BPS HP-CO

Boxer Packaged Solution with Heat Pump

Service Manual

1.0 SAFETY PRECAUTIONS

Before servicing or carrying out repairs to the unit, make sure you read all the “Safety precautions”.

1.1 Hazard Symbols

Warning: Describes precautions that should be observed to prevent danger of injury or death to the user.

Caution: Describes precautions that should be observed to prevent damage to the unit.

1.2 Important Information

Warning:

- Carefully read the labels affixed to the main unit.
- Only a trained and qualified technician should carry out repair and service work on this unit.
- EN378-4 specifies that anyone working on flammable refrigerants systems should receive training which includes the following:
  - Knowledge of legislation, regulation and standards relating to flammable refrigerants;
  - Detailed knowledge of and skill in handling flammable refrigerants, personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection, recovery and disposal.
- Improper service or repair by the user /other may result in, electric shock, fire, explosion or water leakage.
- Any copper tube used to replace refrigerant piping shall be seamless copper tube of Type ACR (hard or annealed) complying with sound engineering practice of PED/PE(S)R.
- Use the specified cables for wiring. Make the connections securely so that any outside forces acting on the cables are not applied to the terminals. Inadequate connection and fastening may generate heat and cause a fire.
- Never repair the unit with unspecified parts always use approved Nuaire parts. If the unit is repaired improperly, electric shock, explosion or fire may result.
- When handling this product, always wear protective equipment e.g. Gloves, full arm protection namely boiler suit, and safety glasses. Improper handling may result in injury.
- If the pressure switch, thermal switch, or other protection device is shorted or operated forcibly, or parts other than those specified by Nuaire are used, fire or explosion may result.

1.2.1 Tools & Equipment

Warning:

- Tools should be rated for use in a Zone 2 area or have been suitably tested for use with flammable refrigerants. Type ‘n’ protection according to EN60079-15 is deemed as suitable for this application. **This is not intrinsic safety.**
- A flammable gas detector should be used to monitor the air in the work area. If an electronic leak detector is used it must be safe and sensitive to the flammable refrigerant.
- Refrigerant recovery machines must be assessed for use with flammable refrigerants. Approval must be sought from the manufacturer before using a standard HFC recovery machine with any flammable refrigerant.
- More accurate scales are necessary when charging small, critical charged systems with some flammable refrigerants An accuracy of ±5 g is often necessary.
- A dry powder or CO2 fire extinguisher must be available at the location.
- A suitable ventilation fan should be used when working inside if there is insufficient natural ventilation. Procedures The work area must be well ventilated with no source of ignition within 3 m of the system and the service equipment such as a vacuum pump and recovery machine.
- The vacuum pump should be controlled by a switch outside the 3m zone (the vacuum pump’s switch should not be used as it is a source of ignition) and the pump should be located in a well-ventilated area. Prior to un brazing joints the flammable refrigerant must be removed from the system, and the system filled with nitrogen. Faulty electrical devices and compressors must be replaced with like for like components.
- To dispose of this product, consult your dealer. Do not use a leak detection additive.

1.2.2 Before Service

Caution:

- Do not install the unit where combustible gas may leak and keep away from any fire source.
- If the gas leaks and accumulates around the unit, an explosion may result.
- Ground the unit. Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground lines. Improper grounding may result in electric shock.
- Install the power cable so that tension is not applied to the cable. Tension may cause the cable to break and generate heat which may, in turn, cause fire.
- Install a leak circuit breaker, as required. If a leak circuit breaker is not installed, electric shock may result.
- Use power line cables of sufficient current carrying capacity and rating. Cables that are too small may leak, generate heat, and cause a fire.
- Use only a circuit breaker and fuse of the specified capacity. A fuse or circuit breaker of a larger capacity or a steel or copper wire may result in a general unit failure or fire.
- Be very careful regarding product transportation. Two people should be used to carry products of 20kg or more.

1.2.3 Before Testing

Caution:

- Do not touch the switches with wet fingers. Touching a switch with wet fingers can cause electric shock.
- Do not touch the refrigerant pipes during and immediately after operation. During and immediately after operation, the refrigerant pipes may be hot or cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. Your hands may suffer burns or frostbite if you touch the refrigerant pipes.
- Do not operate the air handling unit or heat pumps with the panels / guards removed. Rotating, hot, or high-voltage parts can cause injuries.
- Do not turn off the power immediately after stopping operation. Always wait at least five minutes before turning off the power. Otherwise, water leakage and other problems may occur.

1.2.4 Overview Of Service

Warning:

- Systems should be serviced and maintained following good refrigeration practice, with some changes to tools, equipment and procedures.
- Engineers working on flammable gas system should be appropriately trained.

1.2.5 Disclaimer

Warranty: This product manufactured by Nuaire is warranted against defective materials for a period **of 5 years from** the date of delivery to the original purchaser.

Warning: Nuaire assumes no liability for damages consequent to the user of this product. We reserve the right to change this manual at any time without notice. The information furnished by us is believed to be accurate and reliable. However, no responsibility is assumed by us for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

1.3 Personal Protective Equipment

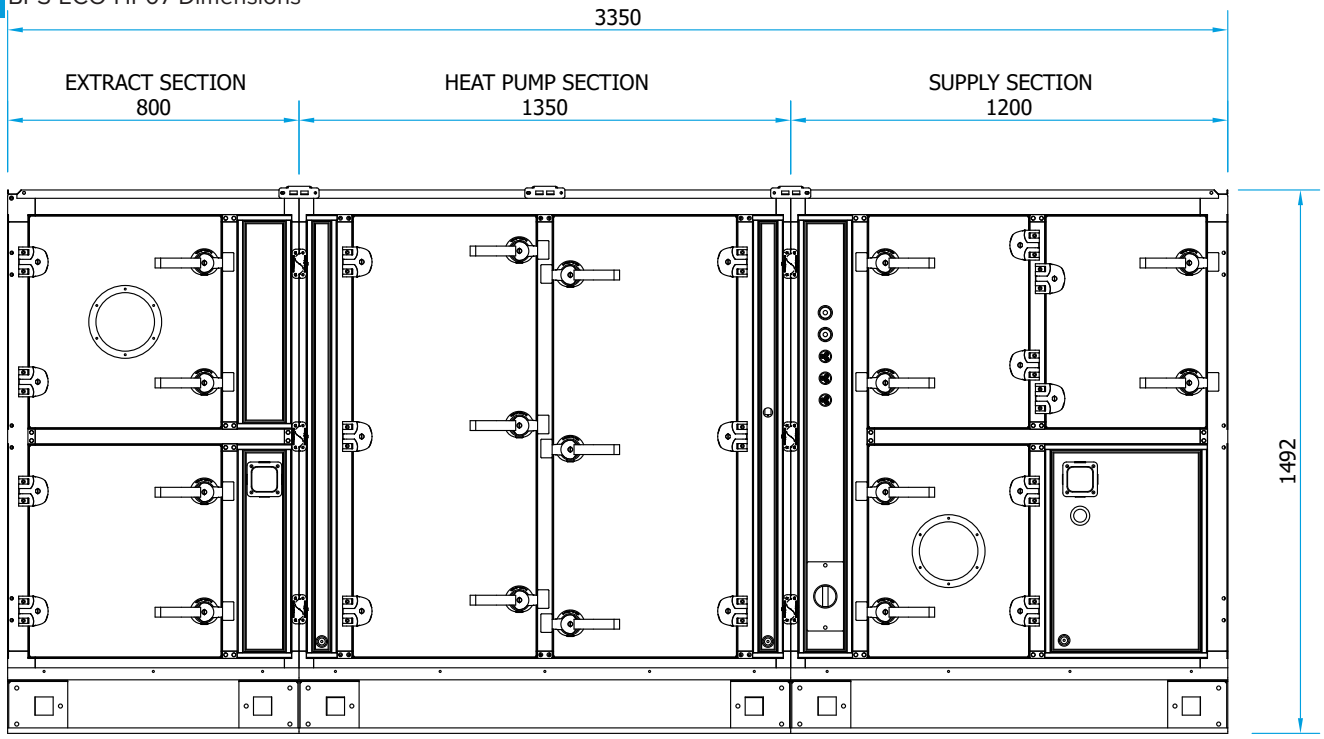
The following minimum Personal Protective Equipment (PPE) is recommended when interacting with Nuaire product:

- Protective Steel Toed Shoes - when handling heavy objects.
- Full Finger Gloves (Marigold PU800 or equivalent) - when handling sheet metal components.
- Semi Fingerless Gloves (Marigold PU3000 3DO or equivalent) - when conducting light work on the unit requiring tactile dexterity.
- Safety Glasses - when conducting any cleaning/cutting operation or exchanging filters.
- Reusable Half Mask Respirators - when replacing filters which have been in contact with normal room or environmental air.

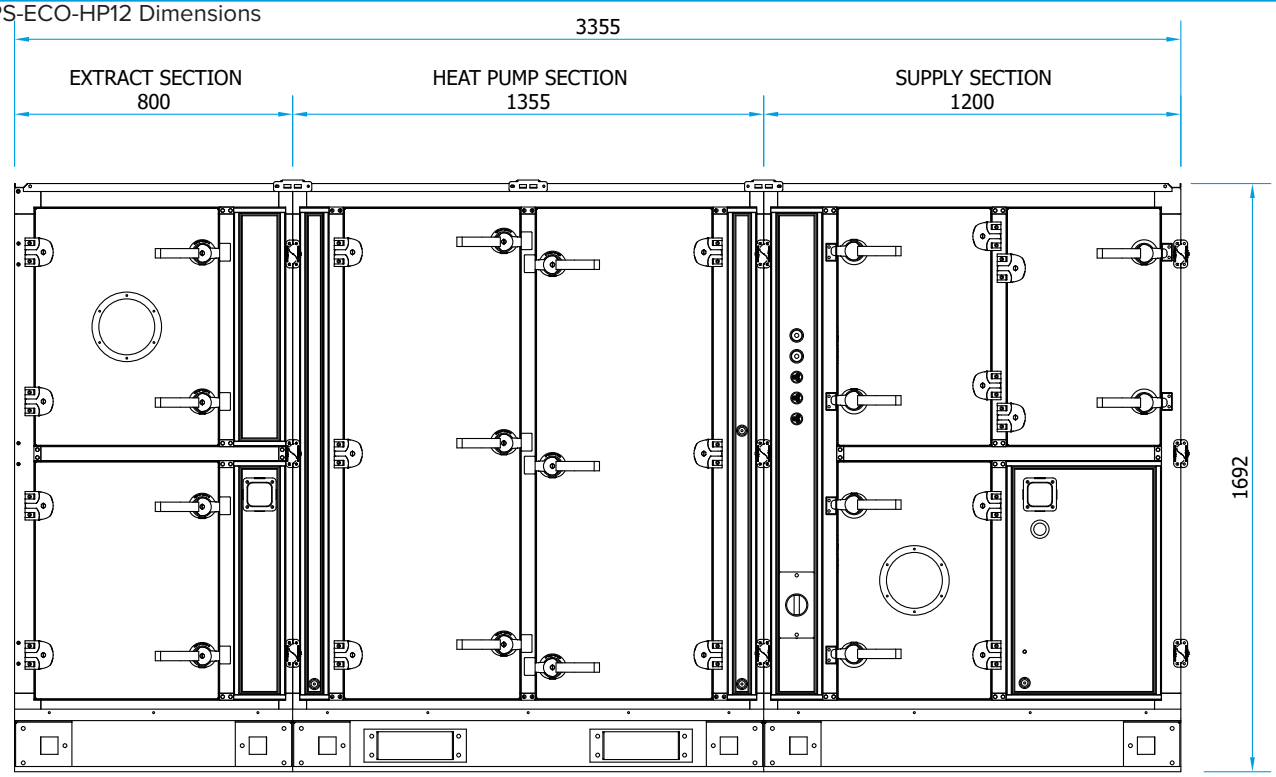
Nuaire would always recommend a site specific risk assessment by a competent person to determine if any additional PPE is required.

2.0 UNIT DIMENSIONS

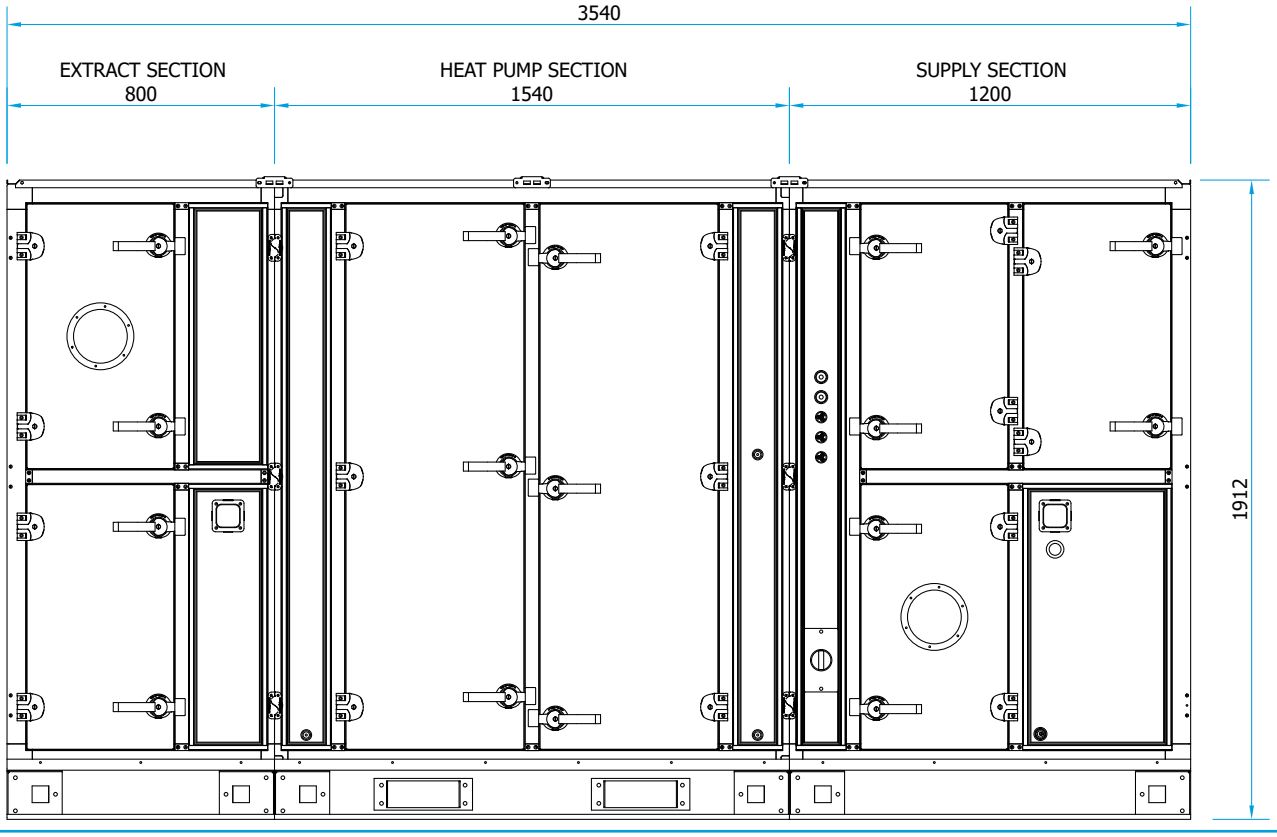
1 BPS-ECO-HP07 Dimensions



2 BPS-ECO-HP12 Dimensions



3 BPS-ECO-HP17 Dimensions



3.0 SYSTEM OPERATION

The BPS-Eco internal heat pump is a twin compressor DX R32 heat pump system, designed to recover heat from the extracted air.

Each system will run independently, giving back up in case one system should fail, each system is controlled by a c.pco plc. Each controller communicates via Ethernet, so back up / run and duty share is all possible.

In the event of any faults on the lead system the other system will take up the primary operation. Fault codes are displayed on both controllers but does not prevent the health system from operating. A list of all fault codes can be found on page 26 > 38.

The heat pump will operate from a 0 >10 volt signal from the BPS Connect controller housed in main BPS control panel, the 0 >10 volt signal is dependant of the air supply temperature set point, set on the controller. The controller will also send a cooling or heating volt free signal to the C.pco heat pump controllers. This signal will energise the reversing valve coil when cooling is required.

Two R32 refrigerant gas detectors are factory installed, one in the compressor section and the other in the supply coil section.

In the unlikely event of a refrigerant gas leak when the AHU is not in operation, either one of these sensors will start both extract and supply fans in boost mode.

Each sensor should be checked and serviced every 12 months, details of the sensors can be found in Section "6.0 R32 GAS DETECTORS" on page 30.

For further information on testing or servicing and to ensure safe operation of the heat pump systems gas detection please contact Nuaire after sales department.

3.1 System Information

3.1.1 BPS-ECO-HP07

Modes	Cooling / Heating
Power Supply	3 Phase, 400 Volts, 50 Hz
Running Current	8.9 Amps
Maximum Current	12.8 Amps
Refrigerant Control	Electronic Expansion Valve
Compressor Type	Hermetic Rotary Compressor
Compressor Model	C-7RZ233H3CBF
Capacity	7.825 kW, Minimum 95%
Protection Devices	HP switch & Discharge thermo
Heat Exchanger	Plate Fin Coil
Defrost Method	Off Cycle / Reverser Cycle
Noise Level	59 dB
Refrigerant	R32
Charge	1.2 kg (Per Circuit)

3.1.2 BPS-ECO-HP12

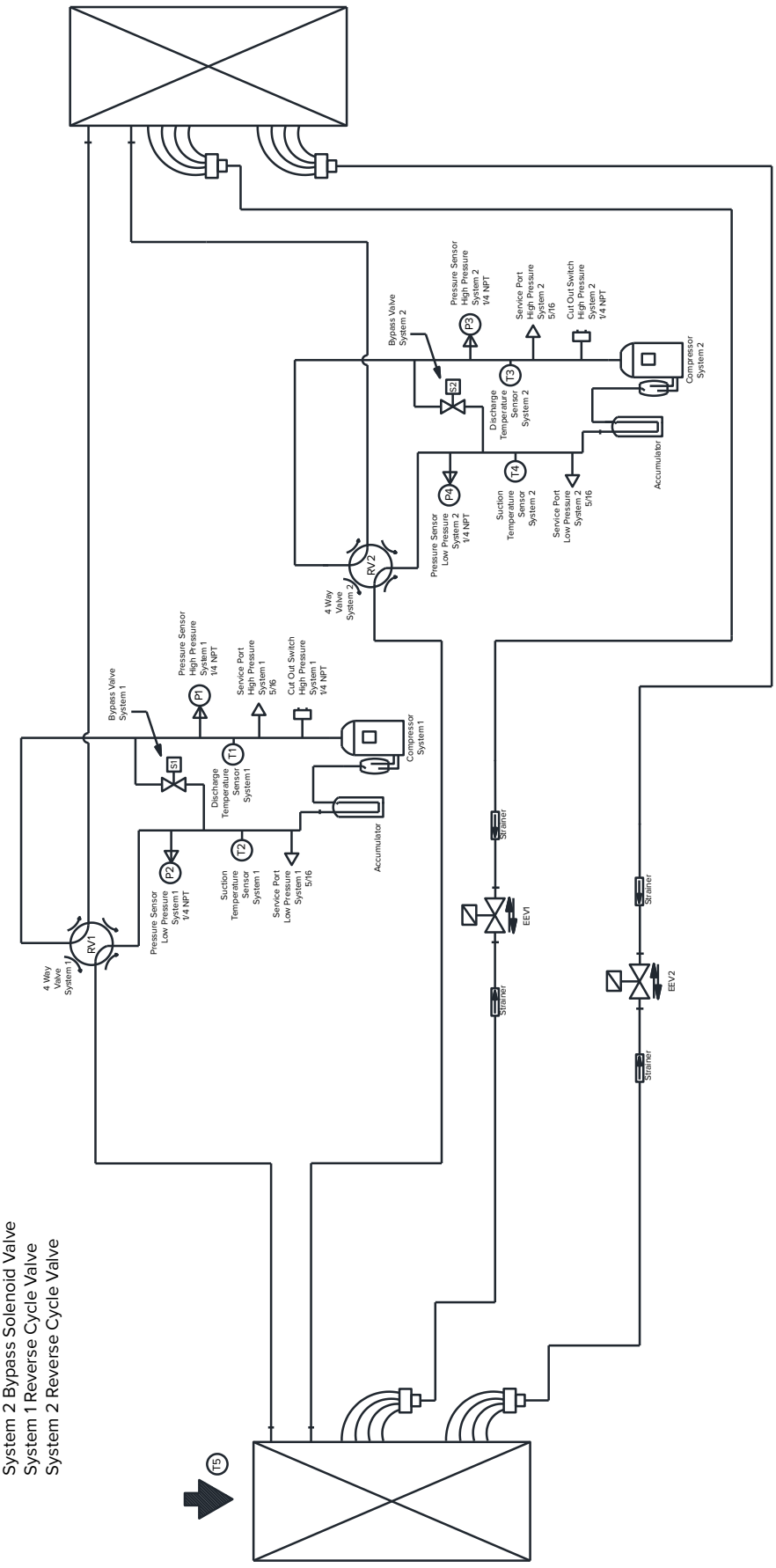
Modes	Cooling / Heating
Power Supply	3 Phase, 400 Volts, 50 Hz
Running Current	8.9 Amps
Maximum Current	12.8 Amps
Refrigerant Control	Electronic Expansion Valve
Compressor Type	Hermetic Rotary Compressor
Compressor Model	C-7RZ233H3CBF
Capacity	7.825 kW, Minimum 95%
Protection Devices	HP switch & Discharge thermo
Heat Exchanger	Plate Fin Coil
Defrost Method	Off Cycle / Reverser Cycle
Noise Level	59 dB
Refrigerant	R32
Charge	1.6 kg (Per Circuit)

3.1.3 BPS-ECO-HP17

Modes	Cooling / Heating
Power Supply	3 Phase, 400 Volts, 50 Hz
Running Current	12.0 Amps
Maximum Current	16.0 Amps
Refrigerant Control	Electronic Expansion Valve
Compressor Type	Hermetic Rotary Compressor
Compressor Model	C-7RZ320H3CAF
Capacity	10.5 kW, Minimum 95%
Protection Devices	HP switch & Discharge thermo
Heat Exchanger	Plate Fin Coil
Defrost Method	Off Cycle / Reverser Cycle
Noise Level	59 dB
Refrigerant	R32
Charge	1.8 kg (Per Circuit)
Oil	FW68S Or Equivalent

3.2 Piping Schematics

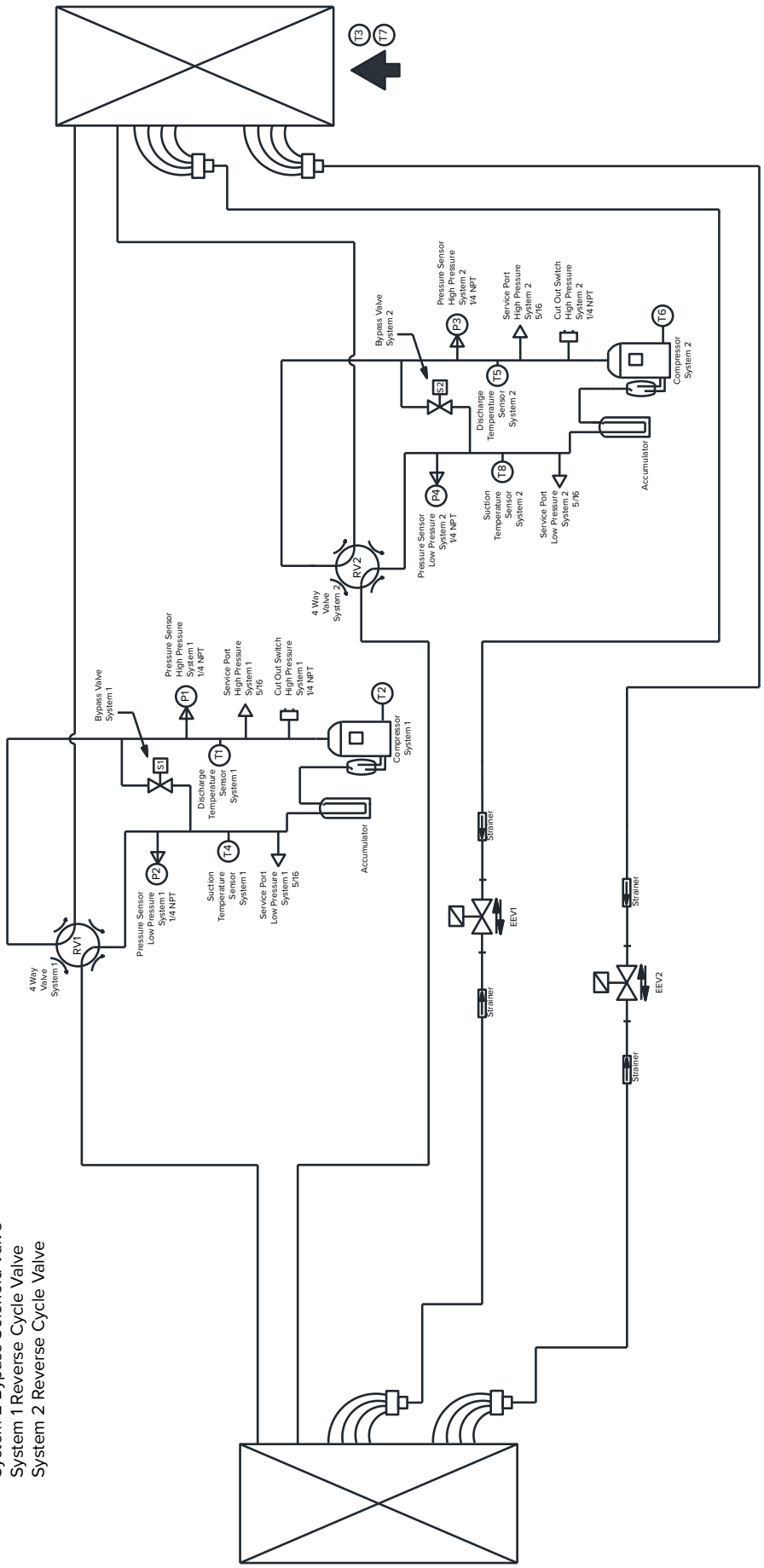
4 BPS-ECO-HP07 Piping Schematic



KEY

EEV1: Electronic Expansion Valve, System 1
EEV2: Electronic Expansion Valve, System 2
T1/T5: Discharge Temperature Sensor
T2/T6: Compressor Shell Temperature Sensors
T3/T7: Temperature After Thermal Wheel (Extract) Defrost Control
T4/T8: Suction Temperature Sensors
P1/P3: High Pressure Sensors
P2/P4: Low Pressure Sensors. Overload Switches
HP1/HP2: High Pressure Switches
S1: System 1 Bypass Solenoid Valve
S2: System 2 Bypass Solenoid Valve
RV1: System 1 Reverse Cycle Valve
RV2: System 2 Reverse Cycle Valve

5 BPS-ECO-HP12 Piping Schematic



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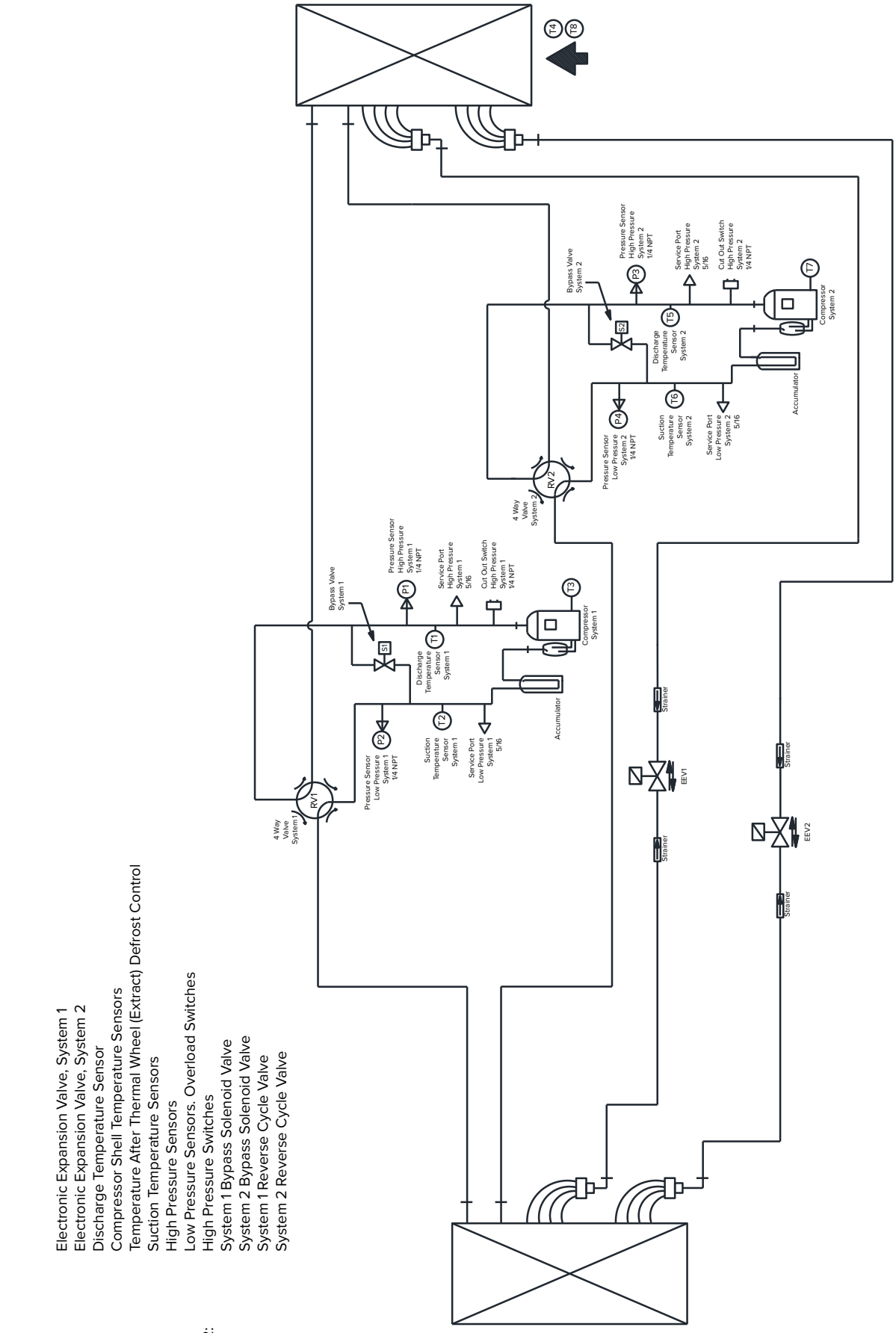
EEV1: Electronic Expansion Valve, System 1
EEV2: Electronic Expansion Valve, System 2
T1/T5: Discharge Temperature Sensor
T2/T6: Compressor Shell Temperature Sensors
T3/T7: Temperature After Thermal Wheel (Extract) Defrost Control
T4/T8: Suction Temperature Sensors
P1/P3: High Pressure Sensors
P2/P4: Low Pressure Sensors. Overload Switches
HP1/HP2: High Pressure Switches
S1: System 1 Bypass Solenoid Valve
S2: System 2 Bypass Solenoid Valve
RV1: System 1 Reverse Cycle Valve
RV2: System 2 Reverse Cycle Valve

6 BPS-ECO-HP17 Piping Schematic



KEY

EEV1:	Electronic Expansion Valve, System 1
EEV2:	Electronic Expansion Valve, System 2
T1/T5:	Discharge Temperature Sensor
T2/T6:	Compressor Shell Temperature Sensors
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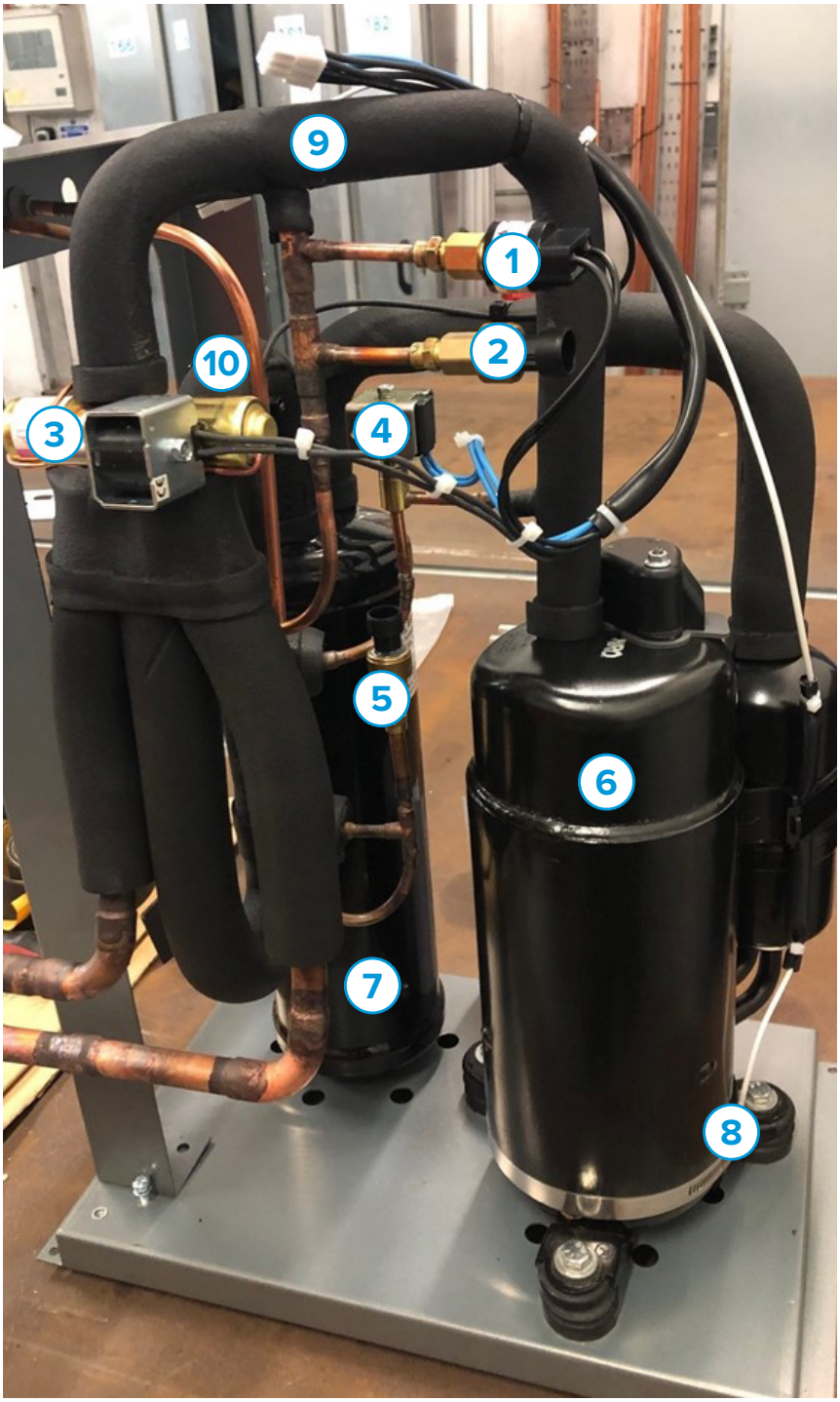
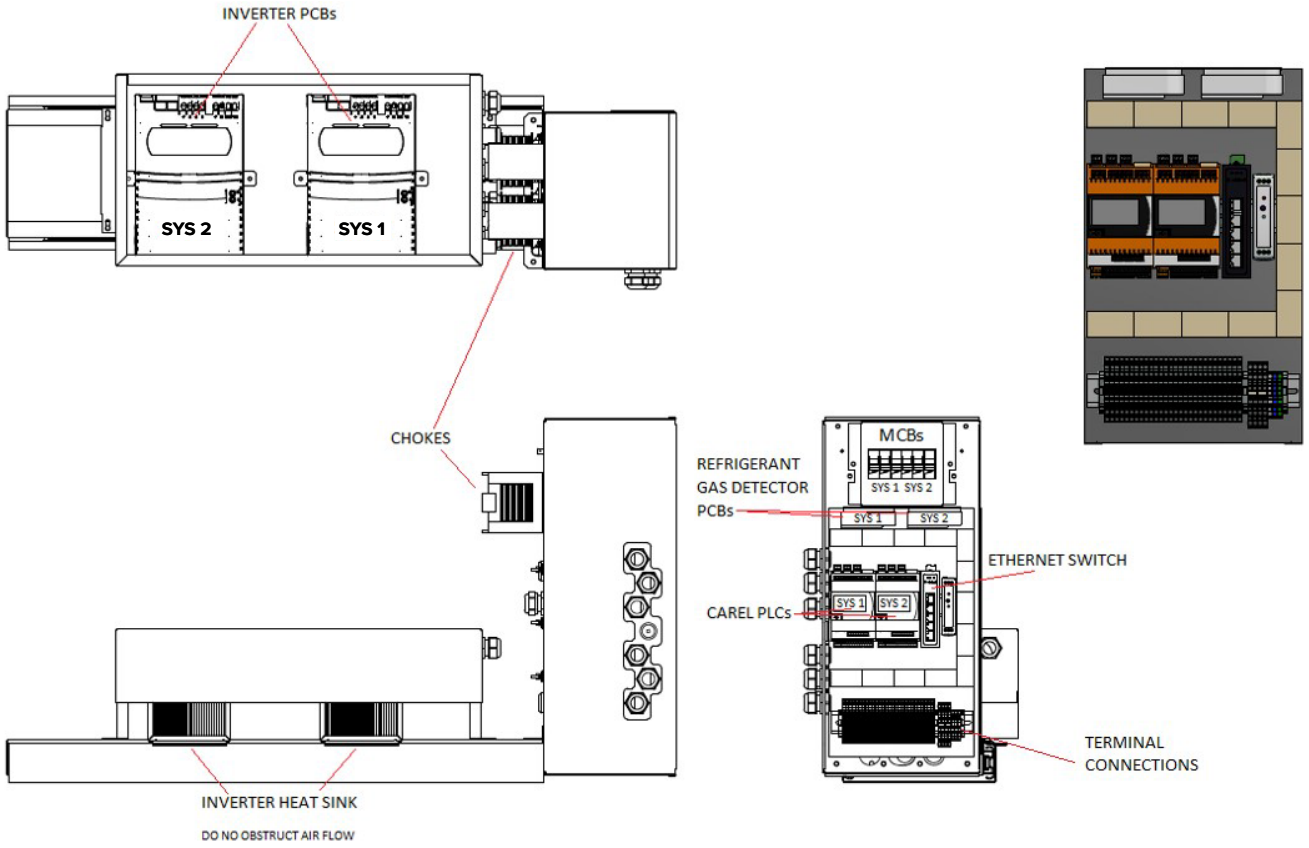
T4/T8:	Suction Temperature Sensors
P1/P3:	High Pressure Sensors
P2/P4:	Low Pressure Sensors. Overload Switches
HP1/HP2:	High Pressure Switches
S1:	System 1 Bypass Solenoid Valve
S2:	System 2 Bypass Solenoid Valve
RV1:	System 1 Reverse Cycle Valve
RV2:	System 2 Reverse Cycle Valve

7 Compressor Section Components



Key	Item Description
1	High Pressure Switch
2	High Pressure Transducer
3	Reversing Valve
4	Bypass Solenoid
5	Low Pressure Transducer
6	Rotary Compressor
7	Suction Accumulator
8	Compressor Shell Temperature Thermistor
9	Discharge Temperature Thermistor (Installed Under Pipe Insulation)
10	Suction Temperature Thermistor (Installed Under Pipe Insulation)

8 Heat Pump Control Panel Layout



3.3 Wiring Schematics

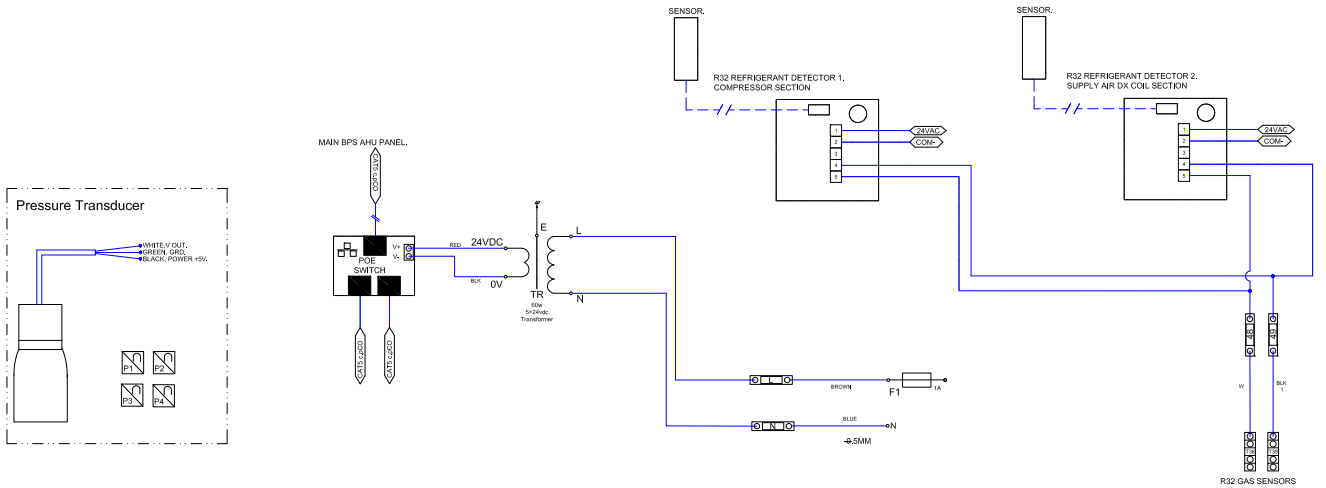
9 Condensate & Refrigerant Gas Detection Wiring

Key:

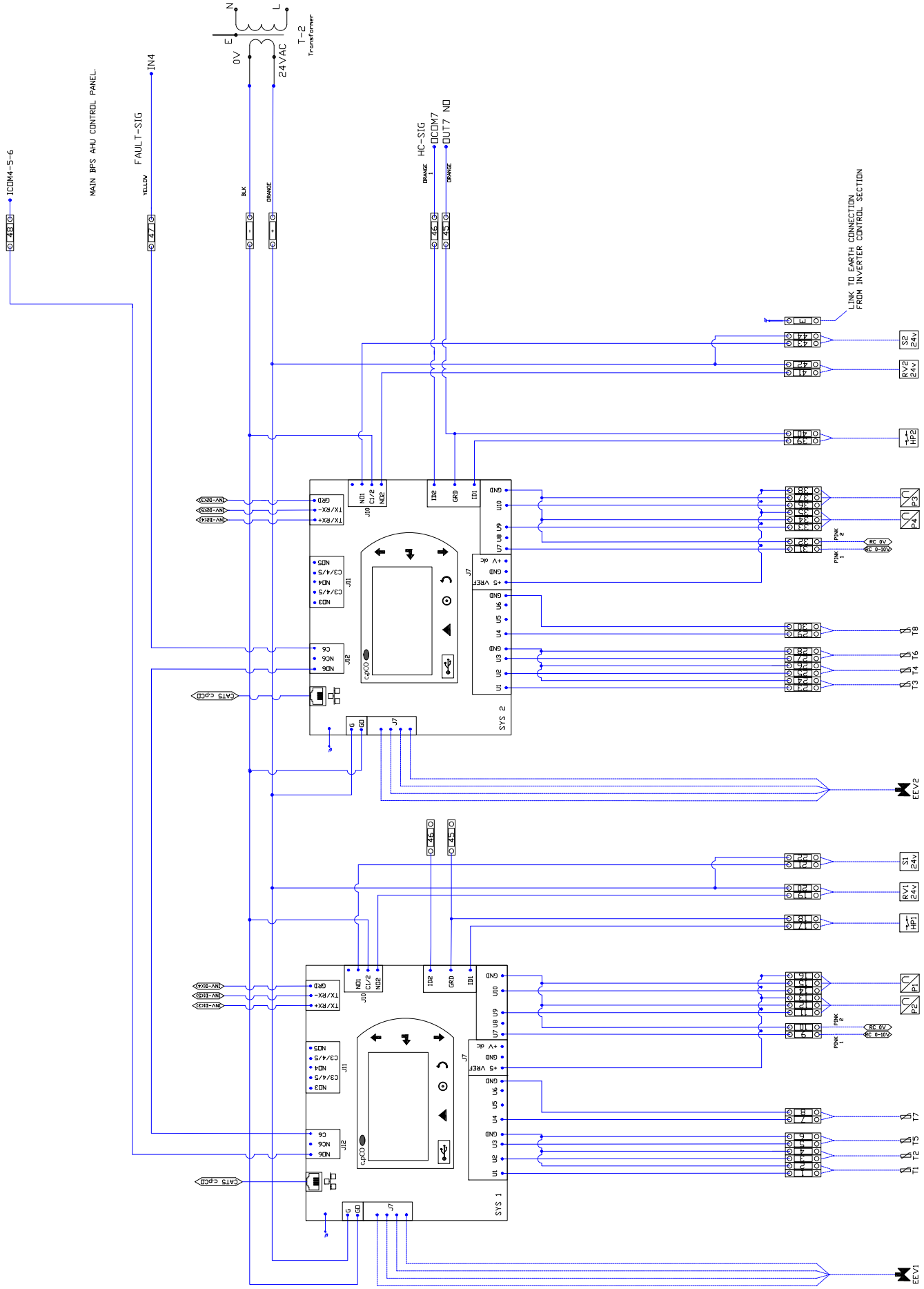
Internal Factory Connection

EEV 1: Electronic expansion valve sys 1.
EEV 2: Electronic expansion valve sys 2.
T1/T3: Discharge temperature sensor.
T2/T4: suction Temperature sensors.
T5/T6: Temperature after thermal wheel (extract) defrost control.
T7/T8: Compressor shell temperature sensors.
P1/P3: High pressure sensors.
P2/P4: Low pressure Sensors. overload switches.
HP1/HP2: High pressure switches.
S1: System 1 by-pass solenoid valve 24vac coil.
S2: System 2 by-pass solenoid valve 24vac coil.
RV1: System 1 Reverse cycle valve 24vac coil.
RV2: System 2 Reverse cycle valve 24vac coil.

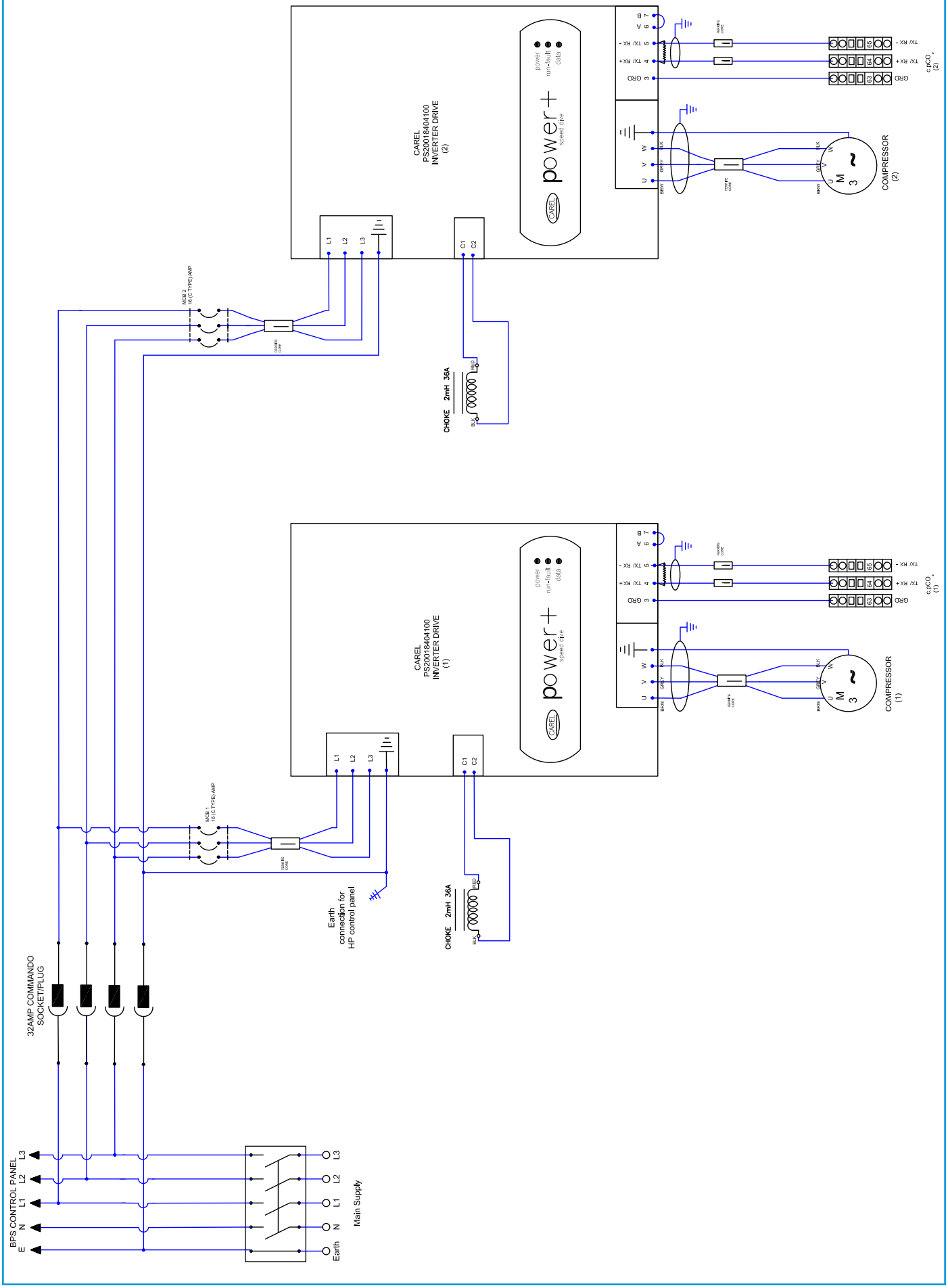
F-1 : Heat pump panel Fuse 1.5A



10 Heat Pump Controller Wiring



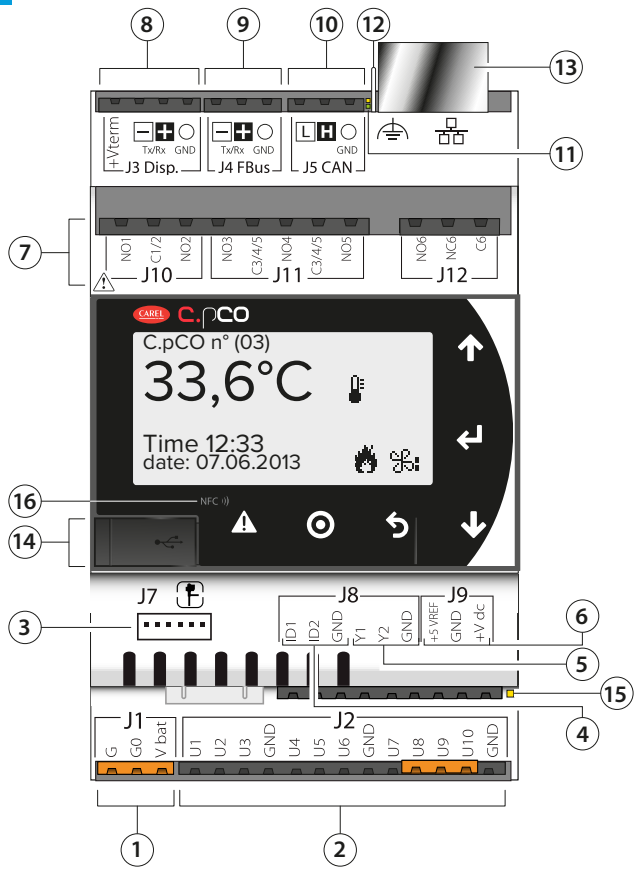
11 Mains Power & Inverter Wiring



4.0 CONTROLS

4.1 Controller Layout

12 Compressor Section Components



Key	Item Description
1	Power Supply Connectors [G(+), G0(-), Vbat]
2	Universal Input / Outputs
3	Valve Unipolar Connector
4	DI: Digital Inputs Free Contact
5	Analogue Outputs
6	+VDC: Power Supply For Active Probes +5V Power Supply For Ratiometric Probes
7	Relay Digital Outputs
8	External Terminal Or BMS Or Fieldbus Connector +Vterm: Terminal Power Supply
9	FieldBus Connector
10	CANBus Connector
11	CANBus Communication LED
12	Faston For Ethernet Earth Connection
13	Ethernet Connection
14	Micro USB Port
15	Power Supply LED
16	Antenna NFC

4.2 Home Page Layout

13 Home Page Layout

Key	Item Description
A	COOLING or HEATING mode and status. The bottom bar will also show OFFBYKEYB if turned off, SHUT DOWN if turning off or START UP if turning on.
B	Suction Pressure
C	Discharge Pressure
D	External Operation Signal (0-10VDC)
E	Compressor Speed Output (0-100%)
F	Quick Menu (Info or On/Off)
1	Alarm Summary Button (Flashes Red In Alarm)
2	Menu Button (Takes User To Menu)
3	Return Button (Returns User To Previous Or Home Menu)
4	Up Button (Navigates UP Page In a Loop, Or Increases A Parameters Value)
5	Enter Button (Confirms Selection Or Enters Quick Menu Selected)
6	Down Button (Navigates DOWN Page In a Loop, Or Decreases A Parameters Value)

4.3 Quick Menu On/Off

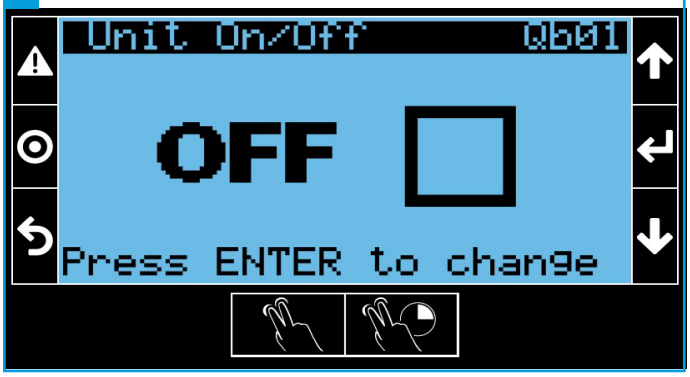
Pressing 'ENTER' when the quick menu On/Off symbol is shown will take the user to the relevant menu as stated below.

If Off, pressing 'ENTER' will turn on the system. A Countdown is displayed.

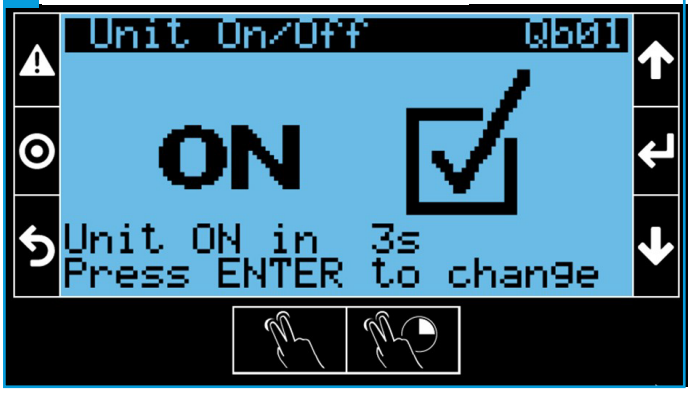
If On, pressing 'ENTER' will turn off the system. A Countdown is displayed.

14 Quick Menu - On/Off

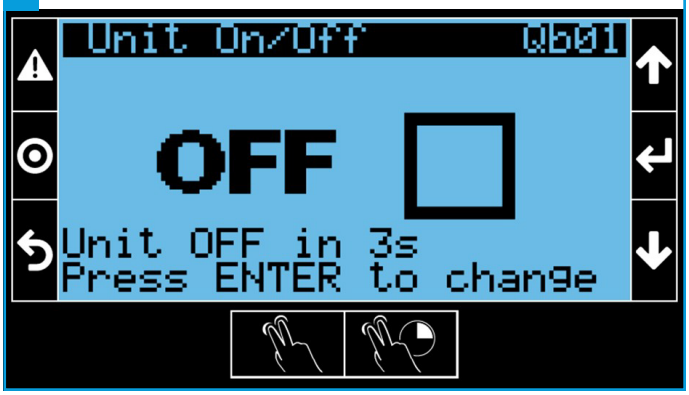
15 Quick Menu - On



16 Quick Menu - Off



17 Quick Menu - Countdown



4.4 Quick Menu Information / Compressor Summary

Pressing 'ENTER' when the quick menu Information symbol is shown will take the user to the compressor summary.

18 Quick Menu - Information

4.4.1 Compressor Summary Layout

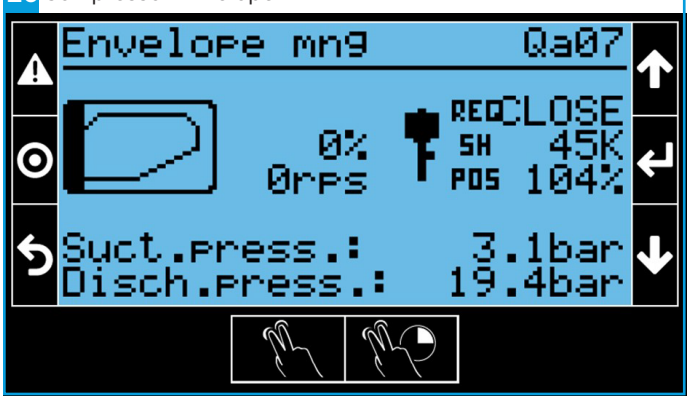
19 Compressor Summary Layout

Key	Item Description
1	Discharge Pressure
2	Calculated Discharge Temperature
3	Measured Discharge Temperature (U1)
4	Compressor Status
5	Compressor Request
6	Actual Compressor Speed
7	Measured Suction Temperature (U6)
8	Suction Pressure
9	Calculated Discharge Temperature

4.4.2 Compressor Envelope

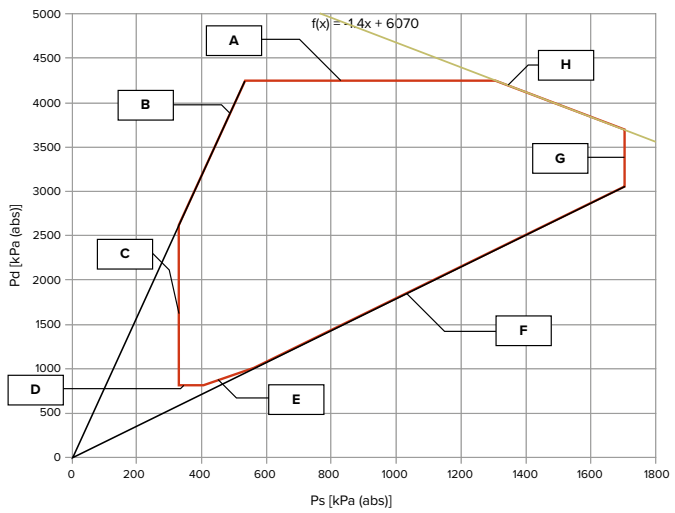
Exact envelope is compressor dependent.

20 Compressor Envelope



4.4.3 Compressor Envelope Explanation

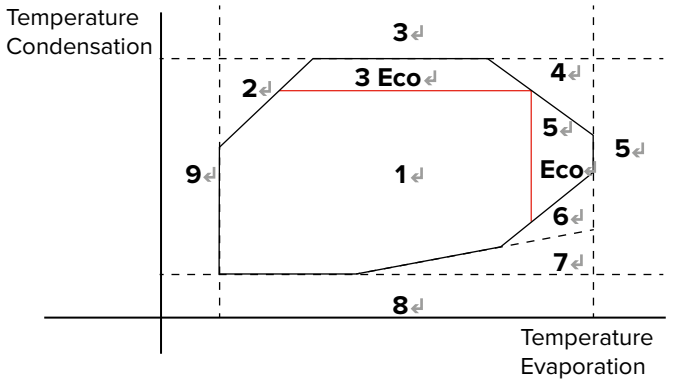
21 Generic Compressor Envelope



Limit (EnvZone)	Description
A	High Discharge Pressure
B	High Compression Ratio
C	Low Suction Pressure
D	Low Discharge Pressure
E	Low delta P (Lubrication)
F	Low Compression Ratio
G	High Suction Pressure
H	Motor Current High Limit (y=mx+q)

4.4.4 Compressor Zone Explanation

22 Generic Compressor Envelope



Zone	Description
1	Zone Within Operating Limits
2	High Compression Ratio
3	High Discharge Pressure
3 Eco	High Discharge Pressure With Eco On
4	High Motor Current
5	High Suction Pressure
5 Eco	High Suction Pressure With Eco On
6	Low Compression Ratio
7	Low Differential Pressure
8	Low Discharge Pressure
9	Low Suction Pressure

4.4.5 Electronic Expansion Valve (EEV) Summary Layout

23 EEV Summary Layout

Key	Item Description
1	Electronic Expansion Valve (EEV) Status
2	Current Steps (0-480), Overdrive Closed Or Open For Synchronisation.
3	Current Position
4	Superheat Set Point To Which EEV Is Controlled
5	Calculated Suction Superheat
6	Discharge Superheat
7	Discharge Temperature

4.5 Quick Menu Exit

Quick menus are exited by pressing ‘ESCAPE’ once to return to the home screen.

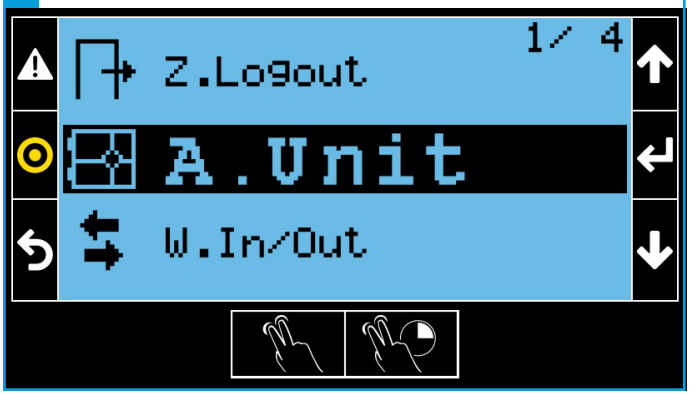
4.6 Menu

4.6.1 Login

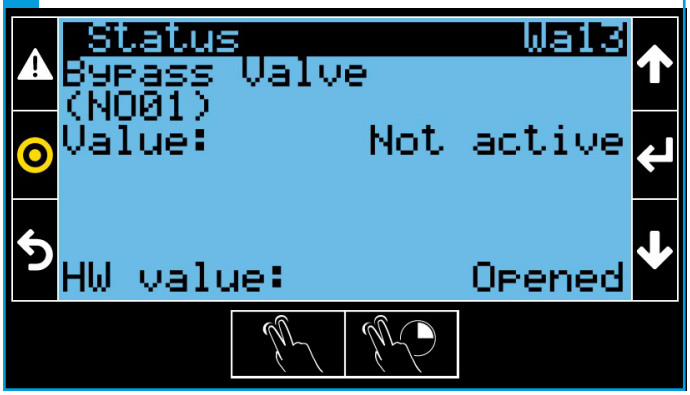
To access inputs and outputs, press ‘PROGRAM’. Press ‘ENTER’ 4 times to key in password “0000”, allowing user access and displaying the user menu.

24 Login Screen

25 Menu Screen



29 Wa13



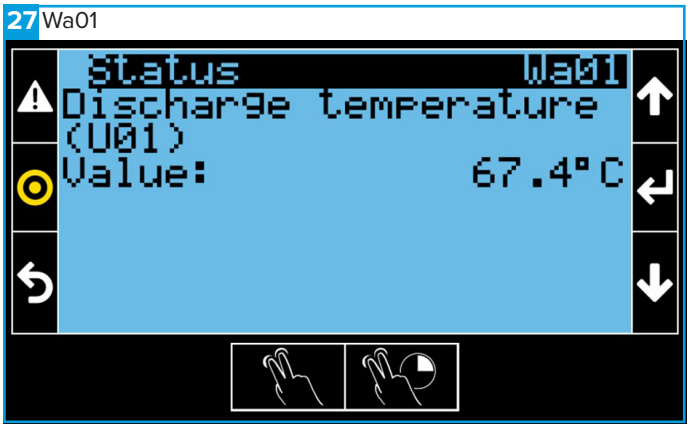
4.6.2 W In/Out

Press DOWN once so W. In/Out is selected and press 'ENTER' to access the menu. The W. In/Out menu displays all Inputs & Outputs (I/O) in order.

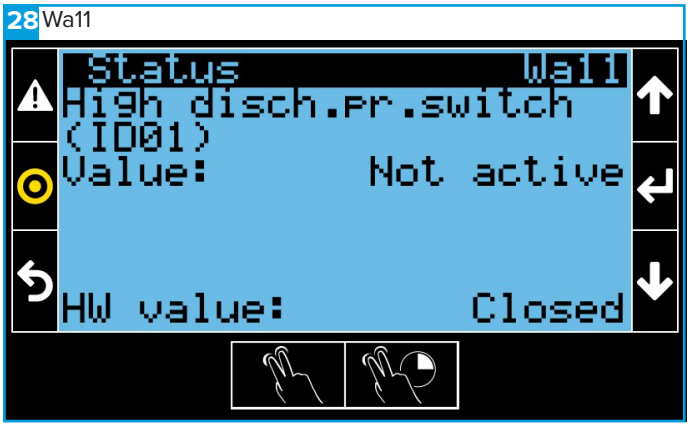
Press 'UP' or 'DOWN' to navigate through the menu loop. Press 'RETURN' twice to return to homepage.

26 W.In/Out Screen

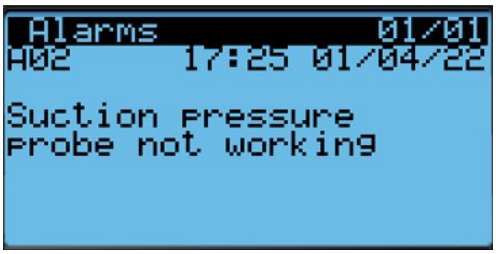
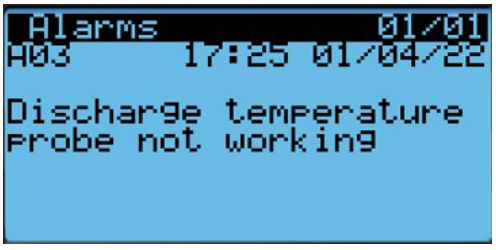
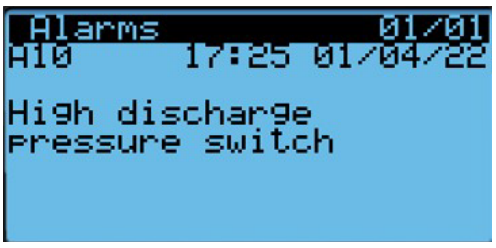
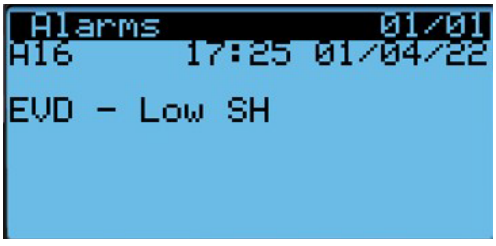
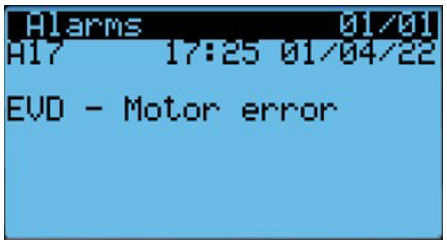
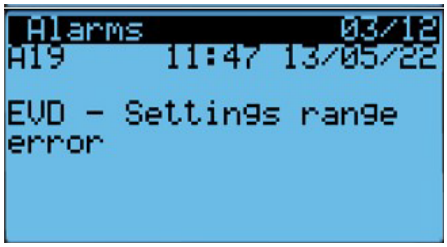
27 Wa01



28 Wa11



4.7 Alarm Code List

Index	Screen	Type	Description	Cause & Resolution
1		Auto Reset	A02 - Suction Pressure Probe Not Working	Suction pressure transducer (U9) not reading. •Check connections and probe.
2		Auto Reset	A03 - Discharge Temperature Probe Not Working	Discharge temperature sensor (U1) not reading. •Check connections and probe.
9		User Reset	A10 - High Discharge Pressure Switch	High discharge pressure switch (ID1) triggered because maximum discharge pressure was exceeded. •Check fans are running and that the unit temperature limits have not been exceeded.
15		User Reset	A16 - EVD - Low SH	Low superheat alarm. •Check refrigerant charge. •Check fans are running. •Check valve operation.
16		User Reset	A17 - EVD - Motor Error	Whenever the valve is powered a valve motor error recognition procedure is initiated. •Check valve motor connections. •Check and possibly replace stator coil.
17		Auto Reset	A18 - EVD - Setting Out Of Bound	EEV driver settings are set outside of allowed limits. •Check EEV parameters. •Reload defaults to reset if necessary.
18		Auto Reset	A19 - Settings Range Error	EEV driver settings are set outside of allowed limits. •Check EEV parameters. •Reload defaults to reset if necessary.

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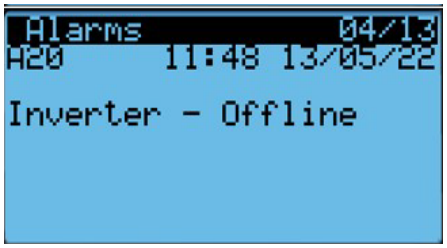
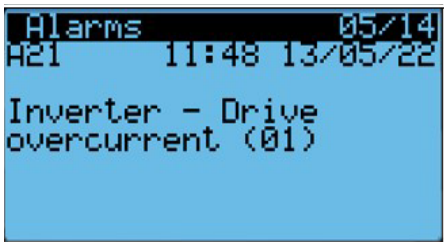
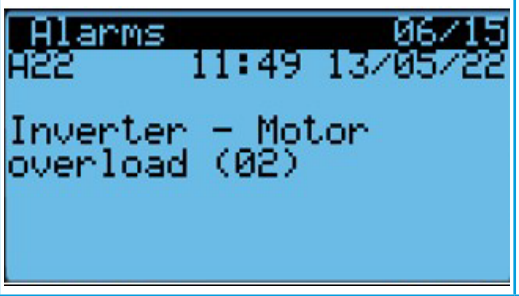
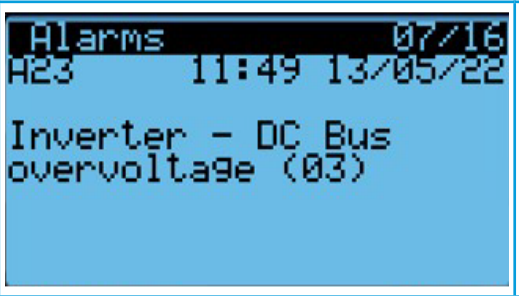
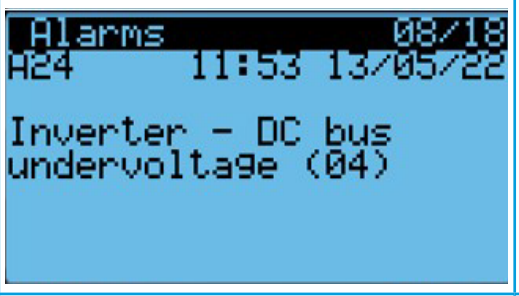
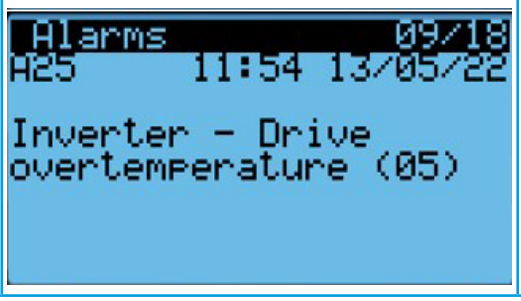
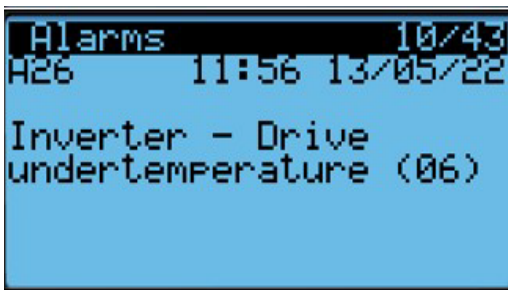
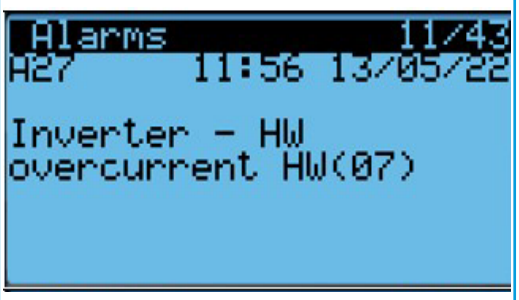
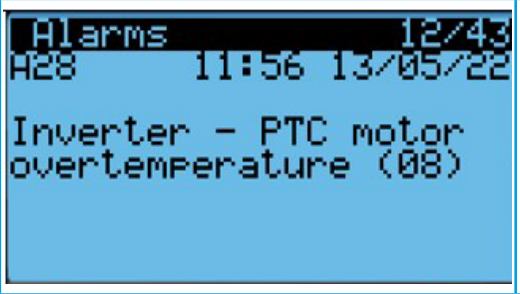
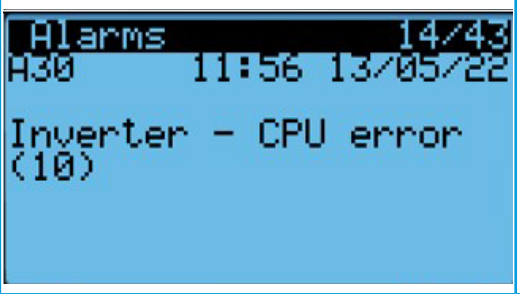
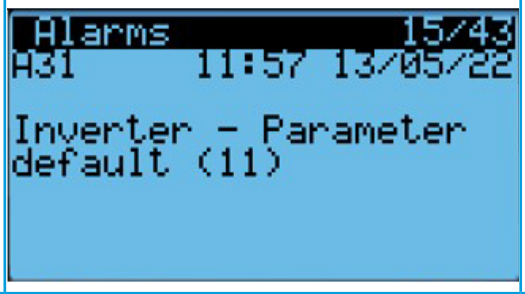
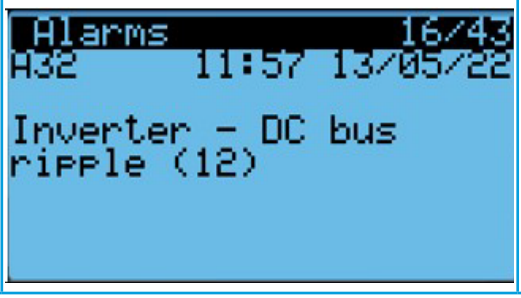
19		Auto Reset	A20 - Inverter Offline	Power+ drive has detected a current supplied that is too high due to: -Sudden strong load increase. -Acceleration that is too high. -Wrong parameter values or inadequate motor. •Check load and dimensions of motor and cables. •Check inverter address is set to 1 and Baud rate is set to 19200.
20		User Reset	A21 - Inverter - Drive Overcurrent (01)	Power+ drive has detected a current supplied that is too high due to: -Sudden strong load increase. -Acceleration that is too high. -Wrong parameter values or inadequate motor. •Check load and dimensions of motor and cables. •Decrease acceleration. •Check motor parameters.
21		Auto Reset	A22 - Inverter - Motor Overload (02)	Current supplied has exceeded motor rated current over the maximum accepted time. •Check load and dimensions of motor and cables. •Check motor parameters.
22		Auto Reset	A23 - Inverter - DC Bus Overvoltage (03)	DC overvoltage of intermediate circuit has exceeded limits envisioned due to: -Deceleration that is too high. -High overvoltage peaks on power supply network. •Decrease deceleration.
23		Auto Reset	A24 Inverter - DC Bus Undervoltage (04)	DC overvoltage of intermediate circuit is below limits envisioned due to: -Insufficient power supply voltage. -Fault inside drive. •In event of temporary power supply outage, reset alarm and restart drive. Check power supply voltage.
24		Auto Reset	A25 Inverter - Drive Overtemperature (05)	Temperature inside drive has exceeded maximum allowed. •Check that quantity and flow of cooling air are regular. •Check environment temperature. •Ensure switching frequency is not too high with respect to environment temperature and motor load.

Index	Screen	Type	Description	Cause & Resolution
25		Auto Reset	A26 Inverter - Drive Undertemperature (06)	Temperature inside drive is below minimum level allowed. •Warm up ambient where drive is installed.
26		Auto Reset	A27 - Inverter - HW Overcurrent (07)	Drive has detected an instantaneous current supplied is too high due to: -Sudden strong load increase. -Motor cables short circuit. -Wrong parameter values or inadequate motor. •Check load and dimensions of motor and cables. •Check motor parameters.
27		Auto Reset	A28 - Inverter - PTC Motor Overtemperature (08)	Temperature detected by PTC thermistor corresponds to resistance > 2600 ohm. •Reduce motor load. •Check motor cooling.
29		Auto Reset	A30 - Inverter - CPU Error (10)	Loss of memory data. •Critical failure, replace Power+.
30		Auto Reset	A31 - Inverter - Parameter Default (11)	Execution of reset parameter default command; Parameters user setting corrupted. •Reset parameters using Default Parameters procedure.
31		Auto Reset	A32 - Inverter - DC Bus Ripple (12)	Input power supply phase loss. •Check input power supply phases to drive.

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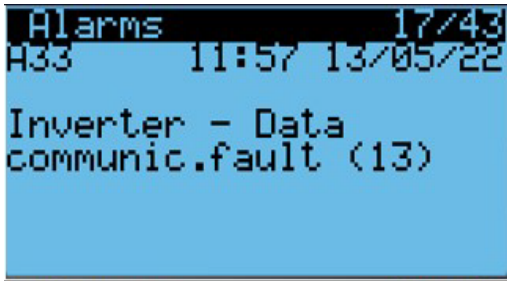
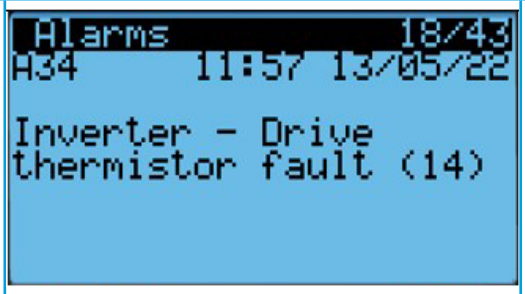
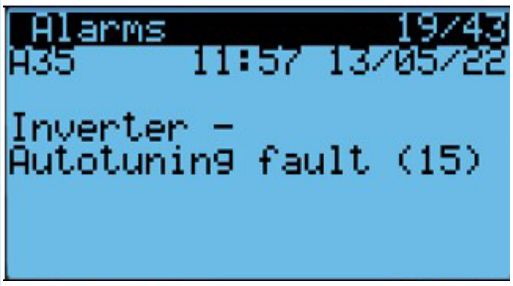
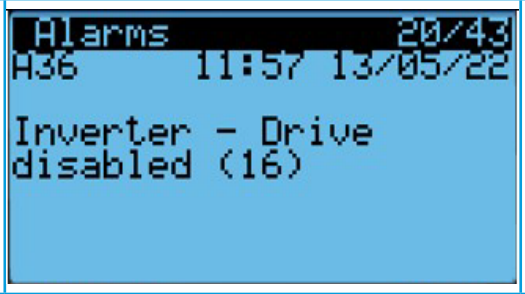
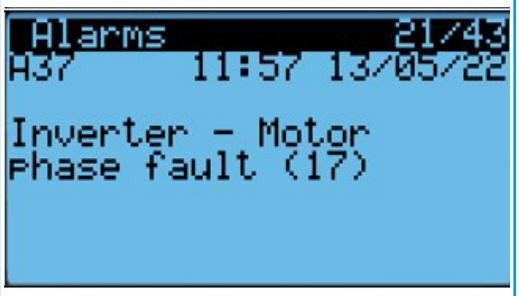
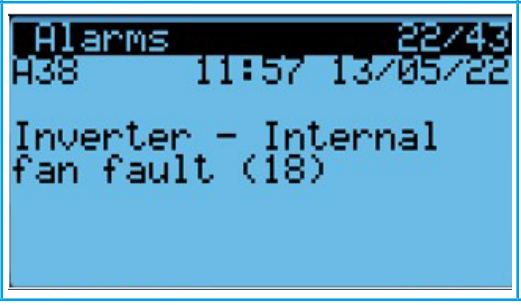
32		Auto Reset	A33 - Inverter - Data Communication Fault (13)	Data reception failure. •Check serial connection. •Switch drive off and back on again.
33		Auto Reset	A34 - Inverter - Drive Thermistor Fault (14)	Internal Fault •Call for assistance.
34		Auto Reset	A35 - Inverter - Autotuning Fault (15)	Wrong parameter values. •Check parameter values. •Restart command again.
35		Auto Reset	A36 - Inverter - Drive Disabled (16)	•Check cable disconnected. •Check operation of external contactor. •Check 24V power supply loss. •Check wiring. •Restore external contactor.
36		Auto Reset	A37 - Inverter - Motor Phase Fault (17)	•Motor cable disconnected. •Check motor cable connections.
37		Auto Reset	A38 - Inverter - Internal Fan Fault (18)	Internal Fault. •Call for assistance.

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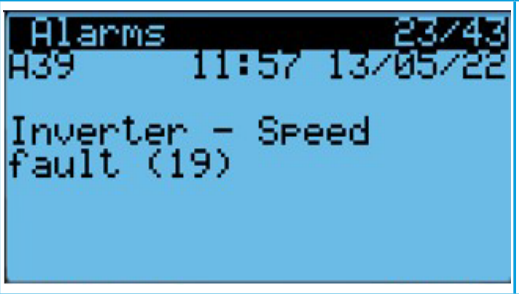
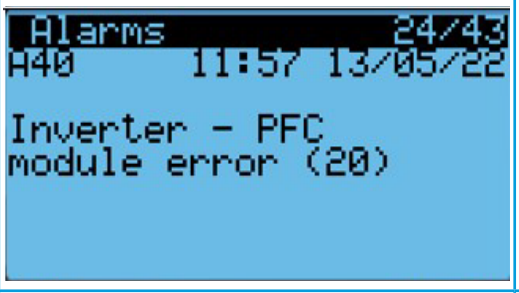
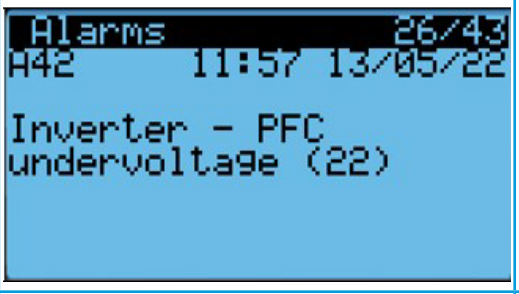
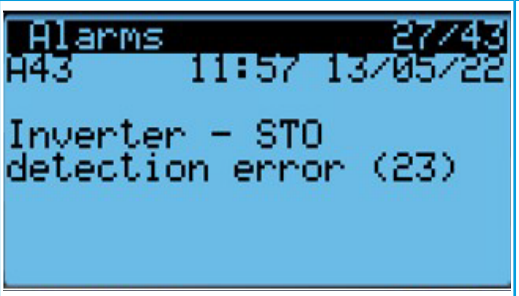
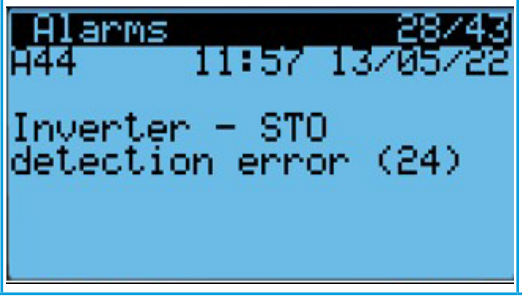
38		Auto Reset	A39 - Inverter - Speed Fault (19)	Wrong Parameter values or unsuited load. •Switch drive off and back on again and check parameters. •Check motor load.
39		Auto Reset	A40 - Inverter - PFC Module Error (20)	PFC overcurrent. •Call for assistance.
40		Auto Reset	A41 - Inverter - PFC Overvoltage (21)	Too high power supply voltage. •Check input power supply and inductive load generating voltage are connected to line.
41		Auto Reset	A42 - Inverter - PFC Undervoltage (22)	Too low power supply voltage. •Check input power supply.
42		Auto Reset	A43 - Inverter - STO Detection Error (23)	Internal Fault. •Call for assistance.
43		Auto Reset	A44 - Inverter - STO Detection Error (24)	Internal Fault. •Call for assistance.

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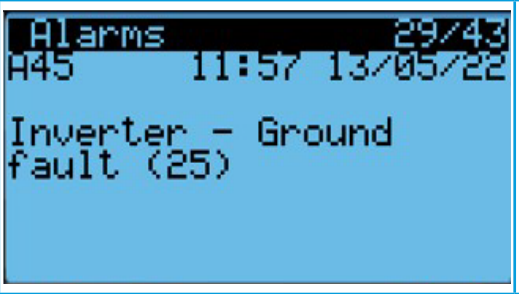
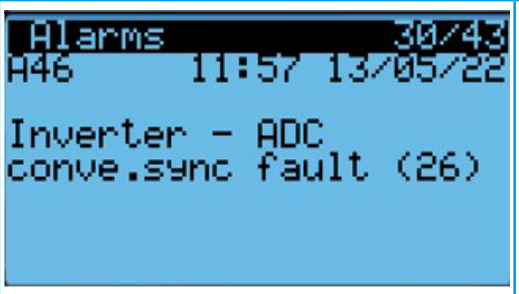
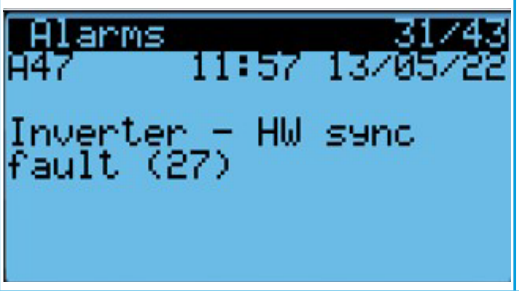
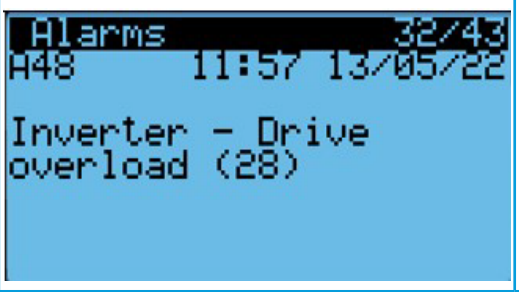
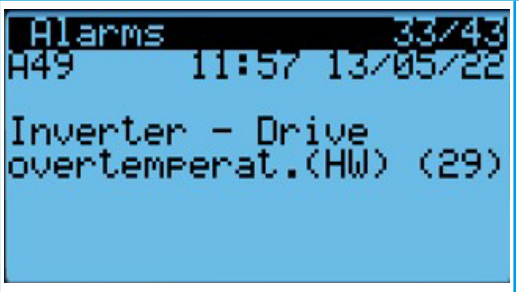
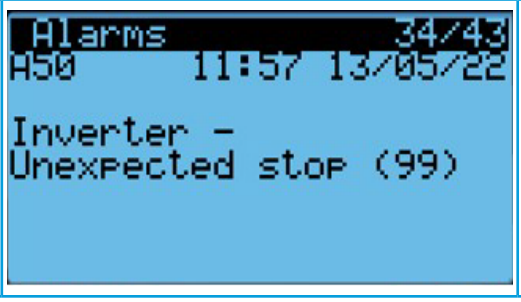
44		Auto Reset	A45 - Inverter - Ground Fault (25)	Drive detected too high ground current. •Check ground insulation of motor and wires.
45		Auto Reset	A46 - Inverter - ADC Conversion Sync Fault (26)	Overload CPU •Call for assistance.
46		Auto Reset	A47 - Inverter - HW Sync Fault (27)	Hardware synchronisation fault. •Call for assistance.
47		Auto Reset	A48 - Inverter - Drive Overload (28)	Current supplied exceeded drive rated current over maximum time accepted. •Check load and dimensions of motor and cables. •Check motor parameters.
48		Auto Reset	A49 - Inverter - Drive Overtemperature (HW) (29)	Temperature inside drive has exceeded maximum allowed. •Check that quantity and flow of cooling air are regular. •Check heat sink is free of dust. •Check environment temperature. •Ensure switching frequency is not too high with respect to environment temperature and motor load.
49		Auto Reset	A50 - Unexpected Stop (99)	Unexpected Stop. •Check connections, restart system. •If is persists - This is a critical fault.

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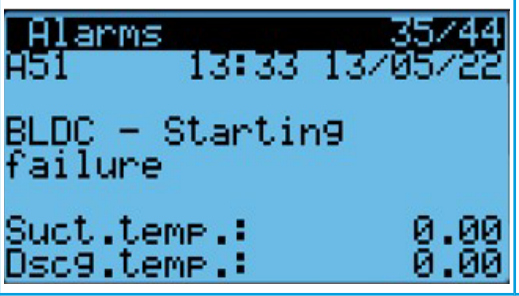
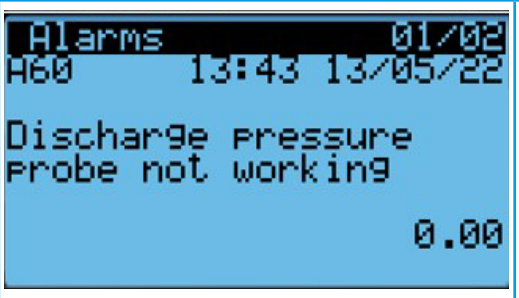
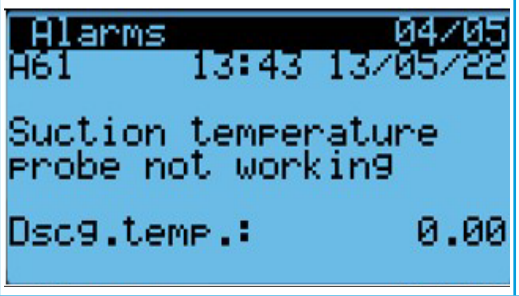
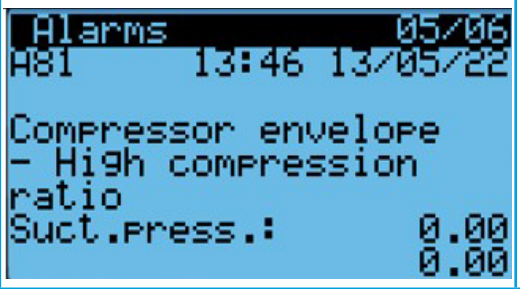
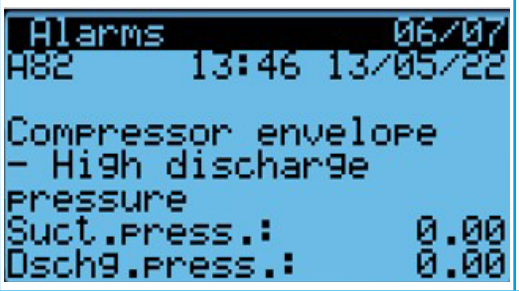
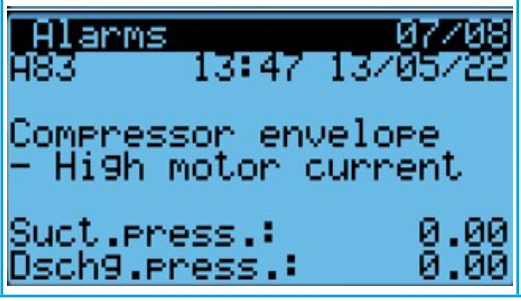
50		User Reset	A51 - BLDC - Starting Failure	BLDC failed on start. •Check compressor windings. •Check inverter wiring.
59		Auto Reset	A60 - Discharge Pressure Probe Not Working	Discharge pressure sensor (U10) not reading. •Check connections and probe.
60		Auto Reset	A61 - Suction Temperature Probe Not Working	Suction temperature sensor (U2) not reading. •Check connections and probe.
80		Auto Reset	A81 - Compressor Envelope - High Compression Ratio	High difference between suction and discharge pressures - exceeding maximum compression ratio set in parameters. •Check sensors •Check refrigerant level.
81		User Reset	A82 - Compressor Envelope - High Discharge Ratio	Envelope high discharge pressure limit exceeded. •Check refrigerant level. •Check discharge pressure sensor. •Check air flow.
82		Auto Reset	A83 - Compressor Envelope - High Motor Current	High motor current level exceeded - causes may include faults on compressor windings or issues in refrigerant circuit. •Check compressor windings. •Check refrigerant level.

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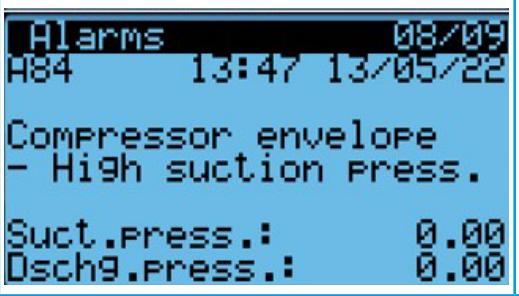
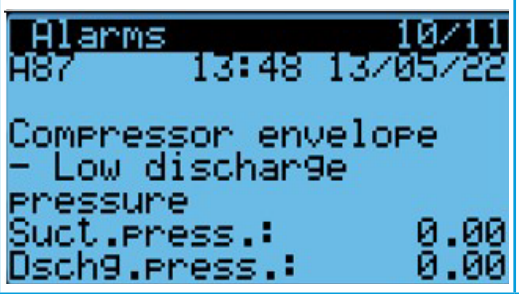
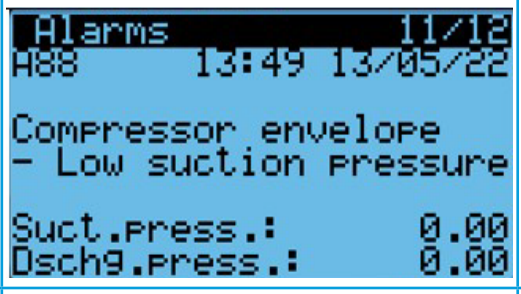
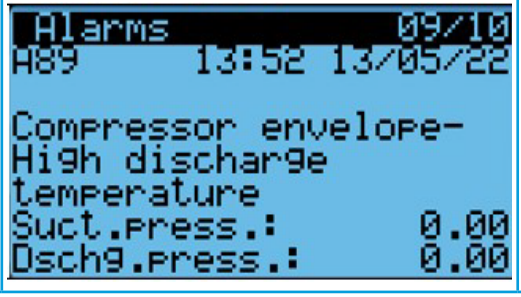
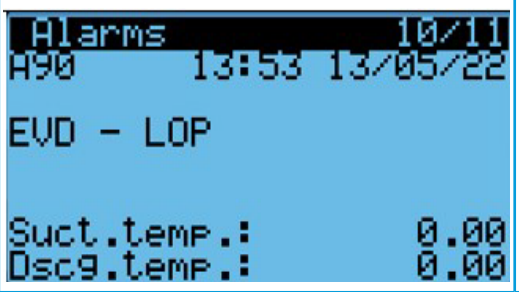
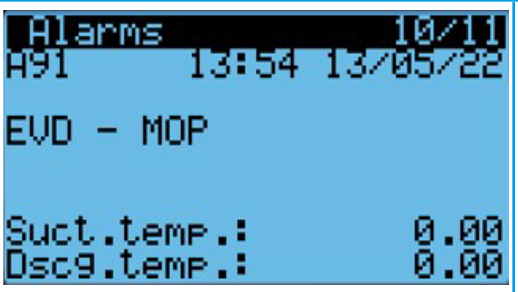
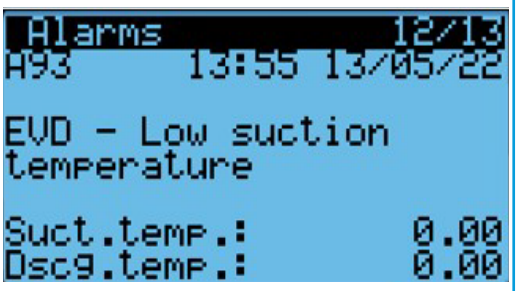
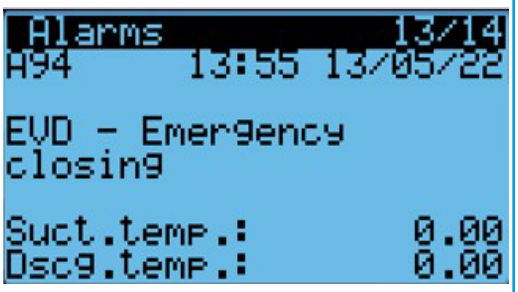
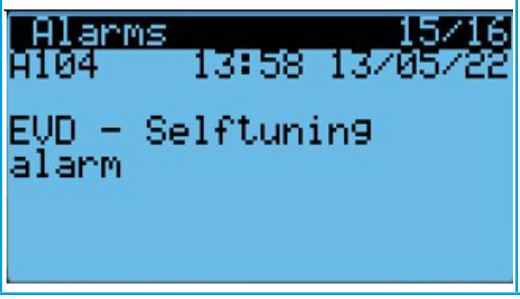
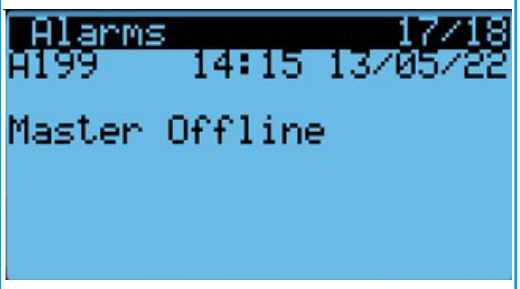
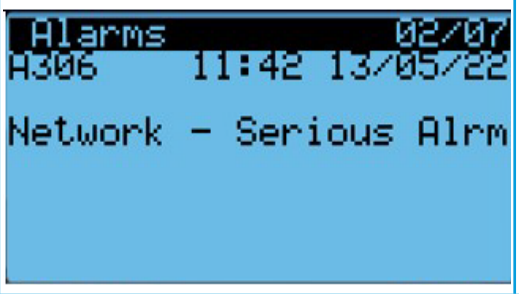
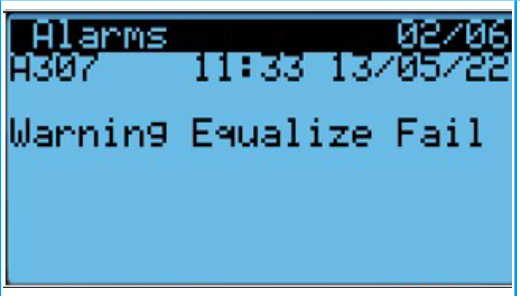
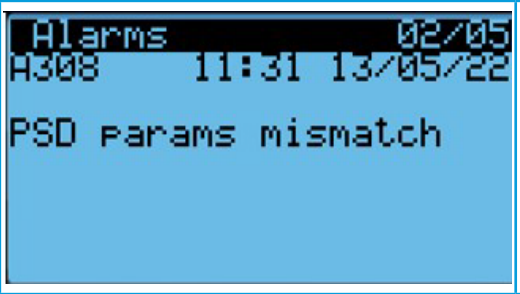
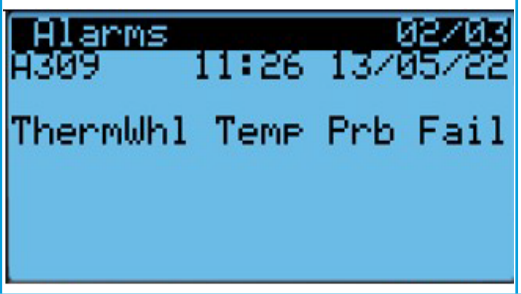
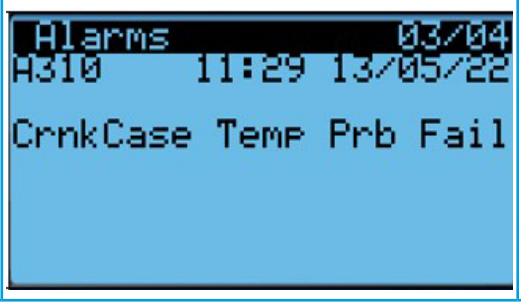
83		Auto Reset	A84 - Compressor Envelope - High Suction Pressure	High suction pressure alarm. •Check compressor operation.
84		Auto Reset	A85 - Compressor Envelope - Low Compression Ratio	Low Compression ration, lower than expected for compressor operation. •Check no bypass is active. •Check compressor operation. •Check for leaks.
85		Auto Reset	A86 - Compressor Envelope - Low Differential Pressure	Low pressure differential, lower than expected for compressor operation. •Check no bypass is active. •Check compressor operation. •Check for leaks.
86		User Reset	A87 - Compressor Envelope - Low Discharge Pressure	Low discharge pressure alarm. •Check compressor operation. •Check refrigerant level. •Check system not outside ambient limits.
87		Auto Reset Until Counter	A88 - Compressor Envelope - Low Suction Pressure	Low suction pressure alarm. •Check compressor operation. •Check refrigerant level. •Check system not outside ambient limits.
88		Auto Reset	A89 - Compressor Envelope - High Discharge Temperature	Envelope high discharge temperature limit exceeded. •Check refrigerant level. •Check discharge temperature sensor. •Check airflow.

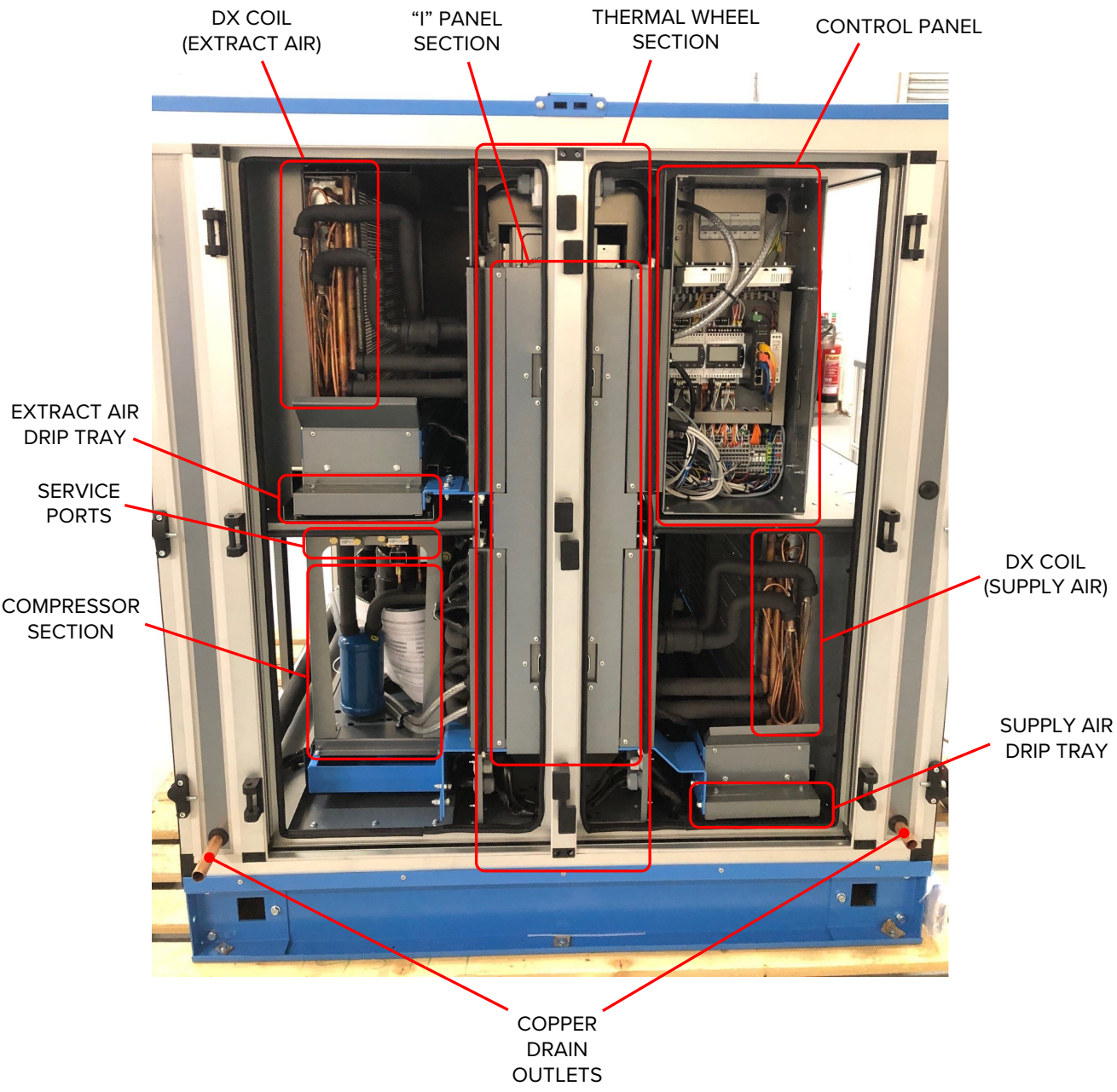
Index	Screen	Type	Description	Cause & Resolution
89		Auto Reset	A90 - EVD - LOP (Low Operating Pressure)	LOP alarm triggered because suction pressure was below LOP limit for a set period of time. •Check refrigerant level. •Check LOP limits.
90		Auto Reset	A91 - EVD - MOP (Maximum Operating Temperature)	MOP alarm triggered because suction pressure was below MOP limit for a set period of time. •Check refrigerant level. •Check MOP limits.
92		Auto Reset	A93 - EVD - Low Suction Temperature	EVD (Electronic Expansion Valve Driver) detected low suction pressure. •Check refrigerant level. •Check EVD configuration and refrigerant is correct. •Check suction temperature sensor.
93		Auto Reset	A94 - EVD - Emergency Closing	EVD had to perform, an emergency closing procedure. •Other alarms and resolve.
94		Auto Reset	A95 - BLDC - Delta Pressure Greater Than The Allowable At Startup	Pressure differential between suction and discharge pressures higher than allowed at startup, preventing BLDC start. •Check bypass valve operation. •Check pressure sensors. •Extend bypass valve activation time.
103		Auto Reset	A104 - EVD - Selftuning Alarm	EVD self tuning failed. •Restart tuning required.

Index	Screen	Type	Description	Cause & Resolution
198		Auto Reset	A199 - Master Offline	Secondary controller cannot detect primary. •Restart tuning required.
305		Auto Reset	A306 - Serious Alarm	Another unit in the group has a serious alarm. •Resolve alarm on secondary units.
306		Auto Reset	A307 - Warning Equalize Fail	Equalisation failed at compressor start-up. •Check bypass valve operation. •Extend bypass time if required. •Check suction and discharge pressure sensors.
307		Auto Reset	A308 - PSD Parameters Mismatch	Compressor (BLDC) parameters do not match expected for the compressor and unit type. •Check BLDC parameters and restart default initialisation procedure.
308		Auto Reset	A309 - Thermal Wheel Temperature Probe Failure	Thermal wheel extraction temperature probe (U3) failed.
309		Auto Reset	A310 - Crankcase Temperature Probe Failure	Cranckcase temperature probe (U4) failed. •Check temperature sensor.

5.0 HEAT PUMP ACCESS

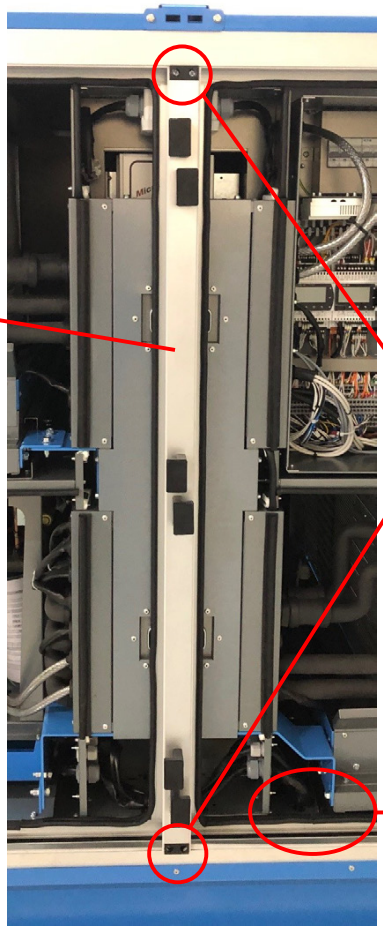
Caution: Before carrying out the below operation the system must be isolated at the main BPS isolator.

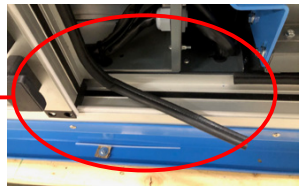
30 Heat Pump Section Layout



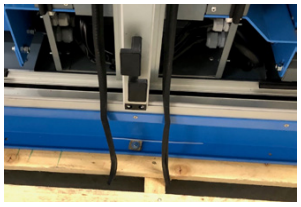
5.1 EEV's & Condensate Drain

31 Heat Pump Access - Door Pillar





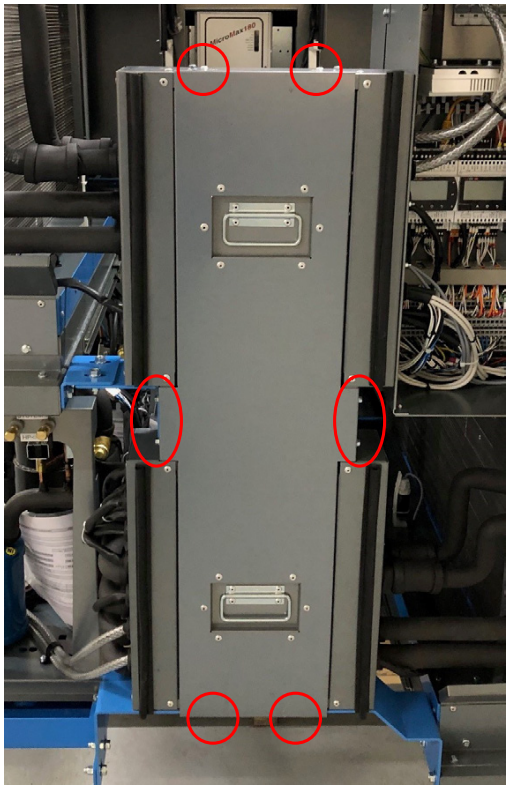
Remove door gasket connected to door pillar



Leave door gasket connected to the rest of the unit

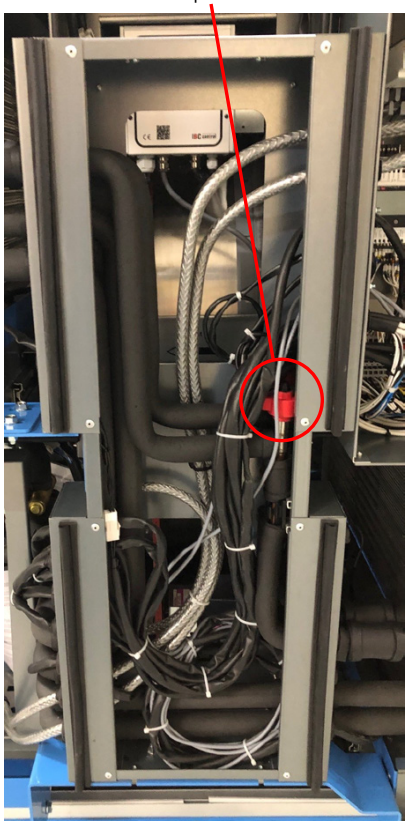
32 Heat Pump Access - EEV Cover Plate

Remove the 8x 5mm machine screws for access to the "I" section



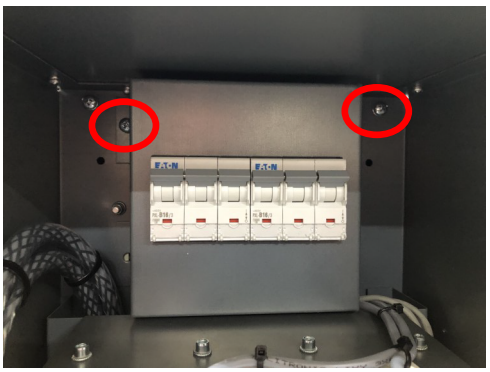
33 Heat Pump Access - EEVs

Electronic Expansion Valves



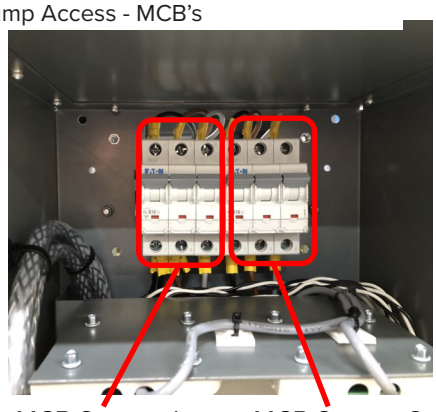
5.2 MCB

34 Heat Pump Access - MCB Cover



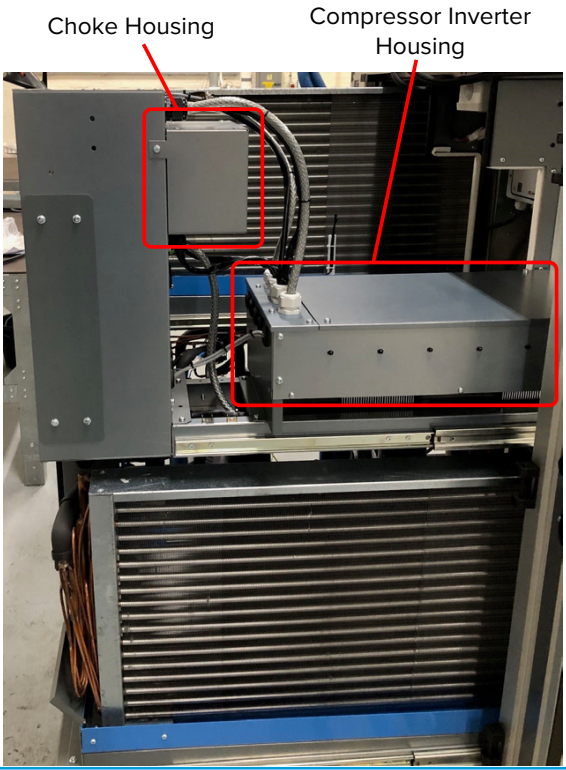
Remove Screws & MCB Cover

35 Heat Pump Access - MCB's

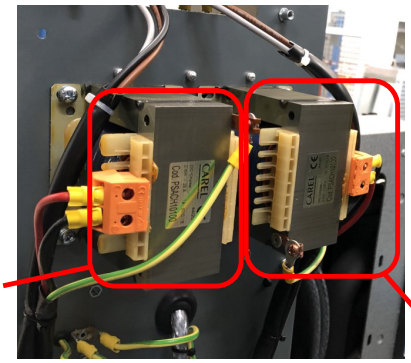


5.3 Inverter Choke

36 Heat Pump Access - Back of MCB Panel



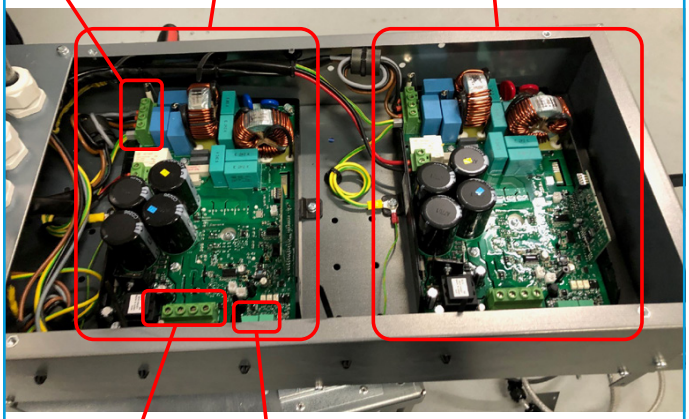
37 Heat Pump Access - Inverter Chokes



Remove Cover

5.4 Inverter PCB

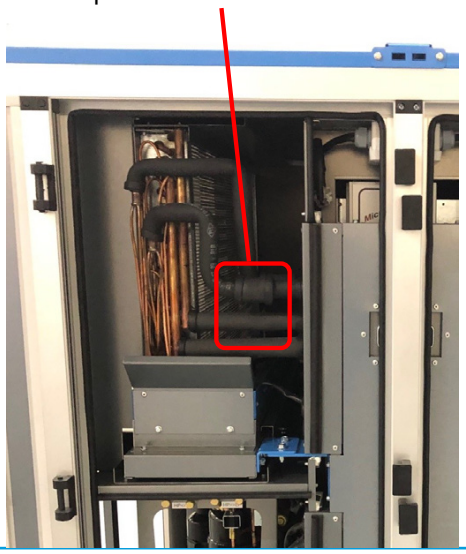
38 Heat Pump Access - Inverter PCB's



5.5 Thermal Wheel Exhaust Temperature Thermistor

39 Heat Pump Access - Temperature Thermistor 1

Exhaust thermal wheel temperature sensor location

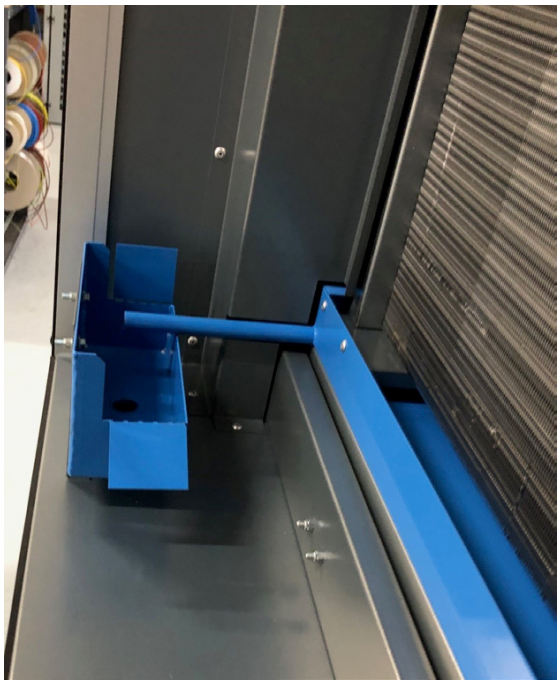


40 Heat Pump Access - Temperature Thermistor 2

Supply air DX drain outlet and hopper

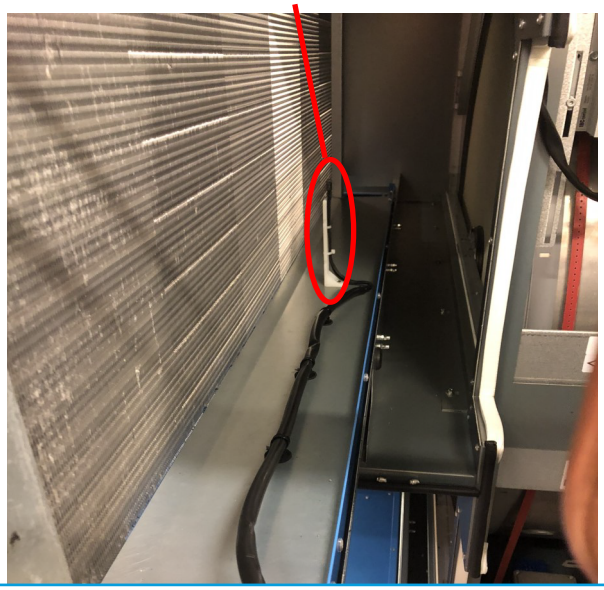
41 Heat Pump Access - Temperature Thermistor 2

Exhaust air DX drain outlet and hopper



42 Heat Pump Access - Temperature Thermistor 2

Exhaust Thermal Wheel Temperature Thermistor



5.6 Heat Pump Skid Withdrawal Video

AD-em HFC - Datasheet

Unit overview

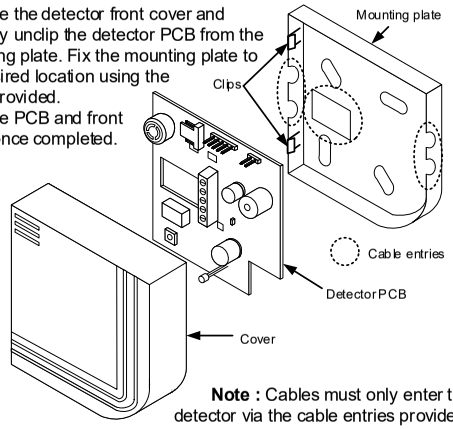
The AD-em HFC is a stand-alone, semi conductor based refrigerant leak detector for use in air conditioning and refrigeration applications.

Specification

Housing……White plastic (main unit)
Power……12-24V AC or DC – 2.5VA Max, 1VA Nom
Relays……1 Relay – Max Rating 0.5A @ 125VAC / 1A @ 24VDC
Indicators……1 x Tri-colour LED
Sounder……85dB 2300Hz (+/- 300Hz)
Screw Terminals……5 x 0.5mm/sq stranded core
Size……85 x 85 x 38mm
Weight……approx. 85g
Refrigerant……R410a, R32 (other gases available on request)
Sensor……Semi-conductor

Mounting

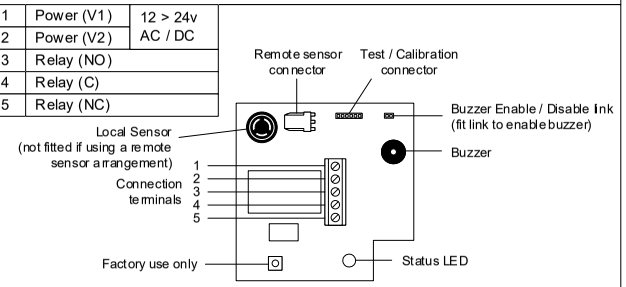
Remove the detector front cover and carefully unclip the detector PCB from the mounting plate. Fix the mounting plate to the desired location using the holes provided.
Refit the PCB and front cover once completed.



Note : Cables must only enter the detector via the cable entries provided.

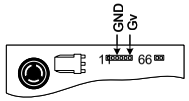
Detector PCB electrical connections and features

1	Power (V1)	12 > 24v AC / DC
2	Power (V2)	
3	Relay (NO)	
4	Relay (C)	
5	Relay (NC)	



Testing

Measure the Gv voltage on the test/calibration connector - pin 3 (GND), pin 6 (Gv);
as shown opposite >>
Refer to the table below for the expected voltages.



Locating the sensor

The main considerations when deciding where to locate the detector are:-

Low Level – As HFC refrigerants are heavier than air, the detector / sensor should be mounted as close as practical to floor level (150mm ~ 250mm above floor level), preferably directly below the potential source of any leaks.

Accessible for Maintenance - The detector should be mounted in a position where it can be easily accessed for maintenance and repairs.

Minimize Damage - Mount the detector in a position that minimizes the risk of mechanical damage to the unit.

Minimize false alarms - Semi-conductor sensors can be '***poisoned***' by contaminants and after exposure may take considerable time to recover. Solvent paints and silicon mastic are typical contaminants and exposure from these substances must be avoided.

Ensure leaks can be detected - Do not mount the sensor next to doors or windows, where fresh air may influence readings.

Operation

State	LED	Buzzer	Relay	Gv Volts
Power Off	OFF	OFF	3 4 5	N/A
Warmup (5mins)	Flashing Green>Red 1Hz	OFF	3 4 5	N/A
Normal Operation	Constant Green	OFF	3 4 5	0.4>1VDC
Sensor Fault	Flashing Red>Off 1Hz 1 Amber pulse p/min	1 x pulse p/min	3 4 5	N/A
Pre-Alarm Level 1 Gv > 2.5V For >2 secs	Flashing Green>Off 2Hz	OFF	3 4 5	>2.5VDC
Pre-Alarm Level 2 Gv > 3.5V For >2 secs	Flashing Red>Off 2Hz	OFF	3 4 5	>3.5VDC
Low Level Alm. Gv > 3.5V For >30mins	Flashing Red>Amber 2Hz	Pulsing 2Hz	3 4 5	>3.5VDC
High Level Alm. Gv > 4.2V For >30secs	Flashing Red>Amber 4Hz	Pulsing 4Hz	3 4 5	>4.2VDC

Notes: When returning below *Pre-alarm* level – there is a 60s delay before returning to *Normal Operation.*

CPC (UK)
Unit 3 Beta Way,
Thorpe Industrial Estate,
Egham, Surrey
TW208RE

Phone : +44 (0) 1784 222110
Web : www.cpcuk.co.uk

For further information refer to user manual

ADEM04v1.0 – AD-em HFC Product datasheet

Disclaimer
Gases and vapours other than the target refrigerant gas may cause semi-conductor sensors to react. Sensors exposed to silicon fumes may be permanently damaged.

7.0 PARTS LIST

Nuaire Part Number	Quantity Of Parts			Description
	BPS HP07	BPS HP12	BPS HP17	
7713322	2	2		C-7RZ233H3CBF 200V AVIC R32 Rotary Compressor
7713323			2	C-7RZ320H3CAF 200V AVIC R32 Rotary Compressor
7713279	2	2	2	Inverter 18A, 380-480VAC 3PH
7713280	2	2	2	Sensor NTC HT IP55 0/150T 6M
7713958	2	2	2	EEV Coil For E2V%
7713876	2			EEV E2V11ZWF7
692234		2		EEV E2V14FWF73
7713289			2	EEV E2V18FWFC1
692298	4	4	4	Press Trans Cable & Vulcanized Connector
692237	2	2	2	c.pCO Mini DIN High-End, LCD
692398	2	2	2	PRESS.TRASD.0-5V 0...45 BARG (0...650PSIG)
692238	2	2	2	PRESS.TRASD.0-5V 0...34,5 BARG
692239	2	2	2	Sensor NTC L=6,0-50/+105GC IP67
692241	2	2	2	Connector Kit, c.pCO Mini
692246	2	2	2	Sensor NTC HP IP67 -50T50 6M
692369	2	2	2	HP Switch YK03H-059-42R35R
692347	2	2	2	LDF3A08 ODF 1/4 Bypass Solenoid Valve
692345	2	2	2	SQ-A25024-000001 AC24V RV Coil
692342	2			SHF(L)-7H-34-52 Reversing Valve
692343		2		SHF(L)-7H-35-52 Reversing Valve
692344			2	SHF 14A-46 Reversing Valve
692303	4	4		KGQ-W11661-701 3/8 Strainer
692300			4	KGQ-W11881-701 1/2 Strainer
692348	2	2	2	FQ-A05024-000709 Bypass Solenoid Coil
692371	2			Suction Line Accumulators - Volume 04S
692372		2		Suction Line Accumulators - 15S
692373			2	Suction Line Accumulators - 16S
7713317	1			14kW Twin Circuit Right Handed DX Coil
7713318	1			14kW Twin Circuit Left Handed DX Coil
692306		1		20kW Twin Circuit Left Handed DX Coil
692307		1		20kW Twin Circuit Right Handed DX Coil
7713570			1	28kW Twin Circuit Left Handed DX Coil
7713571			1	28kW Twin Circuit Right Handed DX Coil
692304	2	2	2	DC Chokes

8.0 ANNUAL MAINTENANCE & SERVICING

- An inspection of the exterior condition of the equipment.
- An annual test for refrigerant leaks on each individual condenser/evaporator circuit in accordance with current legislation. This should include all integral soldered joints. All seals and valves should be inspected for possible wear and tear.
- Any refrigerant leaks found should be repaired asap.
- Refrigerant gas detectors should be clean and checked for correct operation (see page 47 for detector details).
- Heat exchange coils should be inspected for free airflow and cleaning carried out either by reverse blowing or by brushing with a stiff brush.
- Compressors should be checked for smooth operation.
- The controls should be checked for correct operation setting, calibration and response.
- The safety controls should also be inspected for operation and settings.
- There should be an inspection of the solenoid valves, EEV motorised valve heads and checked for operation.
- Condensate and overflow drains should be tested and cleaned.
- Refrigeration system pipe insulation should be inspected for any damage.
- Compressor anti-vibration mountings, should be checked for their effectiveness.
- Wiring should be checked for integrity.
- The temperature and pressure sensors should be checked and info recorded.
- A written service report should be provided and the customers F-Gas log books updated.
- Chemical treatment to remove bacteria, smells and odours is also recommended.
- High pressure switch operation should be checked (every 24 months).

9.0 AFTER SALES AND REPLACEMENT PARTS

For technical assistance or further product information, including spare parts and replacement components, please contact the After Sales Department.

If ordering spares please quote the serial number of the unit together with the part number, if the part number is not known please give a full description of the part required. The serial number will be found on the identification plate attached to the unit casing.

Telephone 02920 858 400
aftersales@nuaire.co.uk

9.1 Nuaire Website QR Code

Technical or commercial considerations may, from time to time, make it necessary to alter the design, performance and dimensions of equipment and the right is reserved to make such changes without prior notice.