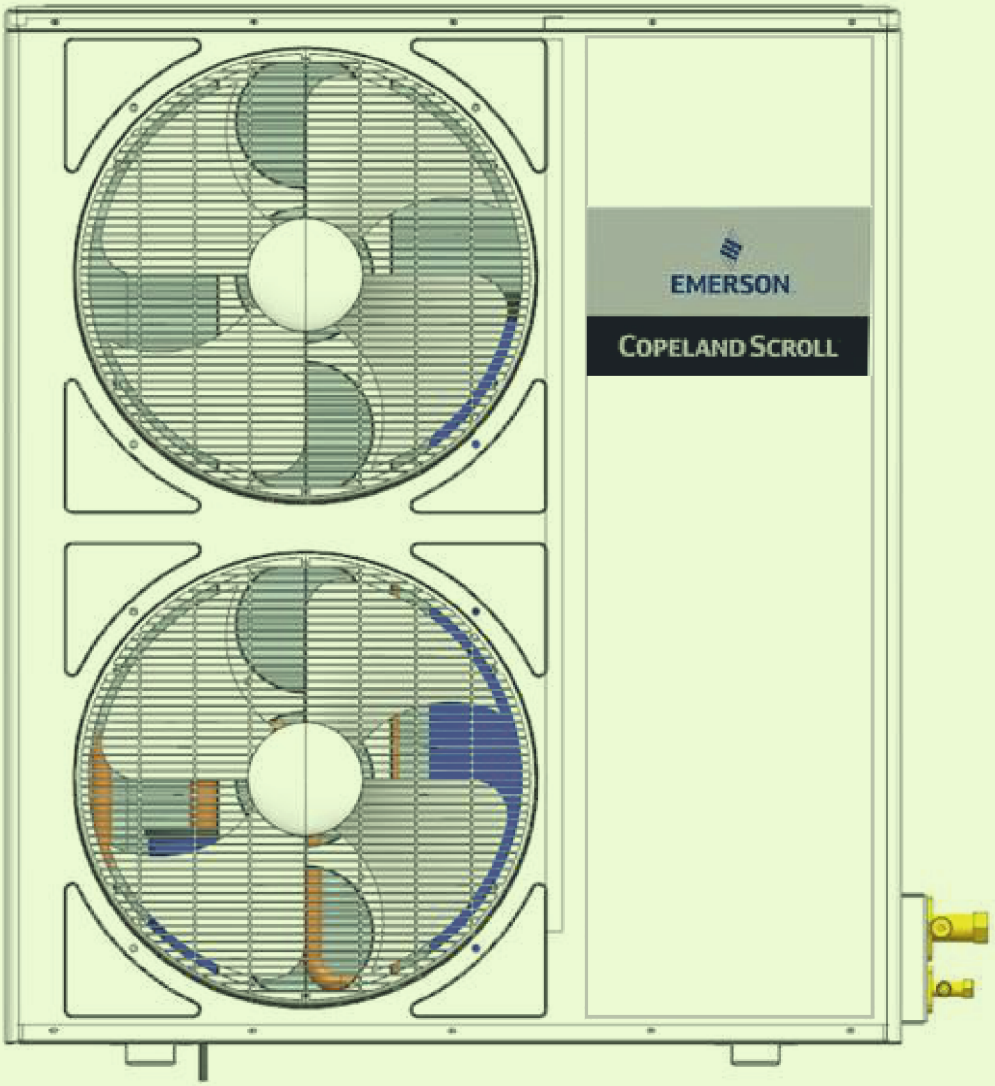
ZSI Scroll Condensing Units

User Manual



COPELAND™ | 100 YEARS OF INVENTIVENESS

EMERSON™

Table of Content

Disclaimer

Thank you for purchasing the Emerson Copeland ZSI low Temperature Condensing units. We trust that you will see this product meeting your refrigeration needs efficiently and efficaciously.

Please read through the User Manual thoroughly to familiarize yourself with the installation and commissioning process of this product and how to use it optimally to suit your needs. Please do read the information given below before proceeding with the rest of the manual.

The Emerson Low temperature refrigeration condensing units should only be installed by suitably qualified and experienced refrigeration technicians. No responsibility can be accepted for damage caused by inexperienced or inadequately trained site technicians or improper system design. All instructions and procedures described in this manual are based on good refrigeration trade practices as applicable to this particular product. The installation contractor may prefer to use variations to these recommendations. However, the methods described in this manual represent the minimum requirements to avoid any subsequent warranty claims for this equipment and its components. These instructions do not cover the fundamentals of good electrical or refrigeration practice and are therefore intended for use only by qualified and/or experienced personnel or technicians certified by us.

These instructions are general in nature for this family of products and due to our policy of continuous improvement, some of the details may not apply to the unit that you are installing. If in doubt, please consult your local sales office, quoting unit model and serial number as shown on the name plate. In case of ambiguity, the wiring diagram supplied with each unit takes precedence over the diagram in this manual.

Important:

The information contained in this manual is critical to the correct operation and maintenance of the condensing unit and should be read by all persons responsible for the installation, commissioning and maintenance of this unit.

Icon Explanation:

WARNING **This icon indicates instructions to avoid Personal injury and material damage.**	**CAUTION** **This icon indicates instructions to avoid property damage and possible personal injury.**
High voltage **This icon indicates operations with a danger of electric shock.**	**IMPORTANT** **This icon indicates instructions to avoid malfunction of the compressor.**
Danger of burning or frost burn This icon indicates operations with a danger of burning or frost burn.	**NOTE** **This word indicates a recommendation for easier operation.**
Explosion hazard **This icon indicates operations with a danger of explosion.**	

Use personal safety equipment. Safety goggles, gloves, protective clothing, safety boots and hard hats should be worn where necessary.

Safety Instruction:

The equipment has been designed and manufactured to meet international safety standards but, like any mechanical/electrical equipment, care must be taken if you are to obtain the best results.

- Service and maintenance of this unit, that is Electrical and Mechanical in nature should be carried out by technically trained and competent personnel. They should be familiar with Local Standards and Codes of Practice.
- When carrying out unit maintenance, ensure that the equipment is disconnected from the electrical power supply.
- Never Place the unit in flammable atmosphere. Do not bypass any Electrical and Product safety devices.
- Refrigerant used in this unit is classified under the COSHH regulations as an irritant, with set Occupational Exposure Levels (OEL) for consideration if installed in confined or poorly ventilated areas.
- Use personal protective equipment's (PPE's) while installation and commissioning the product at site.
- Under all Circumstances, any applicable local safety regulations requirement must be fulfilled.
- Ensure the proper earthing should be connected to condensing unit before starting the Unit.
- The condensing unit must only be used for its designed purposes with approved Refrigerants & lubrication oil, proper Electrical supply and within its scope of application.
- Do not start the unit until it is charged with refrigerant. Never charge the oxygen in the Unit/System
- Ensure that materials and wiring do not touch high temperature areas of the compressor & discharge line.
- Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system.
- Under running condition, the compressor and the tubing can reach temperatures high enough to induce burns and in case of leak of refrigerant avoid eye contact.
- During maintenance, if Brazing or De-brazing process is required. Kindly ensure that there should not be any refrigerant & oil inside the system pipe or the brazing area.
- Company shall not be responsible for any kind of accidents occur at sites due lack of sense of responsibility, Mis-handling, Wrong practice of installation and not following the instructions as mentioned above.
- All the products are not released for use with caustic, poisonous or flammable substances.
- Do not pressurize the unit above 300 PSI in ideal conditions with Nitrogen, dry air,& Refrigerant. Always use pressure regular valve while connecting to Nitrogen cylinder.

Receiving your unit

All units are shipped with a holding charge of dry nitrogen inside at a low but positive pressure. It is very important to check that this holding pressure exists at the time you receive each unit from us or our authorized representatives. Please inform us or our authorized representative if the holding charge is non-existent. Failure to do so could void the claim for other related system faults at a later period.

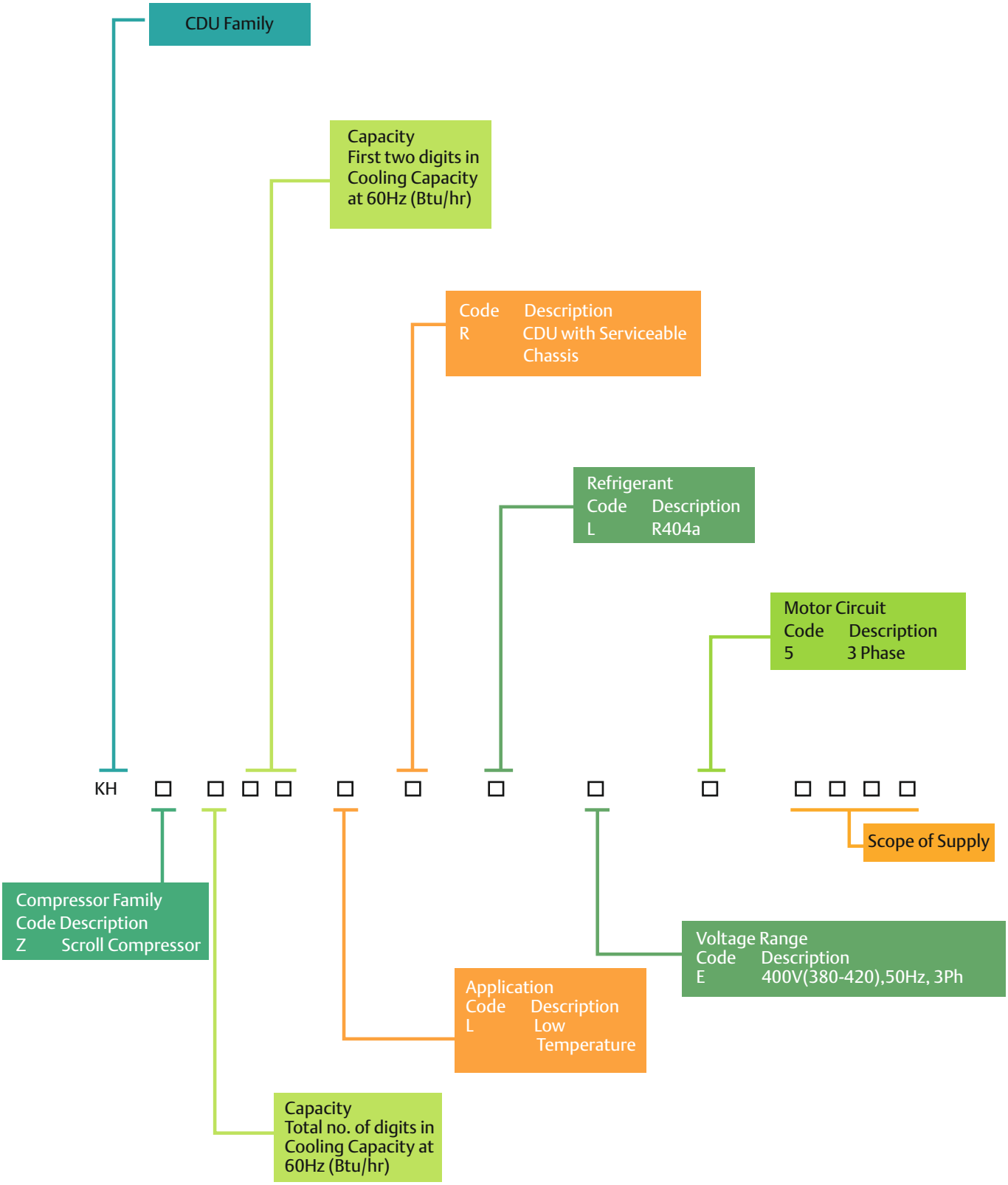
Transit damage is essentially an insurance claim and is not covered under manufacturing defect. It is also advisable to inspect the rest of the unit for obvious physical damage and inform us or our authorized representative in case any is discovered.

Condensing Unit Handling

Transport, Handling and Storage

- During transportation & storage, always keep the unit in vertical/upright position.
- Always move the CDU Boxes or pallet using shrink wrap packaging and all the boxes should be tighten properly with strapping tape. Because it may cause transit damage.
- Do not stack single boxes on top of each other without pallet in any case.
- Always move the units in fully closed container/Vehicle to avoid from rain.
- Handle the unit with care. The packaging allows the use of a forklift or pallet jack for handling. Use appropriate and safe handling equipment.
- It is recommended not to open the packaging before the unit is at final place for installation.

Nomenclature:



Features & Benefits:

Emerson Commercial and Residential Solutions is pleased to introduce the Copeland Scroll™ KHZXXXLRL condensing units for low temp applications. These condensing units are built with the ZSI scroll compressors with liquid injection and premium on-board CoreSense™ electronics features for diagnostics plus protection and come with a service door for ease of access and serviceability.

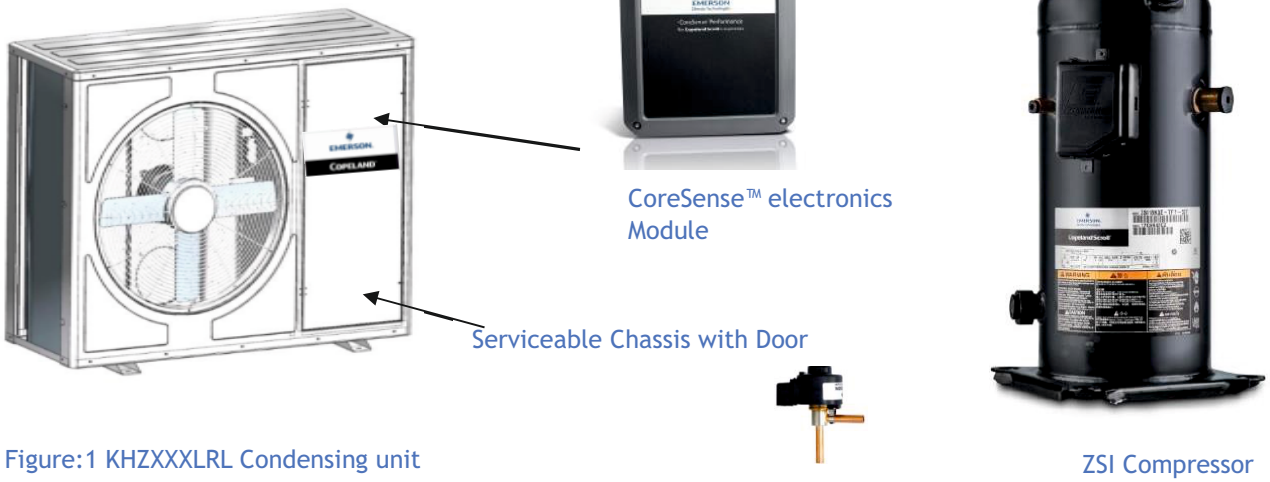


Figure:1 KHZXXXLRL Condensing unit

Some of the key features of this line-up of condensing units is as follows:

- Provides complete line-up of scroll CDUs (below 7.5 HP) for low temperature applications.
- Built with Copeland Scroll™ ZSI compressors for a silent and enhanced reliable operation.
- On-board CoreSense™ electronics unit for diagnostics and protection to assist contractors troubleshoot in the field.
- Uses Liquid Injection technology, controlled by CoreSense™ to protect the compressor from high discharge temperature.
- LED display alerts user of DLT sensor status and EXV operation enabling easier troubleshooting.
- Tropicalized for Indian climate to operate at higher ambient temperatures.
- Provides service door for ease of access & accessibility.
- Offering best life cycle cost solution to end users.
- Light weight and compactness, up to 20 weight reduction of equivalent semi-hermetic compressors; Leading to Compact CDU Design.
- Optimized Condenser Design & Higher CFM for Elevated Ambient Conditions & Extreme Field Conditions.
- Hydrophilic blue fins condenser to prevent from corrosion.
- Large surface area coil ideally positioned to optimize air flow and heat transfer.
- Low Noise Fan for Quieter Fan Operation.
- Robust & Reliable components of construction.

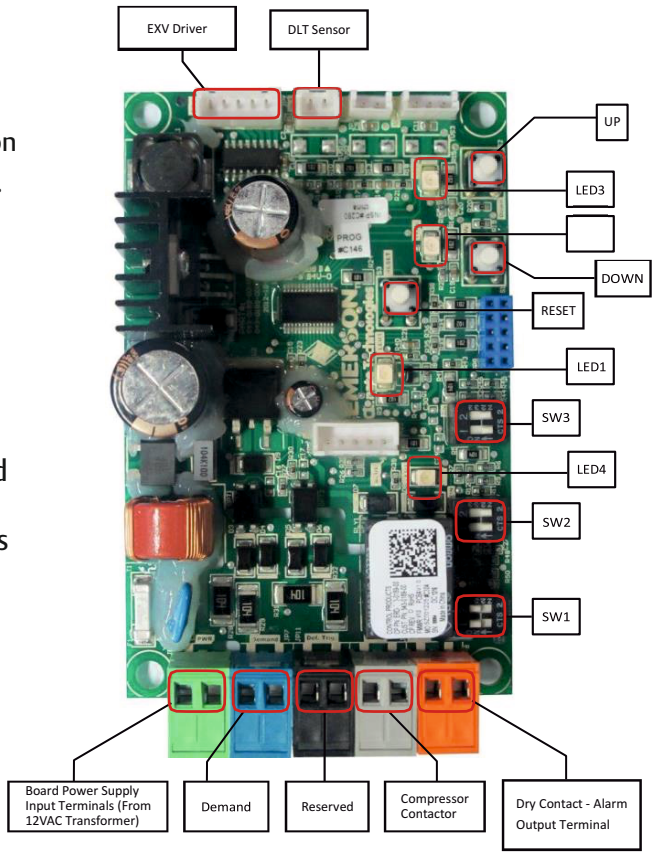
CoreSense™ Electronics Module:

CoreSense™ electronics Module

The KHZXXXLRL use the proven ZSI compressor range which features Liquid Injection Technology controlled by an intelligent electronics platform—the CoreSense™ Control Board. CoreSense™ regulates liquid injection by sensing the Discharge Line Temperature (DLT) to widen the operating envelope and enhance the product reliability. It also features LED display that alerts the user of sensor status and Electronic Expansion Valve (EEV) operation.

Function Descriptions:

The board will be used to turn the compressor on/off based on the demand signal from low pressure switch and thermostat. The board will control Liquid Injection through an EXV based on a temperature sensor placed on the discharge line.



Dipswitch Setting

- SW1 is used to control the liquid injection setpoint and cut out. Do not change settings and ensure that a replacement board is set correctly.
- SW2 and SW3 are not functional in ZSI CDU units

Dipswitch	Factory Setting
SW1 bit1	OFF
SW1 bit2	OFF
SW2 and SW3	Not used

Board Operation - EXV Testing

Button	Function
Up	To operate EXV manually
Down	
Reset	Resets the board

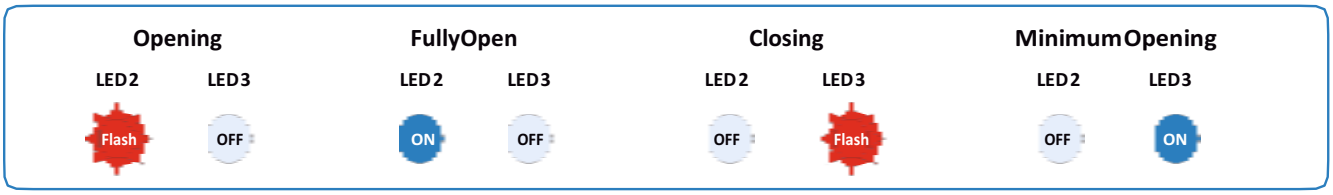
LED Display	Description
1 (Yellow Green)	LED Blinking Pattern Indicates DLT Sensor Status
2 (Yellow Green)	LED2 and LED3 Combination and Blinking Patterns Indicate EXV Opening or Closing
3 (Yellow Green)	LED2 and LED3 Blink Once When Entering or Exiting EXV Manual Operation
4 (Red)	LED4 Turns on as an Alarm when Triggered by any of the following: 1) DLT overheat protection 2) DLT sensor open circuit 3) DLT sensor short circuit

Operation: Shift Between Auto Mode and Test Mode

- Push “Up” and “Down” together for 5 seconds to shift between Control Mode and Auto Mode
- LED2 and LED3 flashing together once means the shift is successful

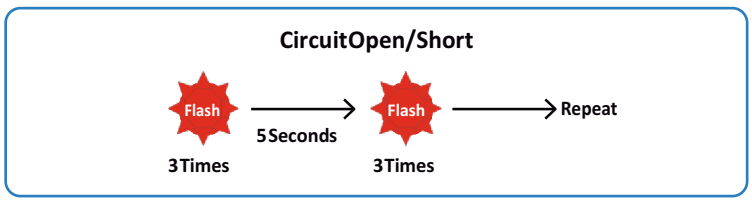
Operate EXV Manually

- Short Push (< 2s) “Up” or “Down” to open or close EXV by one step
- Long Push “Up” and “Down” to open and close EXV rapidly
- LED2 will flash when EXV is opening and will remain on when EXV is fully open
- LED3 will flash when EXV is closing and will remain on when EXV reaches minimum opening
- Push “Up” and “Down” together for 5 seconds to revert to Auto Mode
- Board will automatically revert to Auto operation after 10 minutes from last manual button push



Diagnostic Function of the Board

LED1: Status Indicator of Discharge Line Temperature Sensor



LED4: Warning Signal

- Overheat Protection
- Sensor Failure, Circuit Open/Short

Standard Scope of Supply:

The following components are included in the KHZXXXLRL - E5EC6C condensing unit scope of supply:

Table 1: Scope of Supply Details of KHZXXXLRL CDU models

Model	KHZ506	KHZ508	KHZ509	KHZ511	KHZ514	KHZ515	KHZ518	KHZ521
Compressor with oil Sight glass	✓	✓	✓	✓	✓	✓	✓	✓
CoreSense along with EXV	✓	✓	✓	✓	✓	✓	✓	✓
Fan motor	✓	✓	✓	✓	✓	✓	✓	✓
Serviceable chassis	✓	✓	✓	✓	✓	✓	✓	✓
Blue fin coated condenser	✓	✓	✓	✓	✓	✓	✓	✓
Receiver with valve	✓	✓	✓	✓	✓	✓	✓	✓
Accumulator	✓	✓	✓	✓	✓	✓	✓	✓
Oil separator	✓	✓	✓	✓	✓	✓	✓	✓
Adjustable LP/HP switch	✓	✓	✓	✓	✓	✓	✓	✓
Liquid Line filter drier	✓	✓	✓	✓	✓	✓	✓	✓
Moisture Indicator	✓	✓	✓	✓	✓	✓	✓	✓
CDU service valves	✓	✓	✓	✓	✓	✓	✓	✓
Electrical Terminals	✓	✓	✓	✓	✓	✓	✓	✓
Crank Case Heater	✓	✓	✓	✓	✓	✓	✓	✓

Important Note - Above given Scope of supply comes with our Standard designed Models. For any customized requirement of additional accessories/system component, please contact our Authorized WHS/Dealer or our Regional Sales Manager

Physical Layout

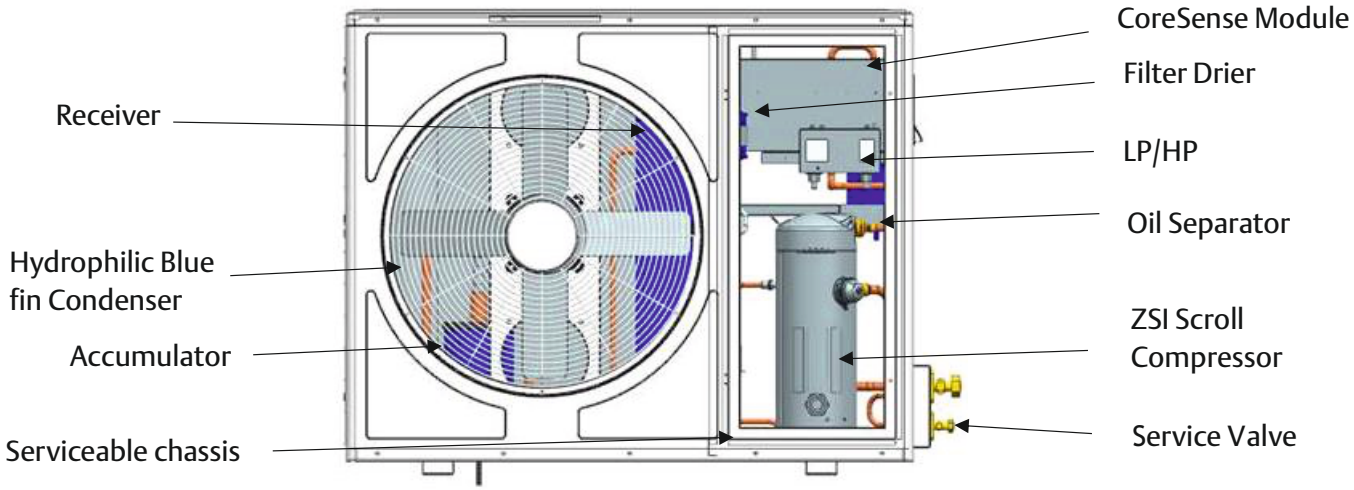


Figure 2 : KHZXXXLRL Physical layout

Technical Specifications:

Refer Table 2 below for the dimension, weight & other mechanical details of the product.

Table 2: Mechanical Details of KHZXXXLRL CDU models

CDU Model*	No of Fans	Fan W/V/P	Receiver	Dimensions	Mounting Dimensions		Suction Line	Liquid Line	Net Weight	Sound
		W/V/P	Liters	W X D X H mm	L1	D1	Connection	Connection	Kg	dBA.
KHZ506LRL	1	160 Watts 230V/ 1Ph/50Hz	4.6	1043 x 440 x 805	656	402	5/8”	3/8”	96.5	60
KHZ508LRL					656	402	5/8”	3/8”	96.5	62
KHZ509LRL					656	402	5/8”	3/8”	96.5	63
KHZ511LRL					656	402	7/8"	1/2"	111	68
KHZ514LRL					656	402	7/8"	1/2"	140	71
KHZ515LRL					656	402	7/8"	1/2"	140	71
KHZ518LRL	2		5.7	1043 x 440 x 1140	656	402	7/8"	1/2"	169	73
KHZ521LRL					656	402	7/8"	1/2"	190	74

*Power Input is 400V/3Ph/50Hz

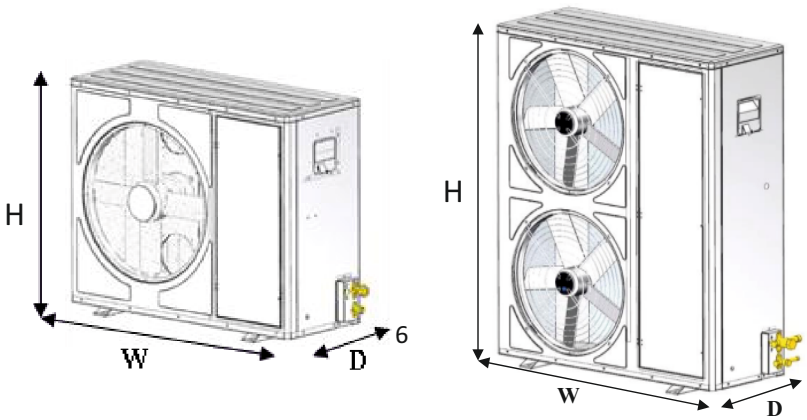
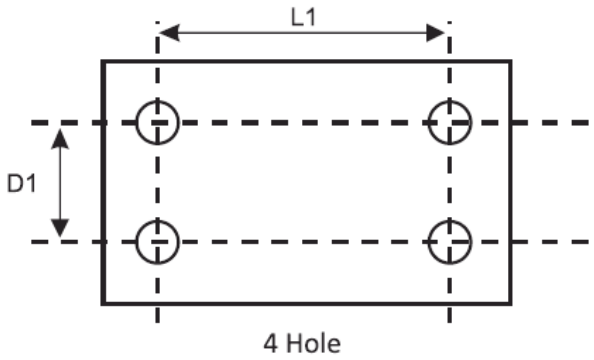


Figure 3: KHZXXXLRL CDU Top View, Side View & Dimensions



Mounting dimensions as per above table:

Refer Table 3, for theElectrical details of the KHZXXXLRL CDU models as under

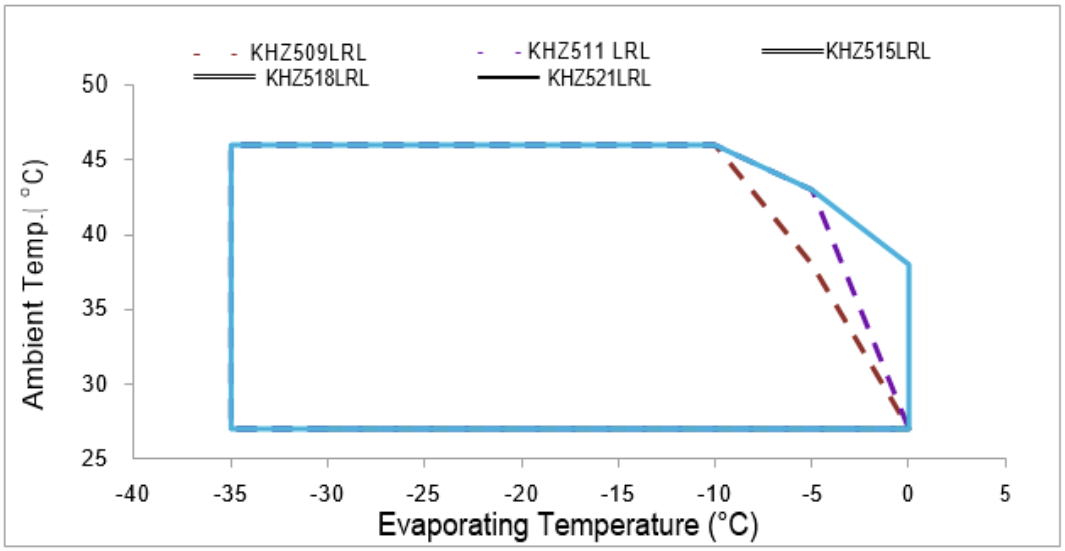
Table 3: Electrical data for the **KHZXXXLRL** CDUs

Model	Compressor	Rated Voltage	CDU MCC (A)	Contactor Rating	Cu. Cable Size
KHZ506LRL-E5EC6C	ZSI06KQE-TFM	380-420V/50 Hz/3Ph	7.9	9A	2.5 Sq. mm
KHZ508LRL-E5EC6C	ZSI08KQE-TFM	380-420V/50 Hz/3Ph	7.9	9A	2.5 Sq. mm
KHZ509LRL-E5EC6C	ZSI09KQE-TFM	380-420V/50 Hz/3Ph	7.8	9A	2.5 Sq. mm
KHZ511LRL-E5EC6C	ZSI11KQE-TFM	380-420V/50 Hz/3Ph	11.2	12A	2.5 Sq. mm
KHZ514LRL-E5EC6C	ZSI14KQE-TFM	380-420V/50 Hz/3Ph	12.1	12A	2.5 Sq. mm
KHZ515LRL-E5EC6C	ZSI15KQE-TFM	380-420V/50 Hz/3Ph	12.7	18A	2.5 Sq. mm
KHZ518LRL-E5EC6C	ZSI18KQE-TFM	380-420V/50 Hz/3Ph	15	22A	4.0 Sq. mm
KHZ521LRL-E5EC6C	ZSI21KQE-TFM	380-420V/50 Hz/3Ph	19.3	22A	4.0 Sq. mm

- Always use AC-3 Category Contactor with above mentioned rating in table .

Refer below the operating envelope of the KHZXXXLRL CDU models

Figure 4 : Operating Envelope for KHZXXXLRLModels



Refrigerant R404A; Suction return gas temperature: 5° C

Installation

The condensing unit should be located in such a place to prevent any dirt, plastic bag, leaves or papers from covering the condenser and its fins. The unit must be installed without restricting the airflow. A clogged condenser will increase the condensing temperature, thus reduce the cooling capacity, and lead to a high-pressure switch tripping. Clean the condenser fins on a regular basis.

Before Installation

- Check all the LOTO tags, Working Space, operative should have correct tools etc.
- Ensure the units received are the correct models for the intended application.
- Ensure the refrigerant, voltage and gauges are all suitable for the proposed application & unit.
- Check there is no damage to the units.
- Check that the proposed equipment locations are suitable and provide adequate support for the weight of the units.

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.
- As lifting equipment is required, ensure that it is suitable for purpose, certified and that the operators are qualified to use it
- Safe working methods are identified, and operator have suitable PPE's.
- Ensure the working area has adequate ventilation during brazing procedures.
- 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 earthed, and no maintenance work should be attempted prior to disconnecting the electrical supply
- The electrical box/terminal covers, and fan guards must always remain fitted.

Note: All Compressors are delivered with sufficient oil for normal operation. The optimum oil level or oil return should be checked by operating the compressor until the system is stable. It is not recommended to top up Oil unnecessary. If required additional charge of oil for top-up or oil change during maintenance or in case of leakage. kindly use our qualified oil as per below table recommended for these Condensing units. Oil Level should not exceed 1/3$_{rd}$ of the Compressor sight glass.

Oil & Refrigerant:

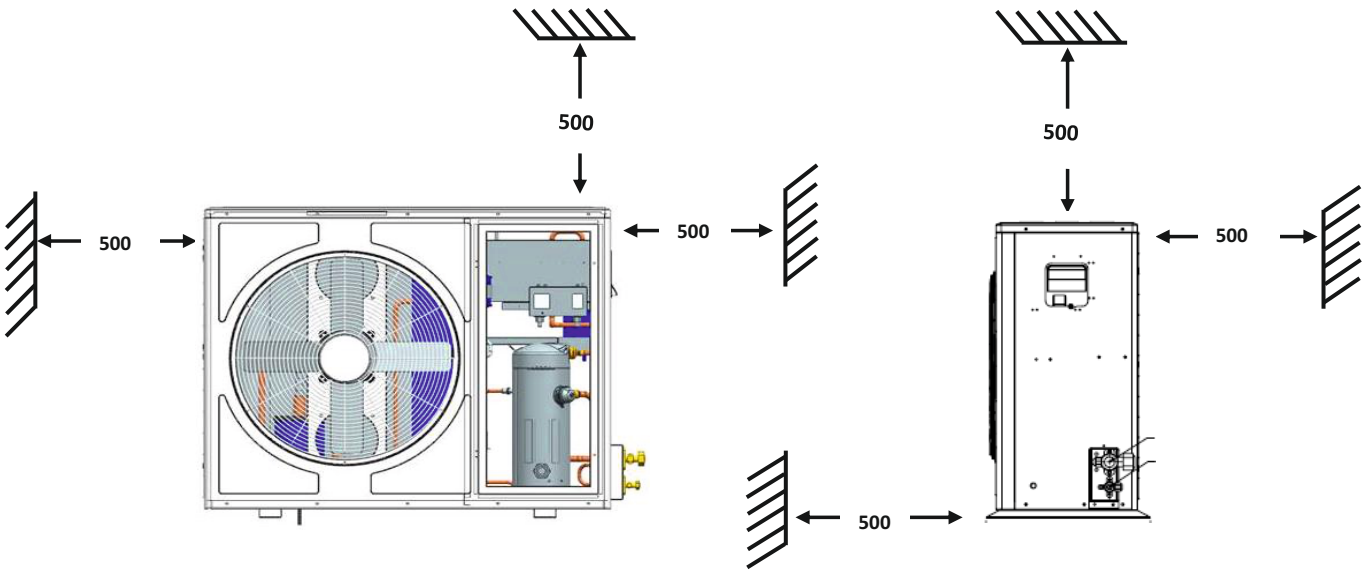
Qualified Refrigerant	R404A
Copeland® Brand Products Standard Oils	Emkarate RL 32 3MAF
Servicing Oils	Emkarate RL 32 3MAF Mobil EAL Arctic 22 CC

Location and Fixing

- The unit should always be installed in a location that ensures clean air flow. Both service access and airflow have been considered in making these recommendations.
- Where multiple units are to be installed in the same location, the contractor needs to consider each individual case carefully.
- Ideally, the unit should be mounted on a solid concrete slab with anti-vibration pads between unit feet and concrete.
- Ensure that there is no obstruction to air flow into or out of the unit. Remove obstacles which block air intake or discharge
- The location must be well ventilated, so the air can pass properly through condenser by maintaining the proper condensation in the system.

Installation Clearance:

It is recommended to have a clearance of 500 mm between the condenser face and adjacent wall or unit, while a clearance of 500mm on remaining 3 sides and top for service and free circulation.



All Dimensions are in mm
Above instructions are recommended for Dual Fan CDU Units Also.

Refrigeration Piping Installation

All interconnecting pipes should be of refrigeration grade, clean, dehydrated and must remain capped at both ends until installation. Even during installation, if the system is left for any reasonable period (say two hours), pipes should be re- capped to prevent moisture and contaminants from entering the system.

Do not assume that the service connection sizes on the unit (at the service valves) are the correct size to run your interconnecting refrigeration pipes. The service valve sizes have been selected for convenience of installation and in some cases (larger units) these may be considered too small. However, for the very short pipe run within our units, these service connection sizes are adequate.

The pipe should be sized to ensure optimum performance and good oil return. The sizing must also take into account the full capacity range through which this particular unit will need to operate.

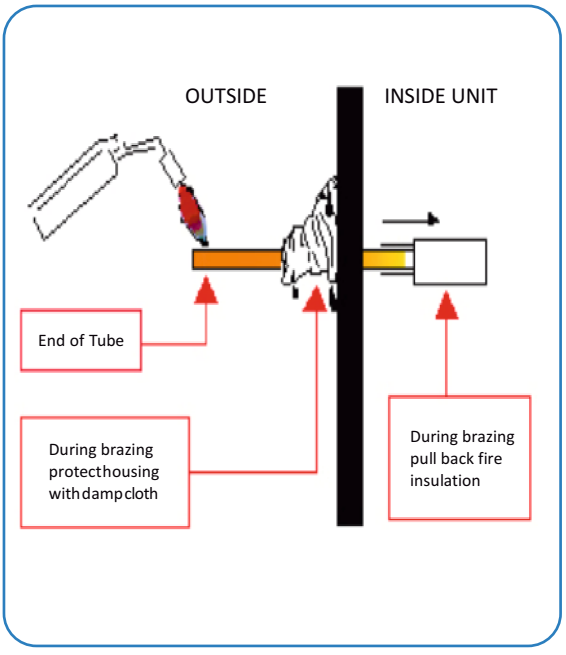
Pipe runs should be kept as short as possible, using the minimum number of directional changes. Use large radius bends and avoid trapping of oil and refrigerant. This is particularly important for the suction line. The suction line should ideally slope gently towards the unit. Recommendation slope is 1/200~1/250. P traps, double risers and reduced pipe diameters may be required for suction lines where long vertical risers cannot be avoided. All pipes should be adequately supported to prevent sagging which can create oil traps.
The recommended pipe clamp support distance is shown in the table.

Tube Size	Max distance between 2 clamp support
12.7mm (1/2 inch)	1.20 m
16.0mm (5/8 inch)	1.50 m
22.0mm (7/8 inch)	1.85 m
28.5mm (1 1/8 inch)	2.20 m

Brazing Recommendations

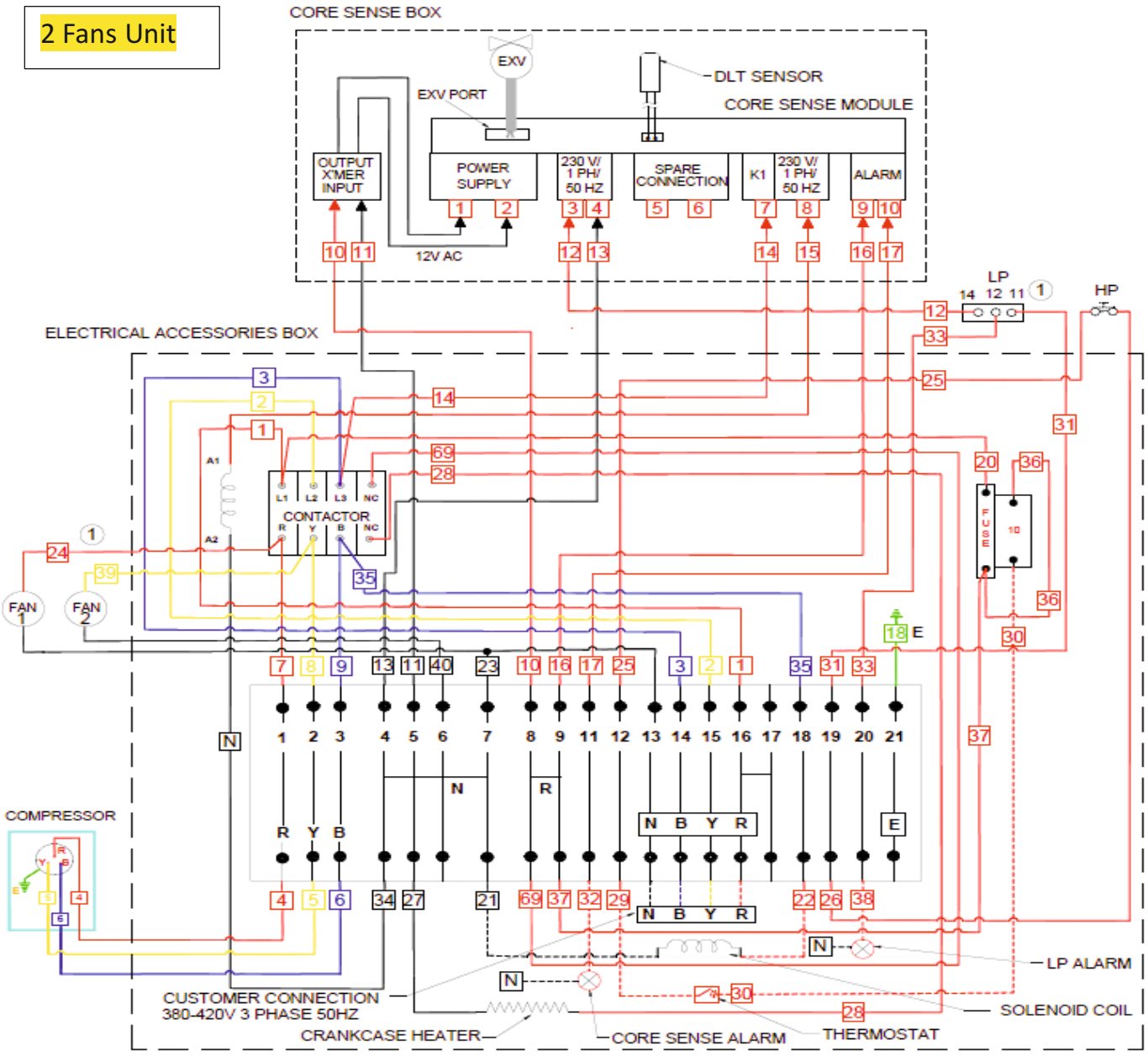
Maintain a flow of oxygen-free nitrogen through the system at a very low-pressure during brazing. Nitrogen displaces the air and prevents the formation of copper oxides in the system. If copper oxidization is allowed to form, the copper oxide material can later be swept through the system and block screens such as those protecting capillary tubes, thermal expansion valves, and accumulator oil return holes. This minimizes any entry of contaminants and moisture.

- Remove the liquid line connection cap.
- Then remove the suction connection cap.
- Open both valves midway. Care should be taken to avoid the holding charge from releasing too quickly.
- Be sure tube fitting inner diameter and tube outer diameter are clean prior to assembly.
- Since both tubes are extended from the condensing unit housing, we recommend insulating the housing by using a wet cloth on the copper tubing.
- Recommended brazing materials: a copper / phosphorous or copper/ phosphorous / silver alloy rod should be used for joining copper to copper whereas to join dissimilar or ferric metals, use a silver alloy rod, either flux coated or with a separate.
- Use a double tip torch.



Wiring Diagram:

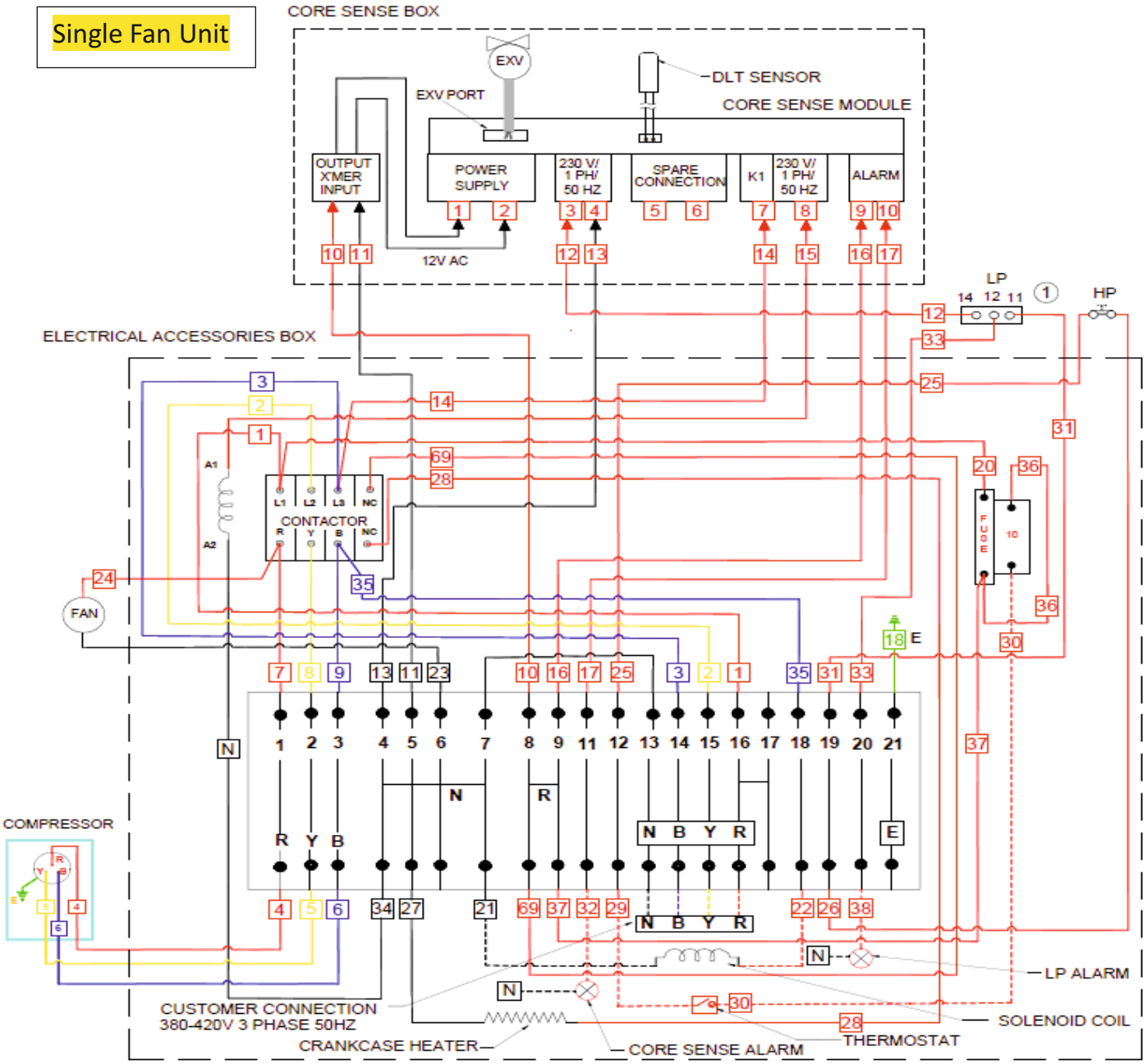
2 Fans Unit



CONNECTION CHART	
FERRULES NO. ON WIRES	USED FOR CONNECTING
22 21	TO SOLENOID COIL 230 1PH/50HZ
29 30	TO THERMOSTAT
24 23	TO FAN 1
32 N	CORE SENSE ALARM
12 31 33	TO LP
25 26	TO HP
4 5 6	TO COMPRESSOR
28 27	TO CRANKCASE HEATER
39 40	TO FAN 2

Wiring Diagram:

Single Fan Unit



CONNECTION CHART	
FERRULES NO. ON WIRES	USED FOR CONNECTING
22 21	TO SOLENOID COIL 230 1PH/50HZ
29 30	TO THERMOSTAT'
24 23	TO FAN
32 N	CORE SENSE ALARM
12 31 33	TO LP
25 26	TO HP
4 5 6	TO COMPRESSOR
28 27	TO CRANKCASE HEATER

Start Up and Operation

Leak Check

The unit has been leaktested and QA approved from the factory. However, due to handling and shipping the entire refrigeration systemmust be tested for leaks. Failure to carry out leak test can result to undesirable system performance.

Step-by-step:

1. Open both the liquid and suction service valves.
2. Ensure the solenoid valve is energized and open, if available.
3. Pressurize the system to300 psig/21 Bar maximum with dry nitrogen.
4. Allow dry nitrogen to reach all parts of the system.
5. Check all joints and components using soap/bubble test or with an electronic leak detector.
6. Wait for atleast an hour to ensure the system is holding the pressure and is found to beleaked proof, if the system loses any pressure over the course of 30 minutes to1 hour, then it is a sure indication that the system is leaking

If leak has been detected somewhere on the system, relief the pressure and repair the leak. For an effective installation, the system must be leak tight.

System Evacuation

Evacuating a refrigeration system serves two primary objectives: (1) remove non-condensable and (2) remove water vapor or dehydrate the system.

Air and moisture are detrimental to system operation. The successful long-term operation of the system depends on thoroughly conditioning them before charging with refrigerant and the losses associated with improper evacuation erodes system efficiency as well as costly for the installers.

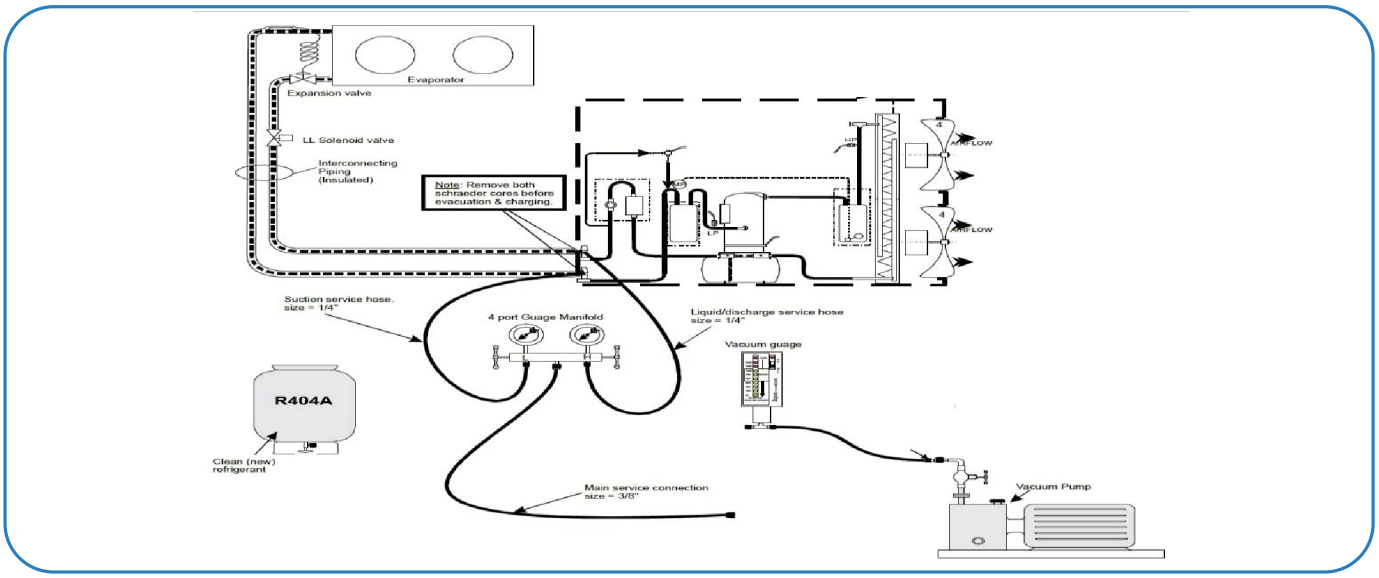
A 2-stage vacuum pump along with a micron gauge is recommended in performing evacuation. The quality of vacuum is not determined by time – a micron gauge must be used since it is the only device that accurately reads the vacuum pressure during the evacuation process.

REMINDER: **Do not use the system compressor as a vacuum pump and never operate the compressor while the system is in vacuum.** Emerson Climate Technologies recommends Triple Evacuation Process (best practice) to be implemented on all our installations.

Note that the following procedure is based upon achieving an actual system vacuum standard and it is **NOT TIMEDEPENDENT!**

Step-by-step:

1. Open both the liquid and suction service valves.
2. Ensure the solenoid valve is energized and open, if available.
3. Connect vacuum pump to the liquid and suction service valves.
4. Start the vacuum pump and then open the service valves.
5. Perform triple evacuation process as follows:
   i. Vacuum until a pressure of 500 microns is reached — at which time the vacuum should be broken with the refrigerant to be used in the system through a drier until the system pressure rises to 20 psig
   ii. Repeat this vacuuming process again.
   iii. Evacuate the entire system to 500 microns (minimum recommended). Evacuate the system below 500 microns may enhance the reliability of system.



Refrigerant Charging

After ensuring the system is vacuumed properly and all valves are opened, only then start the refrigerant charging process

1. Ensure that there is no power supply to the CDU unit. The Liquid Line solenoid needs to be kept open for the charging process, if available and this may require a temporary power feed to it.
2. Connect the refrigerant cylinder to main service hose and purge line at the manifold end.
3. Ensure correct orientation of the refrigerant cylinder.
4. Follow cylinder labeling/instructions so that liquid refrigerant can be charged into the high side of the system using high-pressure side of the manifold.
5. The refrigerant cylinder should be weighed at this point to be able to record the final refrigerant charge.
6. Now open the liquid service valve (off the back seat). With a good vacuum in the system, system will in-take 60-70 of the refrigerant required in the system without running the compressor.
7. The compressor can then be started, and the unit continued to be charged (with liquid refrigerant through the suction service valve).
   The quantity of charge should always be measured. See note.
8. The system needs to be operated down to its design evaporating temperature before you can be sure the charge is correct. Check the liquid line sight glass for violent bubbles and the operating pressures.

In the event that the system is still short of refrigerant, repeat from step #7 onwards.

Refrigerant charging is said to be complete when the operating temperature of the system has been stable for some time and the liquid line sight glass is clear ensuring Suction & Discharge pressure, Superheat and subcooling.

Note: Do not Charge the refrigerant by measuring the current drawn by compressor.

Pressure Cut Out Settings

Please ensure following setting for the cut outs for the safe operation of the unit:

Refrigerant	Maximum Condensing Temp.	LP		Minimum Evaporating Temp.	HP	
		Cut Out	Cut In		Cut Out	Cut In
R404A	60°C	1.0 bar	2.7 bar	-30°C	29.6 bar	24.1 bar

Refrigerant Charge

Refer to the table below for the approximate Refrigerant holding capacity of Condensing Unit :

Model	Refrigerant Charge (R404a) kg
KHZ506LRL-EX	4.10
KHZ508LRL-EX	4.10
KHZ509LRL-EX	4.10
KHZ511LRL-EX	4.10
KHZ514LRL-EX	4.10
KHZ515LRL-EX	4.10
KHZ518LRL-EX	4.54
KHZ521LRL-EX	4.54

Maintenance

Condenser Fins

- Condenser fins become dirty over time as ambient air is induced to the condenser. Dirty coil surfaces result in high condensing temperatures and poor unit performance. Regular cleaning is recommended with frequency depending on the installation and the surrounding environment. As a general guide, it is advisable to do this at least once every two months.

- Fins should be cleaned with proper cleaning agent. Before washing, a light brush downward (in the direction of the fins) should be brushed to remove heavy deposits.

Electrical Connections

- Check tightness of electrical connections occasionally.
- Always ensure the below mentioned Electrical tips before starting the unit.

Compressor

- Check the oil level if sight glass is available.
- No corrosion is deposited at compressor body over the period of time.
- Ensure compressor superheat and all system parameters as per designed conditions.

Routine Leak Test

- All joints should be checked for leaks during site visits. All joints should be leak tested once-a-year.

Condenser Fan(s) and Motor(s)

An annual inspection of these items is recommended. Fastenings may loosen, bearings may wear, and fans may require cleaning of solid deposits which can cause imbalance.

WARNING: TURN OFF OR DISCONNECT THE ELECTRICAL POWER SOURCE BEFORE CLEANING THE CONDENSER

Application Tips for Scroll Compressors/ Do's & Don'ts:

General Tips:

- Please do Vacuum break with pure liquid refrigerant charge on high side and top-up by liquid bleed in suction
- Always ensure the LP/HP Setting before starting the compressor.
- Don't use refrigeration compressor for self-evacuation.
- Never use the compressor to suck oil into the system.
- Do not test compressor by closing suction valve.
- Do not set low pressure switch below 1 bar.
- Do not pump down below 1 bar.
- To avoid the refrigerant flood back a Solenoid valve should be used in liquid line.
- Don't start the compressor when it is in vacuum.
- Don't operate the compressor in open air.
- Don't allow short- cycling of compressor.
- Ensure the oil return in sight glass during running cycle.

- Don't allow air, moisture, contaminants to enter compressor.
- Don't charge refrigerant looking at compressor amperes
- Do not bypass LP/HP controls
- Reverse Rotation

  Scroll compressors pump in one direction only

  Incorrect rotation can be identified by:
  -low current, noise, balanced suction and discharge pressure Correct by interchanging any two phases
  Short-term reverse rotation will not damage the compressor

Electrical Tips:

Kindly verify before any Electrical installation if the voltage, frequency and phase of supply satisfy those required of the unit. Ensure that Operative is following all safety guideline & procedure as mentioned above while performing Electrical Installation.

- All wiring should be carefully checked & refer wiring diagram (attached inside of the electrical cabinet) to complete unit control circuit.
- Do not handle high-voltage electrical wiring unless properly trained.
- Check if the Voltage deviation of 10 is within the specified range mentioned on unit name plate.
- Do not by -pass any electrical safety equipment like MCCB, SPP, Contactor, Overload Relay, timer & other safety devices.
- Use genuine specified electrical accessories for CDU/Compressor model recommended by Company.
- Check the electrical connections if they are properly attached, secured and properly tightened.
- Make sure all panels are secure and panel screws are properly tightened.
- Check that the ampere draw doesn't exceed the amperage specified on the nameplate.
- Check the phase unbalance if there is a three-phase connection.
- In single phase compressor. Check for neutral connection. It is better to connect Common (C) terminal to the neutral supply.
- Check for proper Earthing/ground. Ensure each component is getting proper supply, no burnt/Chattering in Connection and is working as intended.
- Do not bypass the crankcase heater connection and its operation sequence (low ambient/ During off cycle).
- If you do not fully understand how to install your product after reading the manufacturer's instructions, contact our local authorized dealer or technical team for help and do not attempt to install it yourself.

Electrical (Power) Connections

KEEP IN MIND KHZ Condensing units uses 3-Phase Scroll compressors and can rotate in the wrong direction when starting. If this happens reverse any two phases (L1 & L3) and start again. So, a Single phase preventor must require. Always observe the rotation of 3 phase Scroll Compressor by measuring Current drawn, Compressor pumping and running sound.

Rotation direction of Scroll compressors

KEEP IN MIND ZSI Low temperature Condensing units 'uses 3-Phase Scroll compressors which can only compress in one rotational direction. Scroll Compressor can rotate in the wrong direction when start depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, So, a Single phase preventor must require. Always observe the rotation of 3 phase Scroll Compressor by measuring Current drawn, Compressor pumping and running sound.

Maximum Compressor Cycle & Minimum run time

KHZ or ZSI Scroll CDU units- Maximum permitted starts per hour is 10.

There is no minimum off time because Scroll compressors start unloaded even if the system has unbalanced pressures. It is recommended to set minimum 3 mins run time of compressor after it comes in operation for adequate oil return and if possible, we can set 3 mins off time/Delay time of compressor once the power supply is disconnected from circuit to avoid frequent on/off or chattering in Electrical components.

Note:

The components listed in this catalogue are not released for use with caustic, poisonous or flammable substances.
Emerson Climate Technologies cannot be held responsible for any damage caused by using these substances.

Pressure -Temperature Chart

Temperature		Refrigerant				
°F	°C	R-22	R-410a	R-407c	R-134a	R-404a
3	-16.1	26.5	52.2	21.2	8.0	36.7
4	-15.6	27.4	53.6	22.0	8.6	37.7
5	-15.0	28.3	55.0	22.8	9.1	38.8
6	-14.4	29.1	56.4	23.7	9.7	39.8
7	-13.9	30.0	57.9	24.5	10.2	40.9
8	-13.3	31.0	59.3	25.4	10.2	40.9
9	-12.8	31.9	60.8	26.2	11.4	43.1
10	-12.2	32.8	62.3	27.1	12.0	44.3
11	-11.7	33.8	63.9	28.0	12.6	45.4
12	-11.1	34.8	65.4	29.0	13.2	46.6
13	-10.6	35.8	67.0	29.9	13.8	47.8
14	-10.0	36.8	68.6	30.9	14.4	49.0
15	-9.4	37.8	70.2	31.8	15.1	50.2
16	-8.9	38.8	71.9	32.8	15.7	51.5
17	-8.3	39.9	73.5	33.8	16.4	52.7
18	-7.8	40.9	75.2	34.8	17.1	54.0
19	-7.2	42.0	77.0	35.9	17.7	55.3
20	-6.7	43.1	78.7	36.9	18.4	56.6
21	-6.1	44.2	80.5	38.0	19.2	57.9
22	-5.6	45.3	82.3	39.1	19.9	59.3
23	-5.0	46.5	84.1	40.2	20.6	60.6
24	-4.4	47.6	85.9	41.3	21.4	62.0
25	-3.9	48.8	87.8	42.4	22.1	63.4
26	-3.9	48.8	87.8	43.6	22.9	64.8
27	-2.8	51.2	91.6	44.7	23.7	66.2
28	-2.2	52.4	93.5	45.9	24.5	67.7

Temperature		Refrigerant				
°F	°C	R-22	R-410a	R-407c	R-134a	R-404a
29	1.7	53.7	95.5	47.1	25.3	69.2
30	-1.1	54.9	97.5	48.4	26.1	70.7
31	-0.6	56.2	99.5	49.6	26.9	72.1
32	0.0	57.5	101.6	50.9	27.8	73.8
33	0.6	58.8	103.6	52.1	28.6	75.3
34	1.1	60.2	105.7	53.4	29.5	76.9
35	1.7	61.5	107.9	54.8	30.4	78.5
36	2.2	62.9	110.0	56.1	31.3	80.2
37	2.8	64.3	112.2	57.5	32.2	81.7
38	3.3	65.7	114.4	58.9	33.1	83.5
39	3.9	67.1	116.7	60.3	34.1	85.2
40	4.4	68.6	118.9	61.7	35.0	86.9
41	5.0	70.0	121.2	63.1	36.0	88.6
42	5.6	71.5	123.6	64.6	37.0	90.4
43	6.1	73.0	125.9	66.1	38.0	92.2
44	6.7	74.5	128.3	67.6	39.0	94.0
45	7.2	76.1	130.7	69.1	40.0	95.8
46	7.8	77.6	133.2	70.6	41.1	97.6
47	8.3	79.2	135.6	72.2	42.2	99.5
48	8.9	80.8	138.2	73.8	43.2	101.4
49	9.4	82.4	140.7	75.4	44.3	103.3
50	10.0	84.1	143.3	77.1	45.4	105.3
55	12.8	92.6	156.6	106.0	51.2	115.3
60	15.6	101.6	170.7	116.2	57.4	126.0
65	18.3	111.3	185.7	127.0	64.0	137.4

System Troubleshooting Guide:

Symptom	Possible Cause	Correction
Unit is not starting	• Power disconnected or loose connection • Blown fuse / breaker tripped • Thermostat out of calibration – set too high • Contactor defective • High pressure Switch open (if provided)	• Check voltage at contactor in condensing unit • Replace fuses / reset breaker • Reset • Check & replace if open • Reset – see high pressure correction (high pressure control opens at 450 psig)
Outdoor fan on; Compressor off	• Run or start capacitor defective • Start relay defective • Loose wire & low Voltage • Compressor stuck, grounded or open motor winding, open internal overload	• Replace • Replace • Check for correct voltage at compressor – check and tighten all connections • Wait at least 2 hours for overload to reset; if still open, Check the compressor & replace.
Too little cooling	• Improperly sized unit • Improper indoor airflow • Incorrect refrigerant charge • Air, non-condensable or moisture in system	• Recalculate load • Check as per desired conditions • Charge per procedure in installation manual • Recover refrigerant, evacuate and recharge, replace filter drier
Compressor operates in short cycles	• Incorrect voltage • Defective overload protector • Refrigerant undercharge	• At compressor terminals, voltage must be +/- 10% of nameplate marking when unit is operating • Replace – check for correct voltage • Add refrigerant
High head pressure; Low suction pressure	• Restriction in liquid line, expansion device or filter drier • Lack of sufficient indoor airflow	• Remove or replace defective component • Clean/check filters, registers, or evaporator coil that may cause a restriction.
High head pressure; Normal suction pressure	• Dirty outdoor coil • Refrigerant overcharge • Outdoor fan not running • Air or non-condensable gas in system	• Clean coil • Correct system charge • Repair or replace • Recover refrigerant, evacuate and recharge
Low head pressure; High suction pressure	• Expansion device stuck in open position • Defective compressor valves	• Replace expansion device • Replace compressor
Low suction pressure; Compressor cool; Ice on indoor coil	• Low indoor airflow • Operating in very low Ambient • Moisture in system	• Increase speed of blower or reduce restriction – replace air filter • Add low ambient kit • Recover refrigerant – evacuate and recharge – replace filter drier
High suction pressure; Or fluctuating head and suction pressures	• Excessive load • Defective compressor • TXV hunting	• Recheck load calculation • Replace • Check TXV bulb clamp – check air distribution on coil – replace TXV

	• Air or non-condensable gas in syste	• Recover refrigerant, evacuate and recharge
Suction & Discharge pressure balanced	• Compressor may loss pumping • If Cooling achieve, Gauges may faulty • Compressor may trip on IPRV	• Replace • Gauges Replace • Check for high side restriction in the system
Unit /Compressor Draw high Amps	• Run or start capacitor defective • Start relay defective • Loose wire • Low Voltage or Voltage Fluctuation • Moisture in the system • Liquid Flood back in the compressor • Any Contamination/ Oil Dilute	• Replace • Replace • Check for correct voltage at compressor – check and tighten all connections • Recover refrigerant – evacuate and recharge • replace filter drier • Ensure proper load • Check oil quality, replace with new oil & do the commissioning as per procedure
Compressor trip on IOLP	• Leakage in the System • Compressor Stuck/JAM • Compressor getting hot & Motor temperature Shooting – up • Reverse rotation of compressor	• Repair • Replace • Maintain proper suction superheat & check oil level/return to compressor • Check voltage & connection of Comp. terminal

System Start-Up and Operational Check Sheet:

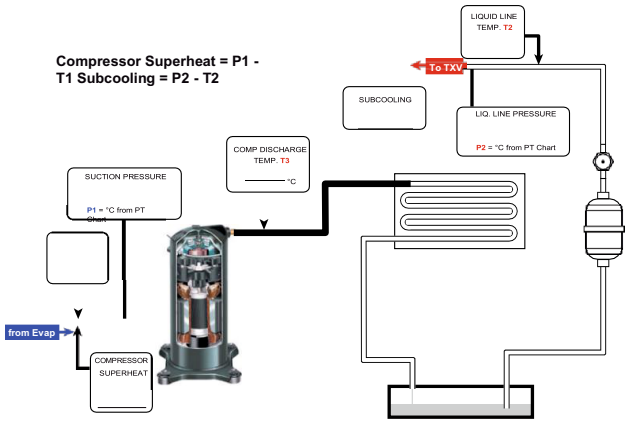
Client Details	
Facility/Customer Name :	
Address :	
Contact Details :	
Installer :	
Installation Date :	

Condensing Unit Info	
CDU Model :	
Serial Number :	
CDU Location :	
Indoor Unit Make/Model :	

System Details	
Room/Case ID :	
Pipe Length (approx.) :	
OAT @ Start-Up/Check :	
PSI Leak Test :	**PSIG**
Duration :	**Hours**
System is Leak Tight :	**Y / N**
Triple Evacuation :	**Y / N**
Micron Gauge Reading :	**microns**
Total Evacuation :	**PSIG @ # of Hrs**
Refrigerant :	
Total Charge :	**Kg.**
Sight Glass Clear :	**Y / N**
Evap. Fans Running :	**Y / N**
Liquid Line Insulation :	**Y / N**
Sound and Vibration	

System Operation	
COMP Voltage :	**V**
COMP Current :	**A**
Standing Pressure	**PSIG/Bar**
Suction Pressure :	**PSIG/Bar**
Liquid Line Pressure :	**PSIG/Bar**
COMP Suction Temp :	**°C**
COMP Disch. Temp :	**°C**
Liquid Line Temp :	**°C**
Compressor SH :	**K**
Subcooling :	**K**
Adjustable LP Setpoint :	**PSIG**
Design/Operating Temp:	**°C**
Actual Room/Case Temp :	**°C**

Comments



SALES OFFICES:

Gurgaon
Emerson Climate Technologies (India) Private Ltd.
18th Floor, Tower B, Building No. 5,
Epitome, DLF Cyber City,
Phase - III, Gurgaon 120 002
Tel: (91-124) 489 4500

Mumbai
Emerson Climate Technologies (India) Pvt. Ltd.
Delphi B-Wing, 601-602,
6th Floor, Central Avenue,
Hiranandani Business Park, Powai,
Mumbai- 400076
Tel: (91-22) 6662 0566

Pune
Emerson Climate Technologies (India) Pvt. Ltd.
Plot No. 23, Rajiv Gandhi Infotech Park, Phase - II,
Hinjewadi, Pune-411 057
Tel: (91-20) 4200 2000, Fax: (91-20) 4200 2099

WAREHOUSES:

Ahmedabad
Emerson Climate Technologies (India) Pvt. Ltd.
C/o Agility Logistics Pvt. Ltd.,
Old Survey No-753, 756 (New Survey No-155)
Off Cadila Estate, Off Hotel Tulsi,
National Highway No,8, Aslali, Taluk-Daskroi
Ahmedabad - 382427
Tel: 079-30924722/7600098528

Bengaluru
Emerson Climate Technologies (India) Pvt. Ltd.
C/o Agility Logistics Pvt. Ltd.,
Shed No. 8, Survey No. 31,
18th KM old Madras Road,
Virgonagar, Bengaluru-560 049
Tel: +918970772593

Chandigarh
Emerson Climate Technologies (India) Pvt. Ltd.
Khata No-694/712 Village–Pabhat
MC Zirakpur, District – SAS Nagar
Mohali, Punjab-140603
Tel: 8054001380

Chennai
Emerson Climate Technologies (India) Pvt. Ltd.
C/o. Agility Logistics Pvt Ltd.,
Kanishk Warehouse, Sr. No. 204,
Vijayanallur Village Road, Nallur Village,
Cholovaram Po, Ponneri Tk, Chennai-600067.
Tel: +918939571199

Gurgaon
Emerson Climate Technologies (India) Pvt. Ltd.
C/o Agility Logistics Pvt. Ltd.,
Khasra No.9/7/2,7/3 Min,8/1 Min, 8/2, 8/3,
Off. Revenue Estate Of Village Gadoli Khurd,
Sector-37 B, Pataudi Road,
Gadoli Khurd (Gurgaon)-122 001
Tel: +919013774070

Howrah
Emerson Climate Technologies (India) Pvt. Ltd.
C/o Agility Logistics Pvt. Ltd.,
Sankrail Industrial PARK,
Mauza-Kandua, Bhagabatipur,
Po-Kandua Howrah-711 302
Tel: Tel: +919093970556

Lucknow
Emerson Climate Technologies (India) Pvt. Ltd.
C/o Agility Logistics Pvt. Ltd.,
G-522, Maya Bhagwan Complex,
Near Shaheed Path Road, Transport Nagar,
Lucknow-226 008
Tel: +919044225771

Mumbai
Emerson Climate Technologies (India) Pvt. Ltd.
Unit No. 59, Ground Floor, 'AA' Wing,
Building No.1, at Kailas Industrial complex,
CTS No. 1/7 & 1/11, Veer Savarkar Marg,
Near Hiranandani Park,
Vikhroli (West), Mumbai-400 079
Tel: (91-22) 4270 8001

New Delhi
Emerson Climate Technologies (India) Pvt. Ltd.
56, Rama Road Industrial Area,
Nr. Mahindra Showroom,
New Delhi-110 015
Tel: (91-11) 45751000

Secunderabad
Emerson Climate Technologies (India) Pvt. Ltd.
C/o: Agility Logistics Pvt. Ltd, # 8-122,
Devaryamjal Road, Kompally, Shameerpet Mandal,
Ranga Reddy Dist.,
Secunderabad-500014,
Tel: (91) 9247000174/9000649871

COLD CHAIN CENTERS

Chakan
Emerson Climate Technologies (India) Pvt. Ltd.
Plot No. G-8/3, Block M.I.D.C.
Chakan Industrial Area, Phase - III,
Taluka : Khed. Dist : Pune - 410 501
Tel: (91- 2135) 625300

Gurgaon
Emerson Climate Technologies (India) Pvt. Ltd.
Plot No. 127,
Udyog Vihar, Phase IV,
Gurgaon - 122 015, Haryana
Tel: (91 124) 2866600

PLANT
Atit Pali Road, Atit - 415 519, Maharashtra.
Tel: (91-2162) 224200, Fax: (91-2162) 262069

REGISTERED HEAD OFFICE
Emerson Climate Technologies (India) Pvt. Ltd.
Plot No. 23, Rajiv Gandhi Infotech Park, Phase - II, Hinjewadi, Pune-411 057
Tel: (91-20) 4200 2000, Fax: (91-20) 4200 2099

www.EmersonClimate.com/India

1800-209-1700 ClimateIndia@Emerson.com

Scan to download the soft copy

@EmersonComResAP

CONSIDER IT SOLVED™