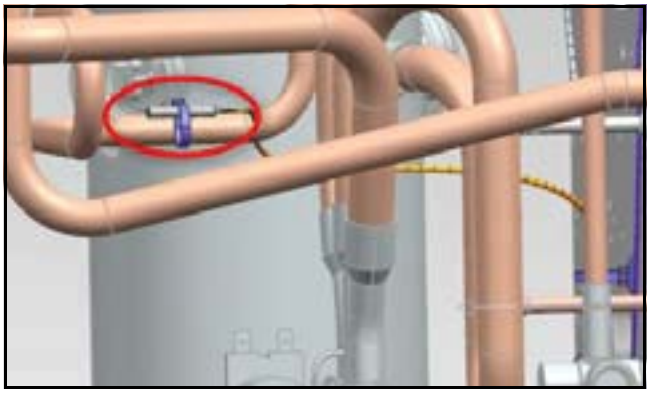


Fig. 10 DRT Sensor Location

Domestic Water Temperature (DWT) Sensor

The Heat Recovery Package (HRP) controller will constantly monitor the DWT sensor and only allow the HRP pump to run when the water temperature in the tank is below the set point and the refrigerant temperature is suitable for hot water production. The minimum and maximum allowed temperature set points are 110°F and 140°F respectively and can be adjusted via the Bosch EasyStart app. The controller will run the pump four times/hour (adjustable two to six times/hour via Bosch EasyStart app) to determine whether or not domestic hot water production is needed.

The controller will enable domestic hot water production only when the loop pump and the compressor are running.

If the DWT sensor is invalid or not within range a warning message will be sent to the Bosch EasyStart app.

If the DWT sensor fails at any time during normal unit operation HRP operation will be disabled.

Location of the DWT sensor is shown in Fig. 11.

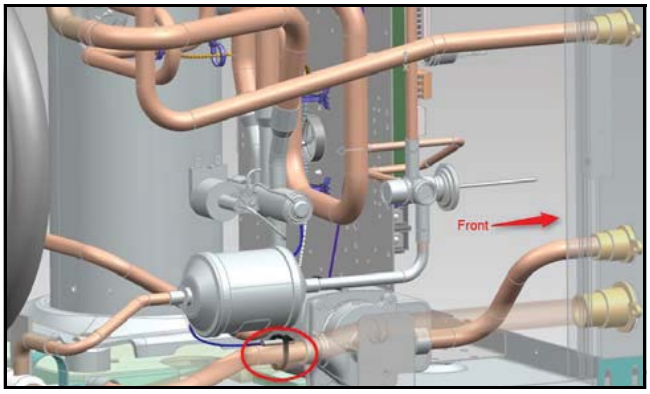


Fig. 11 DWT Sensor Location

TROUBLESHOOTING

Invalid Thermostat Demands

The controller validates the thermostat demands to prevent field miswiring.

When an invalid call is sensed, the unit will shutdown and the status LED will be lit for the duration of the invalid call.

IO Information	
THERMOSTAT	All inputs are 24 VAC from the wall thermostat and can be verified using a voltmeter between (C) and (G), (O), (Y1), (Y2), (W1), (W2), (H).
	Thermostat inputs are fused via F4 on PCB.
SENSOR INPUTS	All sensor inputs are fused via F4 on PCB.
	All switches are 24 VAC inputs.
	All sensors are 3.3 VDC powered.
	The thermistor resistance should be measured with the connector removed so that only the impedance of the thermistor is measured. (See the table on page #23 for values.)
OUTPUTS	The Reversing Valve, Compressor Stage 1, Compressor Stage 2, Auxiliary Relay 1 and Auxiliary Relay 2 are 24 VAC and can be verified using a voltmeter.
	The Loop Pump and HRP Pump are 208 or 230 VAC, depending on the line voltage connected to the unit. These can be verified using a voltmeter and their value must be equal to the line feed on the compressor connector.
	Loop Pump outputs are fused with 5 Amp rated fuses and the HRP pump output with a 1 Amp rated fuse. Fuses can be tested for continuity with a multimeter.
	The Blower Motor is a PWM signal that varies from 0 to 24 VDC. The voltmeter will show values from 0 through 24 VDC.
TEST MODE	Test Mode will be available for 20 minutes. The HPC will enter test mode when commanded via the Bosch EasyStart app.
	The controller will require a Wi-Fi network connection from the Wireless Interface Module (WIM) to enable communication with the Bosch EasyStart app.
REAL-TIME CLOCK	The controller will require a CR2032 Battery in order to keep its Real-Time Clock (RTC) in case of a power outage or a power loss.
	It is a best practice to check that the Battery Voltage is 3 VDC as checked with a voltmeter while on site.

Table 6 Troubleshooting IO

Replacement Parts

Fuses

Provides protection for the Class II field thermostat wiring.

- Fuse 3: Fuse Auto 3A 32 VDC Blade for F4
- Fuse 5–6: Fuse glass 5A 250 VAC 5x20 mm for F5
- Fuse 7: Fuse glass 1A 250 VAC 5x20mm for F7

Board Battery

Battery type used is CR2032 Lithium 3V coin 20mm.

Unit Status LED (Blink Code) Information

Fault	Status LED Code	Fault Condition
NO FAULT	Status LED is OFF	No fault
INVALID CALL	Status LED solid ON	Invalid call, possible thermostat wiring issue
HIGH PRESSURE SWITCH	1	HPS open, Instant reaction
LOW PRESSURE SWITCH	2	LPS during a demand call (bypassed for first 120 seconds)
FREEZE COAXIAL SENSOR	3	FZC below temperature limit (bypassed for first 30 seconds)
CONDENSATE OVERFLOW	4	Sensed overflow (grounded) instant reaction
BROWNOUT CONDITION	5	Sensed input voltage at or below 18 VAC
FREEZE EVAPORATOR SENSOR	6	FZE below temperature limit (bypassed for first 30 seconds)

Table 7 Status LED Information

Heating and Cooling

Troubleshooting Heating/Cooling				
Indicator	**HTG**	**CLG**	**Behavior**	**Solution/Action**
HEARTBEAT LED	X	X	LED is flashing two times a second	Normal HPC Operation.
	X	X	LED is flashing at a slow rate, one flash per second instead of two	HPC application program is not running. Connect to Bosch EasyStart app to update or reload application.
	X	X	LED is solid ON	Reboot controller. If condition persists, HPC application program is not running. Connect to Bosch EasyStart app to update or reload application.
	X	X	LED is OFF all the time	Reboot controller. If condition persists, contact customer service to replace the controller.
STATUS LED	X	X	LED is solid ON	Verify thermostat wiring to make sure (R), (C), (G), (O), (Y1), (Y2), (W1), (W2), and (H) are properly wired.

Troubleshooting Heating/Cooling				
Indicator	**HTG**	**CLG**	**Behavior**	**Solution/Action**
POWER STATUS LED OFF	X	X	Main power problems (line voltage)	Check line voltage circuit breaker and disconnect.
				Check for line voltage between L1 and L2 on the contactor. Check for 24 VAC between (R) and (C) on HPC P1.
				Check for continuity across fuse F4.
				Check primary/secondary voltage on transformer.
HPS STATUS RED LED FAULT CODE 1 HIGH PRESSURE		X	Reduced or no water flow	Check pump operation or valve operation/setting.
				Check water flow, adjust to proper flow rate. Verify water flow condition with the Bosch EasyStart app.
			Water temperature out of range	Verify temperature value with Bosch EasyStart app. Bring water temp within design parameters.
	X		Reduced air flow	Check for dirty air filter and either clean or replace.
				Check fan motor operation and airflow restrictions. Review airflow setting with Bosch EasyStart app.
				Dirty Air Coil, construction dust, etc.
	X		Air temperature out of range in heating	Bring return air temperature within design parameters.
	X	X	Overcharged with refrigerant	Check and service system refrigerant.
			Bad High Pressure Switch	Verify continuity/replace switch.
LPS STATUS LED FAULT CODE 2 LOW PRESSURE LOSS OF CHARGE	X	X	Insufficient charge	Check for refrigerant leaks.
	X	X	Compressor pump down at start-up	Check charge and start-up water flow. Use the Bosch EasyStart app to verify that there are no water flow warnings.

Table 8 Troubleshooting HTG-CLG

Heartbeat LED

The Heartbeat LED will continuously pulse as long as the controller is in normal operation. If this LED light is solid it is an indication that the controller has stopped running its normal sequence of operation and needs attention.

If during an HPC firmware update and there is an update failure (e.g., caused by a power outage), the control software on the HPC will be corrupted. The HPC update failure will place the HPC in safe mode and an update must be performed to restore normal operation.

Safe mode (also known as “bootloader mode”) provides the means to restore the HPC to operating. Safe mode is indicated by a slow heartbeat LED.

For the Heartbeat LED location, see Fig. 1 on page #4.

Thermistor Resistance Versus Temperature

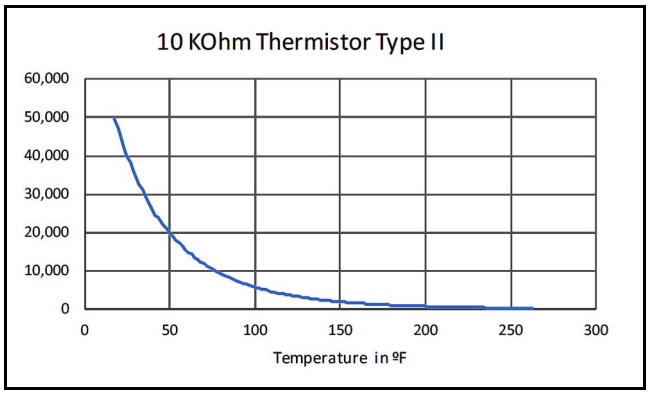


Fig. 12 Type II Thermistor Temperature Curve

Thermistor Resistance Versus Temperature—US SENSOR 10K

C°	F°	OHM	C°	F°	OHM	C°	F°	OHM	C°	F°	OHM
-55	-67	963,800	-9	16	52,410	37	99	6,015	83	181	1,141
-54	-65	895,300	-8	18	49,660	38	100	5,774	84	183	1,105
-53	-63	832,100	-7	19	47,070	39	102	5,545	85	185	1,071
-52	-62	776,800	-6	21	44,630	40	104	5,326	86	187	1,038
-51	-60	719,900	-5	23	42,330	41	106	5,116	87	189	1,006
-50	-58	670,200	-4	25	40,160	42	108	4,916	88	190	975
-49	-56	624,200	-3	27	38,120	43	109	4,725	89	192	945
-48	-54	581,600	-2	28	36,190	44	111	4,542	90	194	916
-47	-53	542,200	-1	30	34,370	45	113	4,368	91	196	889
-46	-51	505,800	0	32	32,650	46	115	4,201	92	198	862
-45	-49	472,000	1	34	31,030	47	117	4,041	93	199	836
-44	-47	440,700	2	36	29,500	48	118	3,888	94	201	811
-43	-45	411,600	3	37	28,050	49	120	3,742	95	203	787
-42	-44	384,700	4	39	26,690	50	122	3,602	96	205	764
-41	-42	359,700	5	41	24,400	51	124	3,468	97	207	741
-40	-40	336,500	6	43	24,170	52	126	3,339	98	208	720
-39	-38	314,900	7	45	23,020	53	127	3,216	99	210	699
-38	-36	294,900	8	46	21,920	54	129	3,099	100	212	679
-37	-35	276,200	9	48	20,890	55	131	2,986	101	214	659
-36	-33	258,800	10	50	19,900	56	133	2,878	102	216	640
-35	-31	242,700	11	52	18,970	57	135	2,774	103	217	622
-34	-29	227,600	12	54	18,090	58	136	2,674	104	219	604
-33	-27	213,600	13	55	17,260	59	138	2,579	105	221	587
-32	-26	200,500	14	57	16,470	60	140	2,488	106	223	571
-31	-24	188,300	15	59	15,710	61	142	2,400	107	225	555
-30	-22	177,000	16	61	15,000	62	144	2,316	108	226	539
-29	-20	166,400	17	63	14,330	63	145	2,235	109	228	525
-28	-18	156,400	18	64	13,380	64	147	2,157	110	230	510
-27	-17	147,200	19	66	13,070	65	149	2,083	111	232	496
-26	-15	138,500	20	68	12,490	66	151	2,011	112	234	483
-25	-13	130,400	21	70	11,940	67	153	1,942	113	235	470
-24	-11	122,800	22	72	11,420	68	154	1,876	114	237	457
-23	-9	115,800	23	73	10,920	69	156	1,813	115	239	445
-22	-8	109,100	24	75	10,450	70	158	1,752	116	241	433
-21	-6	102,900	25	77	10,000	71	160	1,693	117	243	422
-20	-4	97,080	26	79	9,573	72	162	1,637	118	244	411
-19	-2	91,620	27	81	9,166	73	163	1,583	119	246	400
-18	0	86,500	28	82	8,778	74	165	1,531	120	248	389
-17	1	81,700	29	84	8,409	75	167	1,480	121	250	379
-16	3	77,190	30	86	8,057	76	169	1,432	122	252	370
-15	5	72,960	31	88	7,722	77	171	1,386	123	253	360
-14	7	68,980	32	90	7,402	78	172	1,341	124	255	351
-13	9	65,250	33	91	7,098	79	174	1,298	125	257	342
-12	10	61,740	34	93	6,808	80	176	1,256	126	259	333
-11	12	58,440	35	95	6,531	81	178	1,216	127	261	325
-10	14	55,330	36	97	6,267	82	180	1,178	128	262	317

Table 9 US SENSOR 10K

HPC BOARD REPLACEMENT AND INSTALLATION

WARNING: PERSONAL INJURY HAZARD
Improper servicing of this equipment can result in dangerous operation, personal injury, or property damage. The procedure described below must be performed by qualified personnel.

Recommended Tools

1. Hex driver 5/16”
2. Hex driver 1/4”
3. Needle nose pliers

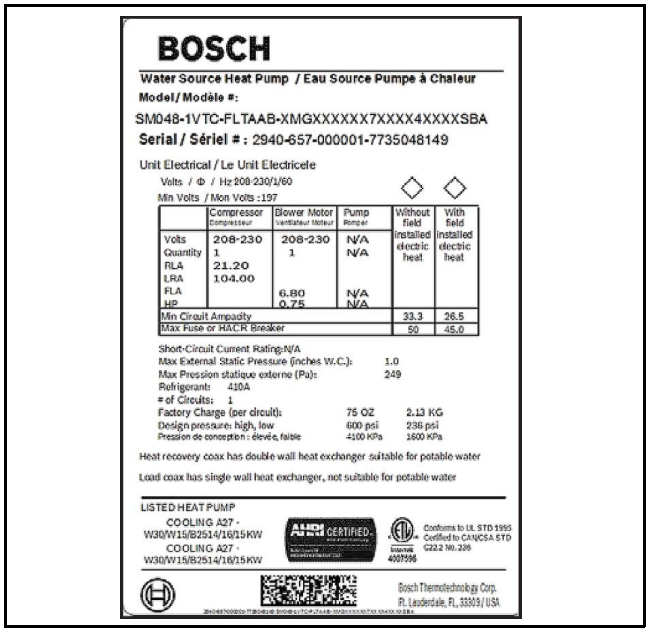
NOTICE: Use manual hex drivers instead of an electric screwdriver/drill to reduce chance of damaging the board.

Model and Serial Number

Before the replacement is started make sure the following information is identified from the unit data plate:

1. Unit Model Number
2. Unit Serial Number

Example of a unit data plate is shown in Fig. 13. This will be used later to update the configuration of your appliance.


BOSCH
Water Source Heat Pump / Eau Source Pompe à Chaleur
Model / Modèle #:
SM048-1VTC-FLTAAB-XMGXXXXXX7XXXX4XXXXSBA
Serial / Sériel # : 2940-657-000001-7735048149
Unit Electrical / Le Unit Electricele
Volts / Φ / Hz 208-230/1/60
Min Volts / Mon Volts :197

	Compressor Compresseur	Blower Motor Ventilateur Moteur	Pump Pompe	Without field installed electric heat	With field installed electric heat
Volts	208-230	208-230	N/A		
Quantity	1	1	N/A		
RLA	21.20				
LRA	104.00				
FLA		6.80	N/A		
HP		0.75	N/A		
Min Circuit Ampacity				33.3	26.5
Max Fuse or HACR Breaker				50	45.0

Short-Circuit Current Rating:N/A
Max External Static Pressure (inches W.C.): 1.0
Max Pression statique externe (Pa): 249
Refrigerant: 410A
# of Circuits: 1
Factory Charge (per circuit): 75 OZ 2.13 KG
Design pressure: high, low 600 psi 236 psi
Pression de conception : élevée, faible 4100 KPa 1600 KPa
Heat recovery coax has double wall heat exchanger suitable for potable water
Lead coax has single wall heat exchanger, not suitable for potable water
LISTED HEAT PUMP
COOLING A27 - W30/W15/B2514/16/15KW
COOLING A27 - W30/W15/B2514/16/15KW
AHRI CERTIFIED
Conforms to UL STD 1995 Certified to CAN/CSA STD C22.2 No. 236
Bosch Thermotechnology Corp. Ft. Lauderdale, FL, 33309 / USA

Fig. 13 Example of a Unit Data Plate

The controller will not operate the unit without the unit model or serial number. Improperly entering either may result in partial or total loss of unit functionality.

DANGER: ELECTRIC SHOCK
Before performing service or maintenance operations on the system, turn off the main power to the unit. Electrical shock could cause personal injury or death.

HPC Board Replacement

To replace the controller perform the following steps:

1. Turn off power to the unit and wait AT LEAST three minutes before removing any panels.
2. Use the handle to pull the panel upwards and detach from the unit.

NOTICE: To avoid static electricity damage, DO NOT touch the components on the main board.

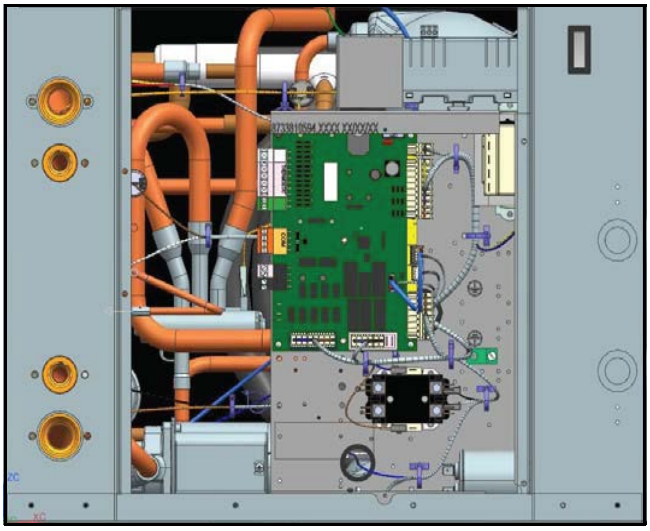


Fig. 14 Electrical Access Panel Removed

Take a photo before removing any screws or wiring to use as reference when installing the new board.

3. Identify the standard harnesses connected to the HPC (see Fig. 15), and carefully detach them from the controller.

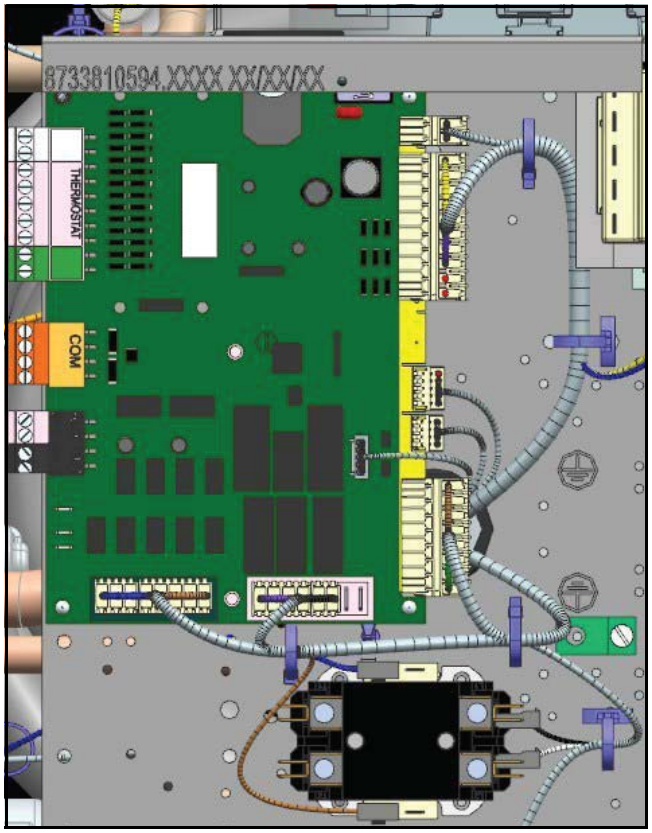


Fig. 15 HPC Harness Connections

4. Move the plugs to the side to allow room to access the standoffs and the ground screw.

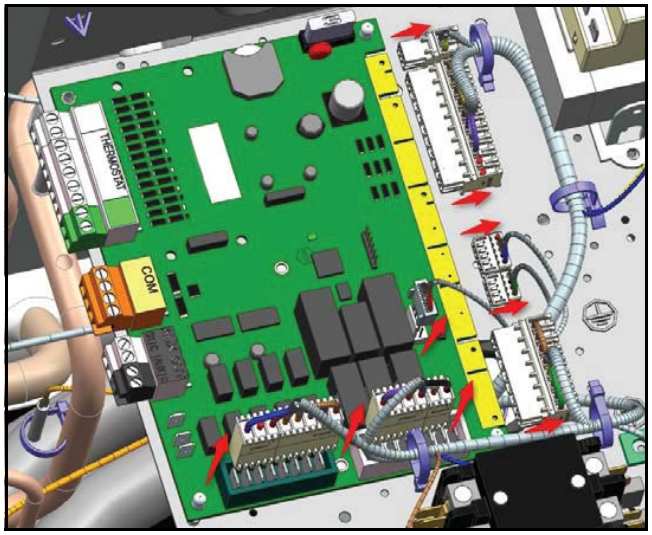


Fig. 16 HPC Wiring Disconnected

NOTICE: Make sure that the plugs are moved to the side to avoid wire damage.

5. Once the plugs are removed:
   - Use a 1/4” Hex driver to remove the ground screw.
   - Use the needle nose pliers to remove the PCB from the plastic standoffs.
   - Push on the standoff's tabs and pull the PCB from the bottom to detach it from electrical box.

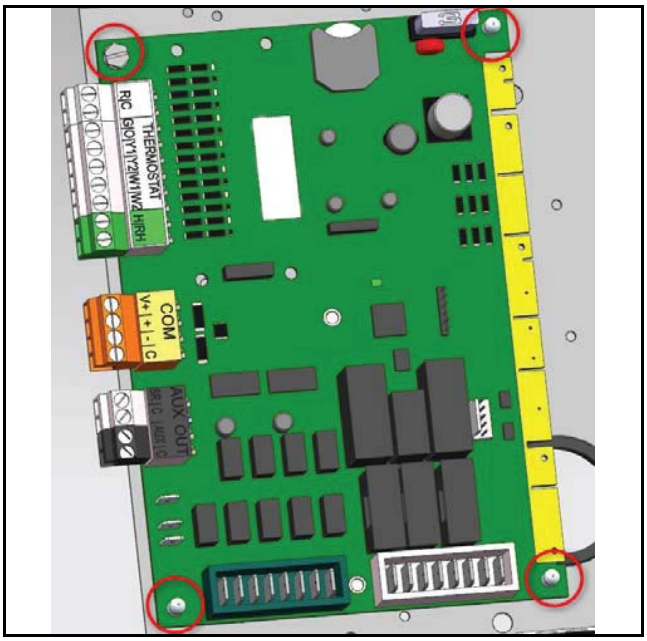


Fig. 17 Standoffs and Ground Screw

6. Once the controller is detached, place the new controller in the existing footprint.

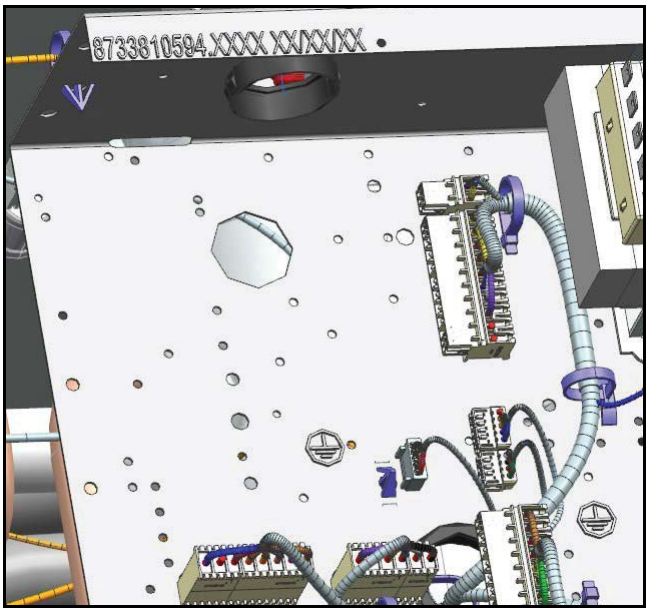


Fig. 18 HPC Board Removed

7. Secure the PCB via the standoffs.

8. Double-check that the controller is secured and attached to the electrical box.
9. Use the 1/4” hex driver to secure the ground screw to the electrical box’s metal plate.

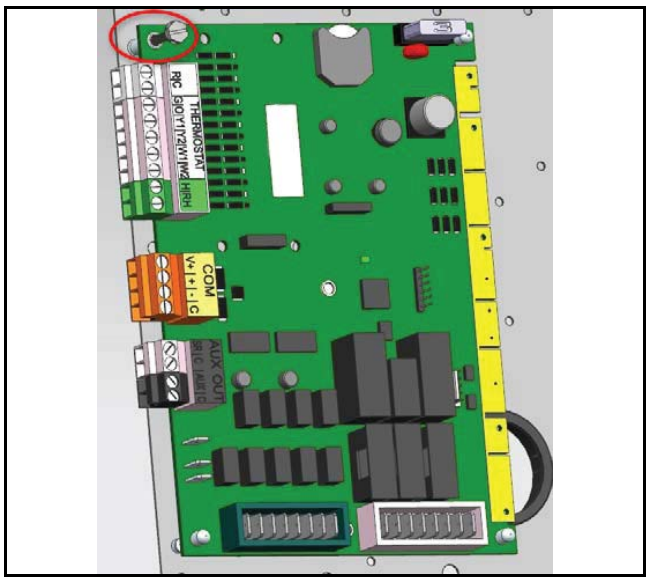


Fig. 19 Ground Screw Circled

WARNING: The ground screw must be connected as it provides earth ground to the controller. There is potential for electric shock if not grounded properly.

10. Reconnect all the wiring harnesses.

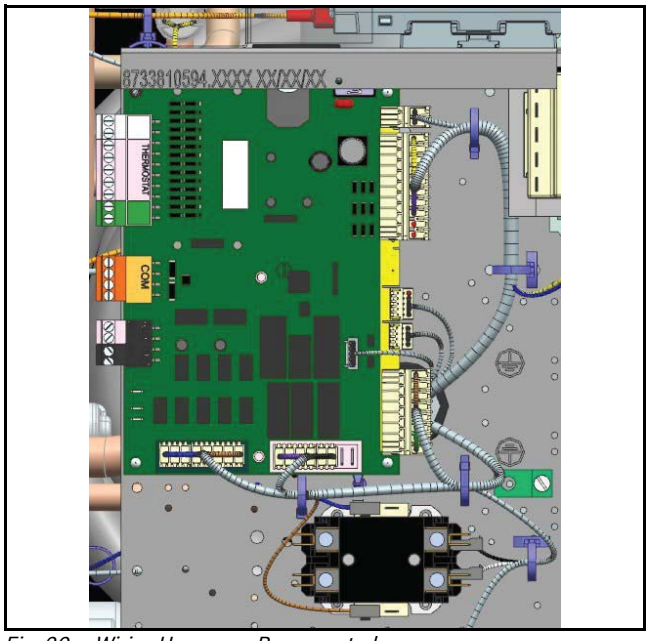


Fig. 20 Wiring Harnesses Reconnected

11. Apply power to the unit. A green LED should now be flashing on the top of the board.
12. Once the board has been replaced, it may need to be updated with the latest firmware and your preferred configuration settings.

Updating the Firmware and Configuring Unit Settings

1. Download and launch the Bosch EasyStart app onto your Android tablet, Apple iPad, or Windows laptops/PCs.
2. Upon launching the app, the splash screen displays and is followed by the Legal information and User Guide screens.

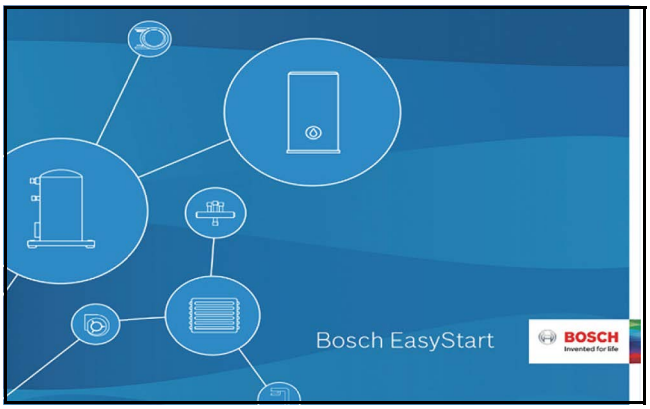


Fig. 21 Splash Screen

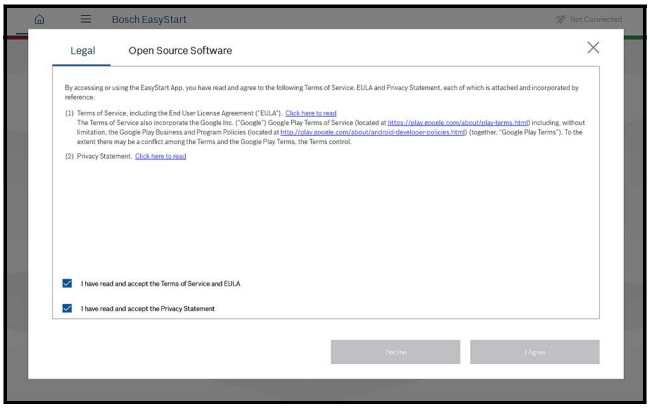


Fig. 22 Legal Information

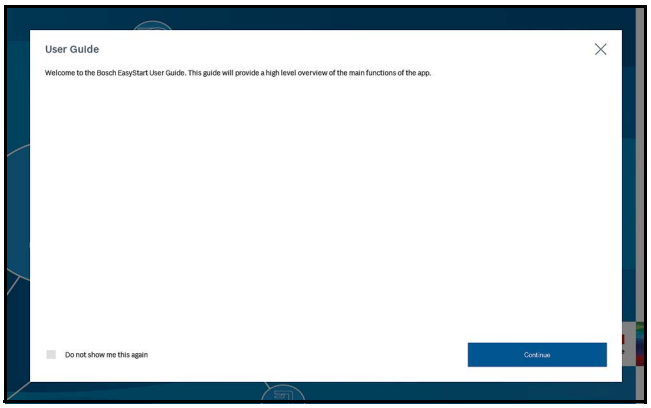


Fig. 23 User Guide

3. Once you accept the legal information and review the User Guide, navigate to the home screen. See Fig. 24.

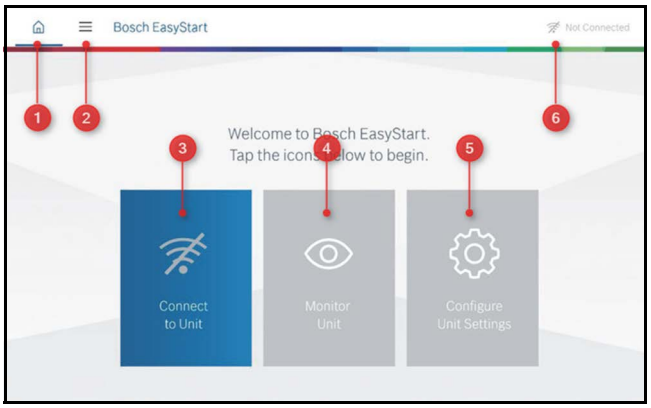


Fig. 24 Home Screen Elements

[1]	Home Button
[2]	Extended Menu Button
[3]	Connect (disconnect) to Unit
[4]	Monitor Unit
[5]	Configure Unit Settings
[6]	Connection Status

4. In order to connect to the appliance, click the **Connect to Unit** button shown in Fig. 25. The Connect to unit via Wi-Fi screen displays. The screen instructs the user to physically press the button on the Wireless Interface Module (WIM) to turn it on.

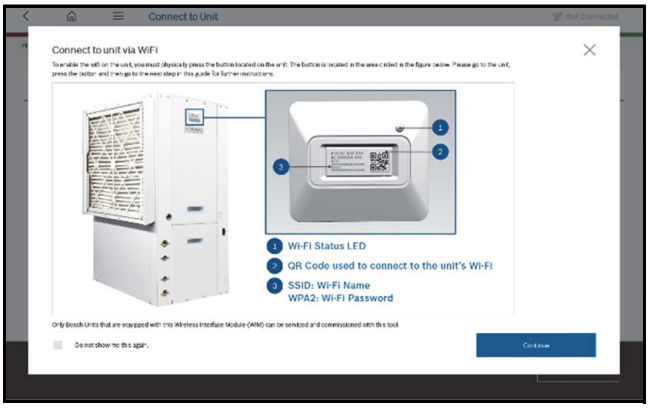


Fig. 25 Connect to the Unit via Wi-Fi

5. Press the WIM button as instructed. Once the button is pressed, the WIM will broadcast a Wi-Fi network SSID unique to the specific WIM. If using an iOS or PC device, connect to the Wi-Fi network via the settings menu before continuing to the next step.
6. Click the **Continue** button in the app. The Bosch network for the unit displays as shown in Fig. 26.

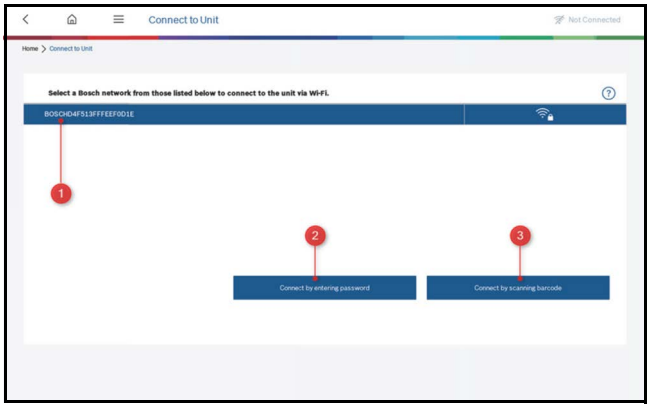


Fig. 26 Select Network

[1]	Network
[2]	Connect by entering password button
[3]	Connect by scanning barcode button

7. Select the network.
8. Next select the connection method—either manually entering the password for the network or using the WIM's QR code to automatically enter the password.
   - Click the **Connect by entering password** button then manually enter the password that is printed on the WIM.
   - Click the **Connect by scanning barcode** button then scan the QR code (with the tablet's camera.)

   Once the password has been correctly entered, you will be granted access to the information on the appliance and the "Connected to Unit" home screen displays.

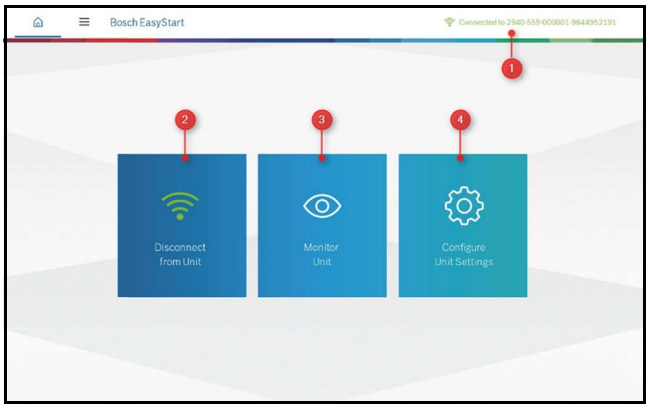


Fig. 27 Connected Home Screen

[1]	Unit Serial Number
[2]	Disconnect from the Unit
[3]	Monitor Unit
[4]	Configure Unit Settings
[5]	Connection Status

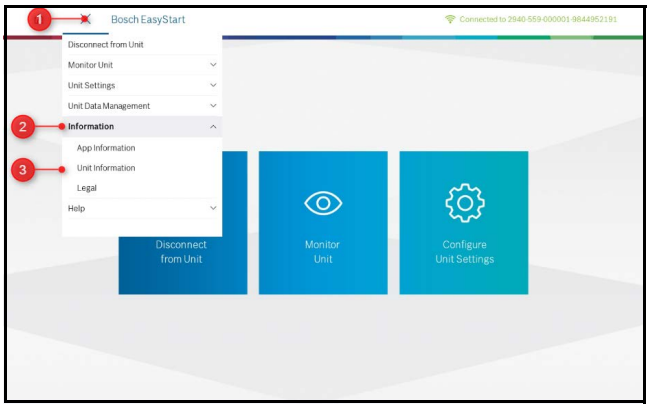


Fig. 28 Navigating to User Information

[1]	Extended Menu button
[2]	Information
[3]	Unit Information

9. Click the Extended Menu icon button [1] to display the menu.
10. Click the **Information** menu item [2] then the **Unit Information** item [3]. The Unit Information screen displays.

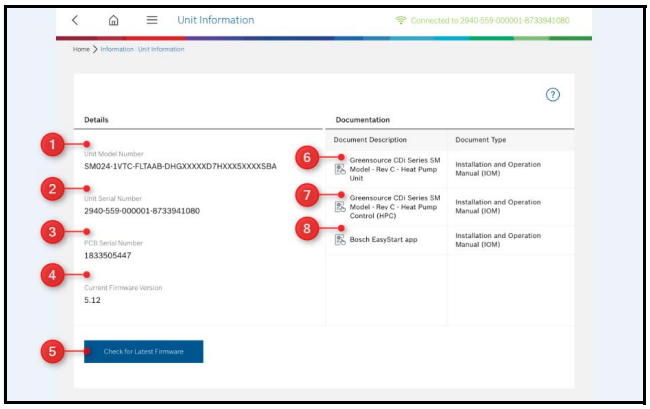


Fig. 29 Unit Information Screen

[1]	Unit Model Number
[2]	Unit Serial Number
[3]	PCB Serial Number
[4]	Current Firmware Version
[5]	Check for Latest Firmware Button
[6]	Heap Pump IOM
[7]	HPC IOM
[8]	Bosch EasyStart IOM

11. Click the **Check for Latest Firmware** button to update to a newer firmware version, as available. A list of available versions is displayed.

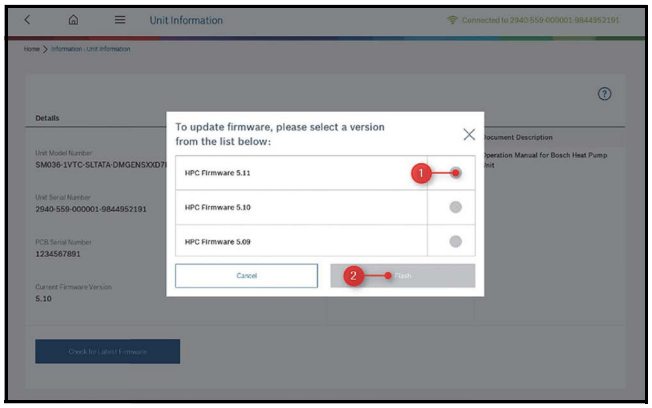


Fig. 30 Firmware Update

12. Select the version you want to use [1] from the list then click the **Flash** button [2]. The Firmware Update progress is displayed.

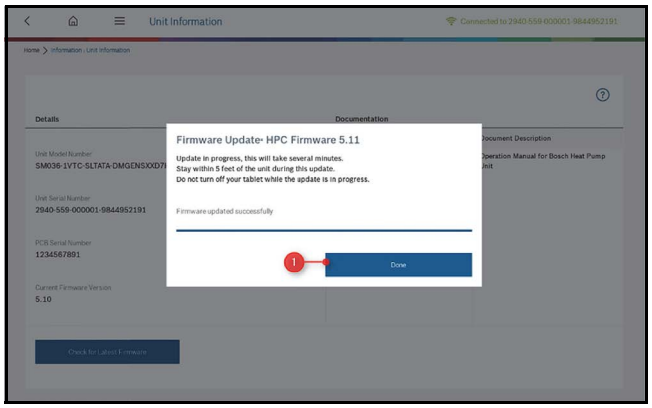


Fig. 31 Firmware Update Progress

13. When the firmware update completes, click the **Done** button [1].
14. Click the Home icon button to display the Home screen.

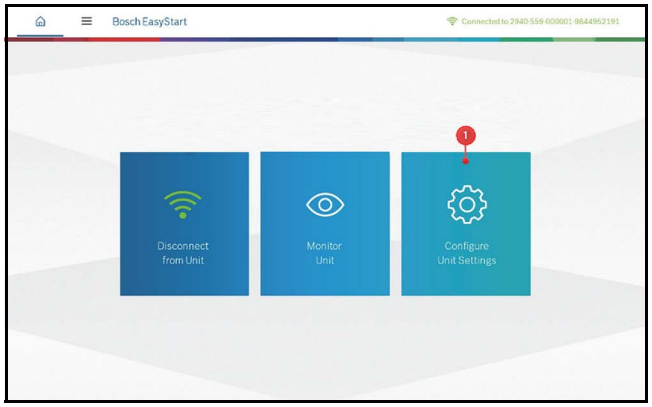


Fig. 32 Configure Unit Settings [1]

15. Click **Configure Unit Settings**. The Configure Unit Settings screen displays. See the list of unit settings in the figure below.

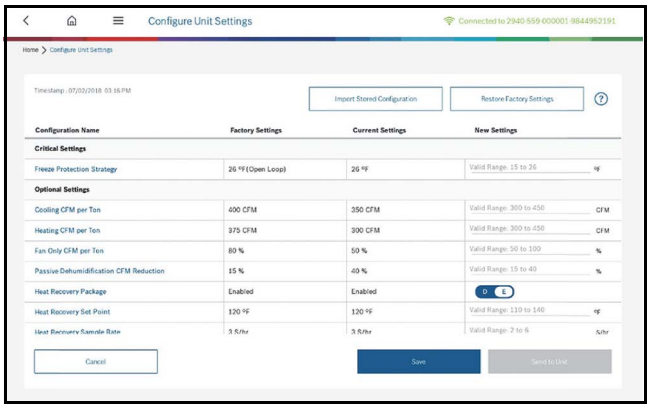


Fig. 33 Configure Unit Settings Screen

16. Enter the appropriate settings for the device. Pay close attention to make sure the Model and Serial numbers in the app match the model and serial numbers of the device.

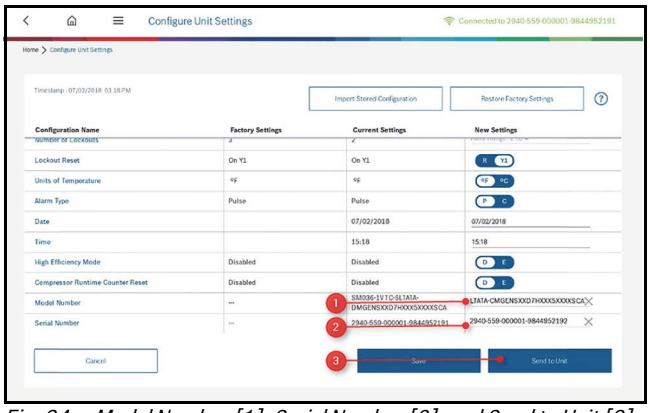


Fig. 34 Model Number [1], Serial Number [2], and Send to Unit [3]

17. Click the **Save** button to save the configuration profile with the information entered.
18. Click the **Send to Unit** button [3] to write the changes to the unit.

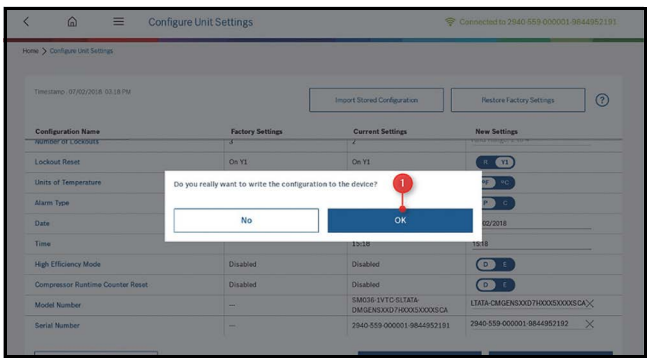


Fig. 35 Confirm Sending the Configuration Changes to the Unit

19. Click OK [1] to write the configuration to the unit. Once this is completed, your controller has been successfully replaced and your appliance is ready to use.

WIRING DIAGRAMS

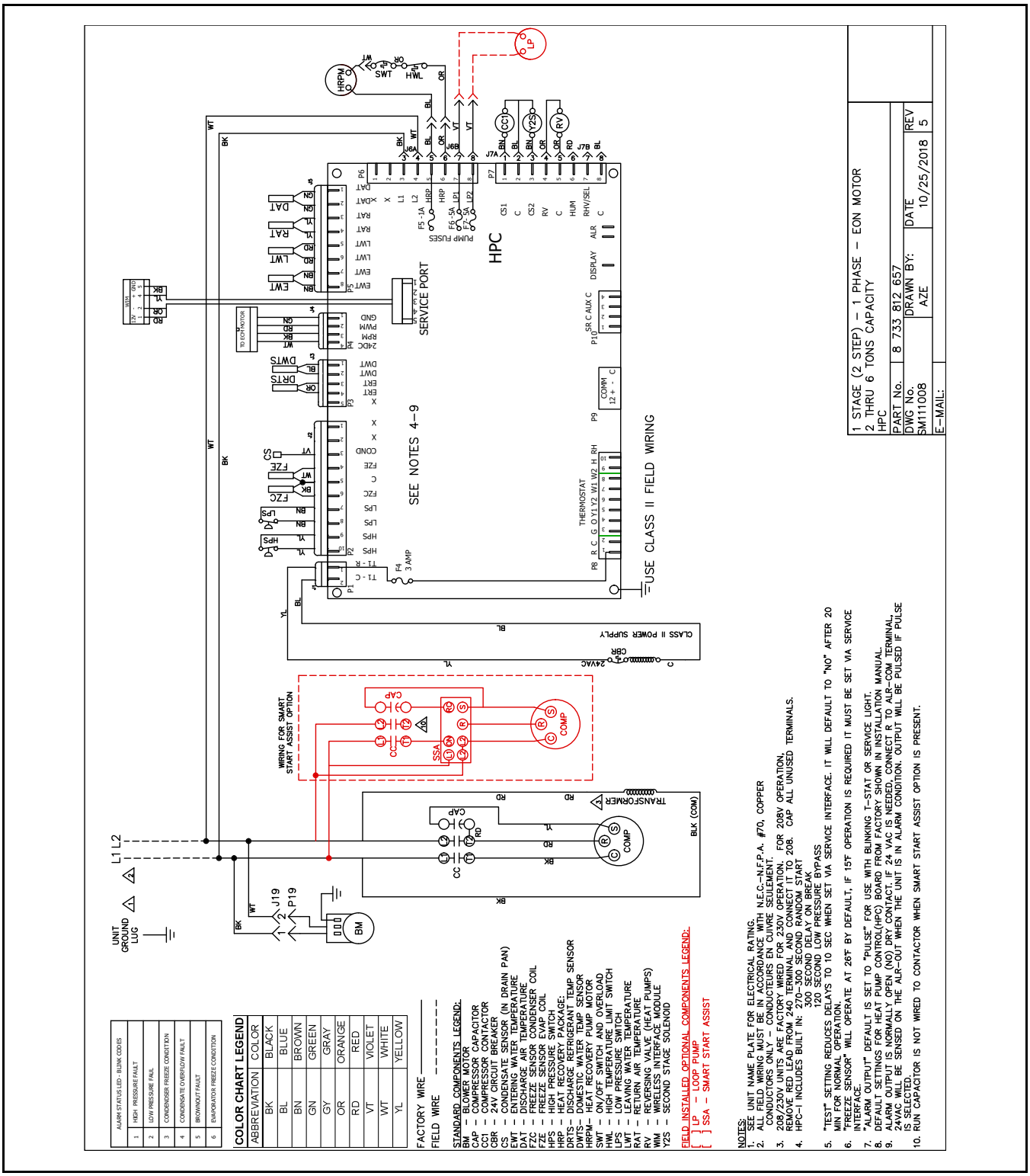


Fig. 36 One Stage (2-Step) Single-Phase Unit with EON Motor

FOR REFERENCE ONLY: Actual unit wiring may vary from this example. Always refer to the wiring diagram attached to the unit.

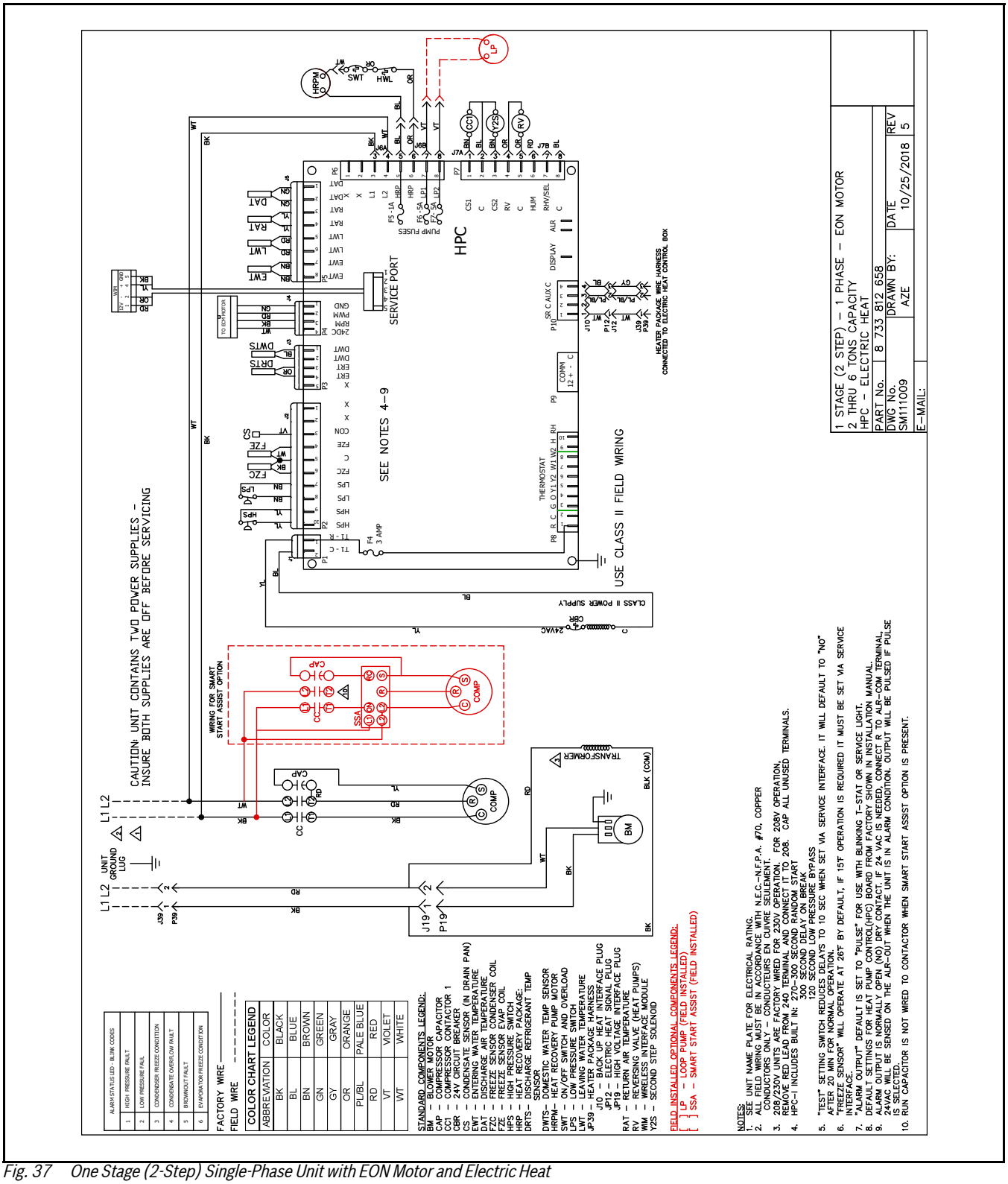


Fig. 37 One Stage (2-Step) Single-Phase Unit with EON Motor and Electric Heat

FOR REFERENCE ONLY: Actual unit wiring may vary from this example. Always refer to the wiring diagram attached to the unit.

ELECTRICAL BOX

Typical Layout

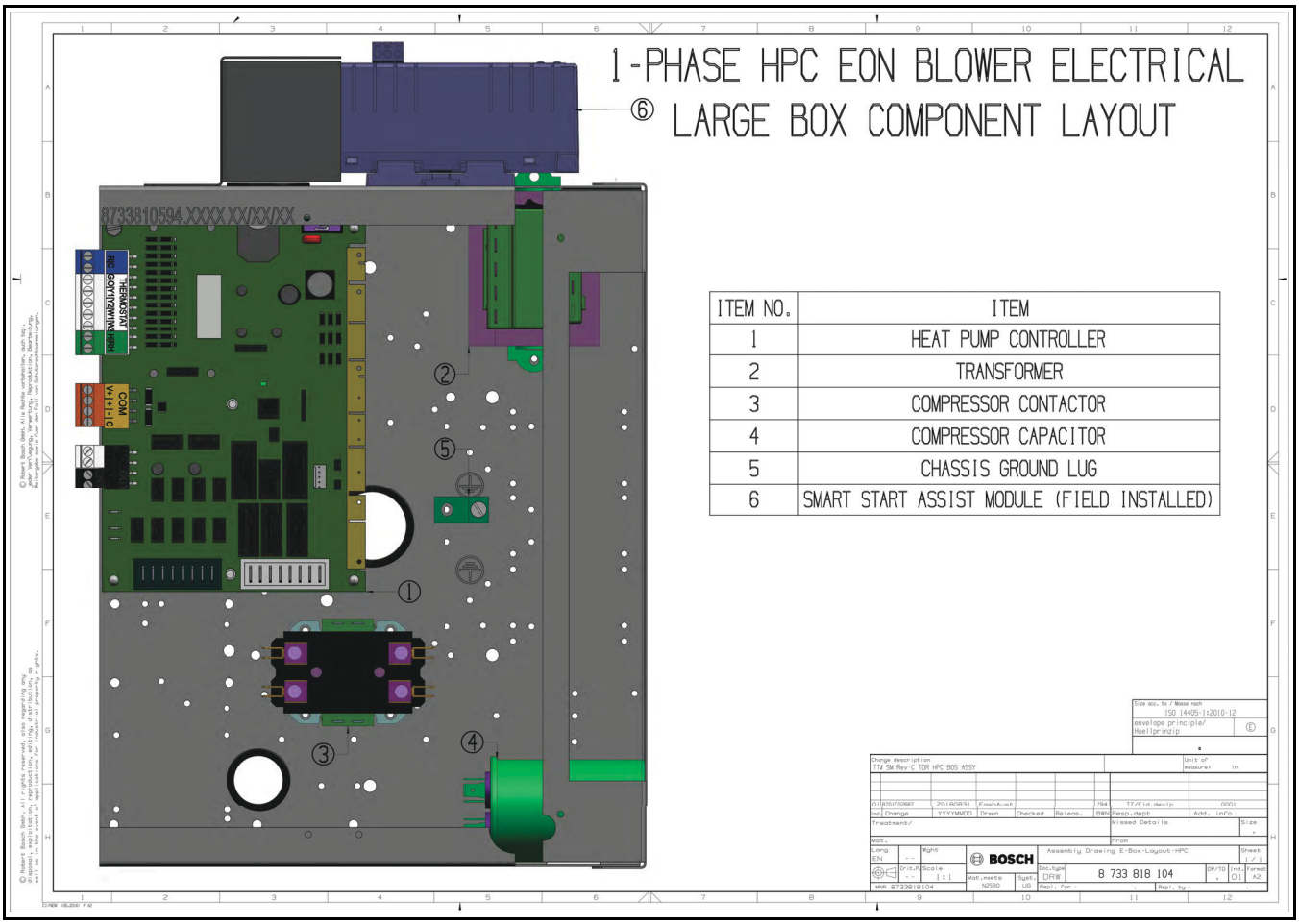


Fig. 38 Typical Electrical Box Layout

THERMOSTAT CONNECTIONS

The HPC is equipped with a standard coded Thermostat interface connectors. Refer to the figures below.

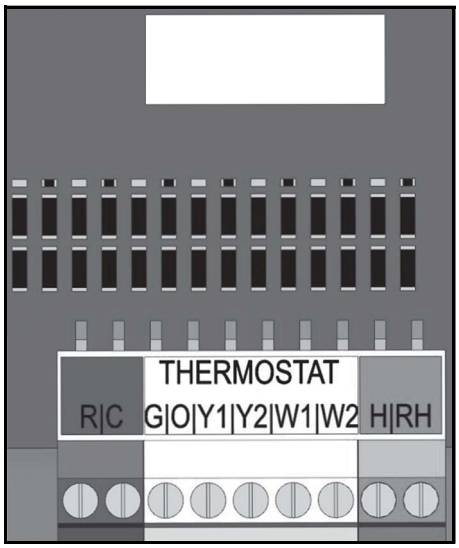


Fig. 39 HPC Thermostat Connectors

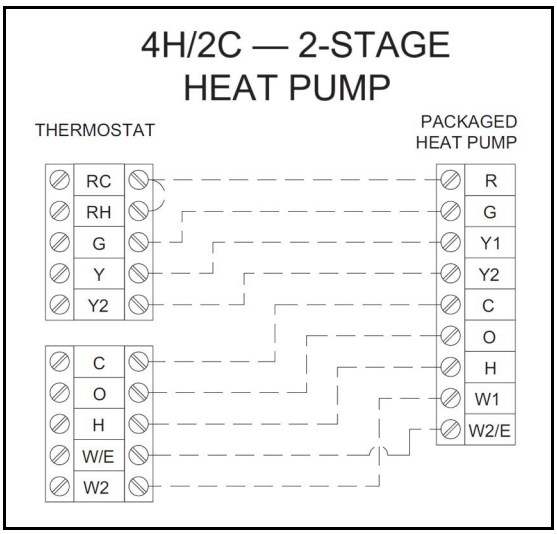


Fig. 40 Generic Thermostat Connections

When using a 2-cool, 3-heat thermostat both the W1 & W2 on the Heat Pump and W2 & EM on the thermostat must be connected together via a jumper.

The HPC also provides visual indication (green LED) when the Thermostat has a call for a signal.

ALARM TERMINAL WIRING

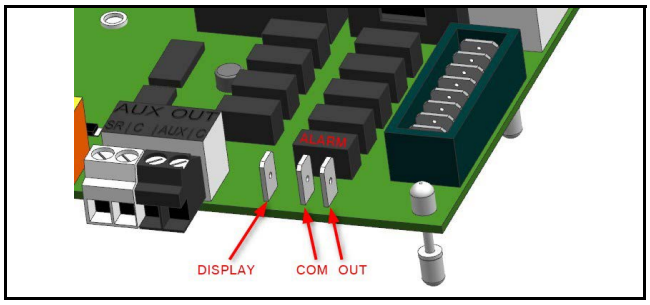


Fig. 41 Alarm Terminal Connectors on the HPC Board

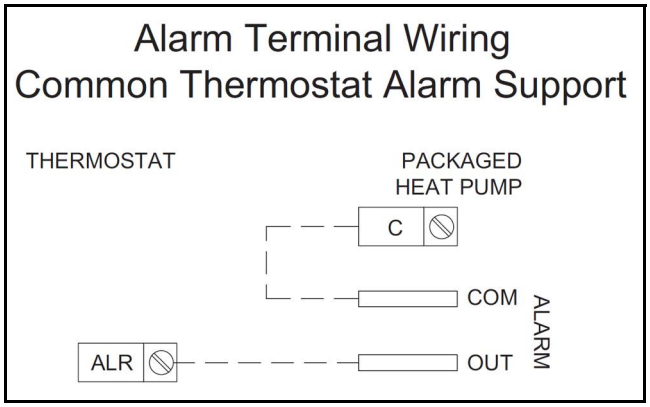


Fig. 42 Generic Thermostat Connections

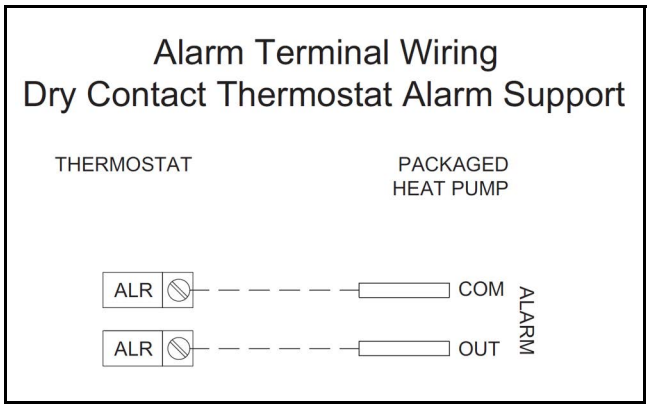


Fig. 43 Alarm Support for Dry Contact Thermostats

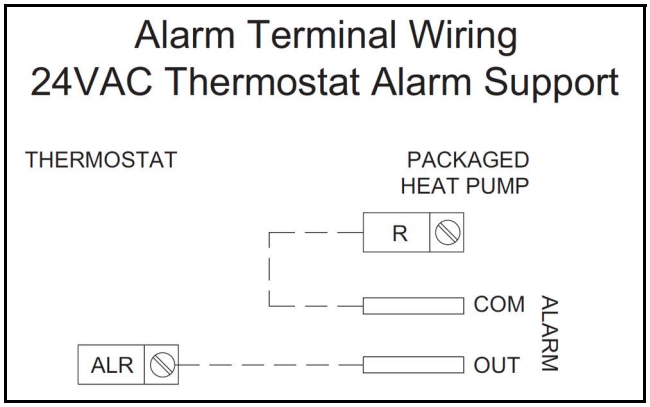


Fig. 44 Alarm Support for 24VAC Thermostats

TERMINOLOGY

Acronyms

AHJ — Authority Having Jurisdiction

APP — Application

ASC — Anti-Short Cycle

CFM — Cubic Feet per Minute

CLG — Cooling

CS1/2 — Compressor Stage 1/2

DAT — Discharge Air Temperature

DRT — Discharge Refrigerant Temperature

DWT — Domestic Water Temperature

EWT — Entering Water Temperature

FZC — Freeze Coax Temperature

HP — Heat Pump

HPC — Heat Pump Controller

HPEEPROM — Heat Pump Electrically-Erasable Programmable Read-Only Memory

HPS — High-Pressure Switch

HRP — Heat Recovery Package

HTG — Heating

IOM — Installation, Operation, and Maintenance Manual

LED — Light Emitting Diode

LLWPC — Low-Loop Water Protection Control

LPS — Low-Pressure Switch

LWT — Leaving Water Temperature

NO — Normally Open

PCB — Printed Circuit Board

PCBA — Printed Circuit Board Assembly

QR — Quick Response

(R/A) — Return Air

RAT — Return Air Temperature

RH — Relative Humidity

RHS — Relative Humidity Sensor

RTC — Real-Time Clock

SSID — Service Set Identifier

WDT — Watch Dog Timer

Wi-Fi — Wireless Network

WIM — Wireless Interface Module

Terms

Conditioned space — Space within a building provided with heated or cooled air or both (or surfaces) and, where required, with humidification or dehumidification means to maintain conditions for an acceptable thermal environment.

Decommissioning — Means the final shut-down and removal from operation or usage of a product or piece of equipment containing fluorinated greenhouse gases.

Discharge Pressure — Referring to the pressure leaving compressor

Reclamation — Means the reprocessing of a recovered fluorinated greenhouse gas in order to match the equivalent performance of a virgin substance, taking into account its intended use.

Recovery — Referring to the collection and storage of fluorinated-greenhouse gases from products (including containers and equipment) during maintenance or servicing or prior to the disposal of the products or equipment.

Recycling — Referring to the reuse of a recovered fluorinated-greenhouse gas following a basic cleaning process.

Repair — Referring to the restoration of damaged or leaking products or equipment that contain, or whose functioning relies upon, fluorinated-greenhouse gases, involving a part containing or designed to contain such gases.

Suction Pressure — Referring to the pressure entering compressor

DECOMMISSIONING INFORMATION

Only trained and qualified technicians are allowed to decommission and dispose of equipment following the requirements of the Local Authority Having Jurisdiction (AHJ).

WARNING: Decommissioning of this equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, service, or disconnect the equipment.

Protecting the Environment

By disposing of this product correctly you will help ensure that the waste undergoes the necessary treatment, recovery, and recycling, thus preventing potentially negative effects on the environment and human health, which could otherwise arise due to inappropriate waste handling.

Components

Many parts in the Heat Pump can be fully recycled at the end of the product life. Contact your city authorities for information about the disposal of recyclable products.

Refrigerant

At the end of the service life of this appliance, and prior to its environmental disposal, a person qualified to work with refrigerant circuits and AHRI Certified® Refrigerant Recovery/Recycling Equipment must recover the refrigerant from within the sealed system.

Hazardous Waste

Some components in the Heat Pump may be considered as hazardous waste, such as batteries. For their disposal contact your local household hazardous waste collection site.

CHECK-OUT SHEET

Customer Data

Customer Name _____ Date _____

Address _____

_____

Phone _____ Unit Number _____

Unit Nameplate Data

Unit Make _____

Model Number _____ Serial Number _____

Refrigerant Charge (oz) _____

Compressor: RLA _____ LRA _____

Blower Motor: FLA (or NPA) _____ HP _____

Maximum Fuse Size (Amps) _____

Maximum Circuit Ampacity _____

Operating Conditions

	Cooling Mode	Heating Mode
Entering / Leaving Air Temp	_____/_____	_____/_____
Entering Air Measured at:	_____	_____
Leaving Air Measured at:	_____	_____
Entering / Leaving Fluid Temp	_____/_____	_____/_____
Fluid Flow (gpm)	_____	_____
Compressor Volts / Amps	_____/_____	_____/_____
Blower Motor Volts / Amps	_____	_____
Source Fluid Types	_____	_____
Fluid Flow (gpm)*	_____	_____
Fluid-Side Pressure Drop*	_____	_____
Suction / Discharge Pressure (psig)*	_____ /_____	_____/_____
Suction / Discharge Temp*	_____/_____	_____/_____
Suction Superheat*	_____	_____
Entering TXV / Cap Tube Temp*	_____	_____
Liquid Subcooling*	_____	_____

* Required for Troubleshooting ONLY

Auxiliary Heat

Unit Make _____

Model Number _____ Serial Number _____

Max Fuse Size (Amps) _____

Volts / Amps _____

Entering Air Temperature _____

Leaving Air Temperature _____

EASYSTART CHECK-OUT SHEET

EasyStart Configuration	Default Value	New Value
Freeze Protection Strategy	26°F	
Cooling CFM per TON	400 CFM/Ton	
Heating CFM per TON	375 CFM/Ton	
Fan Only CFM reduction	80%	
Dehumidification CFM reduction	15%	
Heat Recover Package	Disabled	
Heat Recovery Setpoint	120°F	
Heat Recovery Sample Rate	3 Samples/Hr	
Electric Heat Size	None	
Low-Loop Water Protection	Disabled	
Low-Loop Control Setpoint	34°F	
Loop Pump Compressor Delay	30s	
Mode of Compressor Operation	Comfort	
Down-Staging	Unlatched	
Number of Lockouts	3 Strikes	
Lockout Reset	(Y1)	
Units of Temperature	°F	
Alarm Type	Pulse	
High-Efficiency Mode	Disabled	

NOTES

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