

**DAIKIN**

# TECHNICAL MANUAL

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## COMMERCIAL CONDENSING UNIT

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**High-Medium Temperature (HMT) Application**

CCHMX0150AV16

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READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLATION.

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# 1. Nomenclature

<b>C</b>	<b>C</b>	<b>HM</b>	<b>X</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>A</b>		<b>V</b>	<b>1</b>	<b>6</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>

Digit	Description
1 & 2	CC – Commercial Condensing Unit
3	L – Low Temperature M – Medium Temperature HM – High Medium Temperature
4	R – Reciprocating S – Scroll X – Rotary
5, 6, 7 & 8	Compressor horse power , 0150-1.5HP (150/100=1.5HP)
9	A – Major Design Category (Progress according to design change).
10	R - Minor Design Category (Progress according to design change).
11 & 12	Power supply: Y1 - 3ph/50Hz/380V ~ 415V V1 - 1ph/50Hz/220V ~ 240V
13	6 - India

# 2. Product Overview

▲ R32

MODEL \ CAPACITY(HP)	1	1.5	2	2.5	3	4	5	6	7	8
<b>Medium Temperature</b>										
<b>Low Temperature</b>										
<b>High-Medium Temperature</b>										
CCHMX0150AV16		▲								

\*\*Capacity is declared as per BS EN 13215.

Note: Detailed Capacity Data

### 3. Specifications

Model	Electical Data	Compressor							Fan Motor	
	Power Input	Type	Swept Volume (cm3/Rev)	Oil Type	Oil Charge (Ltr)	Operating Current(A)*	MCC (A)**	LRC(A)	No.	FLC(A)
CCHMX0150AV16	230V/1~/50Hz	KSF165S2VFPC3	16.55	VG74	0.410	5.7	7.0	37	1	0.65

Model	Coil Volume (Litre)	Condenser Airflow (m3/min.)	Accumulator/ Volume (Litre)	Connection		Dimensions			Weight (Kg)	Sound Pressure dB(A)at 1m***
				Liquid (inch)	Suction (inch)	Height (mm)	Width (mm)	Depth (mm)		
CCHMX0150AV16	1.76	52	-	1/4	1/2	595	845	300	41	56

Refer to condition:

\* Evaporation temperature = -10°C, Outside ambient temperature = 32°C (Medium temperature application, R404A)

\* Evaporation temperature = -35°C, Outside ambient temperature = 32°C (Low temperature application, R404A)

\* Evaporation temperature = 5°C, Outside ambient temperature = 32°C (High-Medium temperature application, R32)

\*\* MCC= Maximum Continuous Current

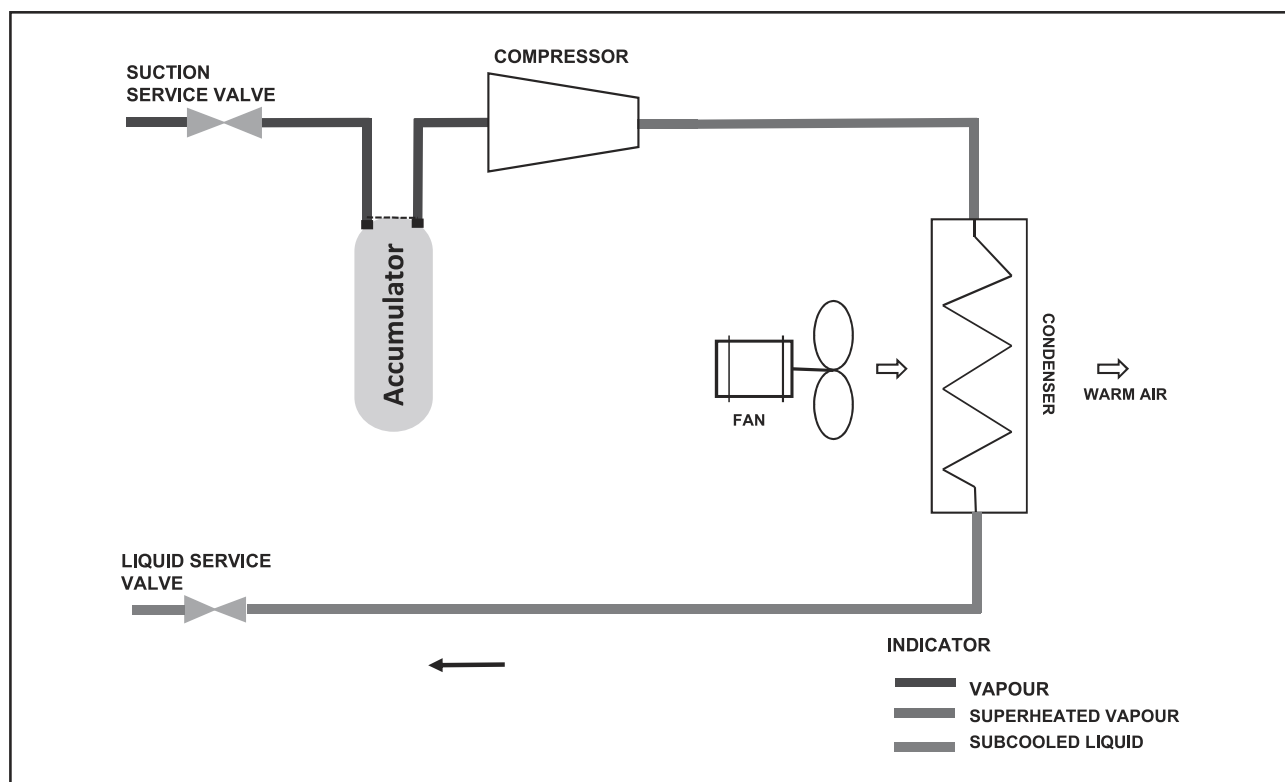
\*\*\* Sound Pressure Level measured in an anechoic room at (-10/+38°C) MT, (-35/+38°C) LT & (0/+38°C) HMTconditions. Alternative conditions may produce different results.

## 4. Standard Product Configuration

- Rotary compressors for high medium temperature models.
- Magnetic contactor.
- Stop valves for quick installation and easy access and maintenance.
- Powder coated casing.
- Suction Accumulator to protect against refrigerant flood back during operation and also against off-cycle migration.
- Designed for zero ozone depletion potential (ODP=0) refrigerant R32.
- These unit is pre-filled with R32 refrigerant.

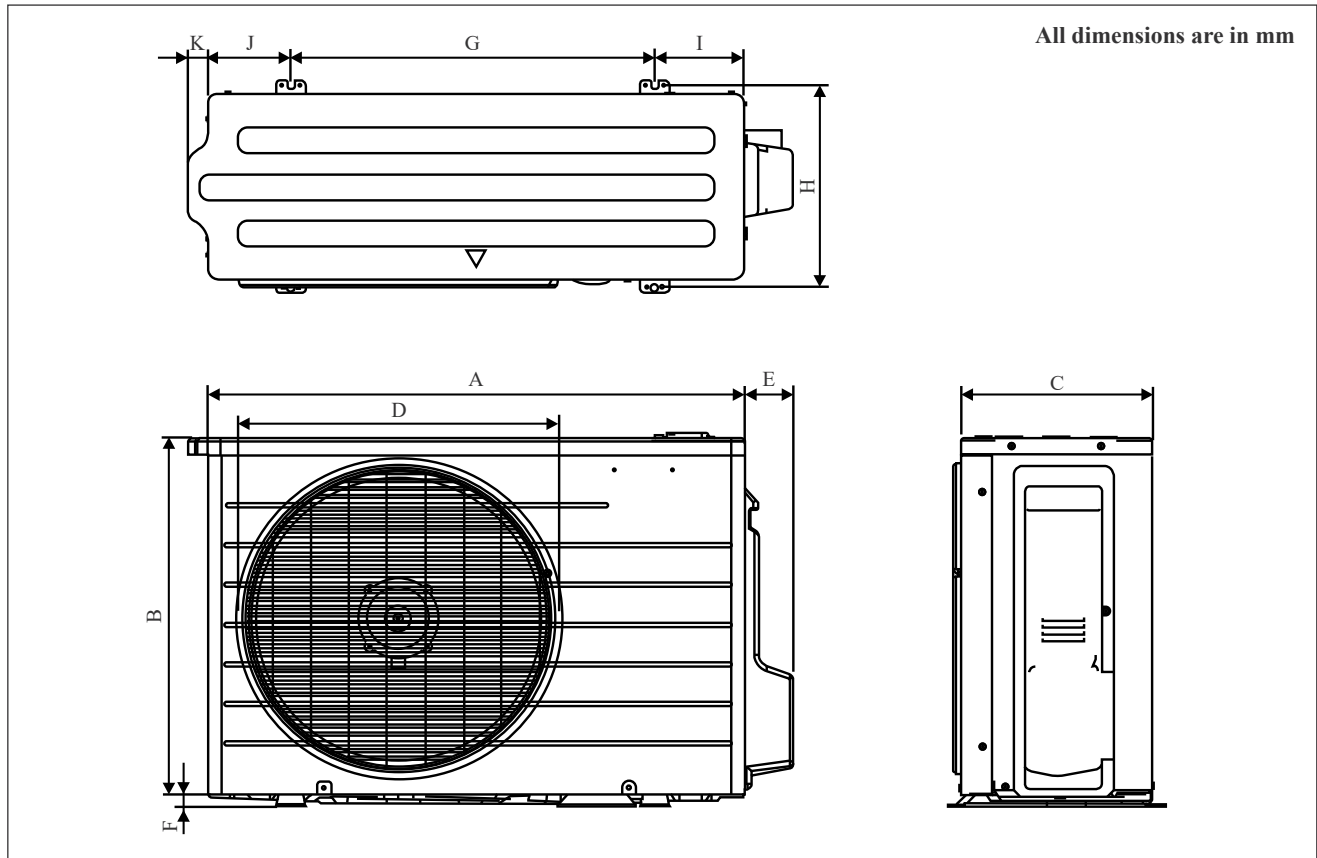
## 5. Product System Cycle

HMT MODEL: CCHMX0150AV16



## 6. Outside Drawings

1.5HP HMT/: CCHMX0150AV16



Dimension	A	B	C	D	E	F	G	H	I	J	K
Model											
1.5HP	845	575	302	505	77	20	573	326	140	131	30

## 7. Performance Data

**R32 High - Medium Temperature** (Rating Condition: Superheat 10K, Subcooling 0K)

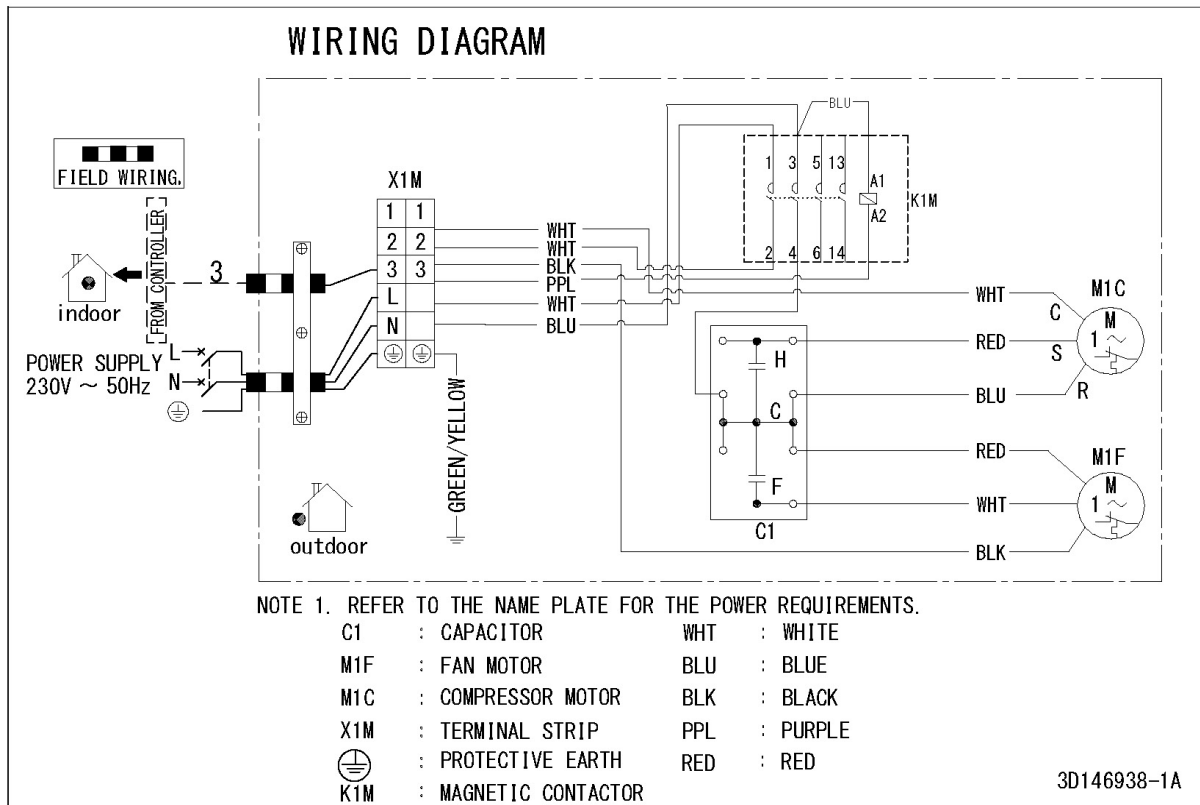
MODEL		HP	TE		-5	0	5	10	15
Commercial Condensing Unit			TA						
HIGH-MEDIUM TEMPERATURE	CCHMX0150AV16	1.5	32	CC (W)	2826	4100	4581	5848	7050
				PC (W)	1048	1078	1085	1038	1018
			38	CC (W)	2645	3800	4424	5465	6589
				PC (W)	1148	1178	1208	1198	1168
			43	CC (W)	2506	3521	3750	5848	6158
				PC (W)	1248	1298	1315	1308	1268

## 8. Wiring Diagram

**Important Note:** All wiring and connections to the condensing unit must be made in accordance to the local codes.

1.5 HP -HMT (230V/1ph/50Hz)

CCHMX0150AV16



## 9. Safety and Health

### Important Note

Only qualified specialist could carry out the installation, maintenance and commissioning of the system. To avoid potential injury, use care when working around coil surfaces or sharp edges of metal cabinets. All piping and electrical wiring should be installed in accordance with all applicable codes, ordinance and local by-laws.

## General Information

### Before Installation

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

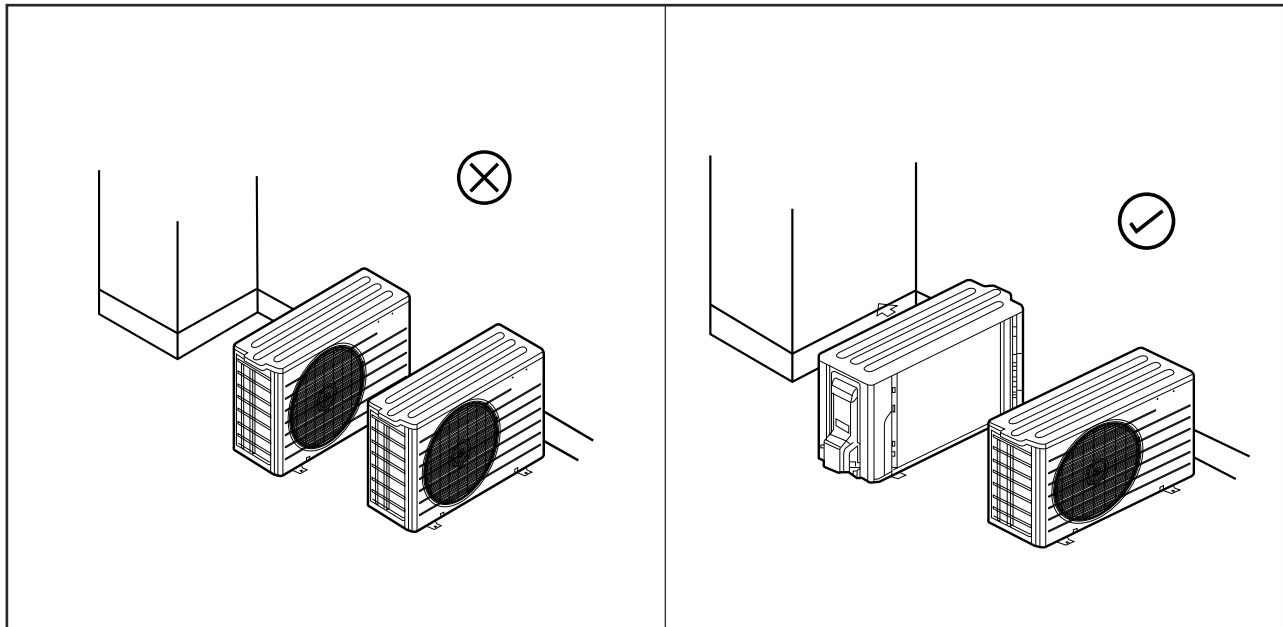
### During Installation and subsequent maintenance

- Installation and maintenance are to be performed only by qualified personnel who is familiar with local codes and regulations, and experienced with this type of equipment.
- The condensing unit is delivered with a holding charge with R32.
- If lifting equipment is required, ensure that it is suitable for purpose certificated and that the operatives are qualified to use it.
- Safe working methods are identified and operatives have suitable Personal Protective Equipment (PPE).
- Ensure the working area has adequate ventilation during brazing procedures.
- The units contain moving machinery and electrical power hazards, which may cause severe injury or death. Shut off power and disconnect before installation or service of the equipment.
- Refrigerant should not be released into the atmosphere. Proper evacuation, recovery, handling and leak testing procedures must be observed at all times.
- Units must be earthed and no maintenance work should be attempted prior to disconnecting the electrical supply.
- The electrical covers and fan guards must remain fitted at all times.
- Use of the units outside of the design conditions and the application for which the units were intended may be unsafe and be detrimental to the units, regardless of short or long term operation.
- The condensing units are not designed to withstand loads or stresses from other equipment or personnel. Such extraneous loads or stress may cause failure/leak/injury.
- A suction accumulator is assembled in the units. It offers protection against refrigerant flood back during operation and also against off-cycle migration by adding internal free volume to the low side of the system.
- Tests must be conducted to ensure the amount of off-cycle migration to the compressor does not exceed the compressor's charge limit.
- Wherever possible the system should be installed to utilize a pump down configuration.
- After installation, the system should be allowed to run for 3-4 hours.

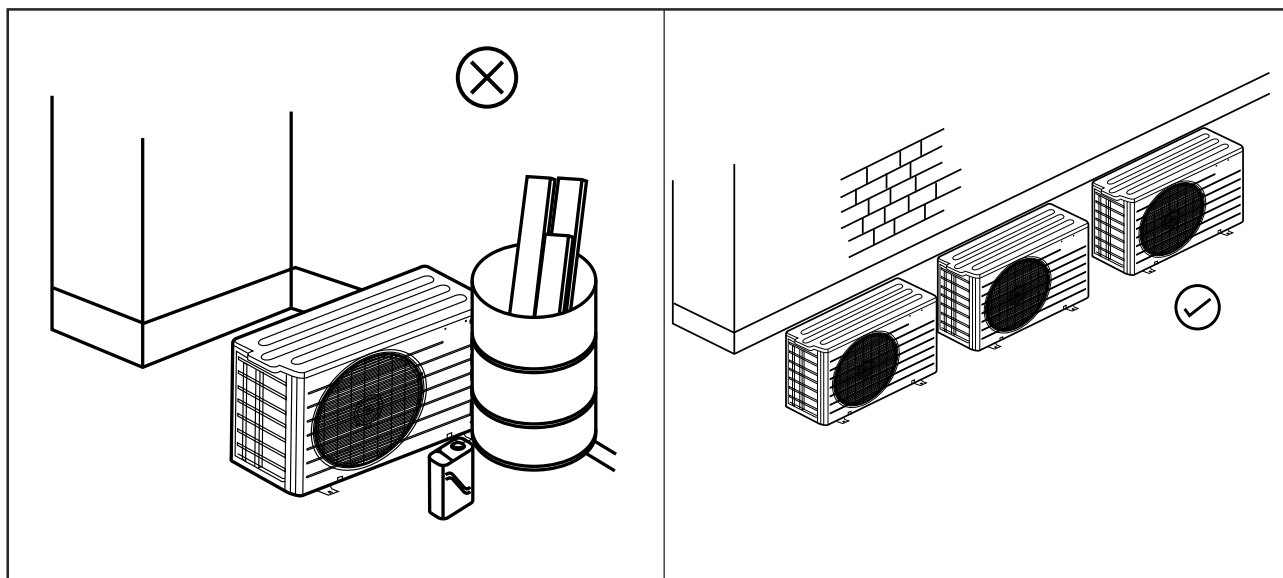
## 10. Installation & Commissioning

### 10.1 Unit site location

- In order to achieve maximum cooling capacity, the installation location for the condensing unit should be carefully selected.
- Install the condensing unit in such a way that hot air ejected by the condensing unit cannot be drawn in again (short circuit of hot discharge air). Allow sufficient space for maintenance around the unit.



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

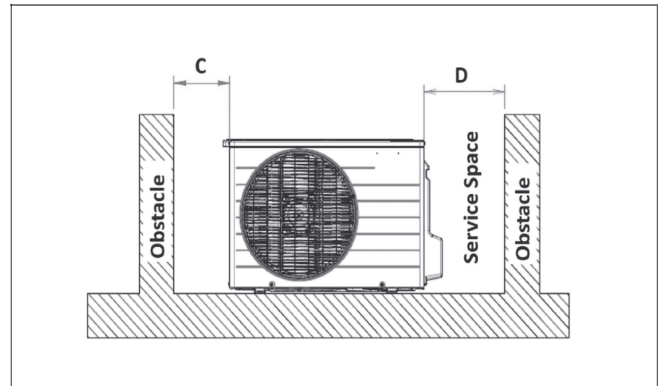
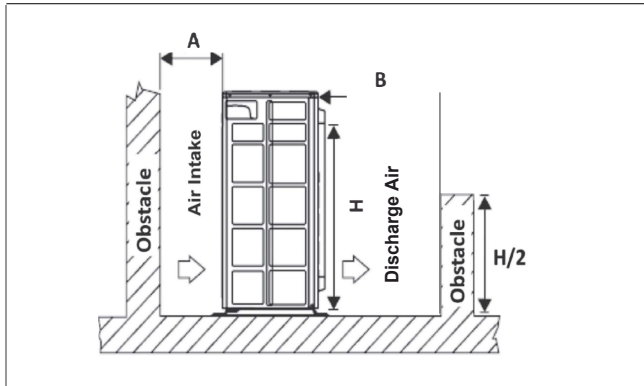


- The location must be well ventilated, so the unit can draw in and distribute plenty of air thus lowering the condensing temperature.
- To optimize the unit running conditions, the condenser coil must be cleaned at regular intervals.
- The unit must be level in all directions.



## 10.2 Installation clearances

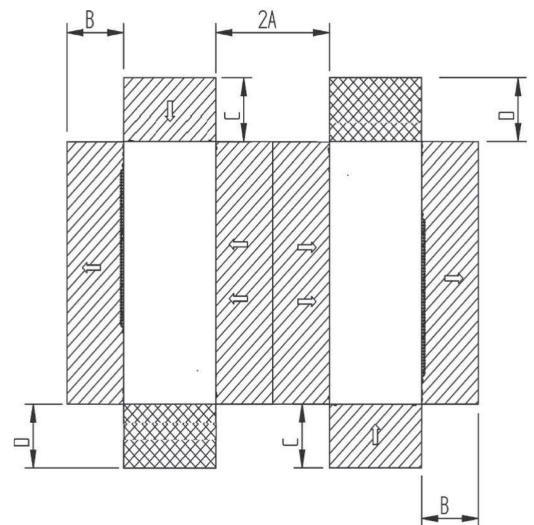
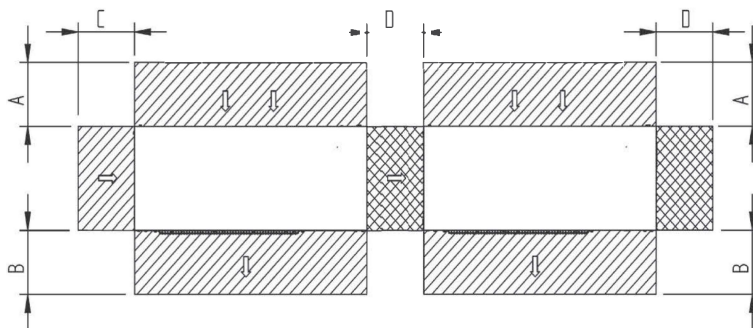
When two or more outdoor units are installed in a location, they must be positioned such that one unit will not be taking the hot discharge air from another to avoid hot air short circuiting. This also applies when two or more units are installed one above the other. Below are the installation clearance guidelines:





MODELS	Minimum Distance (mm)			
	A	B	C	D
CCHMX0150AV16	300	1000	300	500

NOTE: If there is any obstacle higher than half, of the unit's height (H), please allow more space than the figure indicated in the above table.

### Horizontal air discharge

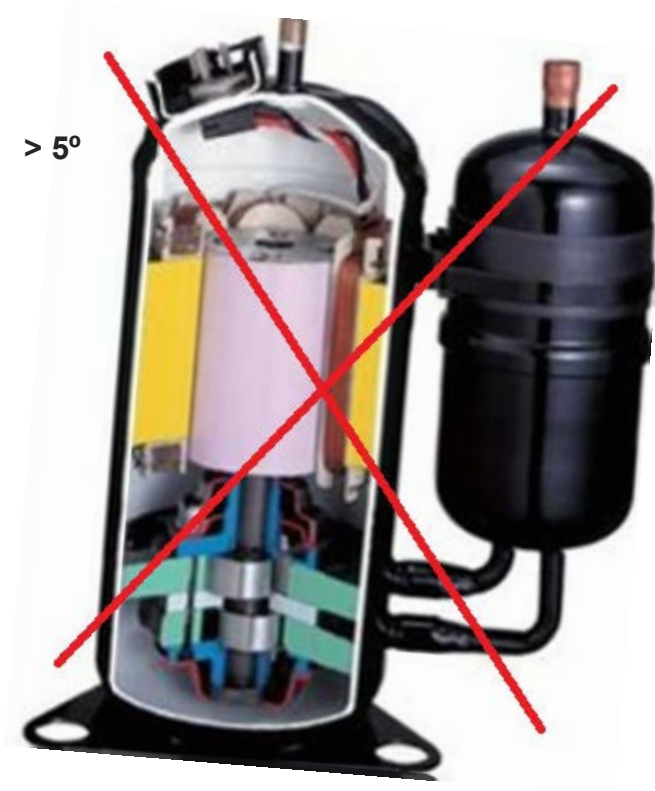


#### LEGEND

-  SPACE FOR AIR FLOW
-  SPACE FOR SERVICE

### 10.3. Compressor handling

To ensure compressor reliability, the condensing unit together with the compressor must not tilt greater than an angle of 5°. Otherwise, the internal part of the compressor can offset from the housing springs and produce abnormal sound and vibration.



### 10.4. Field piping

#### **Important Note**

Pipe sizing should only be determined by qualified personnel. All local codes of practice must be observed in the installation of refrigerant piping.

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

- Pipework routes must be as simple and as short as possible.
- Avoid low points on pipework where oil can accumulate.

- Suction gas velocity must be sufficient to ensure good oil return.
- Use only clean, dehydrated refrigeration grade copper tube with long radius bends.
- Run braze without over filling to ensure there is no leakage into the tube.
- To prevent oxidation, blow oxygen free nitrogen through pipework when brazing.
- Install insulation on all suction lines and on all pipes penetrating walls or passing through hot areas.
- In vertical pipework, the use of U-trap and double suction risers is often required. These suction risers must always be fitted with a U-trap at the bottom and a P-trap at the top and never be higher than 4m unless a second U-trap system is fitted.
- Suction pipework should slope gently back towards the unit to assist oil return to the compressor. A fall of approximately 2cm per metre of pipework is acceptable.
- Liquid lines should be sized to ensure a full supply of liquid refrigerant to the expansion device. Careful attention should be paid to sizing of liquid lines on large risers (above 6m).
- Always choose the shortest path and follow the recommendation as tabulated below.

<b>MODELS</b>	<b>CCHMX0150AV16</b>
<b>Max. allowable length, m</b>	20
<b>Max. allowable elevation, m</b>	10
<b>Liquid pipe size, mm/(in)</b>	6.35 (1/4")
<b>Gas pipe size, mm/(in)</b>	12.70 (1/2")

- Correct line sizing will minimize the pressure drop and maintain sufficient gas velocity for proper oil return.

#### **Important Note**

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

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

### **10.5 Pressure testing**

- It is recommended to use inert gas such as nitrogen for pressure testing.
- The pressure differential between the high and low side of the compressor should not exceed 30 bar (435 psig).
- Test pressures are : 23 bar (334 psig) on the Low Side  
28 bar (405 psig) on the High Side

### **10.6. Leak detection**

- Make sure that all isolation valves throughout the system are fully open.
- Perform a leak detection using compatible refrigerant or pressurize nitrogen, detected by leak detector for the applied refrigerant.
- Never use CFC or HCFC refrigerants for leak detection of HFC systems.
- Leak detecting additives shall not be used as they may affect the lubricant properties.

## 10.7. Special precautions when dealing with R32 unit

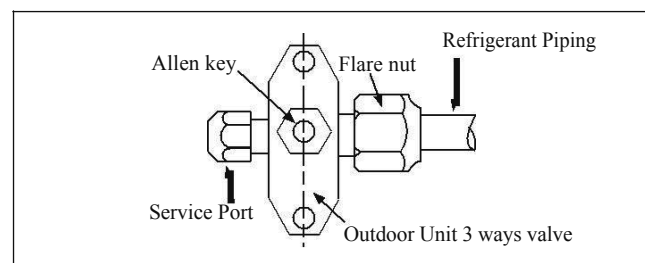
- R32 is a new HFC refrigerant which does not damage the ozone layer. The working pressure of this new refrigerant is 1.7 times higher than conventional refrigerant (R32), thus proper installation / servicing is essential.
- Never use refrigerant other than R32 in an air conditioner which is designed to operate with R32.
- POE-SP32/RM-LP56EG/VG74 oil is used as lubricant for R32 compressor. During installation or servicing, extra precaution must be taken not to expose the R32 system too long to moist air. Residual oil in the piping and components can absorb moisture from the air.
- Use tools and materials exclusively for refrigerant R32. Tools exclusively for R32 are manifold valve, charging hose, pressure gauge, gas leak detector, flare tools, torque wrench, vacuum pump and refrigerant cylinder.
- As an R32 air conditioner incurs higher pressure, it is essential to choose the copper pipes correctly.
- If the refrigerant gas leakage occurs during installation / servicing, be sure to ventilate fully. If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
- When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigerant cycle.

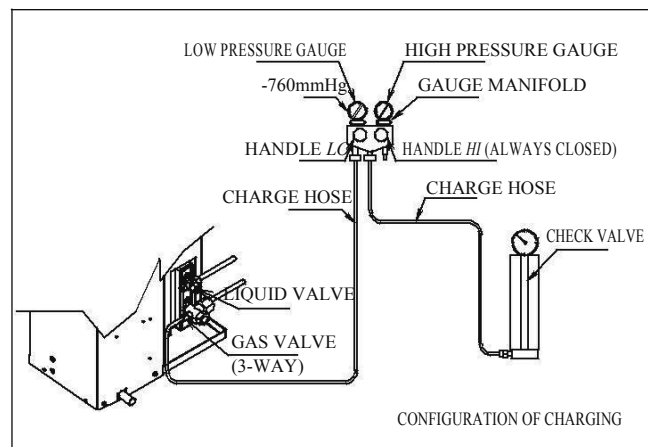
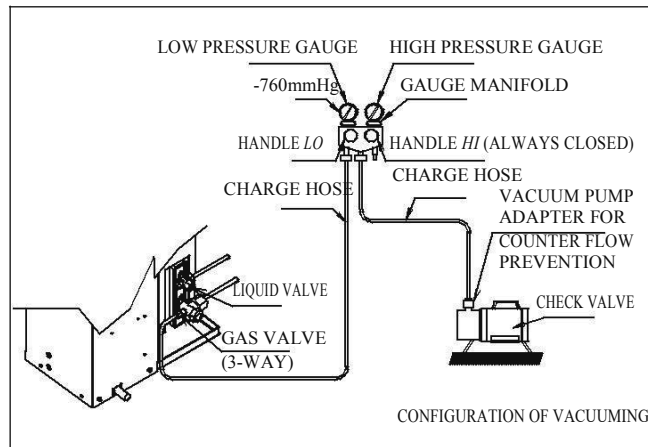
## 10.8. Vacuuming & Charging

### Vacuum The Piping And The Indoor Unit

Except for the outdoor unit which is pre-charged with refrigerant, the indoor unit and the refrigerant connection pipes must be vacuumed because the air containing moisture that remains in the refrigerant cycle may cause malfunction of the compressor.

- Remove the caps from the valve and the service port.
- Connect the centre of the charging gauge to the vacuum pump.
- Connect the charging gauge to the service port of the 3-way valve.
- Start the vacuum pump. Evacuate for 30 minute. The evacuation time varies with different vacuum pump capacity. Confirm that the charging gauge needle has moved towards -760mmHg.





### **Caution**

- If the gauge needle does not move to -760mmHg, be sure to check for leakage at flare type connection of the indoor and outdoor unit and repair the leak before proceeding to the next step.
- Close the valve of the changing gauge and stop the vacuum pump.
- In CCHMX0150AV16, open the suction valve and liquid valve (in anti-clockwise direction with 5mm key. And for other model key should be used as per required size.

### **Charge Operation**

This operation must be done by using a gas cylinder and a precise weighing machine. The additional charge is topped-up into the outdoor unit using the suction valve via the service port.

- Remove the service port cap.
- Connect the low pressure side of the charging gauge to the suction service port centre of the cylinder tank and close the high pressure side of the gauge. Purge the air from the charging hose.
- Start the air conditioner unit.
- Open the gas cylinder and low pressure charging valve.
- When the required refrigerant quantity is pumped into the unit, close the low pressure side and the gas cylinder valve.
- Disconnect the service hose from service port. Put back the service port cap.

### Important notes regarding additional charge:

The refrigerant is pre-charged in the outdoor unit with standard pipe length of 7.5 m. If the piping length is increase, then use additional charge value as indicated in the below table.

<b>Outdoor Unit</b>	1.5 HP
<b>Additional charge (g/m)</b>	20

## 10.8 Electrical

### Important Note

The mains electrical supply to the condensing unit must be via a suitable motor rated circuit breaker or fuse.

Condensing units require 230 volt / 1 phase / 50Hz supply, both of which must include a neutral and an earth. These systems are not suitable for any other supply voltage (other than a deviation of +/- 10% of the above values) and are not suitable for 60Hz supplies.

Mains cable type and sizing must be selected for the particular application and the electrical installation should confirm to the current local standards.

- Cables to the condensing unit should wherever possible be routed through the cable glands supplied on the rear of the units.
- Connect the mains supply to the units as per the wiring diagrams.

To gain access to the electrical box, turn off the power supply, remove the screws from the service plate. The electrical box is located behind the electrical box cover. Remove the screws in the electrical box cover to access components.

And to gain access of electrical component of CCHMX0150AV16 model remove screw of the top plate of the unit. The electrical box is located below of the top plate. For proper access of all component of electrical box, right side plate also need to open.

## 10.9 Pre start-up checks

Before starting the condensing unit the following checks should be carried out as a minimum:

- Check electrical supply is correct and all connections are sound.
- All moving parts are free and guards fitted.
- Compressor oil level satisfactory.
- Overload set correctly.
- Valves in correct operating position.
- Initial refrigerant charge.
- Gauge manifold connected to both low and high sides of system.

## 10.10 Running the unit

- Run the unit and check compressor and condenser fan operation.
- Check system pressures and temperatures, gas charge and running currents of motors to ensure correct operation.
- Check compressor superheat.
- Carry out final leak test and ensure all panels/covers are fitted and screws tightened.
- Log all information along with the system model and serial numbers for future reference.
- Ensure that the customer / responsible person is provided with basic operating instructions and where electrical isolators are situated in case of emergency.

### Important Note

There must be no more than 12 compressor starts per hour. A higher number of starts reduces the service life of the compressor. It is recommended minimum 2 minutes run in time and 3 minute idle time for each start and stop of the compressor. However, consideration should be given to ensuring an adequate minimum run time to ensure proper oil return.

## 10.11 Wiring

The unit must be isolated from power supply prior to installation. In order to ensure the safety of the installation and its smooth operation, it is necessary to:

- Verify the installation is compatible with the wiring diagram.
- Select the motor circuit breaker by using the maximum continuous current. Refer *Section 3*
- Size the wiring for the connection (power and control circuit) according to the properties of the installed unit.
- Protect and earth the electrical power supply.
- Carry out electrical connections according to the norms of the respective country.
- Secure the cable from touching hot parts and sharp edges with cable clamps.
- Close the electrical box after completion of the wiring.

## 10.12 Commissioning of the Condensing Unit

Make sure all isolation valves are fully open before starting the system for the first time. The shut off valve on the condensing unit could be found on outlet of liquid receiver, inlet and outlet of condensing unit.

# 11. Checklist

- Check all electrical termination and circuits.
- Check the service valves are fully open.
- Ensure fan motor and fan blades are installed properly.
- Observe the system pressures during the charging and initial operation process.
- Check the compressor's discharge and suction pressure, ensure it is working within the operating range.
- Check condenser fan, ensure warm air blowing off.
- Check evaporator blower, ensure discharge air is cool.
- Check suction superheat and adjust expansion valve to prevent liquid flood back to the compressor.



## 12. Service and Maintenance

### Important Note

Warning! – Disconnect the main electrical supply before servicing or opening the unit

Warning! – Ensure there is no refrigerant in refrigerant circuit before dismantling

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

The removal of the top, side and front panels ensures that all parts are accessible.

#### 1. Compressor – Inspect at regular intervals

- Check for refrigerant leaks on all joints and fittings.
- Check mountings for tightness and wear.
- Check operation of crankcase heater.
- Check electrical connections.
- Ensure that no abnormal noise or vibration is detected during test run.

#### 2. Condenser Fan Motor & Blade – Clean and inspect at regular intervals

- Check for abnormal noise, vibration and fan imbalance.
- Ensure that the fan motor is clean and spins freely.
- Check that the condenser fan blade is clean and free from restriction and damage/imbalance.  
**Note:** The Fan Motor is pre-lubricated and factory sealed so no maintenance required.

#### 3. Condenser Coil – Clean and inspect at regular intervals.

- Check and remove the dirt and debris between the fins using a suitable chemical coil cleaner.
- Check and remove any obstacles which may hinder the airflow through the condenser coil.

#### 5. Power Supply – Inspect at regular intervals.

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

#### 6. Remote/ Controller

- Controller does not come as an accessory with the unit. Customer need to purchase any compatible controller (Emerson, Danfoss, Carel , Subzero etc.) as per their requirements.
- For information regarding controller wiring, setup, operation, error codes etc., please refer the information manual of the respective controller.

#### 8. Unit decommissioning and disposal

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



## 13. Trouble Shooting

The following are some guidelines to troubleshoot some common failure of condensing unit. Consult to qualified specialists before taking any corrective action.

Failure	Possible Causes
Fan does not work	<ul style="list-style-type: none"><li>• Improper wiring</li><li>• Fan motor faulty</li></ul>
Compressor does not start	<ul style="list-style-type: none"><li>• Improper wiring</li><li>• Defective contactor or coil</li><li>• System stopped because of tripping of safety device.</li><li>• Defective start/run capacitor</li><li>• Compressor faulty</li></ul>
Insufficient cooling	<ul style="list-style-type: none"><li>• Low refrigerant charge</li><li>• Condenser coil dirty</li><li>• Obstacle blocking air inlet/outlet</li><li>• Improper thermostat setting</li></ul>

### Important Note

Warning! – Immediately shut off power of the unit if there is any event of accident or breakdown.









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