

**Service Manual**  
**MIH Series**  
**Condensing Units**  
**Heat Pump** 1.5 tons to 5 tons



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## 1. Description Of Products & Features

### 1.1 Summary

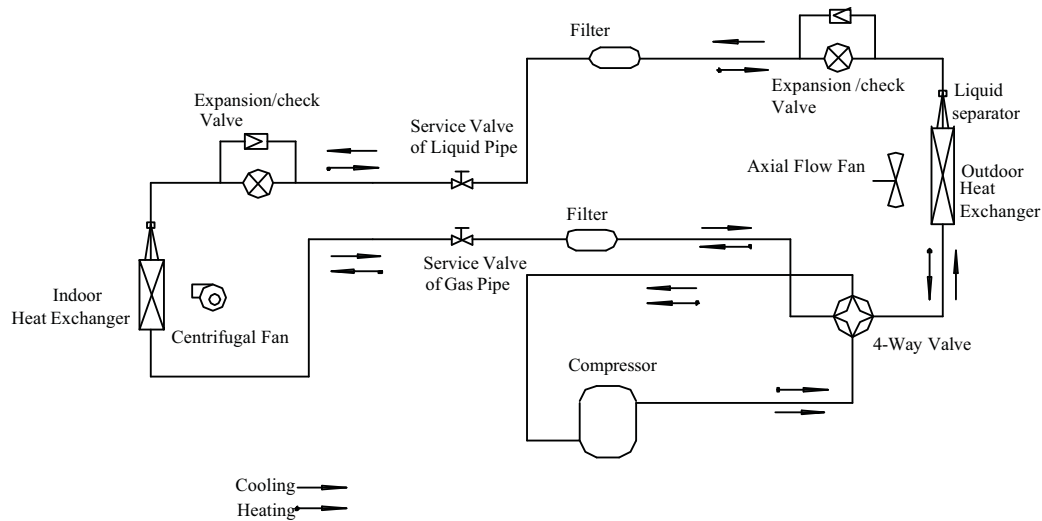
- ✧ The main components of Condensing UnitS :  
Scroll compressor with high efficiency, better reliability, super-quiet operation;  
High efficiency heat exchanger with inner groove copper pipe, inserting aluminum fin;  
The expansion valve can maintain heating capacity.  
Painted and zinc-gilt metal parts with corrosion protection  
Compressor overload protection

### 1.2 Condensing Unit Outline

- ✧ Top discharge air flow with low noise.
- ✧ Smaller body with high efficiency .
- ✧ With ULcertification.
- ✧ Effortless Installation.
- ✧ Annular outdoor unit, Fast heat dispersion and Powerful cooling(heating)
- ✧ Beautiful outline with powerful antiseptics ability.
- ✧ Reliable and steady operation.

### 1.3 Working Principle

- ✧ **MIH series (heat pump) condensing unit**



**Fig.1 Working Principle Diagram of Heat Pump Condensing Unit**

The working principle diagram of the heat pump Air Conditioner is shown above in fig.1. When the system operates in cool mode, the low temperature and low pressure refrigerant gas from the heat exchanger of the indoor unit is sucked by compressor and compressed, the high temperature and high pressure gas is discharged into heat exchanger of outdoor unit, heating exchanges with air of outside and turns into the refrigerant liquid, the liquid is throttled by throttling element and changed into the low temperature and low pressure liquid then flows into the heat exchanger of indoor unit, heating exchange with the air of the indoor then turns into the low temperature and low pressure refrigerant gas. The above circle goes round and round. When the system operates in heat mode, the refrigerant flows in the reversible cycle as the cool mode. The refrigerant gas discharges the heat volume in the indoor heat exchanger, through the expansion valve and sucks the heating volume from outdoor heat exchanger and forms the heat pump cycle, this cycle goes round and round, and the demanded high temperature environment is maintained.

## 2. Specifications

Model Number	MIH18-13	MIH24-13	MIH30-13	MIH36-13	MIH42-13	MIH48-13	MIH60-13
<b>Performance</b>							
Cooling Capacity (Btu/h)	18,000	24,000	30,000	36,000	42,000	48,000	59,000
Sensible cooling capacity (Btu/h)	14,500	19,500	24,500	28,300	31,000	36,800	43,300
Latent cooling capacity (Btu/h)	3,500	4,500	5,500	7,700	11,000	11,200	15,700
SEER	13	13	13	13	13	13	13
Total Input Watts (Cooling)	1,535	2,118	2,584	3,171	3,874	4,419	5,352
Heating Capacity (Btu/h) (47F)	16,300	21,400	27,400	32,000	38,500	43,000	52,000
Sensible heat(Btu/h) (47F)	16,300	21,400	27,400	32,000	38,500	43,000	52,000
Heating HSPF	7.80	7.80	7.80	7.80	7.80	7.80	7.80
Total Input Watts (Heating)	1,395	1,793	2,522	2,971	3,415	3,862	4,747
Airflow Rate (CFM)	694	850	1,083	1,210	1,448	1,585	1,868
<b>Electrical</b>							
Voltage - Phase - Frequency (Hz)	208/230 - 1 - 60	208/230 - 1 - 60	208/230 - 1 - 60	208/230 - 1 - 60	208/230 - 1 - 60	208/230 - 1 - 60	208/230 - 1 - 60
Minimum Circuit Amps	13.7	15.3	20.0	23.7	26.3	28.5	33.4
Maximum Overload Amps	20.0	25.0	35.0	40.0	45.0	50.0	50.0
<b>Compressor</b>							
Type / Maker	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
Model Number	ZR16K4-PFV-522	ZR22K3-PFV-522	ZR28K3-PFV-522	ZR34K3-PFV-522	ZR40K3-PFV-522	ZR47K3-PFV-522	ZR54K3-PFV-522
RLA (Rated Load Amps)	10.0	11.4	15.0	17.9	20.0	21.4	25
LRA (Locked Rotor Amps)	41.0	56.0	72.5	88.0	104.0	137.0	148.0
Internal Overload Protection	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Crankcase Heater	NA	NA	NA	NA	NA	NA	NA
<b>Fan Motor</b>							
RLA (Rated Load Amps)	1.2	1.0	1.3	1.3	1.3	1.7	2.1
Rated Horse Power (hp)	1/6	1/6	1/5	1/5	1/5	1/4	1/3
Nominal RPM	790	940	830	830	830	890	1100
Output Watts	120.0	120.0	150.0	150.0	150.0	210.0	300.0
<b>Fan</b>							
The blade angle	36	36	29	29	29	29	29.5
Diameter (In)	18.0	18.0	22	22	22	22	24
No. of Blade	4	4	4	4	4	4	3
Fan Material	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM	ALUMINIUM
<b>Condenser coil</b>							

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Comfortstar

	2	2	2	2	2	2	2	2	2
Number of Rows	2	2	2	2	2	2	2	2	2
Tube spacings (V x H) (In)	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75	0.5 x 0.75
Fins per Inch - FPI	17	17	17	17	17	17	17	17	17
Fin Type	Enhanced fins	Enhanced fins	Enhanced fins	Enhanced fins	Enhanced fins	Enhanced fins	Enhanced fins	Enhanced fins	Enhanced fins
Tube OD and Type	1/4" Grooved	1/4" Grooved	1/4" Grooved	1/4" Grooved	1/4" Grooved	1/4" Grooved	1/4" Grooved	1/4" Grooved	1/4" Grooved
Gross Finned Face Area (Sq Ft)	8.4	8.4	13.1	13.1	13.1	13.1	15.3	19.8	
<b>Dimensions</b>									
Height (Inch/mm)	23.8 [604]	23.8 [604]	28.3 [718]	28.3 [718]	28.3 [718]	28.3 [718]	32.7 [830]	32.7 [830]	32.7 [830]
Width (Inch/mm)	24 [610]	24 [610]	28 [710]	28 [710]	28 [710]	28 [710]	28 [710]	29.5 [750]	29.5 [750]
Depth (Inch/mm)	24 [610]	24 [610]	28 [710]	28 [710]	28 [710]	28 [710]	28 [710]	29.5 [750]	29.5 [750]
<b>Refrigerant Line</b>									
Liquid Line Dimension (In)	3/8	3/8	3/8	3/8	3/8	3/8	1/2	1/2	1/2
Vapor Line Dimension (In)	5/8	5/8	3/4	3/4	3/4	3/4	1-1/8	1-1/8	1-1/8
Max Refrigerant Line Length (Ft)	100	100	100	250	250	250	250	250	250
Max Vertical Distance (Ft)	50	50	50	100	100	100	100	100	100
Outdoor above Indoor Unit	50	50	50	100	100	100	100	100	100
Indoor above Outdoor Unit	40	40	40	60	60	60	60	60	60
Refrigerant Connection Type	Joining	Joining	Joining	Joining	Joining	Joining	Joining	Joining	Joining
Refrigerant Type / Charge (Oz)	R-22 /113	R-22 /113	R-22 /159	R-22 /159	R-22 /159	R-22 /159	R-22 /176	R-22 /201	R-22 /201
<b>Weight (lbs)</b>									
Net	135	148	183	187	192	216	221	221	221
Ship	146	159	198	203	207	232	247	247	247
<b>Agency Approvals</b>									
Performance Certification	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI
Safety Approvals	UL	UL	UL	UL	UL	UL	UL	UL	UL
<b>Shipping</b>									
Height	25.2 (640)	25.2 (640)	29.5 (750)	29.5 (750)	29.5 (750)	34.3 (870)	39.4 (1000)	39.4 (1000)	39.4 (1000)
Width	25.5 (648)	25.5 (648)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)
Depth	25.5 (648)	25.5 (648)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)	30.3 (770)
Container Loading(40'High)	216	216	135	135	135	135	135	90	90

Notes:

- 1、 R-22 Charge for the outdoor unit with matching indoor unit and 25' line set;
- 2、 Rated in accordance with ARI 210-240 and D.O.E. test standards.

### 3. Warning

- ✧ Before operating the Air Conditioner, read this manual thoroughly and operate accordingly.
- ✧ “CAUTION” and “DANGER” have the following meanings with these instructions:

**DANGER!** This mark indicates improper operation might lead to serious injury for the users.

**CAUTION!** This mark indicates improper operation might possibly result in personal harm to the user, or damage to property.

✧ **DANGER!**

- Do not use or place combustible and explosive gas or liquid near the air conditioner.
- Do not attempt to install Air Conditioner by yourself to guarantee the Air Conditioner can be permanent use.
- In the event of a malfunction (burning smell, etc.), stop operating immediately and turn off the power switch.
- Do not insert fingers or objects into the outlet port or intake grilles.
- Do not check or repair the Air Conditioner when it is running.
- Do not sprinkle water on the Air Conditioner or operate it with wet hands.

✧ **CAUTION!**

- Before install, ensure the power supply is corresponding to that listed in nameplate and check the security of the power source.
- Before use, ensure the wire connections are proper for avoiding electric shock or fire.
- The Air Conditioner should not be operated by children.
- Please turn off the power before cleaning the Air Conditioner or replacing the filters.
- Turn off power source when not using the Air Conditioner for extended periods.
- Do not climb on or place objects on the air conditioner.

✧ **POWER SUPPLY**

- Adequate power supply, adequate cross section of wire. Please consult it with distributor and professional.
- The Air Conditioner must be reliably earthed! The earth wire must be connected to the special grounding devices. It is forbidden to connect it to water pipe, gas pipe, wires of the lightning rod and telephone.
- The cable must be wired by qualified personnel in accordance with national wiring regulation.

Electricity leakage protection switch and air switch should be fixed in the wire circuit.

### 4. APPLICATION

Before specifying any air conditioning equipment, a survey of the structure and a heat gain calculation must be made. A heat gain calculation involves identifying all surfaces and openings that gain heat from the surrounding air and quantifying that heat gain. It also calculates the extra heat load caused by sunlight and by humidity removal. These factors must be considered before selecting an air conditioning system to provide year round comfort. The Air Conditioning Contractors of America (ACCA) J Manual method of load calculation is one recognized procedure for determining the cooling load. The cooling load calculation determines the unit size. There are two capacities that enable the equipment to provide comfort. The first is sensible capacity. How much sensible heat can the unit remove? Sensible heat is the heat energy measured on the dry bulb thermometer.

The second form of heat is called latent or hidden heat. This is heat held in the humidity in the air.

Removing this heat does not affect a thermometer. However, removing the heat held in the moisture in the air greatly increase comfort. A properly sized unit removes both forms of heat, producing a comfortable living space. An oversized system cycles on and off too quickly and does not properly remove humidity , producing an uncomfortable living space. Select the indoor and outdoor equipment combination based on the manufacturer’s engineering data. After the proper equipment combination has been selected, satisfying both sensible and latent conditioning requirements, the system must be properly installed. Only then can the unit provide the comfort the manufacturer built into it.

There are several factors that installers must consider.

- ? Outdoor unit location
- ? Proper equipment evacuation
- ? Outdoor unit refrigerant charge
- ? Indoor unit air flow
- ? Indoor unit blower speed
- ? Supply and return air duct design and sizing
- ? System air balancing
- ? Diffuser and return air grille location and sizing

### Working Temperature

	Indoor unit	Outdoor
Max cooling function	86	115
Min cooling function	61	55 (Low ambient control kit should be installed when temperature lower than 55)
Max heating function	86	75
Min heating function	61	20(Auxiliary heater should be installed when below 20)

Table1

### Unit Dimensions :

	inch			
Model	18&24	30&42	48	60
length	24	28	28	29.5
Height	23.8	28.3	32.7	32.7

Table 2

**Note:**

- 1.The piston placed in the indoor unit is used when cooling.**
- 2. Expansion Valve placed in the outdoor unit is used for indoor unit when heating.**

The air distribution system has the greatest effect. The duct system is totally in the control of the contractor. The industry can only recommend the correct procedure.

The correct air quantity is critical on air conditioning system. Proper operation, efficiency, compressor life and humidity control depend on the correct balance between indoor load and outdoor unit capacity. High indoor air flow increases the possibility of high humidity problems in cooling. Low indoor air flow reduces total capacity, and causes coil icing. Serious harm can be done to the compressor in either condition.

Air conditioning requires a specified air flow. Each ton of air conditioning requires 400 cubic feet of air per minute (400CFM/TON).



Duct design and construction should be carefully done. System performance can be lowered dramatically through bad planning or workmanship. In cooling ,a hot attic can cause a temperature gain of 3°in the return duct and 4°in the supply duct. This can reduce the cooling capacity of an air conditioning system by as much as 30%.This means a loss of almost one ton of cooling capacity from a three ton system.

Air leakage of only 3% in a return duct can cause a 5% loss in system capacity. 3% leakage on a three ton system is only 30 CFM. Two or three unsealed joints can cause this leak. Sealing the return and supply ducts pays dividends in increased system capacity and lower operating costs.

Effective duct insulation is essential to prevent loss of capacity and sweating ducts in the cooling mode. Duct systems installed in the conditioned space can be left uninsulated , but a dense 1/2” fiberglass duct liner reduces blower and air noises, and prevents sweating ducts when humidity levels are high.

Supply and return duct systems in attics and crawl spaces require a minimum 1” of dense duct liner or 2” fiberglass wrap with a sealed vapor barrier. A leaky vapor barrier results in duct sweating, causing wet insulation.

Wet insulation does not insulated .Heat transfer through poorly insulated systems can result in over 50% loss in operating capacity. Sweating ducts also promote rusting ducts resulting in premature duct failure. Other duct materials have been successfully used. Carefully follow the duct manufacturers’ installation instructions. The duct system is only as good as the planners and installers construct.

Air supply diffusers must be selected and located carefully. They must be sized and positioned to deliver treated air along the perimeter of the space. If they are too small for their intended air flow the become noisy. If they are not located properly they cause drafts on the occupants in the rooms. Return air grilles must be properly sized to carry air back to the blower. If they are too small they also cause noise. The installers should balance the air distribution system to ensure proper air flow to all rooms in the home. This ensures a comfortable living space.

## 5. Installation Instructions

### **! WARNING**

These instructions are intended as an aid to qualified, licensed service personnel for proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation. **Failure to follow these instructions may result in improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.**

### 5.1 Outdoor Unit Inspection

This product has been inspected at the factory and released to the transportation agency without known damage. Inspect exterior of carton for evidence of rough handling in shipment. Unpack carefully. If damage is found, report immediately to the transportation agency.

### 5.2 Equipment Protection From Environment

The metal parts of the unit may be subject to rust or corrosion in adverse environmental conditions. This oxidation could shorten the unit life. Salt spray or mist in seacoast areas, sulphur or chlorine from lawn watering systems and various chemical contaminants from industries such as paper mills and petroleum refineries are especially corrosive.

If the unit is to be installed in an area where contaminants are likely to be a problem, special attention should be given to the equipment location and exposure.

Avoid having lawn sprinkler heads spray directly on the unit cabinet.

In coastal areas, locate the unit on the side of the building away from the waterfront.

Shielding provided by fence or shrubs may give some protection.

Regular maintenance will reduce the buildup of contaminants and help to protect the unit's finish.

**! WARNING** -Disconnect all electrical power to the unit before servicing. Disconnect power to both the

indoor and outdoor units. NOTE: There may be more than one electrical disconnect switch. Failure to shut off power can cause electrical shock resulting in personal injury or death.

Frequent washing of the cabinet, fan blade and coil with fresh water.

Regular cleaning and waxing of the cabinet with good automobile polish.

A good liquid cleaner may be used several times a year to remove matter that will not wash off with water.

The best protection is frequent cleaning, maintenance and minimal exposure to contaminants.

## 5.3 Installation

### ✧ The Position of Installation

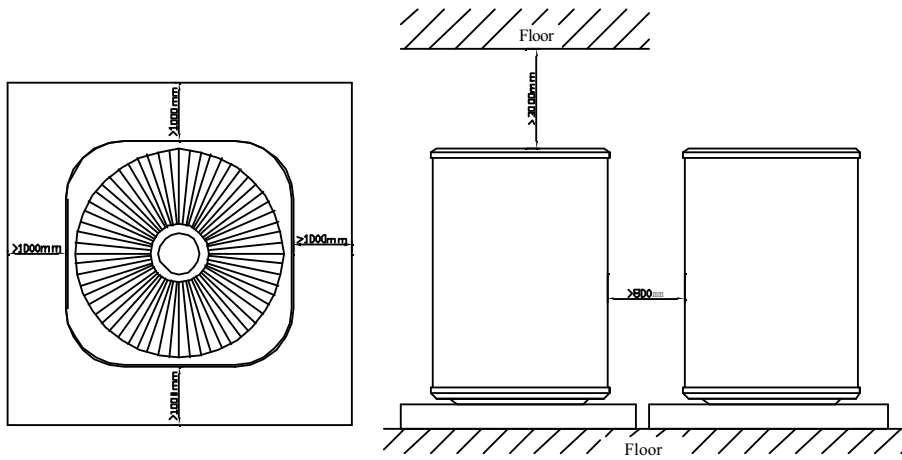
**The Air Conditioner shall be installed in accordance with national and local wiring regulation. Quality of installation can affect its operation. It is forbidden to fix the unit by users themselves, please contact dealer for repair. It must be fixed and adjusted by the qualified person. Switch on after all the fixing work had been finished.**

- Outdoor Unit must be fixed on stable and solid surface of floor.
- Don't install Outdoor Unit under window or between buildings, and prevent the operation noise from entering into room.
- There should be no obstructions at both air intake and outlet vents for indoor and outdoor units for maintaining well air ventilation.
- When installing indoor unit, make sure that the hanging parts at top are strong enough to stand the weight of unit.
- Do not install the Air Conditioner in place with flammable and explosive things, or in some dusty place.
- Make sure to lessen the length of connecting pipe between the indoor and outdoor unit, and the number of bends.

**Don't connect duct to inlet/outlet of outdoor unit. When indoor unit in heating mode, condensing water will drop from the chassis of outdoor unit. The condensing water will freeze when the outdoor temp below 0°C (32°F) .**

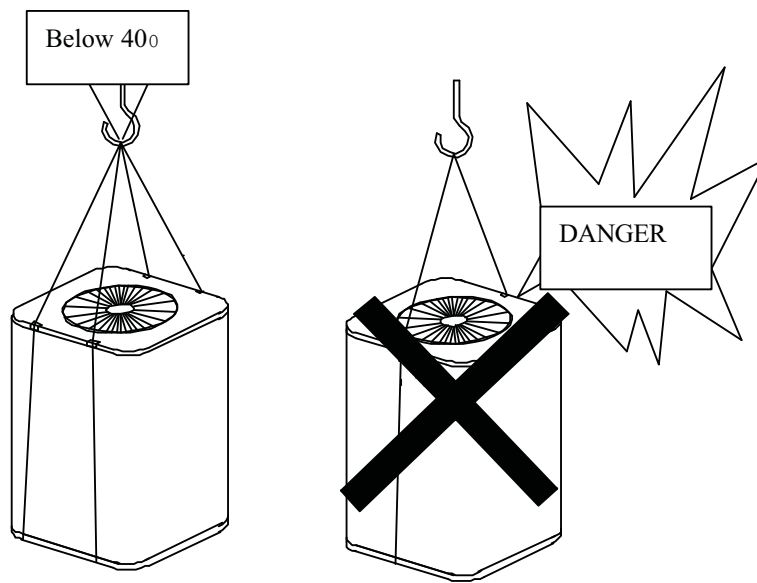
### ✧ The Installation Position of Outdoor Unit

Ensure the place where is well ventilated and there is sufficient space for maintenance. It's shown as follow:



**Fig.3. Installation Position of Outdoor Unit**

When removing the outdoor unit, two ropes are needed to hang the unit along the four directions. In order to avoid the excursion, the angle between the ropes should be less than 40°. It is shown as follow:



**Fig.4. Condensing Unit Hoisting Sketch**

### 5.4 Refrigerant Piping

The refrigerant piping is very important as it's the base of the natural operation and high efficiency of the air conditioning system.

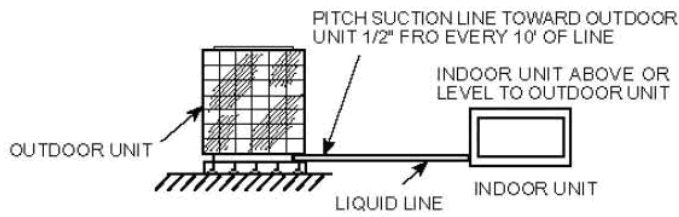


Figure A

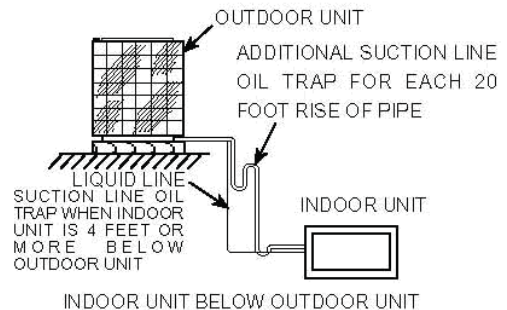


Figure B

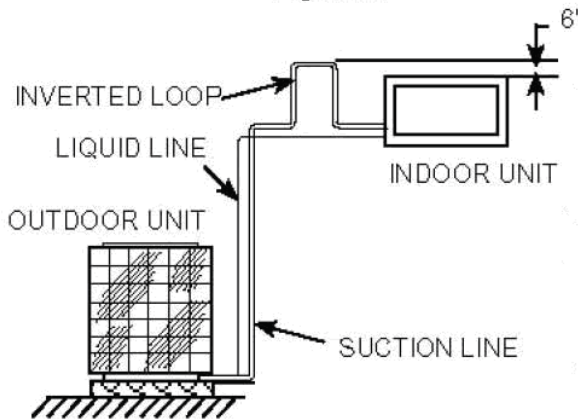


Fig5

Only refrigeration-grade copper piping (dehydrated and sealed) should be used. Take extreme care to keep the refrigerant tubing clean and dry prior to and during installation. If in doubt, blow out the tubing with dry nitrogen to remove any chips or debris before connection. Always keep tubing sealed until it is in place and the connections are to be made. Refrigerant piping should be as short as possible, with a minimum of elbows or bends, to avoid capacity loss and increased operating costs. Refrigerant lines must be adequately supported. If metal strapping is used to secure the tubing, do not allow the strapping to directly contact the tubing. Use a closed cell insulation to separate the strapping from the tubing. Do not kink or twist the tubing. Refrigerant piping should not be installed in a cement slab, as this limits access to the refrigerant should a leak be suspected. To ensure good oil return to the compressor, it is important to pitch the horizontal suction line toward the compressor, approximately 1/2" for every 10' of line.

## 5.5 Line Insulation

Suction line requires insulation in order to prevent condensation from forming on the piping and to prevent heat gain caused by surrounding air. Generally 3/8" wall thickness of Arm flex or equivalent is satisfactory. In severe application (hot, high humidity areas) greater thickness may be required. Apply the line insulation by sliding it on the sealed tubing before cutting and making connections.

Liquid line does not necessarily need insulation, however, if they are exposed to high ambient temperatures (i.e. kitchen, boiler rooms, hot attics & rooftop surface), then, they should be insulated. Make sure to use the proper size tubing for the liquid line to prevent liquid refrigerant flashing to a vapor within the liquid line.

Do not allow the vapor line and liquid line to touch together. This would cause an undesirable heat transfer resulting in capacity loss and increased power consumption.

Refrigerant Line Sizing Check the following table for correct suction and liquid line sizes for any

combination of the unit size and the maximum refrigerant line length. Refrigerant Line Sizing

Unit Size (Ton)	Refrigerant Line Length (Ft)					
	0 – 50		50 – 100		100 – 250	
	Line Outside Diameter (In)					
	Suction	Liquid	Suction	Liquid	Suction	Liquid
1.5	5/8	3/8	7/8	3/8	/	/
2.0	5/8	3/8	7/8	3/8	/	/
2.5	3/4	3/8	7/8	3/8	/	/
3.0	3/4	3/8	3/4	3/8	7/8	3/8
3.5	7/8	3/8	1-1/8	3/8	1-1/8	3/8
4.0	1-1/8	1/2	1-1/8	1/2	1-1/8	1/2
5.0	1-1/8	1/2	1-1/8	1/2	1-1/8	1/2

Table 3

R-22 Cooling Capacity Loss For Various Line Lengths & Tube Diameters													
Model Size	Liquid line(in.)	Acceptable Vapor Line Size(in.)	Cooling Capacity loss(%) at Total Equivalent Line Length(ft.) Refer to Long Line Application Guideline to calculate equivalent length										
			Standard Application			Long line Application (Requires Accessories)*							
			25'	50'	80'	81'	100'	125'	150'	175'	200'	225'	250'
18	3/8	5/8	0	1	1	1	1	/	/	/	/	/	/
24			0	1	1	1	2	/	/	/	/	/	/
30		3/4	0	1	1	1	1	/	/	/	/	/	/
36			1	2	3	3	4	5	5	6	7	8	9
42			1	2	4	4	5	6	7	8	10	11	12
48	1/2	7/8	1	2	2	2	3	4	5	5	6	7	8
60		1-1/8	1	2	3	3	5	6	7	8	9	10	11

Table 4

The factory charge is sufficient for 25 feet of standard liquid line. For longer or shorter liquid line lengths, adjust the charge as follows:

3/8" Liquid line +/- 0.6 oz. Per foot

1/2" Liquid line +/- 0.8 oz. Per foot.

**Vertical Separation between Indoor and Outdoor Units** Maximum allowable vertical separations between indoor and outdoor units are 100' when the indoor unit is below the outdoor unit , and 60' when the indoor unit is above the outdoor unit.

To ensure good oil return to the compressor when the indoor unit is below the outdoor unit, suction line oil trap should be used as illustrated in Fig. 5.

**Tubing Connections**

**! CAUTION** -Use extreme caution in removing the caps from the suction and liquid line fittings, as there is pressure present. A fitting is on the liquid line to remove pressure.

**! CAUTION** -Condensing units are charged with refrigerant. Condensing unit liquid and suction valves are closed to contain the charge within the unit. Do not force the valve stem against the retaining ring. If the valve stem is backed out past the retaining ring, system pressure could force the valve stem out of the valve body and possibly cause personal injury.

Instructions on the field tubing connections and valve opening procedure are as follow:

- 1.Tubing should be cut square. Make sure it is round and free of burrs at the connecting ends. Clean the tubing to prevent contamination from entering the system.
- 2.Make sure that both refrigerant shutoff valves at the outdoor unit are closed.
- 3.Push the tubing into the fitting until it stops. This prevents flux from getting into the system.
- 4.Remove the cap and Schrader valve core from the service port to protect the valve seals.
- 5.Wrap a wet rag around the valve stub before brazing.
6. Braze the joints of interconnecting tubing. Flow dry nitrogen into the shutoff valve port and through the tubing while brazing. 7.After brazing quench with a wet rag to cool the joint. Reinstall the Schrader core in the valve, if removed for brazing. 8.Pressurize the lines to 150 psi maximum with dry nitrogen. Check for leaks at all joints with liquid detergent. If a leak is found, repair it after removing the nitrogen. Repeat the process and re-check.
- 9.Do not purge the lines with refrigerant. Evacuate the lines and indoor coil.

### **Evacuation**

All new installations must be evacuated to a deep vacuum in order that all noncondensable gases and moisture are removed prior to charging the system. Air in a system causes high condensing pressure, which increases power consumption and reduces performance. The presence of moisture in a system can render it inoperable in a very short time. Proper evacuation assures a dry, uncontaminated system. Here is the recommended evacuation procedure:

- 1.Connect vacuum pump to both liquid and suction valve service ports.
- 2.Evacuate the interconnecting tubing and indoor coil to 500 microns or less for a minimum of 30 minutes. Close the valve to the vacuum pump and wait 15 minutes. Vacuum should not rise above 800 microns. If unable to obtain 500 microns, or vacuum rises above 800 microns over 15 minutes period, discontinue evacuation, pressurize and check for leaks. Repair any leaks found and repeat the step 2.
- 3.Close valve to the vacuum pump and stop pump.
- 4.When sure of a tight, well evacuated system, charge with refrigerant.

## 5.6 Charging the System

(For systems with capillary tube or expansion valve or fixed orifice metering device)

Before checking the system charge, make sure that the outdoor unit and indoor coil must be an approved match per the unit specification. The indoor conditions should be within 2 F of the desired comfort conditions.

**! WARNING -Do not vent refrigerant to the atmosphere!** It is a violation of federal law to do so. If the refrigerant needs to be removed from a system to correct the charge inside, always use a recovery or recycling device.

**! WARNING** -To prevent personal injury, **wear safety glasses and gloves when handling**

### **Refrigerant.**

- 1.Fully open both shutoff valves.
- 2.Connect service gage manifold to the valve service ports, being sure to evacuate lines.
- 3.Startup the system. Run system at least 10 minutes to allow pressure to stabilize.

4. Temporarily install thermometer on suction (large) line near condensing unit. Be sure of good contact between thermometer and line. Wrap thermometer with insulating material to assure accurate reading.  
 5. Refer to **Table 5** for proper system superheat. Add charge to lower superheat. Remove charge to raise superheat. Carefully remove gage lines.

System Superheat					
Ambient Temperature At Condenser Inlet ( ) °F	Return Air Temperature ( ) °F				
	65	70	75	80	85
60	17	25	30	33	37
65	13	19	26	32	35
70	5	14	20	28	32
75	5	10	17	25	29
80		5	12	21	26
85		5	10	17	20
90			7	12	18
95			5	5	5
100				5	5

**Table5 :System charging table by superheat**

### 5.7 Electrical Wiring

**! WARNING**

**A means of strain relief must be installed to this appliance at the electrical service entrance.**

Make sure that interconnecting wires between indoor and outdoor units meet the standards, codes and regulations. Incomplete connection or fixing of the wire could result in a fire.

**Do not use intermediate connection of the power cord or the extension cord and do not connect many devices to one AC outlet.** It could cause a fire or an electric shock due to defective contact, defective insulation, exceeding the permissible current, etc.

**Perform electrical work according to the installation manual and be sure to use an exclusive circuit.** If the capacity of the power circuit is insufficient or there is incomplete electrical work, it could result in a fire or an electric shock.

**Ground the unit.** Do not connect the ground to a gas pipe, water pipe, lighting rod or telephone ground. Defective grounding could cause an electric shock.

Electrical installation will consists of power supply wiring to the condensing unit and control wiring between thermostat, indoor unit and the condensing unit. All wiring must be in accordance with National Electrical Code and/or local ordinances that may apply.

**(See unit wiring diagram furnished with this instruction).**

The condensing unit rating plate and the tables of "Physical and Electrical Specifications /provide pertinent data necessary for the selection of proper size electrical service and over-current protection devices.

**Table 6** provides data on the minimum copper wire size as a function of supply wire length and

circuit ampacity.

<b>Copper Wire Size - AWG (1% Voltage Drop)</b>				
<b>Supply Circuit Ampacity</b>	<b>Supply Wire Length - Ft</b>			
	50	100	150	200
15	14	10	8	6
20	12	8	6	4
25	10	8	6	4
30	10	8	4	4
35	8	6	4	3
40	8	6	4	2
45	6	4	3	2
50	6+	4	3	1

**Table6: Minimum Wire Size Based on N.E.C. for 60 C Type Copper Conductors Below 100 Ampacity.**

The owner should be made familiar with the location of the over-current protection, the proper size for this application and the proper procedure for disconnecting power service to the unit. The condensing unit control wiring requires a 24 Volt minimum, 25 VA service from the indoor transformer as shown on the wiring diagram.

**5.9 SYSTEM STARTUP**

- 1.Turn thermostat to "OFF", turn on power supply at connect switch.
- 2.Turn temperature setting as high as it will go.
- 3.Turn fan switch to "ON". Indoor blower should run. Be sure it is running in the right direction.
- 4.Turn fan switch to "AUTO". Turn system switch to "COOL" and turn temperature setting below room temperature. Unit should run in cooling mode.
- 5.Check to see if compressor and outdoor fan are running correctly?.
- 6.Check the refrigerant charge (see Instructions under "Charging the System").
- 7.Replace service port caps. Service port cores are for system access only and will leak if not tightly capped.
- 8.Check unit for tubing and sheet metal rattles.
- 9.Instruct the owner on operation and maintenance.

Leave this "Installation and Operating Manual" and the "Use and Care Manual" with owner.

**5.10 OPERATION**

**SEQUENCE OF OPERATION**

In order to service and troubleshoot an air conditioning system a service technician must understand the unit's sequence of operation. this is the order of events the system undergoes to cycle itself on and off. Knowing how the units operate properly aids in determining where to start troubleshooting when the unit doesn't operate properly .Where the system varies from its normal sequence is a major clue to any problems.

**COOLING CYCLE**



**Mechanical** . the operation sequence as follows:

1. The compressor pumps out high pressure ,superheated refrigerant vapor.
2. The vapor leaves the compressor and passes through the reversing valve.
3. It flows through the outdoor vapor line to the finned outdoor coil. Air from the outdoor fan removes heat from the refrigerant vapor .When enough heat is removed ,the vapor condenses into a high pressure liquid .The liquid temperature is slightly warmer than ambient air temperature.
4. This warm ,high pressure liquid leaves the outdoor coil ,and flows through the small copper
5. At the end of the liquid line the refrigerant passes through the a flowcheck device ,reducing a pressure and temperature .
6. As the cool liquid ,under reduced pressure ,enters the indoor coil surface it expands and absorbs heat from the indoor air passing over the finned surface ..Heat from the indoor air ,causes the low pressure liquid to evaporate and cools the indoor air. The refrigerant is now a cool vapor.
7. The cool refrigerant vapor travels through the larger ,insulated vapor line to the accumulator .
8. The accumulator separator separates any liquid refrigerant and holds it. Only vapor refrigerant and refrigerant oil leave the accumulator .The oil is drawn out through a special port inside the accumulator.
9. Refrigerant vapor flows through the suction line to the intake of the compressor .The cycle then repeats.

**Electrical** . The operation cycle as follows:

1. The thermostat calls for cooling
2. This sends a 24 voltage signal through the “Y” terminal to the compressor start kit ,after 3 minutes the compressor contactor in the outdoor unit are closed .The compressor and outdoor fan start.
3. At the same time ,a 24 Voltage signal flows through the “G” Terminal to the indoor blower relay.. The indoor blower starts.
4. the cooling system is now in operation.
5. The thermostat satisfies and ends the call for cooling.
6. This ends the 24 Voltage signal to the compressor start kit and the outdoor unit stops.
7. This ends the 24 voltage signal to the indoor blower relay and this indoor blower strips
8. The system is now off.

## 6. Defrost Cycle

During heat pump mode, If the compressor continually running for 44 minutes and the outdoor coil temperature drop below 23 oF for more than 1 minute, the defrost cycle start: outdoor fan stop, reversing valve energized, meanwhile the indoor auxiliary heater come on. The maximum time for defrost cycle is 10 minutes. When defrost cycle is terminated, the outdoor fan come back on, reversing valve de-energized and the indoor auxiliary heater turn off.

When switch system from heat pump mode to cooling mode, the defrost cycle will be terminated immediately.

### **Outdoor defrost control board display:**

Both LED1 and LED2 will blink when units working under normal condition, during defrost cycle, both LED1 and LED2 will be continually on.

## 7. Maintenance Instructions

❖ **Warning! Make sure to turn off the power before maintenance.**

- The heat exchanger of Outdoor unit must be cleaned regularly. At least clean it for once every two months, you can clean the dust and sundries on its surface with vacuum and nylon brush, or blow them by using compressing air.
- Check connecting pipe and connector, if there is oil leakage, repair it in time.
- It is forbidden to wash the unit by water, or it may cause electric shock.

### Inspection at the beginning of the using:

- 1) Remove any block near the outdoor;
- 2) Proper grounding;
- 3) Proper circuitry;

### Maintenance after the using season:

- 4) Clean the body of the outdoor;
- 5) Proper protection of the outdoor;
- 6) Turn off the power supply.

### Notice

When testing the piping system,do not mix the Oxygen and Acetylene into the piping system.  
Pls use Nitrogen or Refrigeration to keep the testing safe.

## 8. Service And Troubleshooting

### 8.1. Fill more oil into Compressor

Processing:

- 1) Collecting the refrigeration under cooling model,fasten up the big and small vavles;
- 2) Disconnecting the bigger copper pipe and valve with welding torch;
- 3) Filling the oil to the copper pipe;
- 4) Welding the copper pipe together with the vavle;
- 5) Vacuumizing then keep pressure for 30 minutes;
- 6) Open the two valves;
- 7) Turn on the unit.

### 8.2 Compressor replacement:

Processing:

- 1) Switching off the power supply of the outdoor unit,make marks for each wires when removing the power cord of the compressor,;
- 2) Loosening the bolts of the compressor;
- 3) Disengage the Discharge pipe from the vent of the Compressor;
- 4) Disengage the suction pipe from the inspiratory end of the compressor;
- 5) Put the new compressor on the right place,pull out all of the rubber plugs,and connect the pipes after that,first the discharge pipe then the suction pipe.Pls do weld the pipes immediately after you

pull out the rubber plugs or else the water vapor may enter into the compressor. When welding the pipes pls be with Nitrogen and the pressure of the Nitrogen is 1.0~3.0kgf/cm<sup>2</sup>.

6) Resume the system as the condition before the compressor replacement;

★When connect the power cord of the compressor,turn it on once to test whether it rolls back.(If rollback,there will be depressing sound from it.)

★If there is any leakage of the lubricating oil,pls fill more.

Notice:Usually the discharge pipe is thin and there is at least one U bend in the pipe,so we disengage this pipe first when replace the compressor.

### 8.3 Maintenance when Refrigeration leakage:

Best hermetic system is the base of the reliable function.When there is leakage,turn off the system immediately and make leak hunting.

Processing:

- 1) Charge Nitrogen 20.0kgf/cm<sup>2</sup> into the system;
- 2) Check the joint of the pipes with suds,mark the leaking point;
- 3) When all of the checking finished,charge more Nitrogen (1.0~3.0kgf/cm<sup>2</sup>) then welding the leaking point;
- 4) After the welding,charge high-pressure Nitrogen(25.0kgf/cm<sup>2</sup>); and check the Press after 48 hours,calculate the Press Decline with the Formula below,the result should be less than 1% of Testing Press;If not,pls recheck the system to find out the leakage joint.

$$\Delta P = P_1 - P_2 \frac{(273 + T_1)}{(273 + T_2)}$$

In the formula:  $\Delta P$ —the Press Decline(MPa).

$P_1, P_2$ —Press of Nitrogen at the beginning and the finishing(MPa).

$T_1, T_2$ —Temperature of the Nitrogen at the beginning and the finishing(°C).

If possible,test the leakage with Halogen Testing Instrument at the beginning of the leakage.

### 8.4 Vacuumizing for the pipeline after maintenance:

Vacuum pipeline can keep the system running naturally and high efficiently.So vacuumizing after leak hunting is necessary.

Processing:

- 1) Discharge the Nitrogen first;
- 2) Connect the pressure gauge to the service vavle,you can get the result of the vacuum from the lower-pressure gauge;
- 3) Turn on the vacuum pump;
- 4) When the vacuum reaching-1.0kgf/cm<sup>2</sup>,continue 0.5~1.0 hour then turn the pump off;
- 5) Connect the tube to the Refrigeration Pot, after discharging the air in the tube, charge Refrigeration into the system until the pressure reach 0.0kgf/cm<sup>2</sup>;
- 6) Change the tube to connect to the vacuum pump again,turn on the pump to vacuumizing 30 minutes until the vacuum reach -1.0kgf/cm<sup>2</sup>.

### 8.5 Checking before Operation:

No.	Items	Remark		
1	Capacity between outdoor and indoor should match	? yes	? no	other ____
2	Connecting pipes connected properly	? yes	? no	other ____
3	Correct dimension and position of the air outlet.	? yes	? no	other ____
4	Proper duct design for indoor unit	? yes	? no	other ____
5	Correct position of indoor unit	? yes	? no	other ____
6	Specs and gradient of the drainpipe are right	? yes	? no	other ____
7	Make sure the chassis of indoor clean	? yes	? no	other ____
8	Eligible pipe for condensing water	? yes	? no	other ____
9	Proper copper pipe and thermal insulation pipe	? yes	? no	other ____
10	Clean the impurity after welding	? yes	? no	other ____
12	Correct fixing position of outdoor	? yes	? no	other ____
13	Proper shock absorption of outdoor	? yes	? no	other ____
14	Vacuumizing for both liquid pipe and gas pipe	? yes	? no	other ____
15	Enough time for Vacuumizing	? yes	? no	other ____
16	Whether the pressure coming back after 1 hour holding	? yes	? no	other ____
17	Whether need more refrigeration	? yes	? no	other ____
18	Whether the outdoor vavles opened	? yes	? no	other ____
19	Proper power supply	? yes	? no	other ____
20	Terminal connected substantially	? yes	? no	other ____
21	Make sure the switch for leaking current installed	? yes	? no	other ____
22	Proper length of the power cable	? yes	? no	other ____
23	Reliable grounding	? yes	? no	other ____

### 8.6 Troubleshooting

**! WARNING** – Disconnect all electrical power to the unit before servicing. Disconnect power to both the indoor and outdoor units. NOTE: There may be more than one electrical disconnect switch. Failure to shut off power can cause electrical shock resulting in personal injury or death.

Symptom	Possible Cause	Remedy
No cooling/heating	Power off or loose electrical connection	Make sure main switch is ON. Check and tighten all connections.
	Incorrect thermostat setting	Set thermostat correctly
	defective 4-way valve	check the valve coil or replace it
	compressor without pump function	replace it
Insufficient Cooling	Dirty filters	Clean & replace
	Indoor air blockage	Check supply registers and return grills for blockage.
	Blocked outdoor coil	Clear away leaves and other debris
	Improperly sized unit	Recalculate load
	Improper airflow	Check – should be 400CFM/Ton
	Incorrect refrigerant charge	Charge correctly per instruction.
	Air, non-condensable or moisture in system	Recover refrigerant, evacuate & recharge, add filter drier
	Incorrect voltage	At compressor terminals, voltage must be within 10% of rating plate volts when unit is running.
Water on floor or in furnace	Blocked condensate drain and “P” trap	Remove blockage
Condenser fan and compressor don't run	AC Contact not connect to the power supply wire or not tightly fasten.	Re-connect the power supply wire ,and tightly fasten.
	The outdoor power supply main circuit	Dial the power supply switch to “ON ”

	switch locate "OFF" position or fuse failure of main circuit	position or change the fuse and make sure the main touch point of AC Contactor have current go through
	The control coil of AC Contactor no 24 V AC power	Check if the relay P2 of 3-minute timer board have current output ,if not ,check if P1、 P3 have 24 V AC input , if have 24V AC , please check if it keep for 3 minutes , if so and P2 no output , change the 3-minute timer board ; if keep time < 3 minutes , P2 no output ; if P1 、 P3 no24V AC , first check the thermostat C 、 Y terminal have 24 V AC , if no 24 V AC , then check the thermostat or reset the setting temp.; if have 24 V AC ,check if the C Y and P1 、 P3 connection wire cut off or fasten loosely, if cut off , then change the parts.
Condenser fan runs, compressor doesn't	Run or start capacitor defective	Replace
	Loose connection	Check and tighten all connections.
	Compressor stuck, grounded or open motor winding, open internal overload	Wait for 2 hours for overload to reset. Replace compressor if still open.
	Low voltage condition	At compressor terminals, voltage must be within 10% of rating plate volts when unit is running.
	Low voltage condition	Add start kit components
compressor runs, Condenser fan doesn't	Run capacitor defective	Replace
	Loose connection	Check and tighten all connections.
	Fan stuck, grounded or open motor winding, open internal overload	Wait for 2 hours for overload to reset. Replace Fan if still open.
	Low voltage condition	At compressor terminals, voltage must be within 10% of rating plate volts when unit is running.
	Defective overload protector	Replace – check for correct voltage
	Refrigerant undercharge	Add refrigerant
Register sweat	Low evaporator airflow	Increase blower speed or reduce restriction – replace air filter
	Restriction in liquid line, metering device or filter drier	Replace defective components
High head – Low vapor pressures	Flowrator piston size too small	Change to correct size piston
	Incorrect capillary tubes	Change coil assembly
	Blocked outdoor coil	Clear away leaves and other debris
High head – High or normal vapor pressures	Refrigerant overcharge	Correct system charge
	Condenser fan not running	Repair or replace
	Air, non-condensibles or moisture in system	Recover refrigerant, evacuate & recharge, add filter drier
Low head – High vapor pressures	Flowcheck piston size too large	Change to correct size piston
	Defective compressor valves	Replace compressor
	Incorrect capillary tubes	Replace coil assembly
Low vapor – cool compressor – iced evaporator coil	Low evaporator airflow	Increase blower speed or reduce restriction – replace air filter
	Operating below 65 ° F outdoors	Add low ambient kit
	Moisture in the system	Recover refrigerant, evacuate & recharge, add filter drier
High vapor pressure	Excessive load	Recheck load calculation
	Defective compressor	Replace
Fluctuating head and vapor pressures	Air or non-condensibles in system	Recover refrigerant, evacuate & recharge.
Pulsing noise at metering device or liquid line	Air or non-condensibles in system	Recover refrigerant, evacuate & recharge

## 9. Wiring Diagram

### 9.1 Exterior Wiring Diagram:

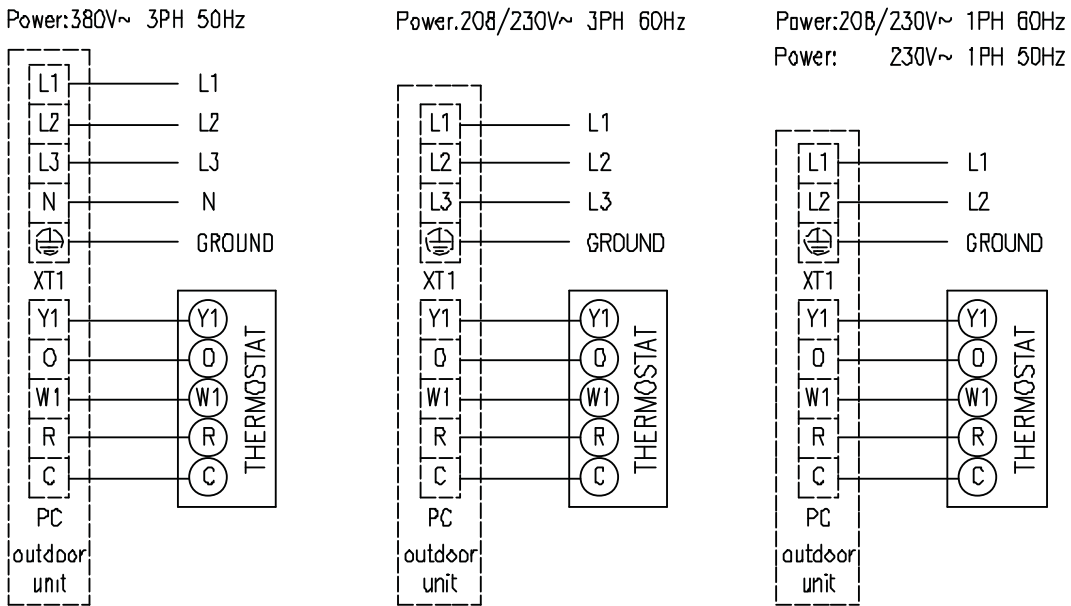
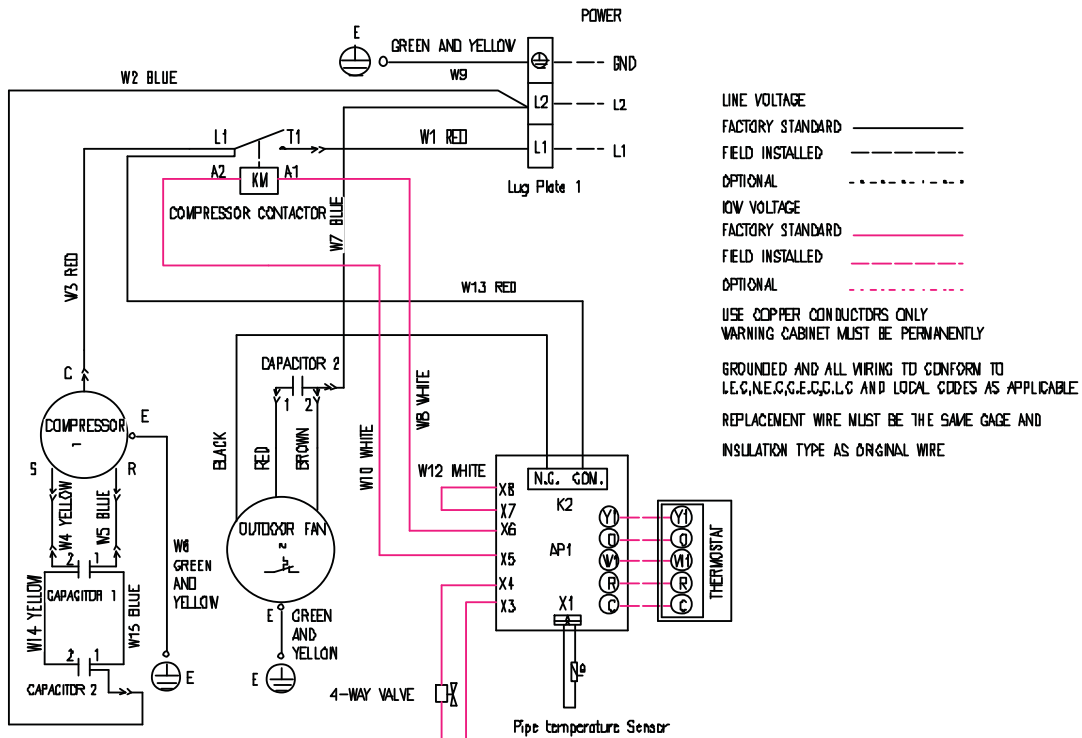


Fig6

### 9.2 Interior Wiring Diagram :



## 10. Explosive view And Spare Parts List

### 10.1 18K & 24K

#### 10.1.1 Exposive view

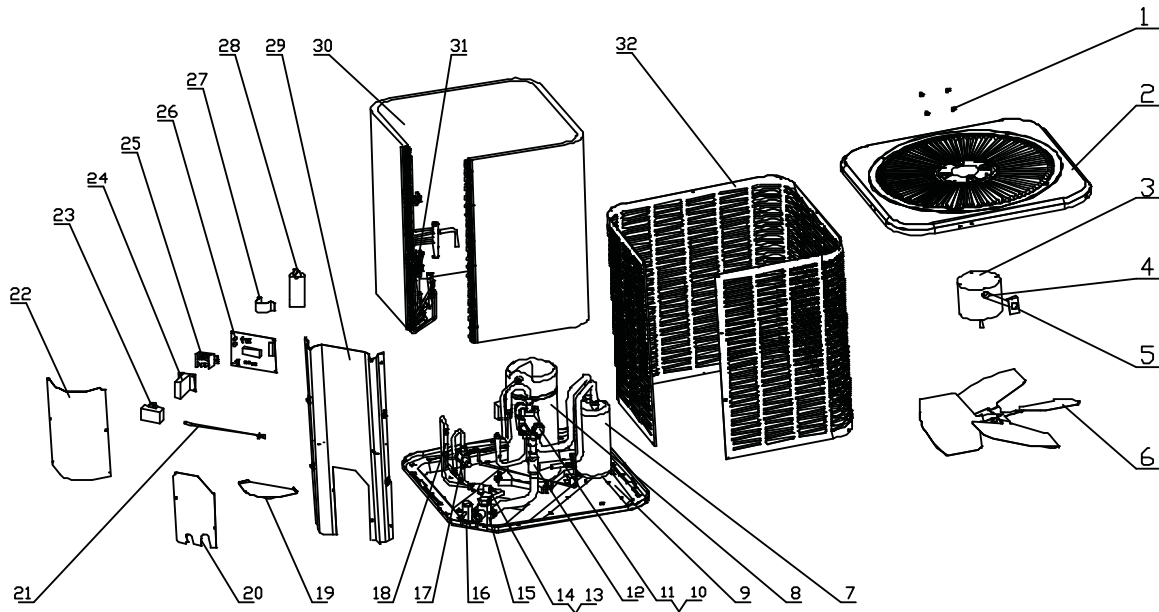


Fig8

#### 10.1.2 Spare parts list

MIH18-13			
No.	discription	Part No.	Qty.
1	Nut M5X7	70318204	4
2	Cover Plate	01258248	1
3	Fan Motor SW120C	15702101	1
4	Ripple Pipe	05012140	1
5	Fixed Block	01722121	1
6	AxialFlowFan	10358203	1
7	Gas-liquid Separator	07228217	1
8	Compressor	00202201	1
9	Base Plate Sub-Assy	012021091	1
10	4-way Valve	430004033	1
11	4-way Valve Accessary	43008214	1
12	Filter	07215201	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1
15	Cut-off Valve 5/8	07138234	1
16	Cut-off Valve 3/8	07138232	1
17	Thermal Expansion Valve BAE1-1/2HCA ODF 3/8X1/2	07332206	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388210	1
21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor CBB61/CBB611A 6uF/500V	33010037	1
24	AC Contactor CJX9B-25S/D-C1	44010250	1
25	Terminal Board	42011242	1

26	Main Board	30221401	1
27	Capacitor Clamp	02143401	1
28	Capacitor CBB65 30uF/450V(440V)	33000018	1
29	Connection Sheet Sub-Assy	013882141	1
30	Condenser Sub-Assy	01152215	1
31	Current Divider	07224041	1
32	Side Plate	01308226	1

**MIH24-13**

<b>No.</b>	<b>discription</b>	<b>Part No.</b>	<b>Qty.</b>
1	Nut M5X7	70318204	4
2	Cover Plate	01258248	1
3	Fan Motor SW120B	15018254	1
4	Ripple Pipe	05012140	1
5	Fixed Block	01722121	1
6	AxialFlowFan	10358203	1
7	Gas-liquid Separator	07228217	1
8	Compressor	00202202	1
9	Base Plate Sub-Assy	012021091	1
10	4-way Valve	43000404	1
11	4-way Valve Accessary	43008214	1
12	Filter	07215201	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1
15	Cut-off Valve 5/8	07138234	1
16	Cut-off Valve 3/8	07138232	1
17	Thermal Expansion Valve BAE2HCA ODF 3/8X1/2	07332207	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388210	1
21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor CBB61 5uF/450V (TUV/VDE)	33010064	1
24	AC Contactor CJX9B-25S/D-C1	44010250	1
25	Terminal Board	42011242	1
26	Main Board	30221401	1
27	Capacitor Clamp	02143401	1
28	Capacitor CBB65 45uF/440V(450V)	33000012	1
29	Connection Sheet Sub-Assy	013882141	1
30	Condenser Sub-Assy	01152215	1
31	Current Divider	07224041	1
32	Side Plate	01308226	1



## 10.2 30K & 36K

### 10.2.1 Explosive view

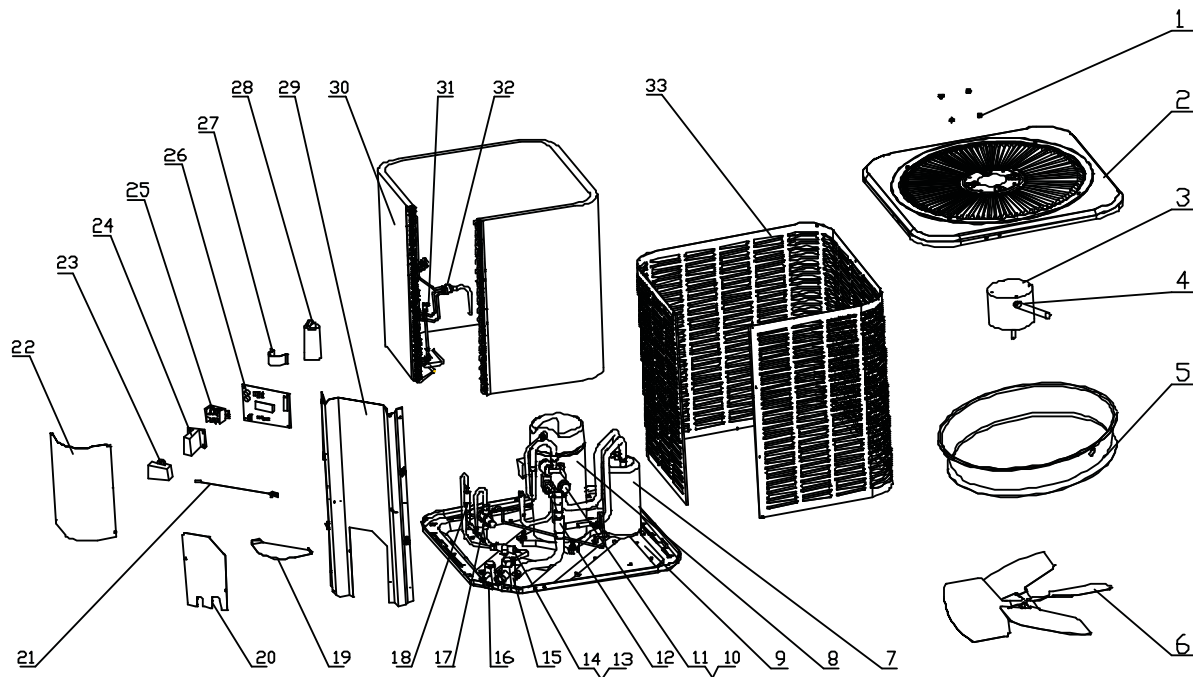


Fig9

### 10.2.2 Spare parts list

MIH30-13			
No.	discription	Part No.	Qty.
1	Nut M5X7	70318204	4
2	Cover Plate	01258210	1
3	Fan Motor SW150D	15702102	1
4	Ripple Pipe	05278205	1
5	Fixed Block	10378211	1
6	AxialFlowFan	10358211	1
7	Gas-liquid Separator	07228217	1
8	Compressor	00100106	1
9	Base Plate Sub-Assy	0120822001	1
10	4-way Valve	43000405	1
11	4-way Valve Accessary	43008214	1
12	Filter	07210037	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1
15	Cut-off Valve 3/4	07138233	1
16	Cut-off Valve 3/8	07138232	1
17	Thermal Expansion Valve TDEX3 ODF f 10X16	07332204	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388210	1
21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor CBB61/CBB611A 6uF/500V	33010037	1
24	AC Contactor CJX9B-25S/D-C1	44010250	1
25	Terminal Board	42011242	1
26	Main Board	30221401	1

27	Capacitor Clamp	02143401	1
28	Capacitor CBB65 45uF/440V(450V)	33000012	1
29	Connection Sheet Sub-Assy	01388222	1
30	Condenser Sub-Assy	0115210301	1
31	Current Divider	07224130	1
32	Current Divider	06642036	1
33	Side Plate	01318213	1

**MIH36-13**

<b>No.</b>	<b>discription</b>	<b>Part No.</b>	<b>Qty.</b>
1	Nut M5X7	70318204	4
2	Cover Plate	01258210	1
3	Fan Motor SW150D	15702102	1
4	Ripple Pipe	05278205	1
5	Fixed Block	10378211	1
6	AxialFlowFan	10358211	1
7	Gas-liquid Separator	07228217	1
8	Compressor	00202203	1
9	Base Plate Sub-Assy	0120822001	1
10	4-way Valve	43000405	1
11	4-way Valve Accessary	43008214	1
12	Filter	07210037	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1
15	Cut-off Valve 3/4	07138233	1
16	Cut-off Valve 3/8	07138232	1
17	Thermal Expansion Valve	07138203	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388210	1
21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor CBB61/CBB611A 6uF/500V	33010037	1
24	AC Contactor CJX9B-25S/D-C1	44010250	1
25	Terminal Board	42011242	1
26	Main Board	30221401	1
27	Capacitor Clamp	02143401	1
28	Capacitor CBB65 50uF/450V	33000001	1
29	Connection Sheet Sub-Assy	01388222	1
30	Condenser Sub-Assy	01152210	1
31	Current Divider	07220011	1
32	Current Divider	06642036	1
33	Side Plate	01318213	1

## 10.3 42K

### 10.3.1 Explosive view

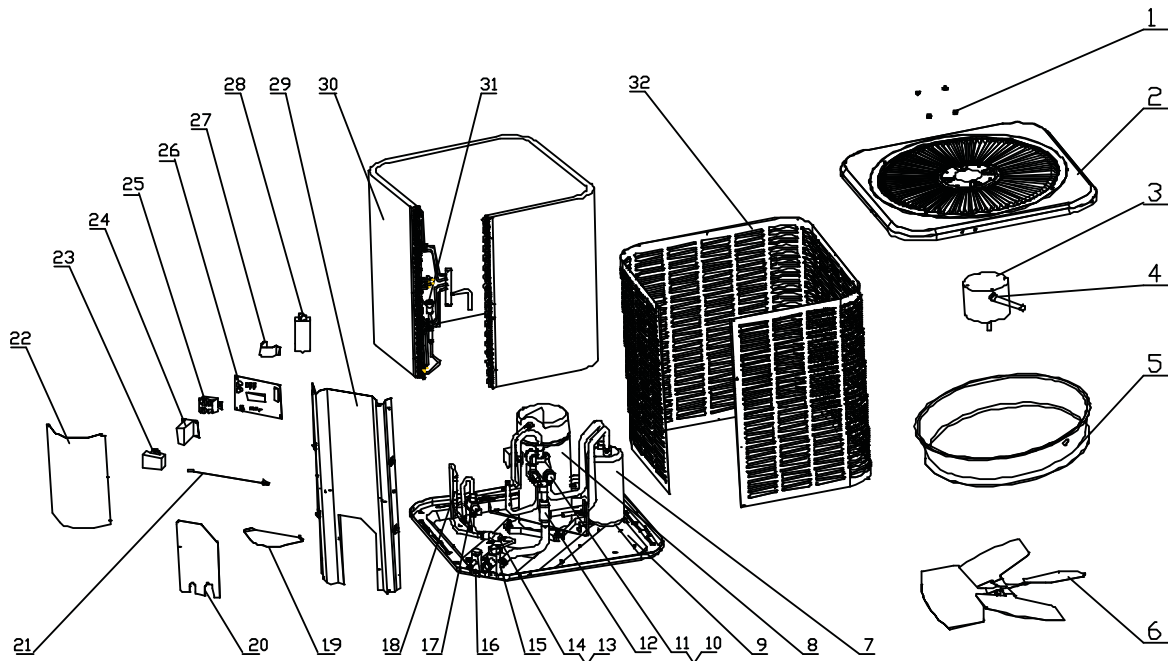


Fig10

### 10.3.2 Spare parts list

MIH42-13			
No.	discription	Part No.	Qty.
1	Nut M5X7	70318204	4
2	Cover Plate	01258210	1
3	Fan Motor SW150D	15702102	1
4	Ripple Pipe	05278205	1
5	Fixed Block	10378211	1
6	AxialFlowFan	10358211	1
7	Gas-liquid Separator	07228217	1
8	Compressor	00202204	1
9	Base Plate Sub-Assy	0120822001	1
10	4-way Valve	43000405	1
11	4-way Valve Accessary	43008214	1
12	Filter	07210037	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1
15	Cut-off Valve 3/4	07138233	1
16	Cut-off Valve 3/8	07138232	1
17	Thermal Expansion Valve	07332208	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388210	1
21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor CBB611A 7uF/500VAC	33010041	1
24	AC Contactor GC6-45S/01C1	44010253	1
25	Terminal Board	42011242	1
26	Main Board	30221401	1
27	Capacitor Clamp	02141375	1

28	Capacitor CBB65 50uF/450V	33000038	1
29	Connection Sheet Sub-Assy	01388222	1
30	Condenser Sub-Assy	01152217	1
31	Current Divider	072200112	1
32	Side Plate	01318213	1

## 10.4 48K

### 10.4.1 Explosive view

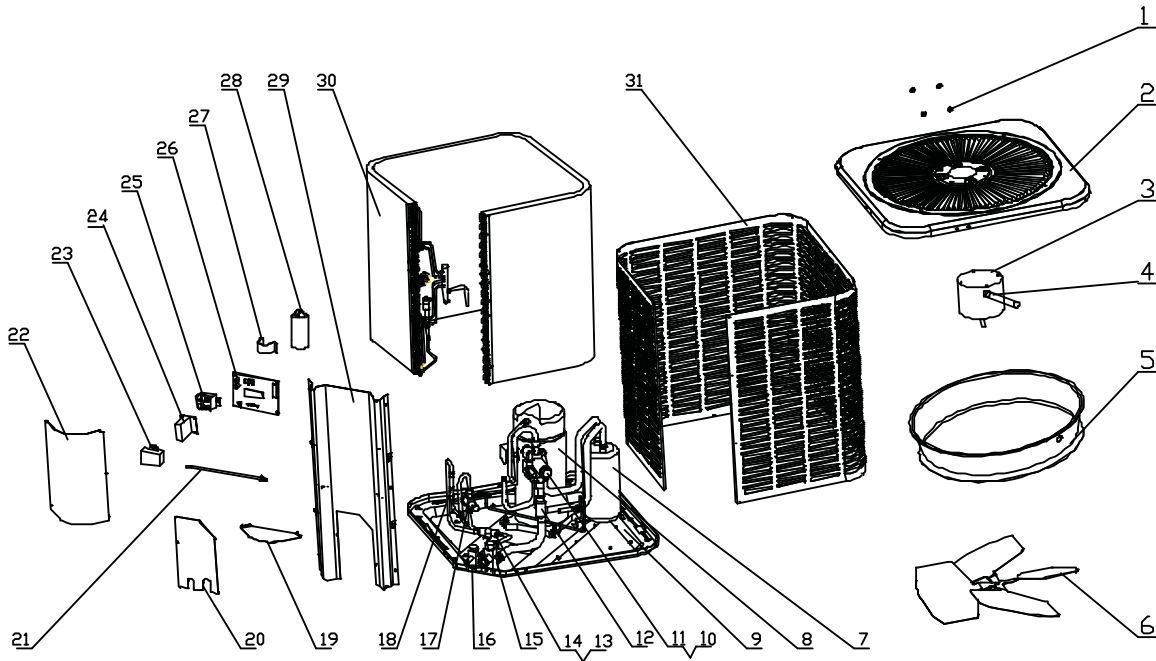


Fig11

### 10.4.2 Spare parts list

MIH48-13			
No.	discription	Part No.	Qty.
1	Nut M5X7	70318204	4
2	Cover Plate	01258210	1
3	Fan Motor SW150D	15702103	1
4	Ripple Pipe	05278205	1
5	Fixed Block	10378211	1
6	AxialFlowFan	10358211	1
7	Gas-liquid Separator	07228212	1
8	Compressor	00202206	1
9	Base Plate Sub-Assy	0120822001	1
10	4-way Valve	43000407	1
11	4-way Valve Accessary	43008214	1
12	Filter	07219056	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1
15	Cut-off Valve 1-1/8	07138236	1
16	Cut-off Valve 1/2	07138235	1
17	Thermal Expansion Valve	07332208	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388208	1

21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor CBB61 8uF/450V	33010014	1
24	AC Contactor GC6-45S/01C1	44010253	1
25	Terminal Board	42011242	1
26	Main Board	30221401	1
27	Capacitor Clamp	02141375	1
28	Capacitor CBB65 60uF/450V	33000039	1
29	Connection Sheet Sub-Assy	01388219	1
30	Condenser Sub-Assy	01152216	1
31	Side Plate	01318213	1

## 10.5 60K

### 10.5.1 Explosive view

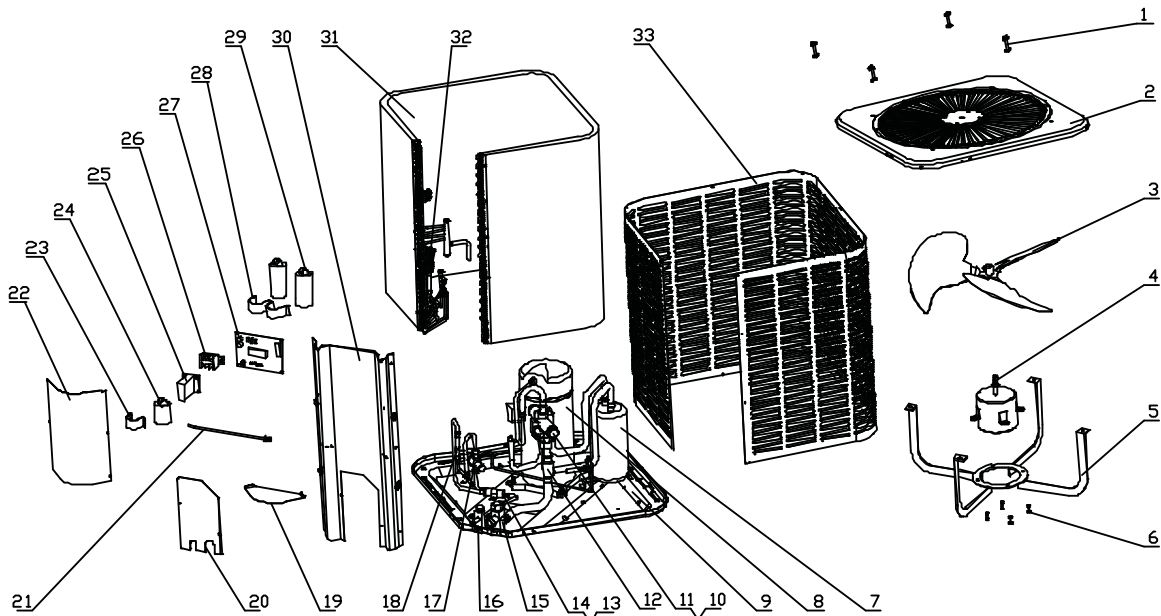


Fig12

### 10.5.2 Spare parts list

MIH60-13			
No.	discription	Part No.	Qty.
1	Bolt M10× 25	70210231	4
2	Cover Plate	01262202P	1
3	Centrifugal Fan	10358212	1
4	Fan Motor SW300C	15702204	1
5	Motor Mounting Plate Sub-Assy	01322218P	1
6	Bolt M8× 25	70210084	4
7	Gas-liquid Separator	07228212	1
8	Compressor	00202205	1
9	Base Plate Sub-Assy	01192205P	1
10	4-way Valve	43000407	1
11	4-way Valve Accessary	43008214	1
12	Filter	07219056	1
13	Bidirection Strainer	03410107	1
14	Tube Clip	021400055	1

15	Cut-off Valve 1-1/8	07138236	1
16	Cut-off Valve 1/2	07138235	1
17	Thermal Expansion Valve BAE6HCAODF5FT1/2X5/8	07130324	1
18	One-way Valve	07138202	1
19	Cabinet	01318206	1
20	Tube-exit plate	01388208	1
21	Temperature Sensor	3900012125	1
22	Electric box cover	01418231	1
23	Capacitor Clamp	02140001	1
24	Capacitor CBB65 15uF/450V	33010045	1
25	AC Contactor GC6-45S/01C1	44010253	1
26	Terminal Board	42011242	1
27	Main Board	30221401	1
28	Capacitor Clamp	02143003	1
29	Capacitor CBB65 40uF/450V	33000022	2
30	Connection Sheet Sub-Assy	01388219	1
31	Condenser Sub-Assy	01152211	1
32	Current Divider	072200112	1
33	Side Plate	01312210P	1