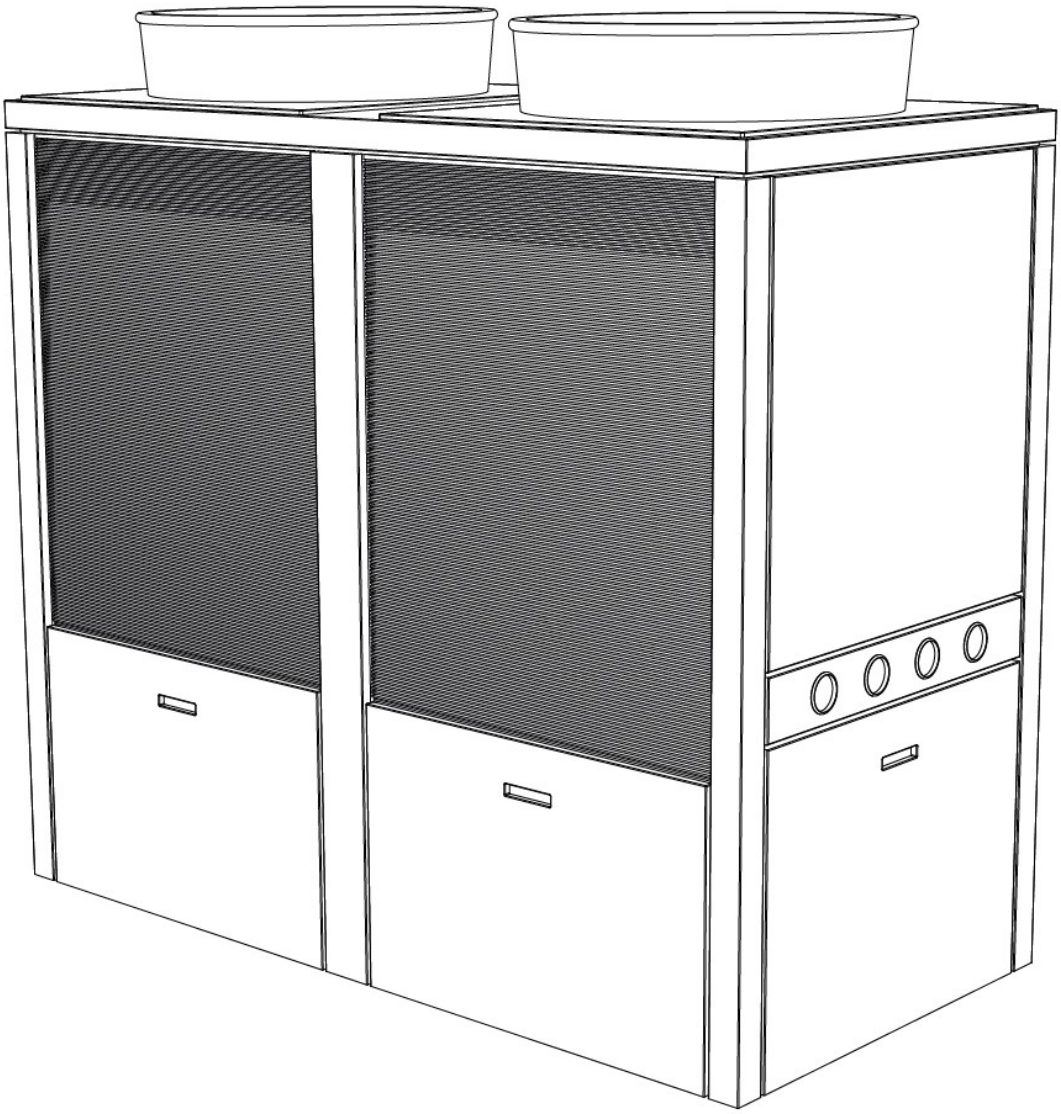
Lincoln Installation Manual

Air/ Water Heat Pump – Installation Instructions (CE)

GES-IM-011-03-03-2023



ADVECO

HOT WATER SPECIALISTS

Please read these instructions carefully before proceeding to install or operate the unit.

Keep these operating instructions safely and hand them on to any new user, should the equipment change hands.

Contents

1 Overview

These installations instructions are intended for contractors. The Air Source Heat Pump Installation also requires the Lincoln User Manual to complete the set-up. The heating system, Lincoln air source heat pump, Lincoln display and BMS interface screens represent one functional unit. Consequently, their instructions complement each other.

The initial operation needs to be set up by your installer. The installer needs to install the system in accordance with the documentation supplied with the Air Source Heat Pump. The Air Source heat pump should not be installed in any area where there may be a potential for an explosive atmosphere to be present. The Air Source Heat Pump should be installed and surveyed with national or local building regulations accounted for (taking into consideration all health and safety measures, fire and electrical emissions and noise pollution).

Ensure that the correct size heat pump has been selected in accordance with the latest version of MIS3005 (for UK installation) and with the GES Heat Pump Planning Manual.

1.1 Description

The Air Source Heat Pump is primarily designed for providing hot water. The unit can operate in ambient conditions between -20deg.C and +30deg.C, and can produce flow temperatures up to 60deg.C. The system is designed to run in conjunction with various heat delivery systems; under floor heating, water to air fan coils, plate heat exchangers and radiators. It is better to use a system that delivers a lower flow temperature as it will deliver a higher coefficient of performance (COP).

The Air Source Heat Pump is controlled from either the Lincoln BMS Interface screen from within the property or via the Eco Link over the internet. These systems all control the features and the safety functions of the air source heat pump. The Lincoln BMS Interface screen allows the user to have greater flexibility and control of the system. There is a second display screen, Lincoln display screen, where certain parameters can be viewed but the main controller is the Lincoln BMS Interface screen. The Lincoln has been designed with a minimum “footprint”. The system is charged with a non-combustible ozone friendly refrigerant R410A.

1.2 Operation

Heat is extracted from the outside air at temperatures ranging from -20°C to +30°C by the evaporator on the air side. The heating medium is then heated up by condenser located within the heat pump. Energy extracted from the air and energy provided by the compressor are the sources of the air source heat pumps energy.

At air temperatures below +7°C, humidity in the air condenses as hoar-frost on the evaporator fins. This hoar-frost is automatically removed and the waste water is caught in a drip tray and drained off via a hose. While the system is automatically defrosting, the fan is switched off and the units system is reversed to activate the defrost cycle. The energy used for defrosting is drawn from the central heating system or DHW cylinder. After a few minutes the unit automatically reverts to heating mode once the ice is cleared.

At low ambient air temperatures (typically between -20°C and 0°C) the heating system may need to be supported by a supplementary heat source. The requirement of the supplementary heat source is determined by the heat load of the building compared to the heat output of the heat pump.

Main functions of the Eco Link are:

- Turn unit on/off remotely
- Set required water temperature remotely
- Monitor the performance and operation of the ASHP unit remotely

Never interrupt the Air Source Heat Pump power supply, even outside the heating season; otherwise the system will not be protected from frost. Generally, the system does not need to be shut down during summer, as you can change the settings in the Eco Touch controller to reflect your desired requirements. This retains the safety features designed to protect the system, (e.g. frost protection).

1.3 Standard delivery and Accessories Options

The following table outlines the combinations of components that are required for different types of installations.

	Space and DWH Heating	Space Heating Only	DHW Heating Only	Swimming Pool
Lincoln Air Source Heat Pump	X	X	X	X
Lincoln Control Screen	X	X	X	X
Lincoln BMS Interface Screen	X	X	X	X
Optional Extras				
Room Temperature Control	X	X		
Tank Temperature Control	X		X	
Buffer Cylinder	X	X	X	X
Heat Exchanger Pump	X	X	X	X
Central Heating Pump	X	X		X
Pool Heat Exchanger				X

Please ensure that you checked the scope of delivery before signing any delivery documentation. Delivery should be accompanied by a specific delivery dispatch checklist for the project. Any queries or questions please contact Adveco Ltd. for what should be contained within your delivery. Claims for missing or damaged parts after signing for the delivery will not be accepted.

1.4 Warnings

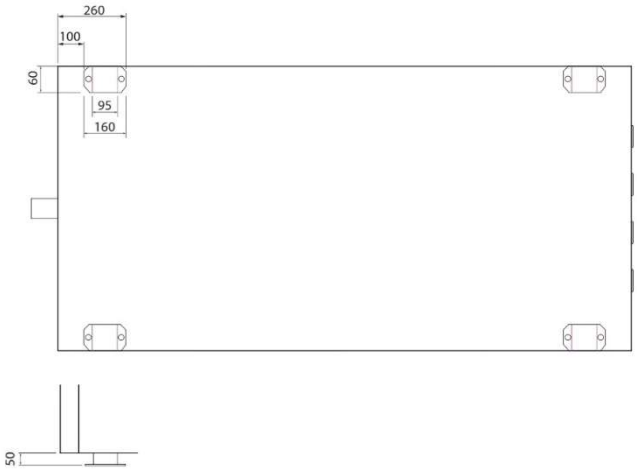
1.4.1 Temporary Power Supply

If the Lincoln is to be run on a temporary power supply for any length of time then it is advised that correct load calculations have been carried to ensure the supply is sufficient to support the Lincoln's power requirements. Fluctuations in voltage will damage the electronics within the Lincoln irreversibly. Adveco will not cover any warranty claims as a result of running on temporary power supplies.

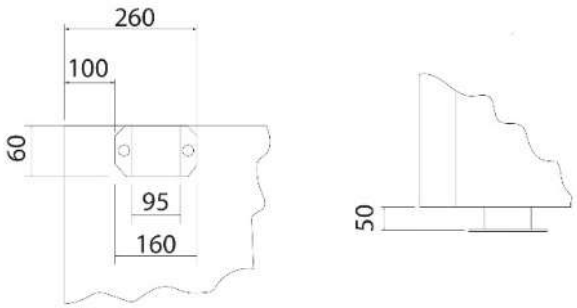
2 General Arrangement

All dimensions in mm.

Front and side views of the Lincoln Eco Air Boiler



Position of Feet (Viewed from underside)



Detailed Position of Feet (Viewed from underside)

3 Technical Specification

Product Name	Lincoln Eco Air Boiler
Product Model Number	Lincoln Air Source Heat Pump
Type	Air to Water Variable Speed Heat Pump

Electrical Spec

Heat Pump

:	Rated Voltage	3N~/400V/50Hz
:	Max. Power Consumption	41.5kW / 74A
:	Protection	MCB Type C 80 A

Performance

Output @ Air 7/2/ -7/-10°C and Water 35°C	74.41/ 62.57 / 61.81 / 54.38 kW
Input @ Air 7/2/-7/-10°C and water 35°C	20.39 / 18.01 / 19.88 / 19.20 kW
COP @ Air 7/2/-7/-10°C and water 35°C	3.65 / 3.47 / 3.11 / 2.83
Sound Power @ Air 7°C and Water 35°C	91dB(A)

Mechanical

Refrigerant	R-410A
Fill Weight	2 x 9.0kg
Water Flow rate min/norm	10.0/ 15.5m^3hr
Maximum Allowable Pressure HP	44.0bar
Maximum Working Pressure LP	14.0bar
Oil Type	POE (3.24Ltrs)
Protection	IP20
Defrost Type	Reverse Cycle
Fan Power Input (W) / Speed (RPM)	2 x 1100 / 900
Heat Exchanger (Delta P)	50KPa

Physical

Dimensions W/D/H	2180*1080*2160
Weight	800kg
Pipe Connections	Flanged connections EN1092-1 / TYPE 13 / DN80 / PN6

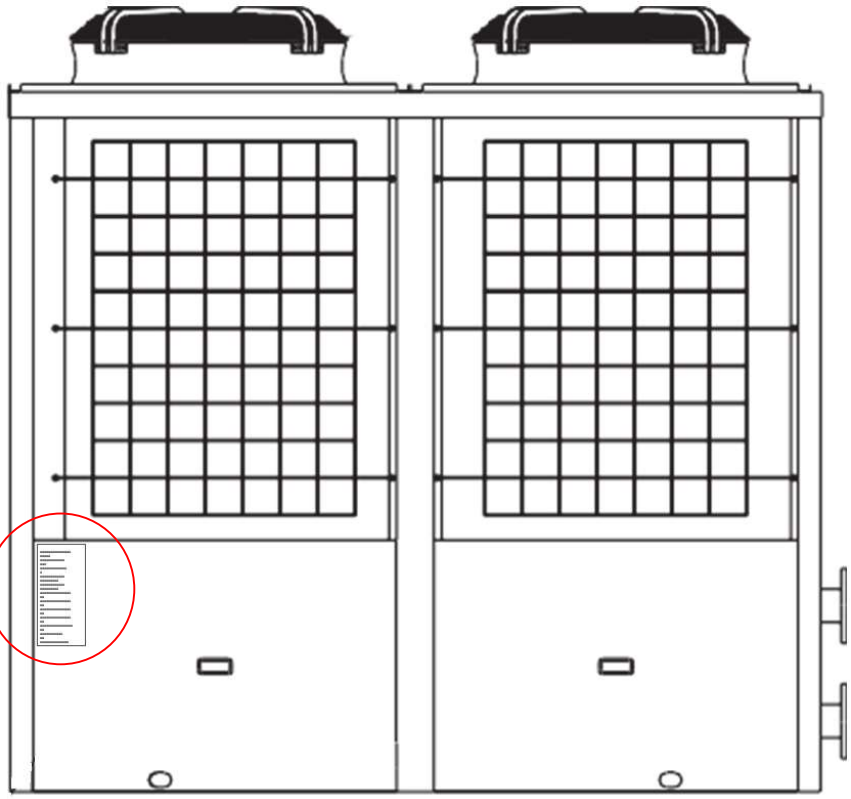
Operating limit

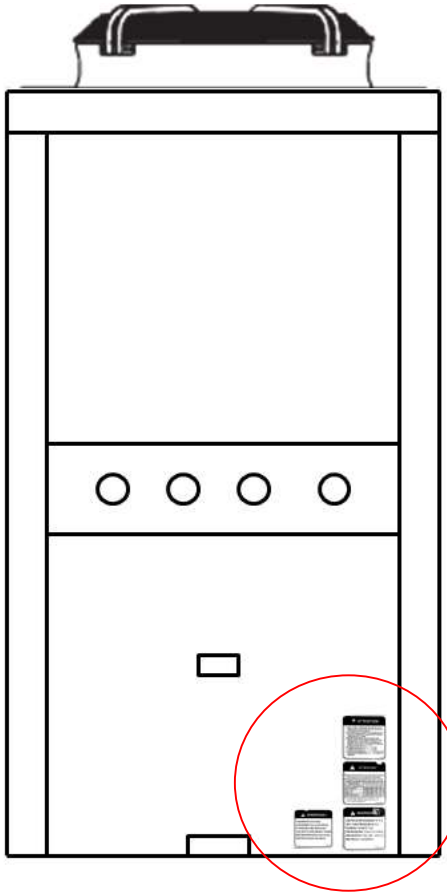
Water Side Min/Max	+25/+60°C
Ambient Min/Max	-20/+35°C

Lincoln
LCNR410MOD1

RATED VOLTAGE / PHASE / FREQ:	400V/3N~/50Hz
MOISTURE RESISTANCE:	IPX4
ELECTRICAL SHOCK PROOF:	I
*RATED HEATING CAPACITY:	84.2kW/286280Btu/h
** RATED HEATING CAPACITY:	86.3kW/293220Btu/h
*RATED HEATING POWER INPUT:	20.0kW
**RATED HEATING POWER INPUT:	32.7kW
*RATED HEATING CURRENT INPUT:	36.3A
**RATED HEATING CURRENT INPUT:	60.9A
*RATED COEFFICIENT OF PERFORMANCE:	4.21
**RATED COEFFICIENT OF PERFORMANCE:	2.64
MAX.POWER INPUT:	41.5kW
MAX. CURRENT INPUT:	74.0A
WATER PRESSURE DROP:	50.0kPa
WATER FLOW RATE:	15.5M³/h
REFRIGERANT / PROPER INPUT:	R410A/2 x9.0Kg
NOISE:	73dB(A)
NET WEIGHT:	778kg
OPERATION PRESSURE (LOW SIDE)	1.4MPa
OPERATION PRESSURE (HIGH SIDE)	4.4MPa
FACTORY NUMER:	ON THE BAR CODE
MAKING DATE:	ON THE BAR CODE
*HEATING: AMBIENT TEMP:	(DB/WB): 7°C/6°C
WATER TEMP:	(IN/OUT): 30°C/35°C
**HEATING: AMBIENT TEMP:	(DB/WB): 7°C/6°C
WATER TEMP:	(IN/OUT): 55°C/60°C

Contains Fluorinated greenhouse gasses covered by the Kyoto Protocol.
GWP:2088: 37.58 tonnes of CO^2 equivalent.
Hermetically sealed.
Manufacturer: Global Energy Systems and Technology.
Dock Road, Lytham, Lancashire
United Kingdom, FY8 5AJ





ATTENTION !

Glycol must be filled into the cooling water system to avoid being frozen in the area with cold climate.
Using an ethylene glycol (antifrost) solution changes markedly its pressure drops and thermal performance.

%Glycol by weight	10	20	30	40	50
Ambient air temperature °C	-3	-8	-14	-22	-33
Cooling capacity	0.991	0.982	0.972	0.961	0.946
Power input	0.996	0.992	0.986	0.976	0.966
Water flow	1.013	1.040	1.074	1.121	1.178
Water pressure drop	1.070	1.129	1.181	1.263	1.308

The table above shows the multifunction factors fixing the new pressure drops and capacities but it is only for reference.

WARNING !

HAZARDOUS VOLTAGE DISCONNECT ALL ELECTRICAL POWER BEFORE SERVICING. FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SERIOUS INJURY OR DEATH.

WARNING !

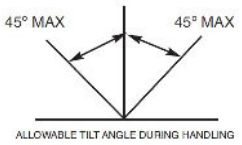
USE R410A REFRIGERANT WITH THIS UNIT. HIGH PRESSURE WHILE RUNNING SO MUST USE PROFESSIONAL TOOLS TO CHECK AND MAINTAIN THE UNIT OR ELSE MAY RESULT IN DANGER.

ATTENTION !

- THE Y TYPE FILTER MUST BE INSTALLED AT WATER INLET AND WITH CHECK VALVE ON TWO SIDES FOR CLEANING.
- PLEASE ALWAYS KEEP THE POWER ON FOR THE UNIT IN WINTER THEN THE AUTO ANTI FREEZING WILL WORK.
- WATER DISCHARGE VALVE SHOULD BE INSTALLED AT THE LOWEST POINT OF THE WATER IN/OUT PIPE FOR CLEANING OUT WATER TO AVOID FREEZING IN WINTER WHEN STOPPED FOR A LONG TIME
- PLEASE CLEAN THE PIPING SYSTEM COMPLETELY BEFORE DEBUGGING
- THE WATER RECHARGE VALVE PREFER TO BE INSTALLED INSIDE TO AVOID FREEZING IN WINTER

4 Transportation

⚠ WARNING – HEAVY



To protect the equipment against damage, it must be transported vertically inside its packaging. Make sure that the unit is not tilted more than 45° (in any direction) for any prolonged period of time.

Short tipping of one of its longitudinal sides is permissible. Lifting slings for handling the standard machine can be hooked up anywhere on the lower frame.

Protect the heat pump against severe impact.

Ensure that there is a clear pathway for a truck to deliver the Air Source Heat Pump as close to the selected location as possible.

The installer must use a suitable lifting method in accordance with Health and Safety Regulations.

4.1 Unpacking

1) Undo the screws (remove retention straps) from the non-returnable pallet.
2) Remove the washers.
3) Remove the equipment from its pallet and position it where required.

The Air Source Heat Pump has a low center of gravity. To maintain stability, strap the unit down.

5 External installation

5.1 Location

The Air Source Heat Pump must be installed outdoors with adequate clearances for ventilation and maintenance. It is recommended that the Air Source Heat Pump is installed along the property wall. There must be a minimum distance of 1000mm on all sides of the heat pump to prevent air recirculation.

Positioning the Air Source Heat Pump in a confined space, frost hollow or well will result in reduced efficiency, as the cold air which is expelled by the fan cannot disperse and may be drawn back into the system. This means that the Air Source Heat Pump may be operating using a lower inlet temperature than what is actually available and will therefore run less efficiently. Make sure heat pump is located in a location of free-flowing air.

The unit should preferably not face prevailing winds to ensure correct air flow through the evaporator. If the unit is to be positioned in such away it will be affected by prevailing winds then a wind break should be erected to shelter the unit. Ensure a minimum gap of 1m (clearance) to L and R sides, 1m to the back and 1m to the front of Air Source Heat Pump.

The Air Source Heat Pump must be accessible from all sides. With external installations, water and electricity supplies can be routed into the heat pump through the left hand side.

5.2 Placement

The heat pump must be fixed on to a level, stable base that is capable of withstanding the unit's weight of 750kg, with a minimum of 1000mm clearance around all sides of the heat pump. Recommended surfaces:

- Foundation.
- Kerb stones.
- Stone slab.

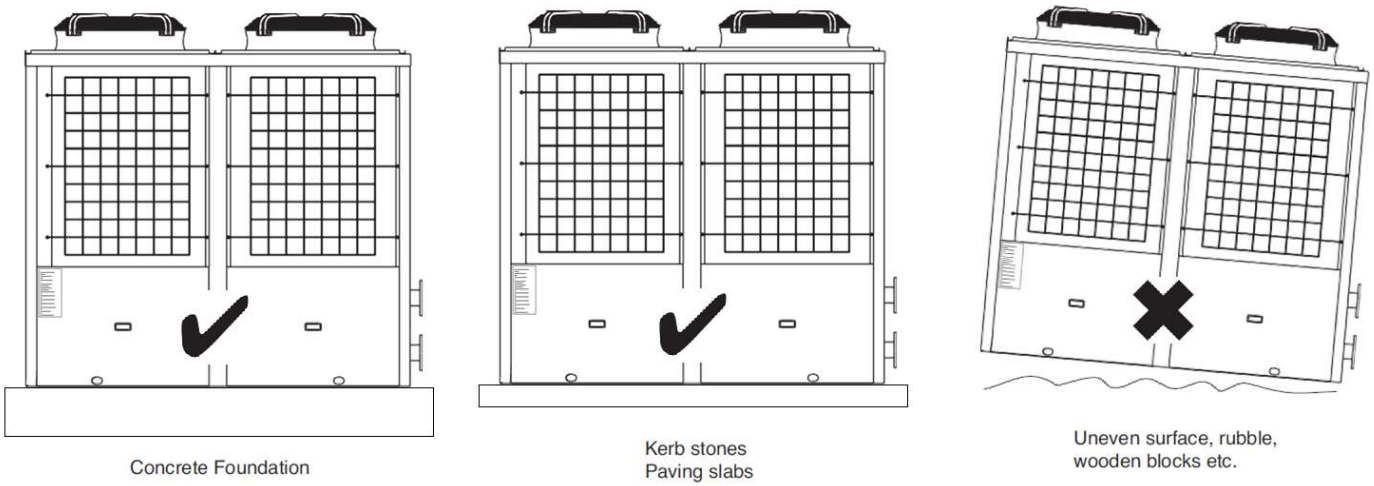
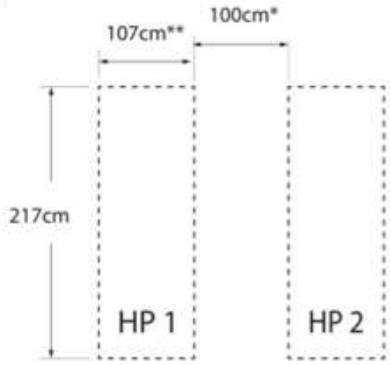


Figure 5-1: Heat Pump Location

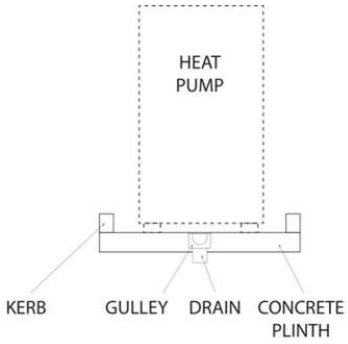
> ⚠ Important
>
> Never install the Air Source Heat Pump on timber floors which form the ceiling below.

5.2.1 Plinth Dimensions

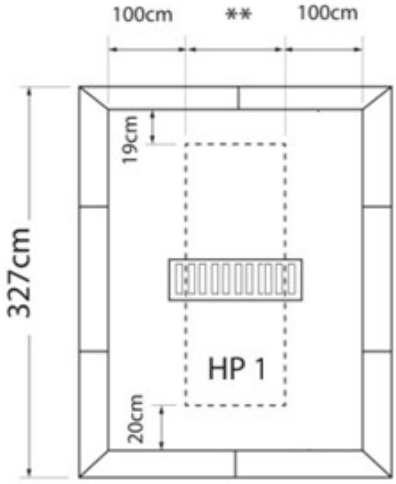
When creating a plinth for the heat pump to sit on the dimensions shown in the following figures should be used noting that there should be a 600mm gap between the base and the wall.



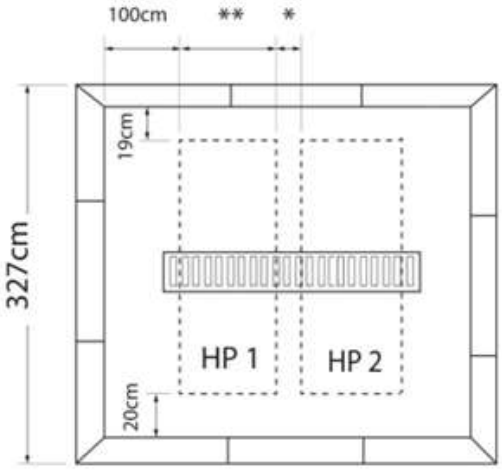
Heat Pump Spacing



Side view of Suitable plinth

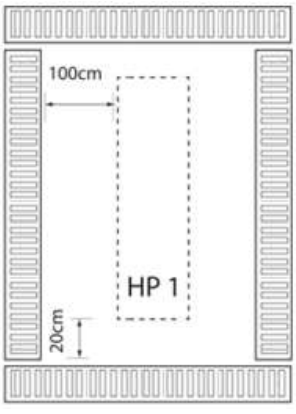


Overhead view Heat Pump

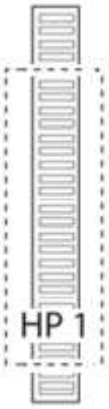


Overhead view of Two Heat Pumps

Additionally, the plinth should be fitted with drain or soak away for condensate. Installers to design suitably in order to remove required water, see condensate pipe routing for more information.



Plinth example with surround drainage



Plinth Example with single drainage

Ideally the heat pump should be located close to the property. Positioning the heat pump at a distance from the property will result in the need for extra insulated pipe, which will lead to extra cost, and result in additional heat losses.

5.3 Condensate Routing

Approximately 4 liters of condensate water are drained from the system every time a defrost cycle occurs (approximately once every hour in (colder weather). Therefore, it is essential that the condensate is fed into a drain or soak away to allow for safe disposal of the excess water, away from footpaths, patios and other potentially hazardous areas. Installer to ensure all water runs into a drain sufficiently.

NOTE: If there is insufficient fall on the condensate pipe and ice accumulates on the floor or drain, a suitably sized trace heater may need to be used to prevent ice build-up in the condensate pipe and surrounding area.

6 Removing / Replacing Panels

In order to access the internals of the Lincoln air source heat pump the panels can be removed. Prior to removal of panels, as a minimum requirement isolate power supplies for the heat pump at the supply disconnects local to the heat pump.

> ⚠ WARNING!
> Although the mains supply must be isolated before the panels are removed for cleaning, inspection etc., there are several high-voltage components within the cabinet which will hold their charge, even when the mains supply has been turned off.

To remove the selected panel:

1) Undo the bolts located around the panel
2) Lift and pull outwards.
3) Store panel in a secure location to avoid damage

To replace the panel:

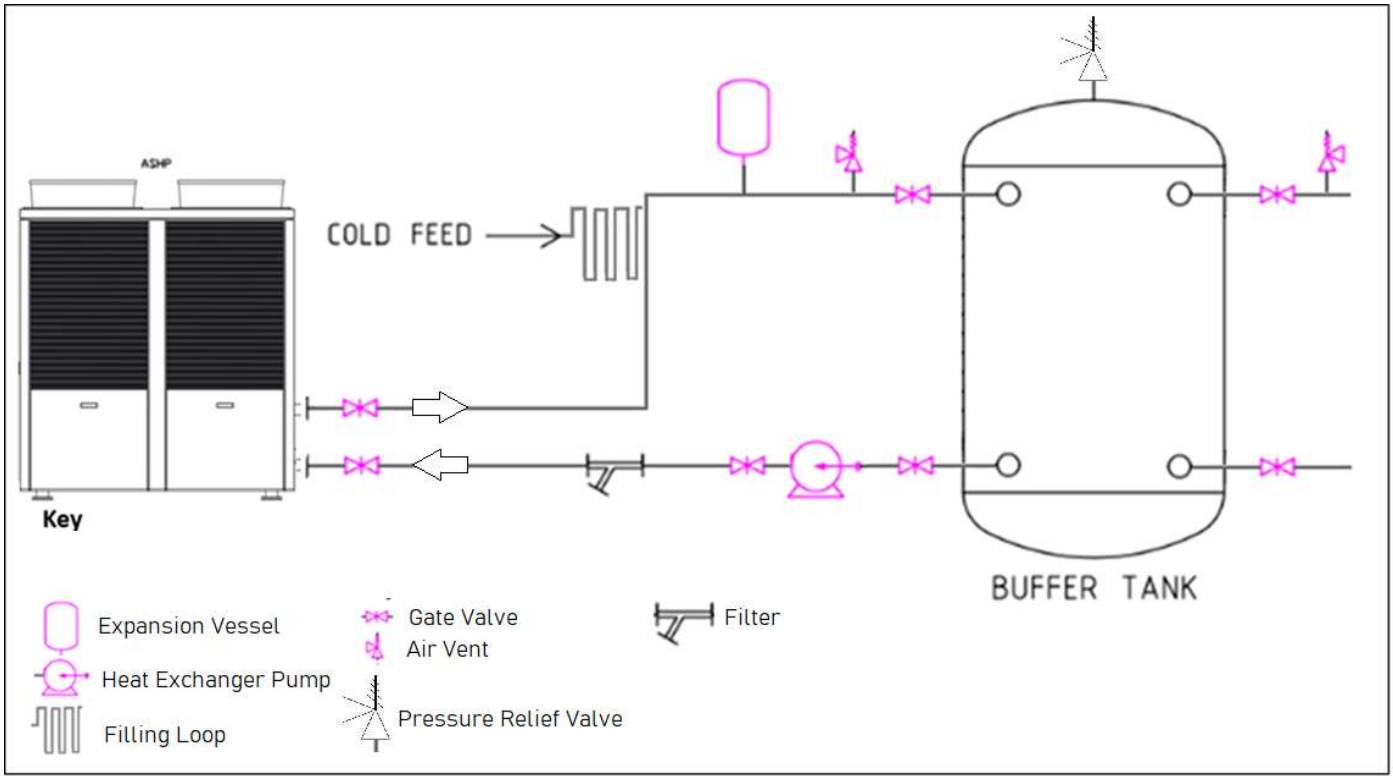
1) Push forward and downwards.
2) Retighten bolts around the panel
3) Once the panel has been replaced ensure there is an even gap on each side when closed.

7 Plumbing Installation

The Lincoln air source heat pump has two pipes that require connecting to the heating system. The pipes are flange connections consisting of a 'FLOW' and 'RETURN' pipe. The 'FLOW' pipe is the heated fluid from the unit to the heat load, while the 'RETURN' pipe is the fluid returning from the heat load to the unit. It is important that these are piped the correct way around and each pipe has a label to help identify 'FLOW' (Top pipe) and 'RETURN' (Bottom Pipe) within the unit. Please take great care to not disturb joints within the heat pump itself.

7.1 General Plumbing Schematic

Air Source Heat Pump to Standard Buffer



General Installation Schematic

7.2 General Plumbing Components

Referring to the schematic above, there are number of components required to connect the Lincoln Air Source Heat Pump to a system. The main components have been identified below.

Flange Connections

The flange type required to connect to the Lincoln flow and return pipes is: EN1092-1 / TYPE 13 / DN80 / PN6.

Heat Exchanger Pump

The heat exchanger pump is the main pump used for circulating the fluid between the heat pumps heat exchanger and the Buffer cylinder within the property. This is operational whenever the heat pump is running. The heat exchanger pump should be installed into the system as shown in the diagram above. This pump needs to be sized accordingly to the system taking in to account any pressure loss associated with the system to maintain the required 15.5m3hr.

We advise heat exchanger pumps to be installed on the return pipework of the system. If more than one pump installed, we advise installing one heat exchanger pump on the flow and the second on the return. Suitable shut off valves either side of the heat exchanger pump are advisable for routine maintenance or future replacement.

Valves

Ensure all valves within the installation should be full bore in order to reduce any impedance to flow rates within the circuit.

Buffer Cylinder

A buffer cylinder is recommended to ensure trouble-free Air Source Heat Pump operation. The Buffer is installed primarily as an energy source for defrosting the evaporator. It is necessary to connect a buffer tank in series with the heat pump. The buffer cylinder should be installed into the system as shown in the diagram above. Connecting the flow and return pipes, from the Air Source Heat Pump, directly to the buffer cylinder, ensures flow rates are always managed suitably for operation and not impeded by any of the heating zones. A buffer increases compressor life due to reduction in the number of starts. All heating zones to be connected via the buffer (i.e. central heating circuit, plate heat exchanger, Domestic hot water coil).

If a non-Adveco heat pump buffer is being used, consult Adveco to ensure that it has been accurately sized, that all necessary hydraulic connections have been considered in connecting it to the heat pump system and there is a minimum volume required for the Air Source Heat Pump. We advise one Lincoln has at minimum 1,000Ltr Buffer Cylinder.

Expansion Vessel and Pressure relief valves

The safety valve and expansion vessel are to be accurately sized by the installer based on the system volume.

Air Vents

The air vents indicated in the schematic are advised as a minimum in order to ensure no air blocks within the heating circuit. Ensure air vents are located at the highest point in the circuit.

7.3 Installation

Prior to Connection

- Thoroughly power flush any existing pipe work before connecting the Air Source Heat Pump with clean water. Debris, such as welding, dust, sand, sealant etc., can impair the operation and reliability of the Air Source Heat Pump, and can lead to blocking of the strainer.

Pipe Sizing

- When selecting piping to install with the Air Source Heat Pump, please ensure that the pipe sizes are adequate to allow the correct nominal water flow rate through the heat pump.
- Not all types of pipe will have the same internal diameter, e.g. multi-layered / plastic pipes will have a thicker wall.
- Please note a one pipe system is not suitable for an air source heat pump. Heating systems should be upgraded to a two pipe system.

Heat exchanger and Circulatory Pump Sizing

- When selecting circulating pumps ensure the required flow rates have been calculated.
- Heat Exchanger pump must be sized to ensure suitable flow rate between the ASHP and Buffer Cylinder
- Circulatory pump must be sized to ensure suitable flow for the design of the systems heat emitters.
- Pumps are not supplied by Adveco Ltd. as standard, these need to be calculated and sized accordingly for the specific application.

Insulation

- All External pipe work and valves should be adequately insulated with adequate vapour resistant thermal insulation and protected against damage by routing through conduits where possible. All joints should be suitably sealed and exposed pipework should be avoided.
- All tank pipework should be insulated
- Required insulation thickness in accordance with the Heating System Order (or local regulations) should be maintained. Protect all pipe fixings and wall transitions with anti-vibration insulation
- Pipework and insulation should be protected against rodent damage where necessary.

Filling

- The system must be filled and flushed with clean fresh water to ensure the removal of all the air from the installation.
- Air bleed points must be installed at every high point in the system. Adveco recommend the use of a power flush and purge cart to facilitate this process.
- Venting the heating system. Air pockets in the system are detrimental to the Air Source Heat Pump function. Vent the pipe work thoroughly. For this, also activate the air vent valve integrated into the heat exchange flow.
- A strainer must be fitted in order to prevent contamination of the heat exchanger.

7.4 Oxygen diffusion

The products of corrosion, i.e. rusty sludge, can settle inside the Air Source Heat Pump condenser and can result in a lower output through reduction of the heat transfer area. Therefore, it is advisable to avoid open heating systems or the installation of steel pipes in conjunction with plastic pipes in underfloor heating systems, which are not impermeable to oxygen.

7.5 Minimum volume flow

Adveco recommends installing a buffer cylinder, directly flowing and returning to the air source heat pump unit. This will ensure suitable flow rate through the unit's heat exchanger. maintaining the required 10.0/ 15.5m3hr.

7.6 Buffer Tank

The buffer tanks come in various designs depending on installation requirements. To aid installation and maintenance all ports on the buffer tank need isolation valves. Please install suitable drain off valves.

8 Electrical Installation

Only qualified electricians may carry out the installation which must be in accordance with these instructions.

> ⚠ Before any work, isolate the equipment from the main power supply at the mains control board.

Observe local/national regulations of the power company. The Air Source Heat Pump must be capable of being separated from the mains power supply by an additional supply/disconnect switch, which disconnects all poles with at least 3 mm contact separation. For this purpose, use contactors, mains isolators, fuses, etc. on site. The unit has components which must be kept safe from harmful ingress of water.

In order for operation of the heat pump several components require connecting to the heat pump. Onboard the heat pump there are two separate electrical boxes, connections will only need to be made from the *Lincoln BMS Interface Control Box*, see below for more detail.

There is a mixture of high voltage (400V + 240V) and low voltage/ data cables to be run between several locations. In order to prevent noise affecting the heat pump it is strongly recommended that shielded cable is used for all low voltage / data cabling and that they are run separate to 400/240V. The following components are required as a minimum.

> ⚠ WARNING!
> When wiring components into the wiring centre high voltage (240V) and low voltage (24V) connections are to be made side by side. Incorrect wiring will cause irreplaceable damage of the heat pumps components. If there is any doubt contact Adveco Ltd.

COMPONENT	**PROTECTION**
Air Source Heat Pump Power Supply	Triple Pole 80A Type C MCB (3Phz 400V)
COMPONENT	**CABLE TYPE**
Air Source Heat Pump Supply Cable	SY Cable SWA Nominal (2M 25mm come with unit)
Lincoln Control Screen	4-CORE twisted Pair screened cable
Lincoln BMS Interface Screen	4-CORE twisted Pair screened cable
Control Logic Cables to External BMS Panel	
Data Cable – Multi- cores (24v signal cable)	Number of cores dependant on control logic external BMS provider is planning on using. Refer to schematic below for total number of cables required if utilising every function of the Lincoln.

8.1 Overview

8.2 Preparation

Ensure the incoming power supply and the distribution board are suitably rated. Ensure that the regulations specified by the local electricity supplier have been adhered to.

The supply cable must be suitable for the installation location and sized to meet the requirements of national wiring regulations for current carrying capacity, disconnection time and voltage drop. Cable sizing should be carried out by the installer.

For external installations, use cables suitable for outdoor use (or local regulations). Route such cables through a conduit (protective pipe); entry into the Air Source Heat Pump can be gained from underneath the unit.

8.3 Access Electrical Box and Wiring Centre

To open the heat pump, follow the procedure shown in section 6, Removing / Replacing Panels to remove the panel located at the opposite end of where the pipe connections protrude from the unit. You will then be able to see the electrical box. To access the electric box, remove the screws holding the cover in place and remove. Using a box key open the door of the electrical box. Ensure all wiring within this box is done while the unit is not running

8.4 Connection of the Air Source Heat Pump

To make electrical connections to the heat pump: Feed power cable and controller cable underneath the base of the unit. Allow sufficient cable to ensure the connections are not strained when the cover is opened. The controller cable is then connected from the heat pump to the wiring centre.

The standard installation of the heat pump requires the power cables to be routed to the supply/disconnect switch local to the heat pump.

8.5 General Electrical Components

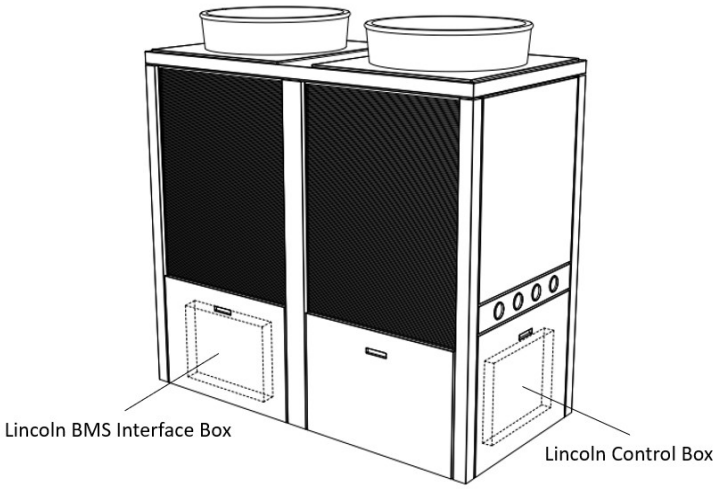
Lincoln Electrical boxes and control systems

There are two separate electrical boxes within the Lincoln ASHP unit. They serve different purposes; Contractors only need to interact with one of the boxes **(Lincoln BMS Interface Box).**

Lincoln Control Box

Lincoln control box contains all the internal wiring configurations of the Air Source Heat Pump in order for it to run. Contractors installing the unit **will not need to interact with this electrical box**, all control and pumps cabling is terminated in the Lincoln BMS interface Box noted below.

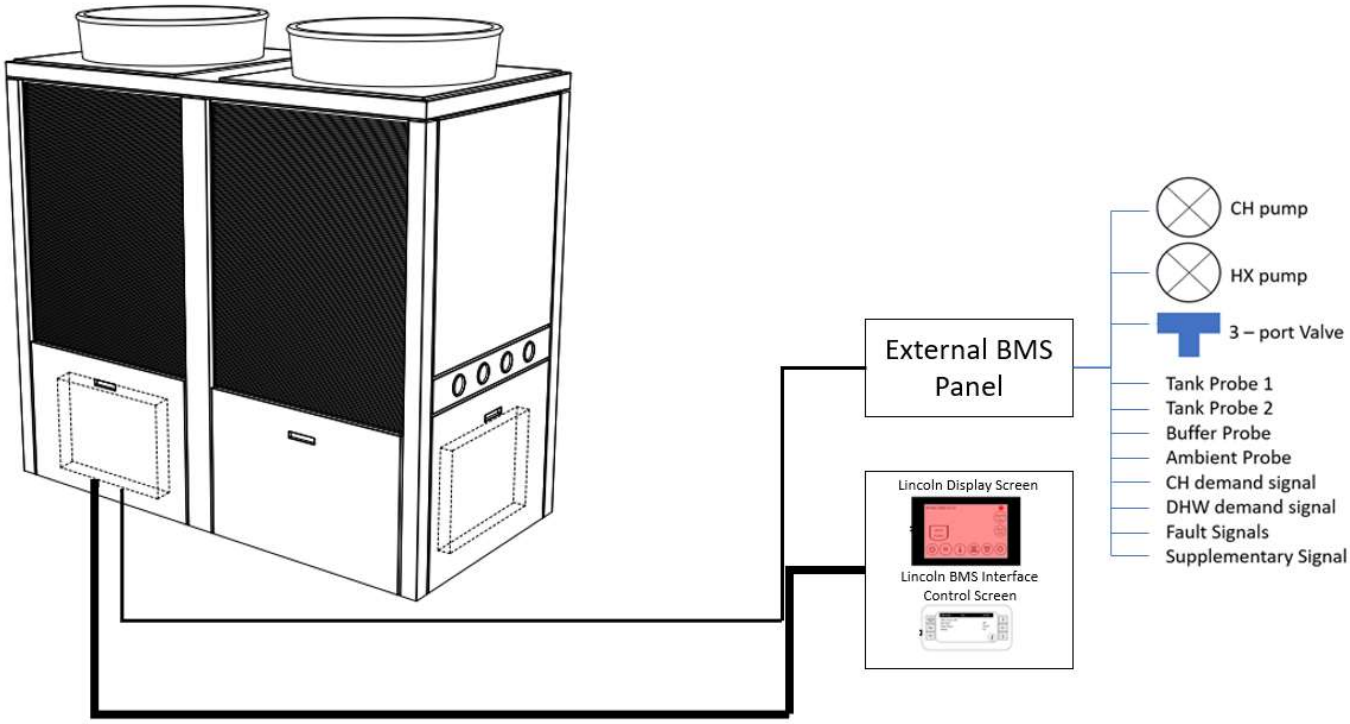
If, in the unlikely event that there is a power issue and the breakers trip within the unit then the Fan, Compressor and Control breakers are installed within this electrical box.



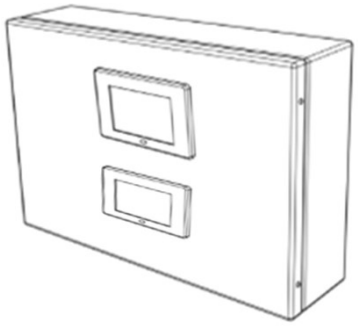
Lincoln BMS Interface Box

Lincoln BMS Interface Box is the main installer electrical box that contractors will interact with. Locate this electrical box in order to install the relevant valves, screens and control cables.

The Lincoln BMS interface box is a BMS Interface between the on-site external BMS system and the Lincoln ASHP unit. Please refer to your BMS engineers' arrangement and control of the overall heating system to ensure suitable integration info this control box. Power supplies and signal cables need to be assessed and ensure power for certain pumps; valves are provided from a separate source.



Control Screens



There are two separate screens relating to the Air Source Heat Pump, one of the screens is a display screen only and not settings can be changed or altered on this screen, Lincoln Display Screen, the second is the main screen to interact with, the Lincoln BMS Interface control screen. This screen can be used to set the heating system up.

Lincoln Display Screen

Lincoln control Screen to be installed in the plant room and accessible for the end user.
This screen can be used by the end user to view air source heat pump parameters and monitor its current running of the internal components. This screen will display any alarms suffered by the unit.

The cable is a 4-core twisted pair screened cable.

Please note: this screen is **not for set up or control**, it will ignore any requests and revert back to original settings. To change the operation of the unit and its controls use the Lincoln BMS Interface Screen.

The unit can run with or without this screen being installed, however it is imperative the original screen remains with the Lincoln, and accessible, in order to be utilized by any returning engineers in the future so maintenance and service can be carried out.

Please refer to the Lincoln Control Screen user manual section below for more information.

Lincoln BMS Interface Control Screen

The Lincoln BMS Interface screen. This is to be installed in the plant room and accessible for the end user. The Lincoln BMS interface control screen controls the overall set up and commissioning of the air source heat pump.

The cable is a 4-core Beldon screened or equivalent.

Please note: this **screen is for set up and control**. Use this screen to alter any settings required on commissioning or maintenance.

Once set up, the unit can run with or without this screen being installed, however it is imperative the original screen remains with the Lincoln, and accessible, in order to be utilized by any returning engineers in the future so maintenance and service can be carried out.

Please refer to the Lincoln BMS Interface Screen user manual section below for more information.

Heat Exchanger Pumps

The heat exchanger pump is the main pump used for circulating the fluid between the heat pumps heat exchanger and the Buffer cylinder within the property. This is operational whenever the heat pump is running.

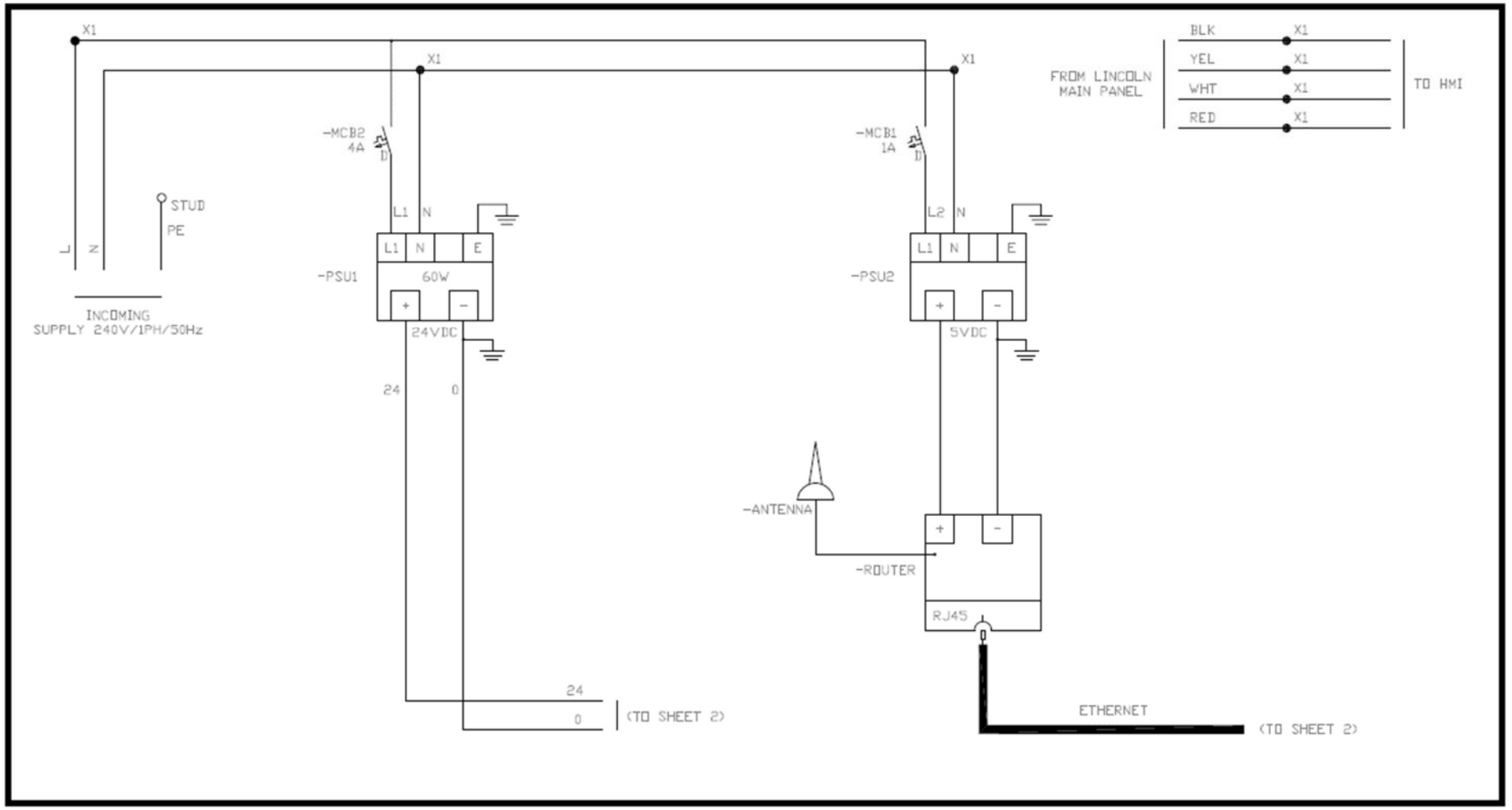
The Lincoln BMS interface box does have the output for the heat exchanger pump. Output signal is a 240Volt interface relay. Maximum pull is 4amps 240volts single phase. Any additional pumps or valves being controlled by this output will need to be wired into an external BMS system in order to not damage the relay installed in unit.
Please refer to your BMS designer for more information.

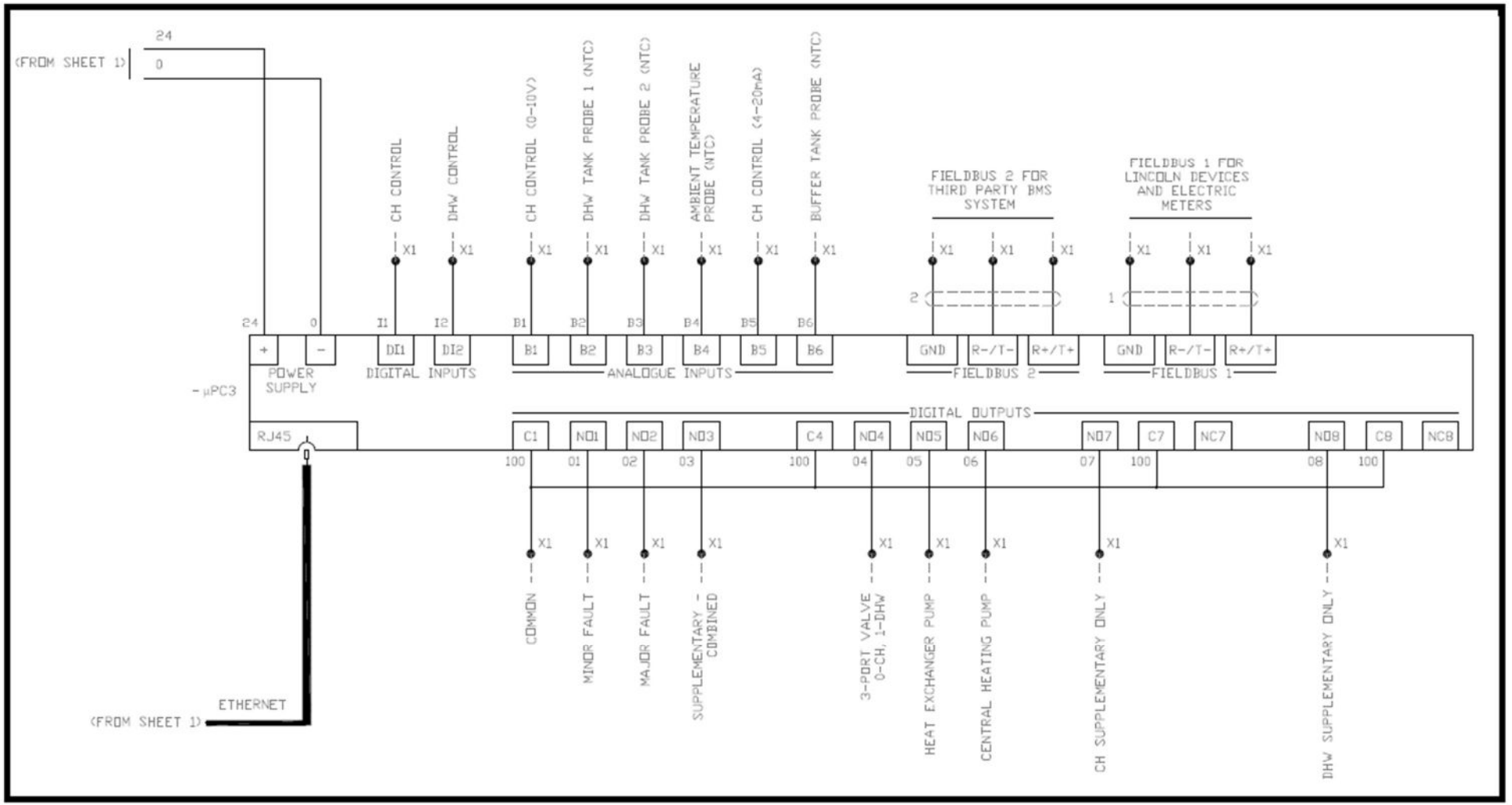
Central Heating/ Circulating Pumps

The distribution, central heating or other circulating pumps, are used for circulating the fluid from the buffer cylinder to the required zones plumbed from the buffer cylinder, this may be central heating, domestic hot water cylinder, plate-plate heat exchanger or other sources of heat. The control of these pumps are to be wired from an external BMS interface from that of the Lincoln. Refer to your BMS designer for more information.

There is an output on the Lincoln BMS interface that can be utilized, this is a 24 Volt signal output that needs to be used by the external BMS interface. All pumps are to be powered from a local source or alternative switch live supply.

8.6 Lincoln BMS Interface Box Wiring Schematics



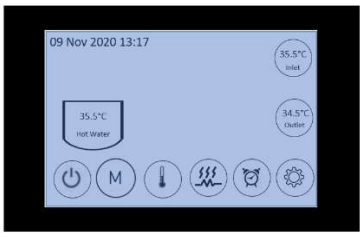

(FROM SHEET 1)
24
0
CH CONTROL
DHW CONTROL
CH CONTROL (0-10V)
DHW TANK PROBE 1 (NTC)
DHW TANK PROBE 2 (NTC)
AMBIENT TEMPERATURE PROBE (NTC)
CH CONTROL (4-20mA)
BUFFER TANK PROBE (NTC)
FIELDBUS 2 FOR THIRD PARTY BMS SYSTEM
FIELDBUS 1 FOR LINCOLN DEVICES AND ELECTRIC METERS
X1
2
1
I1
I2
B1
B2
B3
B4
B5
B6
+
-
DI1
DI2
GND
R-/T-
R+/T+
POWER SUPPLY
DIGITAL INPUTS
ANALOGUE INPUTS
FIELDBUS 2
FIELDBUS 1
- µPC3
DIGITAL OUTPUTS
RJ45
C1
NO1
NO2
NO3
C4
NO4
NO5
NO6
NO7
C7
NC7
NO8
C8
NC8
100
01
02
03
04
05
06
07
08
COMMON
MINOR FAULT
MAJOR FAULT
SUPPLEMENTARY - COMBINED
3-PORT VALVE 0-CH, 1-DHW
HEAT EXCHANGER PUMP
CENTRAL HEATING PUMP
CH SUPPLEMENTARY ONLY
DHW SUPPLEMENTARY ONLY
ETHERNET
(FROM SHEET 1)

8.7 Lincoln Display Screen Guide

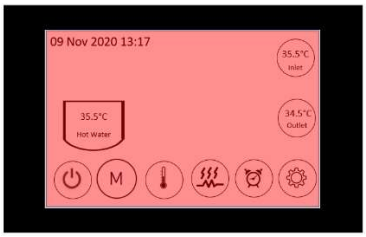
Lincoln Control Screen is for monitoring Only – no settings or functions will be changed on the device from this screen

General Monitoring

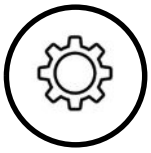
Unit off – No demand for heating

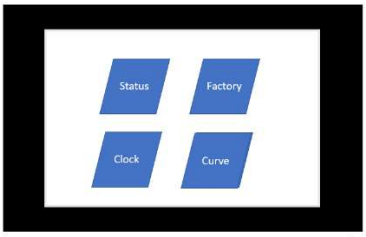


Unit on – Demand for heating

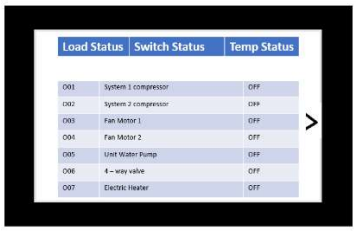


To monitor the ASHP Unit
Select the Settings Icon



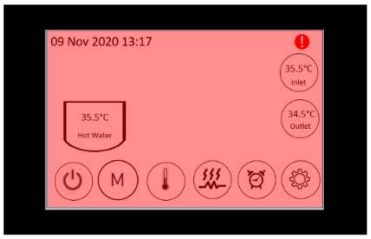


Open up the Status Page

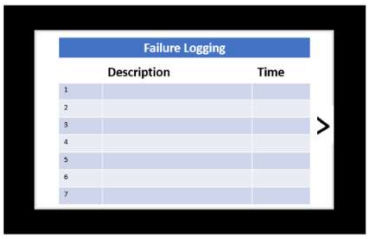


Alarm Status

If unit is in alarm the following symbol will appear on the Lincoln control screen



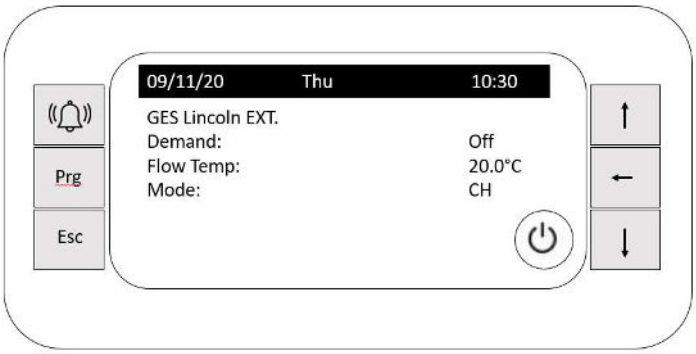
Read through alarm and check trouble shooting section below
For assistance, please call Adveco



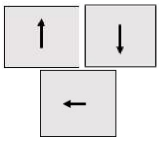
8.8 Lincoln BMS Interface Screen Guide

Following set ups should be carried out on commissioning and no further requirement to be altered.

Separate screen for control settings to be programmed on the Lincoln ASHP



Using the arrow buttons on the outside of the screen, navigate through the required settings to set up the unit.



Navigation

Enter

Control Logic on Lincoln BMS Interface Board

		Description	Setting	Values/ Defaults/notes
ASHP unit priority demand		Unit can prioritise central heating or domestic hot water dependant on installation requirements	Priority	Default: CH Options: CH or DHW
Central Heating				
None	-	If selected, Lincoln is not controlled from the Lincoln BMS interface board or the external BMS, all control is left to the Lincolns own controller, master flow set point on the Lincoln control screen. This is only if no DHW control is selected. This set up is none standard and not advised.	CH mode	
4-20mA	B5	If selected, control of the Lincoln is done via the 4-20mA input from external BMS. The unit is turned on once the lower threshold has been met and will adjust the flow temperature proportionally between a minimum flow setpoint and maximum setpoint.	CH mode	6.0 (lower threshold) – 20.0 (upper threshold) Lower and upper threshold flow set points to be set
0-10v	B1	If selected, control of the Lincoln is done via the 0-10V input from external BMS. The unit is turned on once the lower threshold has been met and will adjust the flow temperature proportionally between a minimum flow setpoint and maximum setpoint.	CH mode	2.0 (lower threshold) – 10.0 (upper threshold) Lower and upper threshold flow set points to be set
Digital Input	ID1	If selected, control of the Lincoln turning on and off is done via the digital input from the external BMS. Flow temperature control is	CH mode/ Max. Flow SP/	

		done via Master flow set point or weather compensation if activated	Weather comp	
BMS Control	-	CH control is via the BMS over modbus. 1-ON,2-OFF. This controls to the CH setpoint via Master flow set point.	CH mode	

Weather Compensation

	Is selected, Weather compensation can be used to control the flow setpoint based on the outside ambient air temperature.	Weather comp:	
	The unit will control proportionally the flow temp between the Min. Flow SP: and Max. Flow SP settings. Max flow temp is based on ambient temperature (See ambient temperature section to select location it is pulled from). Note weather compensation will not be used if 4-20mA or 0-10V modes are active.	Ch min flow temp – ch max flow temp – min air temp – max air temp	

Ambient Temp

	The ambient temperature to control weather compensation and low ambient can be configured to be populated in 3 ways.	Ambient Temp Selection	Average
0	Average temperature of all active Lincolns temperature probes from		
1	Lincoln device 1 temperature probe only from		
2	Temperature probe wired into Lincoln BMS interface board		

CH Supplementary

Central Heating supplementary heater can be activated in the following modes:

Buffer tank temperature	Buffer Tank Temperature – only to be used when a buffer tank probe is connected to the Lincoln BMS Interface box If the tank falls below the CH Buffer Supp./ CH Sup SP: then the CH supplementary output is activated until the CH Buffer SP: is met.		
	Ch buffer supp SP	Activates CH supplementary heating upon buffer tank temperature falling below this setpoint	45
	Ch buffer supp DIFF	Differential by which the buffer tank must be increased above set point for CH supplementary to be turn off	10
	Ch supp mode	Turns on Buffer tank temperature supplementary control,0-OFF,1-Buffer tank temp supplementary ON	0
Low ambient	Low ambient mode brings on the CH supplementary upon the air temperature falling below CH low Amb. SP: and turns off once ambient temperature raises 1deg.C above the set point.		
	Ch low ambient SP	Low ambient set point to bring on CH supplementary, deg.C	-20
Supplementary upon CH Demand	If this mode is activated it brings on the CH supplementary whenever there is a demand for CH.		
	Ch manual supp on demand	Activates CH supplementary upon CH demand,0-OFF,1-ON	0
Supplementary heating constant	Forces the CH supplementary output on constantly regardless of CH demand.		
	Ch manual supp force	Activates CH supplementary constantly,0-OFF,1-ON	0
Supplementary on Alarm	Ch supp on alarm	Activates CH supplementary upon alarm. 0- OFF, 1- ges major fault' AND 'ch demand' are ON,2- ges major fault' only	0

DHW

0	None	Lincoln is not controlled from the Lincoln BMS interface board and all control is left to the Lincolns own controller if no DHW control is selected then ASHP will not run DHW.		
1	Digital	Control of the Lincoln turning on and off is done via the digital input. Flow temperature	BMS Inputs	60

		set point is selected in variable 'DHW flow SP: defaulted to 60deg.C		
2	Tank probe	The tank is controlled using tank probes wired into the Lincoln BMS Interface board. Tank setpoint is controlled 'dhw tank SP'. Tank probe can consist of 1 or 2 probes (higher and lower limit to form an average)	Dhw tank SP - DHW tank differential for DHW demand to be activated	50 - 5
			0 Use average of both probe	
			1 Use probe 1	
			2 Use probe 2	
3	BMS Control	Control is via BMS over modbus. 0- no DHW demand, 1- DHW demand. Controls to DHW setpoint "dhw flow SP".		

DHW supplementary

Can only be used if DHW is selected on tank probe

Domestic hot supplementary heater can be activated in the following modes:

Tank temperature	If the tank falls below the 'dhw tank SP' minus 'dhw supp diff' then the DHW supplementary output is activated until the 'dhw tank SP' is reached	
	Differential from tank set point where DHW supplementary is activated	10
	Selects Tank Temp supplementary mode. 0-off, 1- tank temp supplementary mode ON	0
Low ambient	Low ambient mode brings on the DHW supplementary upon the air temperature falling below 'dhw low ambient SP' and turns off once ambient temperature raises 1deg.C above the set point	
	Low ambient set point to bring on DHW supplementary, deg.C	20
Supplementary upon DHW demand	If this mode is activated it brings on the DHW supplementary whenever there is a demand for DHW.	
	Activates DHW supplementary upon DHW demand,0-OFF,1-ON	0
Supplementary heating constant	Forces the DHW supplementary output on constantly regardless of DHW demand.	
	Activates DHW supplementary constantly,0-OFF,1-ON	0
Supplementary upon alarm	The DHW supplementary heating can be triggered upon a major alarm ('ges_major_fault'). The DHW supplementary can either become active when there is a major alarm and DHW demand or regardless of DHW demand.	
	Activates DHW supplementary upon alarm. 0-OFF, 1- ges_major_fault' AND 'dhw_demand' are ON,2- ges_major_fault' only	0

Manual Mode

Each Lincoln device can be removed from auto control and manually controlled. This can be done via using the following variables. (Note: number in [1] should be substituted depending on device to be controlled)

Manually disables the unit from operation, 0-OFF, 1-ON (Unit Disabled) – Used to take unit out of operation	0
Device is to manual control using 'lincoln_manual_setpoint[1]' AND 'lincoln_manual_on_off' to control operation, 0-OFF,1-ON (Unit uses manual parameters)	0
Manually sets the devices flow set point to be used when lincoln_manual_on_off [1], deg.C	0
Manually allows control of device on and off, to be used with lincoln_manual_setpoint[1], 0- Device manually off, device manually on	0

I/O set up

Analog Inputs	Type	Description
B1	0-10V	0-10V CH Control
B2	NTC	DHW Tank Probe 1
B3	NTC	DHW Tank Probe 2
B4	NTC	Ambient Temperature Probe
B5	4-20mA	4-20mA CH Control
B6	NTC	Buffer Tank Probe

Digital Inputs	Type	Description
ID1	Digital	Digital Input CH Control
ID2	Digital	Digital Input DHW Control

Digital Outputs	Type	Description
NO1	Digital	Minor Fault
NO2	Digital	Major Fault
NO3	Digital	Supplementary - Combined
NO4	Digital	3-port Valve 0-CH,1-DHW
NO5	Digital	Heat Exchanger Pump
NO6	Digital	Central Heating Pump
NO7	Digital	CH Supplementary Only
NO8	Digital	DHW Supplementary Only

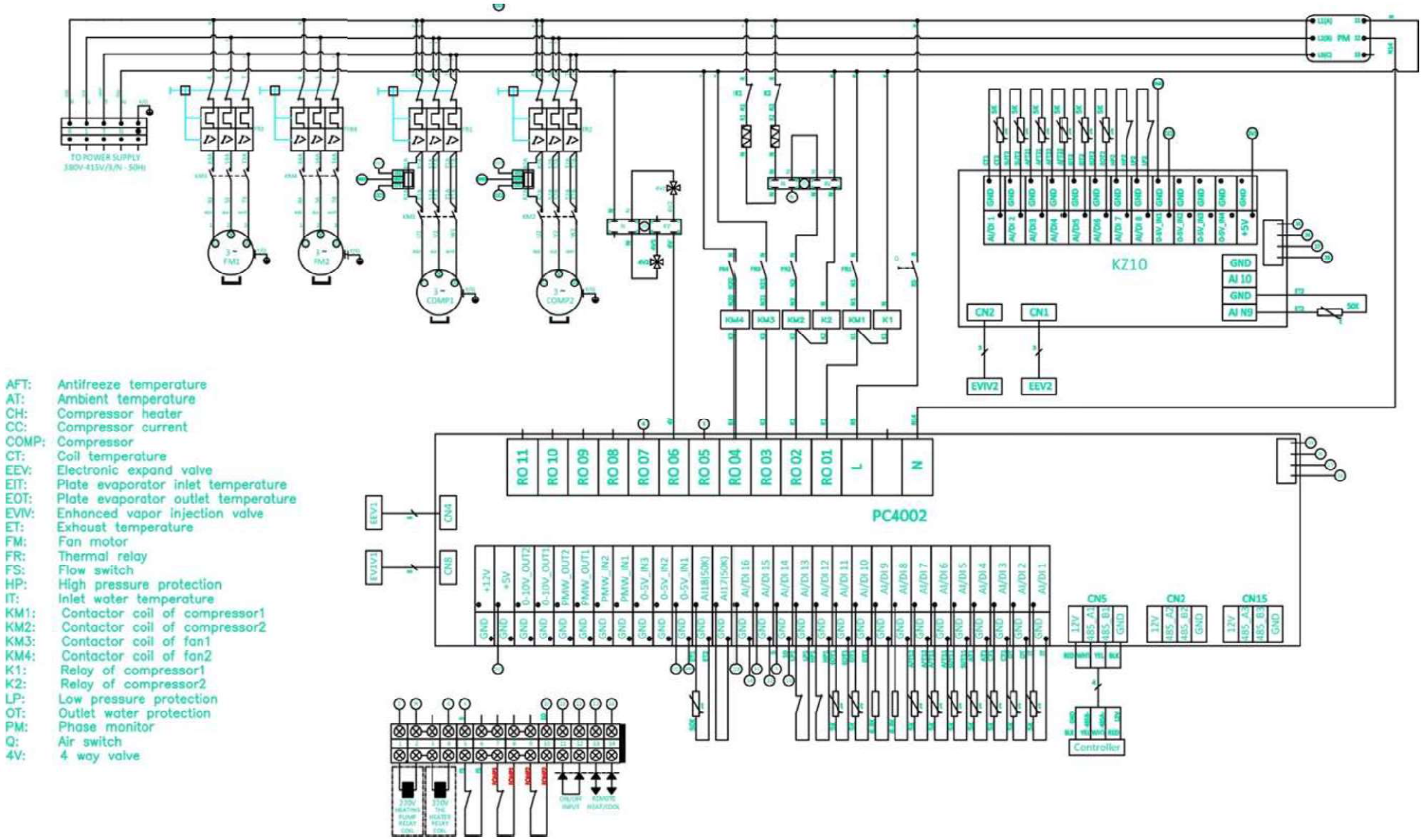
9 Ecolink

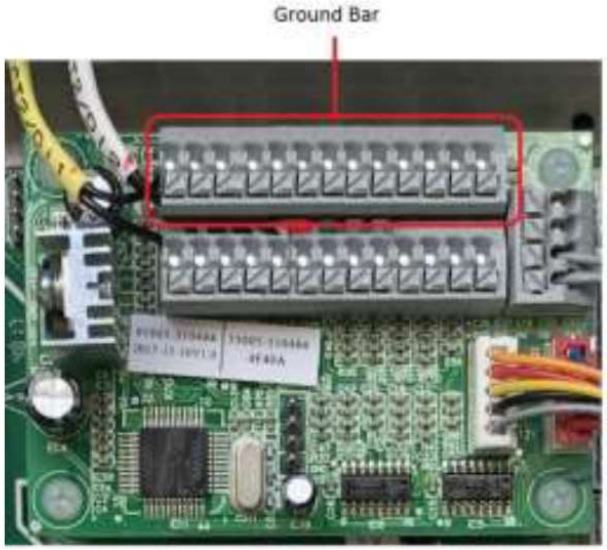
The Eco Link is used to connect the heat pump to Global Energy Services Eco Link Portal. This allows for constant monitoring and remote access of the heat pump. In order for the Eco Link to function an antenna must be fitted between the modem located in the electrical box and the positioned external to the heat pump.

As the system relies on the mobile phone network for transmitting data it is important that location of the antenna has good reception, therefore position should be in a high up position away from obstacles that may interfere with reception. If unsure about the best position please contact Adveco at time of install.

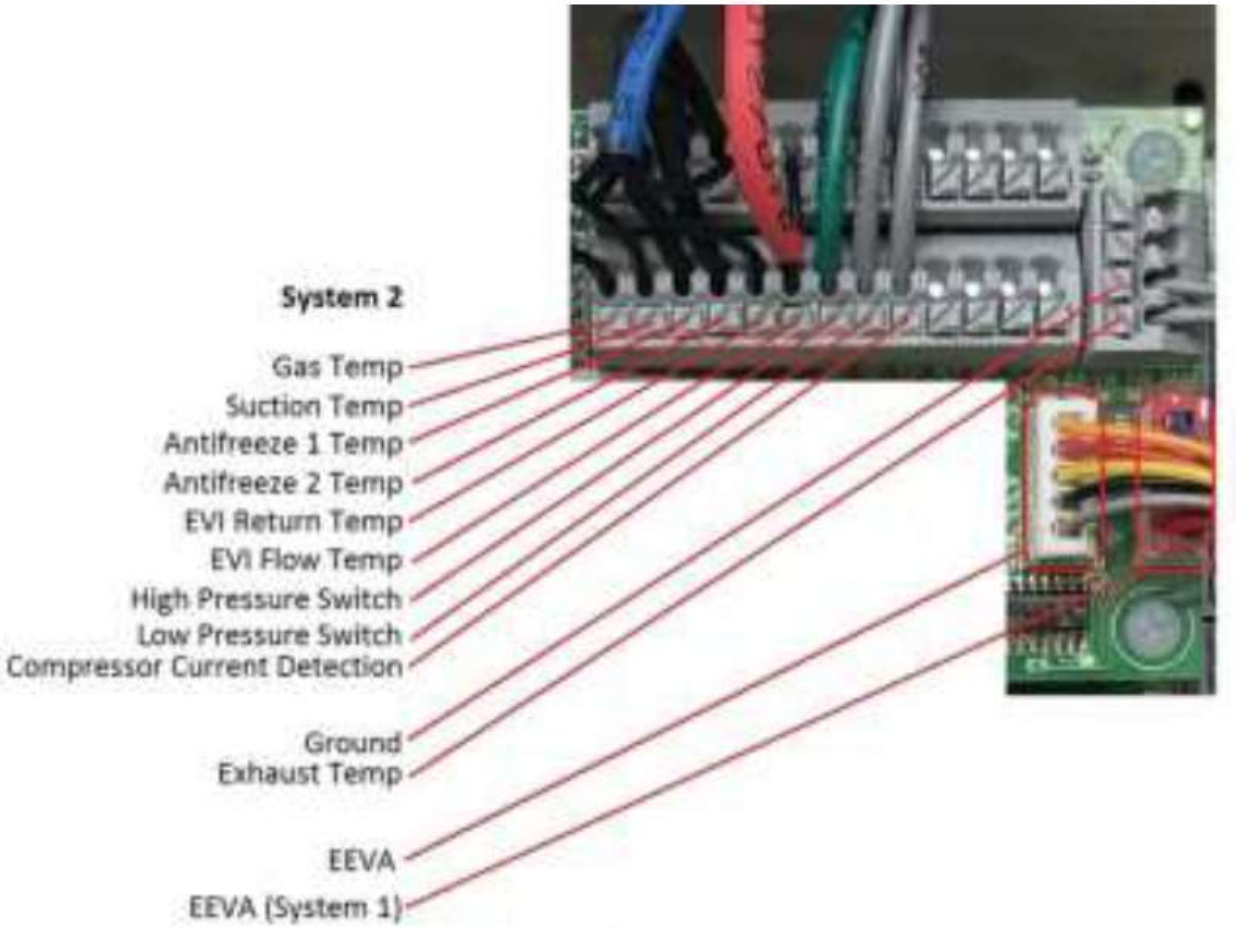
10 Lincoln Control Box

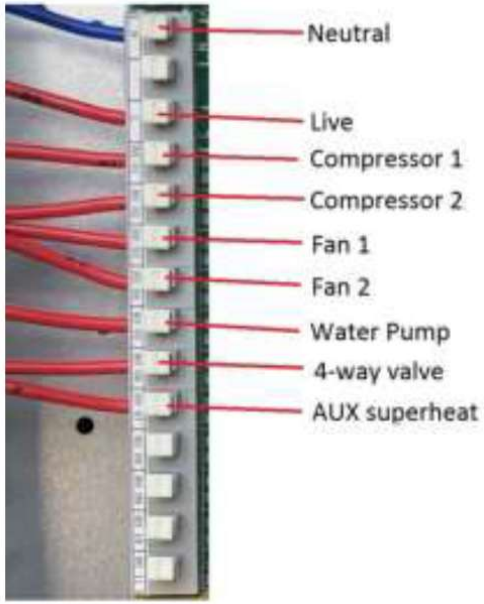
Installers do not need to interact with this electrical box, all connections are made in the Lincoln BMS Interface Box.

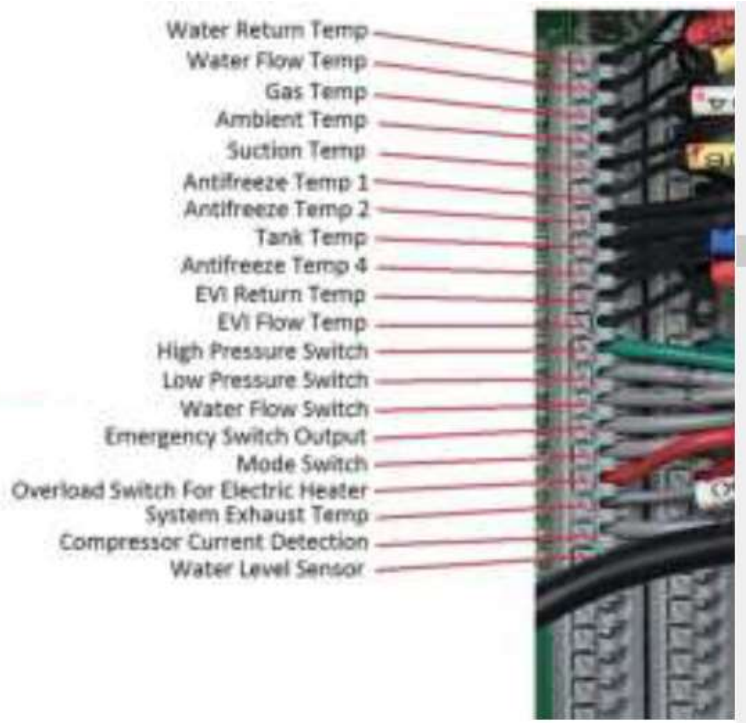


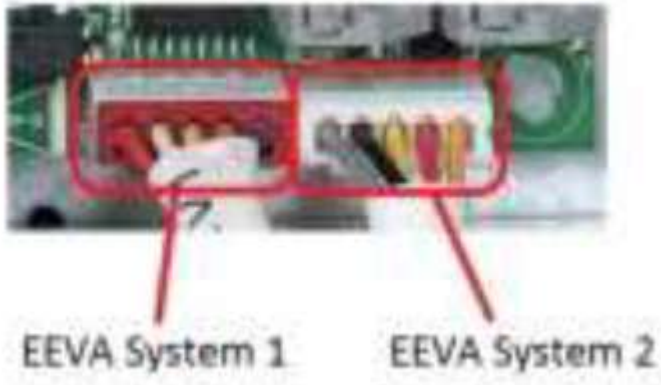

Ground Bar

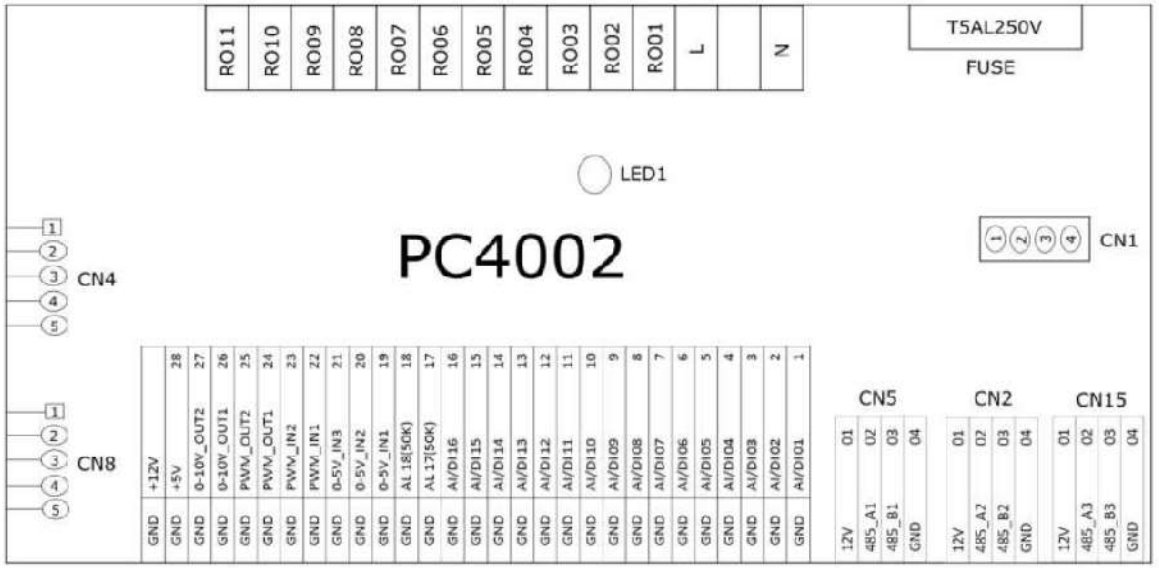

Ground Bar

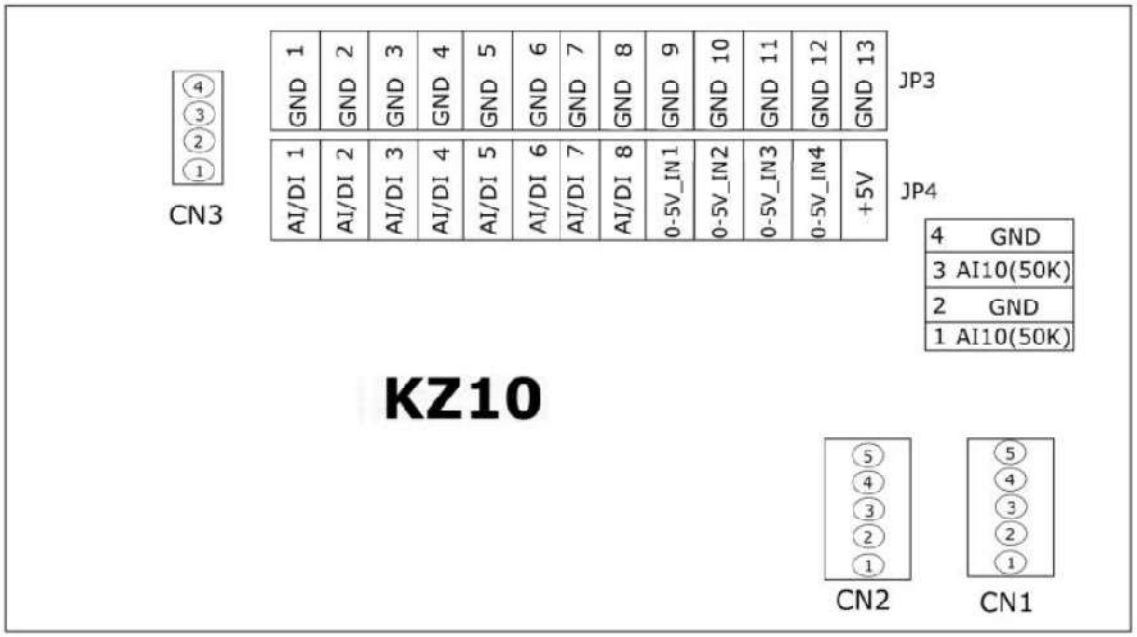

System 2
Gas Temp
Suction Temp
Antifreeze 1 Temp
Antifreeze 2 Temp
EVI Return Temp
EVI Flow Temp
High Pressure Switch
Low Pressure Switch
Compressor Current Detection
Ground
Exhaust Temp
EEVA
EEVA (System 1)


Neutral
Live
Compressor 1
Compressor 2
Fan 1
Fan 2
Water Pump
4-way valve
AUX superheat


Water Return Temp
Water Flow Temp
Gas Temp
Ambient Temp
Suction Temp
Antifreeze Temp 1
Antifreeze Temp 2
Tank Temp
Antifreeze Temp 4
EVI Return Temp
EVI Flow Temp
High Pressure Switch
Low Pressure Switch
Water Flow Switch
Emergency Switch Output
Mode Switch
Overload Switch For Electric Heater
System Exhaust Temp
Compressor Current Detection
Water Level Sensor


EEVA System 1
EEVA System 2


RO11
RO10
RO09
RO08
RO07
RO06
RO05
RO04
RO03
RO02
RO01
L
N
T5AL250V
FUSE
LED1
PC4002
CN4
CN8
CN1
CN5
CN2
CN15


CN3
JP3
JP4
KZ10
CN2
CN1
4 GND
3 AI10(50K)
2 GND
1 AI10(50K)

11 Commissioning

- ☐ Fill central heating system with water until the pressure is 1 bar
- ☐ Vent system to remove air
- ☐ Check pipework for leaks
- ☐ Replace all covers
- ☐ Switch on heat pump power supply
- ☐ Wait for screen to start-up
- ☐ Turn power button on wait until it turns green
- ☐ Heat pump should run in DHW mode
- ☐ Heat Exchanger pump should start
- ☐ Fan and compressor will run on heat pump
- ☐ Flow temp should increase and divert to DHW tank
- ☐ Tank should increase until it reaches set point
- ☐ When tank is at temperature central heating needs a demand via the touch screen or external control
- ☐ Heat exchanger pump and central heating pump (if installed) will run and zone valve divert water to heat emitters
- ☐ When all heat emitter circuits are warm turn off central heating
- ☐ The heat pump booster heater should be forced on by turning the tank temperature up to 60c and turning low ambient air mode above the current ambient temp. Use a clamp on meter to check the amperage it should be 26amps. When the tank has reached 60c revert all changed settings.
- ☐ Turn power to the heat pump off and remove and clean inline filter (See section 10.2)
- ☐ After commissioning, the installer should complete the commissioning report in section 16
- ☐ Only qualified contractors must adjust the Eco Touch heat pump setup section.

12 Maintenance

Before starting to work on the unit, isolate power supplies for the heat pump and booster heater at the supply disconnects. Refer to Section 6 for instructions on removal of the panels. Use / wear appropriate personal protective equipment when attempting any maintenance or cleaning of the unit.

12.1 Preventative Maintenance Plan

The following is the recommended maintenance plan that should be implemented for the Lincoln.

- Check the water supply and air vent frequently, to ensure there are no air pockets in the system and that the system is pressurised. Clean the water filter periodically to maintain the water quality in the system. Poor maintenance of these parts can damage the unit. The water pump in the system will run once per 72 hours to ensure that the system doesn't freeze.
- Placement of the unit should be in a clean dry place with good ventilation. Clean the heat exchanger every 2 months where possible to ensure maximum heat transfer from the unit.
- Ensure that any damaged or failed parts are replaced and that should any leaks occur, repressurise the system to operating pressure.
- Check the power supply and electrical components of the system. If there are any signs of damage or failure of the wiring or components make sure they are replaced.
- If the unit is to be unused for a long period of time it is recommended that the system be drained and sealed and that the heat exchanger is fully drained to stop any water freezing during cold periods. Once refilled, complete a full inspection of the heat pump before restarting the unit.
- The water circuit MUST be protected against freezing during cold ambient conditions. Please see the recommended conditions below, failure to follow the recommendations will invalidate the warranty on the unit.

1) Do not turn the unit off during winter. When the unit is turned on, the ambient temperature is below 0 degrees and the return temperature is below 2 degrees the system will run to ensure the system doesn't freeze.
2) The system should be filled with anti-freeze (glycol) using the table below.

Based on Fernox HP -5^{o}C

Glycol Percentage (%)	10	20	30
Ambient Temperature (^{o}C)	-4	-9	-14

Once a month

- Check that the evaporator is free from debris.
  - This can be checked visually from the front and side panels. Always make sure the system has been switched off and isolated.
- Check that the air inlet/outlet apertures are free from debris. Remove any restrictions.

Once a year

- Check glycol concentration within the system is at a sufficient level to provide anti-freeze protection
  - This can be checked using a refractometer
- Check heating system for leaks and that the general operating pressure is maintained in the heating system.
  - This work should be carried out by a qualified heating engineer.
- Clean inline strainer

12.2 Cleaning Filters

1) Turn heat pump OFF at the screen
2) Isolate heat pump and booster heater at supply disconnects
3) Close the ball valves on the flow and return pipes
4) Locate the strainer on the pipework
5) Remove strainer mesh from within
6) Clean debris from mesh using fresh water
7) Replace strainer mesh
8) Replace strainer cap using PTFE tape on the threads. Ensure cap is tight
9) Open ball valve on the flow and return pipes
10) Re-pressurise the system
11) Check there are no leaks from strainer cap
12) Turn on supply disconnects and turn heat pump ON at the screen.

- The cabinet is corrosion protected for extended life. If the coating is ever damaged, replace immediately with a suitable coating to prevent further deterioration.

13 Alarms

If the system stops working, check the following descriptions below before contacting a service engineer. If the situation is critical, call a service engineer immediately for assistance and isolate the unit by the supply disconnect (Note: Frost protection will be deactivated once isolated). The Air Source Heat Pump will list certain faults on the LCD display. Describe the fault to the service engineer so they can help.

HP Switch

During installation and when the system has been in operation make sure the water is connected and the system is free from air locks. If there are any air locks in the system this will cause the High Pressure switch to activate switching the system off and displaying a fault code (HP switch). To fix the problem, go through the water system checking there are no leaks, all stop valves are open and check that the system is primed with water and pressure if it is an unvented system. This HP switch is on a timed reset. If it activates more often than the factory pre-set level, it will have to be re-set in the Setup Menu (see Eco Touch User Manual).

LP Switch

If the system stops working on an (LP Switch), then the system will not restart as this is connected to the Air Source Heat Pump cycle. A fault will have occurred that needs fixing by a service engineer. Please contact customer services to speak to an engineer.

Flow Switch

The Flow Switch is located on the water flow pipe downstream of the Booster Heater. The Flow Switch protects the system against low or no fluid flow.

13.1 Troubleshooting

Failure	Possible causes	Solutions
Heat pump not powering on	1. Wrong power supply 2. Power supply cable loose 3. Circuit breaker open	1. Shut off power and check power supply 2. Check power cable and make sure connection is good 3. Check for cause and reset circuit breaker
Water pump making audible noise or running without water	1. System is empty of water 2. Air in the system 3. Water valves closed 4. Water filter blocked	1. Check water supply and re-charge with water 2. Bleed air from the system 3. Open valves 4. Clean water filter
Heat pump output low	1. Lack of refrigerant 2. Poorly insulated water pipes 3. Low heat exchange rate 4. Poor water flow through system	1. Check for gas leak. Recharge with refrigerant 2. Insulate water pipes 3. Clean heat exchanger 4. Rectify flow issue
High gas temperature	1. Excess refrigerant 2. Low heat exchange rate	1. Check refrigerant levels and discharge excess gas 2. Clean heat exchanger
Low system pressure	1. Lack or refrigerant 2. Refrigerant side system issue	1. Check for gas leak. Recharge with refrigerant. 2. Investigate system for issues
Compressor not starting	1. Power supply issue 2. Compressor contactor issue 3. Power cable loose 4. Compressor protection running 5. Water temp setting too low 6. Poor water flow	1. Check power supply 2. Replace compressor contactor 3. Tighten/affix power cable 4. Check gas temperatures 5. Change water temp settings within permissible limits 6. Check for water flow issues
Audible compressor noise (different to normal running noise)	1. Liquid refrigerant in compressor 2. Compressor failure	1. Probe/system issue. Investigate temperatures and consult with manufacturer 2. Replace compressor
Fan not running	1. Fan relay failure 2. Fan motor issue	1. Replace fan relay 2. Replace fan motor
Compressor running but not producing heat	1. Lack of refrigerant in the system 2. Heat exchanger issue 3. Compressor failure	1. Check for gas leak. Recharge with refrigerant. 2. Clean or replace heat exchanger 3. Replace compressor
Low water flow temperature	1. Low water flow rate 2. Low water flow setting	1. Check for water flow issues 2. Change water temp settings within permissible limits
Flow switch stopping the system running	1. Poor flow through the system 2. Flow switch failure	1. Check for water flow issues 2. Replace water flow switch

13.2 Faults

If, in an emergency, a fault occurs and the heat pump stops working, a fault description will appear on the screen. Call a service engineer and let them know what the fault is.

Protection/Fault	Fault Display	Cause	Rectify
Standby	None	Sensor is faulty or short circuit	Check / Replace sensor
Normal Boot	None	Sensor is faulty or short circuit	Check / Replace sensor
Inlet Temp Sensor Fault	P01	Sensor is faulty or short circuit	Check / Replace sensor
Outlet Temp Sensor Fault	P02	Sensor is faulty or short circuit	Check / Replace sensor
Water Tank Temp Sensor Fault	P03	Sensor is faulty or short circuit	Check / Replace sensor
AT Sensor Fault	P04	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Coil Temp1 Sensor	P153	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Coil Temp2 Sensor	P154	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Suction Temp Sensor	P17	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Antifreeze Sensor1 (US)	P191	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Antifreeze Sensor2 (US)	P193	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Antifreeze Sensor4 (HSS)	P195	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Inlet Sensor (EVI)	P101	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Outlet Sensor (EVI)	P102	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Exhaust Temp Sensor	P181	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Pressure Sensor Fault	PP11	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Coil Temp Sensor	P25	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Suction Temp Sensor	P27	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Antifreeze Sensor1 (US)	P291	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Antifreeze Sensor2 (US)	P293	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Antifreeze Sensor1 (HSS)	P292	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Antifreeze Sensor2 (HSS)	P296	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Exhaust Temp Sensor	P281	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Pressure Sensor Fault	PP21	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Inlet Sensor (EVI)	P201	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Outlet Sensor (EVI)	P202	Sensor is faulty or short circuit	Check / Replace sensor
Syst1: Exhaust Overtemp	P182	Sensor is faulty or short circuit	Check / Replace sensor
Syst2: Exhaust Overtemp	P282	Sensor is faulty or short circuit	Check / Replace sensor
Low AT Protection	TP	Ambient temp low	
Fan Motor1 Fault	F031	1. Motor in locked rotor state 2. Poor contact on wire between DC-fan motor module and fan motor	1. Change a new fan motor 2. Check wiring connections
Fan Motor2 Fault	F032	1. Motor in locked rotor state 2. Poor contact on wire between DC-fan motor module and fan motor	1. Change a new fan motor 2. Check wiring connections
Communication Fault (Speed Control Module)	E081	Speed control module and main board communication failure	Check the communication wiring
Communication Fault	E08	Communication failure between wire controller and main board	Check wiring between remote wire controller and main board
Syst1: Comp Overcurrent	E101	Compressor current overload	Investigate the compressor / check system temperatures

Syst2: Comp Overcurrent	E201	Compressor current overload	Investigate the compressor / check system temperatures
Syst1: HP Protection	E11	High pressure switch triggered / faulty	Test switch / refrigerant circuit
Syst2: HP Protection	E21	High pressure switch triggered / faulty	Test switch / refrigerant circuit
Syst1: LP Protection	E12	Low pressure switch triggered / faulty	Test switch / refrigerant circuit
Syst2: LP Protection	E22	Low pressure switch triggered / faulty	Test switch / refrigerant circuit
Flow Switch Protection	E032	Poor water flow / no water in the system	Check for water flow issues
Aux Superheat Protection	E04	Electric heater protection switch triggered/faulty	Check electric heater to make sure it hasn't been running for too long
Primary Anti-Freeze Protection	E19	Ambient temp low	
Secondary Anti-Freeze Protection	E29	Ambient temp low	
Syst1: Antifreeze (US)	E171	Water temp low (User side)	1. Check/replace sensor 2. Check for flow issues
Syst2: Antifreeze (US)	E271	Water temp low (User side)	1. Check/replace sensor 2. Check for flow issues
Syst1: Antifreeze (HSS)	E172	Water temp low (Heat side)	1. Check/replace sensor 2. Check for flow issues
Syst2: Antifreeze (HSS)	E272	Water temp low (Heat side)	1. Check/replace sensor 2. Check for flow issues
Syst1: Exhaust Overtemp	E182	Compressor current overload	Investigate the compressor / check system temperatures
Syst2: Exhaust Overtemp	E282	Compressor current overload	Investigate the compressor / check system temperatures
Excess Water Temp Diff	E06	Flow/Return differential too high	Check for flow issues

13.3 Safety Devices

HP Switch

The HP (High Pressure) Switch is located on the compressor discharge and protects the system against over pressure.

LP Trip

The LP (Low Pressure) trip is located on the compressor suction and protects the system against low pressure.

Flow Switch

The Flow Switch protects the system against low or no fluid flow.

14 Legionella Purge

If a domestic hot water tank is to be used with the heat pump then the prevention of the build-up of legionella bacteria must be considered. As domestic hot water will be stored at 50 - 60ºC, a system purge must be performed regularly to prevent the buildup of legionella bacteria. A system purge should be performed once a week involving taking the tank temperature above 60deg.C for the period of 1 hour to disinfect the tank of legionella bacteria.

Note: It is advised that the legionella purge is carried out in the early hours of the morning when domestic hot water demand is at its lowest to ensure the cycle is efficient.

15 Adverse Weather Conditions

Warranty may be void if the Air Source Heat Pump is switched off at the mains or at the control panel during adverse winter weather conditions as this will prevent the automatic frost protection from being activated which in turn may cause damage to the unit. It is also required that an approved frost inhibitor be used in the water circuit in case of electrical power failure.

The integral frost protection control (inside the Air Source Heat Pump), which automatically starts the circulation pump in the Air Source Heat Pump circuit at a pre-set temperature, safeguards circulation in all water bearing components and offers additional frost protection. The Air Source Heat Pump is started automatically when the temperature inside the Air Source Heat Pump drops below a desired set point.

In the event of a power failure / or the unit is to be isolated and no frost inhibitor present in the system then the water must be removed from the system.

When connecting a new Air Source Heat Pump to a heating circuit it is advisable to ensure the heating circuit is cleaned and flushed out of all sludge and corrosion debris and an approved frost inhibiter added to the system before the new unit is installed.

1. Flush out the existing system with fresh mains water.
2. Add appropriate cleaning agent and circulate for one hour.
3. Flush out the cleaner and corrosion debris thoroughly following a standard system cleaning and flushing method statement.
4. Install the Air Source Heat Pump.
5. Dose the system with an approved frost protection and protector.

Adveco recommends frost protection down to -14°C.

It is critical to take into account the volume of water in the buffer store when adding a frost inhibiter to the system. It is important not to under dose. Once the system has been dosed and adequately circulated, a refractometer should be used to verify the frost protection.

15.1 Anti-Freeze Application and Dosage

Dilute with mains water, in order to ensure adequate corrosion and biocidal protection, the minimum in use concentration of the product is 10%. Maximum in use concentration is 30%.

Upon dilution frost inhibitor will provide frost protection according to the table below. (Based on Fernox HP-5C).

Concentration	Frost Protection (deg.C)
10%	-4
20%	-9
30%	-14

16 End of Life

Before disconnection and disposal of the heat pump disconnect it from the electricity supply and close all valves. Observe all environmentally relevant requirements regarding the recovery, disposal of materials and components in accordance with all applicable standards.

This unit contains HFC refrigerant that at end of life must undergo an HFC recovery process. The HFC refrigerant must be recovered by a certified technician before the plant is dismantled. Do not dispose of your Heat Pump, or any of its accessories, in the household waste.

Information concerning dismantling and scraping can be obtained by contacting Adveco Ltd. Contact details:

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