

INSTRUCTION MANUAL

Condensing Units: **ESM-ESL-EMP (60Hz)**



**DESIGNED WITH PASSION AND
BUILT TO PERFORM**

Product nomenclature

E	SM	032	T	401	C8	OS	EL	R6	V
1	2	3	4	5	6	7	8	9	10

- 1** E : EKA-KOOL
- 2** SM : Medium temperature application. Horizontal air direction
SL : Low temperature application. Horizontal air direction
MP : Medium/Low temperature application. Upward air direction
- 3** Compressor code
- 4** T : Tandem unit
T1 : Tandem standby unit
- 5** Fan code
- 6** Condenser code
- 7** OS : Oil separator
- 8** EL : with Electrical components
- 9** Receiver
- 10** Voltage

Voltage code:

- V1: 230V 1ph 50/60Hz
- V2: 230V 1ph 50Hz;
- V3: 400V 3ph 50Hz
- V4: 460V 3ph 60Hz;
- V5: 220V 3ph 60Hz

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This document shall be read in its full context and should be read careful before carry out installation of any of EKA-KOOL's condensing units

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INFORMATION ON THIS DOCUMENT

This instruction must be read carefully before the installation of any EKA-KOOL's condensing units.

For any intervention executed on the condensing unit, always look it up in this document, strictly following the instruction it provides; for anything which is not expressly mentioned, always contact the manufacturer before intervening.

EKA-KOOL accepts no responsibility for the damages caused by and to the people or to things caused by the nonconformity with the instructions this instruction provides.

EKA-KOOL Pte, Ltd. reserves the right to update this publication at any time or to change the components of this unit if this is considered as necessary for manufacturing or commercial needs.

Safety

Compliance with the Regulations

The condensing unit specified and described in this installation / maintenance manual is provided for incorporation in machines as defined in the Machines Directive 2006/42/EC; and MUST NOT be put to use till the final machine it has to be incorporated to has not been declared as compliant, if need be, with the provisions of the same Directive "Machines" 2006/42/EC. The electronic components are compliant with Directive "Low Voltage" 2014/35/EU. As far as the compressor is concerned, you have to refer to the corresponding operational instruction book. The installer of the condensing unit inside the refrigeration system, is obliged to follow the relevant provisions of the law in the installation country, making reference to the electrical systems and to the air conditioning systems, as well as to the regulations of the EN 378 series.

Certified Staff

Any installation and/or maintenance operation of these units shall be carried out only by certified staff and according to the applicable national regulations. This manual shall be carefully read before carrying out any operation on the condensing unit; the observance of the provisions is essential to the operator as well as the involved machinery safety.

Personal Safety

For any transportation, installation, adjustment, maintenance or dismantling of the unit, the certified technician has to be equipped with safety shoes, protection gloves and glasses.

Other Risks

The unit was designed and manufactured trying to avoid or, whenever it is not possible, to reduce to a minimum the risks for the users' safety and health. Nevertheless, there is still a series of other risks and for them it is absolutely necessary for the user to implement the safety measures complementary to those technically already applied to the unit.

All CDUs are delivered with a holding charge of dry nitrogen once the leak test has been approved by our quality control department. Before starting the installation of the unit, discharge the pressure of pre-charge by acting on the service valves. Do not remove any component from the unit before having executed this operation.

Skin Irritation Caution: the compressor is shipped with a charge of oil. Avoid the direct contact with the skin and the eyes since it is irritant.

Transportation and Handling.

Take the usual safety measures for the transportation of heavy loads by means of forklift trucks or hook equipments. Use the indicated lifting point only. Wear safety shoes.

Hot/Cold Surface

The temperatures of the components under pressure are such to cause burns from heat or cold. Before working on the unit, stop it and wait for the temperatures to be stable.

Overview of CDUs

ESM/ESL/EMP: Standard version: single compressor and ready for operation

EMPT: TANDEM CONDENSING UNITS - The CDU is with 2 compressors in tandem connection. Standard connection pipes are provided between the compressor and the condenser. The condenser maybe equipped with pressure control device.

EMPT1: Tandem standby. The CDU is with 2 compressors but 1 is standby

Refrigerant Applicable: Our CDUs have been designed and manufactured only for the compression of the HFC (R404A / R507 / R134a / R407C / R407F / R407A / R449A) and HCFC – CFC refrigerants (wherever the national laws allow it, only) in the operational fields indicated in the operational instructions of the corresponding compressor.

Installation

Transportation and handling

The transport and handling of the packaged unit on pallets has to be executed by lifting it by means of a forklift truck, by checking in advance its capacity compared with the weight indicated in figure 2. Should the unit be without pallet, the handling has to be executed as it is indicated in figure 1, by checking in advance the capacity of the lifting hook of the employed equipment compared with the weight indicated in



Assembly

All CDUs models are with weather proof housing suitable for both indoors and outdoors operation. In both cases the machine has to be accessible to the Certified Staff only. Follow strictly installation position shown on page 8 and make sure there is free airflow space for optimal performance.

Pipes connection and system assembly (Thermostatic expansion valve application)

Before starting the installation of the unit, discharge some of the pressure of pre-charge nitrogen by opening the service valves. Do not remove any component before having executed this operation. Execute the installation in the following way:

- The service valves to be soldered by wrapping with a damp cloth
- Cool solder the service valves to the system pipes;
- Use 2% to 15% silver solder. Make use of the CDUs dry nitrogen holding charge for your soldering. Nitrogen will keep the pipes clean inside
- Check the leaks from the pipes by means of a pressure test with N2 or dry air following all the required safety procedures such as, for example, the use of a pressure reducer placed between the bottle and the system and leaving the service valves closed
- Open the service valves;
- Take away the air of the system by means of the deep vacuum ideally less than 250 microns;
- Charge the system with refrigerant directly to the liquid receiver

Attention:

Do not use the compressor to create a vacuum. Do not run the compressor in vacuum conditions!

Do not use the compressor to fill up the system with refrigerant.

Before connecting service valves to pipes make sure all plastic caps have been removed. Avoid, air coming into the unit! Keep the connections closed during the solder of the service valves to the pipes. Be sure that all the pipes and the joints are perfectly clean and tight.

Pipes connection and system assembly (Capillary tube System)

1 Initial Equipment Check. Once the CDU's and Evaporators have arrived, inspect for damage and check that Nitrogen holding charge is present.

2 Install equipment on site at the required location.

3 Pipe Work. Run the pipe work from CDU to Evaporator.

General Rule: Horizontal suction pipe should be one size larger diameter than the suction pipe from the evaporator.

Evaporator has the suction outlet pipe made so that a P'Trap is not required, its all done for you.

The suction and liquid pipes are also expanded ready for your pipe to be inserted and soldered.

Always try to run the suction and liquid pipes together inside one insulation for 2 to 3 M

This will allow some subcooling if necessary, in case the pipes are running in a hot environment.

Best is to have the 2 pipes together at the evaporator end.

4 Soldering Process. Make use of the nitrogen in the CDU and Evaporator for your soldering process.

Connect all the piping together and then purge nitrogen from the CDU through the pipes just before soldering (welding)

* Note that the Filter Driers have already been fitted to the evaporators and care should be taken not leave the pipes open

for long periods, solder and seal the system as soon as possible.

5 Pressure Test. All components are mostly already fitted, to save time your on site. Only 4 soldering joints required, 2 at the evaporator and 2 at the CDU.

Once all soldering is completed including any joins for longer piping runs, Pressure test the system with dry nitrogen to 450 PSI

Make sure all the stop valves and solenoid valves are energised to allow gas to flow.

6 Vacuum. Once the leak test has passed inspection, vacuum the system

Again be sure to leave the solenoid valves energised open. Best to vacuum from both high side and low side of the system.

7 Refrigerant Charging the system. Connect a hose or 1/4" copper tube to the liquid line in the system and to your Refrigerant bottle.

Turn the bottle up side down and open the tap allowing the refrigerant to flow in a liquid phase.

Once the refrigerant has stopped flowing, (no more vibrations from the hose) close the tap of the refrigerant bottle.

8 Set up to Run. Disconnect the refrigerant bottle from the liquid pipe of the system.

Turn the bottle upright again.

Connect the bottle to the suction side of the system through your refrigeration gauges.

9 Run and Fine Tuning Gas charge. The system is now ready to run

These systems are set up with capillary tube expansion system.

There is no need for an Expansion Valve (TXV) also no need for a liquid receiver.

They are called a critical charge systems, meaning its important to put the right gas charge into the system

Your system now has a charge of refrigerant, this is already a good base and should be quite close to a correct gas charge.

Final gas adjustments are now necessary to make the system run and perform well.

Electrically switch on the system with the compressor running

For low temp and some chiller systems, your Digital temperature controller should be now controlling the evaporator fan to be off due to high temperature, the fan should cycle on and off until a low enough room temperature has been reached.

The evaporator fan will now run continuously and pull the room temp down until the set point room temp is achieved.

This may take 30 minutes or several hours depending on the application.

During this commissioning running process, check that the evaporator is not flooding refrigerant back to the compressor.

Usually at this stage, the evaporator may be starving slightly, (not all U'Bend are frosted)

but this will get better as the room get closer to its desired temperature.

When the room temperature is approx 1°C away from cut out, the evaporator should now be fully frosted.

At this point you now need to adjust the gas charge, fill in more refrigerant to have a fully frosted coil.

If the refrigerant is flooding back too far and reaching the compressor drain out a bit of refrigerant.

Please note* for low temp systems it is quite normal to have ice on the suction valve of the compressor Check to make sure this is not liquid flood back. Wet your finger and press it to the cold pipe, if it sticks that's a flood back.

You have quite a lot of adjustment area for the gas charge, its doesn't have to be perfect.

The gas charge will also vary with different room temperatures and weather conditions.

The flood back of refrigerant should end just outside of the evaporator, this will maintain a fully charged evaporator at all times.

If you have for example 15M of pipe run, then you have approx 10M of flood back adjustment range.

Electrical connections

For the electrical connection of the compressor make reference to the corresponding operational instructions or see also the web page www.EKA-KOOL.com.

Connect electrically the electric equipments wherever they are available and the fans. The plate on each fan indicates the operating voltage and frequency. Be sure that they are compliant with the voltage and the frequency of the line.

! Attention: Danger of short circuit due to the presence of condensate in the electrical connections box. Exclusively use standard fairleads and be careful while carrying out the correct airtight sealing during the assembly.

Commissioning

Before starting the unit, read the operational instructions of the corresponding compressor. Before starting the air cooled condensing unit also check what follows:

- The start up liquid service valves is open;
- Fans are running;

Maintenance

Before carrying out any kind of intervention on the unit it is necessary to interrupt the main power supply of the system. Install on the power supply line a switch selector that can be padlocked, place it in an open condition (0) and padlock it during the maintenance. After the installation, in case of interventions requiring the dismantling of parts of the unit or for its dismantling, it is necessary to start the depressurization according to the following indications:

- Disconnect the electric feed as it is specified above
- Close the on-off valve placed on the suction of the compressor;
- Close the on-off valve placed on the delivery line, downstream of the intervention area;
- Depressurize the involved section of the line (without dispersing the refrigerant in the room) till the pressure does not correspond to the atmospheric one. In case it is necessary to work with the live open electric board, such operation shall be carried out by qualified and expert staff. In no case keep on reactivating the electric protection after a short circuit. Before re-operating the system, the failure shall be eliminated and all damaged components shall be replaced.

Control and Monitoring

- Verify oil level;
- Take a sample of oil and verify its good quality (color and acidity).
- Verify degree of moisture in refrigerant.
- Verify liquid level
- Verify H/L pressure
- Verify clogging of the condenser

Emergency

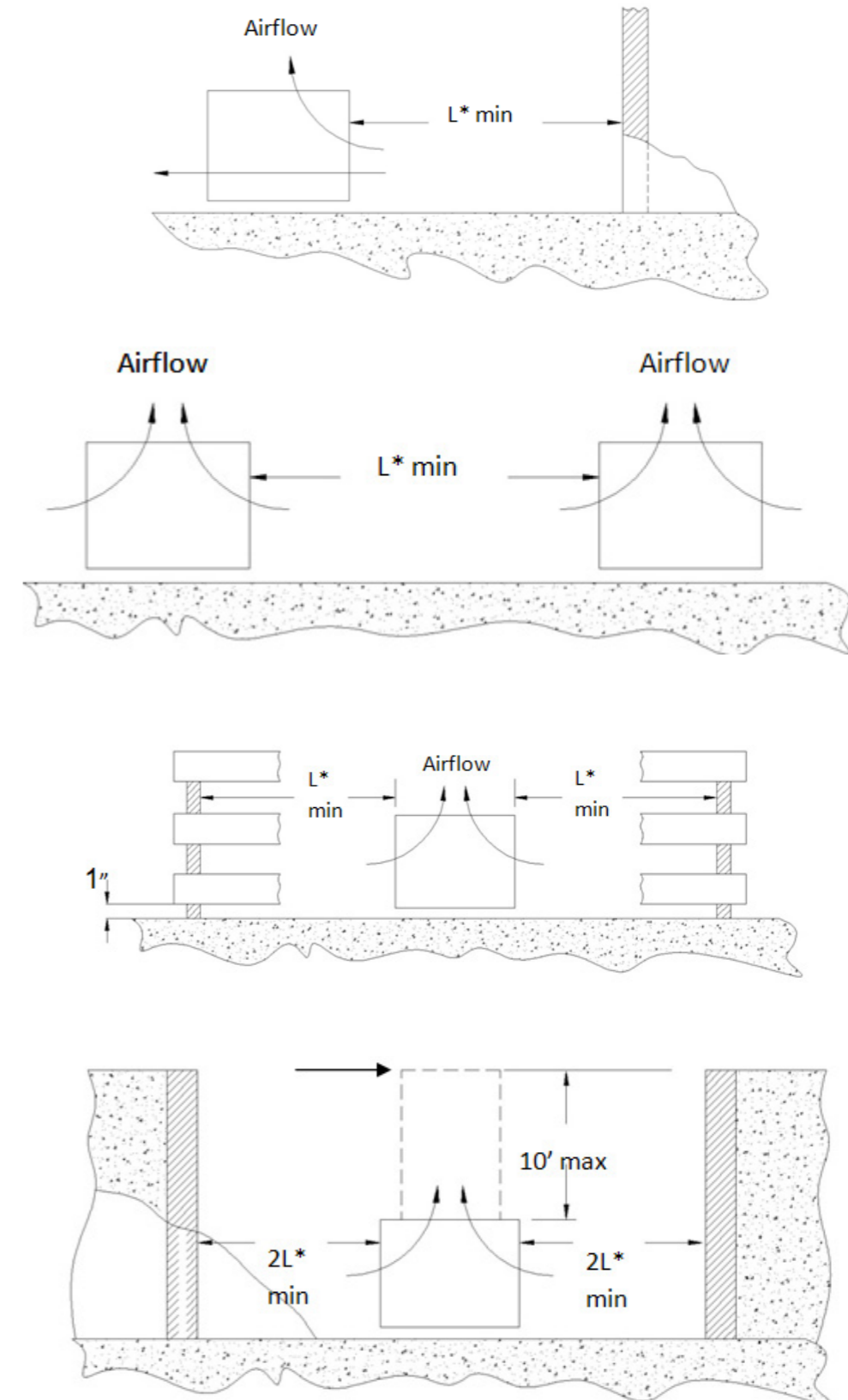
In case of malfunctioning or black-out call the nearest service centre. In case of refrigerant gas leak, aerate the room (if the CDU is installed inside the machine room) where the leak occurred before any operations. Do not stay in the machinery room if it has not been properly aerated; even if the gas inhaled is not harmful, the gas replaces oxygen and can therefore cause choking symptoms. In case of fire turn off the machine by the general switch upstream. Do not use water to extinguish the flames but only use dry extinguishers.

Warning

Any disassembly action or modification made on any Eka-kool product can affect product compliance to the aforesaid directives. Eka-kool will not recognize/guarantee product conformity to the aforesaid directives whenever the products are NOT overhauled from Eka-Kool itself.

Eka-Kool declines any type of responsibility in case damages of any nature occurs to things or persons due to product malfunctioning in case the product have not been overhauled from eka-Kool itself.

Air flow and position



Dimension

Model	Unit Dimensions. mm			Condenser Fan mm	Liquid Receiver L	Sound Pressure at 10m dB(A)	Weight kg	Figure
	L	W	H					
ESM.018.351-A4	1105	455	595	1 x 350	3,4	38	110	1
ESM.022.401-A6	1105	455	695	1 x 400	3,4	42	121	1
ESM.028.401-B7	1105	455	695	1 x 400	6	42	133	1
ESM.032.401-B8	1105	455	845	1 x 400	6	42	134	1
ESM.036.401-C9	1105	455	845	1 x 400	6	42	135	1
ESM.040.402-A12	1205	555	1300	2 x 400	6	46	216	2
ESM.050.402-B15	1205	555	1300	2 x 400	6	46	225	2
ESM.056.402-B15	1205	555	1300	2 x 400	6	46	227	2
ESM.064.402-C17	1205	555	1300	2 x 400	11	46	231	2
ESM.072.502-B22	1205	555	1600	2 x 500	11	52	240	3
ESM.080.502-B22	1205	555	1600	2 x 500	11	52	240	3
ESM.100.502-C25	1205	555	1600	2 x 500	13	55	280	3
EMP.125.502-C28	1535	760	1410	2 x 500	13	55	284	4
EMP.160.632-B45	2235	760	1420	2 x 630	13	59	329	5
EMP.100T.632-C55	2235	760	1420	2 x 630	23	59	380	5
EMP.125T.633-B75	3690	760	1420	3 x 630	30	61	448	6
EMP.160T.633-C88	3690	760	1420	3 x 630	30	61	478	6

Model	Unit Dimensions. mm			Condenser Fan mm	Liquid Receiver L	Sound Pressure at 10m dB(A)	Weight kg	Figure
	L	W	H					
ESL.048.301-B4	1105	455	595	1 x 300	3,4	38	121	1
ESL.068.401-A6	1105	455	695	1 x 400	3,4	40	133	1
ESL.096.401-B7	1105	455	695	1 x 400	6	43	145	1
ESL.108.401-B8	1105	455	845	1 x 400	6	46	145	1
ESL.136.402-A12	1205	555	1295	2 x 400	6	46	225	2
ESL.215.402-B15	1205	555	1295	2 x 400	11	55	252	2
ESL.271.502-C25	1205	555	1600	2 x 500	13	55	284	2
EMP.215T.502-C31	1840	760	1410	2 x 500	25 L	58	324	4
EMP.271T.632-B45	2235	760	1410	2 x 630	30 L	58	388	5

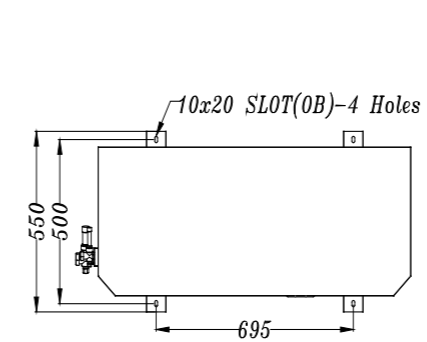


Figure 1

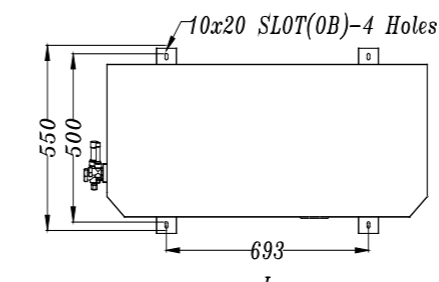
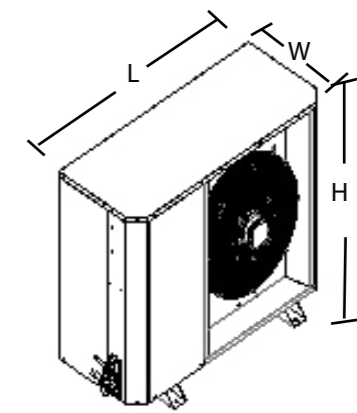


Figure 2

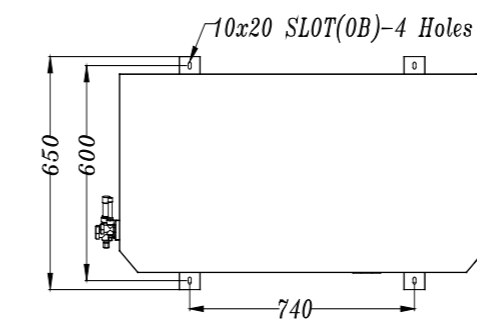
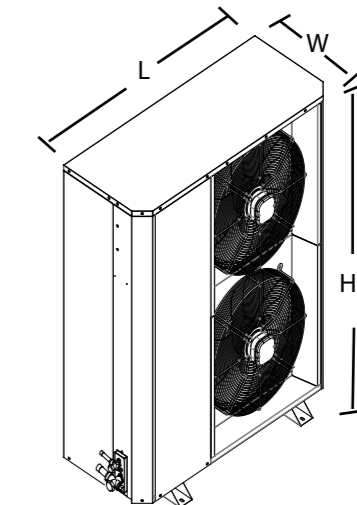
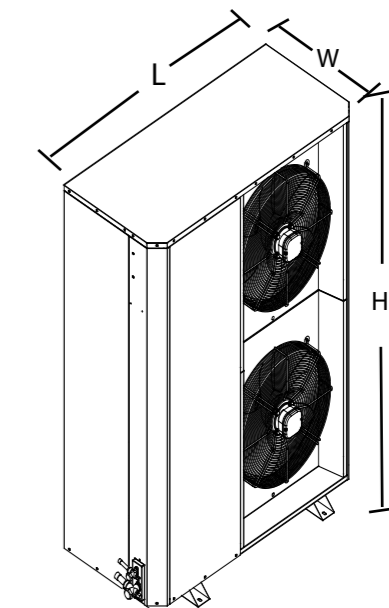


Figure 3



Dimension

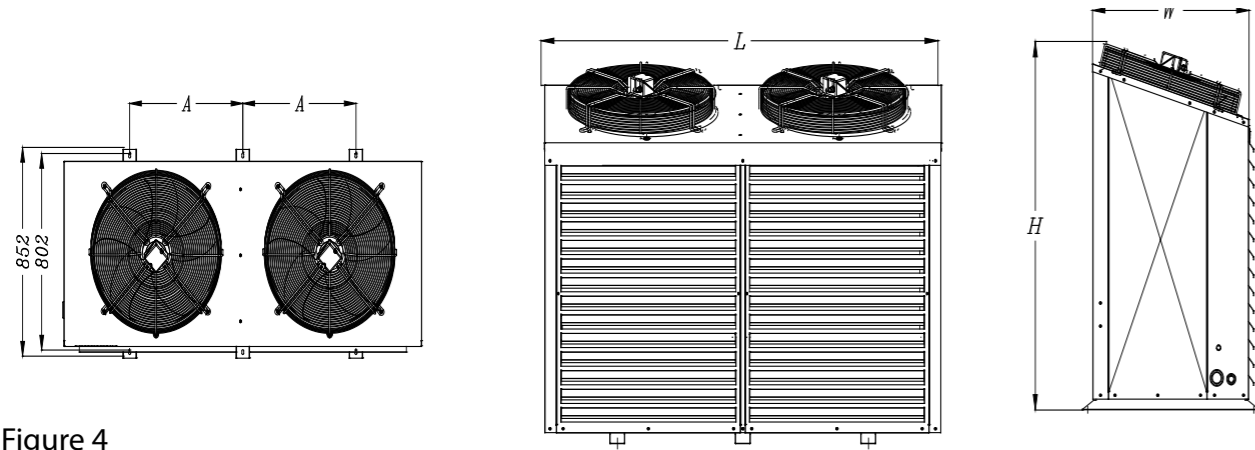


Figure 4

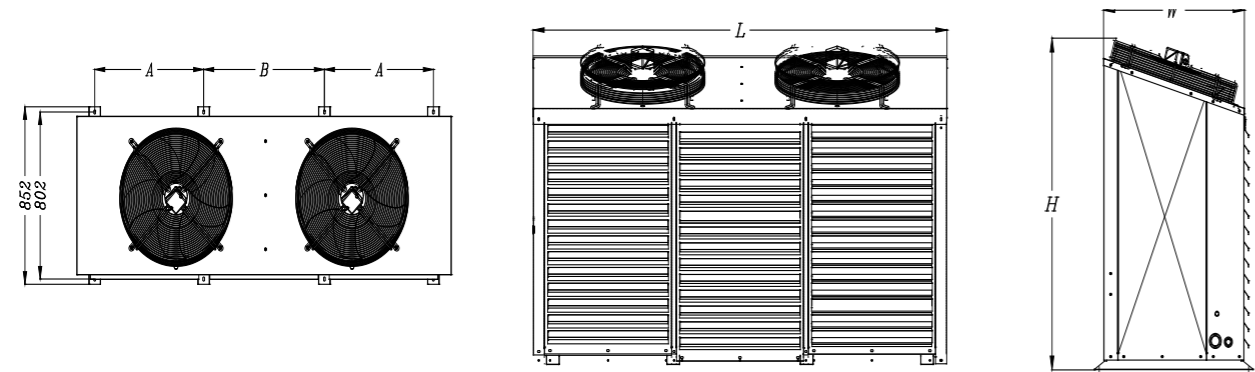


Figure 5

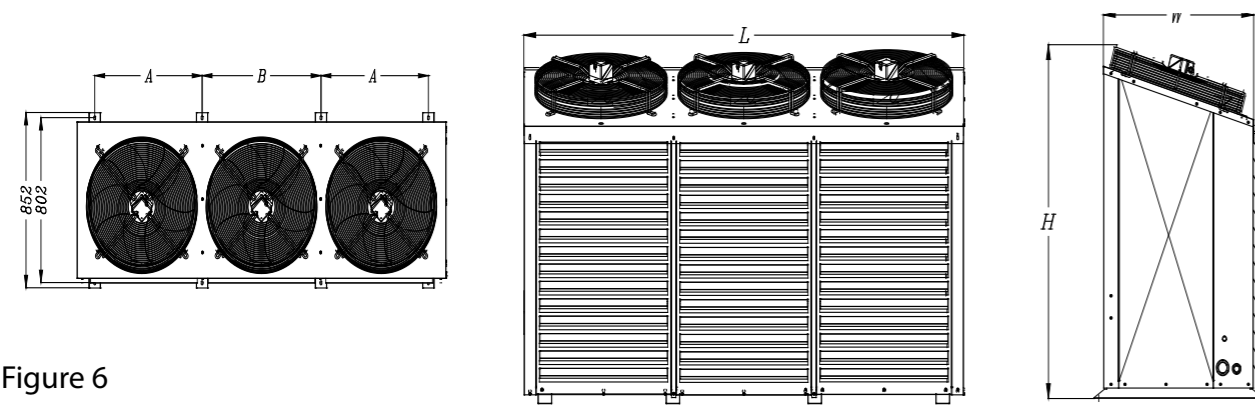
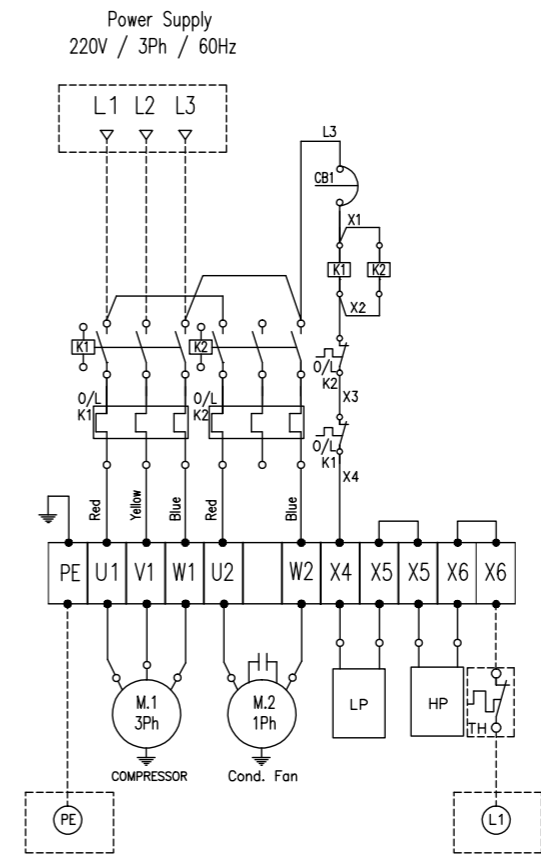


Figure 6

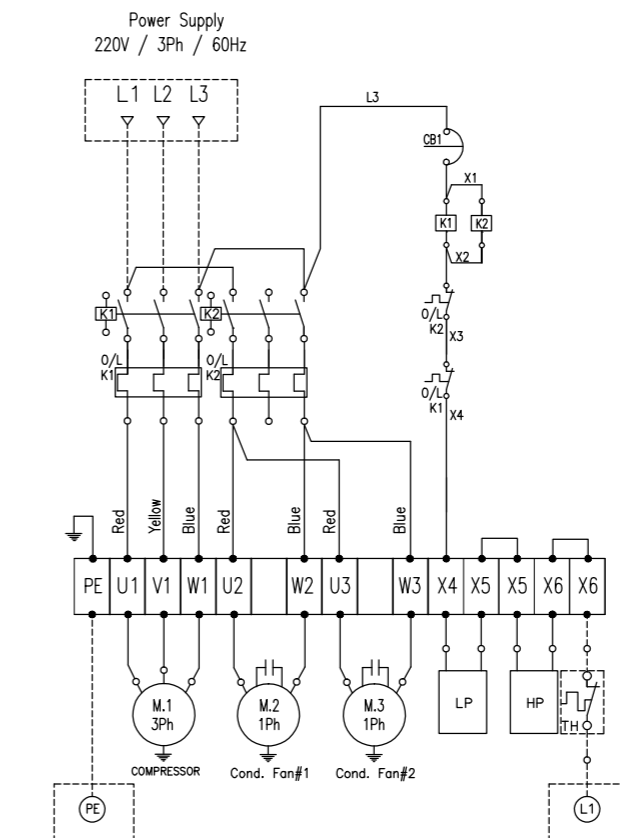
Electrical wiring diagram:



Item	Description
K1	Magnetic Contactor for Compressor
K2	Magnetic Contactor for Condenser fan
M1	Compressor
M2	Condenser fan
O/L K1	Overload Compressor
O/L K2	Overload Condenser fan
LP	Low Pressure Control
HP	High Pressure Control
CB1	Circuit Control Breaker
TH	Temperature Control (By Customer)

- ESM.018.351-A4
- ESM.022.401-A6
- ESM.028.401-B7
- ESM.032.401-B8
- ESM.036.401-C9
- ESL.048.301-B4
- ESL.068.401-A6
- ESL.096.401-B7

— Factory wiring
 - - - Customer wiring
 [] By Customer

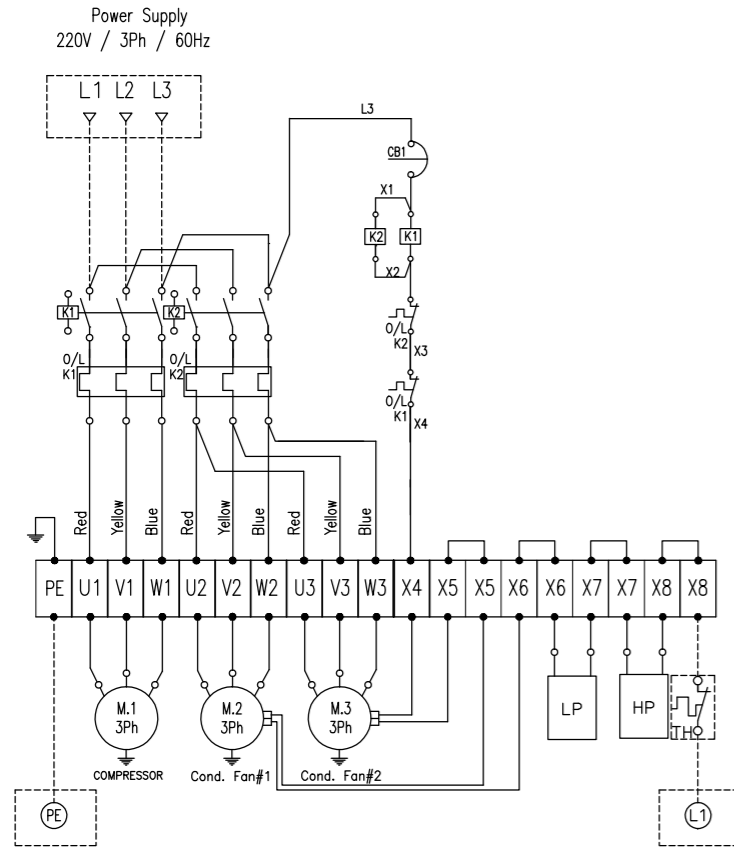


Item	Description
K1	Magnetic Contactor for Compressor
K2	Magnetic Contactor for Condenser fan
M1	Compressor
M2	Condenser fan #1
M3	Condenser fan #2
O/L K1	Overload Compressor
O/L K2	Overload Condenser fan
LP	Low Pressure Control
HP	High Pressure Control
CB1	Circuit Control Breaker
TH	Temperature Control (By Customer)

- ESM.040.402-A12
- ESM.050.402-B15
- ESM.056.402-B15
- ESM.064.402-C17
- ESL.136.402-A12
- ESL.215.402-B15

— Factory wiring
 - - - Customer wiring
 [] By Customer

Electrical wiring diagram:

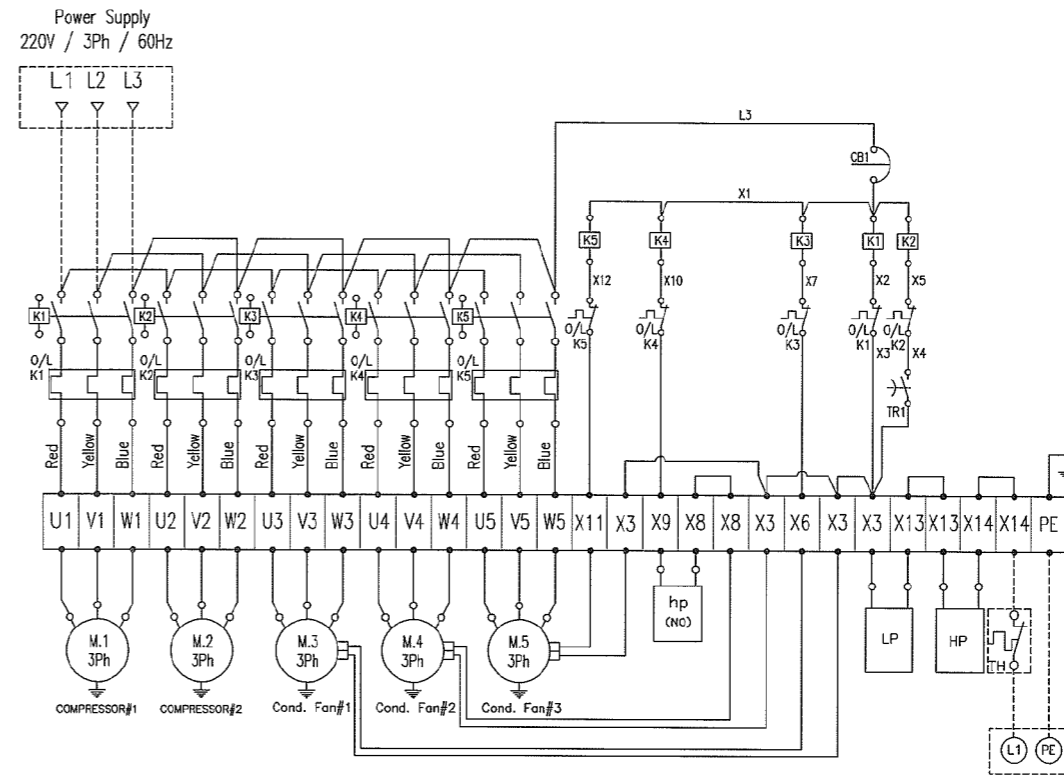


Item	Description
K1	Magnetic Contactor for Compressor
K2	Magnetic Contactor for Condenser fan
M1	Compressor
M2	Condenser fan #1
M3	Condenser fan #2
O/L K1	Overload Compressor
O/L K2	Overload Condenser fan
LP	Low Pressure Control
HP	High Pressure Control
CB1	Circuit Control Breaker
TH	Temperature Control (By Customer)

- ESM.072.502-B22
- ESM.080.502-B22
- ESM.100.502-C25
- EMP.125.502-C28
- ESL.271.502-C25

——— Factory wiring
 - - - - - Customer wiring
 [] By Customer

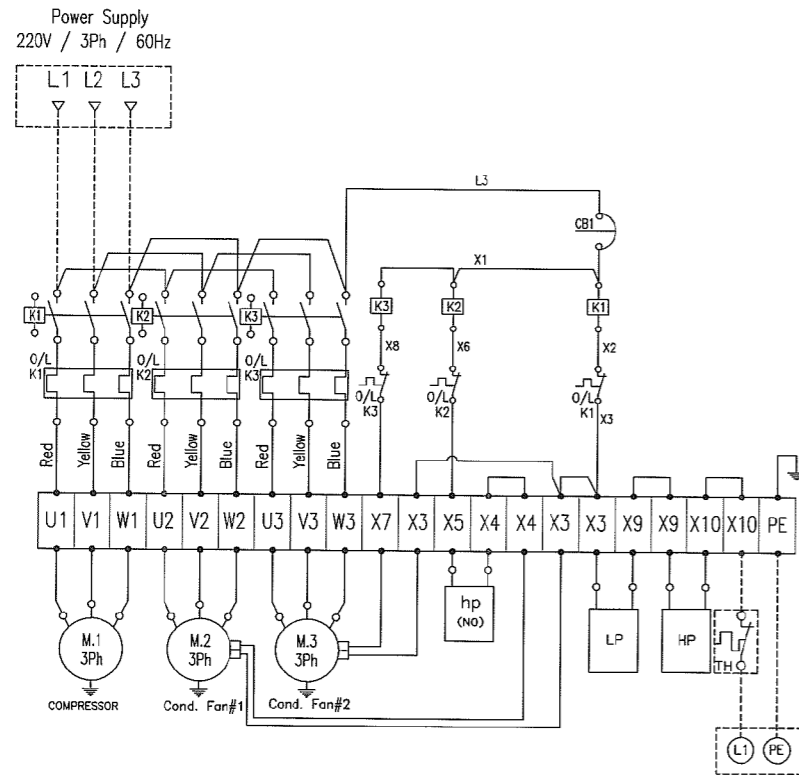
Electrical wiring diagram:



Item	Description
K1	Magnetic Contactor for Compressor #1
K2	Magnetic Contactor for Compressor #2
K3	Magnetic Contactor for Condenser fan #1
K4	Magnetic Contactor for Condenser fan #2
K5	Magnetic Contactor for Condenser fan #3
M1	Compressor #1
M2	Compressor #2
M3	Condenser fan #1
M4	Condenser fan #2
M5	Condenser fan #3
O/L K1	Overload Compressor #1
O/L K2	Overload Compressor #2
O/L K3	Overload Condenser fan #1
O/L K4	Overload Condenser fan #2
O/L K5	Overload Condenser fan #3
TR1	Relay on make timer
LP	Low Pressure Control
HP	High Pressure Control
hp(nc)	High Pressure Control for Condenser fan #2
CB1	Circuit Control Breaker
TH	Temperature Control (By Customer)

- EMP.125T.633-B75
- EMP.160T.633-C88

——— Factory wiring
 - - - - - Customer wiring
 [] By Customer



Item	Description
K1	Magnetic Contactor for Compressor
K2	Magnetic Contactor for Condenser fan #1
K3	Magnetic Contactor for Condenser fan #2
M1	Compressor
M2	Condenser fan #1
M3	Condenser fan #2
O/L K1	Overload Compressor
O/L K2	Overload Condenser fan #1
O/L K3	Overload Condenser fan #2
LP	Low Pressure Control
HP	High Pressure Control
hp(on)	High Pressure Control for Condenser fan #2
CB1	Circuit Control Breaker
TH	Temperature Control (By Customer)

- EMP.125.502-C28
- EMP.160.632-B45

——— Factory wiring
 - - - - - Customer wiring
 [] By Customer

General specification EKA-KOOL Condensing Units

All EKA-KOOL products are ISO 9001:2008 certified and all production processes undergo quality control procedures. All staff are well trained within their scope of competence and the company lives up to all authority regulations. The company respects local culture and value bringing harmony between work and private lives.

Capacity

All our capacities are calculated on R507A
Our technical team are ready to support you on all technical issues at info@eka-kool.com

Compressors

Reliable compressors from reputable manufacturers

Condenser Coils

Fins are made of high quality aluminium alloy and mechanically expanded onto high grade copper tube. Tube sizes is 3/8" and 1/2" Fin spacing 2.1mm
All coils are leak tested with dry nitrogen ensuring leak free coils. All condensing units are delivered with a holding charge of dry nitrogen once the leak test has been approved by our quality control department

Casing

Robust and strong supported zink steel coated casing. Individual fan segments for optimal air distribution and fan control. Casing design with angle corners of 45 degree for easy welding of inlet and out connections during installation

Fan Motors

Powerfull, low noise, internal rotor., axial fan motors in protection class IP44 for all fan diameters 250mm - 400mm and IP54 for all fan diameters 500mm-1000mm.
Winding temperature class for all motors is THCI 155 (IEC 60085). Electrical dimensioning is conducted according to regulation of rotating electrical machines DIN EN 60034-1 and internal balance with protection guard grill according to EN294.
500mm-1000mm optional available for all other voltages of 4poles. 6poles. Reliability and low power consumption.
Please refer to the nameplate for more information.
Admissible air temperature -40 °C to +60 °C .
All fans are pre-wired to the wheather proof terminal box. tested and approved by electrical department at factory to secure safety and optimal operation of the motors.

Single phase 230V 50/60HZ for all fans 250mm-400mm with optional of 3 phase 220V/60Hz.
Three phase 400V 50Hz or 480V 60Hz for all fans

Sound

Comply to standard procedure for calculation of sound pressure level according to EN13487.

Pakaging

All EKA-KOOL's condensing units delivered packaged in instalation position.

Accessories

Fan motors. fan blade (rotors). electrical heaters. drain tray. feet for floor mounting. wall brackets. electrical box.
Please consult with our technical department for more information

Your Success is Our Success

EKA-KOOL®. the specialist in fin & tube heat exchangers technology proudly present to the market its unique design commercial line serving the refrigeration and air-conditioning industries.
EKA-KOOL® stands for efficiency. value for your investment. true performer and a trustworthy partner to your business.



EKA-KOOL Pte Ltd
60 Tessensohn Road
#02-01A Club CSC @ Tessensohn
Singapore 217664
Telephone +84903788664
Email: info@eka-kool.com
Literature no. CDU012129-E1-01

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