

R448A/R449A

JCC3

CELLAR AND PRODUCT COOLERS

ISSUE: 01.06.2023



IMPORTANT!

READ BEFORE PROCEED!

GENERAL SAFETY GUIDELINES




This guideline is intended for users to ensure safe installation, operation and maintenance of J & E Hall Cellar and Product Coolers. This guideline is not intended to replace the system expertise available from the system manufacturers.

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual should have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

 WARNING	Warning! Risk of serious injury or death to person!
 CAUTION	Caution! Danger which can lead to serious damages!
 NOTICE	Notice! Risk of damage to equipment!

NOTICE

Disposal requirement



Your refrigeration product is marked with this symbol. This means that electrical and electronic products shall not be mixed with unsorted household waste. Do not try to dismantle the system yourself: the dismantling of the refrigeration system, treatment of the refrigerant, of oil and of other parts must be done by a qualified installer in accordance with relevant local and national legislation. Refrigeration equipment must be treated at a specialized treatment facility for re-use, recycling, and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. Please contact J & E Hall for more information.

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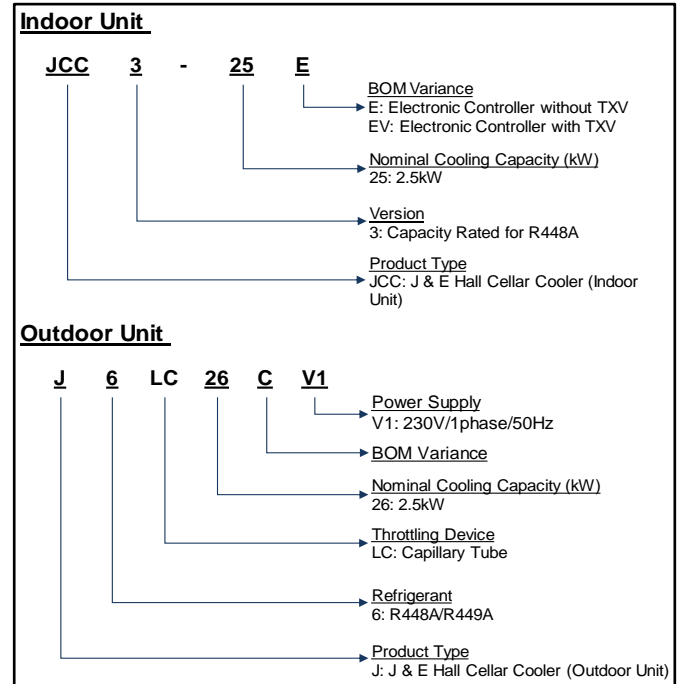
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Nomenclature

Figure 1: Product Nomenclature



Product Features

J & E Hall Cellar and Product Cooler is a single split refrigeration equipment consisting of indoor and outdoor unit integrated with capillary (metering device). The equipment is connected via copper pipes (not supplied) and **needs to be charged with R448A or R449A at field**, to cool and maintain a storage space temperature range down to +4°C and up to +16°C. This range of temperature makes it suitable for preservation of beers, wines, flowers, fruit, vegetables etc.

Main features of the indoor and outdoor listed below:

The indoor unit consist of:

- 6 fins/inch Al-Cu evaporator coil
- AC axial fan with run capacitor
- Digital thermostat with off cycle defrost
- Low pressure protection switch
- Polyester powder coated steel casing
- Accessories: 1"-1.4UNF drain pipe fitting

And the outdoor unit consist of:

- Single phase rotary compressor with Permanent Split Capacitor (PSR wiring)
- AC axial fan with run capacitor
- Al – Cu condenser with inner groove 7mm
- Manual reset high pressure safety switch (cartridge type)
- Acoustic insulation on compressor
- 100 % molecular sieve core filter drier
- Capillary throttling device.
- Service valves with braze connection

Specifications

Table 1: Capacity Data

System Indoor + Outdoor	Cooling capacities in kW at 32°C ambient temperature ⁽¹⁾							
	4°C ⁽²⁾	6°C	8°C	10°C	12°C	12.7°C	14°C	16°C
JCC3-25E + J6LC26CV1	2.41	2.50	2.59	2.67	2.76	2.79	2.85	2.94
JCC3-40E + J6LC41CV1	3.47	3.62	3.76	3.91	4.06	4.11	4.20	4.35
JCC3-55E + J6LC56CV1	4.63	4.87	5.10	5.33	5.56	5.64	5.79	6.03

Notes:

- (1) Cooling capacity rated at standard pipe length 7.6m.
- (2) Room temperature of +4 °C is only applicable with pipe lengths not more than 15m.

Table 2: System Data

Unit Model	Cooling Capacity kW ⁽²⁾	System Pipe Sizes		Maximum Pipe Run ⁽³⁾		Unit Airflows m ³ /h	Indoor Air throw ⁽⁴⁾ m	Noise Levels ⁽¹⁾ dB(A)	Recommended base charge		Additional charge ⁽⁶⁾ g/m
		Liquid	Gas	Length	Rise				R448A/R449A		
									kg	TCO ₂	
JCC3-25E	2.79	1/4"	1/2"	25m	5m	2560	8	48	n/a	n/a	n/a
J6LC26CV1						2070	n/a	26	1.30	1.80	12
JCC3-40E	4.11	1/4"	1/2"	25m	8m	2270	8	48	n/a	n/a	n/a
J6LC41CV1						2225	n/a	26	1.75	2.43	6
JCC3-55E	5.64	1/4"	5/8"	25m	8m	2475	8	45	n/a	n/a	n/a
J6LC56CV1						2984	n/a	31	2.20	3.05	15

Notes:

- (1) Noise levels are sound pressure levels @ 10m free field
- (2) Cooling capacities are nominal duties @ 12.7°C DB / 10°C WB and 32°C ambient
- (3) The pipe length has include the rise (the rise indicated is not an additional to the length).
- (4) Indoor unit air throw distance is based on final air velocity of 0.4m/s.
- (5) For piping exceeds 15m, fan speed controller is recommended to be installed in outdoor unit.
- (6) An additional charge is required for pipe lengths more than 7.6m.



NOTICE

For applications where:

- Back-to-back installation, at least 1.5-meter pipe run with loop (to damp vibration) is required to avoid sound of outdoor unit transferred to indoor unit via connecting pipe.
- The system pipe run **exceeds 15m** up to the maximum of 25m, a fan speed controller (not supplied as standard) is recommended to be fitted to the condensing unit. Refer **Section Fan Speed Controller** for details. This is to eliminate too low evaporating temperature which cause formation of thick frost on evaporator coil.

Table 3: Unit Dimensions and Weights

Model	Unit Dimensions (mm)			Fixing Centres (mm)		Unit Weights kg	Packing Dimensions (mm)			Packing Weights kg
	Width ⁽²⁾	Depth	Height	Width	Depth		Width	Depth	Height	
JCC3-25E	865	372 ⁽¹⁾	489	745	n/a	31	968	534	517	37
J6LC26CV1	855	328	651	603	362	38	990	415	693	41
JCC3-40E	865	372 ⁽¹⁾	489	745	n/a	33	968	534	517	39
J6LC41CV1	855	328	651	603	362	42	990	415	693	46
JCC3-55E	904	370 ⁽¹⁾	546	826	n/a	38	1006	534	576	45
J6LC56CV1	855	328	753	603	362	46	990	415	793	50

Notes:

- (1) Unit depth does not include fan motor depth - add 120mm
- (2) Unit width does not include pipe services - add approximately 70mm

Table 4: Electrical Data and Requirements

Model *Indoor *Outdoor	Outdoor Unit		Compressor		Fan/Unit			Power Supply	Mains Power To	Interconnecting Power Cable + Control Cable ⁽⁵⁾	Suggested Fuse Rating
	PI ⁽¹⁾	RRC ⁽²⁾	LRA ⁽³⁾	MOC ⁽⁴⁾	PI ⁽¹⁾	RRC ⁽²⁾	Qty				(A)
	(kW)	(A)	(A)	(A)	(W)	(A)		V/Ph/Hz	(A)		
JCC3-25E	n/a	n/a	n/a	n/a	232	0.99	1	230/1/50	Indoor	3C2.5mm ² + 2C1.0mm ²	16
J6LC26CV1	1.01	4.3	30	6.0	80	0.35	1				
JCC3-40E	n/a	n/a	n/a	n/a	236	0.96	1	230/1/50	Indoor	3C2.5mm ² + 2C1.0mm ²	20
J6LC41CV1	1.64	7.2	36	10.9	80	0.35	1				
JCC3-55E	n/a	n/a	n/a	n/a	210	0.95	1	230/1/50	Indoor	3C4.0mm ² + 2C1.0mm ²	25
J6LC56CV1	1.99	9.2	42	13.5	120	0.52	1				

Notes:

- (1) PI: Power Input at nominal duties @ 12.7°C DB / 10°C WB and 32°C ambient
- (2) RRC: Rated Running Current at nominal duties @ 12.7°C DB / 10°C WB and 32°C ambient
- (3) LRA: Locked Rotor Amps rated at 230V, 50Hz
- (4) MOC: Maximum Operating Current
- (5) Control cable need to be drawn from two terminals of indoor unit to connect to the high-pressure switch at outdoor unit for compressor protection. Please refer to **Figure 15** and **Figure 16** on page 14 for wiring connections.

Health and Safety



CAUTION

Only a qualified refrigeration engineer, who is familiar with refrigeration systems and components including all controls, should perform the installation and start-up of the system. To avoid potential injury, use care when working around coil surfaces or sharp edges of metal cabinets. All piping and electrical wiring should be installed in accordance with all applicable codes, ordinances, and local by-laws.

- Do not drop the unit. Should this inadvertently happen, it should be immediately unpacked and inspected for damage.

During Installation and subsequent maintenance

- Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations and experienced with this type of equipment.
- Safe working methods are identified, and operatives should have suitable PPE.
- Ensure the working area has adequate ventilation during brazing procedures.
- The units contain moving machinery and electrical power hazards, which may cause severe injury or death. Disconnect and shut off power before installation or service of the equipment.
- Refrigerant release into the atmosphere is illegal. Proper evacuation, recovery, handling, and leak testing procedures must always be observed.
- Units must be **grounded to the screw terminal** labelled



- No maintenance work should be attempted prior to disconnecting the electrical supply.
- The electrical covers and fan guards must remain always fitted.
- Use of the units outside of the design conditions and the application for which the units were intended may be unsafe and be detrimental to the units, regardless of short- or long-term operation.

General information

Before Installation

- Ensure the units received are the correct models for the intended application.
- Ensure the refrigerant, voltage and MWP are all suitable for the proposed application.
- Check there is no damage to the units. Any damage should be reported to the supplier immediately.
- Check that the proposed equipment locations are suitable and provide adequate support for the weight of the units.

Offloading and Lifting

- Whenever a unit is lifted, it should be from the base and, where possible, all packing and protection is kept in position.
- If lifting equipment is required, ensure that it is suitable, certificated, and that the operators are qualified to use it.
- When using a fork-lift or pallet truck to lift the unit, the two support points should be sufficiently apart to give stability when lifting and suitably placed to distribute the load on the forks.
- If slings are used, care should be taken to ensure that the slings do not crush the casework or coil.

Installation

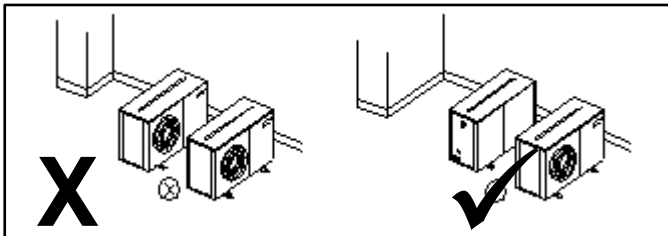
Unit location and Fixing

Both indoor and outdoor units must be level in all directions.

Outdoor

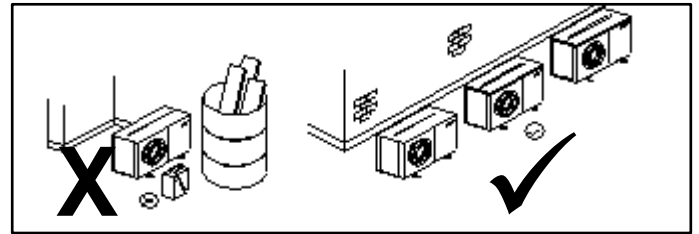
- The installer must fix the unit securely on installation using the M8 bolt holes in the unit feet to prevent instability from accidental contact.
- It is recommended to install the outdoor unit on rubber grommet or vibration dampers.
- The units are not designed to withstand loads or stress from other equipment or personnel. Such extraneous loads or stress may cause failure/leak/injury.
- The units are not designed to operate with any restrictions such as heavy snowfall around them. Additional measures (such as shielding of the units) shall be implemented as required.
- To achieve maximum cooling capacity, the installation location for the condensing unit should be carefully selected.
- Install the outdoor unit in such a way so that hot air ejected by the unit cannot be drawn in again (short circuit of hot discharge air). Refer **Figure 2**.

Figure 2: Positioning of Condensing Unit



- Ensure that there is no obstruction to air flow into or out of the unit. Remove obstacles which block air intake or discharge. Refer **Figure 3**.

Figure 3: Air Circulation for Condenser



- Allow sufficient space for maintenance around the unit. Refer **Figure 4**.
- The location must be well ventilated, so the unit can draw in and distribute plenty of air thus lowering the condensing temperature.
- To optimize the unit running conditions, the condenser coil must be cleaned at regular intervals.



NOTICE

Special attention should be given to an outdoor unit installed near to the sea as this can reduce unit lifespan due to corrosion of metal parts.

Indoor

- The indoor units can be mounted directly to a wall or to the ceiling utilizing the fixing holes on the rear of the unit or on the top of the unit. No additional brackets are required.
- A minimum 10mm rawl bolt type fixing is required with a large steel washer to bear the indoor unit weight. It is important to ensure that the wall/ceiling can withstand the unit weight and that all fixings are secure.
- Position the indoor unit where the optimum airflow can be achieved. Avoid locating in corners or in alcoves which may restrict airflows.
- Avoid mounting indoor directly over door openings. It is recommended to locate the indoor opposite door openings to reduce infiltration and the amount of warm, humid air drawn into the cold room. Also, to locate indoors so that the distance to the opposite wall does not exceed the unit's rated air throw distance.
- The installation location should allow sufficient space for air flow and maintenance around the units. Refer **Figure 5**.

Figure 4: Installation Clearance (Outdoor Unit)

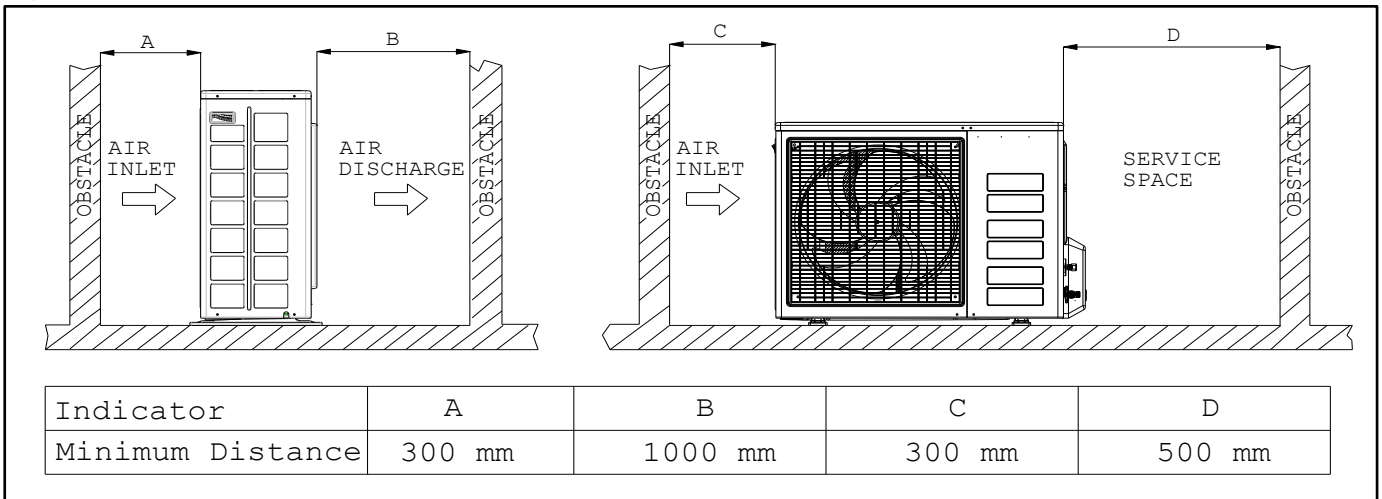
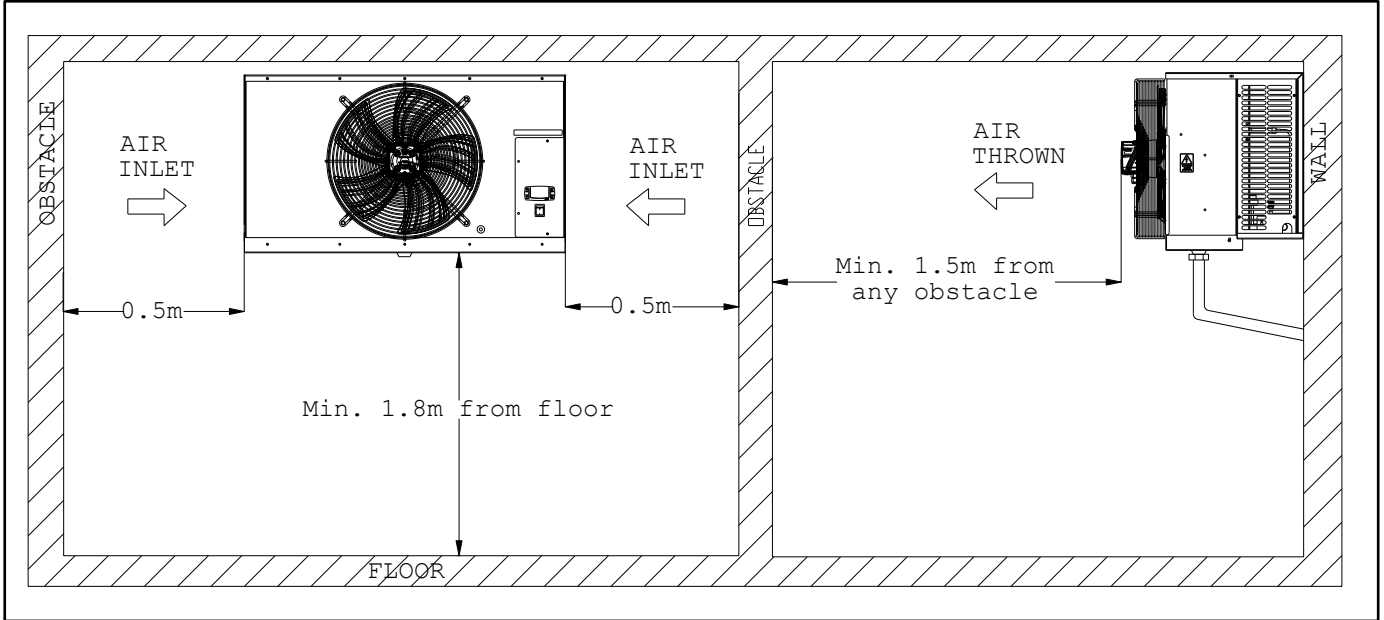


Figure 5: Installation Clearance (Indoor Unit)



Field piping



NOTICE

Pipe sizes and maximum lengths/heights should be strictly as per the information given on Table 2. All local codes of practice must be observed in the installation of refrigerant piping.

To ensure satisfactory operation and performance, the following points should be noted for field piping arrangements:

- Pipework routes must be as simple and as short as possible.
- Use of incorrect pipe sizes can affect system pressures/temperatures and gas velocity for proper oil return.
- Avoid low points on pipework where oil can accumulate.
- Use only clean, dehydrated refrigeration grade copper tube with long radius bends.
- When brazing use brazing filler alloys containing phosphorus such as BCuP-7 without flux for joining copper tubes.
- Run braze without over filling to ensure there is no leakage into the tube.
- To prevent oxidation, blow oxygen free nitrogen through pipework when brazing.
- Protect the casing of the unit when brazing connections.
- Install insulation with a minimum wall thickness of 3/8" on both liquid and suction lines.
- Adequately support all pipe work at a maximum of 2-meter intervals.
- In vertical pipework, the use of U-trap is often required. This suction riser must always be fitted with a U-trap at the bottom and a P trap at the top and never be higher than 4m unless a second U-trap system is fitted. Maximum rise on Table 2 must be followed, limited by compressor ability to handle pressure drop. Refer Figure 6.
- Field piping for outdoor unit located below indoor unit: Inverted P-trap is necessary to prevent refrigerant from draining into the compressor during off-cycle. Refer Figure 7.

- One of the main factors affecting equipment reliability and compressor service life is refrigeration circuit contamination. During installation, circuit contamination can be caused by:



NOTICE

- Brazing & Welding Oxides
- Filings & Particles from de-burring pipework
- Brazing Flux
- Moisture & Air

Figure 6: Piping Layout for Outdoor Above Indoor

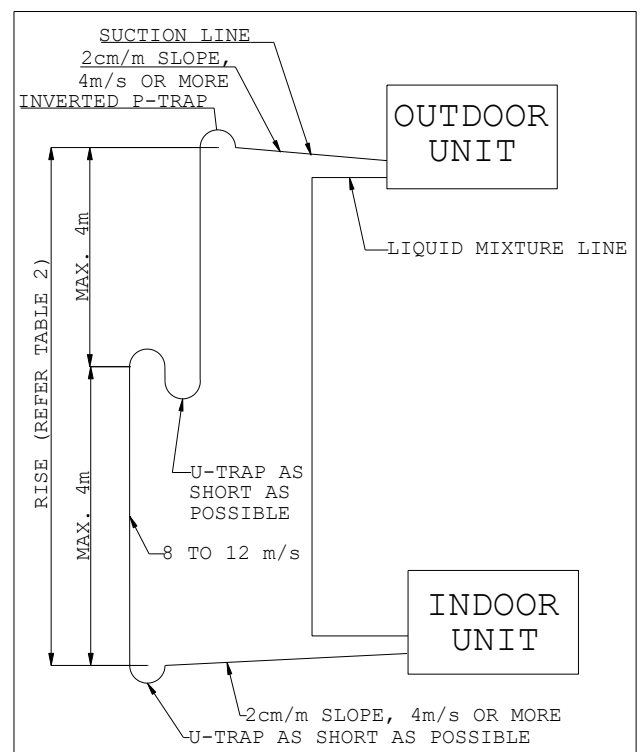
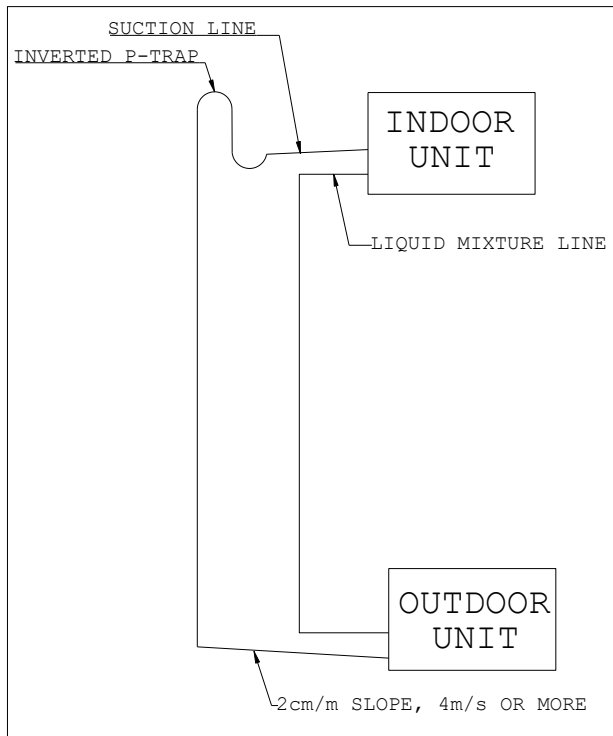


Figure 7: Piping Layout for Outdoor Below Indoor



Pressure testing



CAUTION

Never use oxygen, dry air, or acetylene for pressure testing of the system as these may form an inflammable mixture.



NOTICE

The outdoor unit is NOT pre-charged with refrigerant from factory. Refer Table 2 for the recommended base charge.

- Both the indoor and outdoor units are pressure tested in the factory prior to dispatch. All units come with a holding charge of oxygen free nitrogen ~2barg. Remove the holding charge indication tag which is tied on the service valve of outdoor unit before installation.
- Once the pipework installation is complete, it should be pressure tested for the leaks prior to evacuation.
- A pressure leak test should be carried out using oxygen free nitrogen (OFN). A calibrated nitrogen pressure regulator must always be used. Before starting any pressure testing, ensure the area surrounding the system is safe, inform relevant personnel and fit warning signs indicating high pressure testing. Also, use correct PPE as required.

A simple procedure for testing is as follows:

- Connect a pressure hose from the regulator to the schrader connection on the service port (both suction and liquid line) on the outdoor unit.
- Pressurize the system slowly up to 3 bar (45 psi) for 5 minutes and check for any signs of leakage.
- Increase pressure slowly up to 10 bar (150 psi) for 5 minutes and check for any signs of leakage.

- Increase pressure slowly up to 20 bar (300 psi) and check for any signs of leakage. Leave system under pressure for 24 hours.
- Listen for any possible leaks and check all joints with bubble spray. If any leaks are discovered, release pressure slowly from the system until empty, repair leak and then repeat pressure testing procedure. Never attempt to repair a leak on a pressurized system.

A strength test should also be incorporated according to local regulations. Never exceed maximum working pressures shown in **Table 5**. Failure to obey the limit will cause premature failure on the pressure safety device.

Table 5: Maximum Working Pressure

High Side, barg (psig)	Low Side, barg (psig)
28 (405)	19 (275)

Once testing has been completed satisfactorily, release the pressure from the system gradually and safely to external atmosphere.

Evacuation & Charging



NOTICE

Moisture prevents proper functioning of the compressor and the refrigeration system. Ensure that a good quality vacuum pump is used to pull a minimum vacuum of 250 microns (0.25 torr).

Once pressure testing has been completed, the system can now be evacuated to remove air and any moisture from the piping. This can be done as follows:

- Ensure any nitrogen charge is safely released from the system.
- Connect a gauge manifold to the schrader connection on the service valve on the outdoor unit.
- Connect a vacuum pump and vacuum gauge to the system.
- Evacuate the system until vacuum is below 250 microns (0.25 torr).



NOTICE

A triple evacuation procedure is recommended for all new systems or where moisture is suspected.

- Once the system is isolated and the vacuum pump is switched off, any rise in pressure indicates that either there may be a leak in the system or moisture is still present. In this case, recheck the system for leaks, repair as necessary, and then repeat the evacuation procedure.
- Once evacuation is completed satisfactorily, the vacuum pump and vacuum gauge can be removed. At this point, the refrigerant charge can be added to the system as required. Refrigerant blend must be charged in liquid form to avoid change of chemical properties.
- Ensure an adequate liquid charge (4~5barg) has been introduced to the high side of the system before starting the compressor.
- The remaining charge is slowly throttled into suction side until the installation has reached a level of stable nominal condition during operation. **Charging liquid into the suction side of the system should ONLY be**

done with a metering device. Ensure a minimum operating pressure 0.5 barg is maintained when adding refrigerant to the suction side, otherwise overheating of the compressor may occur. Use calibrated weighing scales to add base refrigerant plus any additional charge required which specified in **Table 2**.

- Stop the filling once obtain the correct charge amount (at this point, there is sufficient suction superheat and liquid subcooling), remove the cylinder from circuit.

Drainage



The evaporator drain pan fitting is supplied loose and must be fitted on site.

NOTICE

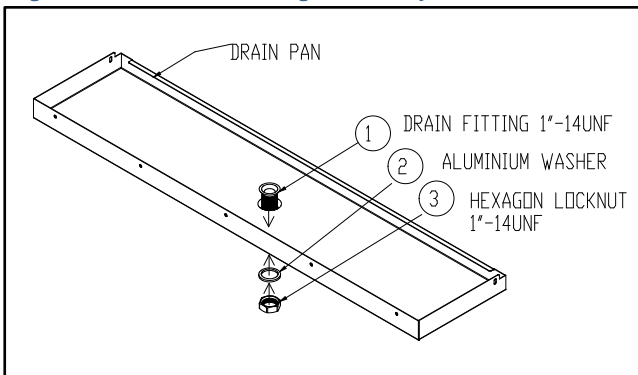
Correct fitting is vital to ensure leak free operation. The lock nut and the aluminium washer on the drain fitting **MUST** be fitted the right way around; otherwise, it will not tighten against the drip tray. One side of the nut has an angled recess – this must be facing towards the drip tray. The fitting does not require any sealant, but a small amount of silicon sealant can be applied between the flared face of the fitting and the drip tray if so desired.

The accessories bag is tied to the indoor unit's fan guard and consists of:

- instruction manual,
- 1pcs aluminum alloy drain fitting 1"-14UNF male thread,
- 1pcs hexagon locknut and
- 1pcs aluminium washer

To install the drain fitting, firstly unscrew the drain pan from the indoor unit. Locate the drain fitting into drain pan, insert washer and followed with locknut to secure the drain fitting to the drain pan. Then refit the drain pan to the unit. Follow **Figure 8** to install the drain fitting in the correct way.

Figure 8: Drain Fitting Assembly



The locknut only requires hand tightening and then pinching up with a spanner. Do not over tighten, else the threads may strip from the nut and damage the tray.

Recommended minimum drainpipe diameter is 25mm or 1". The drainpipe material could be either copper or plastic. It is not recommended to use flexible hose as it tends to kink easily which might cause blockage and water to back up in the unit.

Electrical



WARNING

The mains electrical supply to the indoor unit must be via a suitably rated isolator and motor rated circuit breaker or fuse. There is no isolator fitted to either the indoor or the outdoor unit. The rocker switch on the front of the indoor unit is for isolating the indoor fan and electronic controller only.

J & E Hall cellar cooler systems require a **230 volt / 1 phase / 50Hz** supply which must include a Neutral and Earth. They are not suitable for any other supply voltages (other than a deviation of +/- 10% of the above values) and are not suitable for 60 Hz supplies.

- Cable type and sizing must be selected for the application and the electrical installation should conform to the current local standards. All indoor and outdoor units are Single Phase.
- Cables to the indoor unit should be routed through the 'U' shaped cut-out in the bottom of the removable air grille at the side of the unit and into the rear of the electric box.
- Cables to the outdoor unit should be routed under the plastic pipe / electrical connection cover on the end of the unit.
- The interconnecting cable between the indoor and outdoor unit should be 3 cores for power supply and 2 cores for control circuit connected to high pressure switch.
- Connect the mains supply and interconnecting cables as per the wiring diagrams in **Figure 15**.
- Access to the electrical terminals and components on the indoor unit is via the removable cover plate on the front of the unit. Removal of the cover plate gives access to the outdoor unit contactor, the terminal block as well as the electronic controller and rocker switch connections.

Commissioning

To gain access to the electrical box on the indoor and outdoor unit, isolate the power supply to the outdoor unit and indoor unit by turning the remote motor rated circuit breaker to the OFF position.

To access electrical box on the outdoor unit: Loosen the screws from the plastic valve cover, slightly slide downward to remove the plastic cover.

To access electrical box on the indoor unit: Loosen the screws from the L shaped window panel.

Pre startup checks

Before starting the system, the following checks should be carried out as a minimum:

- Check electrical supply is correct and all connections are sound.
- All moving parts are free, and guards are fitted.
- All valves are in correct operating position.
- Refrigerant type is correct and the required charge amount by referring to **Table 2**.
- Gauge manifold connected to both low and high sides of system.



NOTICE

Before starting the system, ensure that all electrical connections are correctly made and tight, service ports are in the correct position and all covers and guards are fitted.

Unit startup

- Switch on the power at the mains isolator and then switch on the rocker switch on the front of the indoor unit.
- Set the required cold room temperature on the electronic controller and check the system parameters in the controller as required (the controllers are pre-programmed in the factory to suggested settings).
- Run the system to the required temperature and check system pressures, gas charge and running currents of motors to ensure correct operation.
- Carry out a manual defrost (press the defrost button on the controller for more than 2 seconds) to ensure the defrost period is adequate to clear any frost build up on the evaporator coil.
- Carry out final leak test and ensure all covers are fitted and securing screws are tightened.
- Log all information along with system model and serial numbers for future reference.
- Ensure that the customer / responsible person is provided with basic operating instructions and where electrical isolators are situated in case of emergency.



NOTICE

An anti-short cycle timer is built into the indoor controller to prevent the compressor from stop/starting too quickly, which can result in the compressor tripping on its internal overload. If the overload trips, please allow time for it to cool down and auto reset before restarting.

Service & Maintenance



WARNING

Warning! – Disconnect the mains electrical supply before servicing or opening the units.

The units are designed to give long life operation with minimum maintenance. However, it should be routinely checked, and the following service schedule is recommended under normal circumstances:

1. Indoor and Outdoor units – Inspect at regular intervals

- Check for refrigerant leaks on all joints and fittings.
- Check mountings for tightness and wear.
- Inspect pipework for any damage.
- Check all electrical connections.
- Ensure that no abnormal noise or vibration is detected during the test run.

2. Condenser & Evaporator Fan Motors & Blades – Clean and inspect at regular intervals

- Check for abnormal noise, vibration, and fan imbalance.
- Ensure that the fan motors are clean and spin freely.
- Check that the fan blades are clean and free from restriction and damage/imbalance.

- **Note:** The Fan Motors are pre-lubricated, and factory sealed so no maintenance is necessary.

3. Condenser & Evaporator Coils – Clean and inspect at regular intervals

- Check and remove the dirt and debris between the fins using a soft brush and/or a suitable chemical coil cleaner then rinse with clean water.
- Check and remove any obstacles that may hinder the airflow through the coils.
- Repair any damage to fins and ensure any guards are fitted correctly.
- **DO NOT USE HIGH PRESSURE WASHERS ON COILS – THEY DAMAGE THE FINS.**

4. Controls

- Check controller settings and operation.
- Check calibration of temperature probe reading.

5. Power Supply – Inspect at regular intervals.

- Check the running current and voltage for the units.
- Check the electrical wiring and tighten the wires onto the terminal blocks if necessary.

6. Refrigerant Charge

- Check the refrigerant charge by ensuring that the system is operating correctly, and the system pressures are as expected.
- Carry out a full leak test.

7. Unit decommissioning and disposal

- At the end of the system's useful life, a suitably qualified engineer should decommission it. The refrigerant and compressor oil are classed as hazardous waste and as such must be reclaimed and disposed of in the correct manner, including completion of waste transfer paperwork. The system components must be disposed of or recycled as appropriate in the correct manner.

F-Gas Requirement

The equipment covered in this Technical Manual relies on fluorinated greenhouse gases R448A and R449A for their functioning.

J & E Hall Cellar and Product Cooler is a non-hermetically sealed system where the outdoor unit is designed to use with R448A and R449A. The outdoor and indoor unit models come from the factory pressurized with OFN (Oxygen Free Nitrogen) only. The system had to be charged with the recommended charge specified in **Table 2**.

In F-Gas Regulation EU 517/2014, this type of system only be able to be installed by engineers who hold an F Gas qualification.

The requirement for leak testing is based on the charge size in tonnes of CO₂ equivalent specified in below table. Starting 1st January 2017, the requirement for leak detection and maintaining system logs changes from 3kg HFC to 5 tonnes CO₂ equivalent.

Table 6: Leak Inspection Frequency

System Charge (Tonnes CO ₂ Equivalent)	Leak Inspection Frequency
3.6 to 36.0 kg R448A 3.6 to 35.8 kg R449A (5 to < 50 TCO ₂ eq)	<ul style="list-style-type: none"> At least once every year. At least once every 2 years if a fixed leak detection system is fitted.

A refrigerant charge label is supplied with each outdoor unit. The refrigerant charge for the system must be filled on the label along with the TCO₂eq value with indelible ink and must be adhered in the proximity of the product charging port.

Contains fluorinated greenhouse gases			
Ref.	GWP	Charge (kg)	TCO ₂ Eq.
R448A	1387		
R449A	1397		

Total system charge = Recommended charge for pipe length 7.6m and below + Additional refrigerant charge added at site (for pipe length exceed 7.6m)

Enter TCO₂eq value from calculation:

$$\text{To calculate TCO}_2 \text{ Eq value} \\ = \frac{\text{Refrigerant Charge (kgs)} \times \text{Refrigerant GWP}}{1000}$$

Technical Information

Electronic Controller

The indoor unit is equipped with a controller to control the room temperature based on the setpoint temperature. The controller parameter could be viewed and changed as described in the section below.







SET	To display target set point, in programming mode it selects a parameter or confirm an operation
	To start a manual defrost
	In programming mode it browses the parameter codes or increases the displayed value
 AUX	In programming mode it browses the parameter codes or decreases the displayed value
KEYS COMBINATION	
	To lock or unlock the keyboard
	To enter in programming mode
	To return to room temperature display

Figure 9: Temperature Controller XR02CX



To check the setpoint temperature:

- Press and release the SET button.

To change the setpoint temperature:

- Press the SET button for more than 3 seconds
- The setpoint value is displayed and the °C or °F led starts flashing.
- To change the setpoint value press the ▲ or ▼ button within 10 seconds.
- To retain the new setpoint press the SET button again or wait 10 seconds.

To start a manual defrost:

- Press the defrost button for more than 2 seconds.

To lock and unlock keyboard:

- Press the ▲ and ▼ buttons together for more than 3 seconds.
- When The 'OF' message displayed, the keyboard is now locked.
- When the 'ON' message is displayed, the keyboards will be unlocked.

To change a parameter value (selected parameters):

- Enter the programming mode by pressing the SET and the ▼ buttons together for more than 3 seconds (°C or °F LED starts blinking). The first parameter (Hy) is displayed.
- Press the SET button to display the parameter value.
- Use the ▲ and ▼ buttons to change the parameter value.
- Press the SET button to store the new value and move to the next parameter.
- To exit the programming mode, press the SET and ▲ buttons together or wait 15 seconds without pressing a button.

To enter the hidden parameter menu (full parameter list):

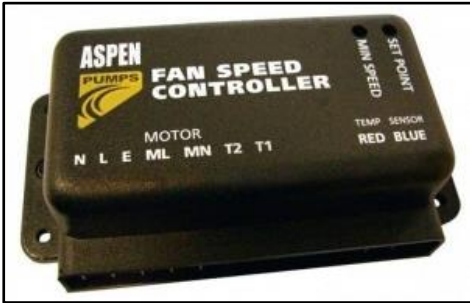
- Enter the programming mode by pressing the SET and ▼ buttons together for 3 seconds (°C or °F LED starts blinking).
- Release the buttons, and then press the SET and ▼ buttons for more than 7 seconds. L2 will be displayed followed by the first parameter (Hy). You are now in the hidden menu.
- Select the required parameter.
- Press the SET button to display the parameter value.
- Use the ▲ and ▼ buttons to change the parameter value.
- Press the SET button to store the new value and move to the next parameter.
- To exit the programming mode, press the SET and ▲ buttons together or wait 15 seconds without pressing a button.

Fan speed controller

The fitting of a fan speed controller is compulsory for applications where the system pipe run is longer than 15m. Refer to **Table 2**.

Aspen Cooling Only model as shown in **Figure 10**, is recommended to be installed on the outdoor unit to regulate fan speed based on condensing temperature. The fan speed controller could be obtained either from your unit distributor or various refrigeration stockists.

Figure 10: Fan Speed Controller (Aspen FP2094)



Aspen FP2094 fan speed controller comes supplied with full fitting and set-up instructions. Refer to **Figure 12** and instructions below for the field wiring:

- Find a suitable mounting point for the controller within the outdoor unit casing and fix it securely. (Aspen FP2094 is not waterproof and should be installed in the electrical compartment of the condensing unit).
- Connect the thermal sensor to the terminals red/blue on the controller and fix the sensor side to a bend of the condenser coil in the middle between an entrance point and outgoing point of the refrigerant tubing, refer

Figure 11. In case of any doubt, measure the condensing temperature and select the point which is closest to the saturation point.

- If possible, put a thermal paste on the sensor or isolate it, to obtain the best measurements and working results.
- Remove the condenser fan Live wire (Black) from the 'L' connection on the unit and connect to ML on the FSC. Remove the condenser fan Neutral wire (Blue) from the connection at the compressor run capacitor and connect to MN on the FSC.
- Make up a new wire to connect 'L' (on unit) to L (on controller) and another new wire to connect 'N' (on unit) to N (on controller). Provide a new Earth wire between the unit and E on the controller.
- Tighten all wiring connections and secure all wires as necessary. The wiring is now complete.
- Run the unit and adjust controller as per instructions to give required condensing temperature (35°C~40°C).

Figure 11: Sensor Location

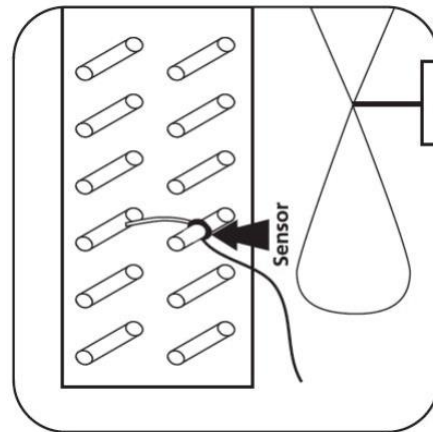
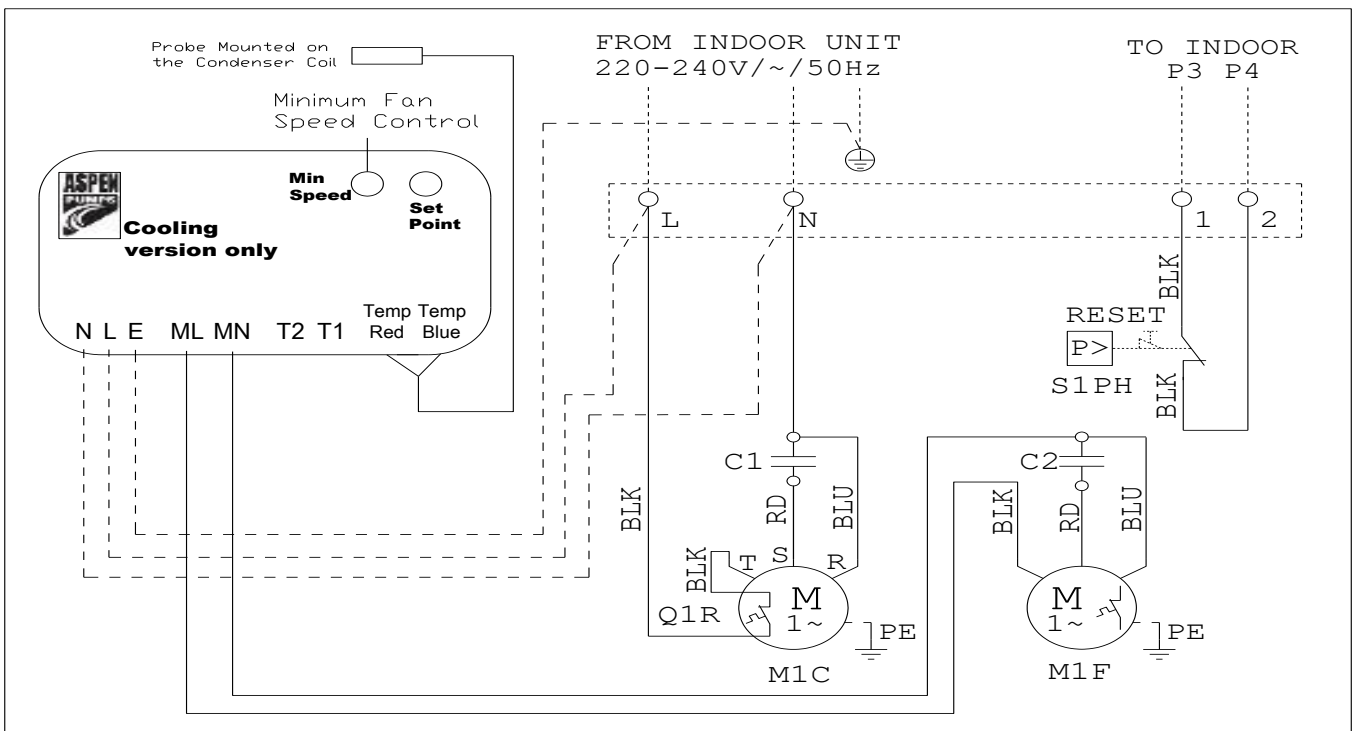
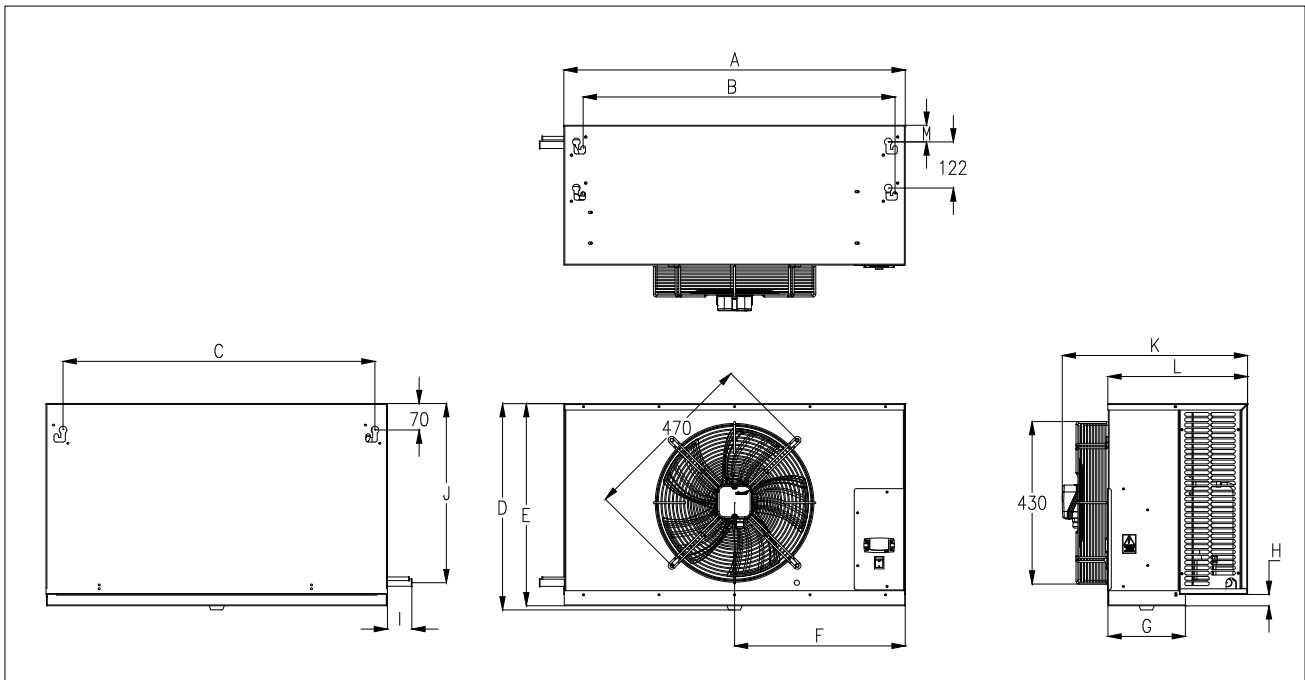


Figure 12: Wiring Diagram Outdoor Unit Integrate FSC



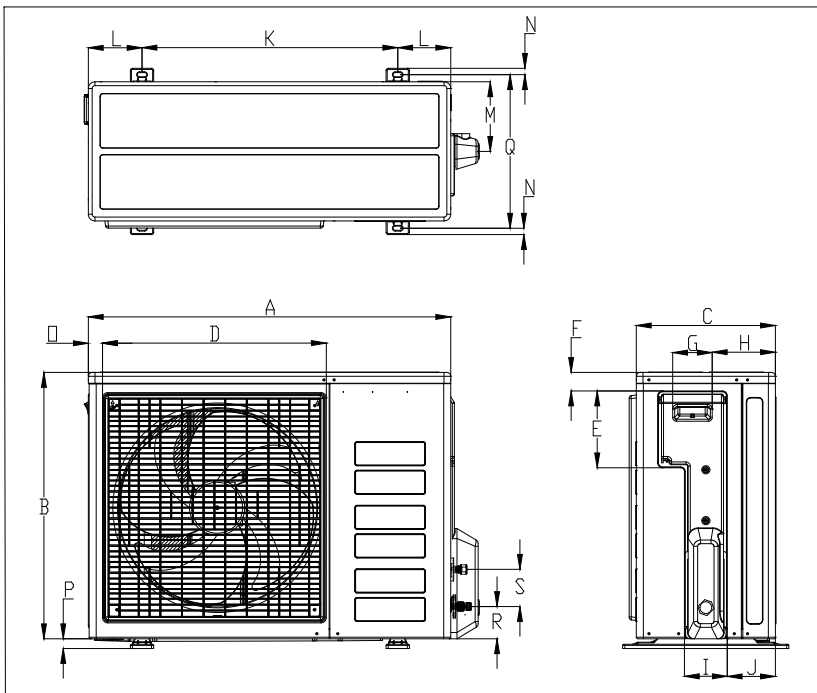
Appendix

Figure 13: Dimension (Indoor Unit)



MODEL	A	B	C	D	E	F	G	H	I	J	K	L	M
JCC3-25E	865	745	745	489	479	433	207	31	51	417	492	372	46
JCC3-40E													
JCC3-55E	904	826	826	546	535	452	205	30	68	472	491	370	44

Figure 14: Dimension (Outdoor Unit)



MODEL	A	B	C	D	E	F	G	H	I	J	K	L	M	N
J6LC26CV1	855	628	328	508/520	181/179	44/46	93	149	101	113	603	126	164	17/15
J6LC41CV1														
J6LC56CV1	855	730	328	513/520	182/179	44/46	93	149	101	113	603	126	164	17/15

MODEL	O	P	Q	R	S
J6LC26CV1	49/34	23	362	73	75
J6LC41CV1					
J6LC56CV1	47/34	23	362	73	75

Figure 15: Wiring Diagram (Indoor Unit)

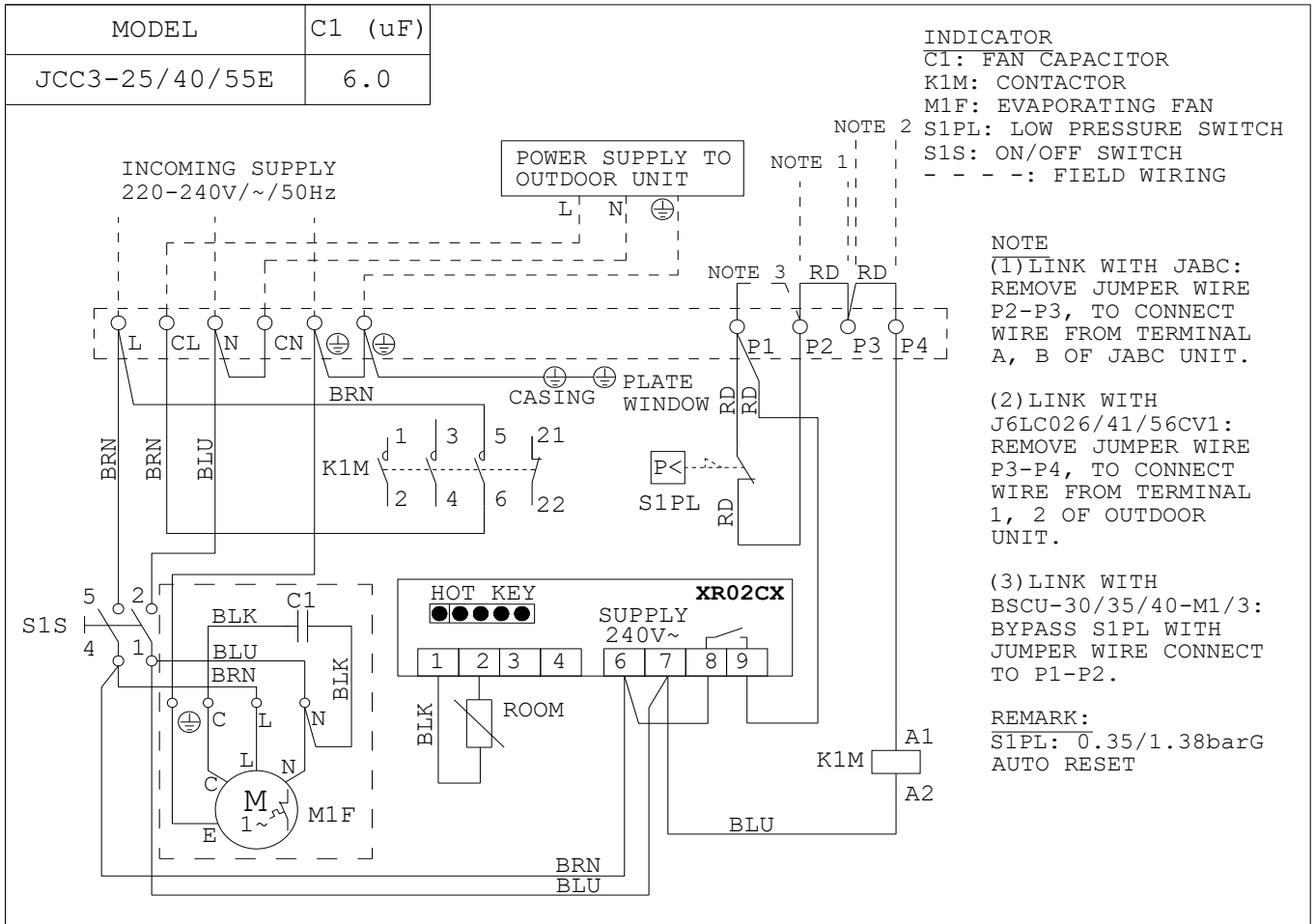
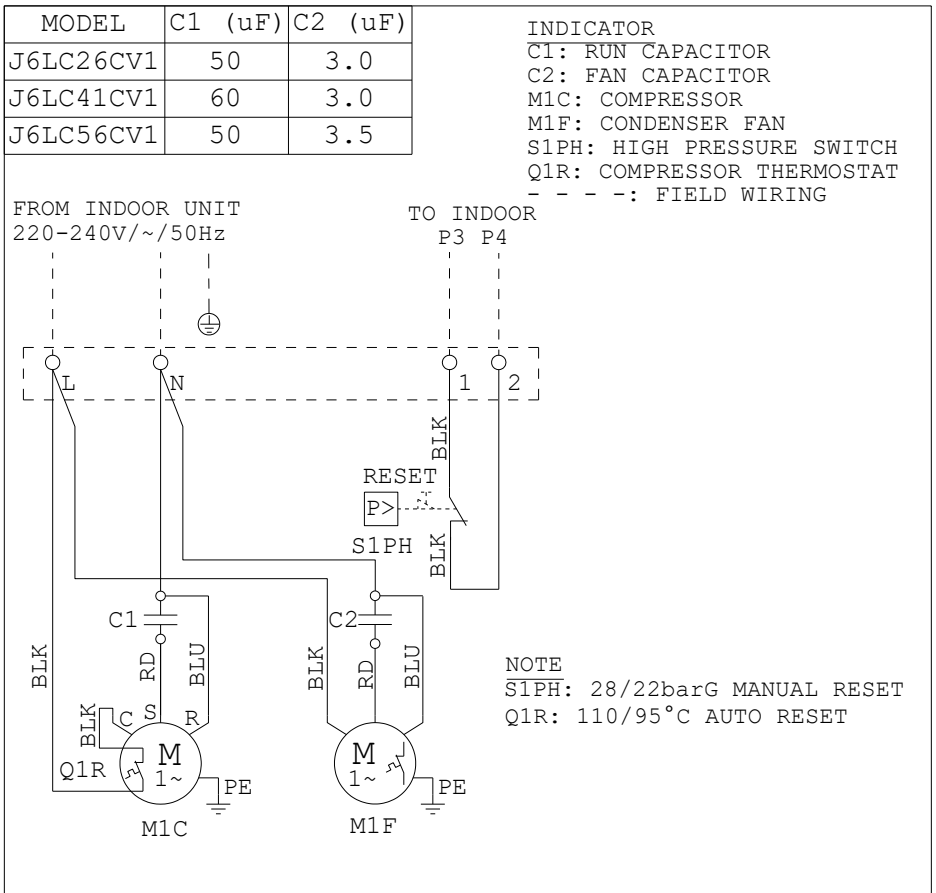


Figure 16: Wiring Diagram (Outdoor Unit)



NOTICE

Manual reset on the cartridge type high pressure switch is required after the fault is removed.

Figure 17: P&I Diagram for System

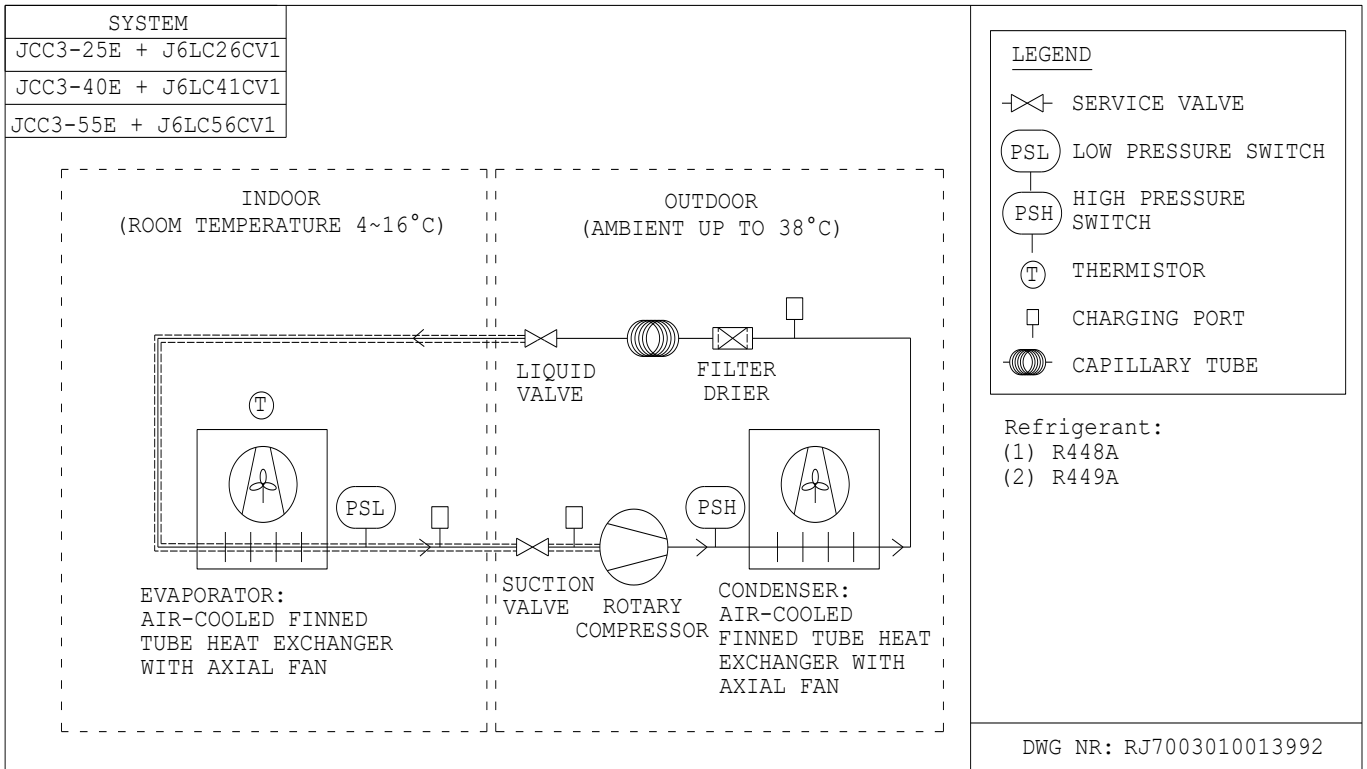


Table 7: Parameters (Controller XR02CX)

Dixell XR02CX Parameters				
Label	Description	Range	Default setting	JEH Setting
Parameter Menu (selected parameters)				
Hy	Differential	0.1 ~ 25°C / 1 ~ 45°F	2.0°C / 4°F	2.0°C
ot	Probe calibration	-9.9 ~ 9.9°C / -18 ~ 18°F	0.0	0.0
AC	Anti Short Cycle Delay	0 ~ 50 minutes	1	3
CH	Kind of Action (Cool / Heat)	cl ~ Ht	cl	cl
rE	Resolution (°C only): dE = decimal between -9.9 ~ 9.9°C; in = integer	dE ~ in	dE	in
id	Interval between defrost cycles	0 ~ 99 hours	8	6
Md	Maximum defrost length	0 ~ 99 minutes	20	30
AU	Maximum Alarm Temperature	~ 99°C / ~ 210°F	99°C / 99°F	99°C
AL	Minimum Alarm Temperature	-55°C / -67°F	-55°C / -55°F	-55°C
iP	Digital input polarity: oP = activated by closing the contact; cl = activated by opening the contact	cl ~ oP	cl	cl
iF	Digital input configuration: EA = external alarm; EA message is displayed; bA = serious alarm; CA message is displayed; do = door switch function; dF = defrost activation; Au = not used; Hc = inversion of the kind of action	EA / bA / do / dF / Au / db / Hc	EA	EA
di	Digital input delay. With iF = EL or bA delay between the detection of the external alarm condition and its signalling. With iF = do it represents the delay to activate the door open alarm	0 ~ 99 minutes	5	5
Hidden Parameter Menu (Full list including above parameters)				
LS	Minimum Set Point	-55°C / -67°F	-55°C / -55°F	4°C
US	Maximum Set Point	99°C / 210°F	99°C / 99°F	16°C
od	Output activation delay at startup	0 ~ 99 minutes	0	0
Cy	Compressor on time faulty probe. Cy = 0 compressor always OFF	0 ~ 99 minutes	15	5
Cn	Compressor off time faulty probe. Cn = 0 compressor always active	0 ~ 99 minutes	30	10
CF	Measurement units: °C = Celsius; °F = Fahrenheit	°C / °F	°C	°C
dY	Display delay	0 ~ 15 minutes	0	0
dF	Display during defrost: rt = real temperature; it = start defrost temperature; St = SET POINT; dF = label dF	rt / it / St / dF	it	it
Ad	Temperature alarm delay	0 ~ 99 minutes	15	15
dA	Exclusion of temperature alarm at startup	0 ~ 99 minutes	90	90
dC	Compressor and fan status when door open: no = normal; Fn = Fans OFF; cP = Compressor OFF; Fc = Compressor and fans OFF	no / Fn / cP / Fc	no	no
rd	Regulation with door open: n = no regulation if door is opened; Y = when di is elapsed regulation restarts even if door open alarm is present	n ~ Y	Y	Y
Pt	Parameter code table	Read Only	-	-
rL	Firmware release	Read Only	-	-

Table 8: Trouble Shooting

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
COMPRESSOR			
Compressor will not start	Power supply	Is power switched on?	If not - switch on
		Phase and neutral present?	Check/rectify
		Voltage within tolerance?	Check/rectify
	Compressor contactor not pulled in (contactor in indoor unit)	Is there correct voltage to contactor coil? (Terminals A1 & A2)	If yes - coil faulty. Replace contactor If no - check for break in control circuit
		Is the controller calling for cooling? (Cooling ❄️ LED lit)	If yes - check for break in control circuit If no - is controller set correctly?
		Is the controller on defrost? (Defrost ❄️ LED lit)	If yes - wait for defrost to finish or terminate defrost and check operation
		Is there an alarm condition shown on the controller display?	Refer to manual for alarm identification and resolution
		Has a safety switch tripped out?	Check cause and rectify
	Compressor contactor pulled in but compressor not running	Is voltage being switched across contactor? (Terminals L1 & T1)	If yes - check voltage present at compressor terminals. If correct - compressor may have tripped internal overload or be faulty
			If no. Replace faulty contactor
	LP switch tripped (on indoor unit)	Low pressure condition	Low refrigerant charge/icing of evaporator coil/evaporator fan failure/blockage in piping. Check & rectify cause
	Compressor internal overload tripped	Is the correct voltage at compressor terminals?	Compressor has overheated - allow time for reset (up to 3 hours) and rectify cause
	Faulty compressor run capacitor	Check visual condition of capacitor and check capacitance reading with capacitor meter.	Replace capacitor as required
	Motor windings faulty	Check resistances of windings	Windings that show open circuit could be due to internal overload trip. Wait for reset and recheck. If continually open circuit - motor faulty. Replace compressor.
	Compressor seized	Does compressor attempt to start but does not run correctly (makes humming sound)? Are amps equivalent to LRC rating?	If all electrical checks on components as above are OK - Change compressor
Compressor runs but no effect on suction/discharge pressures	Mechanical failure within compressor	Are compressor motor amps lower than expected? If so - potentially valve damage or other internal wear/damage	Try pump test on compressor. If test fails - replace compressor.
Compressor starts and stops too quickly	Operating on safety controls	Check LP switch and compressor internal overload	Rectify cause and recheck
	Refrigerant levels	Is there too little refrigerant in the system causing LP switch tripping?	Check refrigerant level and adjust accordingly
	Faulty contactor (if fitted)	Are the contacts chattering on the contactor?	Contacts may be dirty or worn. Check and replace contactor as necessary
	Anti short cycle time in controller is set too low	Anti short cycle time should be set for minimum of 3 minutes	Check and rectify
	Temperature differential in controller set too low	Differential should be set for minimum of 2°C	Check and rectify
	Room temperature rising too quickly	Are doors open to room?	Check and rectify

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
	Loose / broken wiring connection		Make sure all electrical connections are sound
Compressor is noisy	Vibration	Rubber feet mountings worn or bolts are loose/missing	Replace mountings and tighten/replace bolts as necessary
	Liquid refrigerant	Does compressor 'knock' when starting up or running? Liquid refrigerant may be present in oil and compression chambers	Identify cause of liquid return to compressor and rectify
	Overloaded	Are suction and discharge pressures too high? There may be too much load on the compressor.	Identify cause of increased load and rectify
	High discharge pressure	Blocked condenser / faulty condenser fan	Check and rectify
		Refrigerant overcharge	Check and rectify
		Non-condensable in system	Reclaim refrigerant, evacuate & recharge
	Internal wear / damage	Noise is always present even if all operating conditions are OK?	Replace compressor
Compressor body too hot	System load too high	Are suction and discharge pressures high?	Reduce load at evaporator
	High discharge pressure	Blocked condenser / faulty condenser fan / airflow around unit restricted	Check and rectify
	Lack of compressor cooling	Suction superheat too high	Check refrigerant charge is correct
			Too much heat load at evaporator - reduce
			Are refrigerant lines correctly insulated?
	Compressor starting too frequently	Refer section above ' Compressor starts and stops too quickly'	Refer section above ' Compressor starts and stops too quickly'
Discharge gas bleeding into suction side	Does suction pressure rise abnormally quickly when compressor stops.	Compressor valves may be damaged - replace compressor	
CONDENSER FAN			
Condenser fan not running	Power supply	See compressor will not start section	See compressor will not start section
	Compressor contactor not pulled in	See compressor will not start section	See compressor will not start section
	Compressor contactor pulled in	Is voltage being switched across contactor? (Terminals L1 & T1)	If yes - check voltage to fan motor. If correct voltage present at motor - fan faulty. Replace fan motor
			If no. Replace faulty contactor
	Fan being controlled by Fan Speed Controller (if fitted)	Is system operating pressure below FSC setting?	If yes - all OK (check fan operates when pressure rises)
	Fan capacitor fault	Check visual condition of capacitor and check capacitance reading with capacitor meter.	Replace capacitor as required
	Motor fault	If FSC fitted - bypass FSC to test motor. If motor still does not run - motor is faulty	Replace fan motor
Condenser fan runs but only slowly	Fan capacitor or motor fault	See above	See above
	Is fan being controlled by a FSC?	Adjust FSC setting - does fan speed up?	If yes - all OK

FAULT	POSSIBLE CAUSE	CHECK	SOLUTION
	FSC faulty	If fan runs slowly even after adjusting FSC with head pressure rising - FSC may be faulty	Replace FSC
INDOOR UNIT			
Indoor Fan not running	Power supply	Is power switched on?	If not - switch on
		Is rocker switch on unit switched on?	If not - switch on
	Motor fault	Is there correct voltage at motor terminals?	If yes - motor faulty. Replace motor
		Check fan capacitor	If no - check supply / wiring connections Replace as required
No display on controller	Power supply	Is power switched on?	If not - switch on
		Is rocker switch on unit switched on?	If not - switch on
		Is there correct voltage at controller	If yes - controller faulty. Replace controller If no - check supply / wiring connections
Power to controller but no cooling from unit	Is unit in defrost mode?	Check if defrost LED is displayed	If yes - all OK. Wait for defrost to end If no - further checks required
	Is unit in cooling mode (cooling LED displayed)	Is room at required temperature? Room above required temperature?	All OK Further checks required
Reduced airflow	Fan motor	Is fan rotating slowly?	Further checks required on fan (see above)
	Air inlets blocked	Is anything blocking air inlet grilles at side of unit	Clear items from around unit
	Evaporator coil dirty	Check condition of coil	Clean as necessary
	Evaporator coil iced up	Switch off unit and allow to defrost	Checks required to determine cause of icing
SYSTEM			
Insufficient cooling	Lack of refrigerant	Remove charge and note weight	Leak test / pressure test system, repair leak and top up with correct refrigerant charge
	Condenser coil dirty	Visual check of coil condition	Clean condenser coil
	Lack of ventilation to outdoor unit	Any obstructions around unit?	Clear same to ensure good ventilation
	Evaporator coil dirty	Visual check of coil condition	Clean evaporator coil
	Evaporator coil iced up	Switch off unit and allow to defrost	Checks required to determine cause of icing
	System settings	Controller set correctly?	Adjust as necessary
	Service valves do not open correctly	Are valves fully open?	Adjust as necessary
	Restriction in capillary device	Low suction pressure / sweating on capillary	Clear restriction or replace capillary
	Damage to piping	Restricted refrigerant flow	Replace piping as required

Figure 18: Declaration of Incorporation (Outdoor Unit)

Declaration of Incorporation		
According to SI 2008 No. 1597 Annex II		
We:	J & E Hall International	
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	
Declare that for below		
Product	JCC3 Cellar and Product Coolers	
Model Designations:	J6LC26CV1 J6LC41CV1 J6LC56CV1	
Description:	JCC System Outdoor Unit	
<p>The following essential health and safety requirements of The Supply of Machinery (Safety) Regulations 2008 (SI 2008 No. 1597) are applied and fulfilled:</p> <p>1.1.1 – 1.1.2 – 1.1.3 – 1.1.5 – 1.2.1 - 1.2.6 - 1.3.2 – 1.3.3 – 1.3.4 – 1.3.7 – 1.3.8.2 – 1.4.1 – 1.4.2.1 – 1.5.1 – 1.5.2 – 1.5.13 – 1.7.1.1 – 1.7.2 – 1.7.3 – 1.7.4</p> <p>The relevant technical documentation has been compiled in accordance with Annex VII (PART 7 of SCHEDULE 2) part B of SI 2008 No. 1597.</p> <p>The relevant information can be transmitted in electronic form in response to a reasoned request by the national authorities.</p> <p>The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of these Regulations, where appropriate.</p> <p>The legal representative authorised to compile the relevant technical documentation is J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, United Kingdom, DA1 1PU.</p>		
Signed:		
Name:	Andrew Bowden	
Position:	Managing Director	
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	
Date:	26/05/2023	
<hr/>		
Form: JEH-C6-016d-01	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	Page 1 of 1

Figure 19: Declaration of Incorporation (Indoor Unit)

Declaration of Incorporation			
According to SI 2008 No. 1597 Annex II			
We:	J & E Hall International		
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU		
Declare that for below			
Product	JCC3 Cellar and Product Coolers		
Model Designations:	JCC3-25E	JCC3-40E	JCC3-55E
Description:	JCC System Indoor Unit		
The following essential health and safety requirements of The Supply of Machinery (Safety) Regulations 2008 (SI 2008 No. 1597) are applied and fulfilled:			
1.1.1 – 1.1.2 – 1.1.3 – 1.1.5 – 1.3.2 – 1.3.3 – 1.3.4 – 1.3.7 – 1.3.8.2 – 1.4.1 – 1.4.2.1 – 1.5.1 – 1.5.2 – 1.5.13 – 1.7.1.1 – 1.7.3 – 1.7.4			
The relevant technical documentation has been compiled in accordance with Annex VII (PART 7 of SCHEDULE 2) part B of SI 2008 No. 1597.			
The relevant information can be transmitted in electronic form in response to a reasoned request by the national authorities.			
The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of these Regulations, where appropriate.			
The legal representative authorised to compile the relevant technical documentation is J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, United Kingdom, DA1 1PU.			
Signed:			
Name:	Andrew Bowden		
Position:	Managing Director		
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU		
Date:	26/05/2023		
<hr/>			
Form: JEH-C6-016d-01	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	Page 1 of 1	

Figure 20: EU Declaration of Incorporation (Outdoor Unit)

Declaration of Incorporation		
According to DIRECTIVE 2006/42/EC Annex II		
We:	J & E Hall International	
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	
Declare that for below		
Product	JCC3 Cellar and Product Coolers	
Model Designations:	J6LC26CV1 J6LC41CV1 J6LC56CV1	
Description:	JCC System Outdoor Unit	
<p>The following essential health and safety requirements of the Machinery Directive (DIRECTIVE 2006/42/EC) are applied and fulfilled:</p> <p>1.1.1 – 1.1.2 – 1.1.3 – 1.1.5 – 1.2.1 – 1.2.6 – 1.3.2 – 1.3.3 – 1.3.4 – 1.3.7 – 1.3.8.2 – 1.4.1 – 1.4.2.1 – 1.5.1 – 1.5.2 – 1.5.13 – 1.7.1.1 – 1.7.2 – 1.7.3 – 1.7.4</p> <p>The relevant technical documentation has been compiled in accordance with part B of Annex VII of DIRECTIVE 2006/42/EC.</p> <p>The relevant information can be transmitted in electronic form in response to a reasoned request by the national authorities.</p> <p>The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of DIRECTIVE 2006/42/EC, where appropriate.</p> <p>The legal representative authorised to compile the relevant technical documentation is TEWIS SMART SYSTEMS, S.L.U, Auguste y Louis Lumière, 26 Parque tecnológico, Paterna, Valencia, Spain.</p>		
Signed:		
Name:	Andrew Bowden	
Position:	Managing Director	
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	
Date:	26/05/2023	
<hr/>		
Form: JEH-C6-016e-01	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU	Page 1 of 1

Figure 21: EU Declaration of Incorporation (Indoor Unit)

Declaration of Incorporation			
According to DIRECTIVE 2006/42/EC Annex II			
We:	J & E Hall International		
of:	Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU		
Declare that for below			
Product	JCC3 Cellar and Product Coolers		
Model Designations:	JCC3-25E	JCC3-40E	JCC3-55E
Description:	JCC System Indoor Unit		
The following essential health and safety requirements of the Machinery Directive (DIRECTIVE 2006/42/EC) are applied and fulfilled:			
1.1.1 – 1.1.2 – 1.1.3 – 1.1.5 – 1.3.2 – 1.3.3 – 1.3.4 – 1.3.7 – 1.3.8.2 – 1.4.1 – 1.4.2.1 – 1.5.1 – 1.5.2 – 1.5.13 – 1.7.1.1 – 1.7.3 – 1.7.4			
The relevant technical documentation has been compiled in accordance with part B of Annex VII of DIRECTIVE 2006/42/EC.			
The relevant information can be transmitted in electronic form in response to a reasoned request by the national authorities.			
The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of DIRECTIVE 2006/42/EC, where appropriate.			
The legal representative authorised to compile the relevant technical documentation is TEWIS SMART SYSTEMS, S.L.U, Auguste y Louis Lumière, 26 Parque tecnológico, Paterna, Valencia, Spain.			
Signed:			
Name:	Andrew Bowden		
Position:	Managing Director		
Location:	J & E Hall Limited, Questor House, 191 Hawley Road, Dartford, Kent, DA1 1PU		
Date:	26/05/2023		
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Issue: 01.06.2023

