

PHNIX TROUBLESHOOTING GUIDE – HP51202T/HP50952T



HAYWARD®

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51301743001 REV A

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UNIT FEATURES



- HP51202T
- Variable Speed DC Compressor
- Unified Inverter Board
- PC-1004G Main Board
- User Display: “CP203”
- Still sold, Nov. 2026+ models come with “BOOST mode” feature, selectable in the user display – a temporary compressor frequency boost/ramp up that helps obtain target setpoint faster.



- HP50951T/HP50952T
- Variable Speed DC Compressor
- Separate Inverter Boards for Fan and Compressor
- Jan 2024+ **Discontinued**
- PC-1004G Main Board
- User Display: “CP203”

The main difference is the 120kBTU (HP51202T) has a larger capacity compressor and unified inverter board.

The 95kBTU model has two separate boards for speed control i.e. compressor and fan motor, and a smaller capacity compressor.

Always read the data plate to figure out which model you are servicing.

HP50952T = rated 95,000 BTU

HP51202T = rated 120,000 BTU

HISTORY



- HP51202T
- Debuted 2022-current
- Variable speed inverter board: VSP Compressor & VSP Fan Motor
- 120,000 BTU

The inverter boards for fan/compressor were separate, and later unified into one main inverter board.

2022-2023: Two boards, fan board, and compressor board

2024+: One board – controls both fan / compressor



- HP50951T: Sold 2022, discontinued – audit failure
- HP50952T: 2022-2024
- Variable Speed DC Compressor
- Separate Inverter Boards for Fan and Compressor

NOTICE TO SERVICER

HAYWARD TECHNICAL SUPPORT HOTLINE: 908-355-7995

- Heat pumps are ONLY be serviced by EPA 608 licensees with HVAC/R training or having completed Hayward technical training for this product line.
- Hayward microchannel heat pumps are designed to operate on 230/240VAC supply only. Only use copper supply wires when connecting power to the contactor line-side.
- For troubleshooting electrical components, during which live energization of the heat pump is required, only qualified service personnel may perform the testing/troubleshooting.
- We recommend discharging the voltage from: the fan capacitor AND compressor capacitor prior to measuring capacitance and ensure the unit breaker is OFF during this process.
- During diagnostic, Hayward recommends technicians shut off power to the breaker, unless unit power must remain for diagnostics like checking line voltage, measuring amp draw.
- When in doubt, stop what you are doing, consult with a professional service technician in your company or call Hayward technical support.

All technicians performing work which involves any refrigerant circuit related access, *shall at minimum require:*

a) EPA 608 Type II Certification

Or

b) EPA 608 Universal Certification



HAYWARD POOL PRODUCTS

NOTICE – If a GFCI breaker is required by code, then only use Siemens second generation GFCI breaker (QFxxxA). This GFCI breaker has been tested and found to not nuisance trip. GFCI nuisance trips are not covered under warranty.



WARNING - ELECTRICAL

All wiring connections to the heater must be made in accordance with the latest edition of the NFPA 70, unless local code requirements specify otherwise.

In **Canada**, all wiring connections must follow CSA C22.1 Canadian Electrical Code, Part 1.

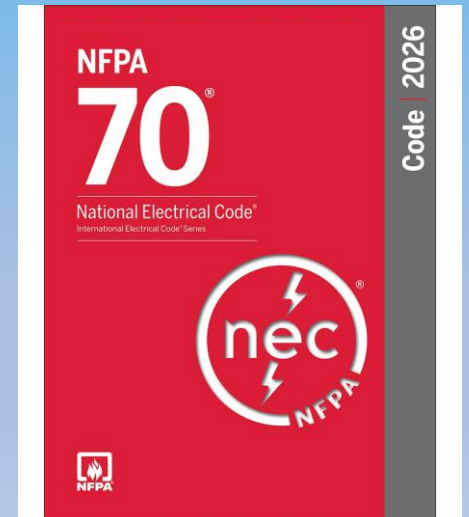
GROUNDING AND BONDING NOTICE

The heater must be electrically grounded and bonded in accordance with local codes or, in the absence of local codes, with National Electrical Code, ANSI/NFPA 70. Wiring connections must be made as shown in the wiring diagram found on the control box mounting bracket.

GROUND LUG: Located in electrical enclosure.

BONDING LUG: Connect a No. 8 AWG (8.4 mm²) solid **copper bonding wire to the grounding lug on the heat pump CHASSIS** and to all metal parts of swimming pool or spa, and to all electrical equipment, metal piping (except gas piping), and conduit within 5 ft. (1.5 m) of inside walls of swimming pool or spa.

Reference NEC codes for all wiring standards including, but not limited to, grounding, bonding and other general wiring procedures.



GROUNDING AND BONDING LOCATIONS



Ground



Bonding
Lug



RECOMMENDED TOOLS

- Refrigerant gauges
- Temperature clamps
 - Vacuum Pump
- Refrigerant Scale
 - Leak Detector
 - Backprobing kit
- Multimeter with Amp Clamp/Capacitance function/in-rush meter
 - Flashlight
 - Nitrogen
- Vacuum Pump
- Recovery Machine
- Recovery cylinder
 - Nitrogen tank
- Basic hand tools
 - Impact driver

GROUNDING AND BONDING INFORMATION

Equipment bonding is the intentional joining of metal parts to create a continuous electrical path. It ensures that exposed metal surfaces (like equipment housings or junction boxes) remain at the same electrical potential, preventing electric shock and providing a path to safely trip circuit breakers during a fault.

Key Concepts

- **Equalizing Potential:** Bonding connects exposed conductive parts together. If an electrical wire accidentally touches the metal casing of an appliance, the bonding ensures the casing does not become dangerously energized compared to its surroundings.
- **Creating a Fault Path:** By tying all metal parts to a continuous loop, bonding provides an effective path for electricity to flow back to the power source. This ensures that overcurrent devices, like fuses or circuit breakers, immediately trip and shut off the power.
- **Bonding vs. Grounding:** These terms are often used interchangeably but serve different roles.
 - **Bonding:** Connects equipment, enclosures, and metal parts together to establish electrical continuity.
 - **Grounding:** Connects those bonded systems to the earth to neutralize surges and lightning strikes

UNIT DATA PLATE AND AHRI RATING HP50952T/HP50951T

HEAT PUMP POOL HEATER

MODEL	HP50952T
RATED VOLTAGE/ PHASE/ FREQUENCY	208/230V~/60Hz
MOISTURE RESISTANCE	IPX4
TOTAL LOAD	30.7A
NET WEIGHT	114kg(251lb.)
COMPRESSOR RATING LOAD	29A
FAN MOTOR RATING LOAD	1.7A
MIN. CIRCUIT AMPACITY	43A
MAX. FUSE	60A
HEATING OPERATING WATER TEMP.	9~40°C(48.2~104°F)
COOLING OPERATING WATER TEMP.	9~30°C(48.2~86°F)
MAX. OPERATING PRESSURE(LOW SIDE)	1.5MPa(217.5PSIG)
MAX. OPERATING PRESSURE(HIGH SIDE)	3.6MPa(522PSIG)
MAX. ALLOWEABLE PRESSURE	4.4MPa(638PSIG)
DESIGN WATER PRESSURE	1.0MPa(145PSIG)
RECOMMENDED WATER FLOW VOLUME	158L/min(41.8gal/min)
WATER PRESSURE DROP	15kPa(2.18PSIG)
REFRIGERANT/ PROPER INPUT	R410A/2300g(5.06lb.)
REFRIGERANT SAFETY GROUP CLASSIFICATION	A1
OUTDOOR USE	
FACTORY NUMBER(ON THE BAR CODE)	
SERIAL NUMBER (ON THE BAR CODE)	
MANUFACTURED DATE(ON THE BAR CODE)	



Certificate of Product Ratings

AHRI Certified Reference Number : 209553712 Date : 07-10-2026 Model Status : Production Stopped

Brand Name : HEATPRO

Model Number (For Split System - Air side or for Packaged Unit) : HP50952T

AHRI Type : SPPH-H/C

Refrigerant Type : R-410A

Rated as follows in accordance with AHRI Standard 1160-2022 (I-P), Performance Rating of Heat Pump Pool Heaters and subject to verification of rating accuracy by AHRI-sponsored, independent, third-party testing:

High Air Temperature High Humidity Heating Capacity, btuh : 97000

High Air Temperature High Humidity COP : 5.3

High Air Temperature Mid Humidity Heating Capacity, btuh : 92000

High Air Temperature Mid Humidity COP : 5.1

Low Air Temperature Mid Humidity Heating Capacity, btuh : 60000

Low Air Temperature Mid Humidity COP : 4.0

UNIT DATA PLATE AND AHRI RATING HP51202T

HEAT PUMP POOL HEATER

MODEL	HP51202T
RATED VOLTAGE/ PHASE/ FREQUENCY	208/230V~/60Hz
MOISTURE RESISTANCE	IPX4
TOTAL LOAD	31.7A
NET WEIGHT	130kg(286lb.)
COMPRESSOR RATING LOAD	30A
FAN MOTOR RATING LOAD	1.7A
MIN. CIRCUIT AMPACITY	45A
MAX. FUSE	60A
HEATING OPERATING WATER TEMP.	9~40°C(48.2~104°F)
COOLING OPERATING WATER TEMP.	9~30°C(48.2~86°F)
MAX. OPERATING PRESSURE(LOW SIDE)	1.5MPa(217.5PSIG)
MAX. OPERATING PRESSURE(HIGH SIDE)	3.6MPa(522PSIG)
MAX. ALLOWEABLE PRESSURE	4.4MPa(638PSIG)
DESIGN WATER PRESSURE	1.0MPa(145PSIG)
RECOMMENDED WATER FLOW VOLUME	191L/min(50.5gal/min)
LOCKED ROTOR AMPS	50A
WATER PRESSURE DROP	15kPa(2.18PSIG)
REFRIGERANT/ PROPER INPUT	R410A/4200g(9.24lb.)
REFRIGERANT SAFETY GROUP CLASSIFICATION	A1
OUTDOOR USE	
FACTORY NUMBER(ON THE BAR CODE)	
SERIAL NUMBER (ON THE BAR CODE)	
MANUFACTURED DATE(ON THE BAR CODE)	



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Certificate of Product Ratings

AHRI Certified Reference Number : 208793933 Date : 07-10-2026 Model Status : Active

Brand Name : HEATPRO

Model Number (For Split System - Air side or for Packaged Unit) : HP51202T

AHRI Type : SPPH-H/C

Refrigerant Type : R-410A

Rated as follows in accordance with AHRI Standard 1160-2022 (I-P), Performance Rating of Heat Pump Pool Heaters and subject to verification of rating accuracy by AHRI-sponsored, independent, third-party testing:

High Air Temperature High Humidity Heating Capacity, btuh : 120000

High Air Temperature High Humidity COP : 5.8

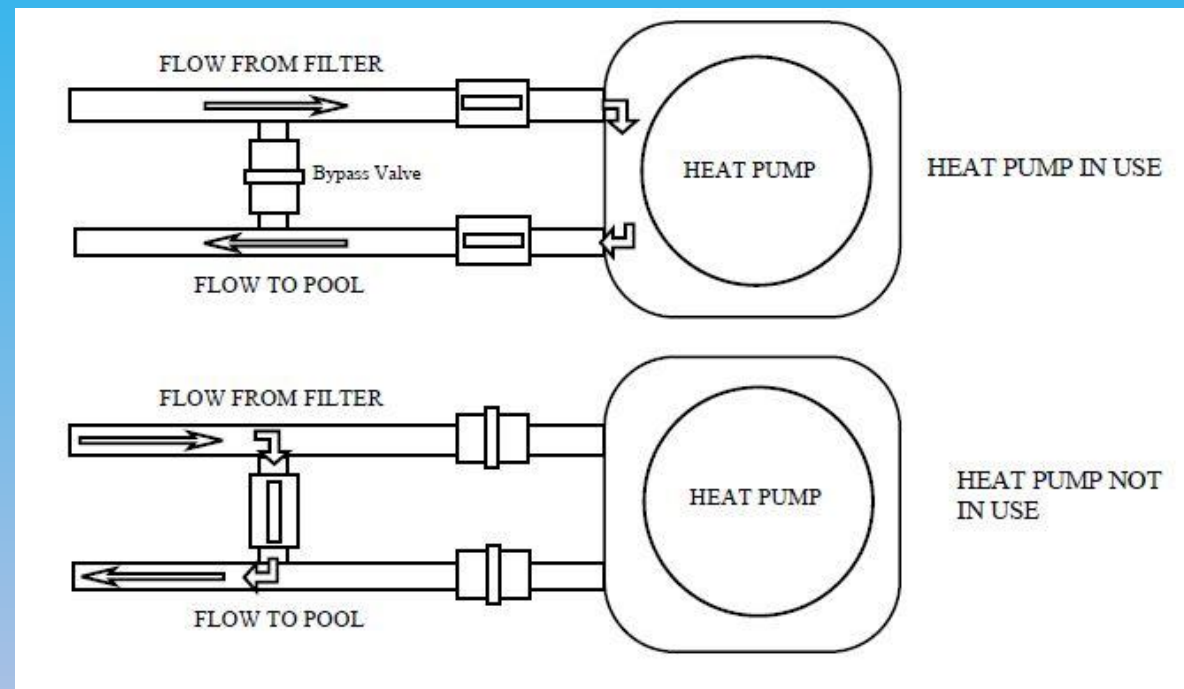
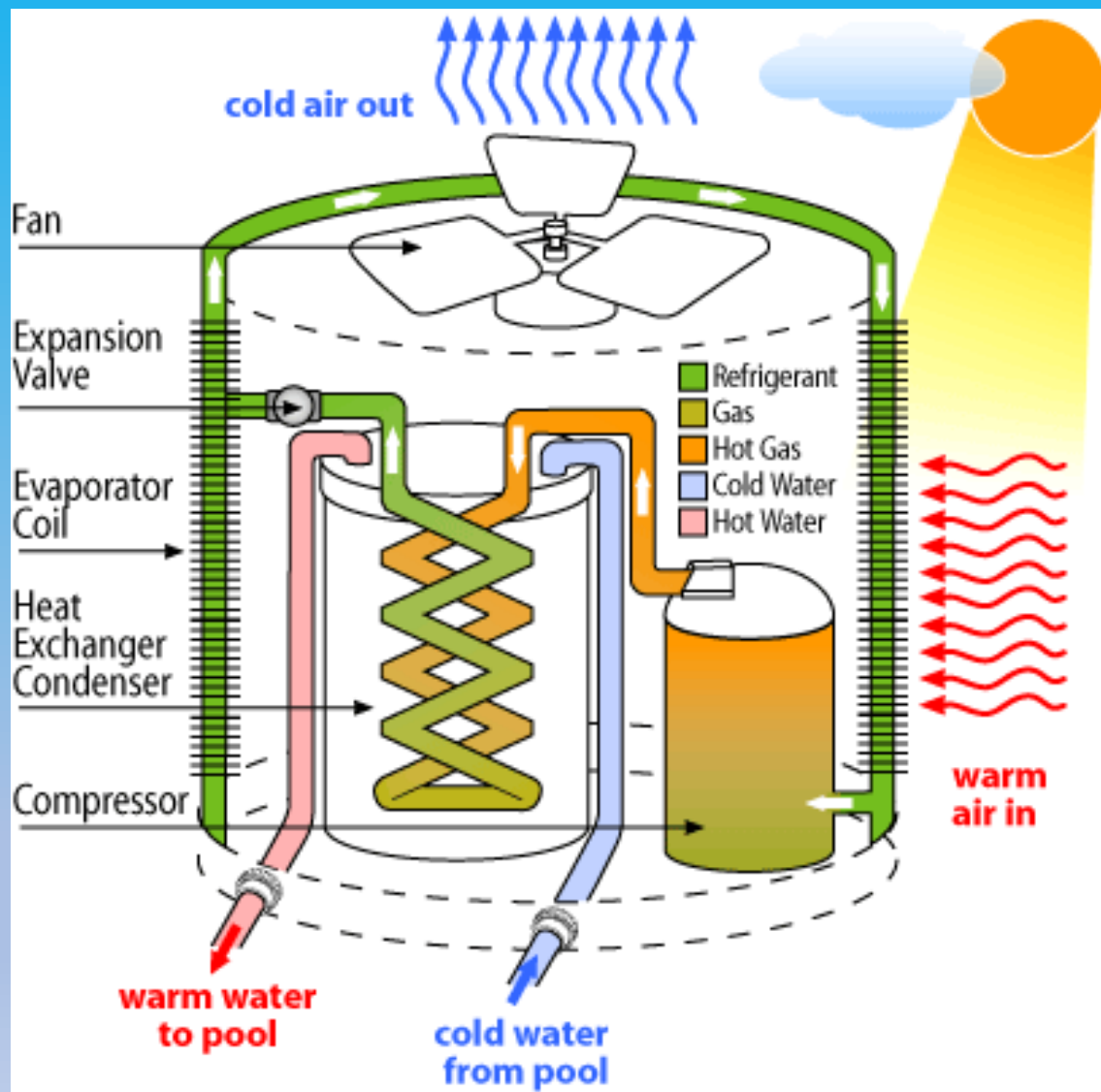
High Air Temperature Mid Humidity Heating Capacity, btuh : 112000

High Air Temperature Mid Humidity COP : 5.5

Low Air Temperature Mid Humidity Heating Capacity, btuh : 65000

Low Air Temperature Mid Humidity COP : 4.0

HEAT PUMP POOL HEATING PART 1

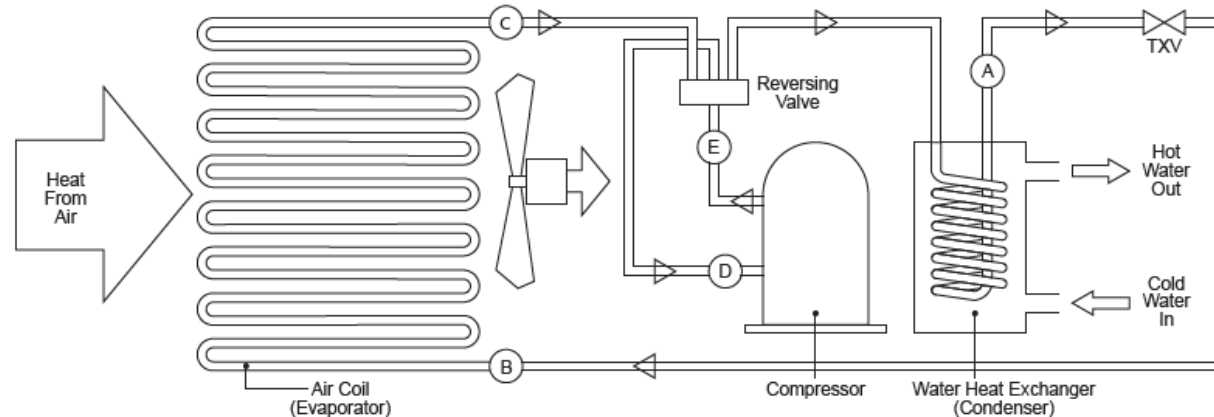


HEAT PUMP POOL HEATING PART 2

Operation

GENERAL: After completing the installation connections to the pool heater, follow the procedures outlined below to ensure that the pool heater is functioning properly. Before proceeding, MAKE CERTAIN there are no water leaks in any plumbing connections or piping and water flow is within the proper flow rate ranges. The heater is equipped with a control system that automatically monitors the water temperature set points and safety devices. As water conditioning is needed, it turns on the compressor to start the appropriate transfer of heat to the water. Figure 12 provides a summary of heater components and their locations in the system. Check that the pump is operating and the system is filled with water prior to starting the heater.

Figure 12: Location of Components (heating operation flow shown)



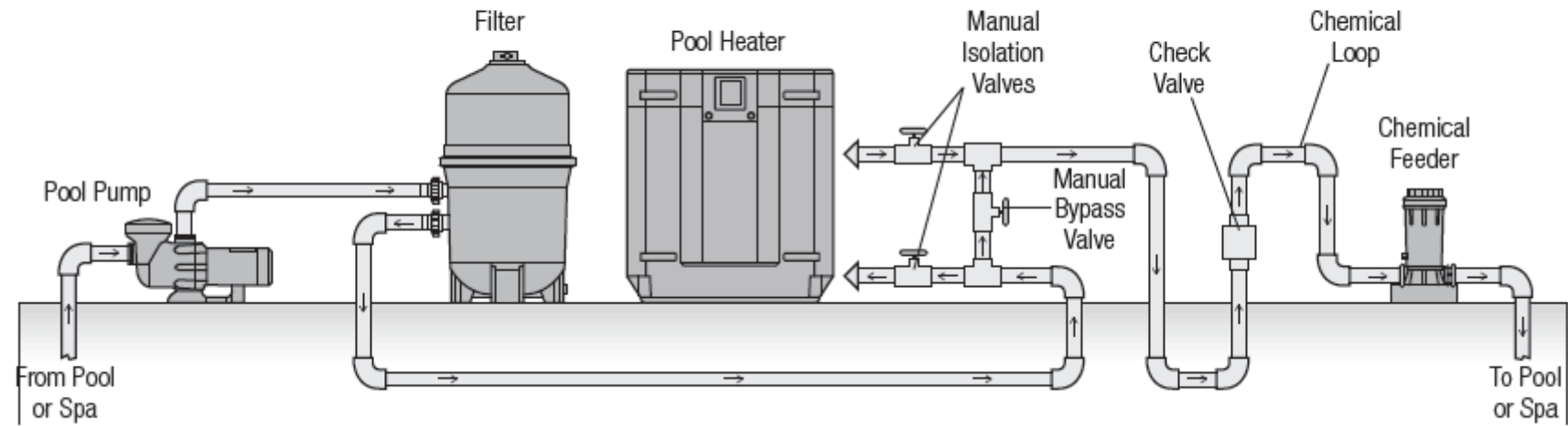
The heat pump takes heat from the environment and uses it to heat the pool water. During heat pump operation, high temperature, high-pressure sub cooled liquid Refrigerant (A) is throttled by Metering Device (TXV) and turned into low temperature, low-pressure saturated liquid (B). The two-phase Refrigerant flows through the Air Coil (Evaporator), where the liquid refrigerant evaporates into vapor by absorbing heat from the surrounding air. At the outlet of the Air Coil (Evaporator) it becomes a low temperature, low- pressure superheated vapor (C). The Compressor receives this flow at the suction line (D), and compresses it into a high temperature, high pressure superheated vapor, which is discharged from the Compressor (E) and flows through the reversing valve into the Water Heat Exchanger (Condenser). The heat carried by the flow is then released to the pool water. At the same time, the high temperature, high-pressure superheated vapor is then condensed back to high-pressure sub cooled liquid (A), which completes the cycle. The water, which is being forced through the Water Heat Exchanger (Condenser) by the pool pump, is thus heated as it passes through.

HEAT PUMP PROTECTION FEATURES: These heat pumps are equipped with safeguards that will stop heater operation to protect the unit in case of the following events:

- Excessively high refrigerant pressure
- Excessively high water temperature
- Loss of refrigerant
- Evaporator Freeze-up
- Low Ambient Temperature

PLUMBING LAYOUT DIAGRAM

Figure 5: Pad Plumbing Layout



OVERVIEW OF TROUBLESHOOTING GUIDE

- FEATURES LIST/UNIT OVERVIEW
- WIRING DIAGRAM
- INPUT/OUTPUTS DIAGRAM
- SERVICE PARTS LIST AND EXPLODED VIEW
- MENU NAVIGATION/BO MODE/OMNI CONNECTION/LOCKOUT
- ERROR CODE SUMMARY
- SEQUENCE OF ERROR CODES AND FLOW-CHARTS
- HEAT PUMP DIAGRAM OVERVIEW GENERAL
- COMPONENT TROUBLESHOOTING SLIDES

HEAT PUMP POOL HEATER	
MODEL	HP51202T
RATED VOLTAGE/ PHASE/ FREQUENCY	208/230V~/60Hz
MOISTURE RESISTANCE	IPX4
TOTAL LOAD	31.7A
NET WEIGHT	130kg(286lb.)
COMPRESSOR RATING LOAD	30A
FAN MOTOR RATING LOAD	1.7A
MIN. CIRCUIT AMPACITY	45A
MAX. FUSE	60A
HEATING OPERATING WATER TEMP.	9~40°C(48.2~104°F)
COOLING OPERATING WATER TEMP.	9~30°C(48.2~86°F)
MAX. OPERATING PRESSURE(LOW SIDE)	1.5MPa(217.5PSIG)
MAX. OPERATING PRESSURE(HIGH SIDE)	3.6MPa(522PSIG)
MAX. ALLOWEABLE PRESSURE	4.4MPa(638PSIG)
DESIGN WATER PRESSURE	1.0MPa(145PSIG)
RECOMMENDED WATER FLOW VOLUME	191L/min(50.5gal/min)
LOCKED ROTOR AMPS	50A
WATER PRESSURE DROP	15kPa(2.18PSIG)
REFRIGERANT/ PROPER INPUT	R410A/4200g(9.24lb.)
REFRIGERANT SAFETY GROUP CLASSIFICATION	A1
OUTDOOR USE	
FACTORY NUMBER(ON THE BAR CODE)	
SERIAL NUMBER (ON THE BAR CODE)	
MANUFACTURED DATE(ON THE BAR CODE)	



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HEAT PUMP POOL HEATER	
MODEL	HP50952T
RATED VOLTAGE/ PHASE/ FREQUENCY	208/230V~/60Hz
MOISTURE RESISTANCE	IPX4
TOTAL LOAD	30.7A
NET WEIGHT	114kg(251lb.)
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OUTDOOR USE	
FACTORY NUMBER(ON THE BAR CODE)	
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MANUFACTURED DATE(ON THE BAR CODE)	

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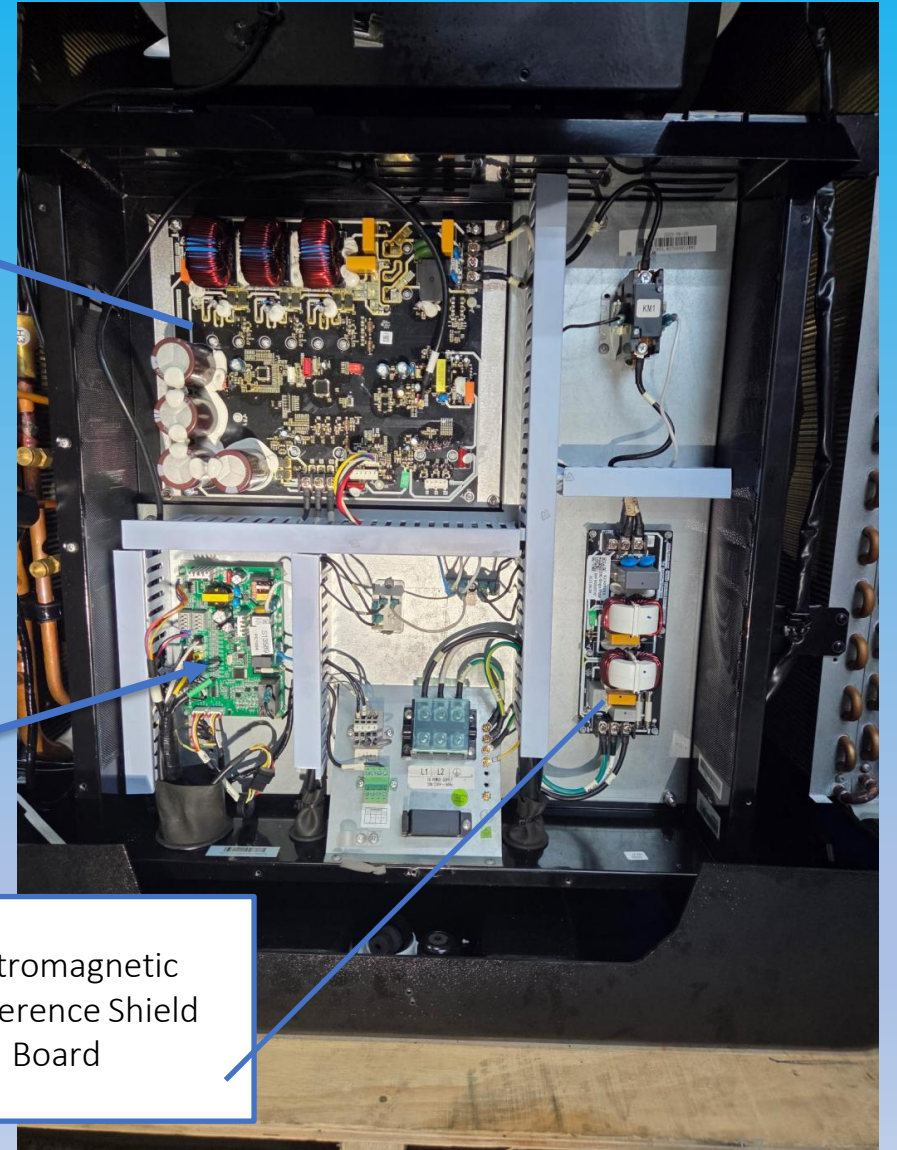
FEATURES OF THE 120K/95K BTU HEAT PUMPS

CP203 USER
INTERFACE



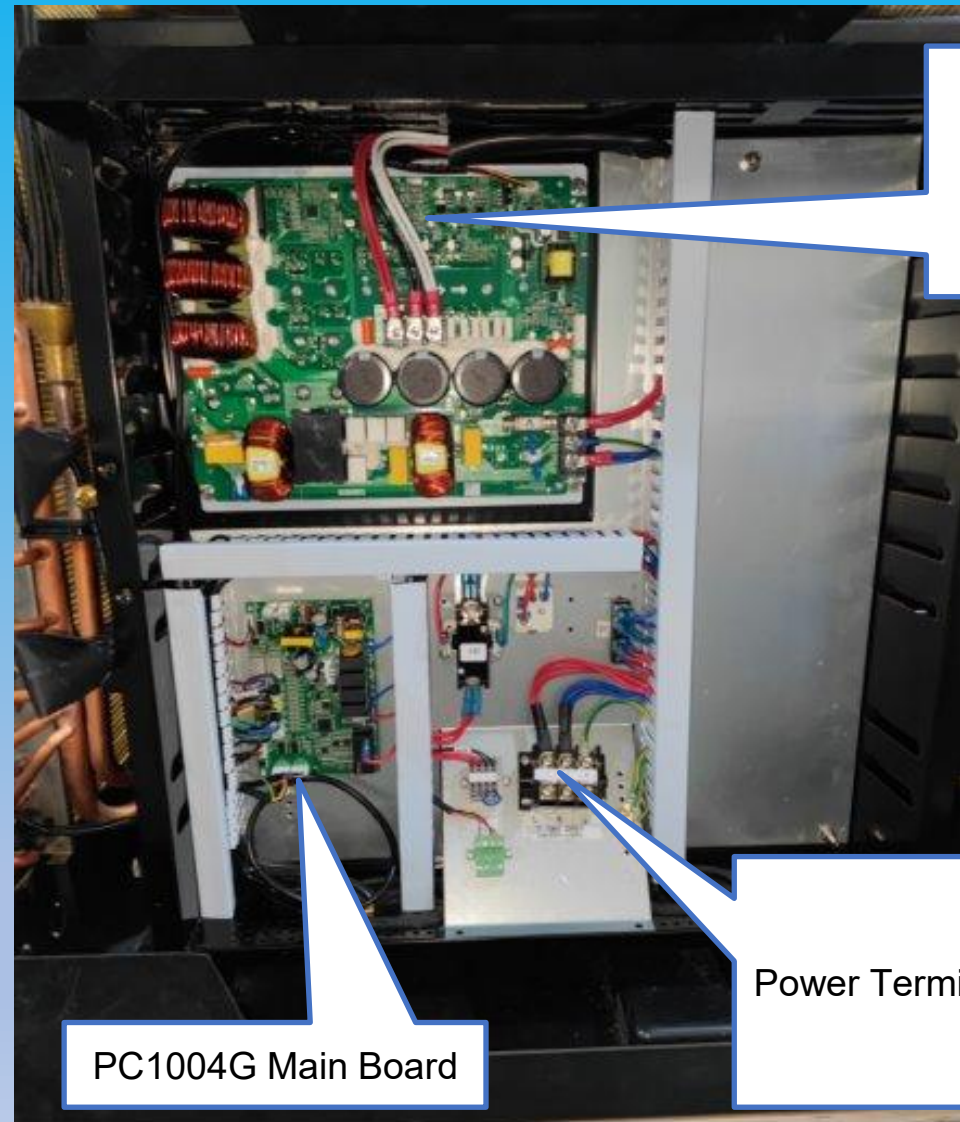
INVERTER BOARD

PC1004-G MAIN
BOARD



Electromagnetic
Interference Shield
Board

UNIT FEATURES – LATE MODEL AND CURRENT



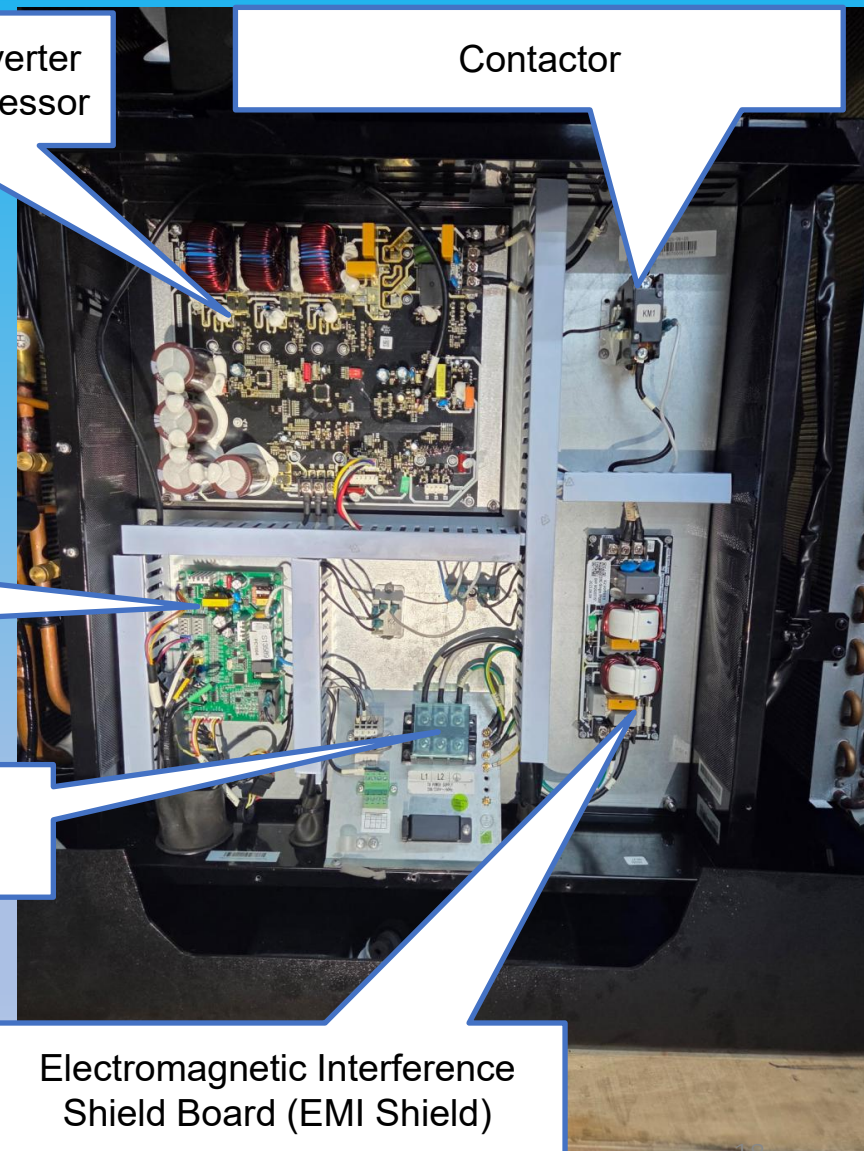
Older unified inverter (DC fan / DC compressor)

PC1004G Main Board

Power Terminal

Main Board model "PC-1004G"

Power Terminal

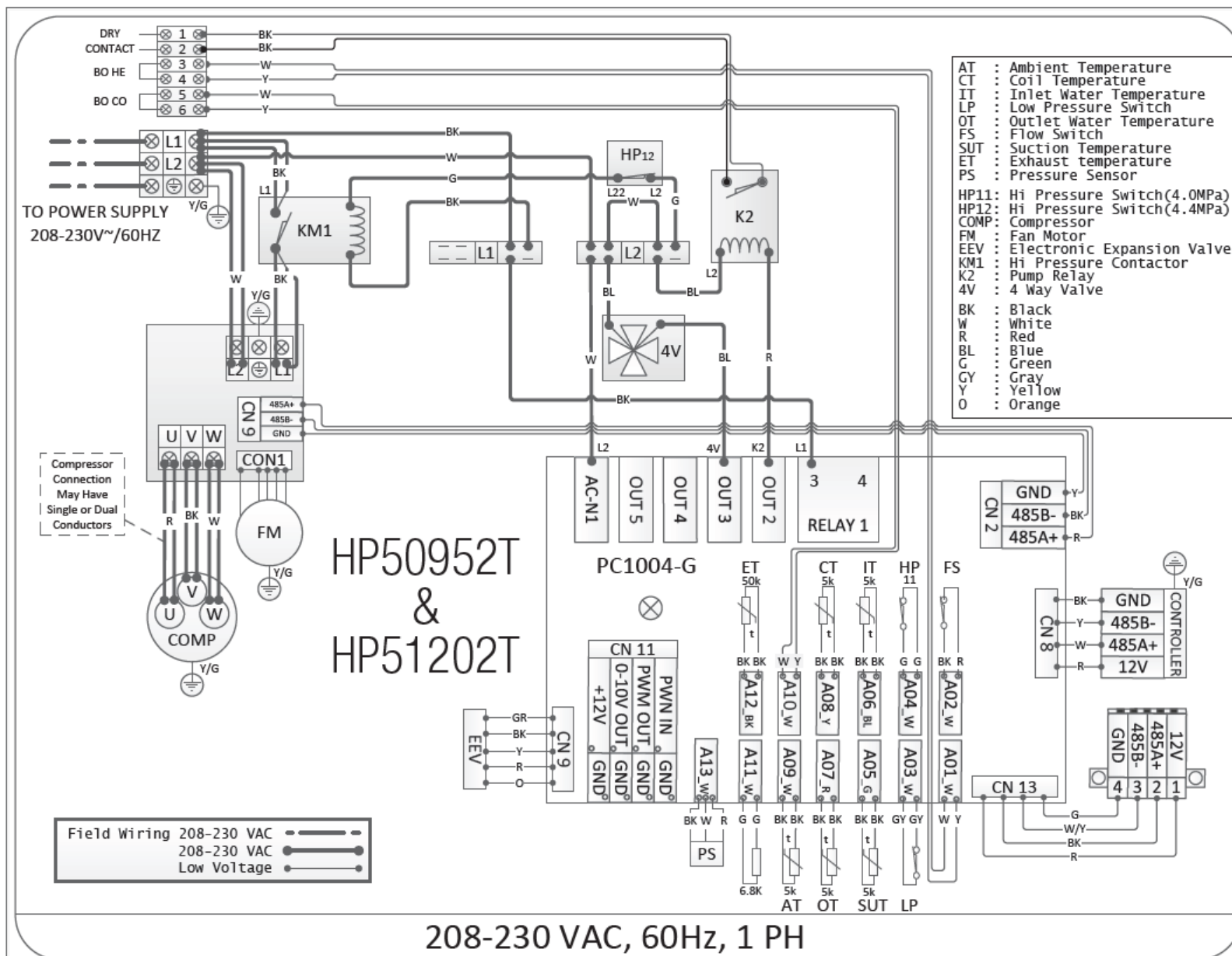


Current unified inverter board fan + compressor

Contactor

Electromagnetic Interference Shield Board (EMI Shield)

HP51202T – WIRING DIAGRAM

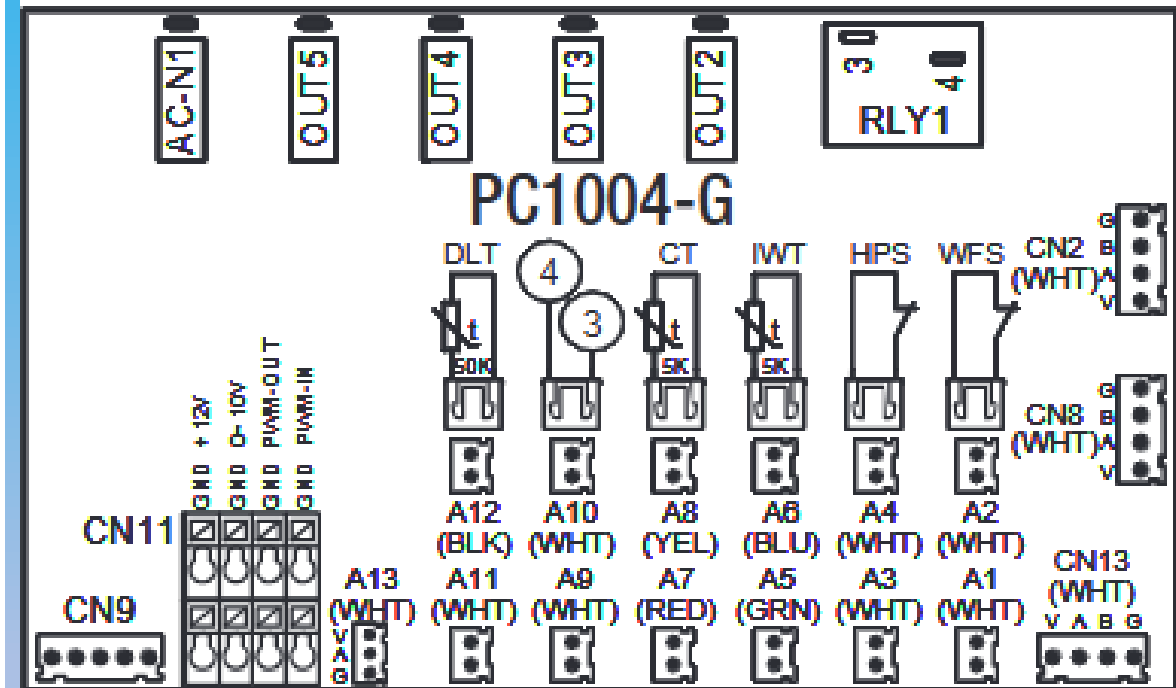


INPUTS AND OUTPUTS OF MAIN BOARD

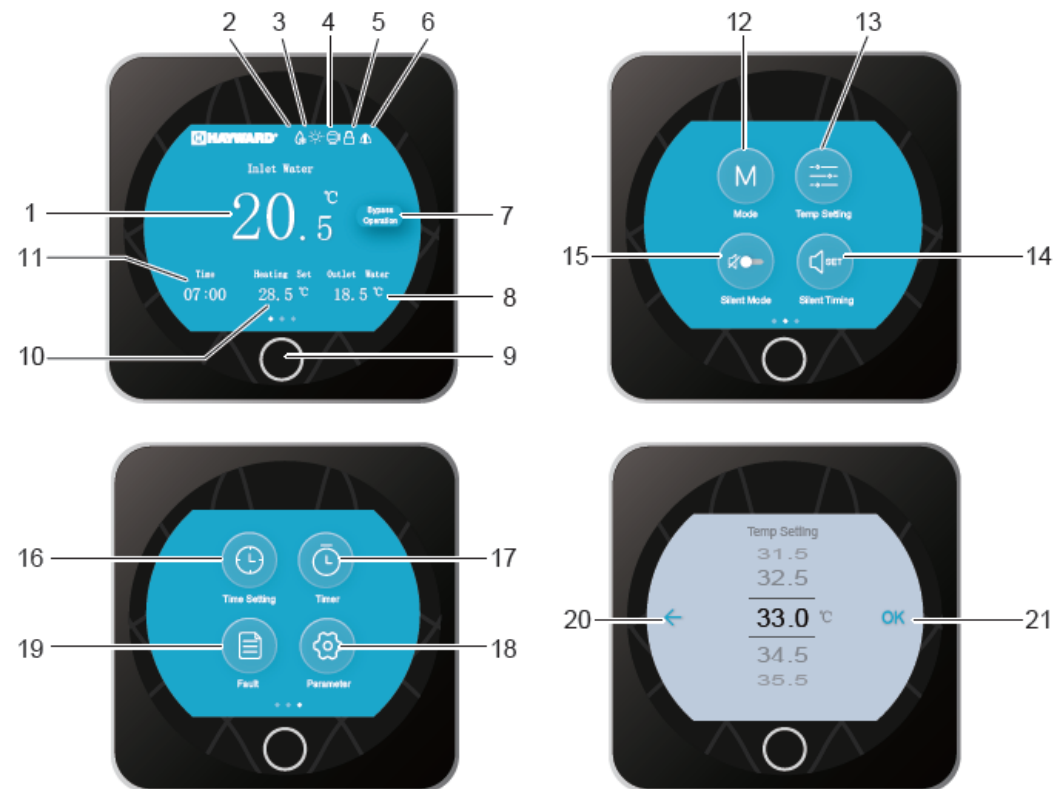
Input/Output Interface Terminology			
Sign	Meaning	Sign	Meaning
OUT1	Compressor	AI/DIO9	Ambient temperature
OUT2	Water pump	AI/DIO10	Mode switch/Coil 2 temperature
OUT3	4-way valve	AI/DIO11	Master-slave machine switch/antifreeze temperature
OUT4	High speed of fan	AI/DIO12	System exhaust temperature
OUT5	Low speed of fan/chassis heating belt	AI/DIO13	Compressor current detection/pressure sensor
L	Live wire	PWM_IN	Master-slave machine switch/feedback signal of EC fan
N	Neutral wire	PWM_OUT	AC fan control
AI/DIO1	Emergency switch	0_10V_OUT	EC fan control
AI/DIO2	Water flow switch	+5V	+5V
AI/DIO3	System low pressure	+12V	+12V
AI/DIO4	System high pressure	CN2	Frequency conversion board communications
AI/DIO5	System suction temperature	CN8	WiFi / 5 inch color display / DC fan speed regulation module
AI/DIO6	Water input temperature	CN9	Electronic expansion valve
AI/DIO7	Water output temperature	CN12	Program port
AI/DIO8	Coil 1 temperature	CN13	Centralized control communication port

Wire Control Interface Terminology	
Sign	Meaning
V	12V (power+)
A	485A
B	485B
G	GND (power-)

Parameter List		
Meaning	Default	Remarks
Cooling target temperature setpoint	80°F / 27°C	Adjustable
Heating target temperature setpoint	80°F / 27°C	Adjustable
Automatic target temperature setpoint	80°F / 27°C	Adjustable



OVERVIEW OF MENU NAVIGATION



No.	Description	No.	Description
1	Water Input Temperature	12	Operating Mode Selection
2	Defrost Mode	13	Adjust Setpoint
3	Operating Mode	14	Setting Silence Mode Timer
4	Compressor's ON Indicator	15	Activate Silent Mode
5	Lock Screen	16	Set Date and Time
6	Alarm	17	Set On/Off Timers
7	Bypass Operation	18	Access Advanced Settings
8	Water Output Temperature	19	Access List of Faults
9	On/Off/Back	20	Back (changes not confirmed)
10	Setpoint Temperature	21	Confirm
11	System Time		

MENU NAVIGATION – TURN UNIT ON/OFF

To switch from OFF to ON mode and vice versa, press the  button for 0.5s.

OFF mode

When the heat pump is idle (in standby mode), OFF is displayed as shown on the screen. The black screen indicates that the heat pump is idle; settings can be adjusted in this mode.



ON mode

When the heat pump is running or priming (setpoint reached), the screen turns blue.



MENU NAVIGATION – CHANGE TEMPERATURE



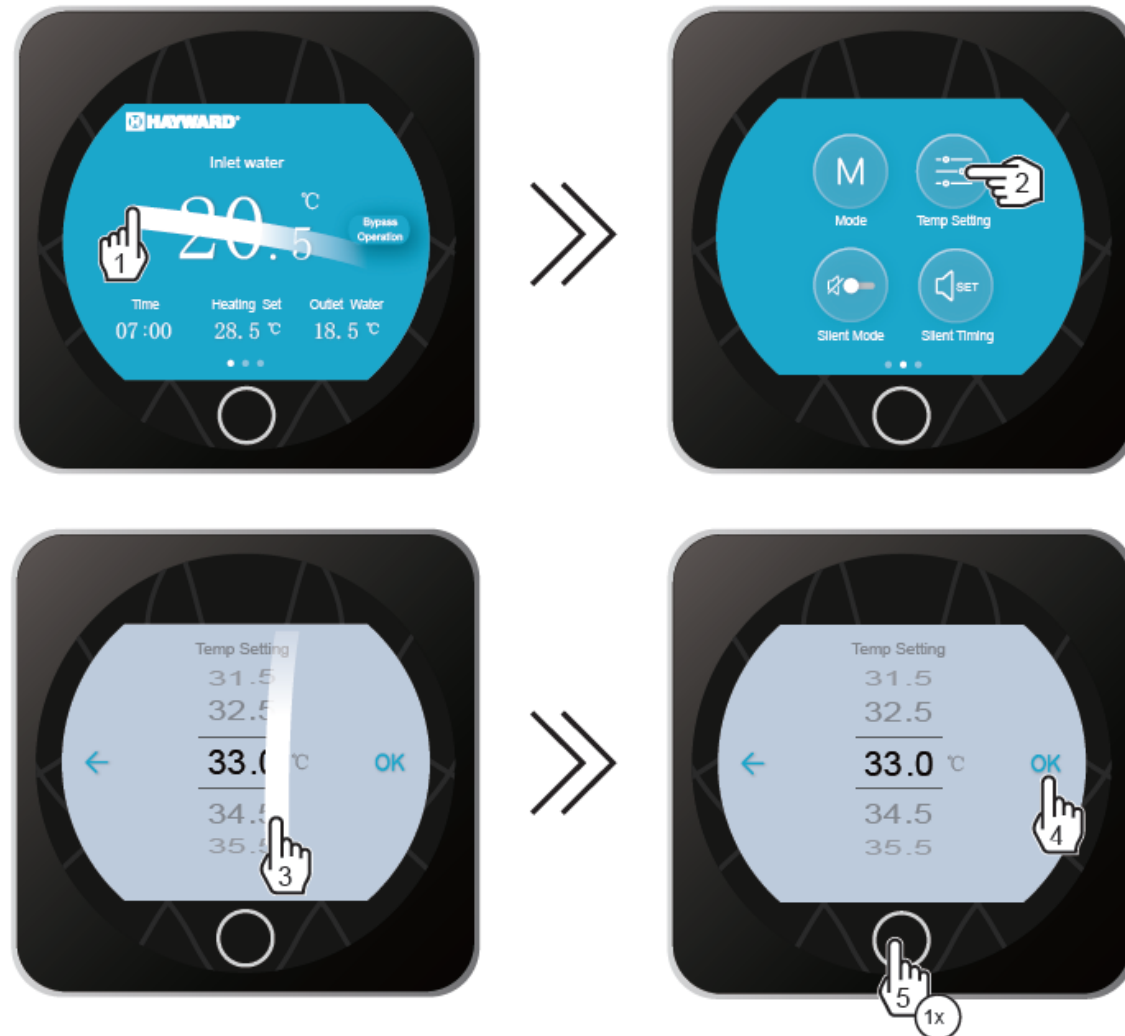
Navigate to the temperature setting by swiping screens.



MENU NAVIGATION – ADJUST SETPOINT

Adjust Setpoint

The setpoint can be changed either in ON or in OFF mode with an accuracy of 0.5°C.



Press the  button 1 time to return to the main screen.

MENU NAVIGATION – LOCKOUT

Locking and Unlocking the Touchscreen

The screen can be locked or unlocked in either ON or in OFF mode.



HOLD 5 SEC



Lock Activated

20

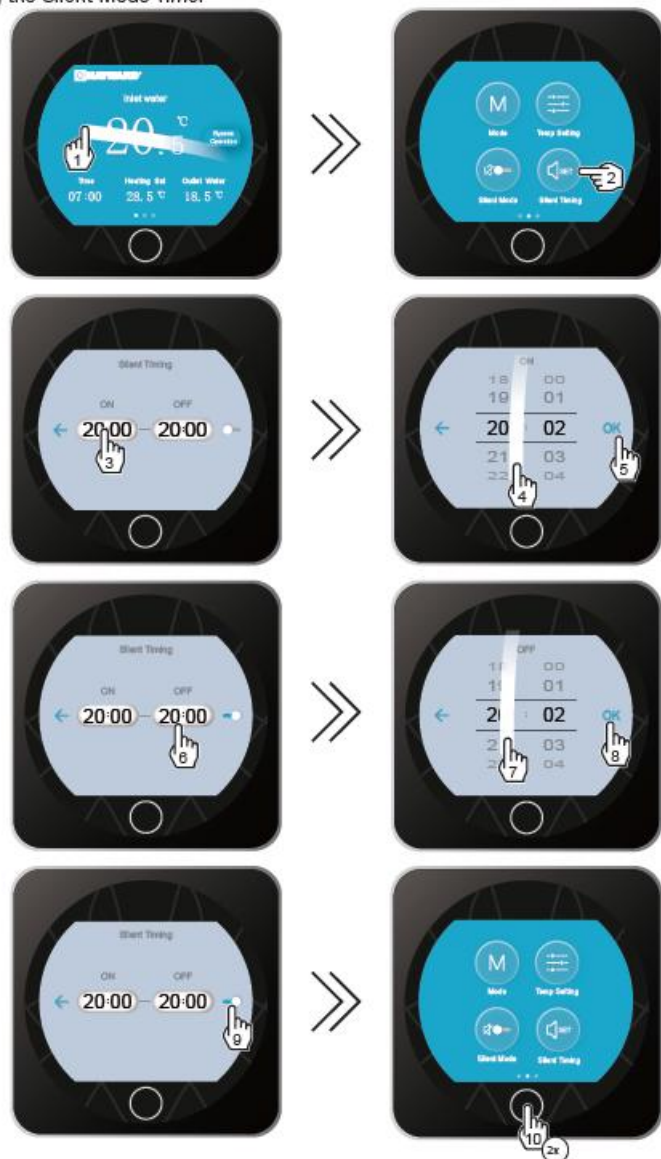


Lock Deactivated

25

MENU NAVIGATION – SILENT MODE

Adjusting the Silent Mode Timer



! The setting step is "hour to hour." Once the timer is activated, it is active 7 days a week.

Press the ● button 2 times to return to the main screen.

Silent Mode Activation/Deactivation

Silent mode means that the heat pump is in economic and silent mode. When the energy demand is low, only maintain the temperature of the swimming pool or for the silence of the unit This function can be Activated/Deactivated manually or using a Timer.



Silent Mode Deactivated

Silent Mode Activated

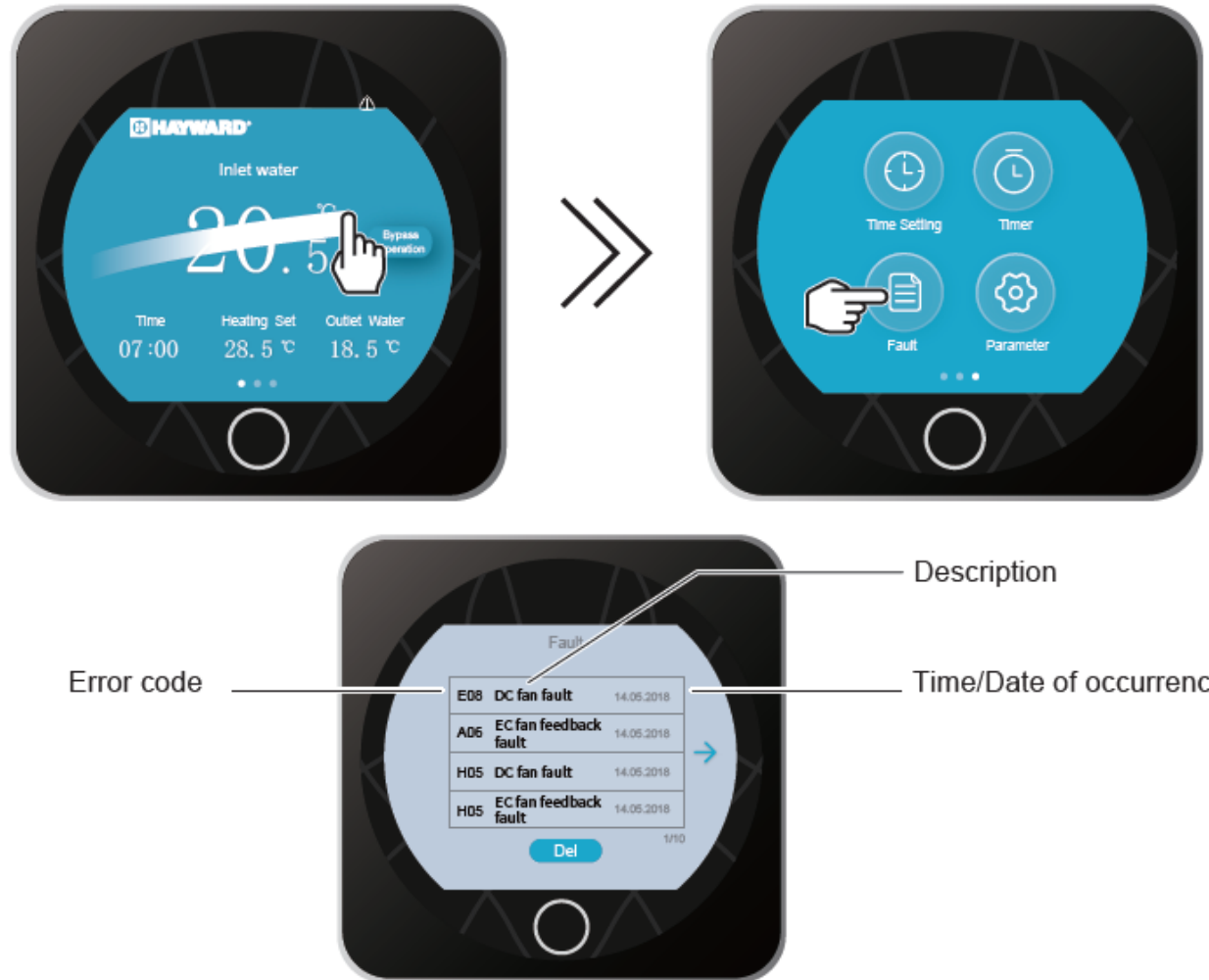
Press the ● button 1 time to return to the main screen.

FINDING FAULT CODES

Error Codes

NOTE: Certain operations must be carried out by an authorized technician.

If a fault occurs on the heat pump, ⚠ appears in the top left-hand corner of the screen. Refer to the table on page 27 for error code troubleshooting.



MENU NAVIGATION – SERVICE MENU ACCESS

22 GAINS ACCESS
TO BASIC PARAMETERS AND
UNIT STATE DURING LIVE RUN



66 GAINS ACCESS TO THE FULL
PARAMETERS AND SUBMENUS:
H - COMPRESSOR PARAMETERS
U - MODEL SELECTION CODE
F – FAN PARAMETERS
E – EEV PARAMETERS
P – PUMP PARAMETERS
D - DEFROST PARAMETERS

BYPASS OPERATION MODE HP51202T/HP50951T/HP50952T

Bypass Operation Function

The heat pump may be controlled by a remote thermostat. Refer to the steps below:

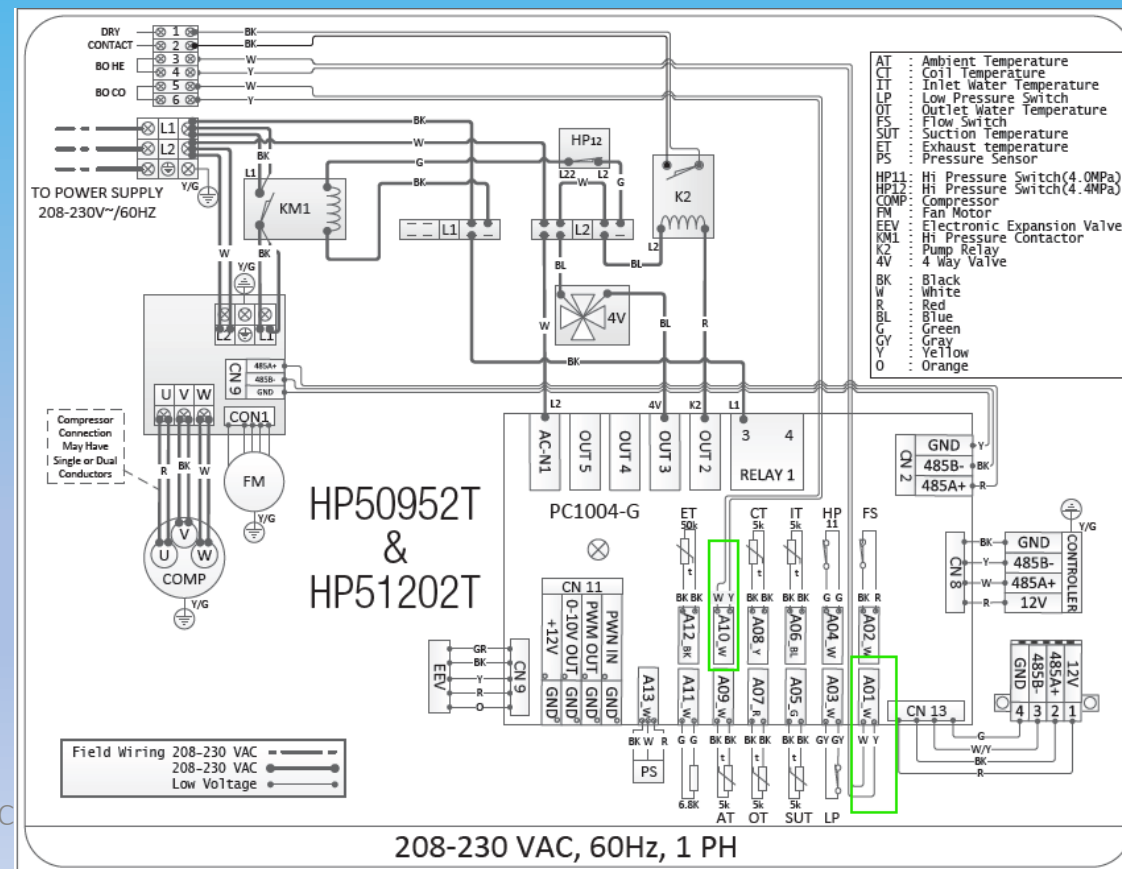
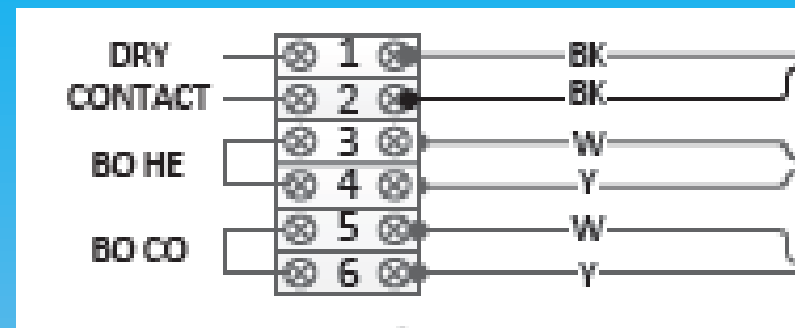
1. Disconnect power to the heat pump before removing any panels.
2. Use a proper outdoor rated 22 AWG cable (20 AWG for runs over 30 ft) for the connection from the thermostat to the heat pump.
3. Route the cable through appropriate knockouts making sure they are not shared with high voltage wiring.
4. Connect the thermostat cable to the "Remote On/Off" terminal.
5. After the thermostat cable is fastened and secure, refasten the panels.
6. Refer to the images below to activate/deactivate bypass operation.



Activate Bypass Operation



Deactivate Bypass Operation

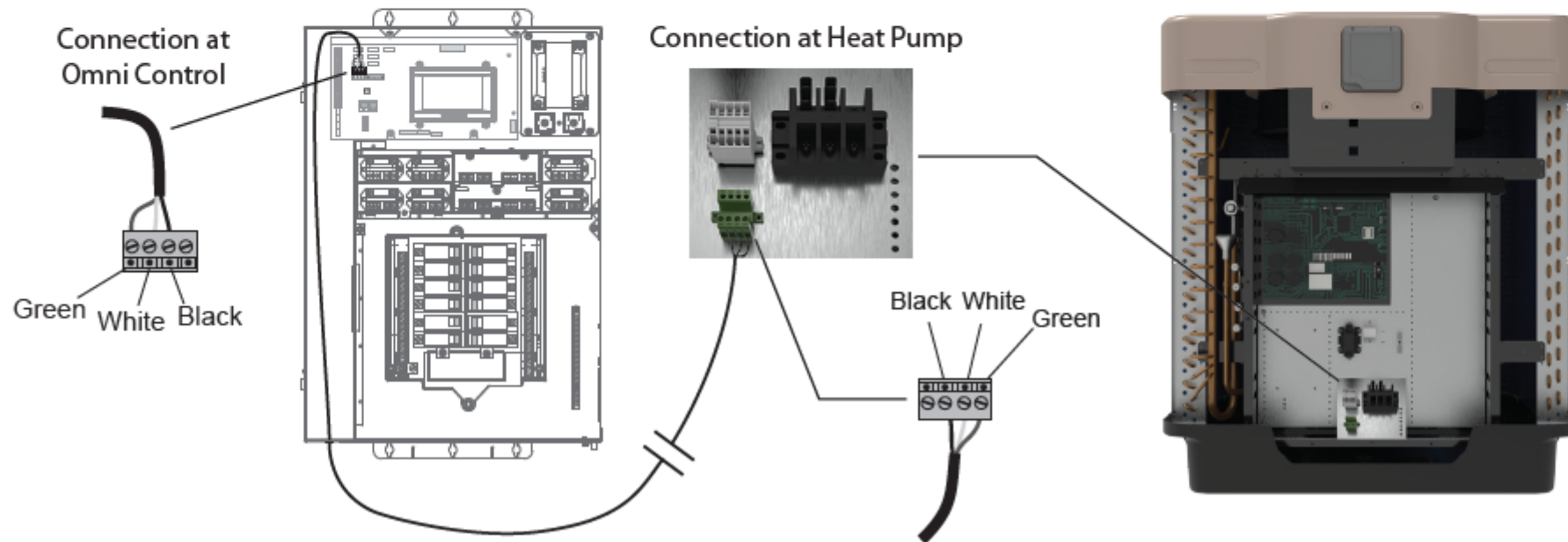


OMNI LOGIC TIE-IN HELP

Hayward Omni Connectivity

The HP50952T and HP51202T are Smart Heaters that can be fully controlled by a Hayward Omni pool automation control. These internet enabled controls allow you to remotely create schedules and set points for both heating and cooling while displaying real time heater status and diagnostics. The Omni family of products provide a cable connection used to communicate with the HP50952T/HP51202T and requires firmware revision R4.3.0 or later. Refer to your Omni Operation manual to determine current firmware revision as well as instructions on how to upgrade.

Disconnect power to both the heat pump and the OmniLogic before removing their panels. Use a proper outdoor rated 3 conductor 22 AWG cable (20 AWG for runs over 30 ft) for the connection from the Omni control to the HP50952T/HP51202T. Route the cable through appropriate knockouts making sure they are not shared with high voltage wiring. Refer to the diagram below showing a Hayward OmniLogic control wired to the heat pump. Note that the position of each colored conductor is the same at both ends of the communication cable. Use this same wiring method regardless of which Omni control model used. After the communication cable is fastened and secure, refasten the panels.



SUMMARY OF ERROR CODES

Table 6: Electronic Control Faults

Protection/Fault	Error Code	Reason	Solution
Inlet Temp. Sensor Fault	P01	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Outlet Temp. Sensor Fault	P02	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Ambient Temp. Sensor Fault	P04	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Coil 1 Temp. Sensor Fault	P05	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Coil 2 Temp. Sensor Fault	P15	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Suction Temp. Sensor Fault	P07	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Discharge Temp. Sensor Fault	P081	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Exhaust Air Over Temp Prot.	P082	The compressor is overload	Check whether the system of the compressor is running normally
Antifreeze Temp. Sensor Fault	P09	Antifreeze temp. sensor is broken or short circuit	Check or change the temp. sensor
Pressure Sensor Fault	PP	The pressure sensor is broken	Check or change the pressure sensor or pressure
High Pressure Prot.	E01	The high-pressure switch is broken	Check the pressure switch and cold circuit
Low Pressure Prot.	E02	The low-pressure switch is broken	Check the pressure switch and cold circuit
Flow Switch Prot.	E03	No water/little water in water system	Check the pipe water flow and water pump
Waterway Anti-freezing Prot.	E05	Water temp. or ambient is too low	Check the water temp. and ambient temp.
Inlet and outlet temp. too big	E06	Water flow is not enough and low differential pressure	Check the pipe water flow and whether water system is jammed or not
Anti-freezing Prot.	E07	Water flow is not enough	Check the pipe water flow and whether water system is jammed or not
Primary Anti-freezing Prot.	E19	The ambient temp. is low	Check the ambient temp. sensor
Secondary Anti-freezing Prot.	E29	The ambient temp. is low	Check the ambient temp. sensor
Comp. Overcurrent Prot.	E051	The compressor is overload	Check whether the system of the compressor is running normally
Communication Fault	E08	Communication failure between wire controller and mainboard	Check the wire connection between remote wire controller and main board
Communication Fault (speed control module)	E081	Speed control module and main board communication fail	Check the communication connection
Low AT Protection	TP	Ambient temp. is too low	Check the ambient temp. sensor
EC fan feedback Fault	F051	There is something wrong with fan motor and fan motor stops running	Check whether fan motor is broken or locked
Fan Motor1 Fault	F031	1. Motor is in locked-rotor state 2.The wire connection between DC-fan motor module and fan motor is in bad contact	1.Change a new fan motor 2.Check the wire connection and make sure they are in good contact
Fan Motor2 Fault	F032	1. Motor is in locked-rotor state 2.The wire connection between DC-fan motor module and fan motor is in bad contact	1.Change a new fan motor 2.Check the wire connection and make sure they are in good contact

Table 7: Frequency Conversion Board Faults

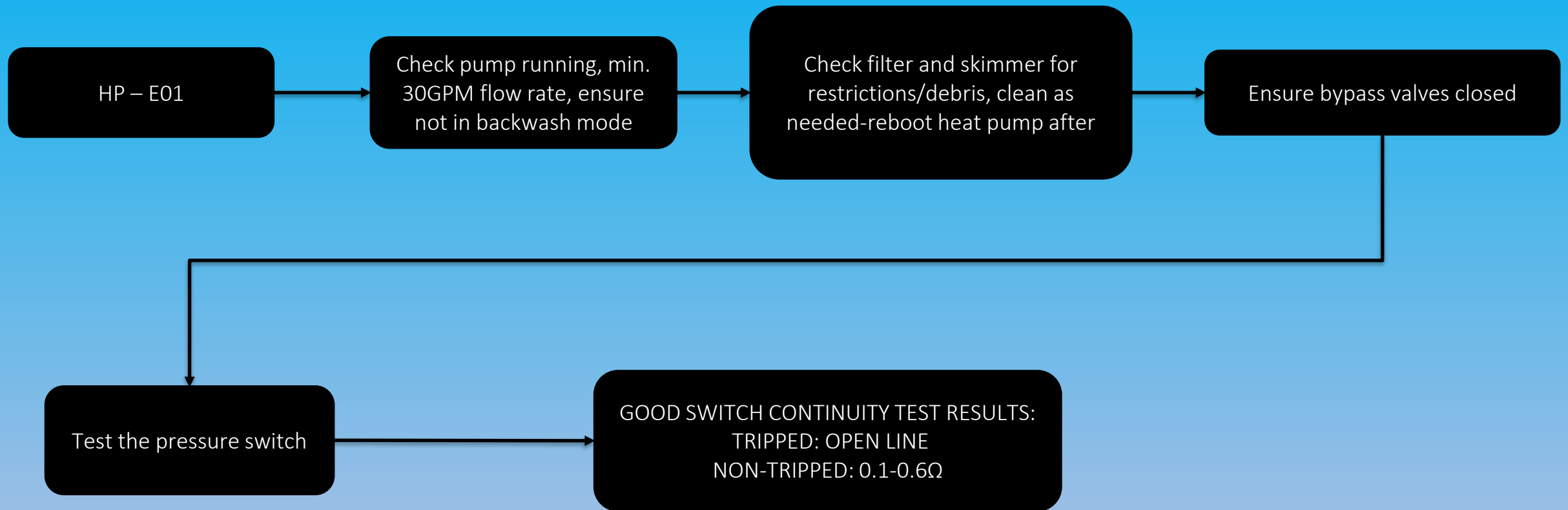
Protection/Fault	Error Code	Reason	Solution
Drv1 MOP alarm	F01	MOP drive alarm	Recovery after 150s
Inverter offline	F02	Frequency conversion board and mainboard communication failure	Check the communication connection
IPM protection	F03	IPM modular protection	Recovery after 150s
Comp. Driver Failure	F04	Lack of phase, step or drive hardware damage	Check the measuring voltage , check frequency conversion board hardware
DC Fan Fault	F05	Motor current feedback open circuit or short circuit	Check whether current return wires connected motor
IPM Overcurrent	F06	IPM Input current is large	Check and adjust the current measurement
Inv. DC Overvoltage	F07	DC bus voltage>Dc bus over-voltage protection value	Check the input voltage measurement
Inv. DC Less voltage	F08	DC bus voltage<Dc bus over-voltage protection value	Check the input voltage measurement
Inv. Input Less voltage	F09	The input voltage is low,causing the input current is high	Check the input voltage measurement
Inv. Input Overvoltage	F10	The input voltage is too high,more than outage protection current RMS	Check the input voltage measurement
Inv. Sampling Volt.	F11	The input voltage sampling fault	Check and adjust the current measurement
Comm. Err DSP-PFC	F12	DSP and PFC connect fault	Check the communication connection
Input Over Cur.	F26	The equipment load is too large	Check whether the unit is overloaded
PFC fault	F27	The PFC circuit protection	Check the PFC switch tube short circuit or not
IPM Overheating	F15	The IPM module is overheat	Check and adjust the current measurement
Weak Magnetic Warn	F16	Compressor magnetic force is not enough	Restart the unit after multiple power failures, if the fault still exists, replace the compressor
Inv. Input Out Phase	F17	The input voltage lost phase	Check and measure the voltage adjustment
IPM Sampling Cur.	F18	IPM sampling electricity is fault	Check and adjust the current measurement
Inv. Temp. Probe Fail	F19	The temp. sensor is broken or short circuit	Check or change the temp. sensor
Inverter Overheating	F20	The transducer is overheat	Check and adjust the current measurement
Inv. Overheating Warn	F22	Transducer temperature is too high	Check and adjust the current measurement
Comp. Over Cur. Warn	F23	Compressor electricity is large	The compressor over-current protection
Input Over Cur. Warn	F24	Input current is too large	Check and adjust the current measurement
EEPROM Error Warn	F25	MCU error	Check whether the chip is damaged,replace the chip
V15V over/undervoltage fault	F28	The V15V is overload or undervoltage	Check the V15V input voltage in range 13.5v~16.5v or not

THIS TROUBLESHOOTING GUIDE COVERS

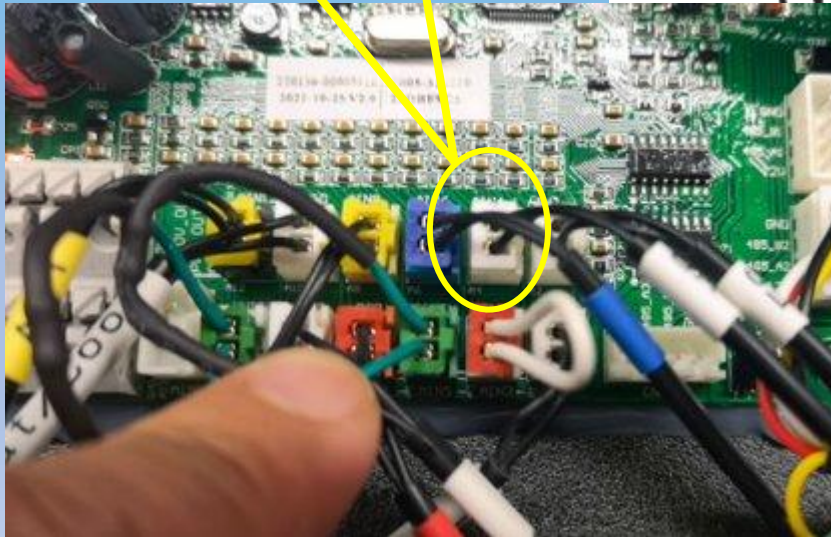
Error Code	Description	Rating kΩ	Input Name on Board
P01	Water Inlet Thermistor	5kΩ	A06
P02	Water Outlet Thermistor	5kΩ	A07
P04	Ambient Thermistor	5kΩ	A09
P05	Coil Temperature Thermistor	5kΩ	A08
P07	Suction Thermistor	5kΩ	A05
P081	Discharge Thermistor	50kΩ	A12

PP	PRESSURE TRANSDUCER ERROR
E01	High pressure switch
E02	Low pressure switch
E03	Flow switch error
E06	Delta T water too large
E07	Anti freeze protection
E19	Primary anti-freeze
E29	Secondary anti-freeze
E051	Compressor overloaded
E08	Comms issue main board and user display
E081	Comms issue main board and inverter
F051	Fan motor locked or issue with internals
F031 and F032	Fan motor fault
F02	Inverter offline

“E01” – HIGH PRESSURE SWITCH – FLOW CHART



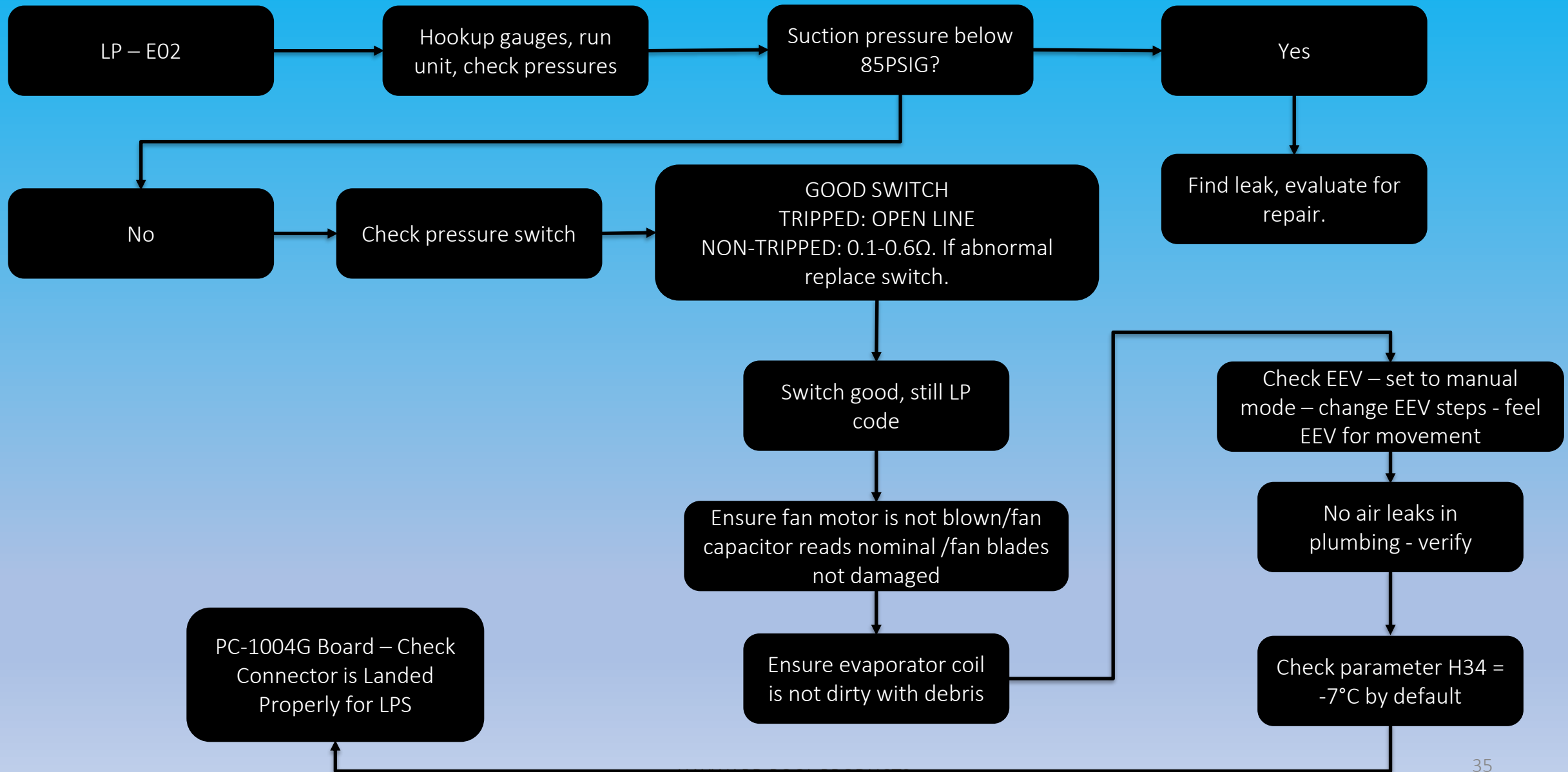
- Board Test: You can jump the LP port, then navigate to parameter (22 in service menu) see S01 to see if the board registers closed (CL).**



PCB good: Parameter S01 show CL(Close).
PCB bad: Parameter S01 show OP(Open).



"E02" – LOW PRESSURE SWITCH – FLOW CHART



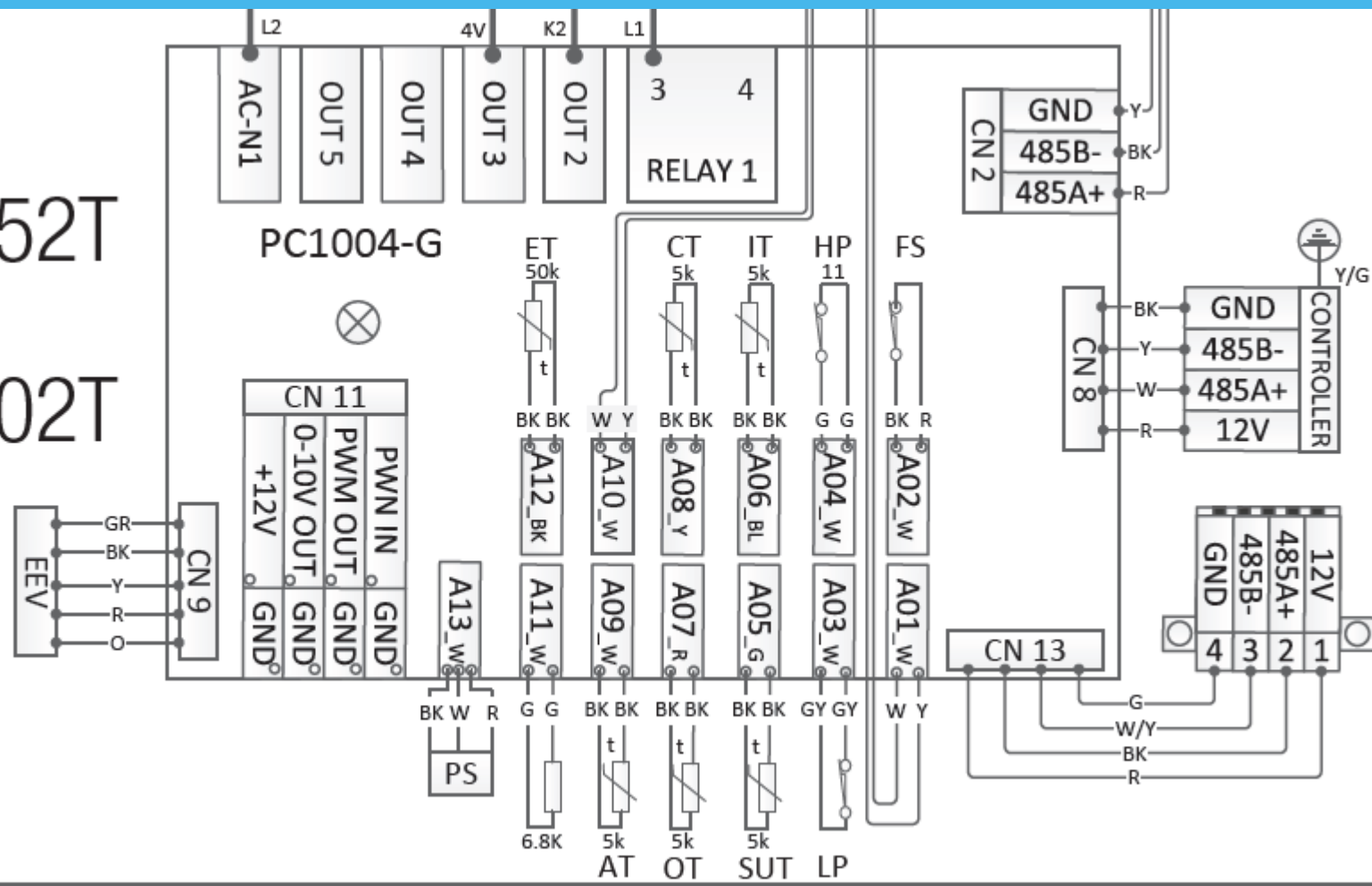
“E02” – LOW PRESSURE SWITCH - TROUBLESHOOTING

1. Evaporator coil is dirty.
2. Fan motor not operational/off.
3. Low refrigerant pressure due to leaks.
4. Defective low-pressure switch.
5. Low outdoor temperature (below 50°F).
6. Check parameter H34, default setting is -7°C.

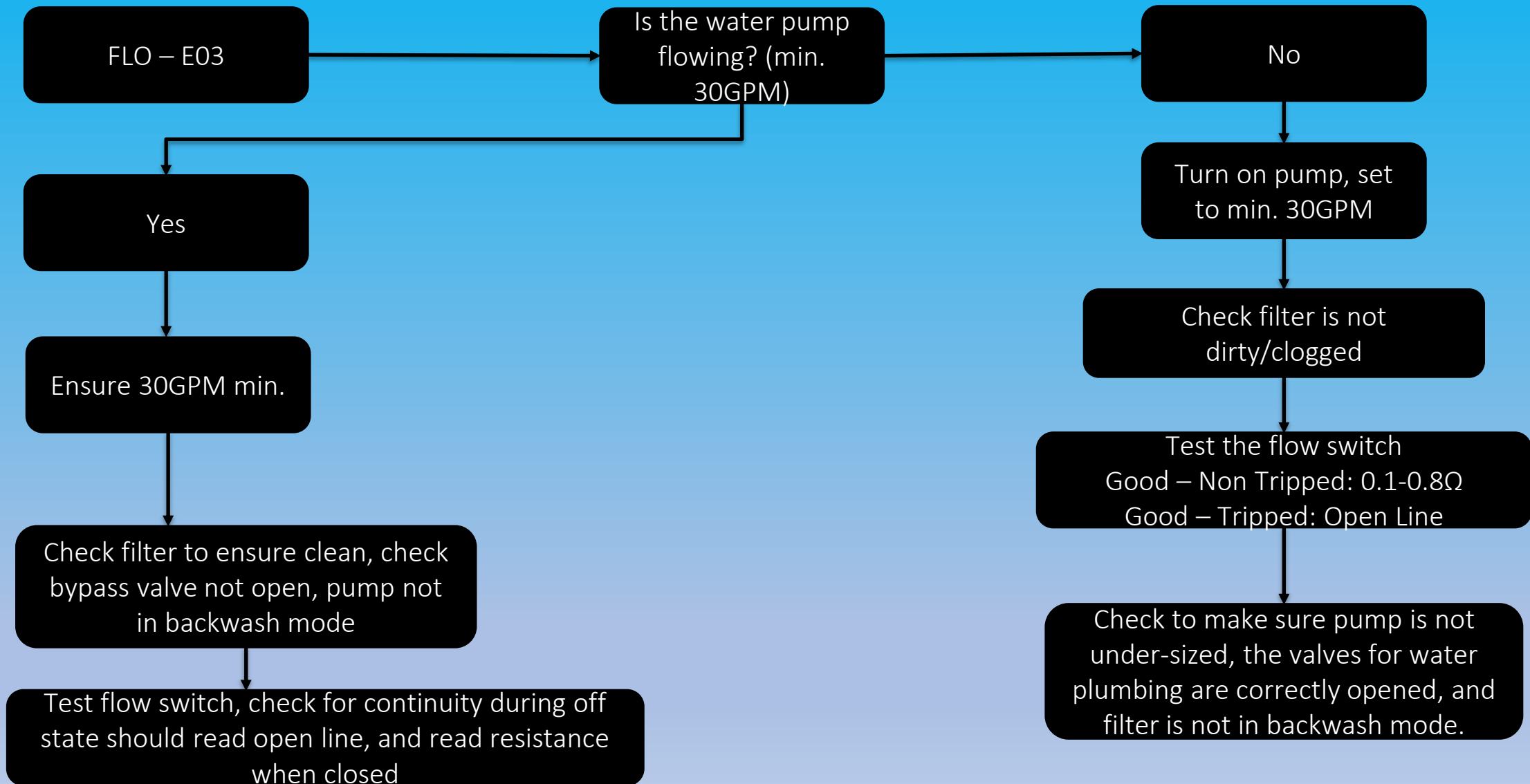


Check PC1004-G board: Use a jumper to jump the thermistor port for LPS, then access parameters (22 is password) and read S02:
PCB GOOD: Parameter S02 show CL(Close).
PCB BAD: Parameter S02 show OP(Open).

HP50952T
&
HP51202T

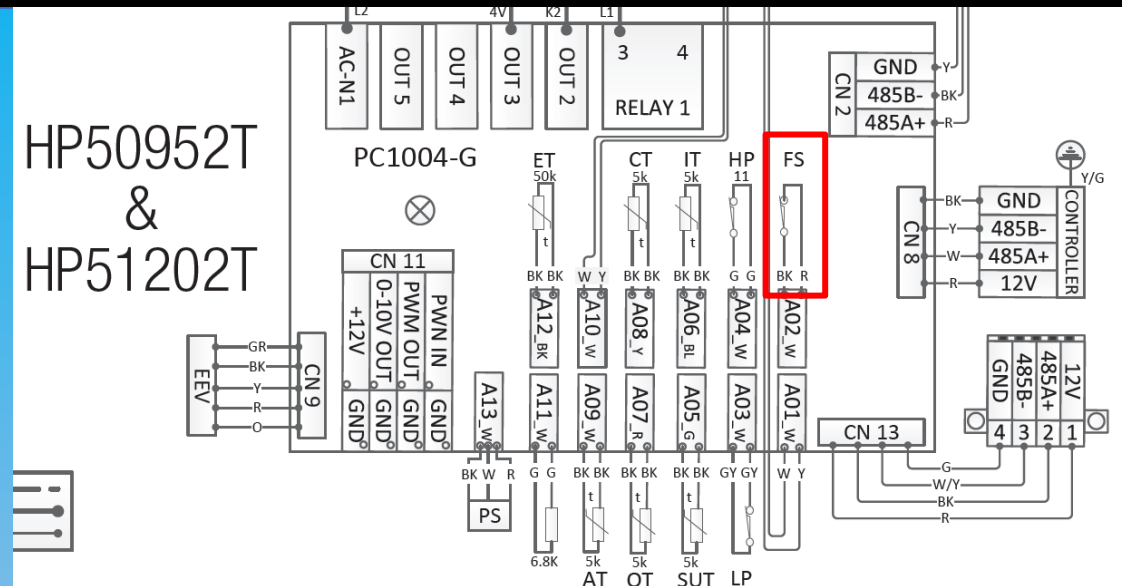


"E03" – WATER FLOW SWITCH – FLOW CHART



“E03” – WATER FLOW SWITCH - TROUBLESHOOTING

1. Check for flow of water.
2. Check for clogs/restrictions in water lines.
3. Check for air leaks in piping causing shortage of water to pump.
4. Undersized water pumps can cause the flow switch to not close.
5. Bypass valves to heat pump must be closed.
6. Filter may be stuck in backwash mode.
7. Maybe the water flow switch is bad, test it via continuity test.



How do I verify the PC1004-G board is not the root cause?

You can unplug the flow switch and SHORT the port using a jumper then check parameter S03.

After causing a short , navigate to the “S” submenu and check S03 parameter in Parameters → “22”

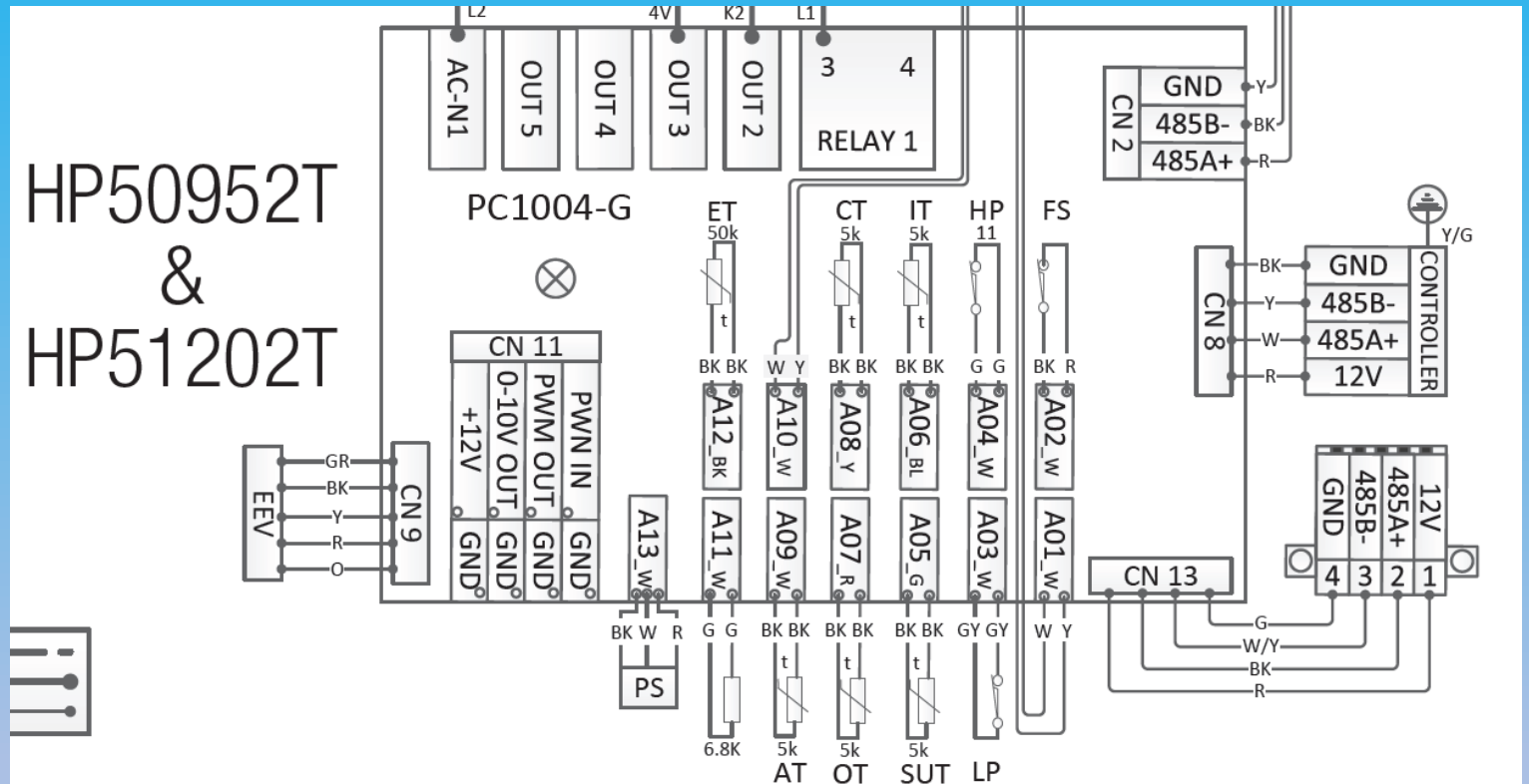
PCB normal: Parameter S03 show CL(Close). (ideal cause you shorted it)

PCB failure: Parameter S03 show OP(Open), board failed, replace PC1004-G board



TROUBLESHOOTING THERMISTORS: OVERVIEW

Error Code	Description	Rating kΩ	Input Name on Board
P01	Water Inlet Thermistor	5kΩ	A06
P02	Water Outlet Thermistor	5kΩ	A07
P04	Ambient Thermistor	5kΩ	A09
P05	Coil Temperature Thermistor	5kΩ	A08
P07	Suction Thermistor	5kΩ	A05
P081	Dischage Thermistor	50kΩ	A12

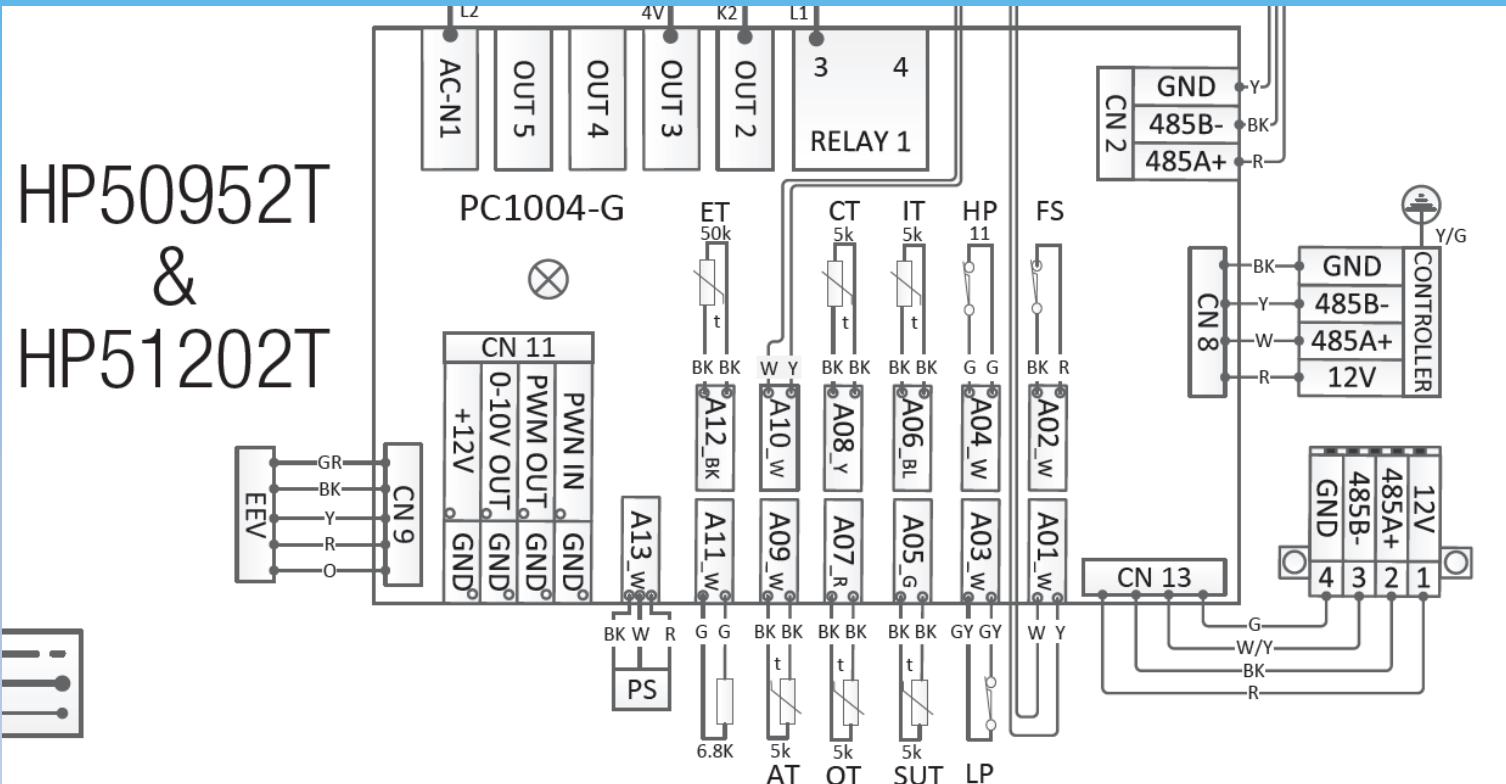


TROUBLESHOOTING THERMISTORS – FLOW CHART

Error Code	Description	Rating kΩ	Input Name on Board
P01	Water Inlet Thermistor	5kΩ	A06
P02	Water Outlet Thermistor	5kΩ	A07
P04	Ambient Thermistor	5kΩ	A09
P05	Coil Temperature Thermistor	5kΩ	A08
P07	Suction Thermistor	5kΩ	A05
P081	Dischage Thermistor	50kΩ	A12

Thermistor Code?

Check it's plugged securely



TROUBLESHOOTING THERMISTORS – 50KΩ CHART

B25/50=3950K±2%, R25=50kΩ±3%

(°C)	Rmax	Rnor	Rmin	(°C)	Rmax	Rnor	Rmin	(°C)	Rmax	Rnor	Rmin
-30.0	959.307	876.519	793.732	3.0	147.784	140.445	133.106	36.0	32.526	31.279	30.031
-29.0	900.972	824.329	747.685	4.0	140.448	133.613	126.778	37.0	31.240	30.017	28.794
-28.0	846.525	775.549	704.573	5.0	133.516	127.150	120.784	38.0	30.012	28.813	27.614
-27.0	795.690	729.943	664.197	6.0	126.964	121.035	115.106	39.0	28.838	27.663	26.488
-26.0	748.210	687.290	626.370	7.0	120.770	115.248	109.726	40.0	27.717	26.566	25.415
-25.0	703.847	647.383	590.919	8.0	114.911	109.768	104.626	41.0	26.644	25.517	24.390
-24.0	662.381	610.032	557.684	9.0	109.367	104.578	99.789	42.0	25.619	24.516	23.412
-23.0	623.606	575.060	526.513	10.0	104.122	99.662	95.203	43.0	24.640	23.560	22.479
-22.0	587.335	542.302	497.269	11.0	99.156	95.003	90.851	44.0	23.703	22.646	21.588
-21.0	553.392	511.607	469.823	12.0	94.454	90.588	86.722	45.0	22.806	21.772	20.737
-20.0	521.614	482.833	444.053	13.0	90.000	86.401	82.802	46.0	21.948	20.936	19.924
-19.0	491.851	455.850	419.848	14.0	85.780	82.430	79.080	47.0	21.127	20.137	19.147
-18.0	463.965	430.536	397.107	15.0	81.781	78.663	75.545	48.0	20.341	19.373	18.405
-17.0	437.827	406.779	375.731	16.0	77.990	75.088	72.187	49.0	19.588	18.641	17.694
-16.0	413.318	384.474	355.631	17.0	74.395	71.695	68.996	50.0	18.867	17.942	17.016
-15.0	390.324	363.523	336.722	18.0	70.985	68.474	65.964	51.0	18.177	17.272	16.366
-14.0	368.747	343.838	318.930	19.0	67.750	65.416	63.081	52.0	17.515	16.630	15.746
-13.0	348.489	325.335	302.180	20.0	64.680	62.510	60.339	53.0	16.881	16.016	15.151
-12.0	329.461	307.934	286.406	21.0	61.766	59.749	57.731	54.0	16.274	15.429	14.583
-11.0	311.585	291.566	271.547	22.0	58.998	57.124	55.249	55.0	15.691	14.865	14.038
-10.0	294.781	276.162	257.542	23.0	56.369	54.629	52.888	56.0	15.133	14.325	13.518
-9.0	278.980	261.660	244.340	24.0	53.873	52.257	50.640	57.0	14.596	13.807	13.018
-8.0	264.118	248.003	231.889	25.0	51.500	50.000	48.500	58.0	14.081	13.311	12.540
-7.0	250.132	235.137	220.142	26.0	49.332	47.853	46.373	59.0	13.587	12.834	12.081
-6.0	236.966	223.011	209.056	27.0	47.268	45.810	44.351	60.0	13.114	12.378	11.642
-5.0	224.567	211.578	198.590	28.0	45.302	43.865	42.428	61.0	12.658	11.940	11.221
-4.0	212.887	200.796	188.706	29.0	43.427	42.013	40.598	62.0	12.221	11.519	10.817
-3.0	201.879	190.624	179.368	30.0	41.641	40.250	38.858	63.0	11.802	11.116	10.430
-2.0	191.502	181.023	170.543	31.0	39.938	38.570	37.202	64.0	11.398	10.728	10.058
-1.0	181.716	171.959	162.201	32.0	38.313	36.969	35.625	65.0	11.010	10.356	9.701
0.0	172.485	163.399	154.312	33.0	36.763	35.443	34.123	66.0	10.638	9.998	9.359
1.0	163.773	155.312	146.850	34.0	35.285	33.989	32.693	67.0	10.279	9.655	9.030
2.0	155.549	147.669	139.789	35.0	33.873	32.602	31.330	68.0	9.934	9.324	8.714

This chart is for a 5kΩ thermistor.

For example, the ambient thermistor, if you measure the ambient thermistor resistance you can see if it falls within Rmin and Rmax resistance.

The Rmin and Rmax are the tolerance bounds, as long as the resistance falls in that bound, the thermistor is good.

Error Code	Description	Rating kΩ	Input Name on Board
P01	Water Inlet Thermistor	5kΩ	A06
P02	Water Outlet Thermistor	5kΩ	A07
P04	Ambient Thermistor	5kΩ	A09
P05	Coil Temperature Thermistor	5kΩ	A08
P07	Suction Thermistor	5kΩ	A05
P081	Dischage Thermistor	50kΩ	A12

Thermistor Code?

Check it's plugged securely – done – code still there

Unplug it from board, test the resistance and compare. See next slides for Resistance v Temps. Be within 2%.

THERMISTOR CHARTS – PART 3 – 5kΩ CHART

B25/50=3470K±1%, R25=5kΩ±1%

(°C)	Rmax	Rnor	Rmin	(°C)	Rmax	Rnor	Rmin	(°C)	Rmax	Rnor	Rmin
-30	66.740	64.104	61.468	3	12.681	12.422	12.163	36	3.362	3.313	3.264
-29	63.118	60.666	58.214	4	12.126	11.885	11.644	37	3.244	3.195	3.146
-28	59.694	57.413	55.132	5	11.600	11.375	11.150	38	3.130	3.082	3.034
-27	56.477	54.355	52.233	6	11.099	10.889	10.679	39	3.022	2.974	2.926
-26	53.454	51.480	49.506	7	10.623	10.428	10.233	40	2.917	2.870	2.823
-25	50.614	48.776	46.938	8	10.170	9.988	9.806	41	2.817	2.770	2.723
-24	47.943	46.232	44.521	9	9.740	9.570	9.400	42	2.721	2.675	2.629
-23	45.429	43.836	42.243	10	9.330	9.172	9.014	43	2.629	2.583	2.537
-22	43.065	41.581	40.097	11	8.939	8.792	8.645	44	2.539	2.494	2.449
-21	40.838	39.456	38.074	12	8.568	8.431	8.294	45	2.455	2.410	2.365
-20	38.761	37.473	36.185	13	8.214	8.087	7.960	46	2.372	2.328	2.284
-19	36.765	35.565	34.365	14	7.876	7.758	7.640	47	2.294	2.250	2.206
-18	34.903	33.785	32.667	15	7.555	7.445	7.335	48	2.217	2.174	2.131
-17	33.147	32.105	31.063	16	7.249	7.147	7.045	49	2.144	2.102	2.060
-16	31.492	30.520	29.548	17	6.956	6.862	6.768	50	2.074	2.032	1.990
-15	29.929	29.023	28.117	18	6.677	6.590	6.503	51	2.006	1.965	1.924
-14	28.454	27.609	26.764	19	6.412	6.331	6.250	52	1.942	1.901	1.860
-13	27.061	26.273	25.485	20	6.158	6.083	6.008	53	1.879	1.839	1.799
-12	25.745	25.010	24.275	21	5.915	5.846	5.777	54	1.818	1.779	1.740
-11	24.501	23.816	23.131	22	5.684	5.620	5.556	55	1.760	1.721	1.682
-10	23.326	22.687	22.048	23	5.463	5.404	5.345	56	1.704	1.666	1.628
-9	22.214	21.618	21.022	24	5.252	5.198	5.144	57	1.650	1.613	1.576
-8	21.164	20.607	20.050	25	5.050	5.000	4.950	58	1.599	1.562	1.525
-7	20.168	19.649	19.130	26	4.861	4.811	4.761	59	1.548	1.512	1.476
-6	19.226	18.742	18.258	27	4.680	4.630	4.580	60	1.501	1.465	1.429
-5	18.335	17.883	17.431	28	4.508	4.457	4.406	61	1.454	1.419	1.384
-4	17.490	17.068	16.646	29	4.343	4.292	4.241	62	1.408	1.374	1.340
-3	16.689	16.296	15.903	30	4.184	4.133	4.082	63	1.366	1.332	1.298
-2	15.930	15.563	15.196	31	4.032	3.982	3.932	64	1.324	1.291	1.258
-1	15.210	14.868	14.526	32	3.886	3.836	3.786	65	1.284	1.251	1.218
0	14.591	14.270	13.949	33	3.747	3.697	3.647	66	1.245	1.213	1.181
1	13.880	13.582	13.284	34	3.614	3.564	3.514	67	1.208	1.176	1.144
2	13.265	12.987	12.709	35	3.486	3.436	3.386	68	1.171	1.140	1.109

This chart is for a 5kΩ thermistor.
For example, the coil thermistor, if you measure the coil thermistor resistance you can see if it falls within Rmin and Rmax resistance.

The Rmin and Rmax are the tolerance bounds, as long as the resistance falls in that bound, the thermistor is good.

Error Code	Description	Rating kΩ	Input Name on Board
P01	Water Inlet Thermistor	5kΩ	A06
P02	Water Outlet Thermistor	5kΩ	A07
P04	Ambient Thermistor	5kΩ	A09
P05	Coil Temperature Thermistor	5kΩ	A08
P07	Suction Thermistor	5kΩ	A05
P081	Discharge Thermistor	50kΩ	A12

Thermistor Code?

Check it's plugged securely – done – code still there

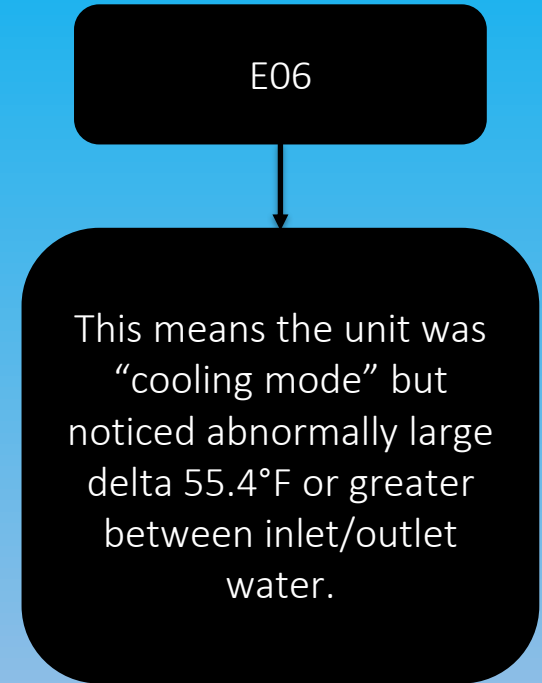
Unplug it from board, test the resistance and compare. See next slides for Resistance v Temps. Be within 2%.

HP31005T – “E06” ERROR CODE

If the heat pump is in **COOLING** mode, and the unit detects a temperature delta GREATER than 13°C or 55.4 °F, the E06 code triggers. It's protection due to TOO large rise in temperature.

The code clears itself, once the delta drops below 3°C or 5.4°F.

If the board senses this 13°C delta across water inlet/outlet three times in 30min, it will lock down the unit and you need to power cycle the breaker.



"E07" ANTIFREEZE ERROR

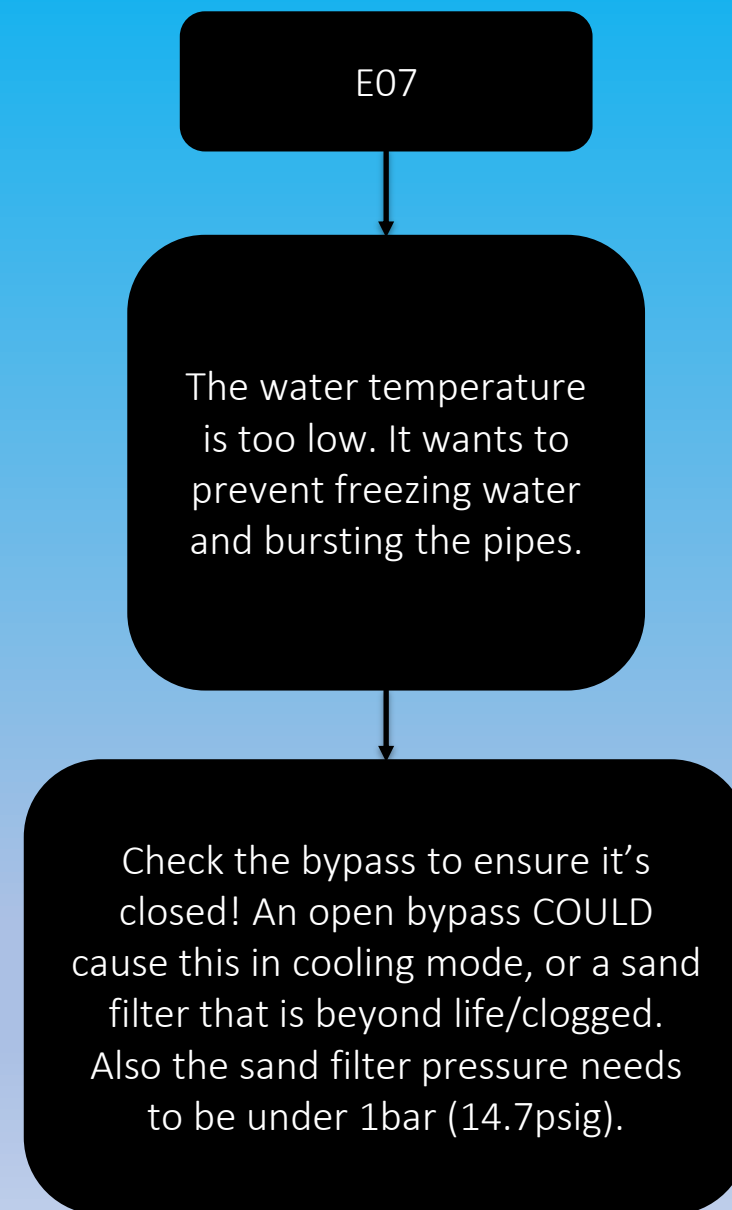
You may be wondering what this code even means?

It's a safety.

When running in COOLING mode, if the outlet water temperature drops below 4°C (39.2°F) for more than 2 seconds, fault code E07 will be shown, and unit goes into freeze protection mode.

Clear: Once the outlet water temperature is $\geq 8^{\circ}\text{C}$ (46.4°F), the code clears.

If this fault happens 3x within 30min, it locks down / shuts off unit. Only a breaker power cycle can re-boot it to remove the lockout.



HP31005T – “E019/E029” WINTER PROTECTION LEVEL 1/2

E19 – Level One Freeze Protection

First level anti-freeze has been enabled. Condition: Unit was in standby, and the DELTA across water ports was between 2°C (3.6°F) and 4°C (7.2°F) and the outdoor temp was ≤ 0°C (32°F).

You can adjust the points it enters/exits this in the parameters: T02,T03,T05. T02 and T03 represent the inlet and outlet water temperature, respectively. T05 represents the outdoor ambient temperature.

First level anti-freeze enabled. It will enable the circulation pump (if you have one tied in to the control)
Once the inlet water temperature is ≥ 8°C (46.4°F) or ambient outdoor temperature is > 1°C (33.8 °F), the error clears and stops the water pump.

E19 – Level Two Freeze Protection

First level anti-freeze has been enabled. Condition: Unit was in standby, and the DELTA across water ports was between 0° and 2°C (7.2°F) and the outdoor temp was ≤ 0°C (32°F).

2nd level anti-freeze has been enabled. Heat Pump will **now run in heat mode to heat water temp**. Once it registers inlet water temperature T5 ≥ 15°C (59°F) or ambient is ≥ 33.8°F, it will clear error and stop the heat pump.

“E08” – COMMS FAILURE BETWEEN BOARD AND USER DISPLAY – PART 1

E08 Code – Comms Failure

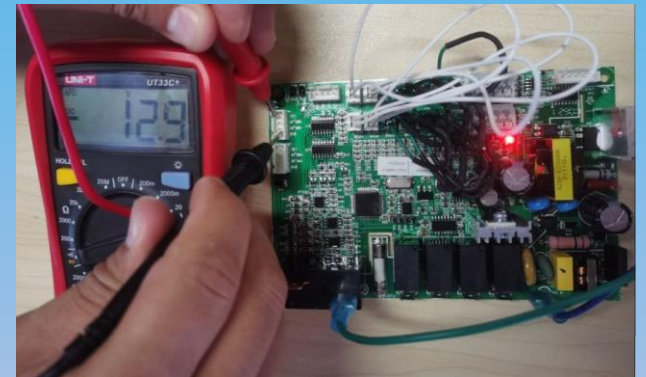
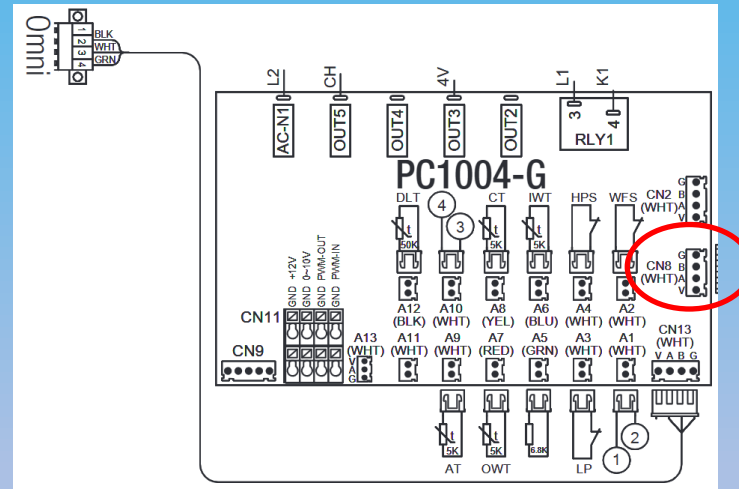
Check cable connection CN8 located on PC1004-G Board

Check if the cable is cut or damaged.

With unit call for heat/cool – measure voltage between Red 12VDC and Black Negative: Target ~11-14VDC. (V and G on board) If not right, replace board.

Measure between yellow and white leads on CN8 (RS485A and RS485B), do you see fluctuating 0-6VDC? – if not, bad board

Red wire: 12VDC,
Black wire: Negative
Yellow wire: RS485B
White wire: RS485A



“E08” – COMMS FAILURE BETWEEN BOARD AND USER DISPLAY – PART 2

E08 Code – Comms Failure
Between Board and User Display

Ensure the correct model of heat
pump is chosen in parameter U03.
U03 = 0 for HP51202T, 1 for
HP50952T

Replace wire if bad

Check continuity of
comms wire from board
to display, check for no
cuts/open line

Normal



Bad



“E081” – COMMS FAILURE BETWEEN PC1004-G AND FAN INVERTER PART I

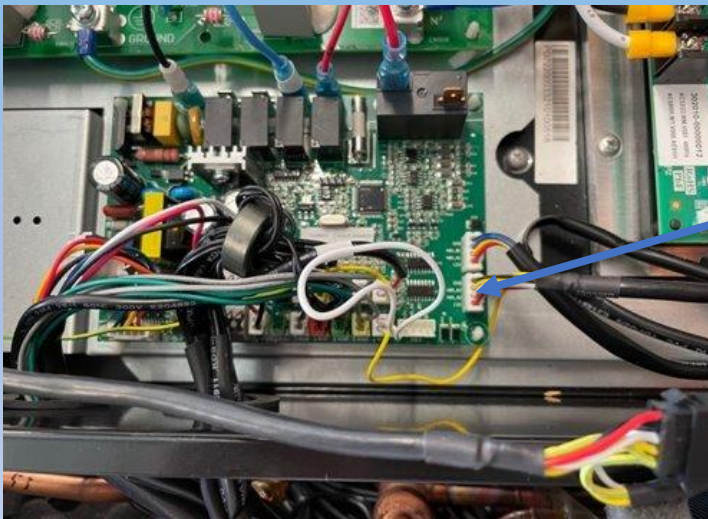
E081 Code – Comms Failure
PC1004-G/FAN INVERTER BOARD

Go to fan parameter, F01. Default = 3
for 95k/120kBTU units.

Proceed, if fan does not work.

Test voltages of harness at port CN8 located
on PC1004-G board via back-probe for
12VDC. Then on the fan board, check
yellow/white for fluctuating 0-6VDC. Please
ensure unit is calling for heat/cool. Heat
pump must be running.

Main Board PC1004-G



Ideal: 11-14vdc Red/Black
Yellow/White: 0-6VDC fluctuating

Red wire: 12VDC,
Black wire: Negative
Yellow wire: RS485B
White wire: RS485A

RS485 Cable

Fan Board



“E081” – COMMS FAILURE BETWEEN PC1004-G AND FAN INVERTER – PART 2

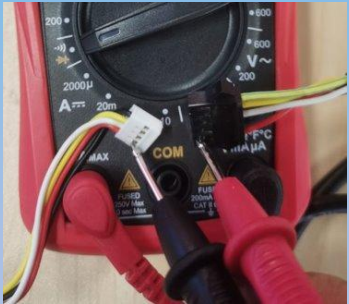
To test whether communication is due to the wire, or board, check voltages. Set the unit to heat or cool while testing. Use back probes.

GOOD: Red/Black 11-14VDC

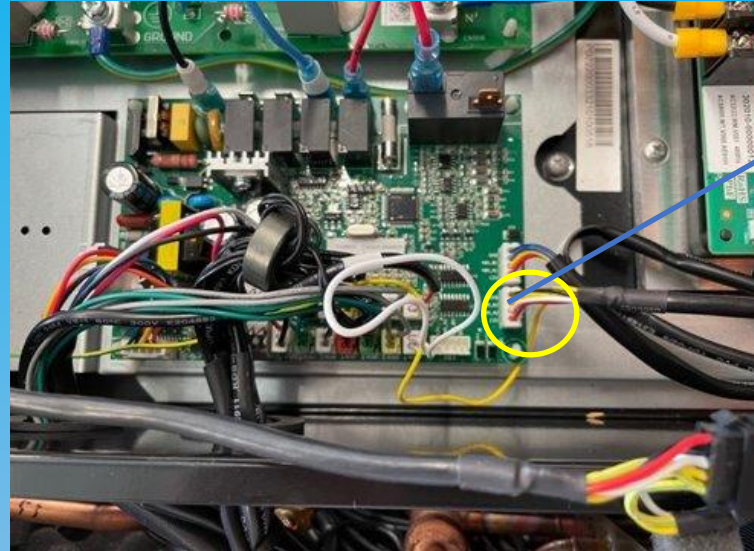
GOOD: Yellow/White Fluctuating 0-6VDC



You can also try a continuity test
Check the wire that connects from fan board to PC1004-G board for continuity. The wire may be cut.



Good: 0.00 – 0.2 Ohm
Bad: Open Line



MAIN BOARD PC1004-G
TEST THESE WIRES: Red/Black:
FOR 11-14V OUTPUT

FAN BOARD

Red wire: 12VDC,
Black wire: Negative
Yellow wire: RS485B
White wire: RS485A

TEST HERE: Yellow/White :
GOOD: Fluctuating 0-6VDC



“E081” – COMMS FAILURE PC1004-G AND FAN INVERTER PART III – FAN CABLE



Buy a **back-probe kit**. These help you precisely check voltages safely on live circuits.

Use a back-probe kit. Unit must be calling for heat (operating) or cool for test. Use care and caution to avoid electrocution. Set your meter to DC Voltage measurement and measure fan voltage.



Good: **Yellow/Black** 0-6VDC

Good: **Red/Black** 310-380VDC

Good: **Black/White** 15VDC



~220/240V

“PP” – PRESSURE SENSOR FAILURE

PP CODE

Parameter setting
H38: Default is 1,
enabled. Ensure not
set to 0.

ENSURE H38 IS SET TO “1”
IN PARAMETERS I.E.
ENABLED VIA SERVICE
MENU “H” SUBMENU

A 0-5V pressure transmitter measures pressure and converts it into a scaled electrical voltage. The control board reads this voltage via an **Analog-to-Digital Converter (ADC)**, converts it into a digital value, and uses software to translate that number into a real-world pressure measurement (like PSI or Bar).



Step 2: Test the Sensor's Output Signal

With power confirmed, verify if the sensor's pressure signal correlates correctly with its output voltage.

Connect your multimeter to the **Signal (usually White or Yellow)** wire and the **Ground (Black)** wire.

Observe the baseline voltage: At zero pressure, the sensor should output close to 0.00V or a slight offset (e.g., 0.5V is common in automotive/HVAC sensors).

•**For a live system test:** Measure the active voltage and compare it to the system's actual pressure using a manifold gauge or your system's digital read-out. **Calculate scale:** The output should scale linearly. For a 0V - 5V sensor that spans 0V - 100 psi, 2.5V means 50 psi is present.

Step 3: Rule Out Internal Faults (Power-Off Test)

If the sensor fails the live test, it may have an internal short or open circuit.

Power off the system and unplug the transmitter.

Set your multimeter to Ohms (Ω). Measure the resistance across the sensor bridge (usually across the power and ground pins). A functioning diffused silicon pressure transmitter should typically measure around 350 Ω . If it reads 0 Ω (shorted) or infinite Ω (open circuit), the transmitter is defective.

Step 1: Check the Board's Power Supply

First, ensure the transmitter is getting the correct power from the control board.

Set your multimeter to Volts DC (V DC).

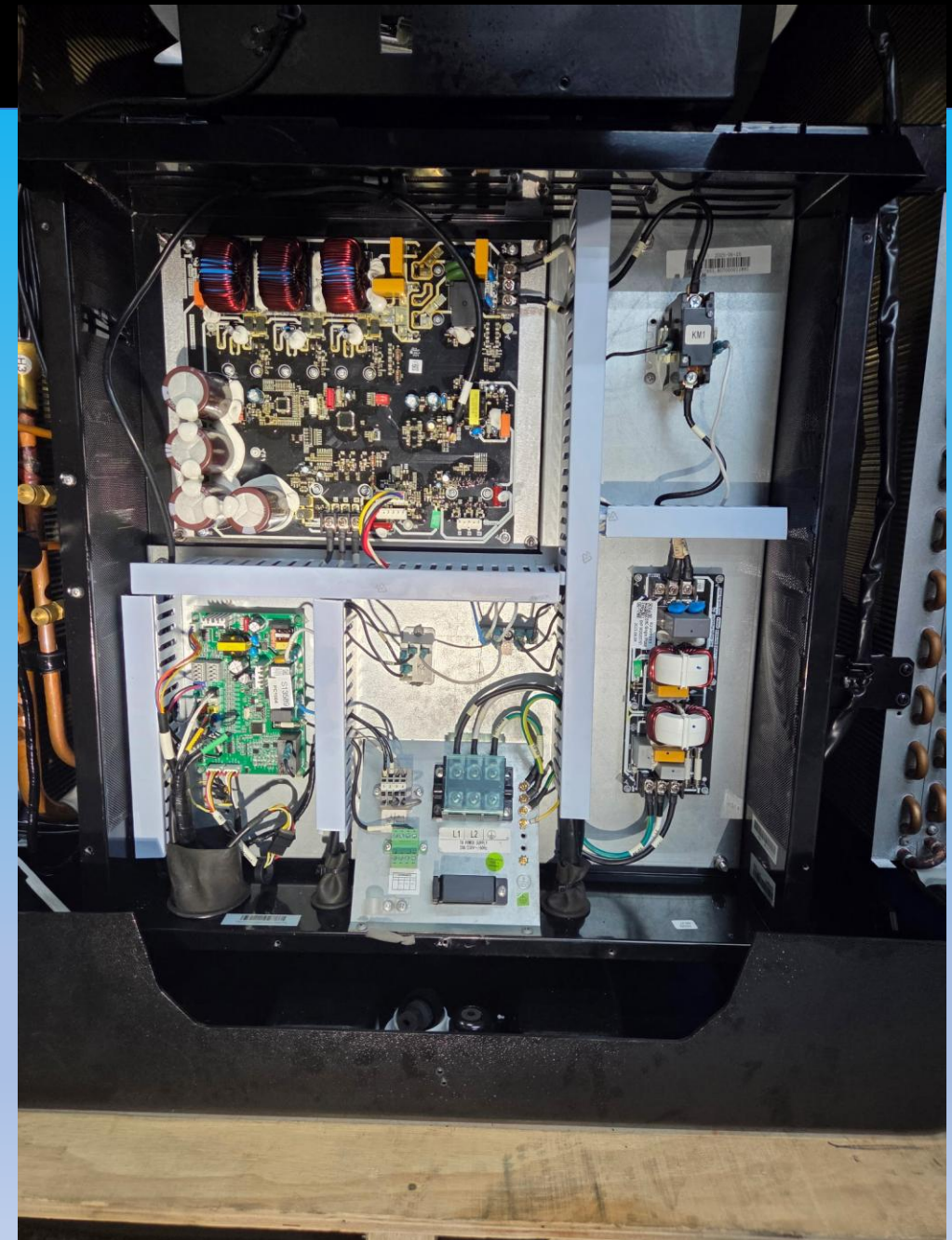
Back-probe or measure at the transmitter's wiring connector on the control board.

Verify excitation voltage: Measure the voltage between the **Supply (usually Red)** and **Ground (usually Black)** wires. You should read a steady 5.0V DC (some sensors may use 12V or 24V DC, check your specific datasheet).

If you read 0V, the control board's power regulator or fuse may be blown, or there is a broken wire in the harness.

SYSTEM LEVEL OVERVIEW

1. Control Board PC1004-G
2. Inverter Board
3. Fan Inverter Board (Older model
120kbtu/95kbtu)
4. UNIFIED Inverter Board – Today's Production
Model
5. Compressor – Variable Speed
6. Copper fin/tube heat exchanger
7. Shell and tube heat exchanger
8. EEV – Electronic Expansion Valve
9. Filter Drier
10. Reversing Valve
11. Fan / Compressor Capacitor
12. Accumulator – Liquid Expansion Tank



MAIN BOARD – PC1004-G

This is the main control board – model PC-1004G – Found on all PHNIX heat pumps

Fan Inverter Board (2022-2023)



TEST PC-1004G BOARD

How to Test Board Output: Test CN8 – Comms between PC1004-G and User Display

Put your meter to DC, set leads on 12v-GND, Good: ~11-14VDC.
Test between the two RS485 pins, Good: ~0-6VDC fluctuating is normal

How to Test Board Output: Test CN2 – Comms Port Between PC1004-G and Inverter

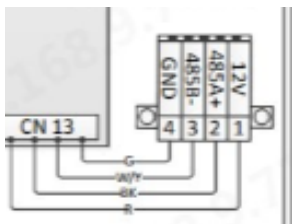
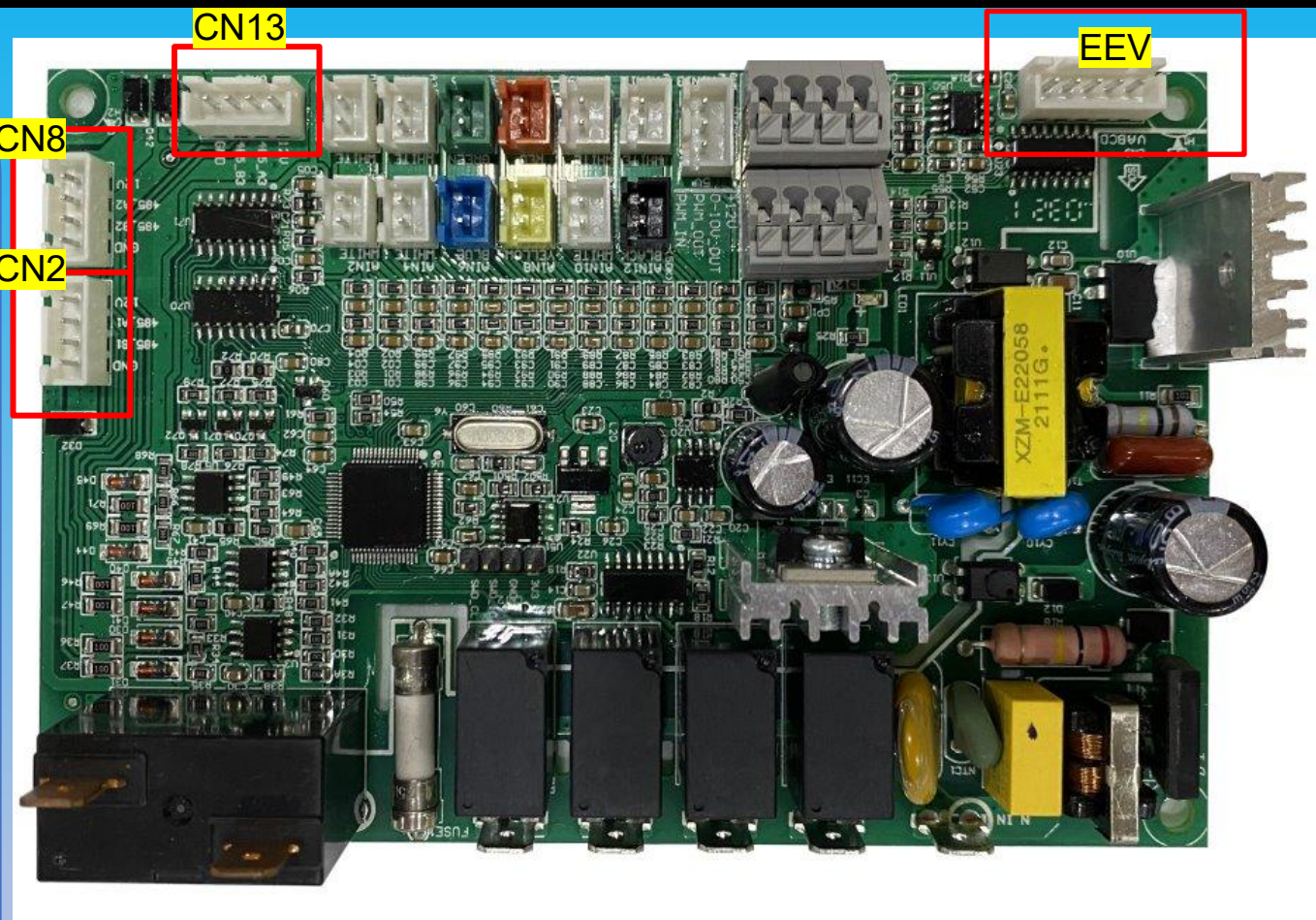
Put your meter to DC, set leads on 12v-GND, Good: ~11-14VDC.
Test between the two RS485 pins, Good: ~0-6VDC fluctuating is normal

How to Test EEV Port:

Measure 12VDC and GND for ~11-14VDC.

CN13 Information Remote OMNI LOGIC:

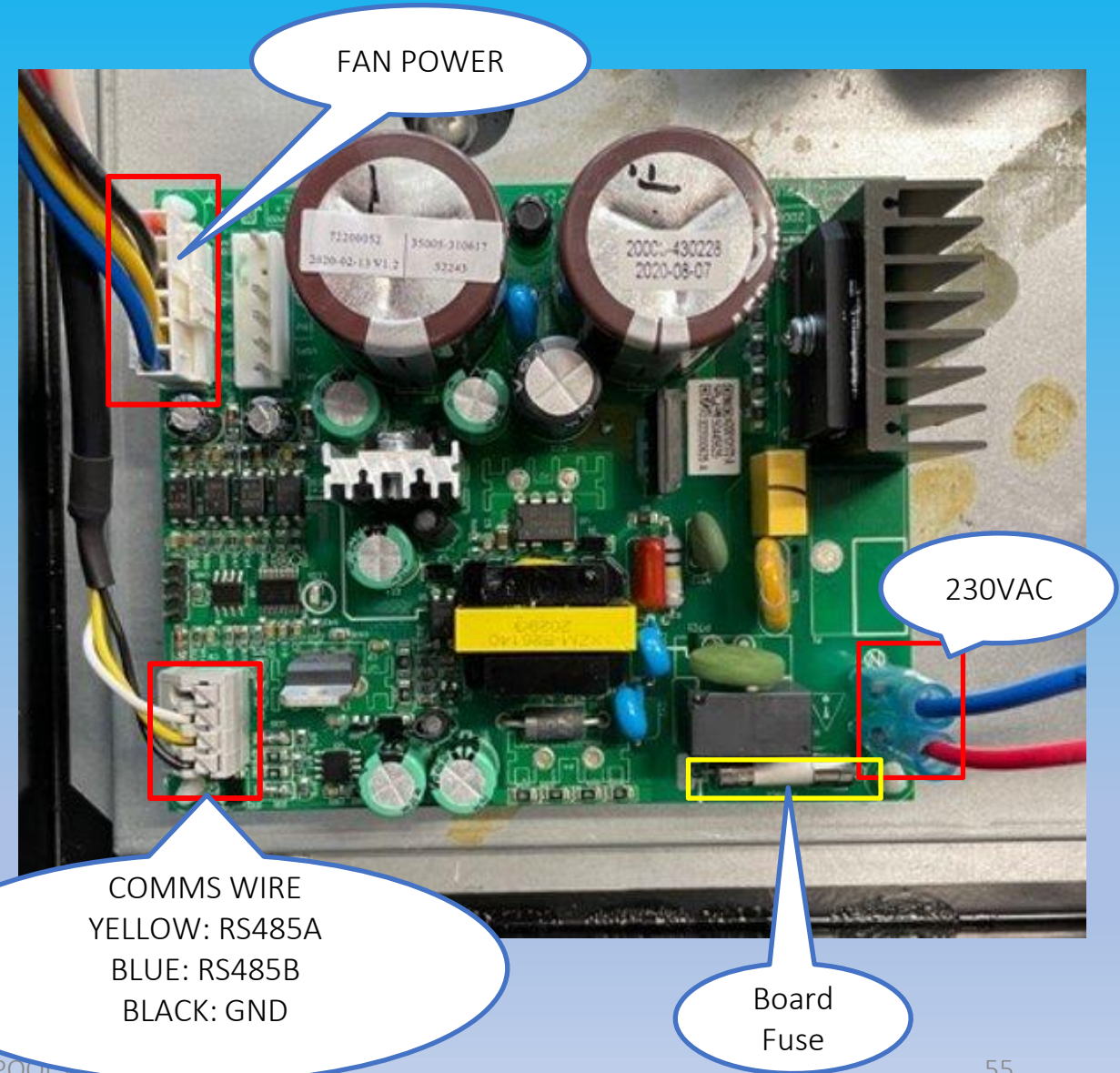
This port connects to the grey terminal block inside the electrical enclosure. It is used for OMNI Logic comms i.e. you'd run a low voltage 18-3 or 22-3 wire shielded, to the OMNI Logic panel. You don't need the 4th ground wire.



FAN BOARD (early models only)

TESTING FAN BOARD

1. Check for 230VAC: Red/Blue wires – this is power to the inverter board.
 2. Check for power OUTPUT to the fan motor, on FAN POWER terminal.
- Good: Red/Black 310-380VDC, White/Black 15VDC, Yellow/Black fluctuating 0-6VDC
3. Check comms wire, make sure wires are seated properly on the wire with yellow/white/black in bottom left corner. This wire “talks” to the main board. Yellow/White should measure 0-6VDC fluctuating during operation.
 4. Check the board fuse.
 5. Check the comms wire for continuity, ensuring there are no cuts/scrapes/knicks.
 6. Ensure fan parameters are correct. F01 = 3 (fan type).
To access service menu, see slide 26: [MENU NAVIGATION – SERVICE MENU ACCESS](#)

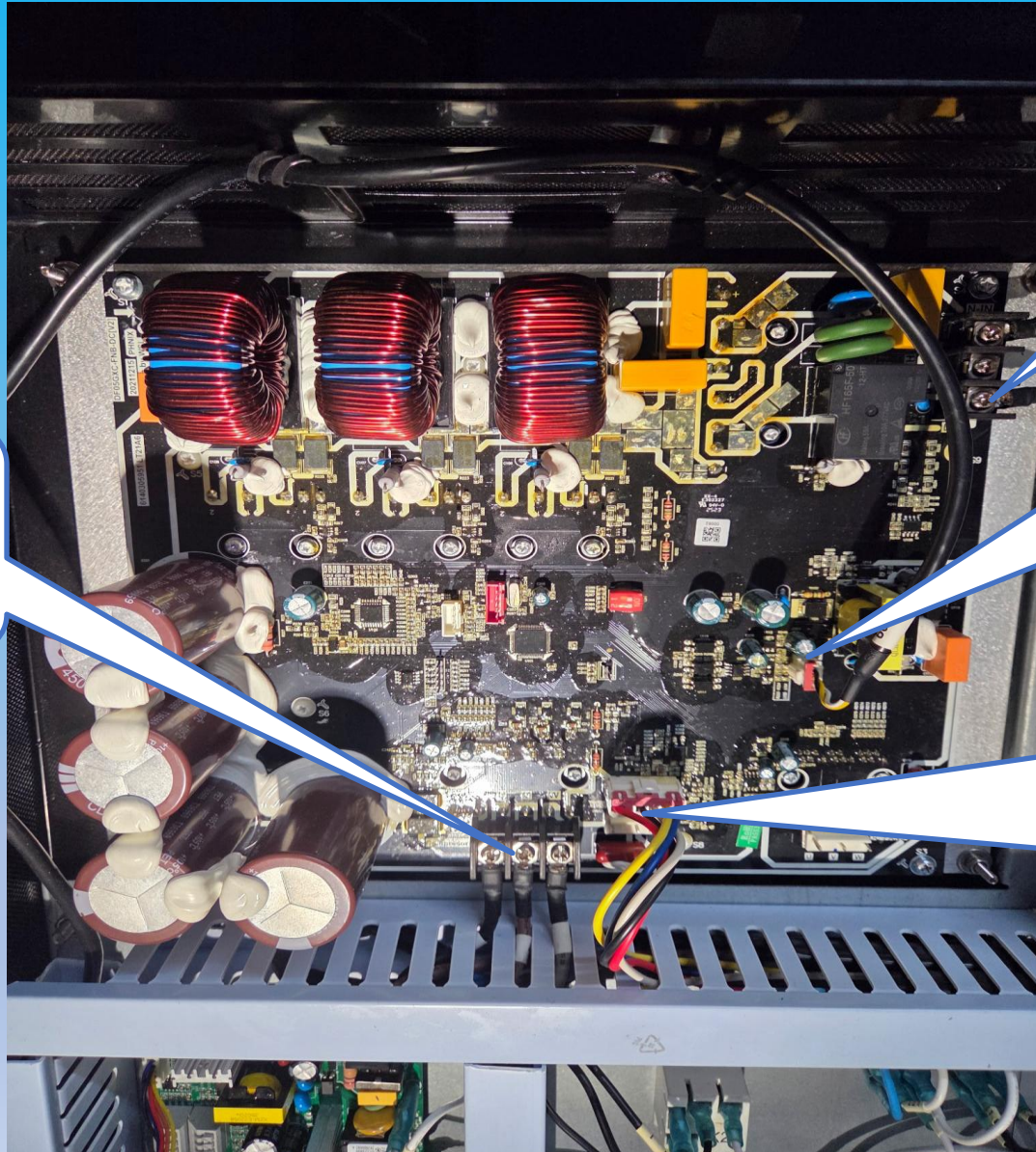


UNIFIED INVERTER BOARD – TROUBLESHOOTING GUIDE



WARNING: RISK OF ELECTRIC SHOCK.
PLEASE FOLLOW THE DIRECTIONS!

U-V-W Terminals – DC Compressor – You can test resistance between windings here – U-V/V-W/U-W
POWER MUST BE OFF!!!



TEST HERE FOR LINE VOLTAGE 230VAC/240VAC

Comms Cable – from Main Board – UNIT MUST BE SET TO HEAT/COOL – AND OPERATIONAL FOR TEST
TEST BETWEEN **YELLOW/WHITE** FOR 0-6VDC FLUCTUATING

HOW TO TEST FAN MOTOR: SET UNIT TO HEAT OR COOL
BACK PROBE:
YELLOW/BLACK ~0-6VDC IDEAL
RED/BLACK 310-380VDC IDEAL
BLACK/WHITE 15VDC

COMPRESSOR TROUBLESHOOTING

Test Motor Windings

Identify the Terminals: Locate the three compressor terminals: **Common (C)**, **Start (S)**, and **Run (R)**.

- **Measure Resistance:** Set your multimeter to measure Ohms (Ω). Test the resistance between the three combinations: Common to Run (C to R)

- Common to Start (C to S)

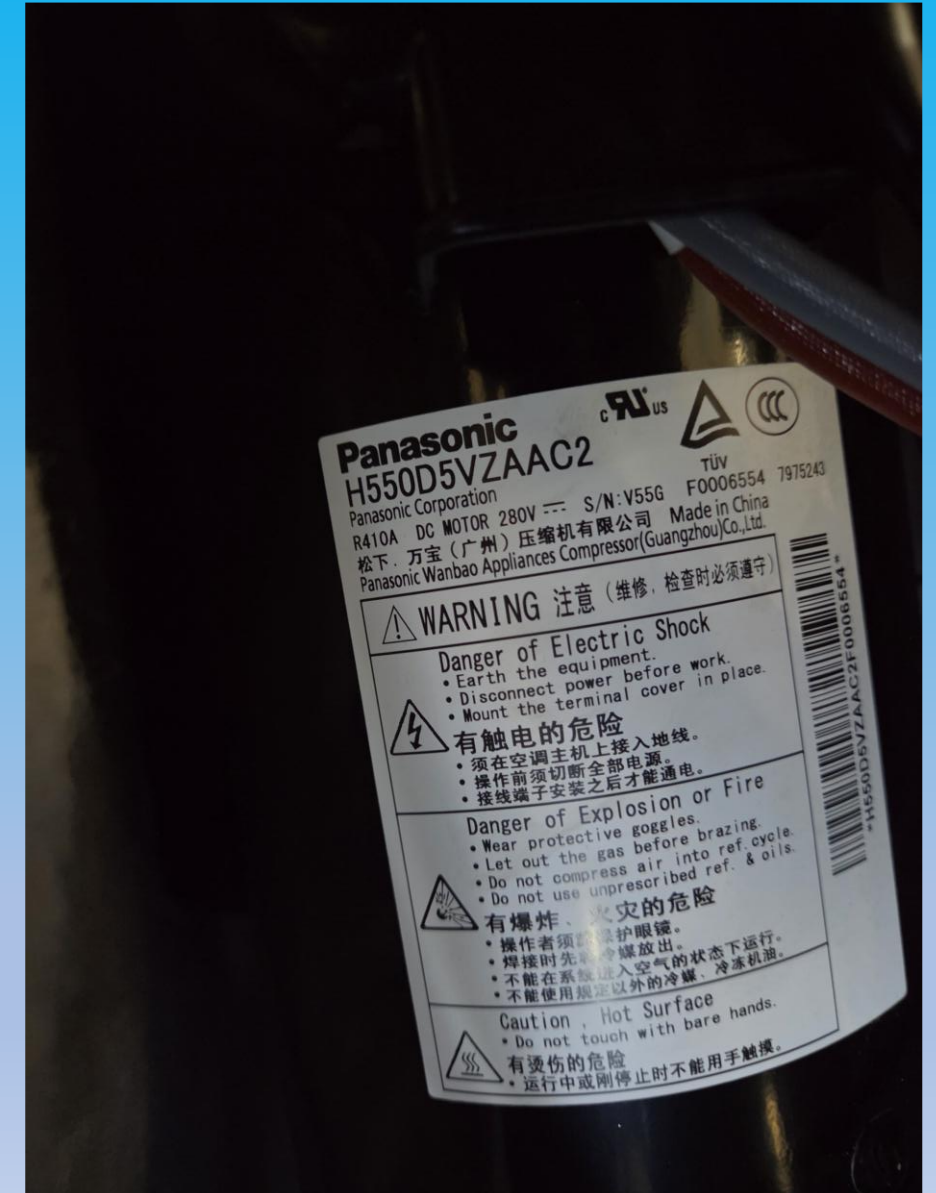
- Start to Run (S to R)

- **Interpret the Readings:** GOOD VALUE: The resistance of COMMON to START = COMMON TO RUN = START TO RUN. They should all be the same resistance. If you measure an open line (O.L.) or $0\ \Omega$ in any winding, the internal windings are burned or broken, and the compressor must be replaced.

4. Check for Short-to-Ground

Perform the Test: Set your multimeter to continuity or Ohms. Place one probe on a clean, unpainted section of the compressor's copper suction/discharge line (or metal shell). Touch the other probe to each of the three compressor terminals (C, S, and R).

Interpret the Readings: If your meter beeps or displays a resistance reading, the compressor is defective and requires replacement. If the meter registers OPEN LINE, that is good, it means there is not a short to ground in any winding.



HP31005T – HEAT EXCHANGERS TROUBLESHOOTING

COPPER TUBE/FIN

Troubleshooting Copper Fin/Tube HEX:

1. Check for a dirty coil. Indications of dirty coil are low suction pressure and low discharge pressure.
2. If the LP error code (low pressure) is shown on the display, make sure the coil is not dirty. If dirty coil, wash gently with foam cleaner rated for aluminum coils.
3. Leak test using nitrogen/bubble spray or UV dye if pressures are too low and coil is clean.

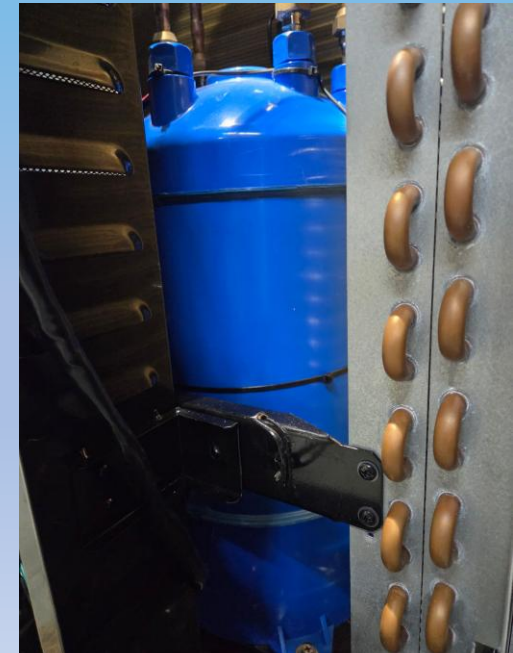


SHELL/TUBE

Troubleshooting Shell/Tube HEX:
Check for pipe leaks of water

1. Ensure there are no damages to piping
2. Check to ensure no refrigerant leaks at copper junctions
3. Check for clogs or restrictions in the water plumbing; ensure pump set to proper flow rate (≥ 30 GPM), clean screens, and ensure no air in water line.

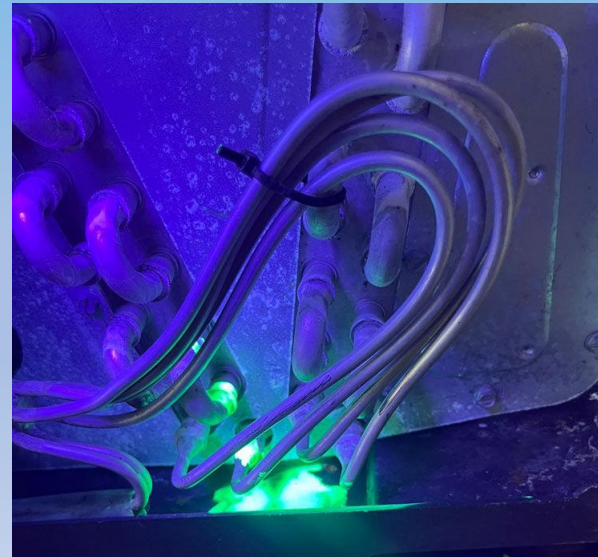
Handle with care when replacing, use PVC glue during re-plumb. New service kits included flanges and PVC pipe.



REFRIGERANT LEAKS - OVERVIEW

There's several known ways to find a refrigerant leak.

1. Hand-held leak detector
2. Nitrogen + Bubble Spray Detector
3. Fluorescent Dye



❄️ DETECTING A REFRIGERANT LEAK IN A SPLIT AC PIPELINE

METHODS



BUBBLE TEST

Apply a soap-water solution to suspected leak points. Bubbles indicate a leak.



PRESSURE TEST

Charge the system with dry nitrogen and monitor pressure. A drop indicates a leak.



ULTRASONIC LEAK DETECTION

Use a handheld ultrasonic leak detector to listen for high-frequency sound emitted by a leak.



DYE TESTING

Inject a fluorescent dye into the system. Use a UV light to detect dye escaping from a leak.

RECOMMENDED DEVICES



ELECTRONIC
REFRIGERANT
LEAK DETECTOR



ULTRASONIC
LEAK
DETECTOR



INFRARED
CAMERA



UV DYE
KIT

HANDHELD LEAK DETECTORS



A handheld leak detector is a quick and easy way to scan suspected components/points of the system for leaks. Use common sense and good judgement calls, scan areas prone to leaks.

- CHECK SERVICE STUBS, AND FOR LEAKING SCHRAEDER VALVES
- CHECK BRAZE JOINTS
- CHECK AREAS ON THE COIL WHERE FINS ARE DAMAGED WHILE UNIT OPERATES
- THESE HAND-HELD DETECTORS ARE GREAT FOR QUICK SCANS, BUT THEY DON'T ALWAYS FIND SMALL LEAKS.

NITROGEN AND BUBBLE SPRAY REFRIGERANT LEAK DETECTION



- A second proven method of finding leaks is to pressurize the system with nitrogen and use a liquid leak detector such as Big Blue to detect leaks.



Recommended pressurization:
300psig

Standard leak test is 14

UV DYE TO CHECK FOR LEAKS



A third proven method is to inject a fluorescent dye into the system and use an ultraviolet light to detect the leak.

Given the sophistication of today's systems as well as the compact designs we believe that having a dye system leak detector is a requirement in your tool box.

If you do not have a dye injector/ UV light detector kit you will need to purchase one. You should be able to purchase a Spectronics kit that contains the UV light, UV protective glasses, cleaner, and enough dye for at least 2 systems.

WHAT IS AN EEV – ELECTRONIC EXPANSION VALVE – HOW DOES IT WORK?

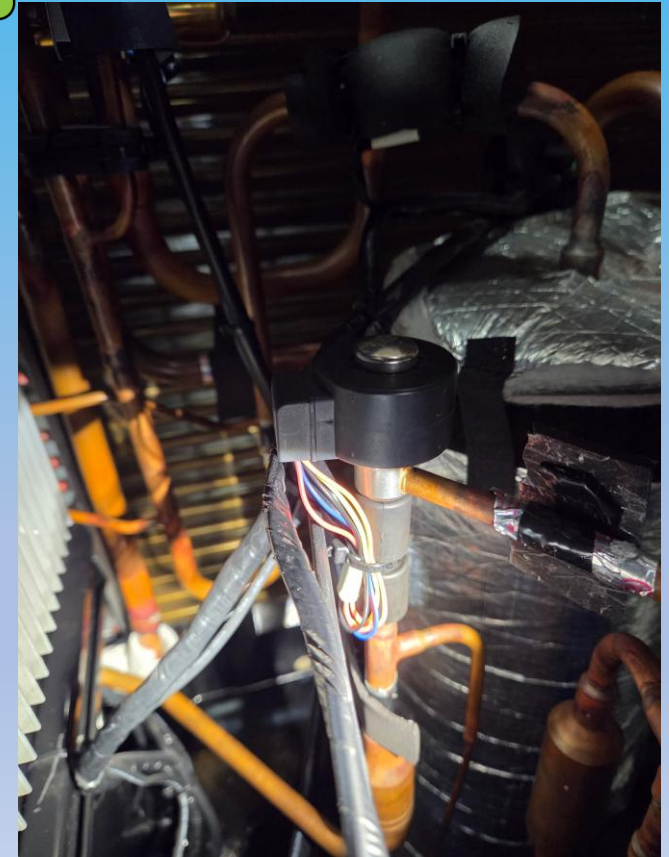
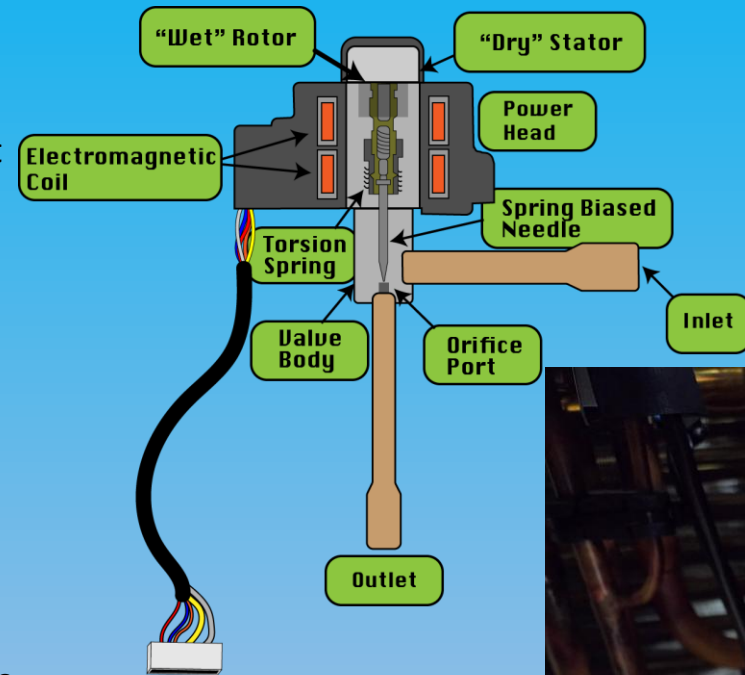
An **EEV** (Electronic Expansion Valve) is a highly precise metering device used in modern HVAC and refrigeration systems to regulate the flow of refrigerant. It acts as an intelligent throttle, dropping the refrigerant's pressure to absorb heat efficiently.

How an EEV Works

Unlike older, mechanical expansion valves that rely on physical springs and bellows, an EEV operates electronically using a motorized system:

1.Sensors: Thermistors and pressure transducers continuously monitor the temperature and pressure of the refrigerant leaving the evaporator.

2.The Brain (Controller): A microcontroller or circuit board processes this data to calculate the "superheat" (the amount of heat added to the refrigerant beyond its boiling point). **The Action (Stepper Motor):** When the controller detects a change in cooling or heating demand, it sends electrical pulses (usually 12-volt signals) to a stepper motor. This motor drives a needle or piston up or down in tiny, precise increments (sometimes thousands of steps) to open or restrict the valve's pathway.



EEV TROUBLESHOOTING



EEVs on PHNIX heat pumps can be tested.

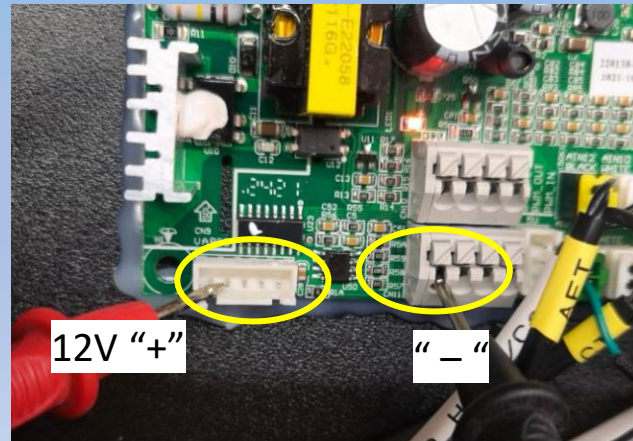
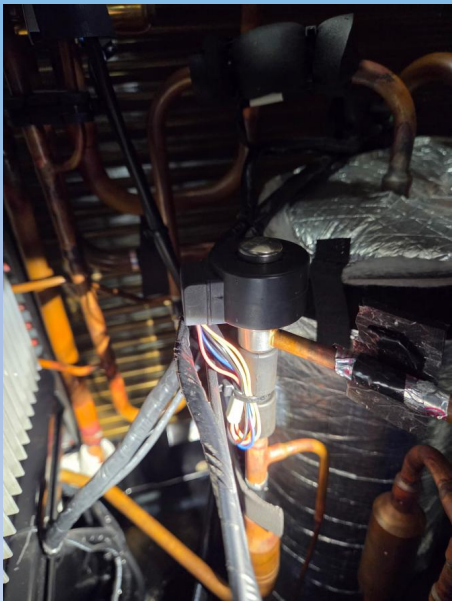
First check the output voltage from the PC1004/G board to the EEV. It should be approximately ~11-14VDC.

If you have proper voltage, and the EEV is suspected to be failing to open, you can verify this by manually adjusting the stepper motor and feeling for a change.

Try setting the parameter of the EEV to “manual” control (in settings). SEE PARAMETER LIST. The parameters are in service menu: On user display, navigate to Parameters from user interface, enter “66” as password, then navigate to the “E” sub-menu. Set the first setting from 0-Auto Control to 1-Manual Control, then you can manually set the “step” the EEV should be at. Then feel with your hand if the EEV motor moves. You will feel it vibrate.

Change the steps of the EEV to arbitrary settings higher or lower, and listen or touch the EEV to check for stepper motor movement.

Another method to test the EEV is to unseat it, and put your warm hand around the EEV itself. Feel it modulate. The unit can be idle when you try this.



11-14VDC Target



FILTER DRIER TROUBLESHOOTING TIPS



Common Filter Drier Failures

1. Restricted or Plugged Filter Drier

The most common failure.

Causes

- Compressor burnout contamination
- Excessive moisture
- Debris from brazing
- Metal particles from compressor wear

Symptoms

- High temperature drop across the drier
- Low suction pressure
- Starved evaporator
- Low superheat control
- Reduced system capacity

2. Saturated Desiccant

The desiccant can only absorb a limited amount of moisture.

Causes

- Improper evacuation
- Refrigerant leak repairs
- System left open to atmosphere
- Severe moisture contamination

Symptoms

- Intermittent freezing at the metering device
- Unstable system operation
- Acid formation
- Repeat compressor issues

3. Internal Breakdown

The desiccant or internal components may deteriorate.

Symptoms

- Fine particles circulate through system
- TXV screen plugging
- Recurring restrictions
- Metering device problems

4. Acid Contamination

Usually occurs after a compressor burnout.

Symptoms

- Oil discoloration
- Acid test failure
- Repeated compressor failures
- Winding damage in hermetic compressors

In these situations, a suction-line burnout drier is often installed temporarily



FILTER DRIER TROUBLESHOOTING TIPS

What Is a Filter Drier?

A filter drier is a component installed in the refrigerant line that performs two critical functions:

1. **Filters contaminants** such as dirt, metal shavings, carbon, and debris.

1. **Removes moisture** from the refrigerant using a desiccant material.

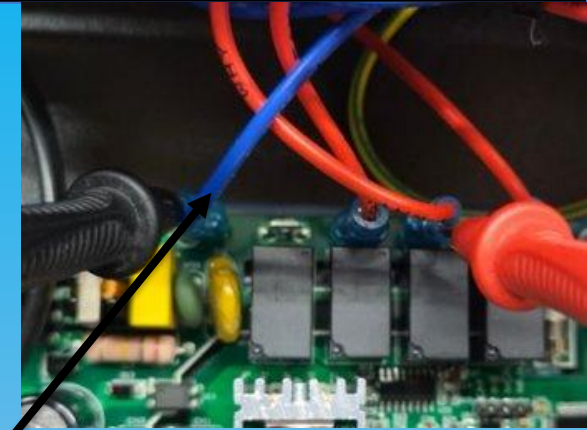
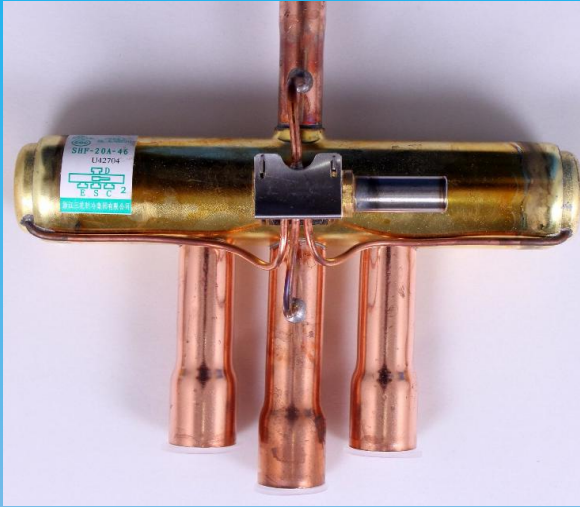
Filter driers are commonly found in:

- **Liquid lines** (most common location)
- **Suction lines** (typically after a compressor burnout or major repair)

<u>Symptom</u>	<u>Likely Cause</u>
High superheat	Starved evaporator
Low suction pressure	Restricted refrigerant flow
Frost at drier outlet	Pressure drop across drier
Poor cooling capacity	Insufficient refrigerant flow
Temperature drop across drier	Internal restriction
Intermittent TXV icing	Moisture contamination



REVERSING VALVE TROUBLESHOOTING TIPS



Verify Board Works: OUTPUT 3 AND NEUTRAL should measure 230VAC in cooling mode. Remember, the reversing valve is only energized during call for cool.

Troubleshooting a Reversing Valve

1. Turn off power to the unit.
2. Remove the coil from the 4-way valve.
3. Use a solenoid tester on the valve.
4. While applying and removing the tester, listen for a **knocking or clicking sound** from the 4-way valve.

Results:

• If you hear a **knocking/clicking sound**: The 4-way valve is not stuck. The valve is operating correctly, and the **coil is likely faulty** and should be replaced.

• If you do not hear a **knocking/clicking sound**: The **4-way valve is stuck** and may require repair or replacement.

Note: Always disconnect power before servicing the unit to avoid electrical hazards.



ACCUMULATOR A.K.A. LIQUID TANK

What Is an Accumulator?

- A storage vessel installed in the **suction line** between the evaporator and compressor.
- Designed to prevent **liquid refrigerant** from entering the compressor.
- Commonly used in **heat pumps** due to varying operating conditions during heating and cooling modes.

Why Accumulators Are Important

- Protect the compressor from **liquid slugging**.
- Prevent compressor damage caused by **floodback**.
- Improve system reliability and compressor life.
- Return refrigerant and oil to the compressor at a controlled rate.

Symptoms of Accumulator Problems

Compressor noise during startup.

Reduced system capacity.

Excessive compressor wear.

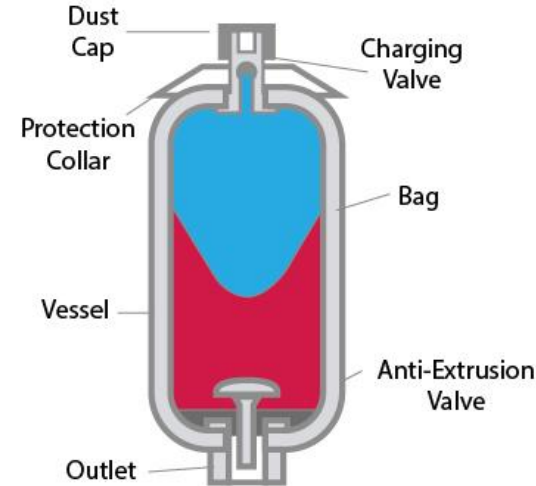
Oil return issues.

Liquid refrigerant reaching the compressor.

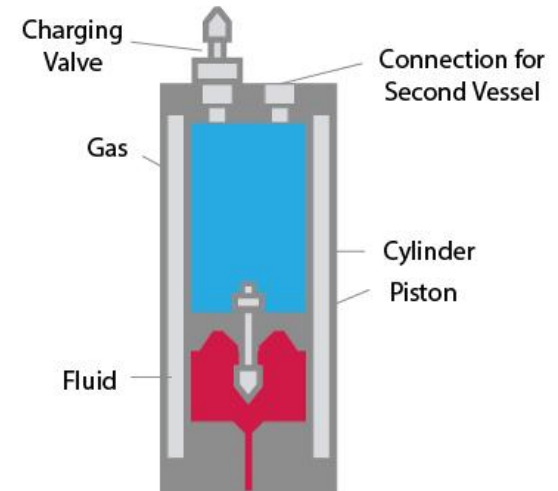
Diagnostic Steps

1. Inspect accumulator body for corrosion, leaks, or physical damage.
2. Check suction pressure and system operating conditions.
3. Look for signs of floodback or compressor slugging.
4. Verify proper superheat at the evaporator outlet.
5. Check for restricted suction-line components.
6. Confirm proper oil return to the compressor.

Anatomy of Accumulators



Bladder Accumulator



Piston Accumulator



REFERENCE PRESSURES AND TEMPERATURES

HP51202T/HP50952T

OPERATING MODE	OUTDOOR TEMPERATURE UNITS: °F	RELATIVE HUMIDITY (%)	SETPOINT ON THE HEAT PUMP – 80°F	SUCTION PRESSURE (PSIG)	LIQUID PRESSURE (PSIG)	RECOMMENDED FLOW RATE FOR PUMP (GPM)	DELTA T – OUTDOOR VERSUS AIR FLOWING OUT FAN TOP	SUPERHEAT	SUBCOOLING
HEATING	50°F	63%	80°F	80-90PSIG	300-315PSIG	30-75 GPM	15-20° F ΔT	4-8°F	12-15°F
HEATING	80°F	63%	80°F	140-145 PSIG	315-325PSIG	30-75 GPM	15-20° F ΔT	12-14°F	10-15°F
HEATING	80°F	80%	80°F	150-155 PSIG	325-330PSIG	30-75 GPM	15-20° F ΔT	15-18 °F	10-18°F
COOLING	95°F	N/A	90°F	150-160PSIG	220-230PSIG	30-75 GPM	15-20° F ΔT	25-30°F	NOT AVAILABLE

END OF TROUBLESHOOTING GUIDE

HAYWARD TECH SUPPORT HOTLINE: 908-355-7995