CLADE

Acer (Integral Pumps)

Standard & Low Noise

65/50kW

95/75kW

130/100kW

Installation Manual

PD-ACER-03

Version: 2.7

Contents

Revision	Change Notes	Date
2.6	Change from CAT 5e to CAT 6 connections between units and general updates	06/06/25
2.7	Updated for up to 50 °C return temperatures.	17/06/25

Safety Precautions

- Thoroughly read the following safety precautions prior to use.
- Observe these precautions carefully to ensure safety.

⚠ **WARNING**	Indicates a risk of death or serious injury
⚠ **CAUTION**	Indicates a risk of injury or structural damage
⚠ **IMPORTANT**	Indicates a risk of damage to the unit or other components in the system

General

⚠ WARNING

Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate.
Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, during repair, or at the time of disposal of the unit. It may also be in violation of applicable laws.
CLADE ENGINEERING SERVICES LTD cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.
Do not install the unit in a place where large amounts of oil, steam, organic solvents, or corrosive gases, such as sulfuric gas, are present or where acidic/alkaline solutions or sprays containing Sulphur are used frequently.
These substances can compromise the performance of the unit or cause certain components of the unit to corrode, which can result in refrigerant leakage, water leakage, injury, electric shock, malfunctions, smoke, or fire.
Do not try to defeat the safety features of the unit or make unauthorized setting changes.
Forcing the unit to operate by defeating the safety features of the devices such as the pressure switch or the temperature switch, making unauthorized changes to the switch settings, or using accessories other than the ones recommended by CLADE ENGINEERING SERVICES LTD may result in smoke, fire, or explosion.
To reduce the risk of fire or explosion, do not use volatile or flammable substances as a heat carrier.
To reduce the risk of burns or electric shock, do not touch exposed pipes and wires.
To reduce the risk of shorting, current leakage, electric shock, malfunctions, smoke, or fire, do not splash water on electric parts.
To reduce the risk of electric shock, malfunctions, smoke or fire, do not operate the switches/buttons or touch other electrical parts with wet hands.
To reduce the risk of electric shock and injury from the fan or other rotating parts, stop the operation and turn off the main power before cleaning, maintaining, or inspecting the unit.
Before cleaning the unit, switch off the power.
To reduce the risk of injury, keep children away while installing, inspecting, or repairing the unit.
Children should be supervised to ensure that they do not play with the appliance.
To reduce the risk of burns or frost bites, do not touch the refrigerant pipes or refrigerant circuit components with bare hands during and immediately after operation.
This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
Keep the space well ventilated. Refrigerant can displace air and cause oxygen starvation.
Always replace a fuse with one with the correct current rating.
The use of improperly rated fuses or a substitution of fuses with steel or copper wire may result in fire or explosion.
If any abnormality (e.g., burning smell) is noticed, stop the operation, turn off the power switch, and consult your dealer.
Continuing the operation may result in electric shock, malfunctions, or fire.
Properly install all required covers and panels on the terminal box and control box to keep moisture and dust out. Dust accumulation and water may result in electric shock, smoke, or fire.
Consult an authorized agency for the proper disposal of the unit.

⚠ CAUTION

Do not operate the unit without panels and safety guards properly installed.
To reduce the risk of injury, do not sit, stand, or place objects on the unit.
Do not connect the makeup water pipe directly to the potable water pipe. Connecting these pipes directly may cause the water in the unit to migrate into the potable water and cause health problems.
To reduce the risk of adverse effects on plants and animals, do not place them where they are directly exposed to discharge air from the unit.
Do not install the unit on or over things that are vulnerable to water damage.
Condensation may drip from the unit.
To prevent environmental pollution, dispose of brine in the unit and cleaning solutions according to the local regulations.
It is punishable by law not to dispose of them according to the applicable laws.
The water heated by the heat pump is not suitable for use as drinking water or for cooking it may cause health problems or degrade food.
In areas where temperature drops to freezing during the periods of non-use, blow the water out of the pipes or fill the pipes with anti-freeze solution. Not doing so may cause the water to freeze, resulting in burst pipes and damage to the unit or the furnishings.
The model of heat pump unit described in this manual is not intended for use to preserve food, animals, plants, precision instruments, or art work.
To reduce the risk of injury, do not touch the heat exchanger fins or sharp edges of components with bare hands.
Do not place a container filled with water on the unit.
If water spills on the unit, it may result in shorting, current leakage, electric shock, malfunction, smoke, or fire.
Always wear protective clothing when touching electrical components on the unit.
Several minutes after the power is switched off, residual voltage may still cause electric shock.
To reduce the risk of injury, do not insert fingers or foreign objects into air inlet/outlet grills.
To reduce the risk of injury, wear protective gear when working on the unit.
In areas where temperature drops to freezing, use an anti- freeze circuit and leave the main power turned on to prevent the water in the water circuit from freezing and damaging the unit or causing water leakage and resultant damage to the furnishings.
Use clean tap water.
The use of acidic or alkaline water or water high in chlorine may corrode the unit or the pipes, causing water leakage and resultant damage to the furnishings.
In areas where temperature can drop low enough to cause the water in the pipes to freeze, operate the unit often enough to prevent the water from freezing.
Periodically inspect and clean the water circuit.
Dirty water circuit may compromise the unit's performance or corrodes the unit or cause water leakage and resultant damage to the furnishings.

Transportation

⚠ WARNING

Lift the unit by using the designated lifting eyes on each side of the unit. Support the unit securely at these four points to keep it from slipping and sliding.
If the unit is not properly supported, it may fall and cause personal injury.

⚠ CAUTION

To reduce the risk of injury, products weighing 20 kg or more should be carried by two or more people.

Installation

⚠ WARNING

Do not install the unit where there is a risk of leaking flammable gas.
If flammable gas accumulates around the unit, it may ignite and cause a fire or explosion.
Properly dispose of the packing materials.
Plastic bags pose suffocation hazard to children.
The unit should be installed only by personnel certified by Clade Engineering Ltd according to the instructions detailed in the Installation/Operation Manual.
Improper installation may result in refrigerant leakage, water leakage, injury, electric shock, or fire.
Any additional parts must be installed by qualified personnel.
Take appropriate safety measures against wind gusts and earthquakes to prevent the unit from toppling over and causing injury.
Periodically check the installation base for damage.
If the unit is left on a damaged base, it may fall and cause injury.
Be sure to install the unit horizontally, using a level.
If the unit is installed at an angle, it may fall and cause injury or cause water leakage.
Remove packing materials from the unit before operating the unit. Note that some accessories may be taped to the unit. Properly install all accessories that are required.
Failing to remove the packing materials or failing to install required accessories may result in refrigerant leakage, oxygen starvation, smoke, or fire.
The unit should be installed on a surface that is strong enough to support its weight.
As an anti-freeze, use ethylene glycol or propylene glycol diluted to the specified concentration.
The use of other types of anti-freeze solution may cause corrosion and resultant water leakage. The use of flammable anti-freeze may cause fire or explosion.

Pipe Installation

⚠ WARNING

To prevent explosion, do not heat the unit with refrigerant gas in the refrigerant circuit.

⚠ CAUTION

Check that no substance other than the specified refrigerant (R744) is present in the refrigerant circuit.
Infiltration of other substances may cause the pressure to rise abnormally high and cause the pipes to explode
To prevent damage from water due to condensation, properly insulate all pipes.
Check for refrigerant leakage at the completion of installation.
Piping work should be performed by a competent person according to the instructions detailed in the Installation Manual.
Improper piping work may cause water leakage and damage.

Electrical Wiring

⚠ WARNING

To reduce the risk of wire breakage, overheating, smoke, and fire, keep undue force from being applied to the wires.
Properly secure the cables in place and provide adequate slack in the cables so as not to stress the terminals.
Improperly connected cables may break, overheat, and cause smoke or fire.
To reduce the risk of injury or electric shock, switch off the main power before performing electrical work.
To reduce the risk of current leakage, overheating, smoke, or fire, use properly rated cables with adequate current carrying capacity.
Keep the exposed part of cables inside the terminal block.
If an exposed part of the cable come in contact with each other, electric shock, smoke, or fire may result.
All electric work must be performed by a qualified electrician according to the local regulations, standards, and the instructions detailed in the Installation Manual.
Capacity shortage to the power supply circuit or improper installation may result in malfunction, electric shock, smoke, or fire.
To reduce the risk of electric shock, smoke, or fire, install an inverter circuit breaker on the power supply to each unit.
Use properly rated breakers and fuses (inverter breaker, Local Switch <Switch + Type-B fuse>, or no-fuse breaker).
The use of improperly rated breakers may result in malfunctions or fire.
Proper grounding must be provided by a licensed electrician. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod, or telephone wire.
Improper grounding may result in electric shock, smoke, fire, or malfunction due to electrical noise interference.

⚠ CAUTION

To reduce the risk of current leakage, wire breakage, smoke, or fire, keep the wiring out of contact with the refrigerant pipes and other parts, especially sharp edges.
To reduce the risk of electric shock, shorting, or malfunctions, keep wire pieces and sheath shavings out of the terminal block.

Transportation and Repairs

⚠ WARNING

The unit should be moved, disassembled, or repaired only by qualified personnel. Do not alter or modify the unit.
Improper repair or unauthorized modifications may result in refrigerant leakage, water leakage, injury, electric shock, or fire.
After disassembling the unit or making repairs, replace all components as they were.
Failing to replace all components may result in injury, electric shock, or fire.
If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

⚠ CAUTION

To reduce the risk of shorting, electric shock, fire, or malfunction, do not touch the circuit board with tools or with your hands, and do not allow dust to accumulate on the circuit board.

IMPORTANT

To avoid damage to the unit, use appropriate tools to install, inspect, or repair the unit
Do not unnecessarily change the switch settings or touch other parts in the refrigerant circuit. Doing so may change the operation mode or damage the unit.
To reduce the risk of malfunctions, use the unit within its operating range.
Do not switch on or off the main power in a cycle shorter than 10 minutes.
Short-cycling the compressor may damage the compressor.
To maintain optimum performance and reduce the risk of malfunction, keep the air pathway clear
To ensure proper operation of the unit, periodically check for proper concentration of anti-freeze.
Inadequate concentration of anti-freeze may compromise the performance of the unit or cause the unit to abnormally stop.
Take appropriate measures against electrical noise interference when installing the heat pumps in hospitals or facilities with radio communication capabilities.
Inverter, high-frequency medical, or wireless communication equipment as well as power generators may cause the heat pump system to malfunction. Heat pump system may also adversely affect the operation of these types of equipment by creating electrical noise.
Check the water system, using a relevant manual as a reference.
Using the system that does not meet the standards (including water quality and water flow rate) may cause the water pipes to corrode.
To reduce the risk of power capacity shortage, always use a dedicated power supply circuit,

1 Technical Specification

1.1 Construction Table

Acer Range		Acer 65/50kW	Acer 95/75kW	Acer 130/100kW
REFRIGERATION SIDE				
Compressor Type		Reciprocating		
Compressor Qty	Pcs.	1		
Refrigerant		CO_2	CO_2	CO_2
Refrigerant Circuits	Pcs.	1		
Variable speed drive (VSD)	Pcs.	1	1	1
Refrigerant charge (CO_2)	kg	5	7	10
No. evaporators	Pcs.	1		
Evaporators Type		Flat bed		
Fin Material	-	AL/MG		
Defrost Type	-	Hot Gas CO_2		
Defrost medium	-	CO_2		
Electrical supply	-	3~ 400V 50 HZ		
DIMENSIONS & NOISE				
Acer Low Noise				
Colour	-	RAL7016 Anthracite		
Unit Weight (empty)	kg	1003	1368	1596
Unit Weight (operational)	kg	1008	1375	1605
Sound Power Level $L_{W(A)}$ (dB)*	dB	72	74	76
Acer Standard Noise				
Colour	-	RAL7016 Anthracite		
Unit Weight (empty)	kg	938	1263	1302
Unit Weight (operational)	kg	943	1270	1311
Sound Power Level $L_{W(A)}$ (dB)*	dB	82	83	85
Free Space Requirements				
Minimum free space side	mm	1000	1000	1000
Minimum free space front	mm	1000	1000	1000
Minimum free space back	mm	600	600	600
Minimum free space above	mm	6000	6000	6000
WATER SIDE				
Type of internal exchanger	-	Stainless steel plate heat exchanger		
Exchanger water content	l	3.9	3.9	5.0
Connections waterside Flow/Return	DN	28mm Copper	35mm Copper	42mm Copper
Connections waterside pressure rating	PN	6		
Waterside Burst Disk (supplied by installer)	PN	6		
Control Methodology	-	Pump		
Water flow rates				
Nominal dT 40 K	l/s	0.37	0.55	0.73
Nominal dT 35 K	l/s	0.43	0.63	0.84
Nominal dT 30 K	l/s	0.42	0.73	0.98
Minimum Water Flow Rate	l/s	0.12	0.18	0.23
Minimum water volume in heating (40K)	l	303	443	606
Total internal water volume	l	4.3	6.3	8.4
Waterside pressure drop	kPa	28	40	40

FANS SECTION				
Fans type	-	Axial fans		
N° fans	Pcs.	2	3	3
Standard airflow	m^3/h	17,640	26,280	31,320
Additional Static Pressure Available	Pa	0	0	0
Fan regulation	-	0-10V		
Fan Power Input	kW	1.4	2.0	2.7
ELECTRICAL DATA				
Total Absorbed Power (at 7°C ambient)	kW	25.3	32.3	51.1
Total Current per phase	A	46.1	69.2	93.2
Starting Method	-	Soft Start		
Starting Current (at -5°C ambient)	A	22.0	32.5	43.5
Total kVA	kVA	32.0	48.0	64.5
Electrical supply	-	3~ 400V 50 HZ		
Communication protocol	-	BACNET over IP (optional extra)		
IP-Class	-	IP54		

1.2 Refrigerant Charge

The heat pumps manufactured by Clade Engineering Systems detailed in this manual are equipped with carbon dioxide (CO_2). Carbon dioxide is also known as R744 in the refrigeration industry. Carbon dioxide is classified as low toxicity and non-flammable therefore belongs to the A1/L1 safety category.

CO_2 is toxic at high concentrations, being an odorless gas and heavier than air it displaces oxygen and can cause serious harm to the body if the concentration of CO_2 is high. In addition, due to the high-pressure environment it has hazards which other refrigerants do not and must be handled appropriately.

All personnel involved with the specification, installation, operation, and maintenance of the unit must be fully qualified, competent and hold any certifications required to conduct the work involved.

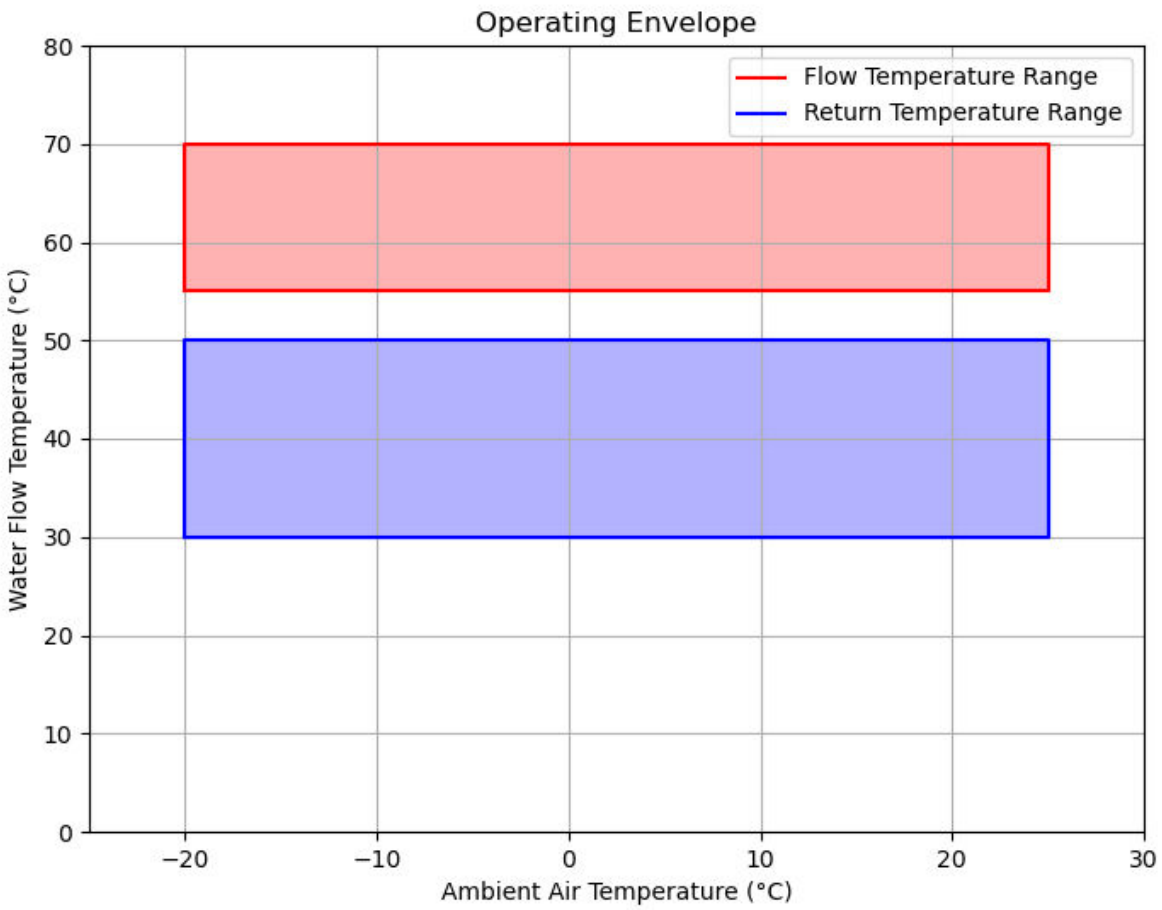
The unit has been evacuated and pre-charged in the factory with the correct amount of refrigerant, no addition charge is required. The refrigerant charge can be found on the PED label.

If due to component failure or in the event of a leak, it is recommended that the system is stopped, and the charge or remaining charge is vented to atmosphere in a controlled manner. See system maintenance manual for access points and isolation procedures. Once the issue has been rectified the system would need to evacuated and re-charged with the correct amount of refrigerant as recorded on the PED label.

Model	Refrigerant (Kg)	Equivalent CO_2 tonnes (tCO_2e)
Acer 50/65kW	5	0.005
Acer 75/95kW	7	0.007
Acer 100/130kW	10	0.010

Physical characteristics of the R744 refrigerant	
Safety class (ISO)	A1 (Non-toxic, Non-flammable)
GWP ($kg.CO_2e$)	1
Low flammability limit (LFL) (Kg/m^3 @ 60°C)	Non-Flammable
Burning velocity (BV) (cm/s)	0 cm/s (Non-flammable)
Boiling point (°C)	-78.5 (Sublimation point at atmospheric pressure)
GWP (100 yr ITH)	1
GWP (ARS 100 yr ITH)	1
Self-ignition temperature (°C)	Non-Flammable

1.3 Operating Ranges



2 Site Selection

2.1 General notes

Accessibility & Space

- Select a location that is safely and easily accessible for maintenance.
- Allow sufficient technical clearance around the unit for its overall dimensions, airflow paths (intake and exhaust), and service access (as specified in this manual).
- Ensure unobstructed airflow by avoiding siting near tall walls, in corners, beneath overhangs, or below ground level where air can stagnate or recirculate.

Structural Support

- Verify that all support points can bear the unit's weight.
- Mount the unit above ground level to facilitate condensate drainage and reduce moisture ingress.
- Align and level all bearing points accurately to prevent vibration and uneven loading.

Environmental Considerations

- Avoid flood-prone areas and account for maximum potential snow levels—ensure snow drift won't block airflow or drainage.
- Protect against debris accumulation (leaves, litter, etc.) on the air coil.
- Avoid siting near strong wind corridors that could impede or exaggerate airflow, and steer clear of nearby heat or pollution sources (e.g. chimneys, flues, vehicle exhausts).
- Prevent cold-air stratification by ensuring intake air remains free-flowing and that expelled air cannot be drawn back in.
- Consult the unit's declared sound power level (dB A) in the technical specifications. Use this to model expected sound pressure levels at neighbouring facades and property boundaries.

Utilities & Drainage

- Confirm that electrical connection runs do not exceed the maximum allowable distance specified by the manufacturer.
- Provide a dedicated condensate drainage system to prevent standing water beneath the unit.
- Ensure water from the unit can be drained properly at all times.

Security & Safety

- If there is a risk of unauthorised access (children, vandalism, wildlife), install appropriate barriers or fencing.
- This unit is designed for outdoor installation only and must not be enclosed indoors.

Final Verification

- After positioning and securing the unit, verify that all space requirements (clearances for airflow, service access, and noise dissipation) outlined in this manual are met.

Adherence to these guidelines will ensure safe installation, effective airflow, and long-term reliability of the outdoor unit.

2.1.1 Structural

- Concrete bases are preferred.
- Raise the base at least 300 mm above ground level to fit hydraulic and electrical connections.
- Check that all supports are level.
- Provide adequate condensate drainage when the unit is in heating mode, ensuring water drains safely away from traffic areas where ice may form.
- Separate the foundation from the building structure to limit noise and vibration transmission.
- Use the factory-provided holes to secure the unit to its foundation.

2.1.2 Positioning

The unit is intended for outdoor use in a permanent, flat orientation, either at ground level or on a roof. In roof installations, verify that the structure supports both the unit's weight and potential maintenance loads.

Minimising vibration:

- Install anti-vibration mounts or neoprene pads under the heat pump support.
- Use flexible joints in the water circuit to reduce transmitted vibration.
- Keep the unit perfectly level.

Key considerations:

- Required service clearances.
- Electrical connection routes.
- Water/hydraulic connection access.
- Potential increases in overall height if optional vibration dampers are used.

2.1.3 Charging lines

Where heat pumps are installed at roof level, ensure that dedicated charging lines are provided. These lines must allow for safe and efficient charging of refrigerant, either during commissioning when pre-charging is not feasible, or for subsequent top-ups during maintenance. The charging lines should be easily accessible from ground or plant level, designed to minimise pressure drop, and clearly identified to avoid confusion with other services.

2.1.4 Pressure Relief Valve Refrigerant Side

PRVs are included on the refrigerant loop within the unit.

2.1.5 Condensate

Heat pumps produce significant condensate from defrost cycles. Route condensate away from areas where frozen water could pose hazards. Use a downward-sloping drainpipe to prevent ice buildup. In colder climates, consider trace heating cables to prevent freezing.

2.1.6 Freezing Prevention

In regions where ambient temperatures can fall below freezing, it is essential to protect all external pipework and equipment from ice formation. Install self-regulating trace heating cables beneath the insulation on external water lines to maintain fluid temperatures above 0 °C, even when the air temperature drops to -25 °C. After commissioning, verify under worst-case conditions that inlet and outlet pipe temperatures remain above freezing. Where trace heaters alone may not suffice, use one or more of the following measures—particularly if outdoor temperatures hover around 0 °C—to avoid permanent damage (which voids warranty):

- Mix the system water with an appropriate concentration of antifreeze glycol.
- Install electric heating cables directly under the insulation on all exposed piping.
- Drain down and isolate the system during extended shutdown periods.

Select self-regulating heaters to prevent local hot spots or overheating, and always ensure adequate control and monitoring of pipe temperatures.

2.2 Water quality

2.2.1 New Systems

Before commissioning any new installation, remove the circulator and thoroughly flush the entire system to clear out welding residue, waste, sealants, mineral oils, and other preservatives. Only then should you fill the system with clean, high-quality tap water.

2.2.2 Existing Systems

When replacing or adding a heat pump to an existing system, first drain and flush all pipework before installing the new unit. Flush each section separately, paying special attention to areas prone to debris build-up due to reduced flow, then refill with clean, high-quality tap water. If the water is still unsuitable, install an appropriate filter, such as a coarse (mesh) filter for larger debris or a finer tissue filter for smaller particles.

2.2.3 Water Filter

- Use a filter of ≥30 mesh at the water inlet, positioned for easy cleaning.
- Never remove the filter, as doing so invalidates the warranty.

2.2.4 Exclusions

Warranty coverage does not extend to damage caused by limescale, deposits, or impurities from the water supply, nor to issues stemming from improper system cleaning.

2.2.5 Risk of Frost

If outdoor temperatures near 0°C, water in pipes or the unit can freeze and cause permanent damage, which is not covered by the warranty. Prevent freezing by mixing water with a suitable antifreeze, installing heating cables under insulation, or draining the system during extended shutdowns.

2.2.7 Anti-freeze Solutions

Adding antifreeze increases system pressure drop, and only inhibited (non-corrosive) glycol compatible with the circuit should be used. Do not use different glycol mixture (i.e. ethylene with propylene). Mixing different glycol types (e.g., ethylene and propylene) is not recommended.

% PROPYLENE GLYCOL BY WEIGHT	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Freezing temperature (°C)	-1.6	-3.3	-5.1	-7.6	-9.6	-12.7	-16.4	-21.1	-27.9	-33.5
Safety temperature (°C)	-7.0	-8.0	-10.0	-13.0	-15.0	-18.0	-21.0	-26.0	-33.0	-39.0

2.2.8 Minimum Water Quality Requirements for Acer Units

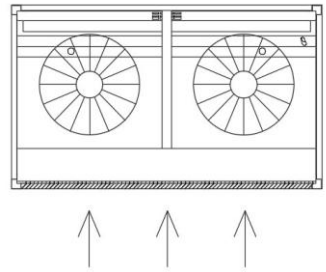
The water system should be maintained to BS 8552. Below is an extract of the figures the water sampling should achieve on a quarterly basis.

Parameter	Source Water	System Water	ALS LoR
Suspended solids	One off	Quarterly	1.0 mg/l
Conductivity	One off	Quarterly	30 µS/cm
pH	One off	Quarterly	1 pH units Dilution number
Visual appearance	One off	Quarterly	-
Odour	One off	Quarterly	-
Total Alkalinity	One off	Quarterly	2.8 mg/l
Total Hardness	One off	Quarterly	0.38 mg/l
Nitrite	-	Quarterly	0.08 mg/l
Sulphate	One off	Quarterly	4.4 mg/l
Chloride	One off	Quarterly	3.7 mg/l
Total Iron	-	Quarterly	230 µg/l
Dissolved Iron	-	Quarterly	230 µg/l
Total Copper	-	Quarterly	9 µg/l
Molybdate	-	Quarterly	0.006 mg/l
Phosphate	One off	Quarterly	0.6 mg/l
Glycol	-	Quarterly	2 mg/l
TVC 22-37°	-	Quarterly	0 cfu/ml
Pseudomonas	-	Quarterly	0 cfu/100ml
SRB	-	Quarterly	DET/ND
NRB	-	Quarterly	0 cfu/ml

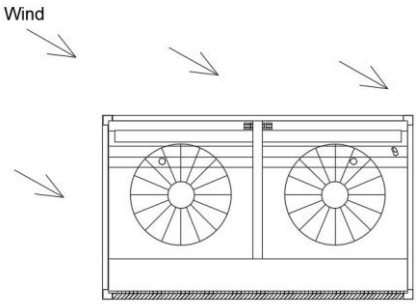
2.3 Protection Against Winds

Protection against the effects of wind should be considered when installing a unit. Whilst the design and operation of unit is designed for the effects of moderate winds, consistent and strong wind will affect the performance of the unit.

Consider the protection of the unit from direct wind across the front grille of the unit. The unit can be orientated to ensure the front on the unit faces away from direct winds as shown below:



Design air flow direction (air intake grille)



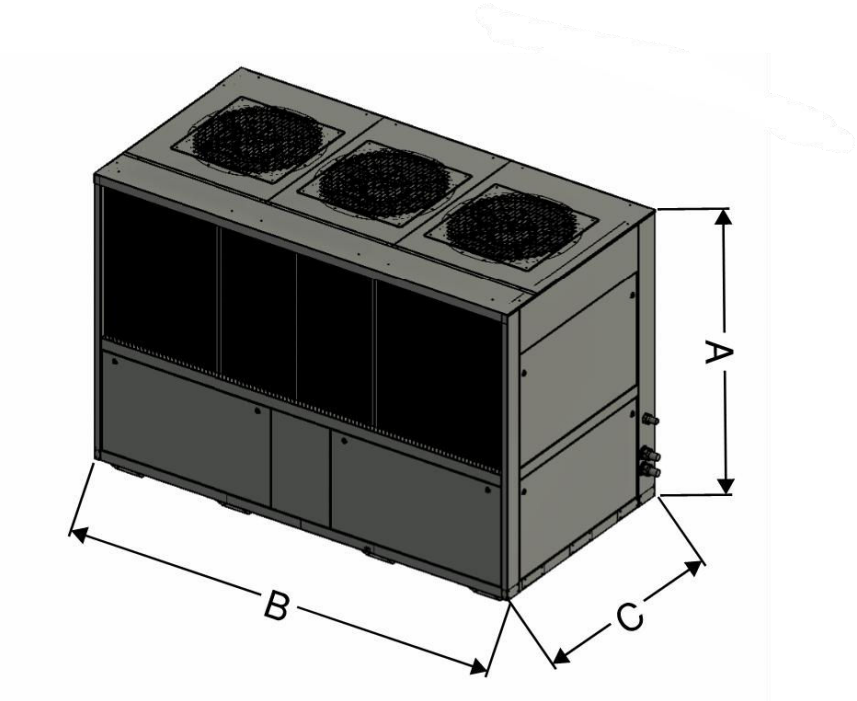
Air intake protected from direct wind

3 Installation Space Requirements

Clade Engineering recommends an allowance of 1.0m perimeter around the front and sides of the unit and 0.6m to the rear of the unit and 0.6m above the unit.

Adequate access must be available for service and maintenance of the unit with a safe defined route for engineers and care must be taken to ensure that trip hazards are eliminated.

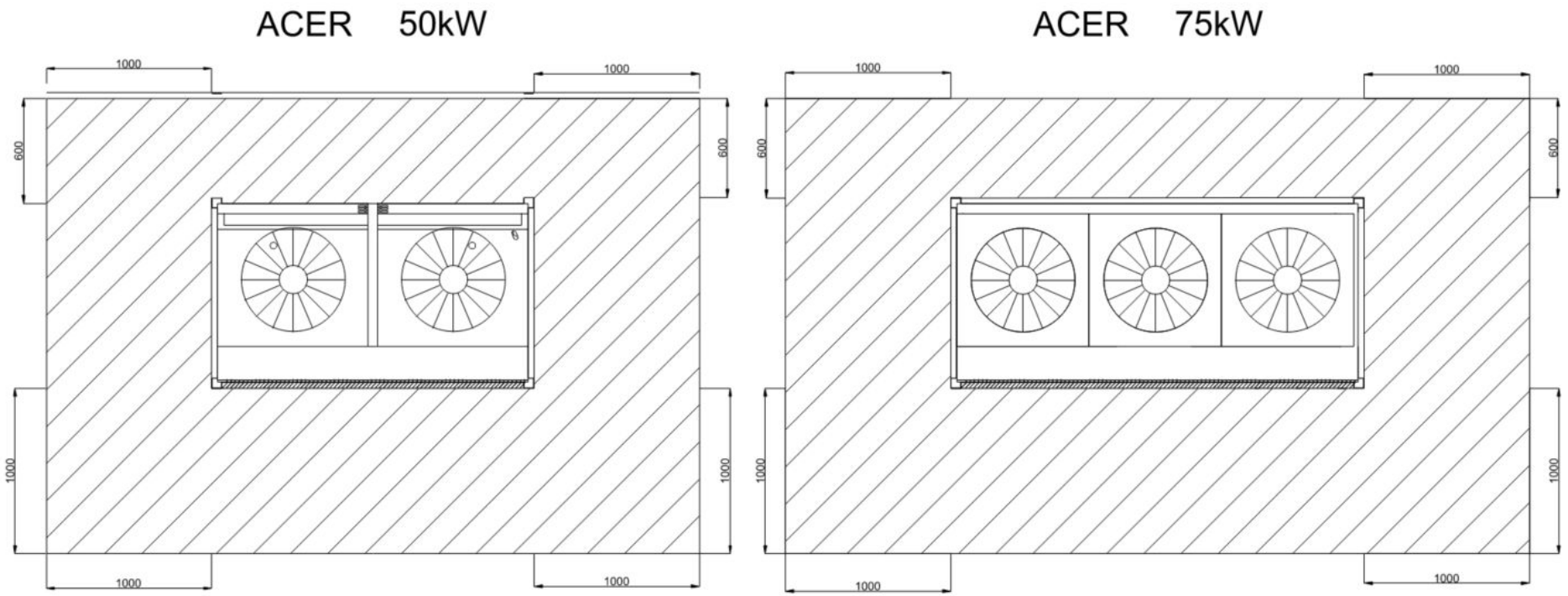
3.1.1 Dimensions



Unit	Height 'A' (mm)	Width 'B' (mm)	Depth 'C' (mm)	Operating Weight (kg)	Shipping Weight (kg)
Acer 65/50kW LN	2395	1959	1159	1008	1003
Acer 65/50kW SN	1907	1959	1159	943	938
Acer 95/75kW LN	2395	2815	1156	1375	1368
Acer 95/75kW SN	1907	2815	1156	1270	1263
Acer 130/100kW LN	2396	2815	1451	1605	1596
Acer 130/100kW SN	1907	2815	1450	1302	1311

3.2 Installation Space Requirements

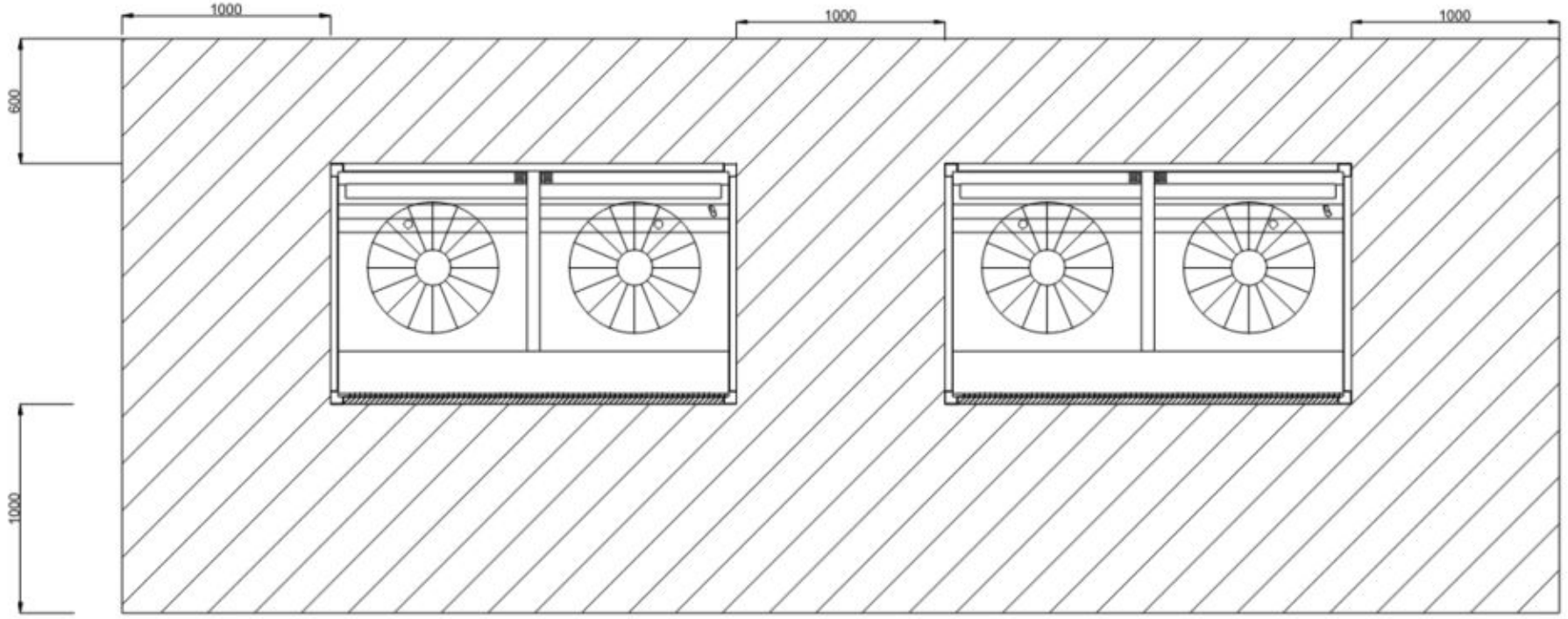
3.2.1 Single Unit Installation



Note. 1 Meter around front and sides to be kept clear to allow access to heat pump, and 0.6 meters at the back of the unit away from other units or walls, shown in hatched region.

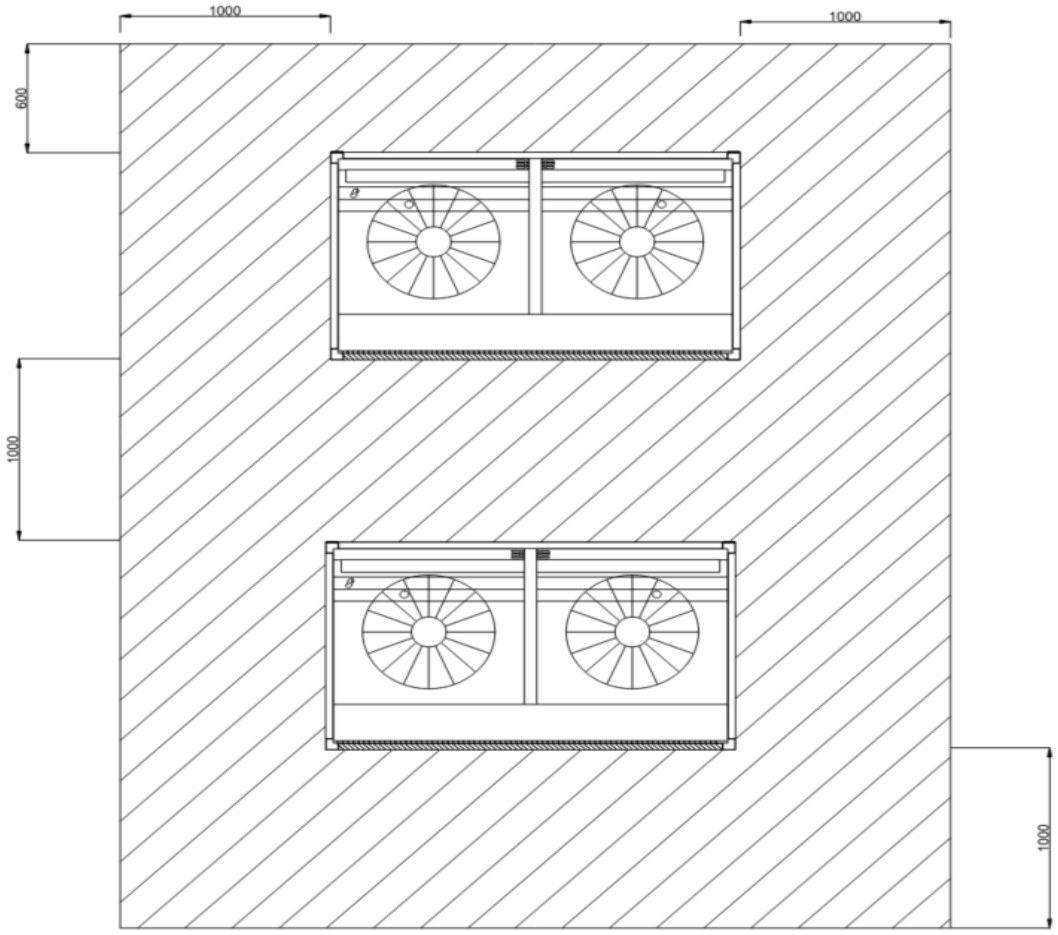
3.2.3 Multiple Unit Installation

When installing multiple units, make sure to take into consideration factors such as providing enough space for people to pass through, ample space between blocks of units, and sufficient space for airflow. Side by side installation, allow access to side of each unit for access.



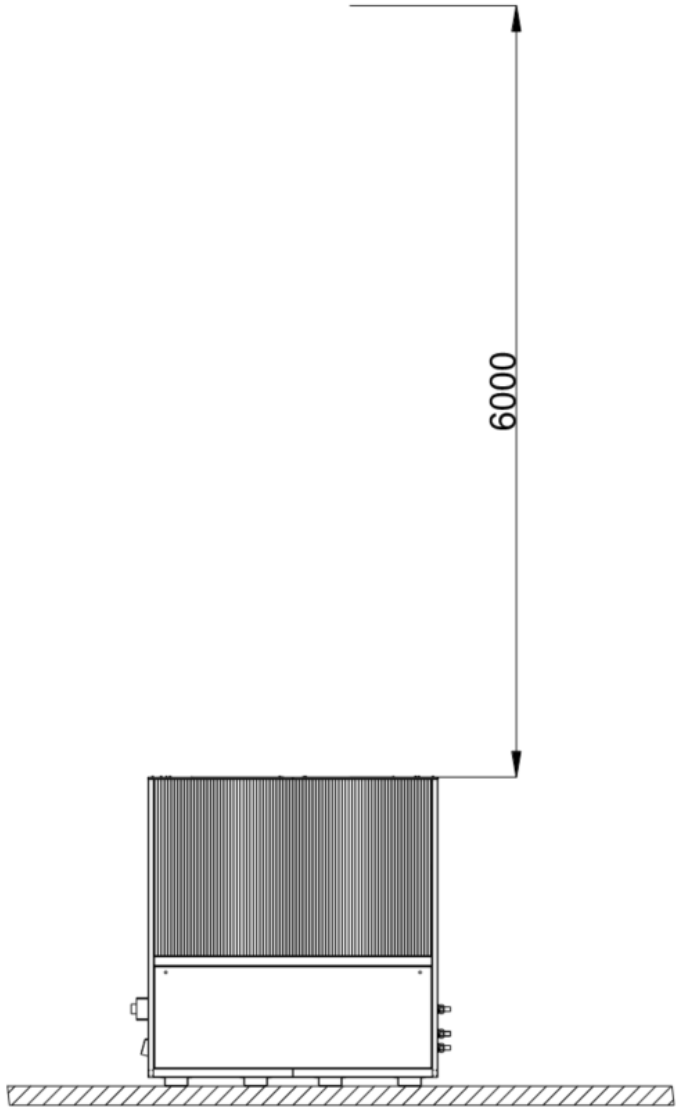
Note. 1 Meter around front and sides to be kept clear to allow access to heat pump, and 0.6 meters at the back away from other units or walls, shown in hatched region.

Units can be placed front to back, ensuring there is 1000mm between the front and back of the units. Please ensure no pipework runs over or across the equipment's access panels, as this can hinder routine inspections and servicing. Likewise, the unit should not be installed beneath a dedicated shelter or roof.



Note. 1 Meter to be kept clear
to allow access to heat pump,
shown in hatched region.

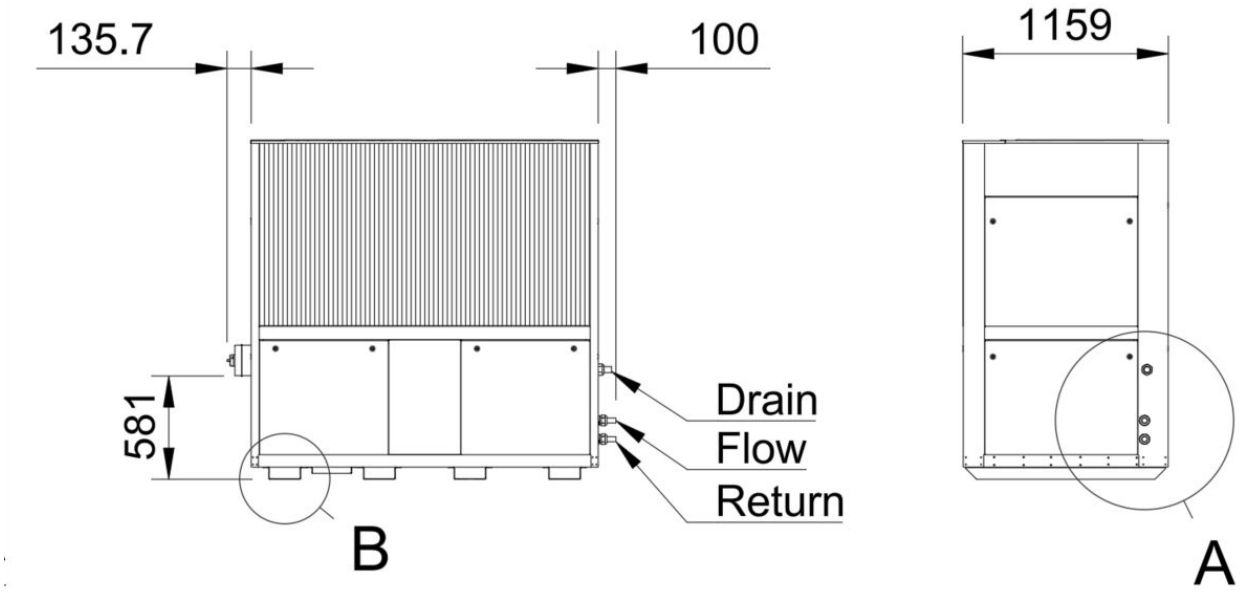
3.2.4 Vertical Clearance

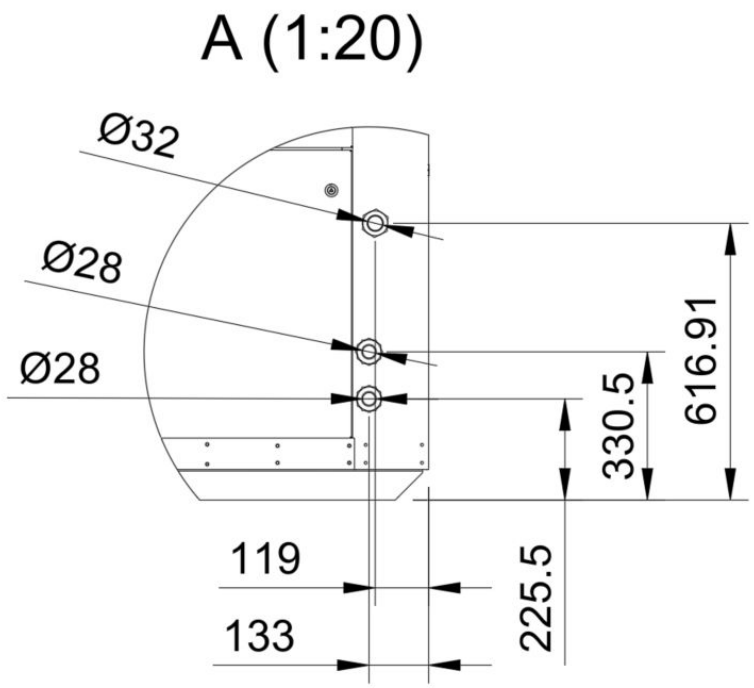


3.3 Service Connections

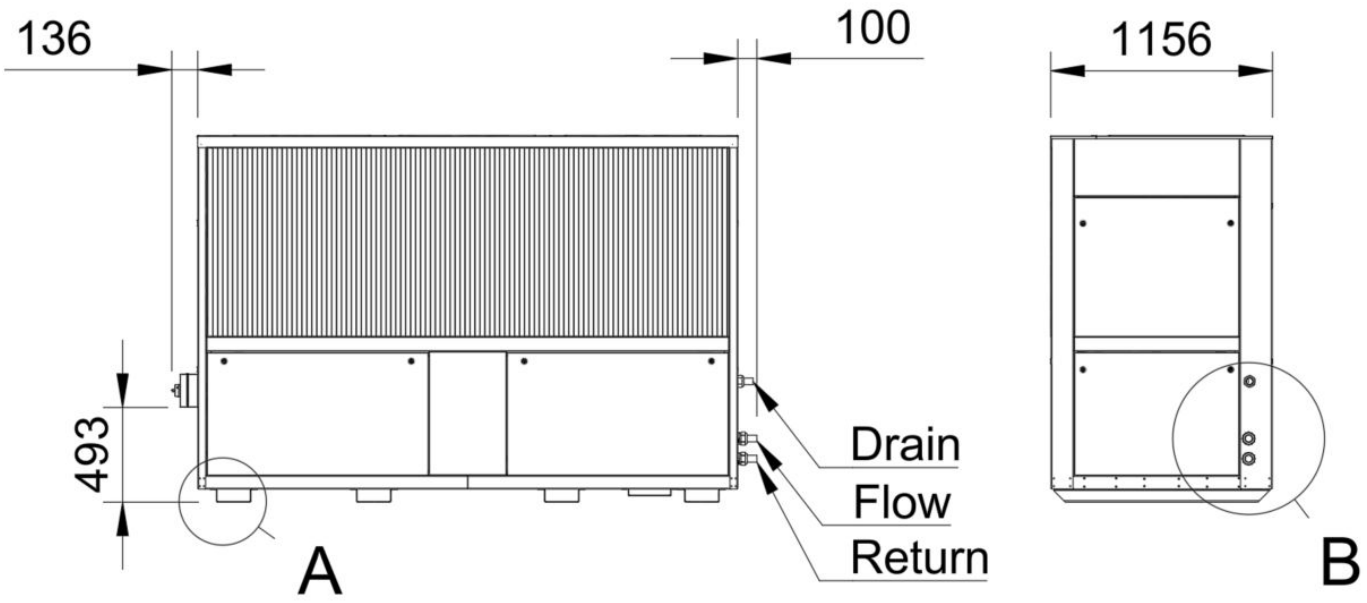
When selecting a location for the unit(s) consider of service connection positions. All water service connections are located on the right hand side panel of the heat pump and electrical on the left hand side panel of the heat pump.

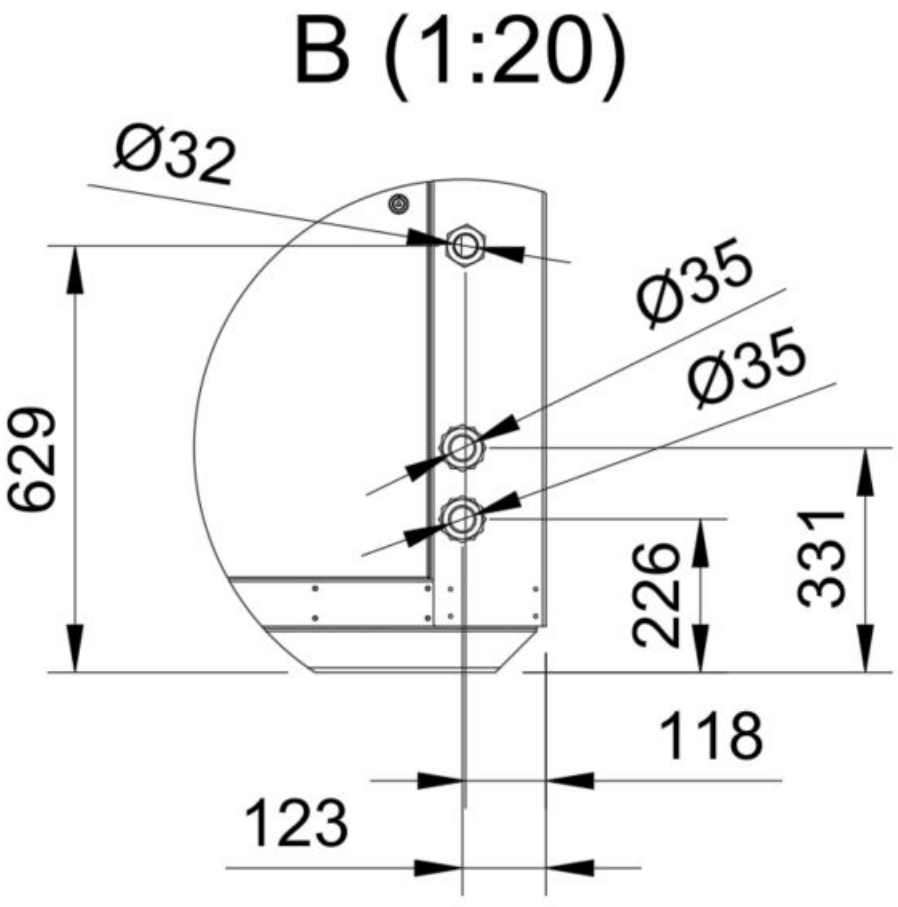
3.3.1 Acer 65/50



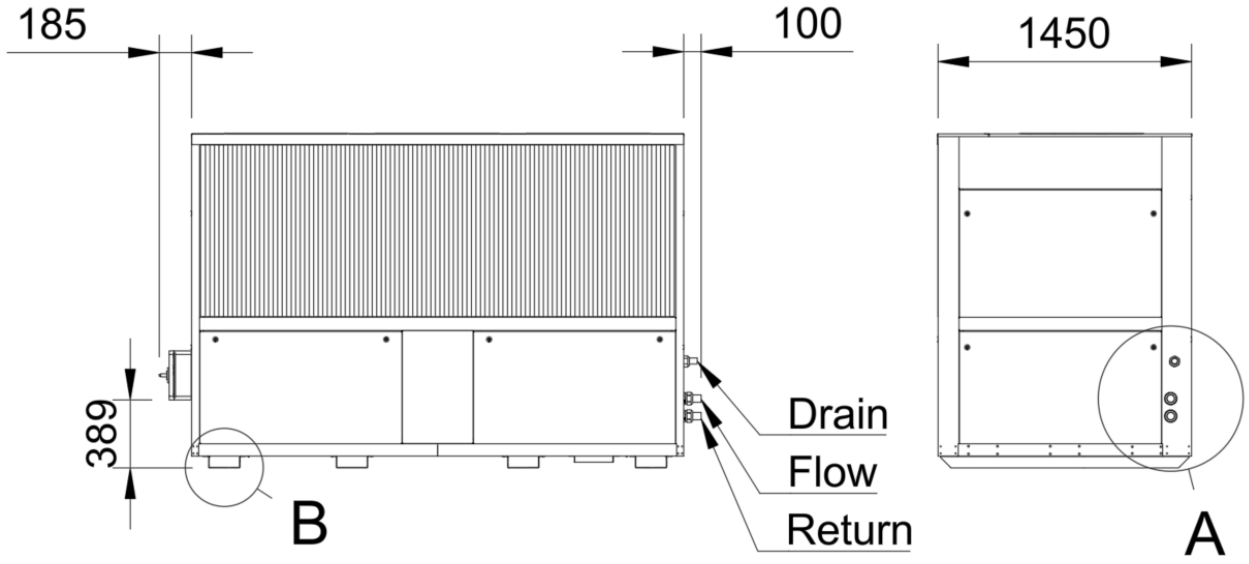


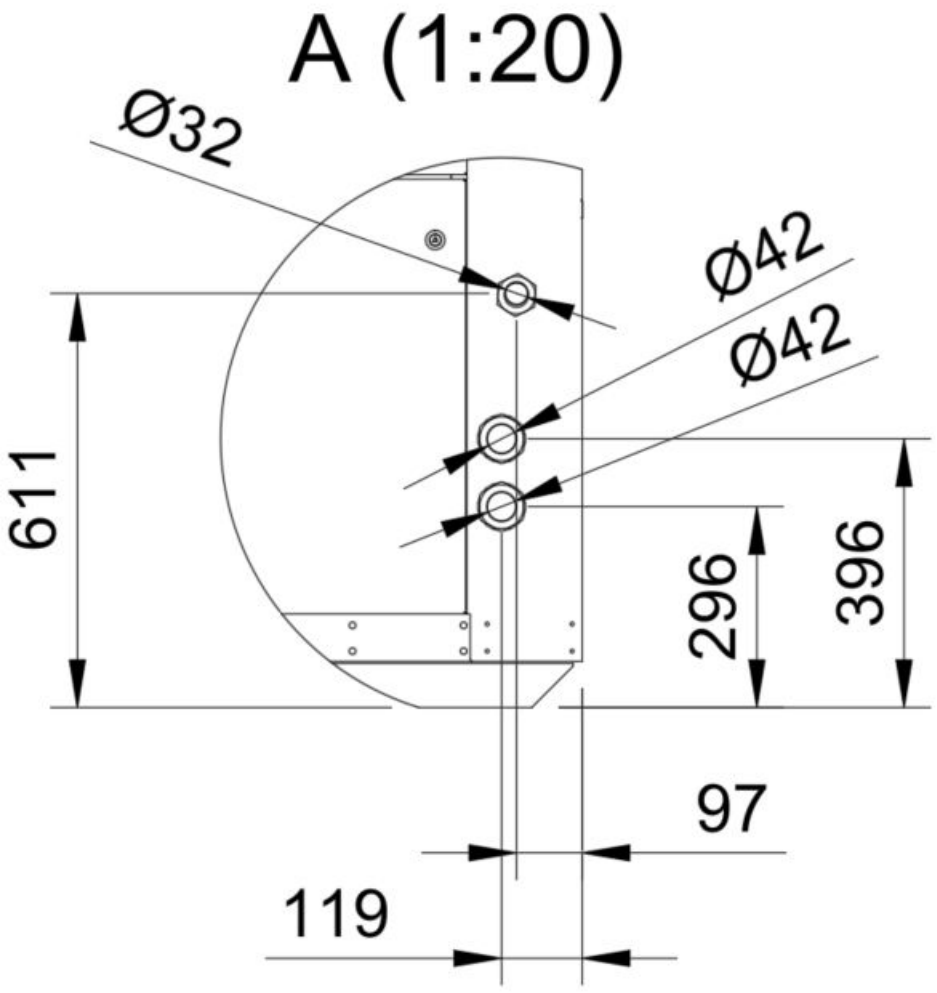
3.3.2 Acer 95/75





3.3.3 Acer 130/100





4 Unit Installation

4.1 Delivery & Unpacking

Clade Engineering Systems manufactures these units with provisions for forklift tines or crane/Hiab lifting straps. Only qualified personnel should conduct all lifting operations.

The base mounting frames are designed so that straps can be passed underneath and between the mounting points. Refer to the following section for specific frame identification. It is advisable to use a spreader bar during lifting to prevent straps from damaging the aluminium grille at the front of the unit.

The image below shows the recommended configuration of lifting straps to lift the unit.

If the equipment arrives damaged, the recipient must notify the supplier immediately. Record any issues on the delivery sheet before signing and take photographs for evidence. If concealed damage is discovered after unpacking, it must be reported within seven working days of receipt for any claim to be valid. The recipient is responsible for compiling all evidence and submitting it to the supplier.

4.2 Heat Pump Installation

Install and operate the unit strictly following all instructions provided in this manual, along with any relevant legislation and health and safety directives. The installation area must have sufficient ventilation and feature a level, structurally sound surface capable of supporting the total weight of the system.

Securely fasten the unit to its base using bolts that prevent movement and vibration transmission into the connected system. After the unit is fixed in place, remove the transportation bolts from the internal base plate to allow for proper operation.

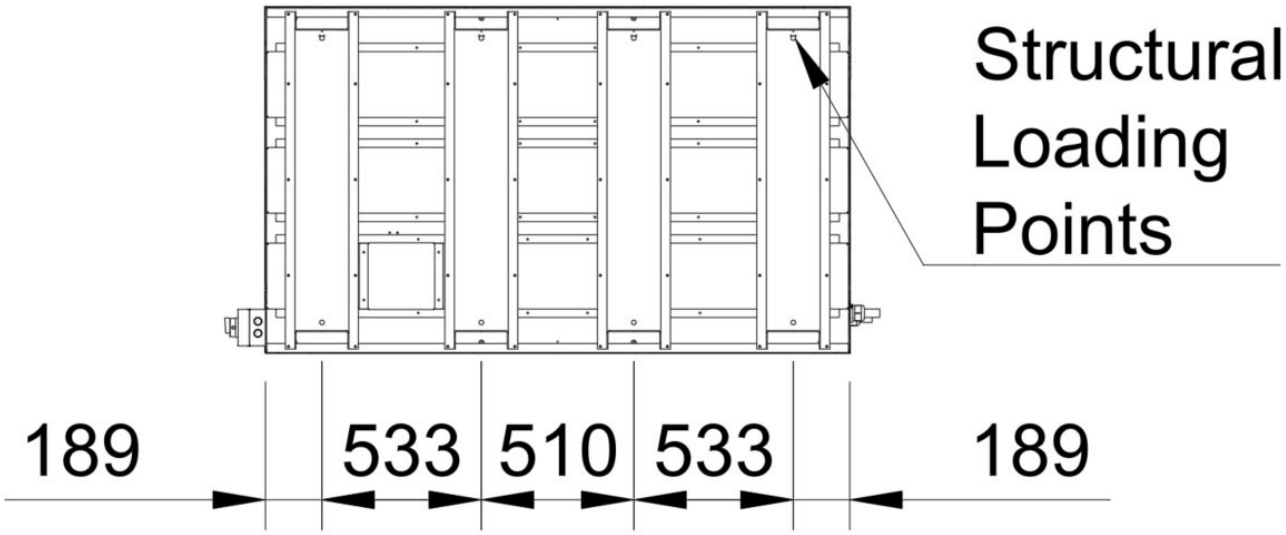
Clade Engineering recommends an allowance of 1.0m perimeter around the front and sides of the unit and 0.6m around the back. Adequate access must be available for service and maintenance of the unit with a safe defined route for engineers and care must be taken to ensure that trip hazards are eliminated.

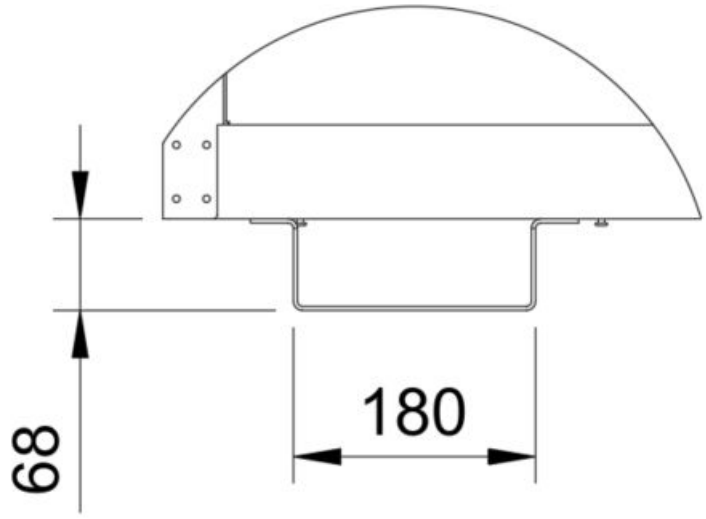
The electrical supplies must comply with the requirements of the latest IEE regulations and the supply must be correctly rated for the unit.

The drainpipe connection should be installed with a downward inclination to prevent drain water from freezing in the winter. For cold climate installations it is recommended that a drain heater tape is used to prevent the drain water from freezing.

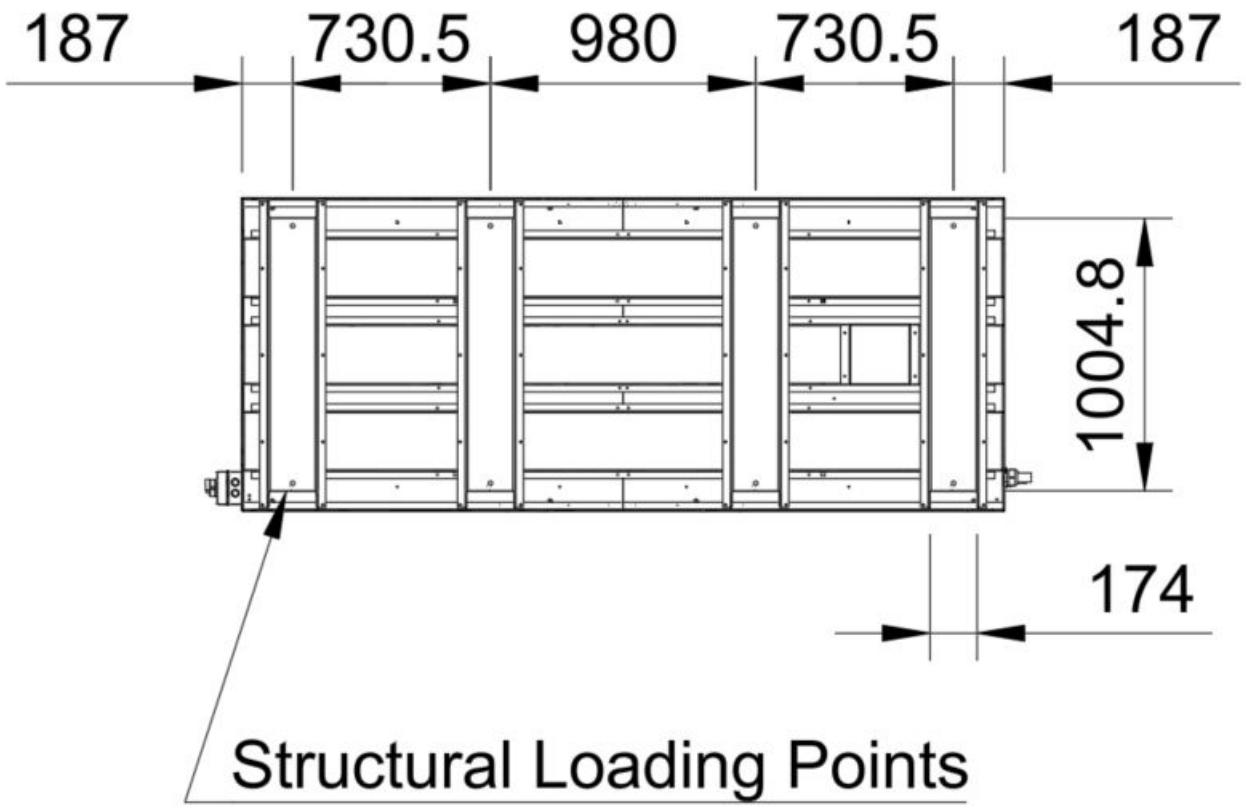
4.2.1 Lifting Centers and Structural Loading Points

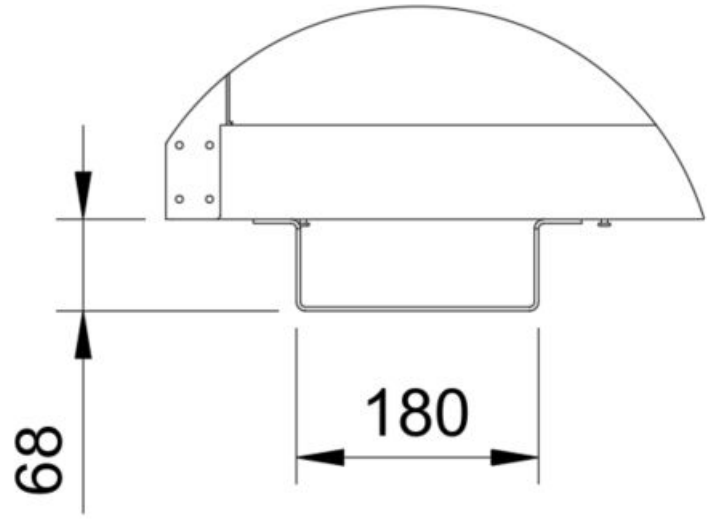
Acer 65/50



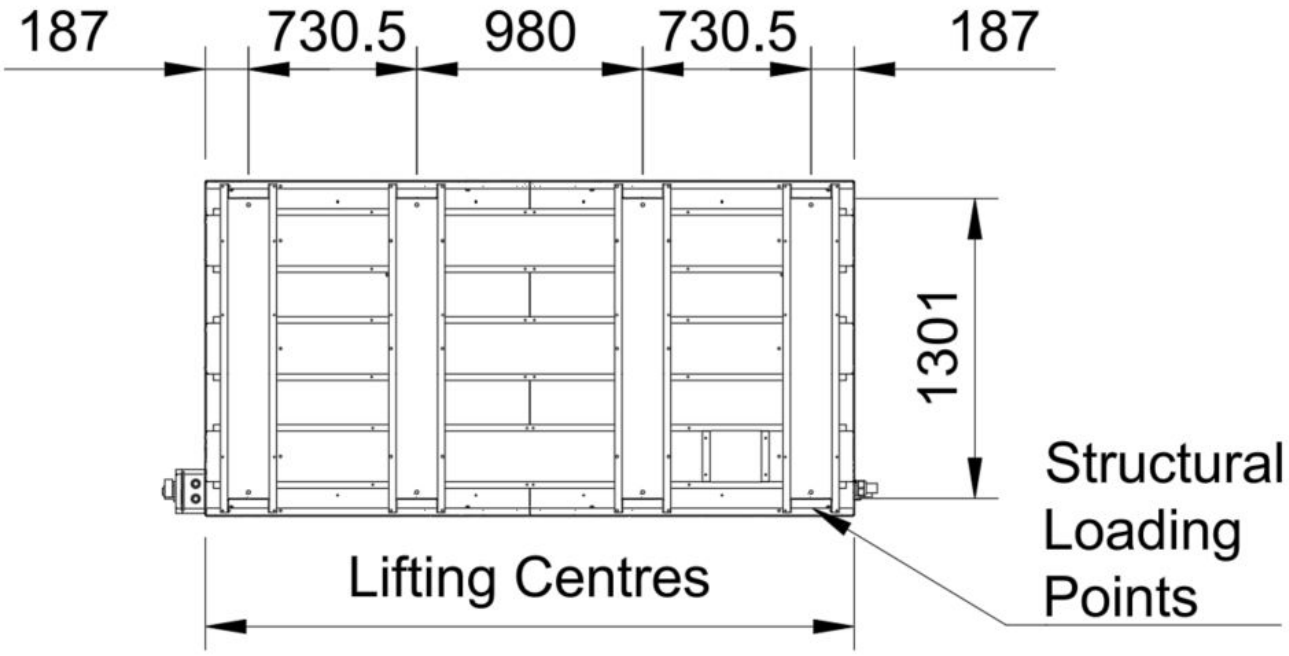


Acer 95/75


187
730.5
980
730.5
187
1004.8
174
Structural Loading Points


68
180

Acer 130/100


187
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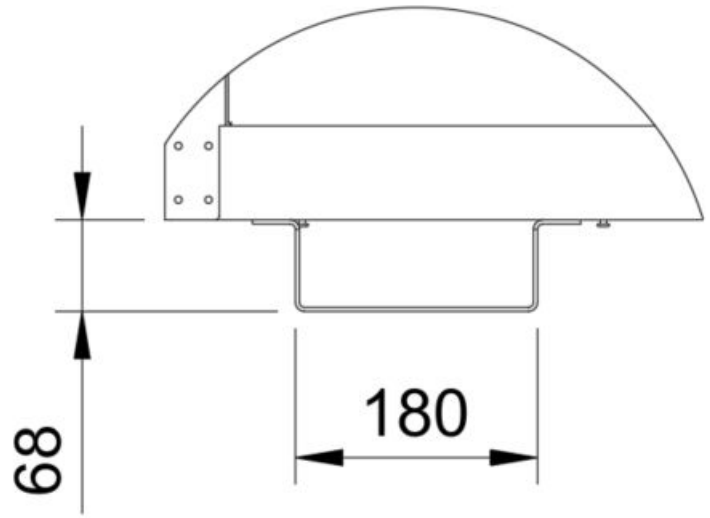
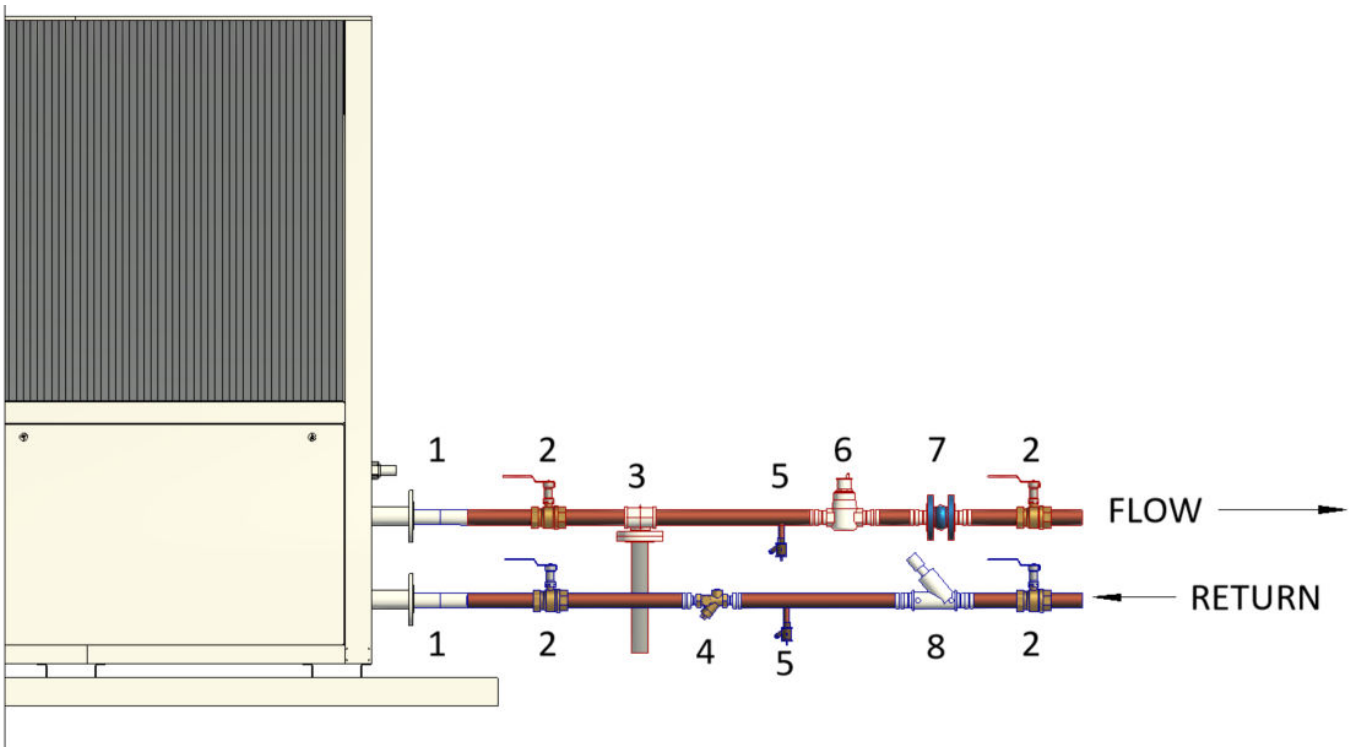
1301
Structural
Loading
Points
Lifting Centres


68
180

5 Piping and Hydraulics

5.1 Piping Connections



1	Flexible joint	Noise/vibration reduction
2	Isolation Valve	Allows for maintenance
3	Burst Disc	Protects against sudden pressure changes (see section 4.5)
4	Strainer	To remove debris from the system.
5	Drain valve	Allows for drainage during servicing of components
6	Air vent valve	Required to release air accumulating within system
7	Non-return valve	Prevents backflow, ensuring fluid moves in the intended direction.
8	Commissioning set	Used for system balancing, performance testing, and setting operational parameters during commissioning.

Optional: As stated in section 3.8.1 a Danfoss Differential pressure controller with flow limitation, AFP/VFG2, is recommended.

5.1.1 Pipe Connection Sizes

Connection Type	Acer 65/50kW	Acer 95/75kW	Acer 130/100kW
Heating Flow	28mm Copper - plain end	35mm Copper - plain end	42mm Copper - plain end
Heating Return	28mm Copper - plain end	35mm Copper - plain end	42mm Copper - plain end
Condensate	40mm solvent weld waste pipe - plain end	40mm solvent weld waste pipe - plain end	40mm solvent weld waste pipe - plain end

5.1.2 Frost Protection

In areas prone to freezing, fit each exterior pipe with a freeze-prevention heater to stop ice from forming. After installing the heater, verify that the pipe joints on the heat pump's inlet and outlet remain at roughly +25°C—even if the outdoor temperature drops to -25°C—to ensure the joints don't fall below 0°C. For different types of pipe materials, consider a self-regulating heater or an equivalent solution that prevents both freezing and overheating.

5.2 Defrost

The ASHPs come with their own hot gas frost protection cycle. This shuts off the internal LTHW flow through the ASHPs and directs hot gas through the evaporation coils removing any ice build-up. To mitigate the loss of output while in defrost, the system buffer vessel must be sized accordingly.

5.2.1 Minimum Buffer Size

Clade's minimum buffer recommendations are given in the table. These represent the minimum storage requirements necessary to protect the heat pump and allow for a maximum of six starts per hour.

Minimum Start up	**50kW**	**75kW**	**100kW**
Minimum buffer vessel capacity (L)	303	443	606

5.2.2 Optimal Buffer Sizing

While the minimum buffer sizes ensure basic heat pump protection and operational stability, optimally sized buffers enhance system efficiency, reduce cycling frequency, and improve overall performance. Buffer vessel sizing ultimately rests with the system designer however, the following recommendations provide guidance on selecting the ideal buffer capacity to maximise energy efficiency and maintain consistent heating output.

Defrost Cycle Management: Air source heat pumps undergo periodic defrost cycles, during which the heat pump uses hot gas to clear ice from the evaporator. During this period, the buffer vessel provides stored thermal energy to maintain heating supply to the building. The vessel must be sized to cover the full heat load during defrost to prevent temperature drops. Clade recommends a minimum of 30 minutes storage to cover this.

Peak Load Consideration: The buffer volume should accommodate the total peak kWh heating demand of the building while accounting for variations in heat pump output due to defrost.

Building Load Profiles: CIBSE Guide A shows how to perform detailed analysis of building heating load profiles. Factors such as occupancy patterns, thermal mass, and intermittent heating requirements should be evaluated to determine the total time the peak load is required and the necessary storage capacity.

5.2.4 Buffer Design Considerations

To ensure optimal performance and efficiency in heat pump systems, proper buffer vessel design is crucial. A well-designed buffer enhances stratification, maximises usable volume, and provides precise control for charging and discharging cycles. Key aspects of an effective buffer design include:

- Height-to-Width Ratio: A buffer vessel should have a minimum height-to-width ratio of 2.5:1. This geometry promotes better thermal stratification by reducing the potential for mixing between layers, ensuring a stable temperature gradient within the vessel.

- Sparge Pipes: Increases the useable volume of the vessel.

- External Combined Headers: One in, one out header based on CIBSE CP1. Prevents mixing an and maintains stratification and sized to achieve less than 0.2 m/s velocity into the vessel. The header helps maintain stable pressure conditions across both the primary and secondary circuits. This is essential for variable flow systems and avoids issues with fluctuating demand. For the Acer units the pipework header should be sized at this velocity all the way back to heat pumps to prevent the integral pumps working against each other.

- Perforated Baffle Plate: Positioned inside the vessel, the baffle plate ensures an even spread of stratification and helps maintain the cold section at the bottom of the buffer critical for return temperatures.

- Temperature sensors
  Five temperature sensors distributed vertically within the buffer need to be distributed properly for precise monitoring and adjustments to maintain optimal conditions. When there are multiple buffers, these need to be spread across the vessels evenly.

5.3 System Pressure

All mechanical/LTHW systems require pressure relief equipment to maintain the safe working condition of the system. This will be designed and specified by the system designer/installer.

5.3.1 Safety Valves

Safety valves on the low-temperature hot-water side are compulsory on all Acer installations. Their role is to prevent system pressure from rising above the maximum allowable working pressure, thereby protecting pipework, heat exchangers and ancillary equipment from over-pressure incidents. It is the system designer's or installer's responsibility to select, size and install these valves in accordance with the national standards ensuring correct set pressure, sufficient discharge capacity and proper discharge piping.

5.3.3 Bursting Disc

In addition to the required safety valves and pressurization equipment of the LTHW system it is strongly recommended that a bursting disc is installed to the system to protect the system from increase in pressure from the high- pressure CO_2 system should the plate heat exchanger fail.

CO_2 refrigerant within the heat pump operates at 100-120 bar, protection for plant and equipment on the LTHW side of the system is advised to mitigate any sudden variations in pressure.

Burst Discs consist of a thin membrane which is designed to break and open when the specific level of differential pressure rises above the resistance limit that the disc was originally calibrated for, so as to allow for the excess pressure to vent out safely.

System configuration, plant locations and servicing routes will need to be considered when locating the burst disc on the system. It is therefore the responsibility of the designer/installer to specify the type and location. On multiple Acer installations one burst disc on the common primary pipework maybe deemed sufficient.

Burst discs are designed to be installed between two flanges. Please refer to manufactures instructions for installation information.

⚠ WARNING

A BURSTING DISC IS NOT A SUBSTITUTE FOR A SAFETY VALVE. SAFETY VALVES MUST BE SIZED AND INSTALLED IN ACCORDANCE WITH EN 13136:2013.

⚠ WARNING

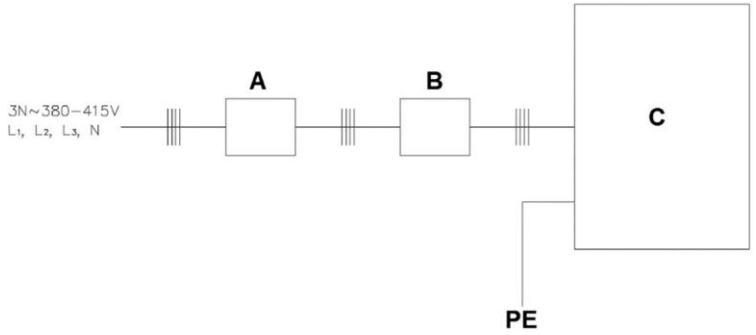
The designer/installer must consider adequate protection for sudden various in pressure.

6 Wiring

6.1 Mains Supply Installation

Schematic Drawing

A: Protection Device
B: Local Isolation
C: Heat Pump unit



Main power supply cable size and switch capacities:

Model	Cable size (mm^2)			Local Isolation (A)	Protection (A)
	L1,L2,L3	Neutral	Earth	AC22/AC23	
Acer 50	16	16	10	80	80
Acer 75	16	16	10	80	80
Acer 100	25	25	16	100	100

A dedicated power supply is required for each unit with its own protection device and local isolation.

Local climate conditions and cable service routes should be taken into account as part of the cable selection and installation of the electrical supply.

The cable size in the above table is selected using Table 4E4A as part of BS7671 2018 IET wiring regulations. The cable selection should only be used between the local isolation and outdoor unit.

The electrical installation should be designed and installed to meet BS7671 2018 IET wiring regulations or adhere to the wiring regulations of the region of install.

6.1.1 Maximum Cable Sizes

The maximum cable sizes into the isolators of the unit can be seen below.

Model	Single or multiple strand wire (mm^2)	Fine strand with sleeve (mm^2)
Acer 50	25	10
Acer 75	25	10
Acer 100	50	50

⚠ WARNING

Be sure to use specified wires and ensure no external force is imparted to terminal connections. Loose connections may cause overheating and fire.

⚠ CAUTION

Only use properly rated breakers and fuses. Using a protection device of the wrong size may cause the unit to malfunction or set fire.

6.2 Cable Connections

Control cable specifications:

Remote controller cable size	0.3 - 1mm²
Cable between units	Cat 6

6.2.1 Terminal Block Arrangement

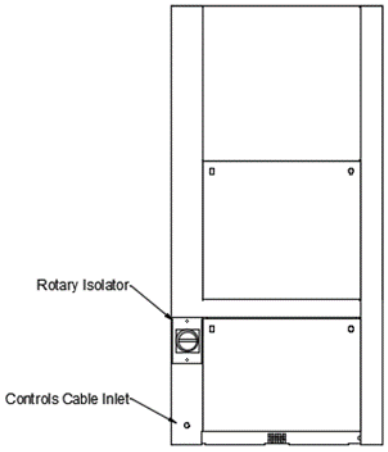
Remove front and side panels to gain access to the electrical controls and cable routes.

⚠ CAUTION

Earth tabs must be reconnected prior to refitting access panels

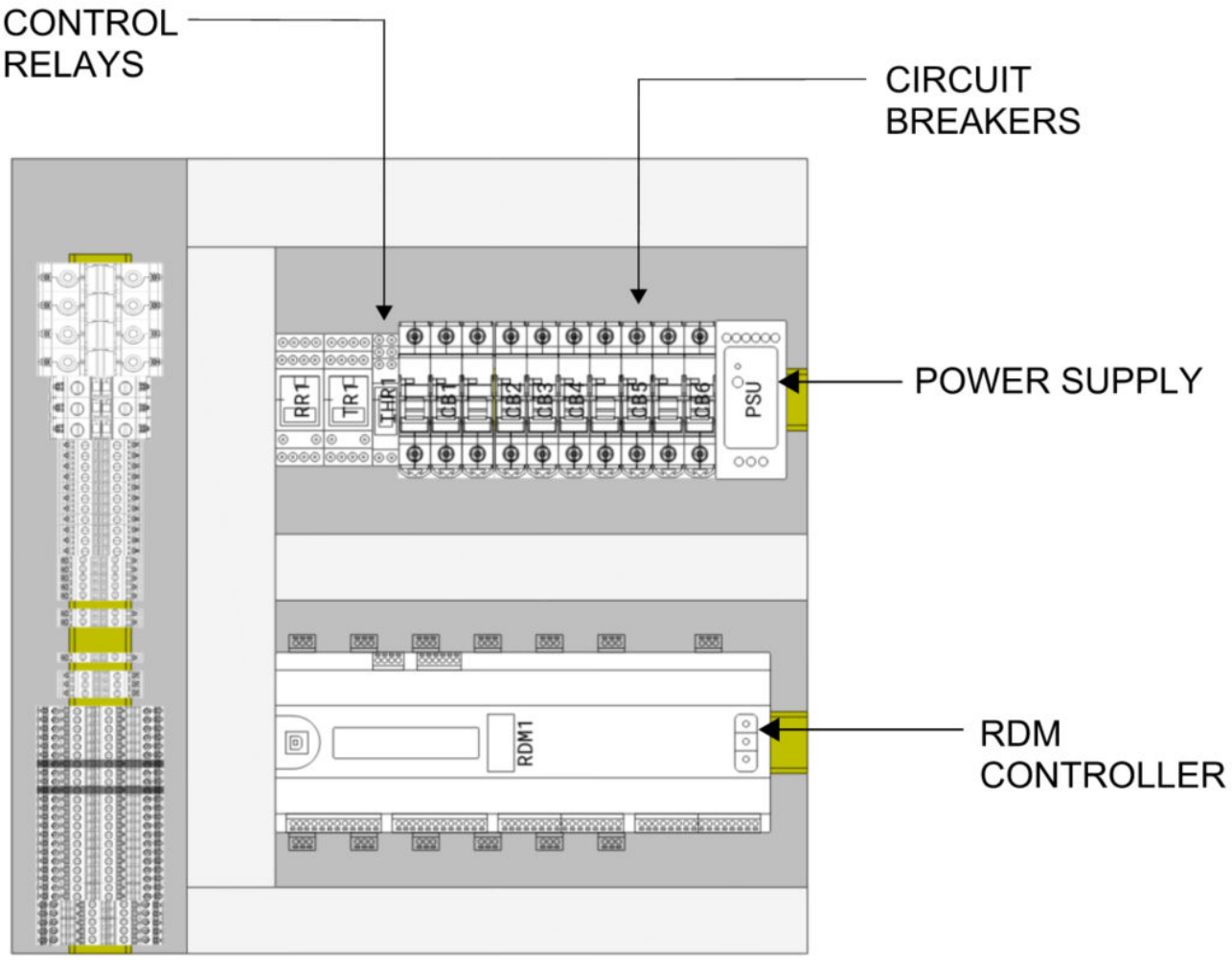
Cable glanding is located to the left-hand side of the unit where a rotary isolator is provided for electrical connections.

Stuffing glands located to the left-hand side of the unit shall be used for control cable access into the control panel.

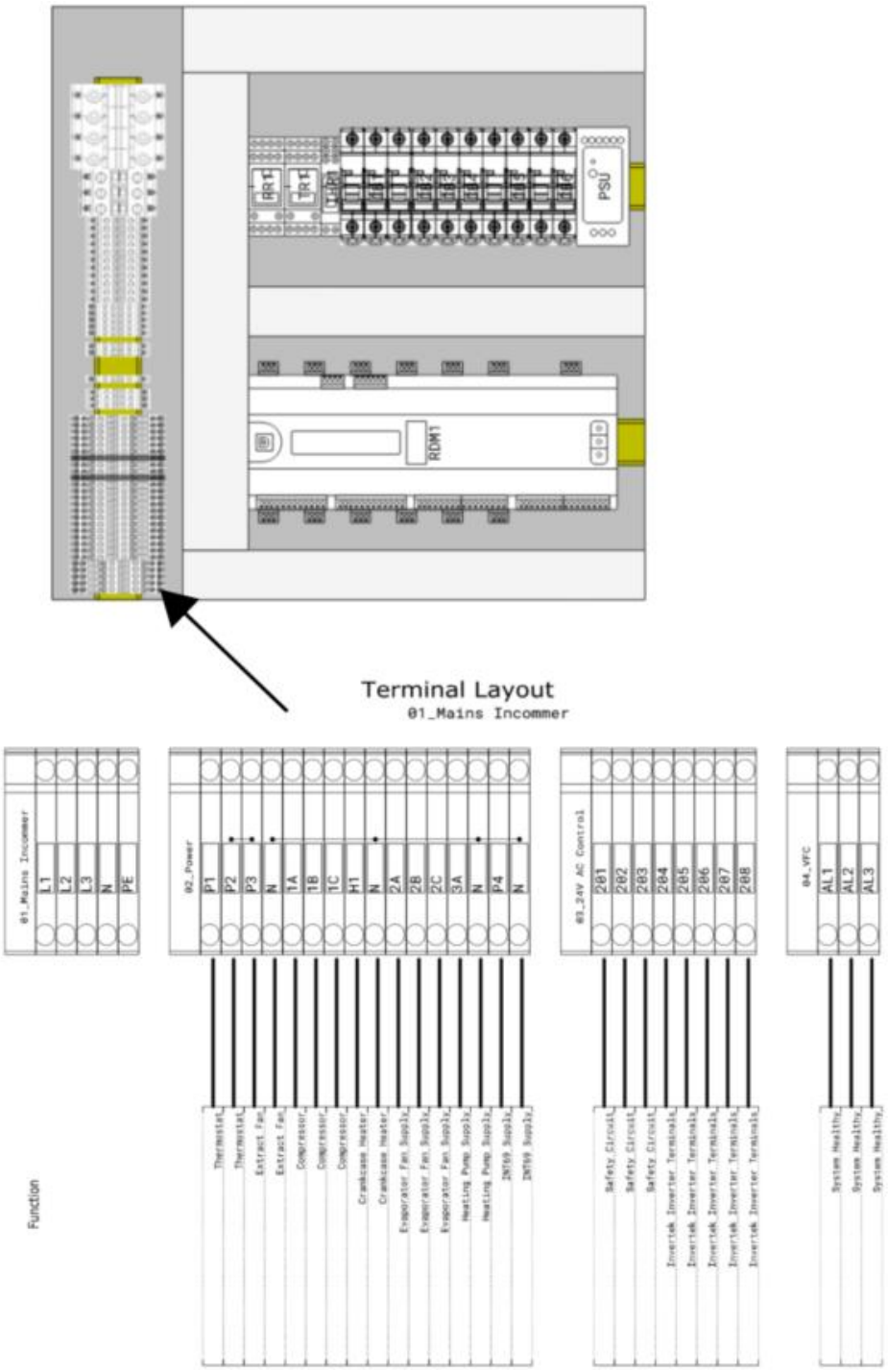


6.2.2 Acer 65/50kW Controls Layout

- Supply: 400V 3-Phase, 50Hz with 35mm terminals
- Main Circuit Breaker: CB1 (C50A) - 3-pole, 50A protection
- Enclosure Size: 500w x 500h x 200d



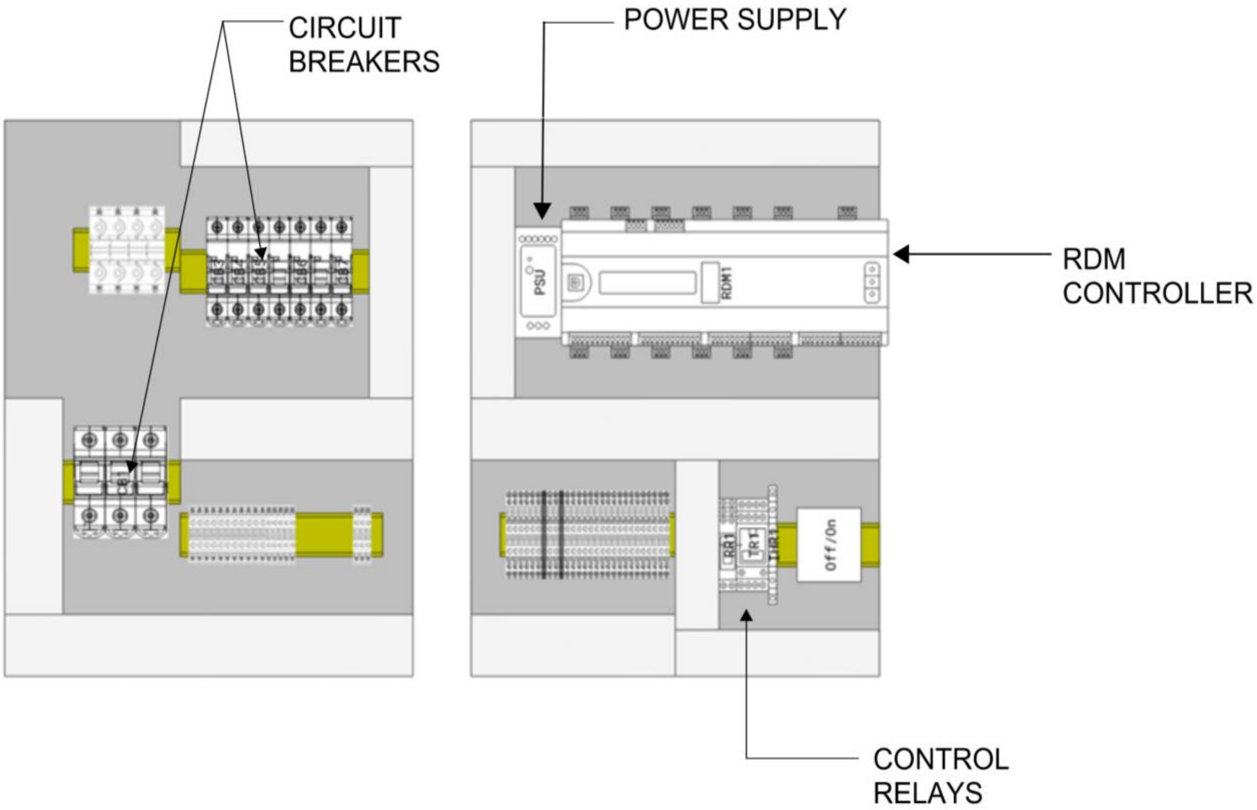
Terminals



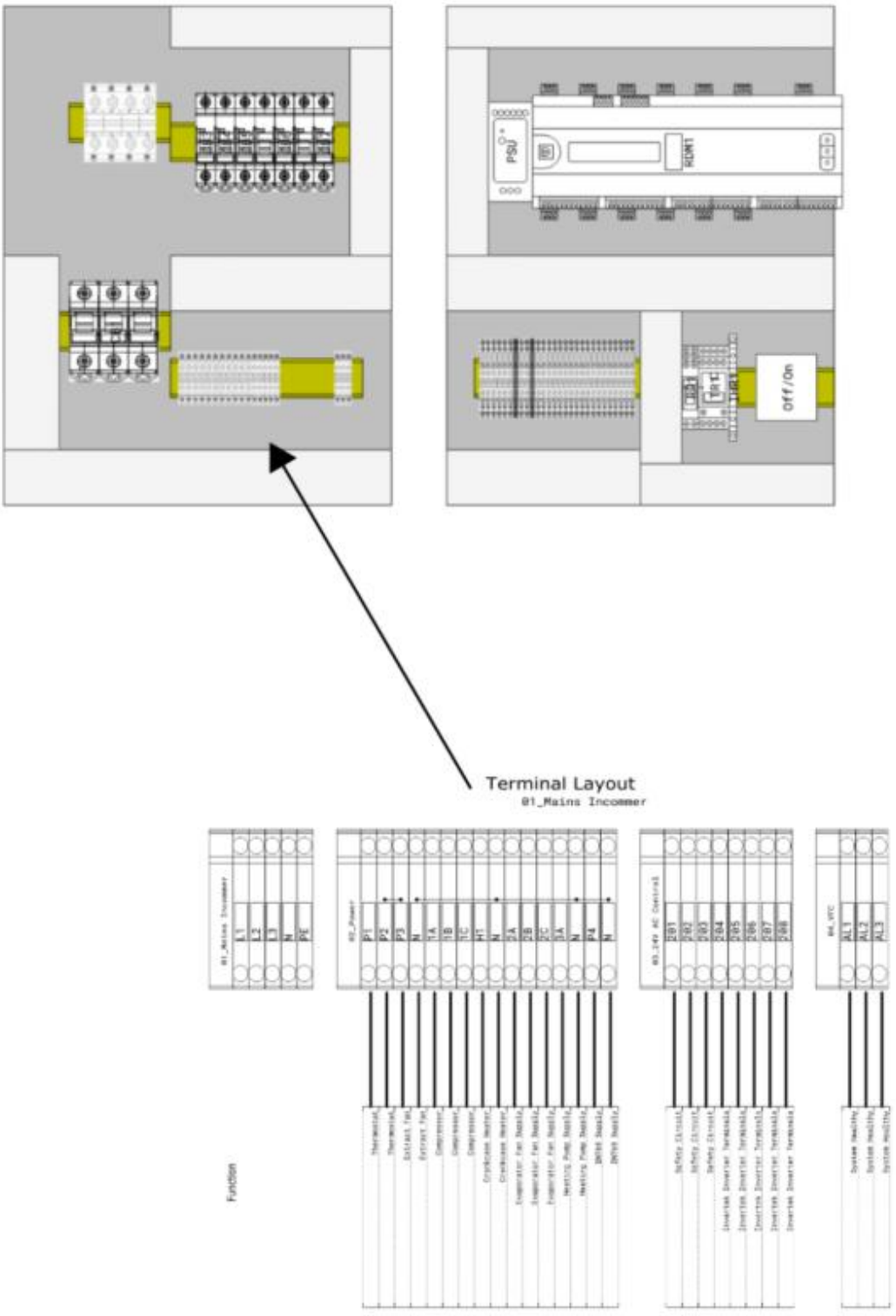
The BMS connection points (BMS1, BMS2) carry remote enable/disable signals or communication lines if the unit is monitored off-site.

6.2.3 Acer 95/75kW & 100/130kW Controls Layout

- Supply: 400 V 3-Phase, 50 Hz with 35 mm terminals
- Main Circuit Breaker: CB1 – 3-pole, 100 A protection (C100A)
- Enclosure Size: 2 × EC040520 – 800 mm (W) × 500 mm (H) × 200 mm (D) each



Terminals



7 Controls

7.1 Individual Heat Pump Controls

Each heat pump has its own integrated and independent controls on board the heat pump designed to maintain a fixed flow temperature. This is an adjustable parameter and, in this instance, has been set to maintain 65°C.

7.1.1 Off/On Switch

The Off/On switch selects the operation of the heat pump. Selecting the on position will start the heat pump. Selecting the Off position will instigate a stop sequence and stop the heat pump from running. The heat pump will continue to run for a short period until it has completed the stop sequence.

⚠ CAUTION

The Off/On switch should not be used in an emergency. Any emergency isolation should be carried out at the local isolator.
The inverter should be fully discharged, prior to removal of the compressor terminal box cover.

7.2 Control Type

There are three options for the method of control on the heat pump. These will be described in the following sections.

7.3 Multiplex Controls

7.3.1 Multiplex Control

Multiplex control should be used when the heat pump is to be controlled by a Master Controller. This enables the control of the heat pump by the Master Controller which can operate multiple heat pumps.

NOTE: Should the return water temperature go above 50°C, this will initiate a high return water fault and shut down the heat pump instantly.

The controller has two modes of control based on the temperatures of the flow and return on both the primary and secondary side of the system. This manages the heat pump(s) and buffer vessel to maintain efficient heating, switching between two modes depending on how much the heat the building is calling for.

Mode 1 – Buffer-Filling

If the flow to the building (Secondary Flow) is significantly cooler (≥3 °C difference) than the heat pump's outlet (Primary Flow), the system gradually heats the buffer in multiple stages based on the setpoints of temperature sensors T4, T3, T2, and T1. Each consecutive heating stage activates only once the lower region is mostly heated. This ensures a reserve of hot water in the vessel without sending overly hot water back to the heat pump.

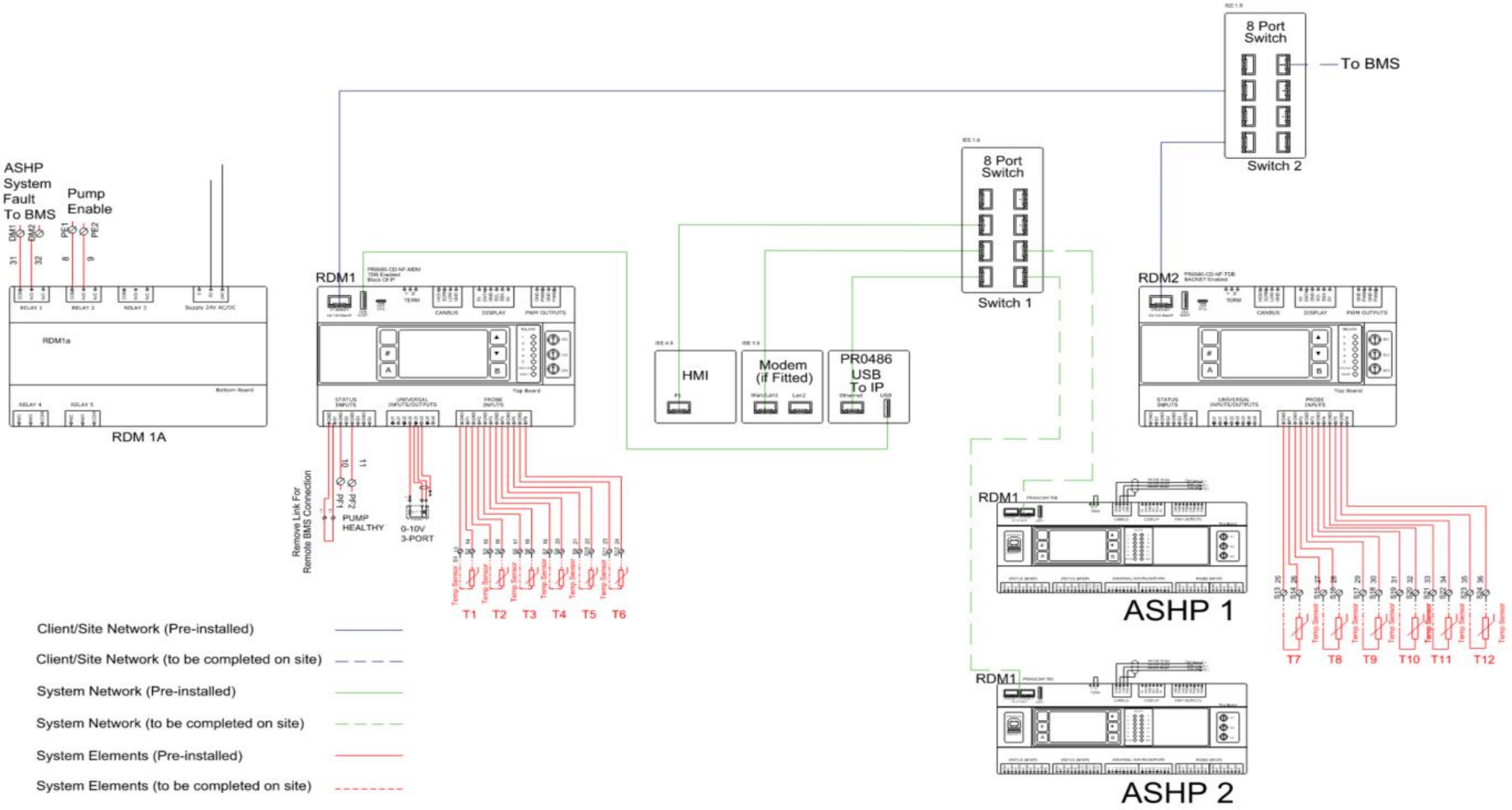
Mode 2 – Site-Load matching

If the Secondary Flow rises closer (within ~2 °C of that 3 °C gap) to the Primary Flow, this means the building is drawing most of the heat directly. The system then uses a faster-acting PI control to match the building's demand in real time. It focuses on keeping the buffer topped up near its target while preventing excessive return temperatures. This maximizes direct supply to the site under higher loads, adjusting capacity so the return from the buffer stays within safe limits.

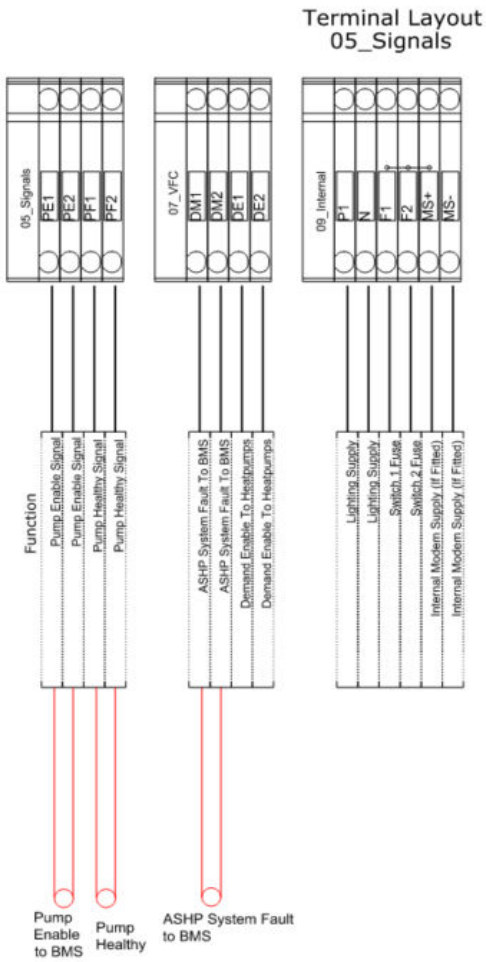
Master controller will be installed as a standalone unit. The heat pumps will connect to the master controller by CAT5 cable between the two units, installed by the contractor as below.

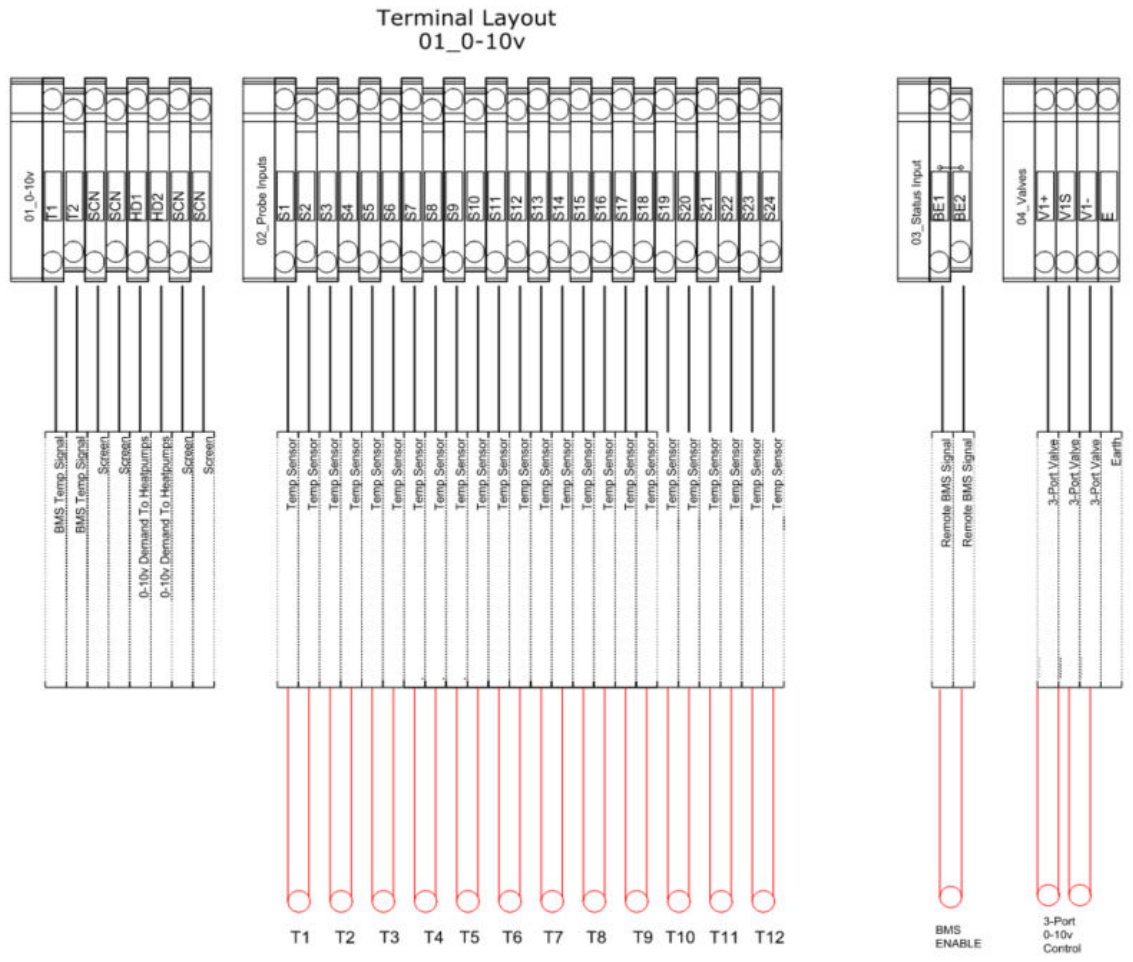
7.3.2 Multiplex System Wiring Diagram

Master Control Panel



Terminal Layout





7.3.3 Heat Pump Data set

A single connection to the master controller is all that is required to access all connected heat pump data. If the client wishes to monitor or log this data via their Building Management System, the master controller can be integrated through its BACnet interface. The table below details the data points available via the BACnet connection from the master controller

Master Controller (large)				
Device Name		**BACnet**		
Inst.-No.		**280028**		
Obj. Type	**Object Name**	**Description**	**Unit**	**Read/Write**
BO	obj_1	System Healthy	On=Healthy / Off=Fault	Read
AO	obj_2	Ambient Temp	°C	Read
AO	obj_3	ASHP Target Temp	°C	Read
AO	obj_4	Heating Demand	%	Read
AO	obj_5	T1 Temp	°C	Read
AO	obj_6	T2 Temp	°C	Read
AO	obj_7	T3 Temp	°C	Read
AO	obj_8	T4 Temp	°C	Read
AO	obj_9	T5 Temp	°C	Read
AO	obj_10	T6 Temp	°C	Read
AO	obj_11	T7 Temp	°C	Read
AO	obj_12	T8 Temp	°C	Read
AO	obj_13	T9 Temp	°C	Read
AO	obj_14	T10 Temp	°C	Read
AO	obj_15	T11 Temp	°C	Read
AO	obj_16	T12 Temp	°C	Read
AO	obj_17	HP1 Status	*See Status Table	Read
AO	obj_18	HP1 P11 Flow Temp	°C	Read
AO	obj_19	HP1 P12 Return Temp	°C	Read
AO	obj_20	HP2 Status	*See Status Table	Read
AO	obj_21	HP2 P11 Flow Temp	°C	Read
AO	obj_22	HP2 P12 Return Temp	°C	Read
AO	obj_23	HP3 Status	*See Status Table	Read
AO	obj_24	HP3 P11 Flow Temp	°C	Read
AO	obj_25	HP3 P12 Return Temp	°C	Read
AO	obj_26	HP4 Status	*See Status Table	Read
AO	obj_27	HP4 P11 Flow Temp	°C	Read
AO	obj_28	HP4 P12 Return Temp	°C	Read
AO	obj_29	HP5 Status	*See Status Table	Read
AO	obj_30	HP5 P11 Flow Temp	°C	Read
AO	obj_31	HP5 P12 Return Temp	°C	Read
AO	obj_32	HP6 Status	*See Status Table	Read
AO	obj_33	HP6 P11 Flow Temp	°C	Read
AO	obj_34	HP6 P12 Return Temp	°C	Read
AO	obj_35	HP7 Status	*See Status Table	Read
AO	obj_36	HP7 P11 Flow Temp	°C	Read
AO	obj_37	HP7 P12 Return Temp	°C	Read
AO	obj_38	HP8 Status	*See Status Table	Read
AO	obj_39	HP8 P11 Flow Temp	°C	Read
AO	obj_40	HP8 P12 Return Temp	°C	Read
***Status Table**				
0=Off				
1=Heating				
2=Defrost				
3=Satisfied				
4=Initialising				
5=Fault				
6=Not Present				
7=Offline				

7.4 BMS Control

This control type must be selected when it is intended to control the heat pump from an independent BMS.

Selecting BMS will allow the heat pump to operate on a 0-10V input signal from the BMS, overriding the local return temperature control.

NOTE: Should the return water temperature go above 50°C, this will initiate a high return water fault and shut down the heat pump instantly.

A 0-10V signal allows the heat pump to be controlled to a desired capacity (QH) based on a percentage of maximum capacity.

NOTE: Maximum capacity will alter dependent on ambient temperatures. Therefore, the minimum QH at 2V (50%) at -5ºC will be less than the minimum capacity during times of warmer ambient conditions. When sizing and selecting buffer vessels the low demands of the building need to be considered in conjunction with minimum turn capacity of the heat pump. Published capacities at 7ºC ambient temperatures are deemed as maximum capacities.

The table below denotes the controls associated with a 0-10V signal:

Voltage Signal	Status
0-0.9	Fault
1-1.9	Off
2	Capacity Control (50-100%)
3	
4	
5	
6	
7	
8	
9	
10	

NOTE: The function will not be available when operating as a multiplex installation using the master controller

7.5 Local control

Selecting LOCAL control means the heat pump will control without any external control signals. This should be selected when there is no BMS 0-10V capacity control input or Master Controller input. Selecting this control type means the unit will operate on return temperature control.

The delivered heating capacity is adjusted by the return temperature which is set to 30°C for optimum efficiency. Should the return temperature rise above this, the heat pump will reduce its heat output and in turn reduce the flow rate of the pump whilst maintaining flow temperature. A reduction in return water temperature will see increase the heating capacity of the heat pump and thus increase flow to maintain a constant flow temperature.

NOTE: Should the return water temperature go above 50°C, this will initiate a high return water fault and shut down the heat pump instantly.

7.6 Controller IO

7.6.1 Acer 65/50 Controller IO

PR0652 CD NF TDB		
Status Inputs	**Location**	**ID**
Compressor Healthy	S1	
Evaporator 1 Fan Healthy	S2	
Evaporator 2 Fan Healthy	S3	
Heating Pump Healthy	S4	
System On / Off	S5	
BMS Enable	S6	
Relay Outputs	Location	ID
Compressor Enable	Relay 1	
System Healthy	Relay 3	
Universal Inputs/Outputs	Location	ID
Suction Pressure	U1	TR1
Discharge Pressure	U2	TR2
Evaporator Pressure	U3	TR3
Compressor VSD Level	U4	
Heating Pump Level	U5	
Evaporator Fan 1&2 Level	U6	
Temperature Probe Inputs	Location	ID
Ambient Temperature	P1	P1
Suction Temperature	P2	P2
Discharge Temperature	P3	P3
Gas Cooler Liquid Outlet Temperature	P4	P4
Evaporator Fin Temperature	P5	P5
Heating Flow Temperature	P6	P6
Heating Return Temperature	P7	P7
Evaporator Outlet Temperature	P8	P8
Stepper Outputs	Location	ID
High Pressure Valve	Stepper 1	STV1
Liquid Injection Valve	Stepper 2	STV2

7.6.2 Acer 95/75 & 130/100 Controller IO

PR0652 CD NF TDB		
Status Inputs	**Location**	**ID**
Compressor Healthy	S1	
Evaporator 1 Fan Healthy	S2	
Evaporator 2 Fan Healthy	S3	
Evaporator 3 Fan Healthy	S4	
Heating Pump Healthy	S5	
System On / Off	S6	
BMS Enable	S7	
Relay Outputs	Location	ID
Compressor Enable	Relay 1	
System Healthy	Relay 3	
Universal Inputs/Outputs	Location	ID
Suction Pressure	U1	TR1
Discharge Pressure	U2	TR2
Evaporator Pressure	U3	TR3
Compressor VSD Level	U4	
Heating Pump Level	U5	
Evaporator Fan 1,2 & 3 Level	U6	
Temperature Probe Inputs	Location	ID
Ambient Temperature	P1	P1
Suction Temperature	P2	P2
Discharge Temperature	P3	P3
Gas Cooler Liquid Outlet Temperature	P4	P4
Evaporator Fin Temperature	P5	P5
Heating Flow Temperature	P6	P6
Heating Return Temperature	P7	P7
Evaporator Outlet Temperature	P8	P8
Stepper Outputs	Location	ID
High Pressure Valve	Stepper 1	STV1
Liquid Injection Valve	Stepper 2	STV2

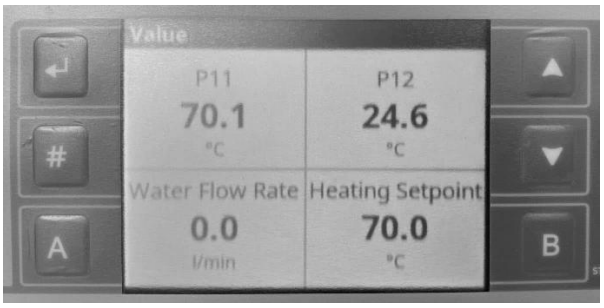
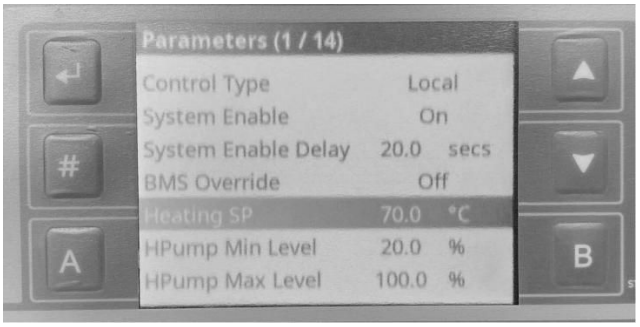
8 First Time Set Up

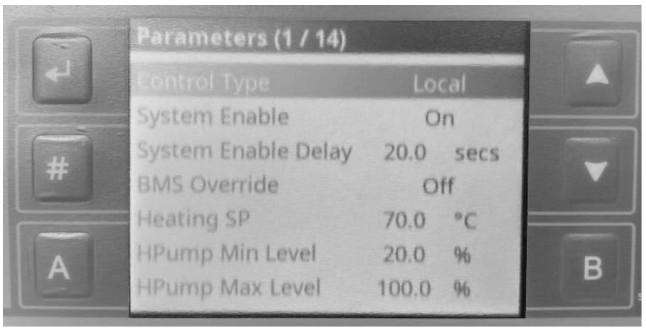
Before switching on the heat pump for the first time ensure that the LTHW circuit is filled with water and all air is removed from the system and the door switch is set to off.

The heat pump will operate according to the control type selected so on first start up it is important the desired control type is selected on the heat pump controller. See Controls section of this document for information on types of control for the heat pump.

8.1 Selecting Control Type

Before the unit will operate, the control type must be selected. To select the control type on the controller:

Press the ENTER key to enable the RDM screen:	
Press the B key and check control type:	
To change the control type, press ENTER and DOWN keys simultaneously to access the menu:	

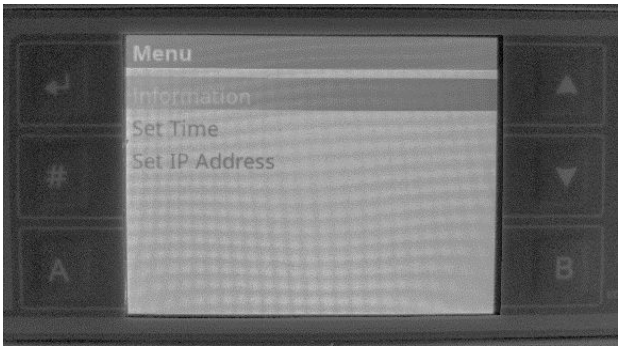
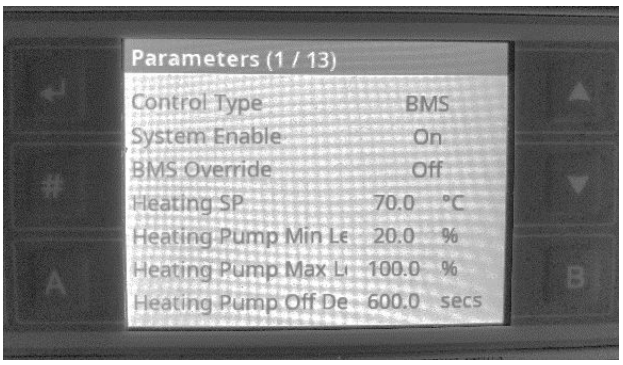
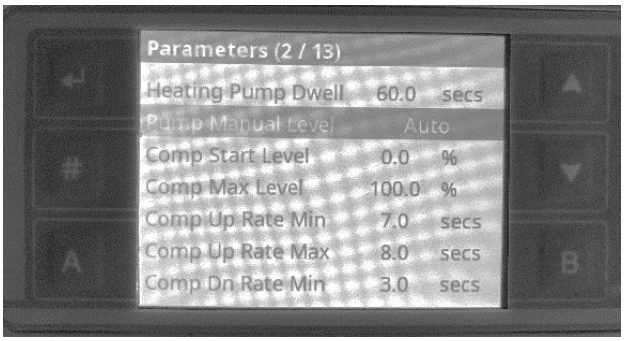
Press the B key to scroll through the parameter menu: Press the DOWN key to parameter page listing Control Type parameter:	
Press ENTER, then using UP/DOWN keys, scroll through to the correct control type. Press ENTER key to select type:	
Press the # key to return to the front screen.	

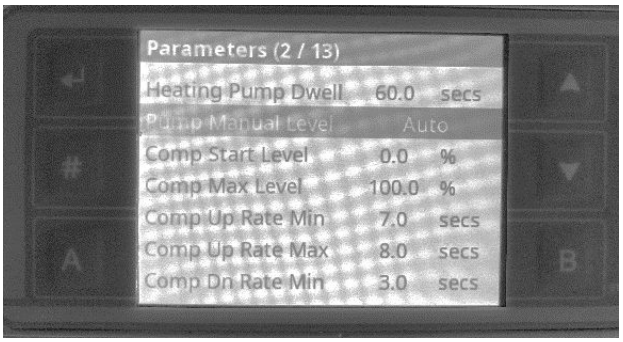
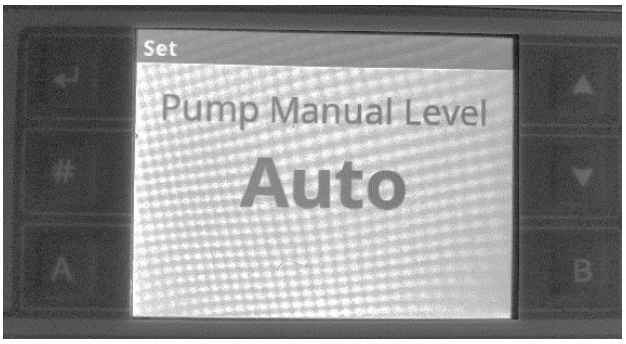
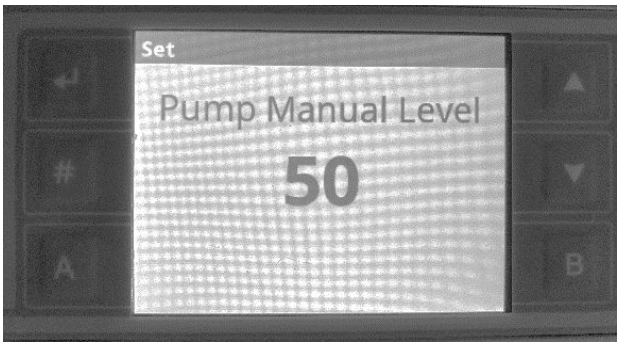
8.2 Fluid Commissioning

To ensure correct operation of the heat pump the LTHW system must be commissioned to ensure maximum flow rates are achieved at 100% heat pump capacity (when the internal LTHW pump is at 100% speed). If commissioning the fluid system is not correctly completed the heat pump may not be able to achieve full capacity or meet set point flow temperatures.

To do this the contractor/installer must set the integral heat pump LTHW pump to 100% flow and set commissioning set flow rates (to all individual heat pumps connected) to the maximum required flow rates based on the required on the duty point (See pump curves for further information).

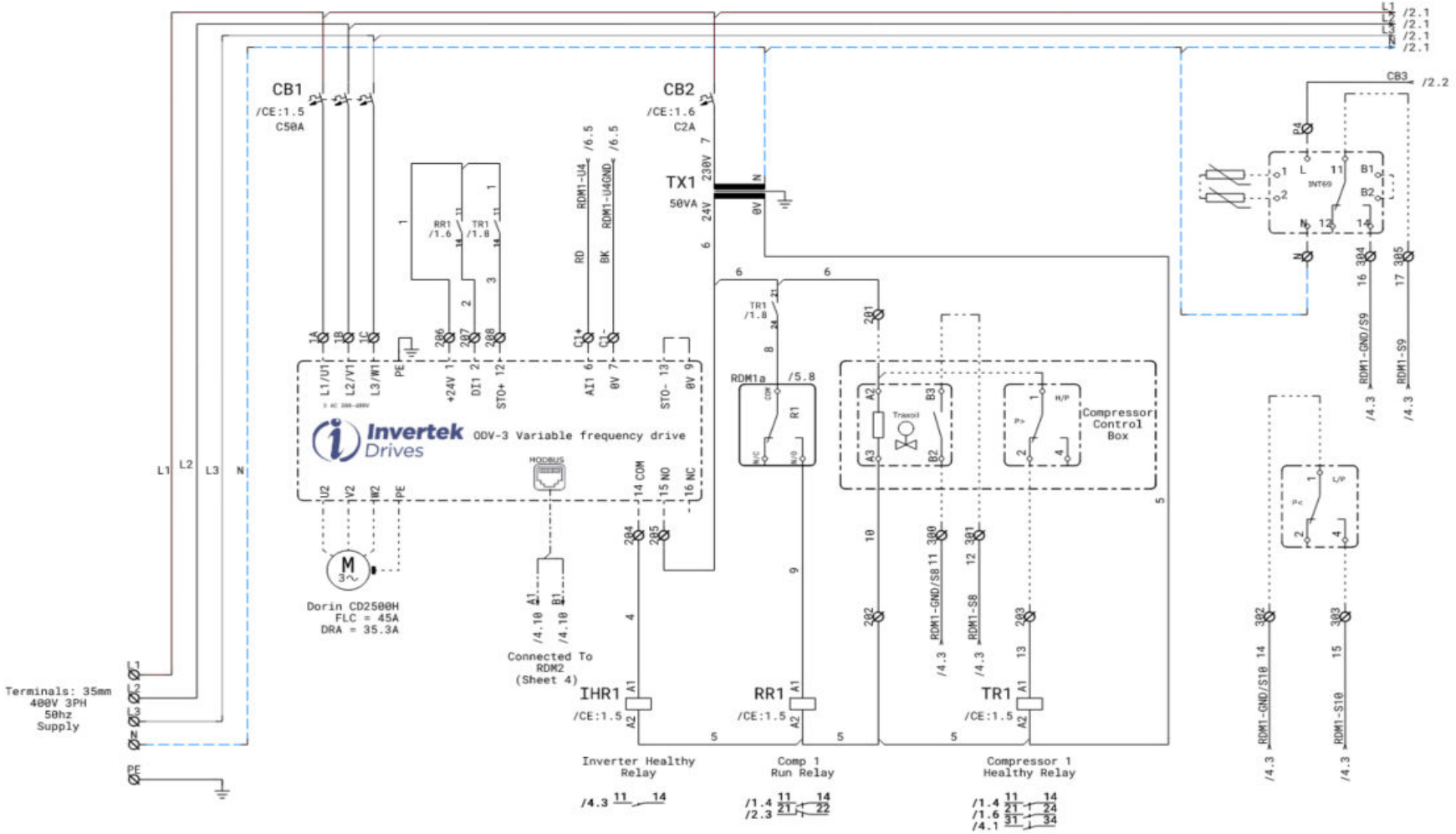
The heat pump integral LTHW pump can be manually set to 100% for the purposes of fluid commissioning.

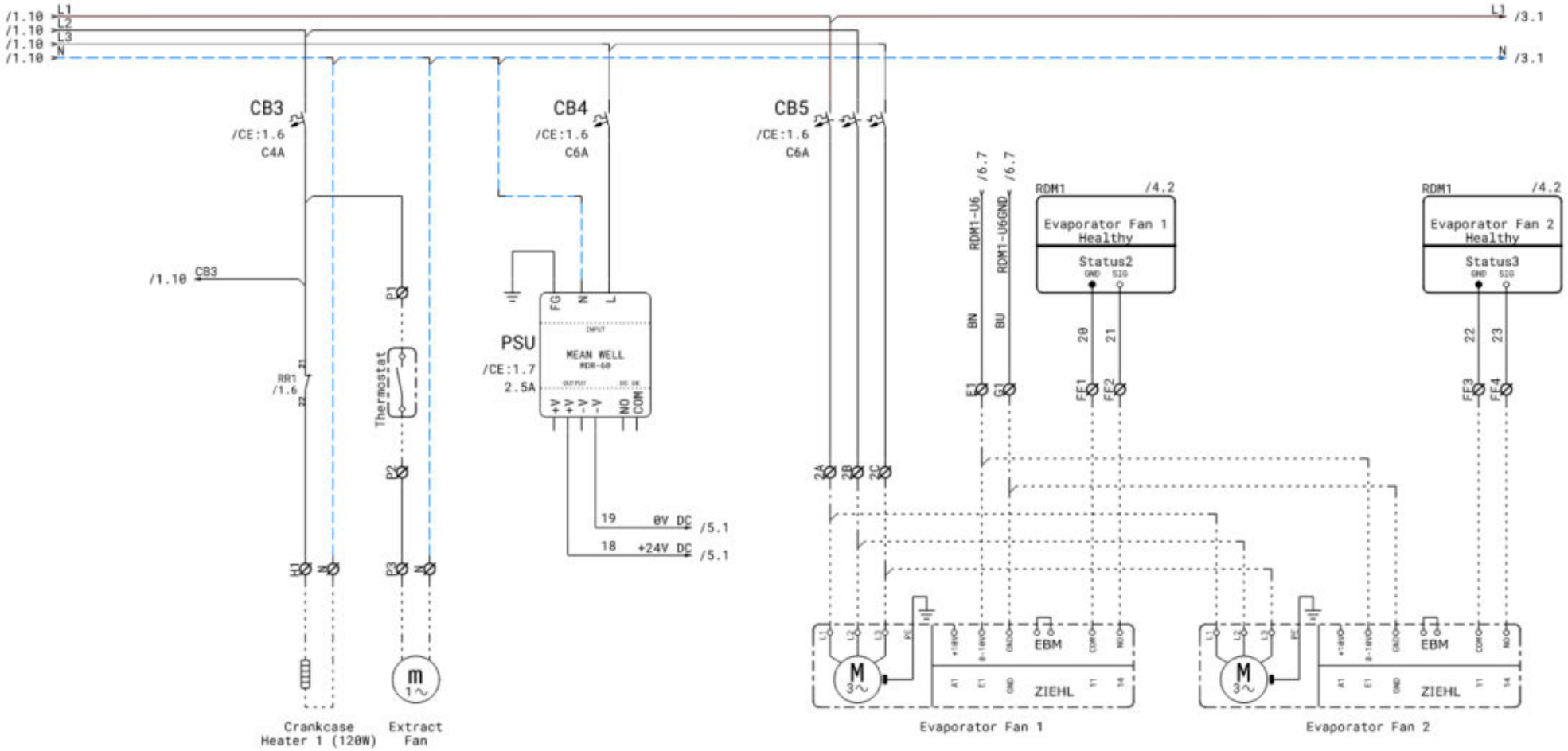
From the Menu screen:	
Press the 'A' button until 'Parameters' are displayed.	
Press the '↓' button unit Parameter 'Pump Manual Level' is displayed. By default, the parameter is set to 'Auto'.	

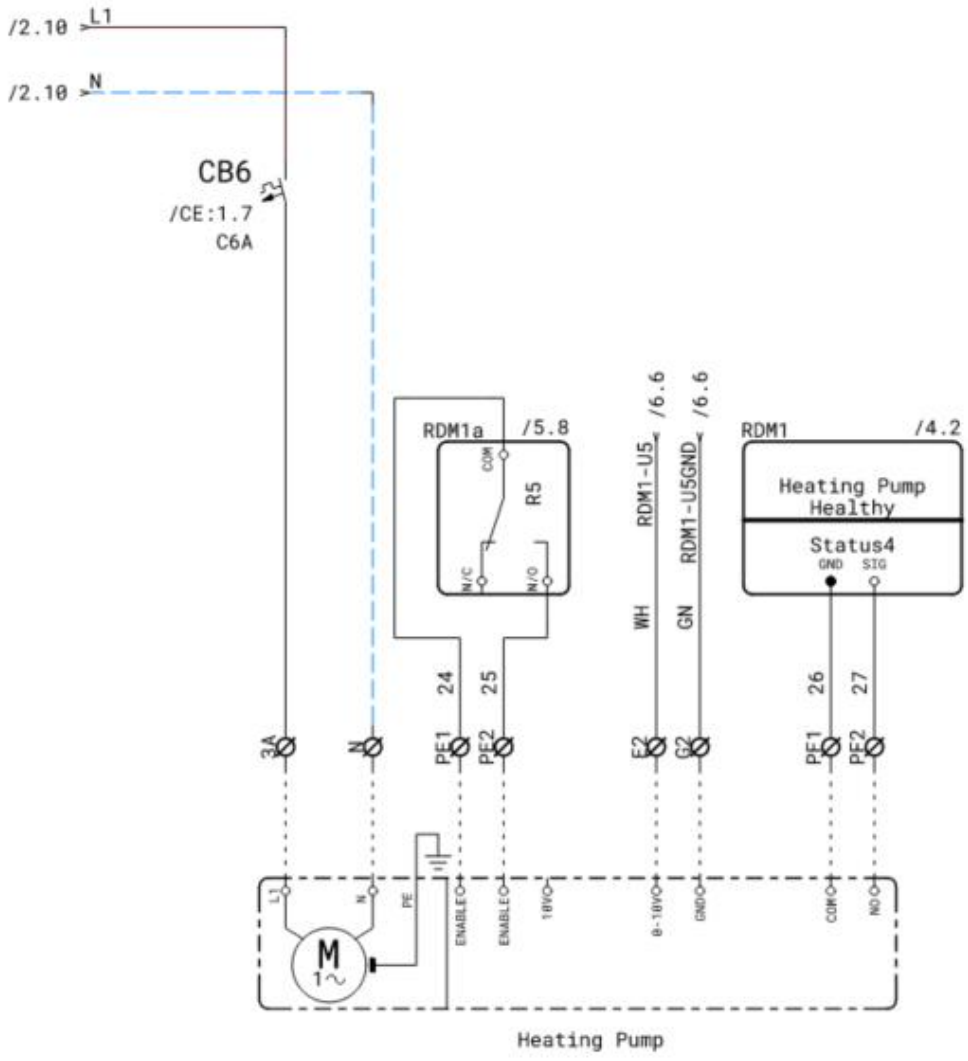
Press the ‘Enter’ button to highlight the parameters and Press the ‘↓’ button to highlight the ‘Pump Manual Level’.	
Press the ‘Enter’ button to enter the parameter.	
Press the ‘↑’ button to select the desired pump level and the press the ‘Enter’ button to accept the new pump level. Note that ‘Pump Manual Level’ is a commissioning function only and the parameter MUST be returned to ‘Auto’ for the heat pump operation to be enabled.	

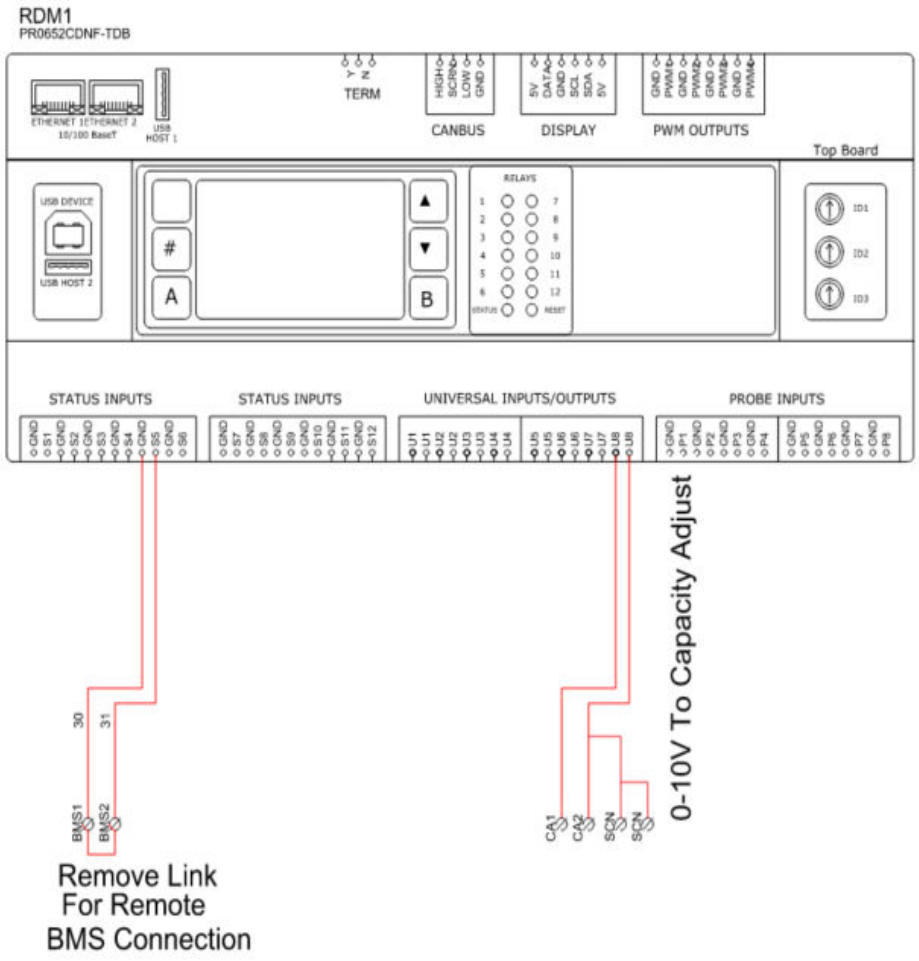
9 Wiring Diagrams

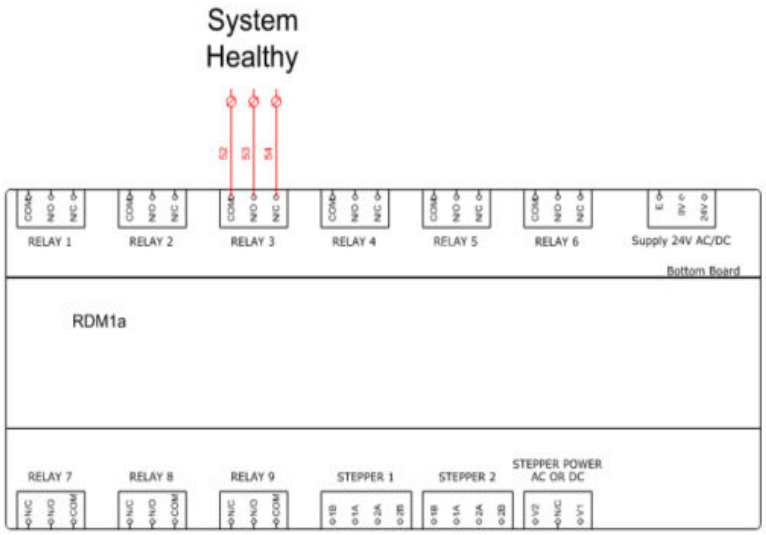
9.1 Acer 65/50kW Power Wiring

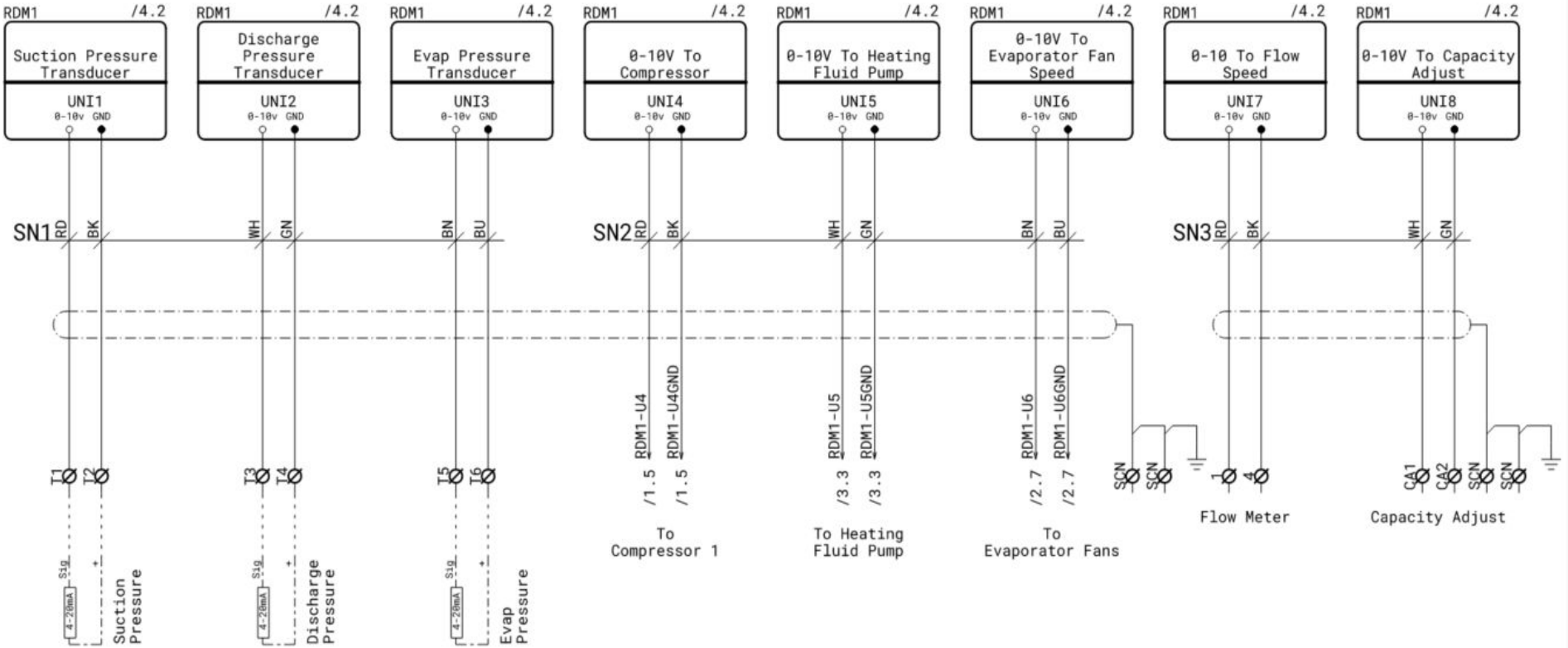



/1.10 L1
/1.10 L2
/1.10 L3
/1.10 N
L1 /3.1
N /3.1
CB3
/CE:1.6
C4A
CB4
/CE:1.6
C6A
CB5
/CE:1.6
C6A
/1.10 CB3
RR1
/1.6
Thermostat
PSU
/CE:1.7
2.5A
MEAN WELL
19 0V DC /5.1
18 +24V DC /5.1
RDM1-U6 /6.7
RDM1-U6GND /6.7
BN
BU
RDM1 /4.2
Evaporator Fan 1
Healthy
Status2
RDM1 /4.2
Evaporator Fan 2
Healthy
Status3
EBM
ZIEHL
Crankcase
Heater 1 (120W)
Extract
Fan
Evaporator Fan 1
Evaporator Fan 2


/2.10 L1
/2.10 N
CB6
/CE:1.7
C6A
RDM1a /5.8
COM
R5
N/C
N/O
RDM1-U5 /6.6
RDM1-U5GND /6.6
RDM1 /4.2
Heating Pump Healthy
Status4
GND SIG
WH
GN
24
25
26
27
3A
N
PE1
PE2
E2
G2
PE1
PE2
L1
N
PE
ENABLE
ENABLE
10V
0-10V
GND
COM
NO
M
1~
Heating Pump

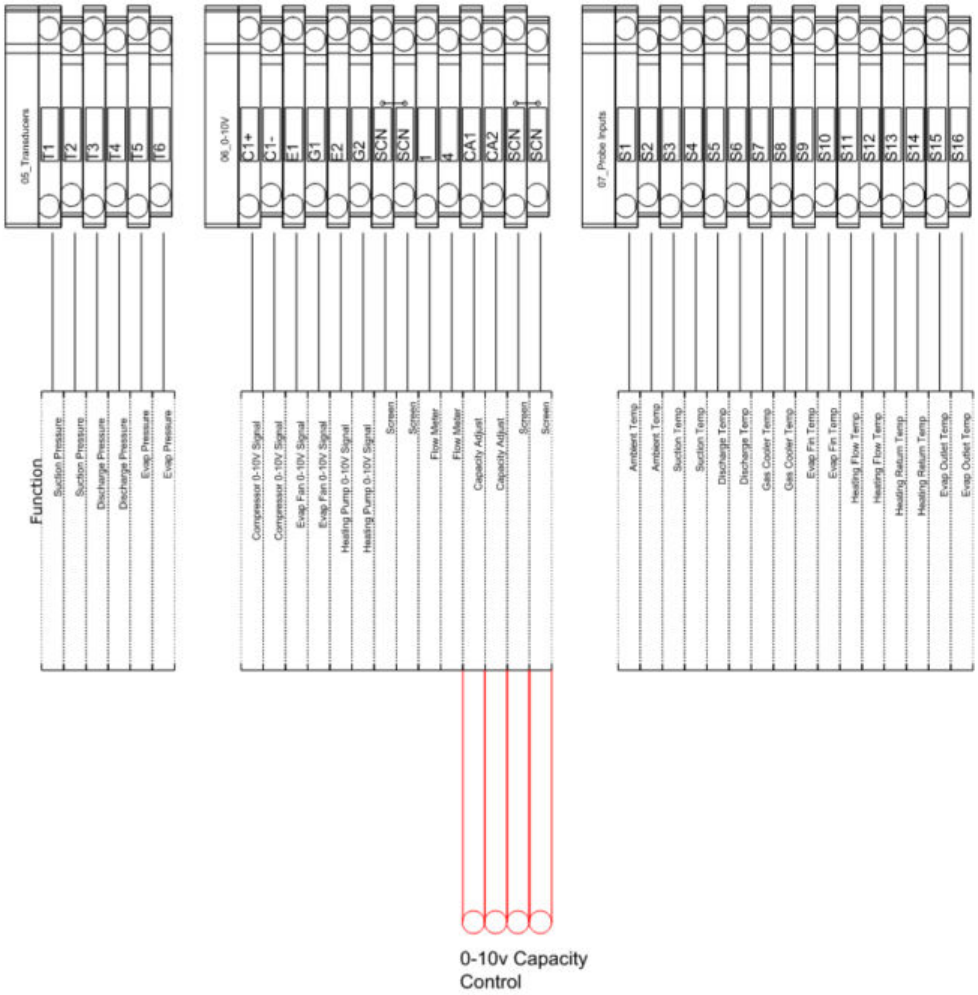

RDM1
PR0652CDNF-TDB
ETHERNET 1
ETHERNET 2
10/100 BaseT
USB HOST 1
TERM
CANBUS
DISPLAY
PWM OUTPUTS
Top Board
USB DEVICE
USB HOST 2
RELAYS
STATUS INPUTS
STATUS INPUTS
UNIVERSAL INPUTS/OUTPUTS
PROBE INPUTS
30
31
BMS1
BMS2
Remove Link
For Remote
BMS Connection
CA1
CA2
SCN
SCN
0-10V To Capacity Adjust


System
Healthy
S2
S3
S4
RELAY 1
RELAY 2
RELAY 3
RELAY 4
RELAY 5
RELAY 6
Supply 24V AC/DC
Bottom Board
RDM1a
RELAY 7
RELAY 8
RELAY 9
STEPPER 1
STEPPER 2
STEPPER POWER
AC OR DC


RDM1 /4.2
Suction Pressure Transducer
UNI1
0-10v GND
RDM1 /4.2
Discharge Pressure Transducer
UNI2
0-10v GND
RDM1 /4.2
Evap Pressure Transducer
UNI3
0-10v GND
RDM1 /4.2
0-10V To Compressor
UNI4
0-10v GND
RDM1 /4.2
0-10V To Heating Fluid Pump
UNI5
0-10v GND
RDM1 /4.2
0-10V To Evaporator Fan Speed
UNI6
0-10v GND
RDM1 /4.2
0-10 To Flow Speed
UNI7
0-10v GND
RDM1 /4.2
0-10V To Capacity Adjust
UNI8
0-10v GND
SN1 RD BK WH GN BN BU
SN2 RD BK WH GN BN BU
SN3 RD BK WH GN
RDM1-U4
RDM1-U4GND
RDM1-U5
RDM1-U5GND
RDM1-U6
RDM1-U6GND
/1.5
/1.5
/3.3
/3.3
/2.7
/2.7
SCN
SCN
1
4
CA1
CA2
SCN
SCN
T1
T2
T3
T4
T5
T6
4-20mA
Sig
+
Suction Pressure
Discharge Pressure
Evap Pressure
To Compressor 1
To Heating Fluid Pump
To Evaporator Fans
Flow Meter
Capacity Adjust

Terminal Layout

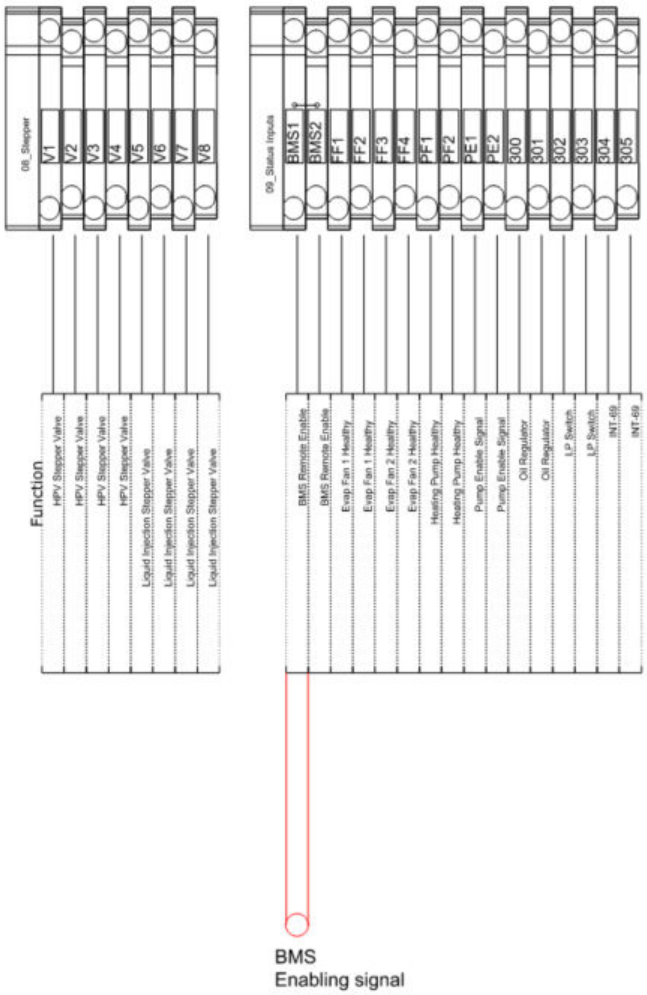
05_Transducers



0-10v Capacity
Control

Terminal Layout

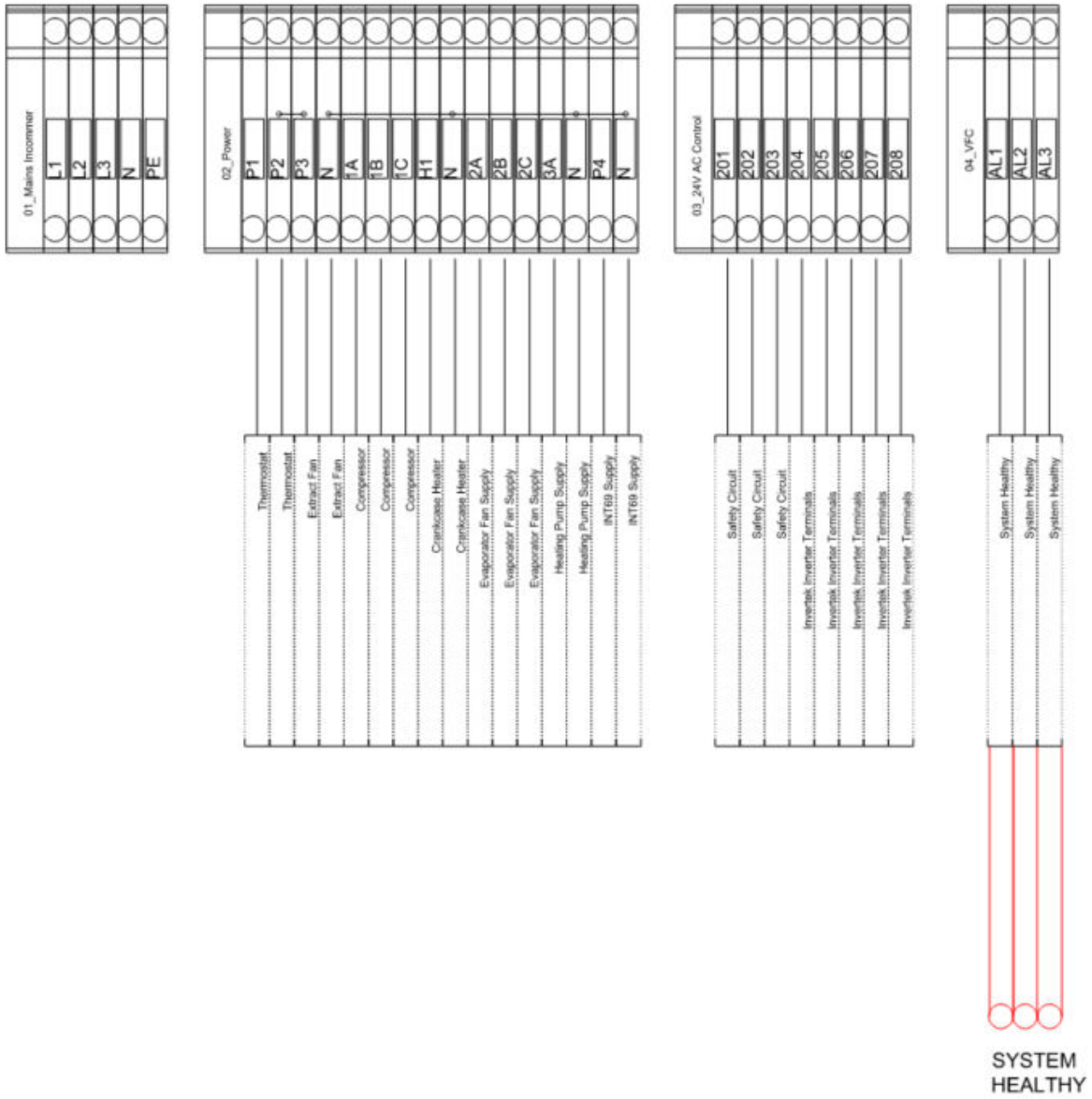
08_Stepper



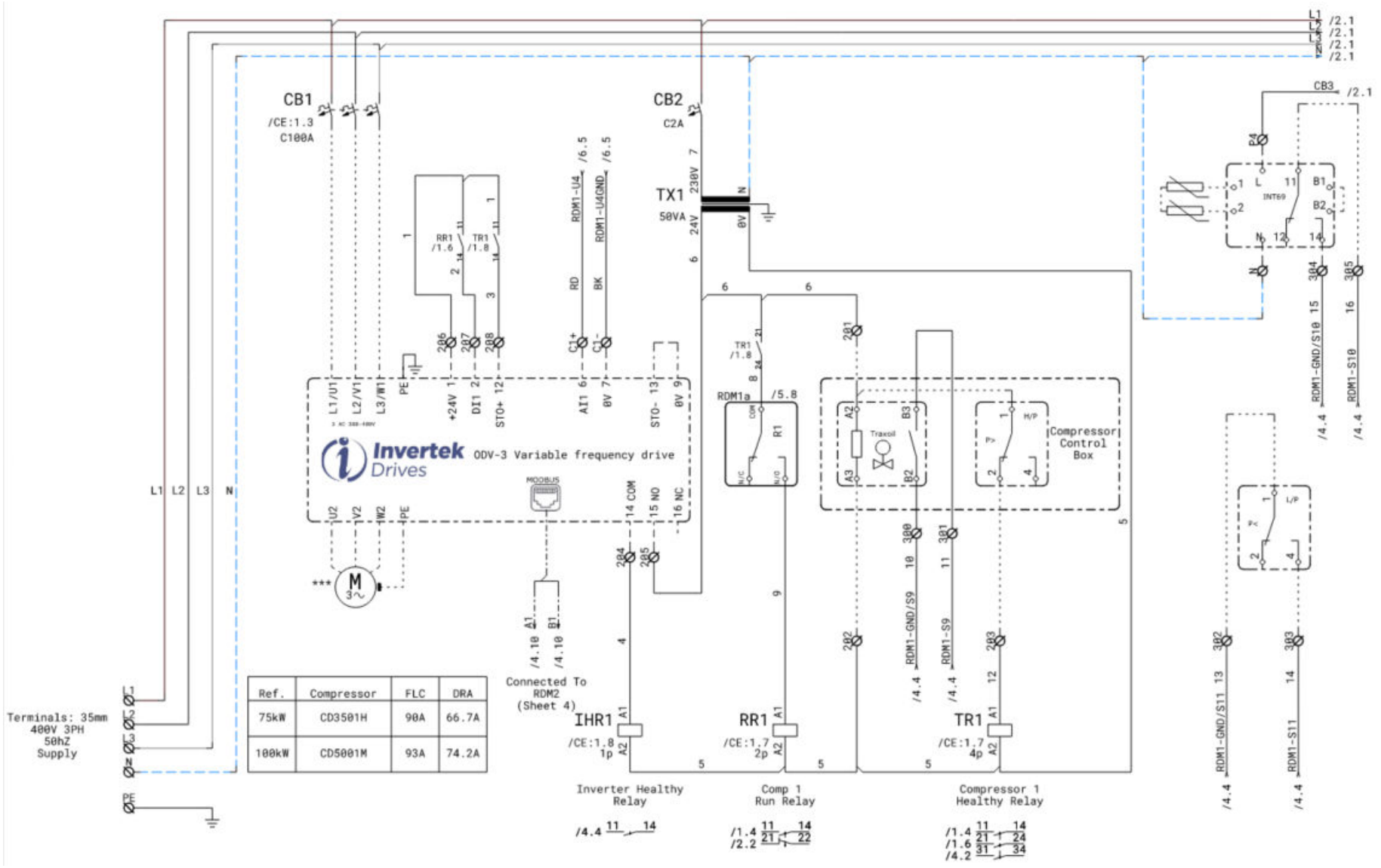
BMS
Enabling signal

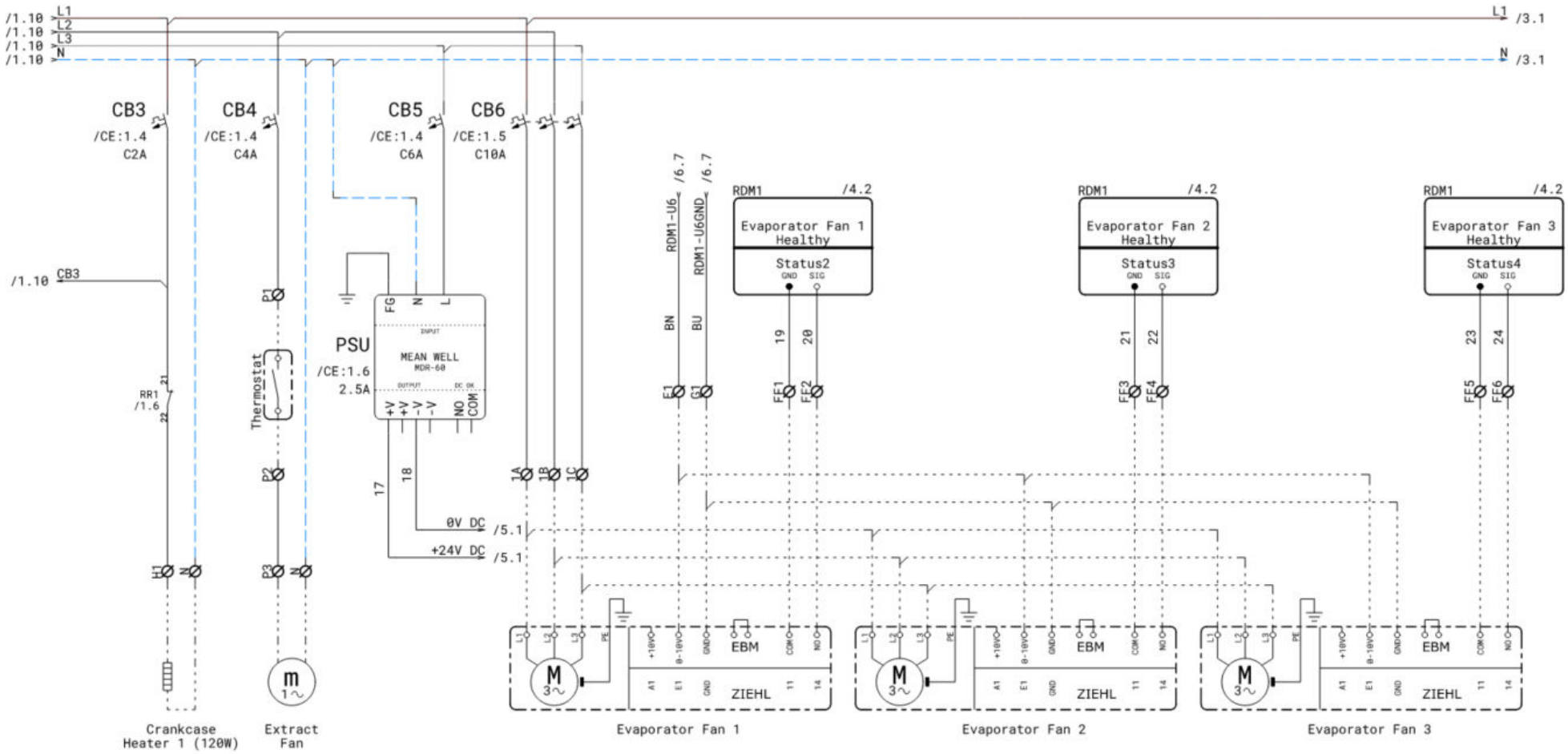
Terminal Layout

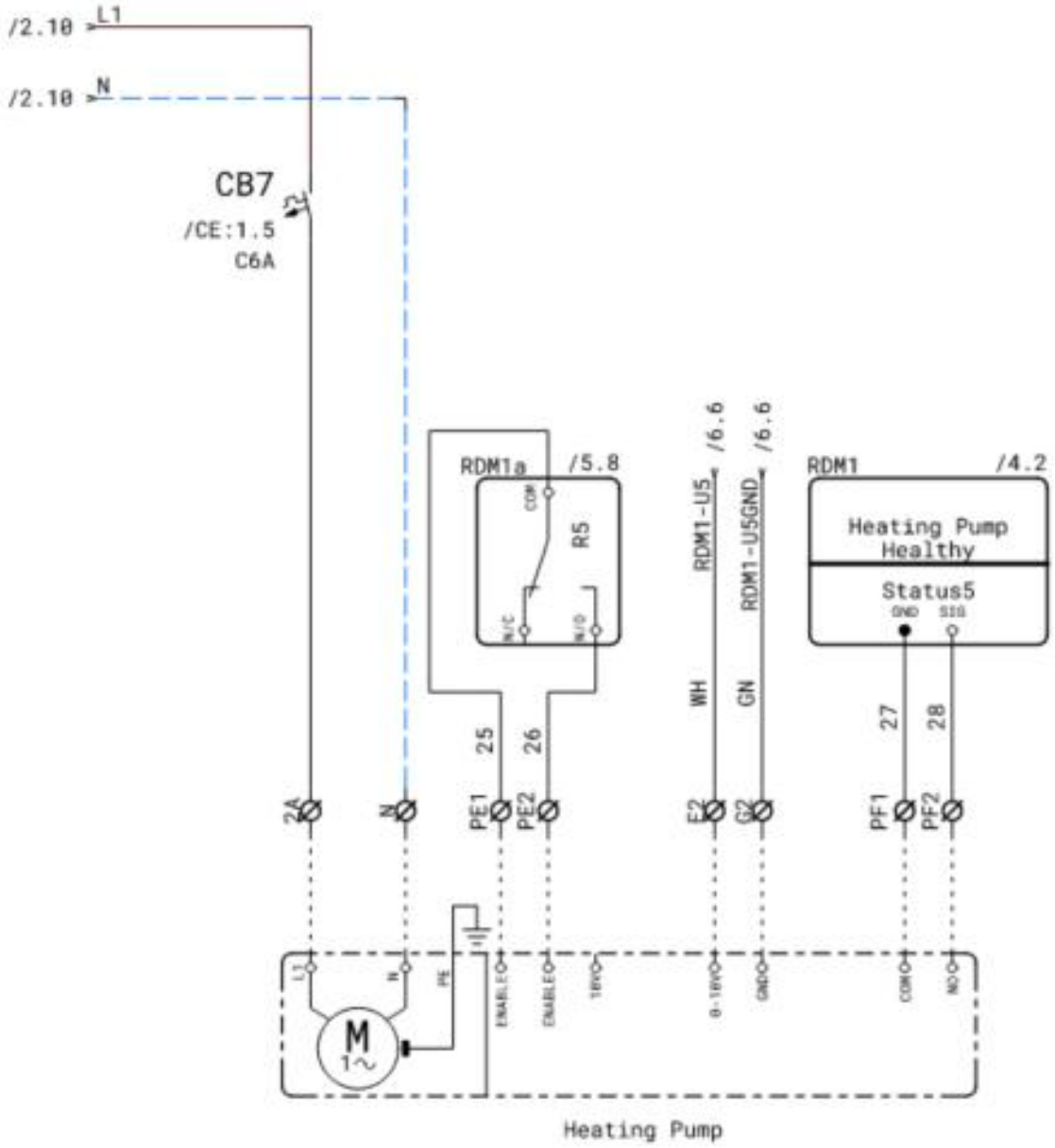
01_Mains Incommer

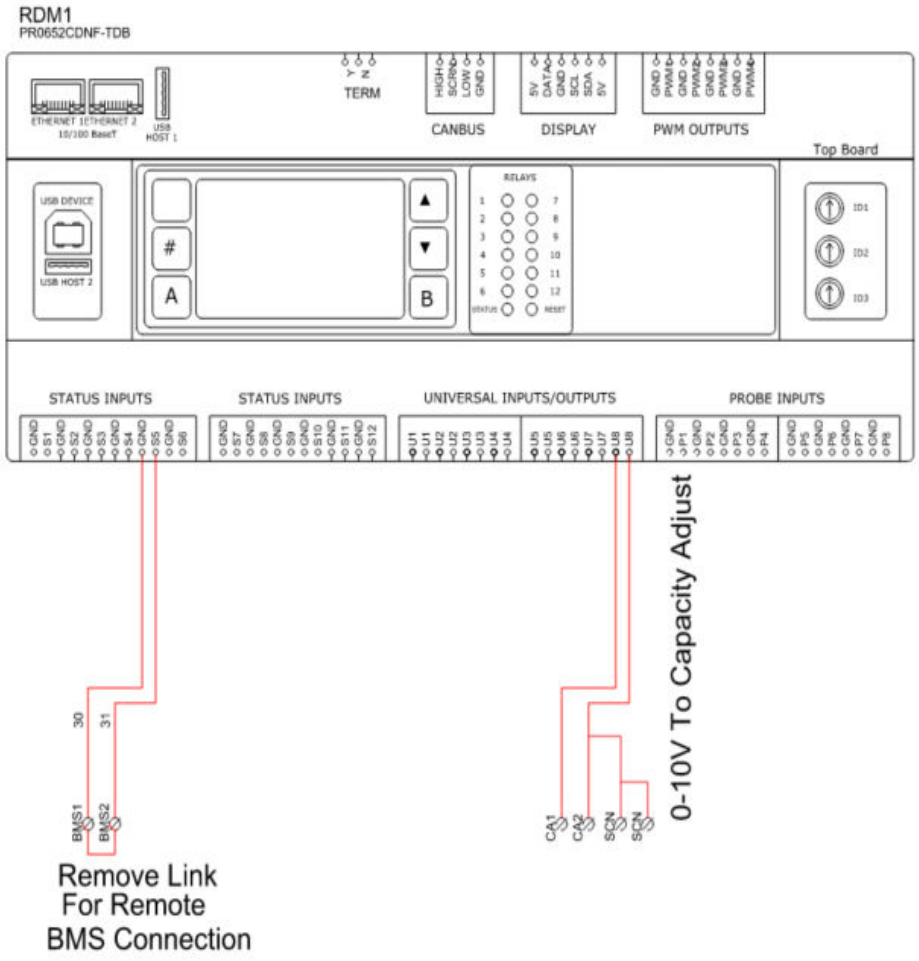


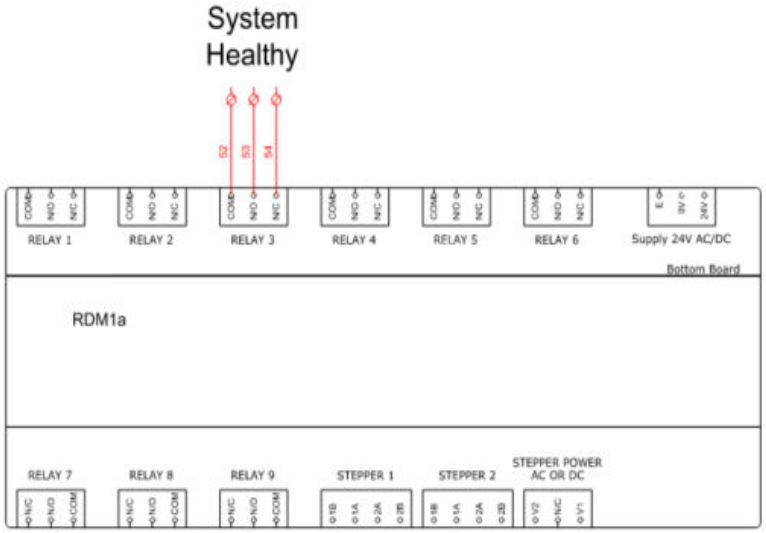
9.2 Acer 95/75 & 130/100kW Power Wiring

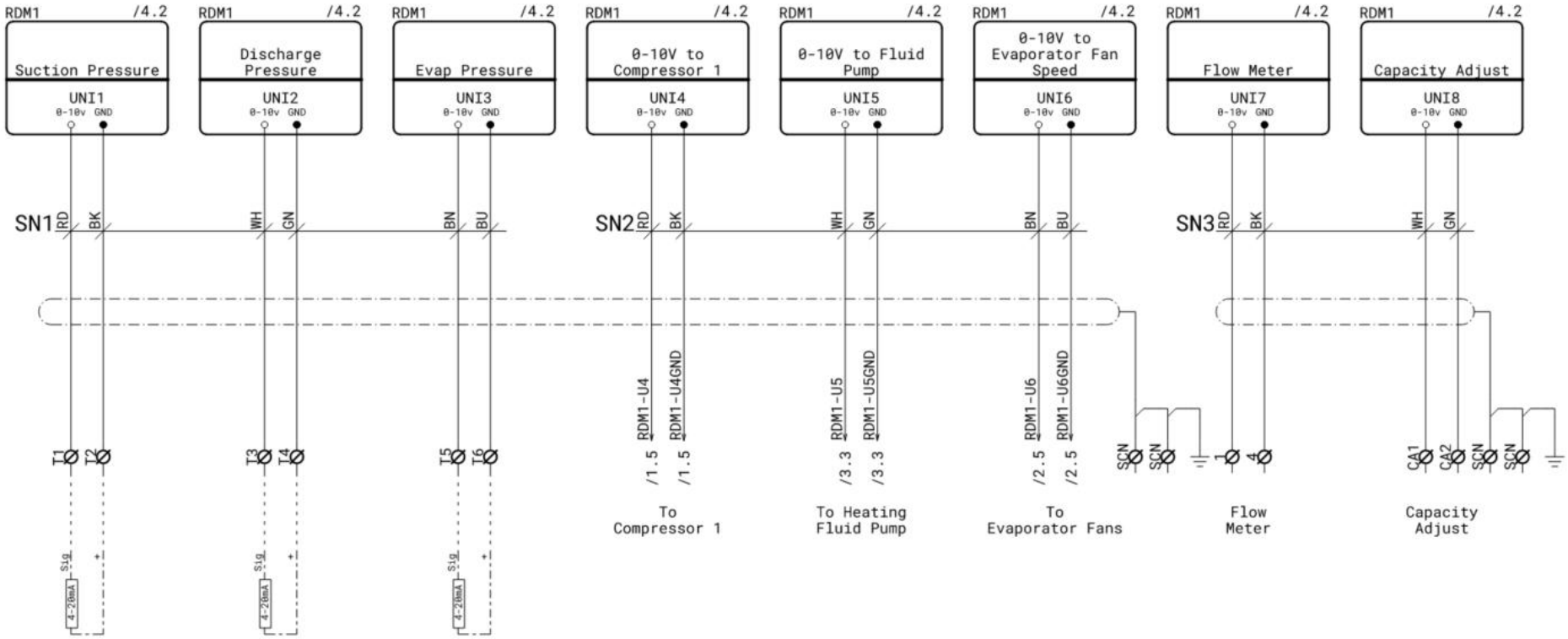


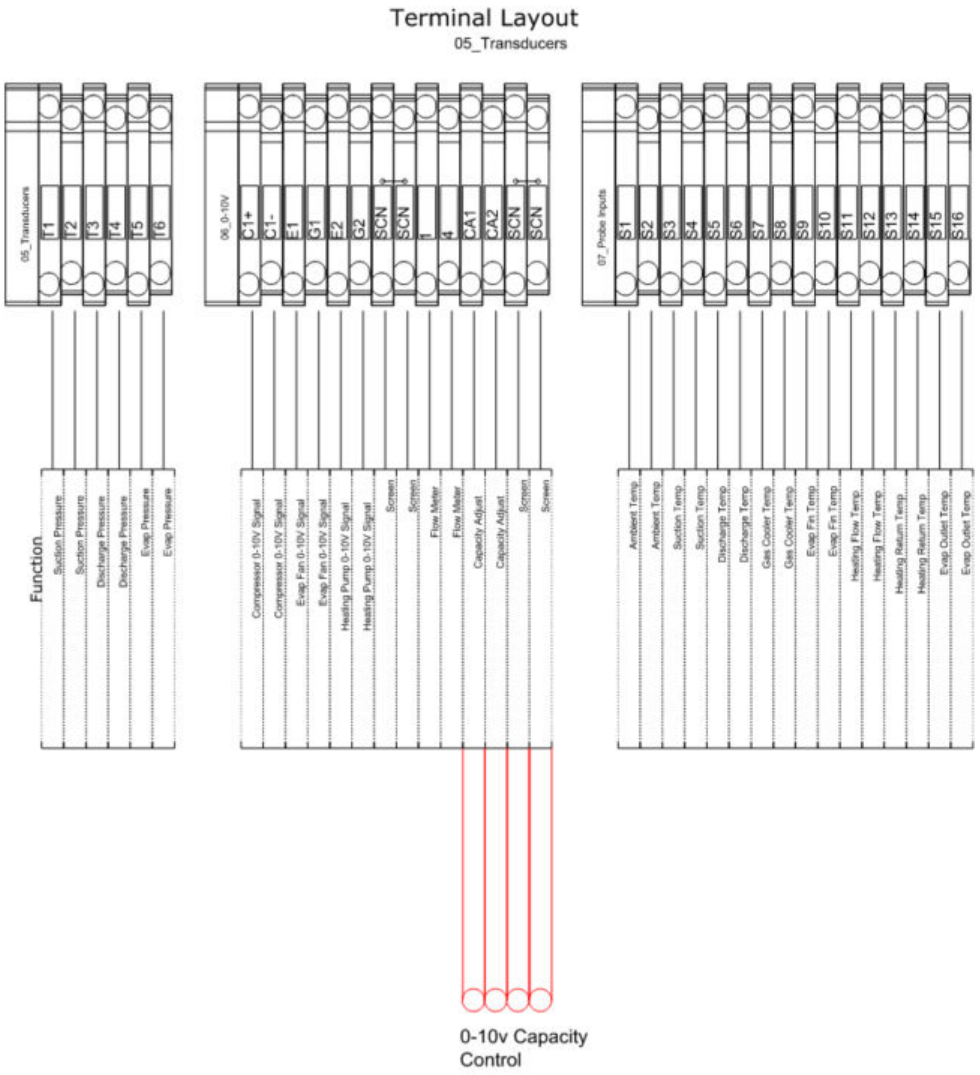

/1.10 L1
/1.10 L2
/1.10 L3
/1.10 N
/1.10 CB3
L1 /3.1
N /3.1
CB3
/CE:1.4
C2A
CB4
/CE:1.4
C4A
CB5
/CE:1.4
C6A
CB6
/CE:1.5
C10A
RR1
/1.6
Thermostat
PSU
/CE:1.6
2.5A
MEAN WELL
MDR-60
FG N L
+V +V -V -V NO COM
17 18
0V DC
+24V DC
/5.1
/5.1
1A 1B 1C
RDM1-U6 /6.7
RDM1-U6GND /6.7
BN BU
E1 G1
RDM1 /4.2
Evaporator Fan 1
Healthy
Status2
GND SIG
19 20
FE1 FE2
RDM1 /4.2
Evaporator Fan 2
Healthy
Status3
GND SIG
21 22
FE3 FE4
RDM1 /4.2
Evaporator Fan 3
Healthy
Status4
GND SIG
23 24
FE5 FE6
P1 P2 P3
H1
EBM
ZIEHL
Crankcase
Heater 1 (120W)
Extract
Fan
Evaporator Fan 1
Evaporator Fan 2
Evaporator Fan 3

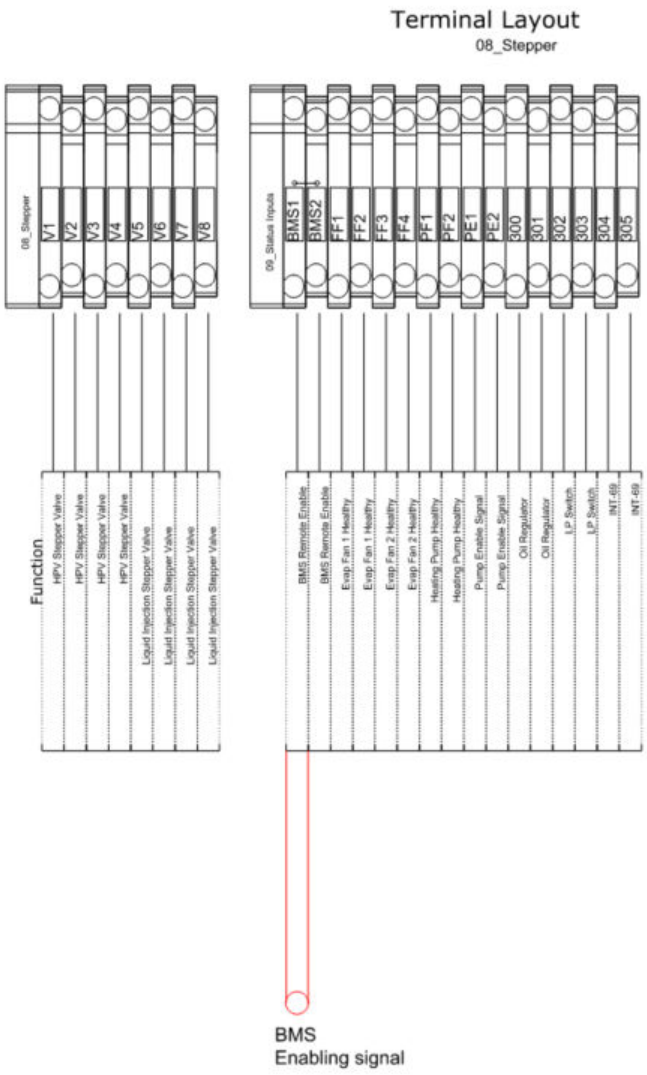

/2.10 L1
/2.10 N
CB7
/CE:1.5
C6A
RDM1a /5.8
COM
R5
N/C
N/O
RDM1-U5 /6.6
RDM1-U5GND /6.6
RDM1 /4.2
Heating Pump Healthy
Status5
GND SIG
WH
GN
25
26
27
28
2A
N
PE1
PE2
E2
G2
PF1
PF2
M
1~
L1
N
PE
ENABLE
ENABLE
1-10V
0-10V
GND
COM
NO
Heating Pump


RDM1
PR0652CDNF-TDB
TERM
CANBUS
DISPLAY
PWM OUTPUTS
Top Board
STATUS INPUTS
STATUS INPUTS
UNIVERSAL INPUTS/OUTPUTS
PROBE INPUTS
0-10V To Capacity Adjust
Remove Link
For Remote
BMS Connection


System
Healthy
RELAY 1
RELAY 2
RELAY 3
RELAY 4
RELAY 5
RELAY 6
Supply 24V AC/DC
Bottom Board
RDM1a
RELAY 7
RELAY 8
RELAY 9
STEPPER 1
STEPPER 2
STEPPER POWER
AC OR DC


RDM1 /4.2
Suction Pressure
UNI1
0-10v GND
RDM1 /4.2
Discharge Pressure
UNI2
0-10v GND
RDM1 /4.2
Evap Pressure
UNI3
0-10v GND
RDM1 /4.2
0-10V to Compressor 1
UNI4
0-10v GND
RDM1 /4.2
0-10V to Fluid Pump
UNI5
0-10v GND
RDM1 /4.2
0-10V to Evaporator Fan Speed
UNI6
0-10v GND
RDM1 /4.2
Flow Meter
UNI7
0-10v GND
RDM1 /4.2
Capacity Adjust
UNI8
0-10v GND
SN1
RD
BK
WH
GN
BN
BU
SN2
SN3
RDM1-U4
RDM1-U4GND
RDM1-U5
RDM1-U5GND
RDM1-U6
RDM1-U6GND
/1.5
/3.3
/2.5
SCN
CA1
CA2
T1
T2
T3
T4
T5
T6
Sig
4-20mA
To Compressor 1
To Heating Fluid Pump
To Evaporator Fans
Flow Meter
Capacity Adjust


Terminal Layout
05_Transducers
05_Transducers
f1
f2
f3
f4
f5
f6
06_0-10V
C1+
C1-
E1
G1
E2
G2
SCN
SCN
1
4
CA1
CA2
SCN
SCN
07_Probe Inputs
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
Function
Suction Pressure
Suction Pressure
Discharge Pressure
Discharge Pressure
Evap Pressure
Evap Pressure
Compressor 0-10V Signal
Compressor 0-10V Signal
Evap Fan 0-10V Signal
Evap Fan 0-10V Signal
Heating Pump 0-10V Signal
Heating Pump 0-10V Signal
Screen
Screen
Flow Meter
Flow Meter
Capacity Adjust
Capacity Adjust
Screen
Screen
Ambient Temp
Ambient Temp
Suction Temp
Suction Temp
Discharge Temp
Discharge Temp
Gas Cooler Temp
Gas Cooler Temp
Evap Fin Temp
Evap Fin Temp
Heating Flow Temp
Heating Flow Temp
Heating Return Temp
Heating Return Temp
Evap Outlet Temp
Evap Outlet Temp
0-10v Capacity
Control


Terminal Layout
08_Stepper
08_Stepper
V1
V2
V3
V4
V5
V6
V7
V8
09_Status Inputs
BMS1
BMS2
FF1
FF2
FF3
FF4
PF1
PF2
PE1
PE2
300
301
302
303
304
305
Function
HPV Stepper Valve
HPV Stepper Valve
HPV Stepper Valve
HPV Stepper Valve
Liquid Injection Stepper Valve
Liquid Injection Stepper Valve
Liquid Injection Stepper Valve
Liquid Injection Stepper Valve
BMS Remote Enable
BMS Remote Enable
Evap Fan 1 Healthy
Evap Fan 1 Healthy
Evap Fan 2 Healthy
Evap Fan 2 Healthy
Heating Pump Healthy
Heating Pump Healthy
Pump Enable Signal
Pump Enable Signal
Oil Regulator
Oil Regulator
LP Switch
LP Switch
INT-69
INT-69
BMS
Enabling signal

Terminal Layout

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CLADE

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