

INSTALLATION INSTRUCTIONS FOR CONDENSING UNITS

A good Installation is one of the best means of enjoying trouble free performance.

Inspection:

After uncrating the equipment inspect for damage in shipment. Any damage due to rough handling in transit should be immediately reported to the transporter.

- Installation must only be performed by qualified staff with necessary technical requirements according to the country in which the machines are installed.
- Location: The Condensing Unit should be located in clean, dry and well-ventilated area sufficient room should be left in front & back of the Condensing Unit to ensure proper condensation.
- Condenser and Compressor cooling: An adequate supply of air must be provided for cooling as well as for exhausting the air to avoid re-circulation of hot air. As a general rule the space to be left open from base & side should be equal to the half width of the Condenser and the front side should be completely open for hot air circulation.
- The Condensing Unit must only be used for its designed purposes and within its scope of application.
- The Condensing Unit is delivered under nitrogen gas pressure (250psi) and hence it cannot be connected as it is normal.
- The Condensing Unit must be handled with caution in a vertical position (maximum offset from the vertical: 15°).

General Information on the Unit:

Manufacturer	Blue Cold Refrigeration Pvt. Ltd.
Serial No	--
Project No	--
Year of Production	--
Unit Type / Model No.	--
Max allowable working pressure	--
Max / Min allowable working temperature	--
Test Pressure	--
Test Date	--
Test Medium	--
Fan Brand	--

1. Handling and Storage:

- It is recommended not to open the packaging before the unit is at the final place for installation.
- Handle the unit with care. The packaging allows the use of a forklift or pallet jack for handling. Use appropriate and safe lifting equipment.
- Store and transport the Unit in an upright position.
- Don't expose the packaging to rain or corrosive atmosphere.
- After unpacking, check that the Unit is complete and undamaged.

2. Installation Precautions:

- Do not braze if the Condensing Unit is under pressure.
- Never place the Unit in a flammable atmosphere.
- Place the Unit in such a way that it is not blocking or hindering walking areas, doors, windows or similar.
- Avoid installing the Unit in locations which are daily exposed to direct sunshine for longer periods.
- Avoid installing the Unit in aggressive and/or dusty environment.
- Ensure a foundation with horizontal surface (less than 3° slope), strong and stable enough to carry the entire Unit weight and to eliminate vibrations and interference.
- The Unit ambient temperature may not exceed 50 °C during off-cycle.
- Ensure that the power supply corresponds to the Unit characteristics (see nameplate).
- Use clean and dehydrated refrigeration-grade copper tubes and silver alloy brazing material.
- Use clean and dehydrated system components.
- The suction piping connected to the Compressor must be flexible in 3 dimensions to dampen vibrations. Furthermore, piping has to be done in such a way that oil return for the Compressor is ensured and the risk of liquid slug over the compressor is eliminated.

3. Installation procedure:

- Check the selected location for the Unit to ensure that rack, flooring foundation etc. are adequate to support the weight of the Unit.
- Pressurize and leak test the entire system including the Condensing Unit, Evaporator and all connected tubing, fitting and brazed joints properly using the nitrogen for leak testing.
- The Unit must be securely installed on a stable and rigid support, and fix from the beginning.
- It is recommended to install the Unit on rubber grommets or vibration dampers (not supplied).
- Slowly release the nitrogen holding charge through the Schraeder port.
- Connect the Unit to the system as soon as possible to avoid oil contamination from ambient moisture.
- Avoid material entering into the system while cutting tubes. Never drill holes where burrs cannot be removed.
- Braze with great care using state-of-the-art techniques and vent piping with nitrogen gas flow.
- Connect the required safety and control devices and remove the internal valve when using the Schraeder port for this.

3.1 Piping Size:

In order to make the connections, suction and liquid line piping with the correct diameters as the connections fitted on the machine must be provided. These diameters are valid up to a maximum length of 10m. For longer sizes, piping diameters must be of a correct size to guarantee the proper gas speed.

3.2 Operation standards, operational limits and operational Instruction:

When the Condensing Unit is being used, check with the final test data of the application product to see whether or not, the following standards are being maintained.

ITEM	OPERATIONAL LIMIT
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Refrigerant used	For Bitzer compressor with “Y” uses only R134a and R404a and without “Y” use R22.
Evaporating temperature range	Please refer the Blue Cold technical sheet.
Discharge gas temperature	Not exceed 115 °C (239 °F), This temperature should be measured at the surface of the heat-insulated discharge pipe at 150 mm distance from the shell surface.
Suction gas temperature	Amount of refrigerant charge should be just sufficient to obtain at least 3 K of superheat to avoid any liquid flood bath.
Amount of refrigerant charged	Amount of refrigerant charged should be just sufficient to obtain at least 3 K of superheat to avoid any liquid flood back. To prevent flood-back a proper accumulator must be installed in the suction pipe side according to the refrigerant charging amount.
ON/OFF frequency	The time between two successive compressor starts should be at least 5 min. The run time of compressor should be at least 3 min before stop.
Pipe stress	The piping must be designed so that no damage will result from transporting of the product and the ON/OFF of the compressor. Recommendable tolerance of piping stress. At starting and stopping: 34.3N/mm ² During operation: 17.7N/mm ²
Piping	The unit pipes should be piped inside of discharge and suction pipes of the compressor.
Pipe clearance	A clearance of at least 13mm must be left between the piping and active parts (compressor, fan, anti-resonance rubber, piping, etc.). A clearance of at least 10mm must be left between the piping and inactive parts.

The unit should be designed to satisfy above operational standard and operational limit in any condition.

The following conditions are hazard-causing example in particular.

- (1) In case of high or low supply voltage at the high ambient temperature (e.g. 43 °C)
- (2) Flood-back at the low ambient temperature (e.g. -5 °C).
- (3) In case of hard condition such as closing fan filter.
- (4) In case of transitional condition such as pull-down and defrost.
- (5) The phenomenon of abnormal low pressure to be caused by bad defrosts

3.3 Electrical parts:

Use the designated electrical parts properly for the safety of compressor. The following electrical parts are used in the compressor and the specifications of each are given in the individual specification sheet of the compressor.

ELECTRICAL PART	PRECAUTIONS
Motor protector	For motor protector it is very important to use following protection. a) Phase failure or single phase b) Overload protection

	c) Voltage high/low d) Proper wiring sizing
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Use heat-resistant cable for the leads which are connected to the compressor terminal, motor protectors attached to compressor (Heat-withstanding temperature of the leads $\geq 105^{\circ}\text{C}$). (Example) Ethylene tetra fluoride or polypropylene hexafluoride resin cable. Please use the lead terminal with soft insulation tube.

3.4 Refrigeration system:

- Solvents which contain chlorine should not be applied for cleaning the apparatus. If applying the solvents by any means, it should be considered sufficiently that chlorine is not remained in the apparatus. Chloride remnants should be less than 100ppm of charged refrigerant (Including the chloride contained in refrigerant).
- Organic material parts which are unknown concerning to compatibility with HFC-134a refrigeration system, should not be applied. (Please let us confirm it if necessary).
- Process oil (machining oil) used for forming pipes and equipment must be removed. It should be confirmed that the oil complies with HFC134a refrigeration system. (Please let us confirm if it is necessary) Especially as remained high viscosity oil may cause choke of refrigerant cycle, do not remain it. HFC refrigerant does not solve almost all oil.

3.5 Recommended piping as per evaporator positioning:

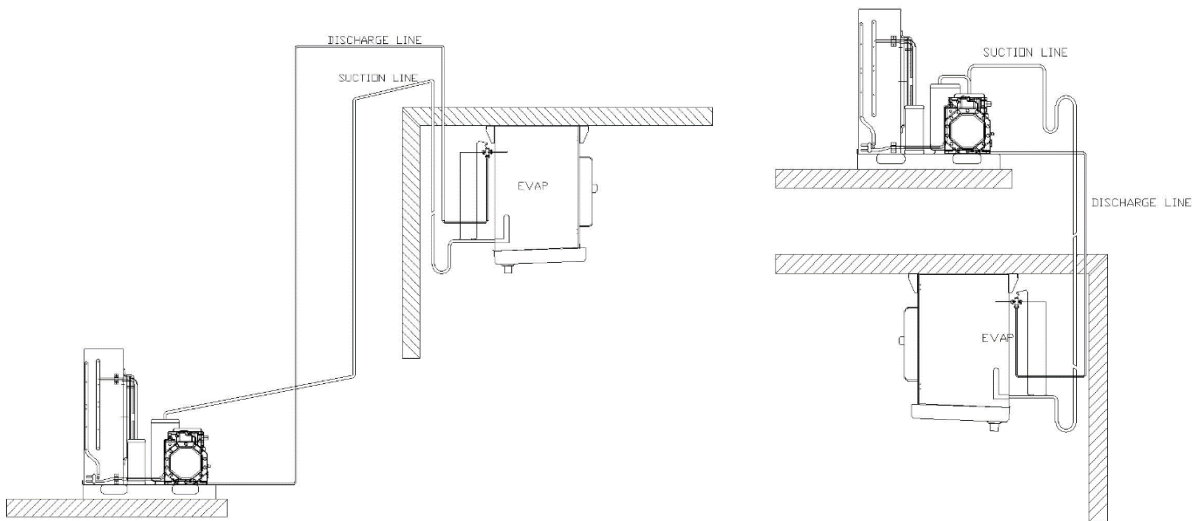


Fig. 1

Fig. 2

3.6 Welding method:

Take care not to allow flux, dirt, foreign matter or moisture to enter the refrigeration circuit while welding between pipes or welding the pipes to the compressor.

3.7 Refrigerant charging method:

- The compressor is supplied with oil. Check the “OIL Line” mark.
- Create the vacuum from both the high and low-pressure side. (If it is possible to create the vacuum from one side only, take sufficient time at the high-pressure side and check that the prescribed vacuum gas has been created). This will ensure that air and above all, humidity contents are below the permitted values. In any case, the target value is a pressure not higher than 5 Pa.

- *Important: In order to avoid irreparable damage to the compressor, never start it in vacuum conditions and the gas charge.*
- Always charge the refrigerant from the high-pressure side (condenser) of the unit. Do not use the refrigerant charger which has been used for HCFC or CFC.
- To charge the refrigerant correctly, we recommend that, after setting the vacuum, you pump part of the refrigerant into the compressor to “break the vacuum”. Then start the compressor so that it sucks up the residual part of the refrigerant.
- For the correct calculation of the gas charge, connect gauges to the pressure inlets (already fitted). Pressure value must be compatible with the operating conditions of the machines.
- *Important: Mixtures of refrigerating gas must be charged into the system in their liquid state only.*

3.8 Starting method:

- Make the time span from power OFF to re-start the same as the time taken for the high and low pressure to be balanced (about 3 min), then balanced starting.

3.9 Moisture:

Keep the amount of balanced moisture inside the refrigeration circuit (including compressor) within 350mg (Cold-trap test). Moisture level in the refrigeration system should be maintained as low as possible.

3.10 Contaminants / foreign obstacles:

- Carefully avoid the fluxes, contaminants (such as metal or fiber scraps) to mingle inside the refrigerant circuit.
- Install a strainer (with about 100 mesh) within the refrigeration circuit and avoid the clogging of capillary tube etc.

3.11 General handling precautions:

- The compressor should be installed in the refrigeration system within 1 year from the manufactured date.
- The compressor should not be left for more than 30 minutes unsealed.
- Do not carry out compressor self-actuated vacuum condition.
- Never operate the compressor as an air compressor.
- Do not severely tilt the compressor, drop it or cause it to topple over while transporting.
- Do not scratch the painted surfaces.
- Do not use the compressor in cars, trains and small size ships.

3.12 Refrigerant:

Refrigerant R-22, R-134a and R-404a 99.9% in purity should be used for apparatus. 99.95% is recommended, if possible. In particular, the refrigerant containing the minimum volume of chloride should be used.

3.13 Oil returns:

- It is important for the piping to be designed with sufficient consideration given to oil return during the refrigeration cycle since the refrigeration oil in the compressor is sometimes discharged in volume inside the equipment as a transitional phenomenon (due to the strong of the refrigerant) during start-up, etc.

- If the Condensing Unit is positioned above the evaporator, it is important to fit siphons along the suction line every 2m of difference in height, so as to guarantee oil return to the compressor. In any case, along horizontal stretches, it is important for the suction line piping to have a slope of at least 3% towards the compressor.'
- Oil is liable to collect when an auxiliary accumulator is attached within the refrigerating cycle, which necessitates an oil-return structure. Care is required with short ON/OFF cycles.
- It is necessary to confirm oil return with above care. Please confirm that the oil level is sufficient to the operation standard, running with the compressor equipped with sight glass, in the unit operation limit condition that high to low ambient temperature, on the mode pull-down, ON/OFF cycle.

3.14 Immunity from vibration during transportation firm:

- Sufficient consideration in design must be given so that mounting parts and connected parts are not damaged as a result of vibration or shock sustained while transporting the fully assembled equipment. It should be confirmed no damage by the transporting test.
- The systems must be sized for max. 80% of standard compressor operation. 100% compressor operation only occurs in special overload and ambient temperature conditions that are outside of the normal permitted operating limits.
- The system has to be sized as not to have more than 5 ON/OFF cycles per hour. The intervention of thermal protection device switches off the compressor, which will be started again after the time required for the protection device contacts to be connected.
- In the machines fitted a dual pressure switch set to the following values:

	Set Bar	Difference Bar
HP	27	4
LP	1	1

- Pressure switch for Pump-down: this must be set considering that the compressor must not startup at intervals that are too close together (5 minutes at least). In these cases, we recommend the use of a timer for the compressor start delay.

4. Leak detection:

- Never pressurize the circuit with oxygen or dry air. This could cause fire or explosions.
- Do not use dye for leak detection.
- Perform a leak detection test on the complete system.
- The maximum test pressure is 465psi.
- When a leak is discovered, repair the leak and repeat the leak detection test.

5. Electrical connections:

- Switch off the system and isolate the main power supply.
- Ensure that power supply cannot be switched on during installation.
- All electrical components must be selected as per local standards and unit requirements.
- Refer to wiring diagram for electrical connections details.
- Ensure that the power supply corresponds to the unit characteristics and that the power supply is stable (nominal voltage $\pm 10\%$ and nominal frequency $\pm 2.5\text{ Hz}$).
- Dimension the power supply cables according to unit data for voltage and current.
- Protect the power supply and ensure correct earthing.

- Make the power supply according to local standards and legal requirements.
- The unit includes high and low-pressure switches which, when activated, cut the power supply to the compressor. Parameters for high and low-pressure cut-outs are to be adjusted by the installer, depending on the compressor model, refrigerant and application. For units with a 3-phase scroll compressor, correct phase sequence for compressor rotation direction shall be observed.
- Determine the phase sequence by using a phase meter to establish the phase order of line phases L1, L2 and L3.
- Connect line phases L1, L2 and L3 to main switch terminals T1, T2 and T3, respectively.

6. Filling the system:

- Wear protective stuff like goggles and protective gloves.
- Never start the compressor under vacuum. Keep the compressor switched off.
- Before charging the refrigerant, verify that the oil level is visible in the oil sight glass between 25% to 75% full.
- Use only the refrigerant for which the unit is designed for.
- Fill the refrigerant in liquid phase into the condenser or liquid receiver. Ensure a slow charging of the system to 58 - 70psi for R404A/ R507A or R22, and approx. 30psi for R134a.
- Do not put liquid refrigerant through the suction line.
- It is not allowed to mix additives with the oil and/or refrigerant.
- The remaining charge is done until the installation has reached a level of stable nominal condition during operation.
- Never leave the filling cylinder connected to the circuit.

7. Verification before commissioning:

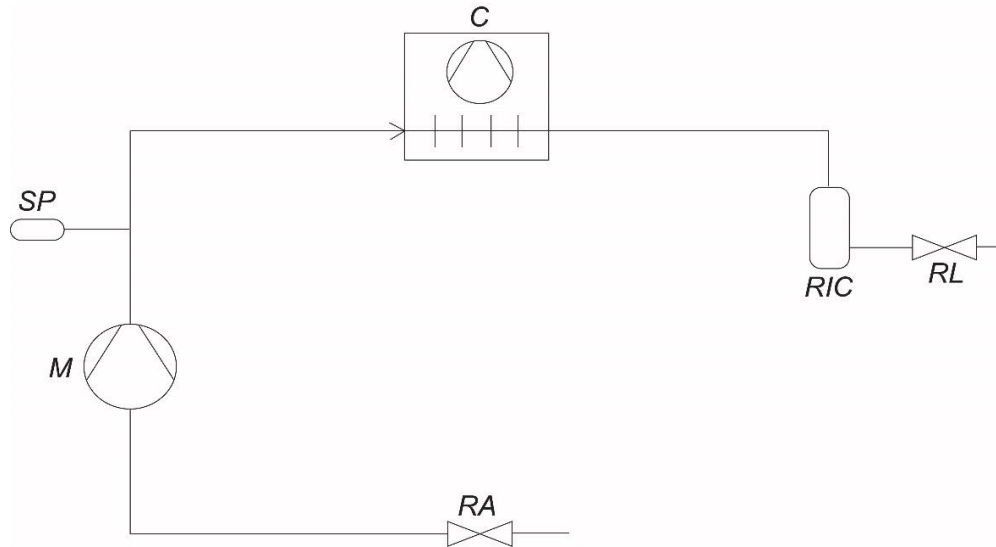
- Use safety devices (such as safety pressure switches and mechanical relief valves) in compliance with both generally and locally applicable regulations and safety standards. Make sure that the devices are operational and properly set.
- Check that the settings of high-pressure switches and relief valves don't exceed the maximum service pressure of any system component.
- When a crankcase heater is required, it must be energized at least 12 hours before initial start-up and start-up after prolonged shut-down or belt type crankcase heaters.

8. Startup:

- Never start the Unit when no refrigerant is charged.
- All service valves must be in the open position.
- Check compliance between Unit and power supply.
- Check that the crankcase heater is working.
- Check that the fan can rotate freely.
- Balance the HP/LP pressure.
- Energize the Unit, it must start promptly. If the compressor does not start, check wiring conformity, voltage on terminals and sequence phase.
- Eventual reverse rotation of a 3-phase compressor can be detected by the following phenomena: Unit doesn't start, the compressor doesn't build up pressure, it has abnormally high sound level and abnormally low power consumption. In such case, shut down the Unit immediately and connect the phases to their proper terminals.
- If the rotation direction is correct, the low-pressure gauge shall show a declining pressure and the high-pressure gauge shall show an increasing pressure.

9. Refrigeration cycle:

All standard Condensing Units are supplied in nitrogen pressure. The refrigeration diagram of a Condensing Unit with air-cooled condensation has been included here below:



M - Compressor

C - Condenser

RIC - Liquid Receiver

RL - Liquid shut-off valve

RA - Suction shut-off valve

SP - Safety pressure switch

10. Checks with running unit:

- Check the fan rotation direction. Air must flow from the condenser towards the fan.
- Check current draw and voltage.
- Check suction superheat to reduce risk of slugging.
- When a sight glass is provided, observe the oil level at start and during operation to confirm that the oil level remains visible.
- Respect the operating limits.
- Check all tubes for abnormal vibration. Movements in excess of 0.06 inch require corrective measures, such as tube brackets.
- When needed, additional refrigerant in the liquid phase may be added in the low-pressure side as far as possible from the compressor. The compressor must be operating during this process.
- Do not overcharge the system.
- Never release refrigerant to the atmosphere.
- Before leaving the installation site, carry out a general installation inspection regarding cleanliness, noise and leak detection.
- Record type and amount of refrigerant charge, as well as operating conditions as a reference for future inspections.

11. Quality of compressor:

11.1. Noise and vibration

The compressors should not bear the abnormal noise or vibration in normal operation.

11.2. Insulation

- Insulation resistance

Insulation resistance should be more than 10M between each of the terminals and the ground (or the shell), and between each of the terminals with a 500V megger.

- Dielectric withstands

A 50 or 60Hz potential as indicated below should be applied between live parts and dead metal parts.

- 1250v for 1 minute, or 1500v for 1 second (Nominal 100~120v)
- 1500v for 1 minute, or 1800v for 1 second (Nominal 200~240v)

11.3. Air tightness and Strength Test

- Air tightness test pressure: 1.78 MPa Gauge
- Hydrostatic strength test pressure: 5.35 MPa Gauge

11.4. Dryness

The inside of compressor is dried up. The remaining quantity of moisture measured by cold-trap procedure should be below 100mg.

12. Maintenance & Cleaning:

- In the event when machine parts need replacing, use manufacturer's original parts only.
- Regularly clean (at least every month) the condenser by removing dust and grease. If the environment where the Unit is located is very dusty, more frequent cleaning is required.
- Check that all electric terminals, both on electrical panels and terminal boards are properly connected and also check carefully that all fuse elements are correctly clamped.
- Check the noise level of the compressor. This check must be performed with caution, as it has to be carried out while the system is operating. Check for ticking or vibrations that result from breakdowns or excessive mechanical friction between moving parts.
- Always switch off the Unit at main switch before removing the fan panel.
- Internal pressures and surface temperatures are dangerous and may cause permanent injury.
- Maintenance operators and installers require appropriate skills and tools. Tubing temperature may exceed 200 °F and therefore cause severe burns.
- Ensure that periodic service inspections to ensure system reliability and as required by local regulations are performed.

To prevent system related problems, following periodic maintenance is recommended:

- Verify that safety devices are operational and properly set.
- Ensure that the system is leak tight.
- Check the compressor current draw.
- Confirm that the system is operating in a way consistent with previous maintenance records and ambient conditions.
- Check that all electrical connections are still adequately fastened.

- Keep the Unit clean and verify the absence of rust and oxidation on the Unit components, tubes and electrical connections. The condenser must be checked at least once a year for clogging and be cleaned if deemed necessary. Access to the internal side of the condenser takes place through the fan panel. Micro channel coils tend to accumulate dirt on the surface rather than inside, which makes them easier to clean than fin & tube coils.
- Switch off the Unit at main switch before removing any panel from the Condensing Unit.
- Remove surface dirt, leaves, fibers, etc. with a vacuum cleaner, equipped with a brush or other soft attachment. Alternatively, blow compressed air through the coil from the inside out, and brush with a soft bristle. Do not use a wire brush. Do not impact or scrape the coil with the vacuum tube or air nozzle.
- If the refrigerant system has been opened, the system has to be flushed with dry air or nitrogen to remove moisture and a new filter drier has to be installed. If evacuation of refrigerant has to be done, it shall be done in such a way that no refrigerant can escape to the environment.
- Always transmit the model number and serial number with any claim filed regarding this product.

The product warranty may be avoided in following cases,

- Absence of nameplate.
- External modification: In particular, drilling, welding, broken feet and shock marks.
- Compressor opened or returned unsealed.
- Rust, water or leak detection dye inside the compressor.
- Use of a refrigerant or lubricant not approved.
- Use in explosive atmospheric environment.
- No model number or serial number transmitted with the warranty claim.

13. Disposal:

If the machine is placed out of service, it is necessary to disconnect it from the mains. The gas contained inside the system must not be dispersed into the environment. The compressor oil is subjected to differentiated waste collection regulation, therefore we recommend that you do not dispose of the unit as normal iron scrap but that you use a special center, as per the standards and regulations in force.

14. Compressor Oil:

Compressor Make	Refrigerant	Model	Compressor Oil
Copeland	CFC, HCFC	ZR	Suniso 3GS.-.Texaco WF32.
	HFC	ZB	Mobil EAL Arctic 22 CC, ICI Emkarate RL 32 CF
Bitzer	R134a, R404a	Piston Compressor	BSE 32
Bitzer	R22	Piston Compressor	B5.2
Danfoss	R134a, R404a	SC	Polyolester – ICI Emkarate

15. Troubleshooting:

S. No.	Likely Cause	Remedy
1	The compressor will not start and no humming sound is heard: 1) No Power, starter relay contacts open 2) Thermal circuit breaker intervention 3) Electrical connections loose or incorrect	1) Check the line or replace the relay 2) Check the electrical connections 3) Tighten the connections or reconnect wiring according to the wiring diagram
2	The compressor will not start (it makes a humming sound) and the thermal circuit breaker intervenes: 1) Electrical Connections incorrect 2) Low voltage at compressor 3) Faulty start capacitor 4) The relay does not close 5) Electric motor - winding interrupted or in short circuit	1) Make the connections again 2) Find and remove the cause 3) Find the cause and replace the capacitor 4) Find the cause and replace the replay if necessary 5) Replace the compressor or get it repaired
3	The compressor starts but the replay does not open: 1) Electrical connections incorrect 2) Low voltage at compressor 3) Relay locked closed 4) Excessive discharge pressure 5) Electric motor - winding interrupted or in short circuit	1) Check the electric circuit 2) Find and remove the cause 3) Find and remove the cause 4) Find the cause and replace the relay if necessary 5) Replace the compressor or get it repaired
4	Thermal circuit breaker intervention: 1) Low voltage at compressor 2) Thermal circuit breaker faulty 3) Faulty run capacitor 4) Excessive discharge pressure 5) High suction pressure 6) Compressor overheated - hot return gas 7) Electric motor - winding interrupted or in short circuit	1) Find and remove the cause 2) Check characteristics and replace if necessary 3) Find and remove the cause 4) Check the ventilation and any restrictions or obstructions in the system circuit 5) Check the sizing of the system. Replace the condensing unit with more powerful one 6) Check the refrigerant charge, repair any leaks and add gas 7) Replace the compressor

5	<p>The compressor starts and runs at brief operating cycle:</p> <ol style="list-style-type: none"> 1) Thermal circuit breaker 2) Thermostat 3) High pressure switch intervention due to insufficient condenser cooling 4) High pressure switch intervention due to excess refrigerant gas charge 5) Low pressure switch intervention due to insufficient refrigerant gas charge 6) Low pressure switch intervention due to expansion valve restriction or blockage 	<ol style="list-style-type: none"> 1) See the previous point (thermal circuit breaker intervention) 2) Small differential: correct adjustment 3) Check the correct operation of the fan motor or clean the condenser 4) Reduce the refrigerant charge 5) Repair any leaks and add refrigerant gas if necessary 6) Replace the expansion valve
6	<p>The compressor runs continuously or for long periods:</p> <ol style="list-style-type: none"> 1) Insufficient refrigerant gas charge 2) Thermostat contacts blocked in the closed position 3) System insufficiently sized for the charge 4) Excess charge to be cooled or insufficient insulation 5) Evaporator covered with ice 6) System circuit restriction 7) Condenser blocked 	<ol style="list-style-type: none"> 1) Repair any leaks and add refrigerant gas 2) Replace the thermostat 3) Replace the system with a more powerful one 4) Reduce the charge or improve the insulation 5) Defrost 6) Identify the cause and remove it 7) Clean the condenser
7	<p>Run capacitor damaged, interrupted or short circuited:</p> <ol style="list-style-type: none"> 1) Incorrect run capacitor 	<ol style="list-style-type: none"> 1) Replace with a capacitor of the correct type
8	<p>Starter relay faulty or burnt out:</p> <ol style="list-style-type: none"> 1) Incorrect relay 2) Relay fitted in incorrect position 3) Incorrect run capacitor 	<ol style="list-style-type: none"> 1) Replace with a relay of the correct type 2) Fit the relay in the correct position 3) Replace with a capacitor of the correct type
9	<p>Cold room temperature too high:</p> <ol style="list-style-type: none"> 1) Thermostat set too high 2) Undersized expansion valve 3) Undersized evaporator 4) Insufficient air circulation 	<ol style="list-style-type: none"> 1) Adjust the setting 2) Replace the expansion valve with one of a suitable type 3) Replace with an evaporator with a larger surface area 4) Improve air circulation
10	<p>Suction pipes frosted:</p> <ol style="list-style-type: none"> 1) Excessive passage of gas through the expansion valve or valve oversized 2) Expansion valve locked in the open position 3) The evaporator fan motor does not work 4) High gas charge 	<ol style="list-style-type: none"> 1) Adjust the valve or replace it with one of the correct sizes 2) Clean foreign bodies from the valve and replace if necessary 3) Find the cause and remove it 4) Reduce the charge
11	<p>Discharge pipe frosted or wet:</p> <ol style="list-style-type: none"> 1) Drier filter restriction 2) Valve on the discharge line partially closed 	<ol style="list-style-type: none"> 1) Replace the filter 2) Open the valve or replace it if necessary

Checklist for Installation and Commissioning of Refrigeration System

1. Make sure that the commissioning done by approved installation companies
2. Make sure that the CDU is placed in correct position and easy to repair
3. Make sure that place the Equipment in smooth and solid surfaces
4. Make sure that the ventilation space for fixing CDU as per given in the Guidelines
5. Confirm the Unit is not direct contact with sunlight, heat sources and cold wind
6. Confirm the Unit installed is not close to the sea shore area and dust free
7. Check all motors, fans and pump bearings in the Equipment
8. Make sure that the selection of piping as per standard
9. Confirm the pipe is clean and dust free
10. Confirm during starting brazing, always apply nitrogen gas to connecting pipes
11. Confirm after brazing, the pipeline should not have leakage and dust particles
12. Please confirm the suction line should be in proper insulation
13. Confirm the wiring connection of unit as per given in the Installation manual
14. Make sure that the vacuuming done as per given in the Installation manual
15. Confirm Expansion valve, solenoid valve and other check valves should be open during vacuuming
16. Confirm the refrigerant charged as per given in the guidelines
17. Confirm Before starting the refrigeration system, perform all installation work on the Refrigerated display side before powering up the equipment
18. Make sure that all the electrical enclosure's switches on (located on the front face of the condensing unit)
19. During starting, confirm compressor(s) and fan(s) start running
20. Check the voltage and amperage readings at the compressor terminals
21. Make sure that the compressor and condenser fan rotating in correct direction
22. Make sure that no vibrations or abnormal noises are present. If vibrations or abnormal noises are noted, shut off the group and locate the cause

- 23. Once the equipment's operation has been stabilized, check the suction and discharge side pressure and temperature
- 24. Check Superheat conditions as per our requirements
- 25. Make sure that the unit is running, to fulfill the commissioning data
- 26. Confirm the cutoff pressure setting in the suction and discharge side
- 27. Make sure that crankcase heater is working properly
- 28. Confirm the Oil level in the compressor is correct
- 29. Make sure that the receiver valves are opened
- 30. Confirm the Expansion valve is adjusted as per our requirements
- 31. Please make sure that the pressure maintained in the refrigeration system is correct
- 32. Check that the room thermostat is set for normal operation and adjust if required

Pre-Commissioning Checklist

- 1. Secure commissioning gauges to the high side of the system, check for a positive charge
- 2. Check tightness of electrical components and properly terminated
- 3. Check external fuses/MCB are of correct rating
- 4. Check units properly earthed
- 5. Check pipe work is earth bonded
- 6. Check that the remote on/off switch (if fitted) is in the off position
- 7. Switch on the controls and individual circuits, primary and secondary, MCBs to the ON position. At this stage the control display panel should be illuminated
- 8. Check the MCBs in the ON position measure the incoming voltage
- 9. Check rotation of the Compressor
- 10. Check voltage and frequency at permanent supply
- 11. Measure and record the primary and secondary voltages at each of the transformers, adjust tapping if necessary and record on the commissioning document

- 12. Check all timer settings are correct
- 13. Check oil level
- 14. Check fans rotate freely
- 15. Check system correctly evacuated
- 16. Check operating of HP/LP cut-out
- 17. Record Controller Data

Commissioning Checklist

- 1. Measure and record the Compressor Amps, once the Compressors are fully loaded and at the unloading stage
- 2. Measure and record full speed Amps of each Condenser and Evaporator fan
- 3. Check the liquid line sight glass is clear and dry
- 4. Check the superheat setting adjusts the expansion valve to maintain a superheat setting of approx. 5 – 8 K at all operating loads
- 5. Check and record the following: Suction and discharge pressures, Liquid, discharge and suction line temperatures