USER MANUAL

Intelecool 2

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Liebert
InteleCool

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1. INTRODUCTION

1.1 GENERAL

The Emerson Network Power (India) Private Limited Intelecool environmental control system is designed for convenience and dependability in unmanned and remote locations typical of the telecommunications industry. Ease of installation, operation and service coupled with the use of high quality, high reliability components make Intelecool ideally suited for maintaining an environment for sensitive electronic equipment.

Self Contained

The Intelecool product is completely self-contained. All components are enclosed in the weatherproof cabinet.

Space Savings

The Intelecool does not use any of the valuable floor space inside the secure space. Instead, it is mounted on the outside wall. No additional space is required outside or on a roof.

Easy to Install

The Intelecool is assembled, wired, pipes charged with refrigerant and fully factory tested as a system to ensure trouble free installation and start-up.

1.2 STANDARD FEATURES

Compressor

The heart of the refrigeration system is a quiet, efficient, Scroll compressor. The compressor operates at 2900 RPM @ 50 Hz and features a suction gas cooled motor, internal centrifugal oil pump, Vibration isolating mountings, internal thermal overloads, high & low pressure switches.

Refrigeration System

The refrigeration circuit includes a liquid line filter drier, an adjustable externally equalized expansion valve, and high and low pressure switches.

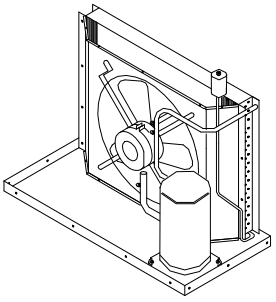
Evaporator Coil

The evaporator coil is constructed of mechanically expanded copper tubes in enhanced surface aluminium fins.

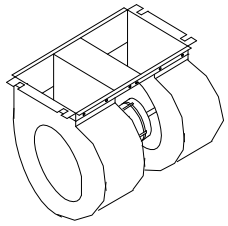
Condenser Coil

The air-cooled condenser coil is constructed of mechanically expanded copper tubes in enhanced surface aluminium fin.

Condenser Coil



Evaporator Blower



Evaporator Blower

Evaporator air is supplied by a dual, direct drive blower package. The fans are centrifugal, double width, double inlet.

Filter

The filter is 2 inches deep, pleated, with a minimum efficiency rating of 80-85 % down to 20 microns (based on ASHRAE standard 52-76) located within the cabinet.

Cabinet

The Exterior cabinet is constructed of CRCA and power coated for weather resistance. Internal structural parts are hot dipped galvanized steel. The evaporator compartment is insulated with ½" thick, EPE (Expanded poly ethylene).

Control Interface

The unit is supplied with customary HVAC wiring designations (R, G, W, Y) inside low voltage partition of the unit electric box. The control interface can be provided by source ranging from a wall-mounted thermostat or a controller.

1.3 OPTIONAL FEATURES

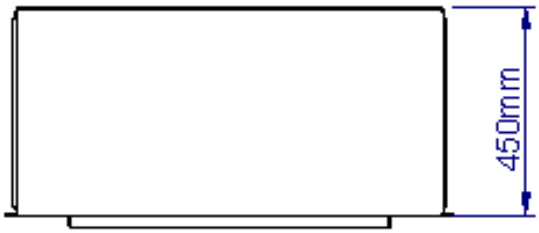
Micro control

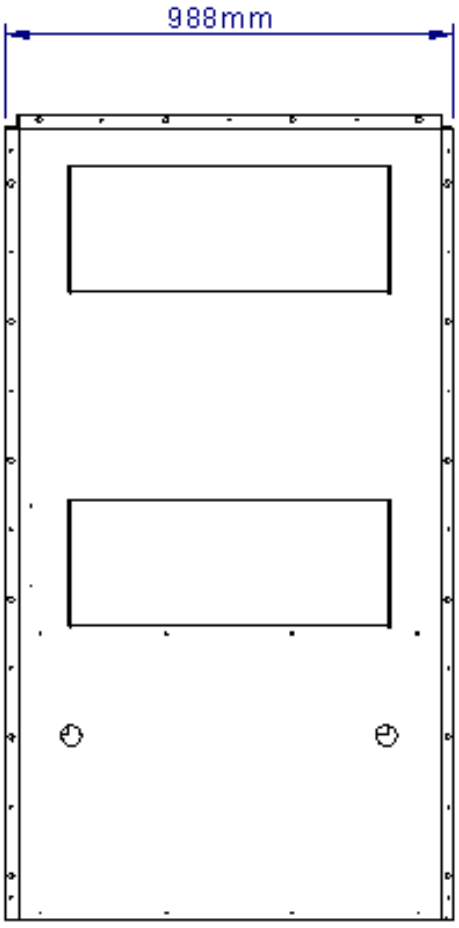
A micro control can be supplied which will ensure control up to a maximum of two units.

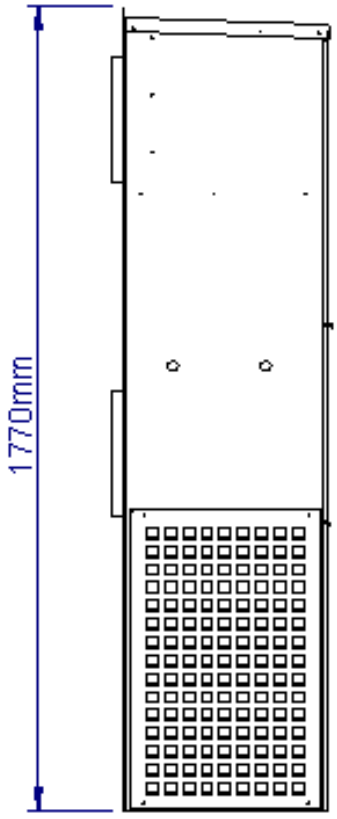
Indoor Supply /Return Grilles

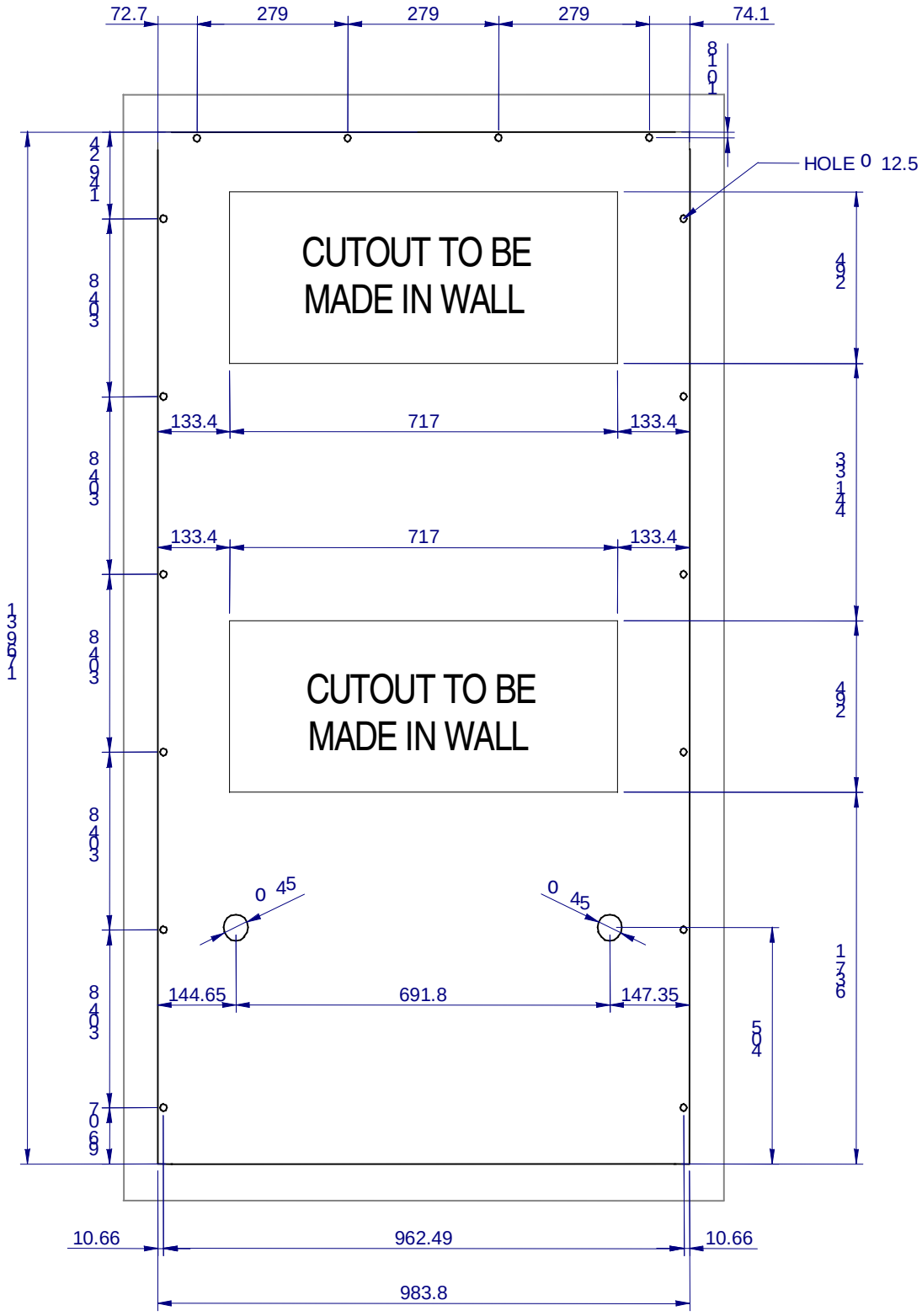
In Intelecool the supply grille is an aluminium louvered, double deflection type grille allowing user adjustment of direction of air distribution. The return grille is an aluminium louvered, adjustable, single deflection style grille.

1.4 DIMENSIONAL DATA








72.7
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CUTOUT TO BE MADE IN WALL
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983.8

2. INSTALLATION

2.1 INSTALLATION CONSIDERATIONS

Room Preparation
The room should be well insulated and should be sealed to reduce airborne contaminants from penetrating the site.

Uncontrolled outside air should be kept to a minimum. Outside air adds to the cooling, heating and filtration loads of the site. Doors should be properly sealed to minimize leaks and should not contain grilles.

Location considerations
The Intelecool is field mounted on an outside wall and additional framing in the wall may be required to ensure adequate structural support. The outdoor area near the condenser supply and discharge must also be considered. To ensure adequate air supply, the unit should be mounted in a clean area, away from loose dirt and foreign matter that may clog the condenser unit. Unit should not be located near steam hot air, or fume exhausts. Also, the unit should not be mounted closer than 12 feet from an opposing wall, obstruction, or unit. For service clearance, provide 36 inches in front of the unit, and 30 inches on each side. When mounting multiple units side by side, provide a minimum of 36 inches between adjacent units.

2.2 EQUIPMENT INSPECTION

Upon arrival of the unit, inspect all items for visible damage. Concealed damage may be discovered later during installation. Report damage to the shipper immediately and file a damage claim. Also inform your Liebert supplier.

2.3 UNIT INSTALLATION

2.3.1 Unit mounting

The Intelecool unit is installed against, and through outside wall. Two openings in the wall are required for the evaporator supply and return. Install unit in a level position to assure proper refrigerant flow, oil return, and condensate drain.

To install the Intelecool unit, follow the instructions below :

a. Verify that an adequate structural support is provided for the unit.

b. Using a chalkline, mark the outside wall with a level horizontal line, where the bottom of the unit is to rest.

c. Prepare supply and return openings in an outside wall. Refer to the drawing for your unit to determine opening dimension and location.

d. Prepare two upper mounting holes, either at the top or midsection of the unit. The mounting holes may be pilot holes for lag screws or clearance holes for bolts that will extend completely through the wall (5/8" for 1/2" bolts). Note that the outside of the top holes will be accessible only through the supply opening (from inside the room) once the unit is placed against wall. The middle holes can be accessed from outdoors when the top front panel is removed.

e. Screw / Bolt unit mounting base angle to the outside wall with six 5/16" bolts, just below chalkline and centered below the holes made in steps 2 and 3.

f. Apply gasket tape around perimeter of the unit back and the evaporator supply and return openings.

g. With the unit front panel removed (rotate two fasteners), lift the unit onto the base angle, making certain that the rear unit foot falls behind the turned up front edge of the mounting angle. Insert top or mid unit fasteners in holes and tighten, drawing the unit into place. If desired, the unit can be secured to the mounting angle with two 5/16 inch bolts and nuts (not supplied) through holes provided in unit base.

WARNING !
Use caution and adequate equipment to safely handle the unit. Weight of each unit ranges from 145 to 215 kg, depending on the model.

CAUTION !
Do not over tighten mounting bolts. Over tightening may result in damage to gasket or unit cabninet.

h. Caulk and flash top and sides as required to form a watertight seal. Top flashing (not factory supplied) is recommended to ensure water does not run behind the unit.

2.3.2 Piping connections

The Intelecool is a self contained, packaged unit. All refrigerant piping connections are made at the factory, so no external condenser is required. The evaporator coil condensate drain is factory supplied and drains outdoors through the unit base pan.

Oil trap to be provided depending upon locations of the indoor & outdoor units

Note: during commissioning the system pressures must be maintained as follows:

Suction - 70 to 80 psig
Discharge - 280 to 300 psig

2.3.3 Electrical connections

Each unit is shipped from the factory with all internal wiring completed. Refer to electrical schematic when making connections. Electrical connections to be made at the installation site are :

i) Line power supply to the power input.

ii) Controller wiring in case of optional two unit controller (customer supplied or Liebert option).

WARNING !
Use voltmeter to make sure power is turned off before making any electrical connections.

CAUTION !
Refer to electrical schematic when making connections.

2.3.4 Power connections

All power wiring, control wiring and ground connections must be in accordance with the National Electric Code and local codes.

Use copper wiring only. Make sure that all the connections are tight.

Make sure that the voltage supplied agrees with the voltage specified on the unit nameplate. A power disconnect switch (field supplied) is required for maintenance.

For access to the electrical enclosure, first remove the top panel by rotating two locks. Remove the condenser grille by pulling it up and forward. Remove electrical box cover on right side by removing screws.

Route the supply power to the customer supplied disconnect switch and then to the unit circuit breaker or terminal block inside the unit. Route the conduit to the hole provided in the cabinet. Connect earth ground to lug provided near circuit breaker or terminal block. Refer to the unit wiring diagram supplied along with the unit.

CAUTION !
The scroll compressor must be rotating in the correct direction for proper operation. This is determined by the way three phase power supply is supplied to the unit at installation.

2.3.5 Control connections

In case of an optional unit controller the Control wiring needs to be done. The controller may be a factory / field supplied.

2.4 CHECKLIST FOR COMPLETED INSTALLATION

1. Proper clearance for service access has been maintained.
2. Equipment is leveled and mounting fasteners are tight.
3. Refrigerant piping is completed as per standard engineering practices.
4. Refrigerant leak test and charging is done if required.
5. Ducting completed**,** if required.
6. Line voltage to power wiring matches equipment nameplate.
7. Power wiring connections completed to disconnect switches, including earth. Proper phase rotation has been observed so that scroll compressor will rotate in the correct direction.
8. Power line circuit breakers or fuses have proper ratings for equipment installed.
9. Control wiring connections completed to optional controls.
10. All wiring connections are tight.
11. Foreign materials have been removed from in and around all equipment installed (shipping materials, construction materials, tools, etc.).
12. Fans and blowers rotate freely without unusual noise.
13. Complete Commissioning as per Commissioning Check-List.

3.0 OPERATION

3.1 Compressorized Cooling

Compressorized cooling is provided by a high efficiency system consisting of a scroll compressor, thermostatic expansion valve, evaporator & condenser coils. A scroll compressor is used for reliable, quiet & smooth operation at a high EER value (Energy Efficiency Ratio).

The Intelecool uses R-22 refrigerant in a conventional vapour-compression refrigeration cycle. Heat is removed from the air in the space by blowing it across the evaporator coil. As heat is added to the refrigerant in the evaporator it boils and turns to a warm vapour. The refrigerant vapour enters the compressor and is compressed resulting in high pressure & temperature. After entering the condenser, the hot vapour is condensed to a liquid by the air blown across the condenser coil. Liquid refrigerant then passes through the thermal expansion valve and into the evaporator. The expansion reduces the pressure and temperature to complete the cycle.

3.2 High Pressure

The high-pressure switch is mounted in the compressor discharge line. Electrically it is connected in the series with the compressor start circuit, which will shut down the compressor and condenser fan if the discharge pressure exceeds 400 PSIG. This protects the Intelecool in the event of condenser motor failure or the condenser coil breakage.

The pressure switch is an auto reset device. When the system pressure drops below 320 PSIG, the switch will reset. If controller is used the high pressure switch has to be reset manually.

3.3 Low Pressure

The low-pressure switch is mounted in the compressor suction line. Electrically it is connected in series with the compressor start circuit, which will shut down the compressor and condenser fan if the suction pressure drops below 20 PSIG. This protects the Intelecool in the event the evaporator fan fails, the filter becomes clogged, or there is a loss of refrigerant. The pressure switch is an auto reset device. When the system pressure rises above 60 PSIG, the switch will reset. If controller is used the low pressure switch and compressor are connected separately and the signal is given by the controller for compressor Start / Stop depending on the signal from the switch. If controller is used the low pressure switch has to be reset manually.

4.0 MAINTENANCE

4.1 Filters

In Intelecool a replaceable evaporator air filter is supplied with the unit. The filter is easily serviceable from the outside, through the top front access panel.
Filters are usually the most neglected item in an environmental control system. To maintain efficient operation they should be checked monthly and changed as required. Units supplied with economizers may require replacement filters more frequently because of airborne dust and organic materials.

4.2 Blower Package

Periodic checks of the blower package include: Blower wheels, housings, motor and motor mounting bracket.

With the power off, inspect and remove any debris removed from the wheels and housings.
Also check to see that they are tightly mounted on the motor shaft and rotate freely without rubbing against the housing.

4.3 Refrigeration System

Each month the components of the refrigeration system should be inspected for proper function and signs of wear. Since in most cases evidence of malfunction is present prior to component failure, periodic inspections can be a major factor in the prevention of most system failures.

Refrigerant Lines
Check all refrigerant lines and capillaries for vibration isolation, & support as necessary. Visually inspect all refrigerant lines for leaks.

Thermostatic Expansion Valve
The thermostatic expansion valve (TEV) keeps the evaporator supplied with enough refrigerants to satisfy load conditions. It does not turn the compressor on or off, but correct valve adjustment is necessary for proper system operation.
Determine TEV operation by measuring superheat (see Superheat). If too little refrigerant is being fed to the evaporator, the superheat will be high; if too much refrigerant is being supplied, the superheat will be low. The correct superheat setting is between 10 and 13°F (5.5 and 7.2°C).

Superheat

To determine superheat:

1. Measure the temperature of the suction line at the point where the TEV bulb is clamped.
2. Obtain the gauge pressure at the compressor suction valve.
3. Add the estimated pressure drop between bulb location and the suction valve
4. Convert the sum of the two pressures to the saturated temperature.
5. Subtract this temperature from the actual suction line temperature. The difference is superheat.

4.4 Air Cooled Condenser

Restricted airflow through the condenser coil will reduce the operating efficiency of the unit & can result in high compressor head pressure & loss of cooling.

Clean the condenser coil each time the evaporator filters are replaced. Cheek for bent or damaged coil fins and repair as needed. Check all refrigerant lines for leaks.

Clean the condenser coil of all debris that will inhibit airflow. This can be done with compressed air or commercial coil cleaner. For access to the coil, first remove the top panel by rotating two fasteners. Remove the condenser grille by pulling it up and forward. Remove the middle panel by removing screws, and then pull panel down and forward. Removing the top condenser coil blocker will enable inspection and cleaning of the backside of the coil. Replace all panels in reverse order.

4.5 Compressor Replacement

Infrequently a fault in the motor insulation may result in a motor burn, but in a properly installed system burnouts rarely occur. Of those that do, most are the effects of mechanical or lubrication failures, resulting in the burnout as a secondary consequence.

If problems that can cause compressor failures are detected and corrected early, a large percentage can be prevented. Periodic maintenance inspections by alert service personnel on the lookout for abnormal operation can be a major factor in, reducing maintenance costs. It is easier and far less costly to take the steps necessary to ensure proper system operation than it is to allow a compressor to fail and require replacement

When troubleshooting a compressor, check all electrical components for proper operation.

1. Cheek all fuses and circuit breakers.
2. Check hi-Low Pressure switch operation.
3. If a compressor failure has occurred, determine whether it is an electrical or mechanical failure.

Mechanical failure

A mechanical compressor failure will be indicated by no burned odour. The motor will attempt to run. If you have determined that a mechanical failure has occurred, the compressor must be replaced.

Electrical Failure

An electrical failure will be indicated by a distinct pungent odor. If a severe burnout has occurred, the oil will be black and acidic.

In the event that there is an electrical failure and a complete burnout of the refrigeration compressor motor the proper procedures must be performed in order to clean the system to remove any acids that would cause a future failure.

CAUTION !
Damage to a replacement compressor caused by improper system cleaning constitutes abuse under the terms of the warranty, and the WARRANTY WILL BE VOIDED.

CAUTION !
Avoid skin contact with the gas and oils. Severe burns will result. Use long rubber gloves when handling contaminated parts.

Compressor Replacement

Replacement compressors are available from your nearest Emerson Network Power (India) Private Limited office. They will be shipped in a crate to the job site by franchisee.

1. Disconnect power
2. Attach suction and discharge gauges to access fittings.
3. Recover refrigerant, using standard recovery procedures and equipment. Use a filter-drier when charging the system with recovered refrigerant.
4. Remove pressure switch capillaries, and disconnect all electrical connections.
5. Remove failed compressor.

CAUTION!
A scroll compressor must rotate in the proper direction. Record compressor motor connections when removing failed compressor. Wire the replacement compressor motor the same way to maintain proper rotation direction.

6. Install replacement compressor and make all connections.
7. Pressurize and leak test the system at approximately 350 PSIG pressure.
8. Follow manufacturer's instructions for cleanout kits.
9. Connect a vacuum pump to both the high and low sides of the system through properly sized connections. Evacuate the system twice. Break the vacuum each time with R-22 Refrigerant gas.

10. Charge the system with refrigerant.
12. Apply power & operate system. Check for proper operation. Refer to design pressures in the following table.

Design pressures PSIG (kPa)	OUTDOOR AMBIENT ^{O}F (^{O}C)		
	95 (35)	105 (40.6)	115 (46.1)
Discharge	290 (2000)	330 (2275)	370 (2550)
Suction	73 (505)	75 (520)	77 (530)

Note. Based on indoor conditions of 80 ^{O}F (26.7 ^{O}C), 50% RH and clean coils.

5.0 TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	REMEDY
Unit will not start	No power to unit	Check voltage to input terminal block
	Control voltage circuit breaker open	Locate short & reset breaker
	Shut off by external Thermostat or stat is Defective	Check operations of thermostat
No cooling	Low refrigerant charge	Check with gauges
	Compressor contactor not pulling in	Check voltage at contactor If not present then refer to Print & determine voltage loss Check enthalpy sensor for full CCW
	No output from Thermostat	Check operation of stat. Should have voltage output to Y terminal during cooling.
Units cycles on High Pressure Switch	Loss or restriction of airflow	Check condenser blower assembly for proper operation. Check for dirty filter or inlet grille restriction.
Defective fan cycling control		Switch should make @ 240 PSIG

6.0 COMMISSIONING / PREVENTIVE MAINTENANCE CHECKLIST

INTELECOOL

Customer :	Date :
Site address :	Controller Details / Make :
Model :	Controller Sr. # :
Sl # :	Commissioned by :

☐ Please tick after each check is done

Physical checks

- ☐ Installation of machines
- ☐ Sealing of gaps around the units
- ☐ Controller fitment
- ☐ Grilles fitment
- ☐ Electrical trunking fitment
- ☐ Cleanliness of air filter
- ☐ Cleanliness of evaporator coil
- ☐ Cleanliness of condenser coil
- ☐ Insulation fitment
- ☐ Fan rotation
- ☐ Condenser fan rotation
- ☐ Compressor rotation
- ☐ Blower fan free rotation
- ☐ Unit vibration if any
- ☐ Refrigerant pipes rubbing
- ☐ Oil trace / refrigerant leak if any
- ☐ Drain pipe clear for water movement
- ☐ Unit changeover

Please mention the values wherever necessary

Electrical

Incoming voltage (volts)			
Loose connection			
Earthing of units			
Earthing of controller			
Total unit current (amp)			
Blower fan current (amp)	R	Y	B
Condenser fan current (amp)	R	Y	B
Compressor current (amp)	R	Y	B
O/L relay settings (amp)	Fan		
	Condenser		
	Compressor		

Mechanical readings

Compressor suction pressure	psig
Compressor discharge pressure	psig
Room temperature	^{o}C

Remarks :	Controller settings
	Mode of operation
	Unit selection
	O/L trip settings amp
	Cycling hours hr
	Temp. set points ^{o}C

Customer's signature

Signature of C S E

TECHNICAL SPECIFICATIONS INTELECOOL FOR TTSL (THREE PHASE) UNITS

UNIT CAPACITY	**3.5 TR** (with 910 rpm Blower Motor & ZR47, 3 Phase Comp)	**2 TR** (with 910 rpm Blower Motor & ZR 26, 3 Phase Comp)
Total Capacity (TR)	3.5	2.0
Sensible Capacity (TR)	3.0	1.9
Sensible Heat Ratio	0.86	0.95
Total Power Input (kW)	3.95	2.25
Specific Power Consumption (kW/ Sensible Cooling Capacity in TR)	1.31	1.18
DESIGN CONDITIONS		
Room Condition	24 °C	24 °C
Standard Operating Ambient	35 °C	35 °C
COMPRESSOR		
Number of Compressors	1	1
Type	Compliant Scroll	Compliant Scroll
Compressor Operating Voltage	Three phase, 415VAC +/-10%, 50 Hz	Three phase, 415VAC +/-10%, 50 Hz
Input Current per Phase	7.2 Amps.	4.3 Amps.
Refrigerant	R 22	R 22
Safety Controls		
LP	20 Psig	20 Psig
HP	400 Psig	400 Psig
Protections	Built-in thermal over load	Built-in thermal over load
EVAPORATOR FAN SECTION		
Nominal air flow - on filter	1600 CFM	1000 CFM
Number of fans/ motors	2 Nos./ 1 No.	2 Nos./ 1 No.
Motor Opearating Voltage	Three phase, 415VAC +/-10%, 50 Hz	Three phase, 415VAC +/-10%, 50 Hz
Motor full load current	0.85 Amps	0.85 Amps
Motor Speed	910 rpm	910 rpm
Type of fan	Forward Curved, DIDW	Forward Curved, DIDW
EVAPORATOR COIL		
Face area	3.19 Sq. Ft.	3.19 Sq. Ft.
Face Velocity	492 FPM	313 FPM
Material of fins	Aluminum	Aluminum
Thickness of fins	0.12 mm	0.12 mm
Type of fin	Super slit	Super slit
Fin pitch	12 FPI	12 FPI
Gauge of the tubes	30 Gauge	30 Gauge
Tube OD	3/8 Inch	3/8 Inch
Material of the tube	Copper	Copper
AIR COOLED CONDENSER		
Condenser coil		
Face area	5.50 Sq. Ft.	5.50 Sq. Ft.
Nominal air flow	2750 CFM	2320 CFM

Face Velocity	467 FPM	422 FPM
Motor Operating Voltage	Three phase, 415VAC +/-10%, 50 Hz	Three phase, 415VAC +/-10%, 50 Hz
Motor full load current	0.65 Amps.	0.65 Amps.
Motor speed (RPM)	910	910
Material of fins	Aluminum	Aluminum
Thickness of fins	0.12 mm	0.12 mm
Fin pitch	12 FPI	12 FPI
Gauge of the tubes	30 Gauge	30 Gauge
Tube OD	3/8 Inch	3/8 Inch
Material of the tube	Copper	Copper
FILTER		
Number of filters	1	1
Size in mm	415 x 800 x 40	415 x 800 x 40
Material	Dry media, Disposable Polyester Fabric	Dry media, Disposable Polyester Fabric
Efficiency	80% down to 20 microns	80% down to 20 microns
CABIENT INSULATION		
Minimum thickness(mm)	10 & 12	10 & 12
Material	EPE / Fibre glass	EPE / Fibre glass
ELECTRICAL DATA		
Supply	Three phase, 415VAC +/-10%, 50 Hz	Three phase, 415VAC +/-10%, 50 Hz
Full load current – All components rated amps	8.7 Amps.	5.8 Amps.
PHYSICAL SIZES		
Width x Height x Depth (mm)	984 x 1770 x 462	984 x 1770 x 462
Weight (kg)	170	140
UNIT CONSTRUCTION		
Mounting type	Wall mounting	Wall mounting
Air delivery	Horizontal discharge	Horizontal discharge
Cabinet Material	1.2 & 1.6 mm CRCA	1.2 & 1.6 mm CRCA
Surface finish	Powder Coated	Powder Coated
Colour	Siemens Grey	Siemens Grey
Paint thickness	50 microns	50 microns