



LUNA ON-OFF SERIES

Service Manual 2014

9ASEU-B1-1401



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1. Precaution

1.1 Safety Precaution

- To prevent injury to the user or other people and property damage, the following instructions must be followed.
- Incorrect operation due to ignoring instruction will cause harm or damage.
- Before service the unit, be sure to read this service manual at first.

1.2 Warning

➤ Installation

- Do not use a defective or underrated circuit breaker. Use this appliance on a dedicated circuit.

There is risk of fire or electric shock.

- For electrical work, contact the dealer, seller, a qualified electrician, or an authorized service center.

Do not disassemble or repair the product, there is risk of fire or electric shock.

- Always ground the product.

There is risk of fire or electric shock.

- Install the panel and the cover of control box securely.

There is risk of fire or electric shock.

- Always install a dedicated circuit and breaker.

Improper wiring or installation may cause fire or electric shock.

- Use the correctly rated breaker or fuse.

There is risk of fire or electric shock.

- Do not modify or extend the power cable.

There is risk of fire or electric shock.

- Do not install, remove, or reinstall the unit by yourself (customer).

There is risk of fire, electric shock, explosion, or injury.

- Be caution when unpacking and installing the product.

Sharp edges could cause injury, be especially careful of the case edges and the fins on the

condenser and evaporator.

- **For installation, always contact the dealer or an authorized service center.**
- **Do not install the product on a defective installation stand.**
- **Be sure the installation area does not deteriorate with age.**

If the base collapses, the air conditioner could fall with it, causing property damage, product failure, and personal injury.

- **Do not let the air conditioner run for a long time when the humidity is very high and a door or a window is left open.**

- **Take care to ensure that power cable could not be pulled out or damaged during operation.**

There is risk of fire or electric shock.

- **Do not place anything on the power cable.**

There is risk of fire or electric shock.

- **Do not plug or unplug the power supply plug during operation.**

There is risk of fire or electric shock.

- **Do not touch (operation) the product with wet hands.**

- **Do not place a heater or other appliance near the power cable.**

There is risk of fire and electric shock.

- **Do not allow water to run into electrical parts.**

It may cause fire, failure of the product, or electric shock.

- **Do not store or use flammable gas or combustible near the product.**

There is risk of fire or failure of product.

- **Do not use the product in a tightly closed space for a long time.**

Oxygen deficiency could occur.

- **When flammable gas leaks, turn off the gas and open a window for ventilation before turn the product on.**

- **If strange sounds or smoke comes from product, turn the breaker off or disconnect the power supply cable.**

There is risk of electric shock or fire.

- **Stop operation and close the window in storm or hurricane. If possible, remove the product from the window before the hurricane arrives.**

There is risk of property damage, failure of product, or electric shock.

- **Do not open the inlet grill of the product during operation. (Do not touch the electrostatic filter, if the unit is so equipped.)**

There is risk of physical injury, electric shock, or product failure.

- **When the product is soaked, contact an authorized service center.**

There is risk of fire or electric shock.

- **Be caution that water could not enter the product.**

There is risk of fire, electric shock, or product damage.

- **Ventilate the product from time to time when operating it together with a stove etc.**

There is risk of fire or electric shock.

- **Turn the main power off when cleaning or maintaining the product.**

There is risk of electric shock.

- **When the product is not be used for a long time, disconnect the power supply plug or turn off the breaker.**

There is risk of product damage or failure, or unintended operation.

- **Take care to ensure that nobody could step on or fall onto the outdoor unit.**

This could result in personal injury and product damage.

➤ CAUTION

- **Always check for gas (refrigerant) leakage after installation or repair of product.**

Low refrigerant levels may cause failure of product.

- **Install the drain hose to ensure that water is drained away properly.**

A bad connection may cause water leakage.

- **Keep level even when installing the product.**

It can avoid vibration of water leakage.

- **Do not install the product where the noise or hot air from the outdoor unit could damage the neighborhoods.**

It may cause a problem for your neighbors.

- **Use two or more people to lift and transport the product.**

- **Do not install the product where it will be exposed to sea wind (salt spray) directly.**

It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins,

could cause product malfunction or inefficient operation.

➤ Operational

- **Do not expose the skin directly to cool air for long time. (Do not sit in the draft).**
- **Do not use the product for special purposes, such as preserving foods, works of art etc.**

It is a consumer air conditioner, not a precision refrigerant system.

There is risk of damage or loss of property.

- **Do not block the inlet or outlet of the air flow.**
- **Use a soft cloth to clean. Do not use harsh detergents, solvents, etc.**

There is risk of fire, electric shock, or damage to the plastic parts of the product.

■ **Do not touch the metal parts of the product when removing the air filter. They are very sharp.**

- **Do not step on or put anything on the product. (outdoor units)**
- **Always insert the filter securely. Clean the filter every two weeks or more often if necessary.**

A dirty filter reduces the efficiency of the air conditioner and could cause product malfunction or damage.

■ **Do not insert hands or other objects through air inlet or outlet while the product is operated.**

- **Do not drink the water drained from the product.**
- **Use a firm stool or ladder when cleaning or maintaining the product.**

Be careful and avoid personal injury.

■ **Replace the all batteries in the remote control with new ones of the same type. Do not mix old and new batteries or different types of batteries.**

There is risk of fire or explosion.

- **Do not recharge or disassemble the batteries. Do not dispose of batteries in a fire.**

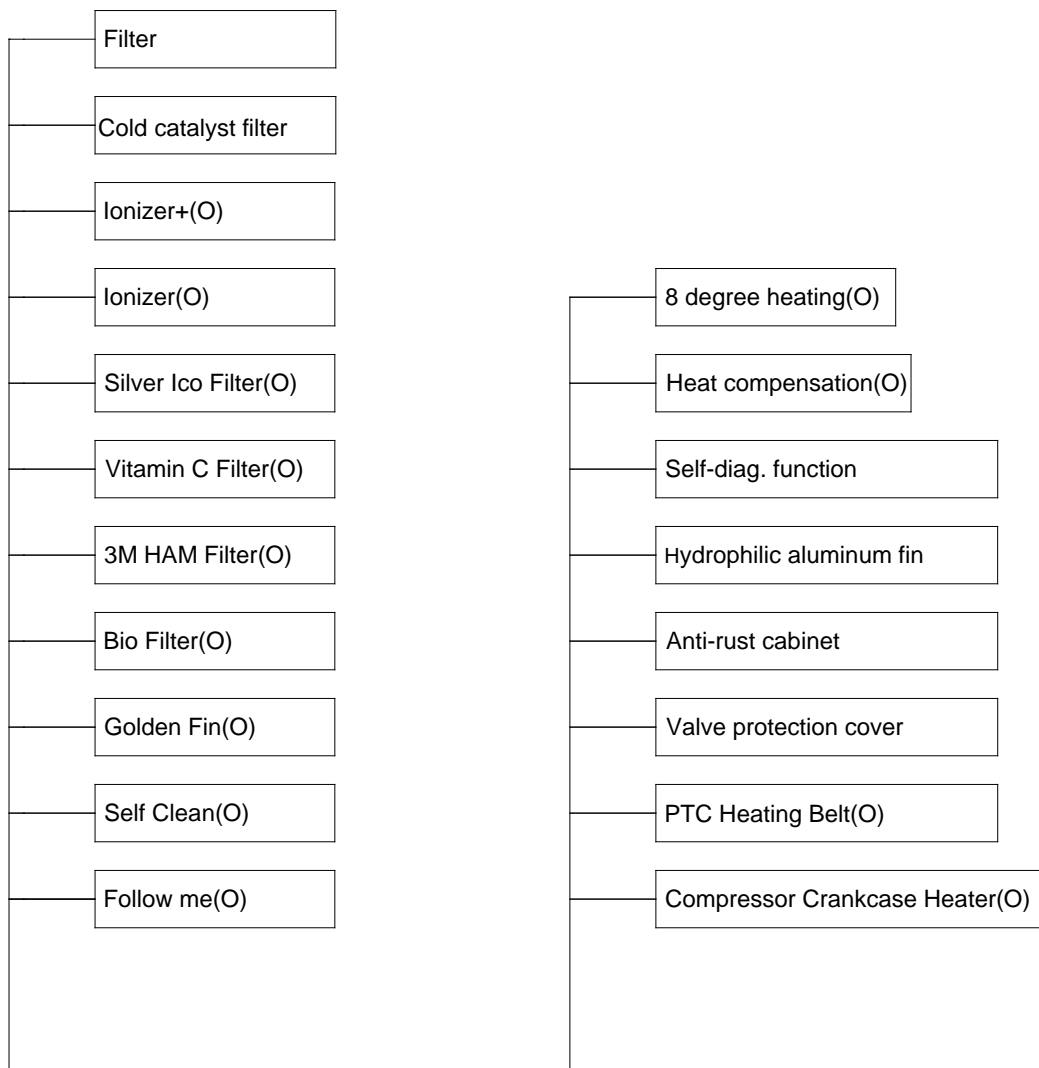
They may burn or explode.

■ **If the liquid from the batteries gets onto your skin or clothes, wash it well with clean water. Do not use the remote if the batteries have leaked.**

2. Function

Model Names of Indoor/Outdoor Units

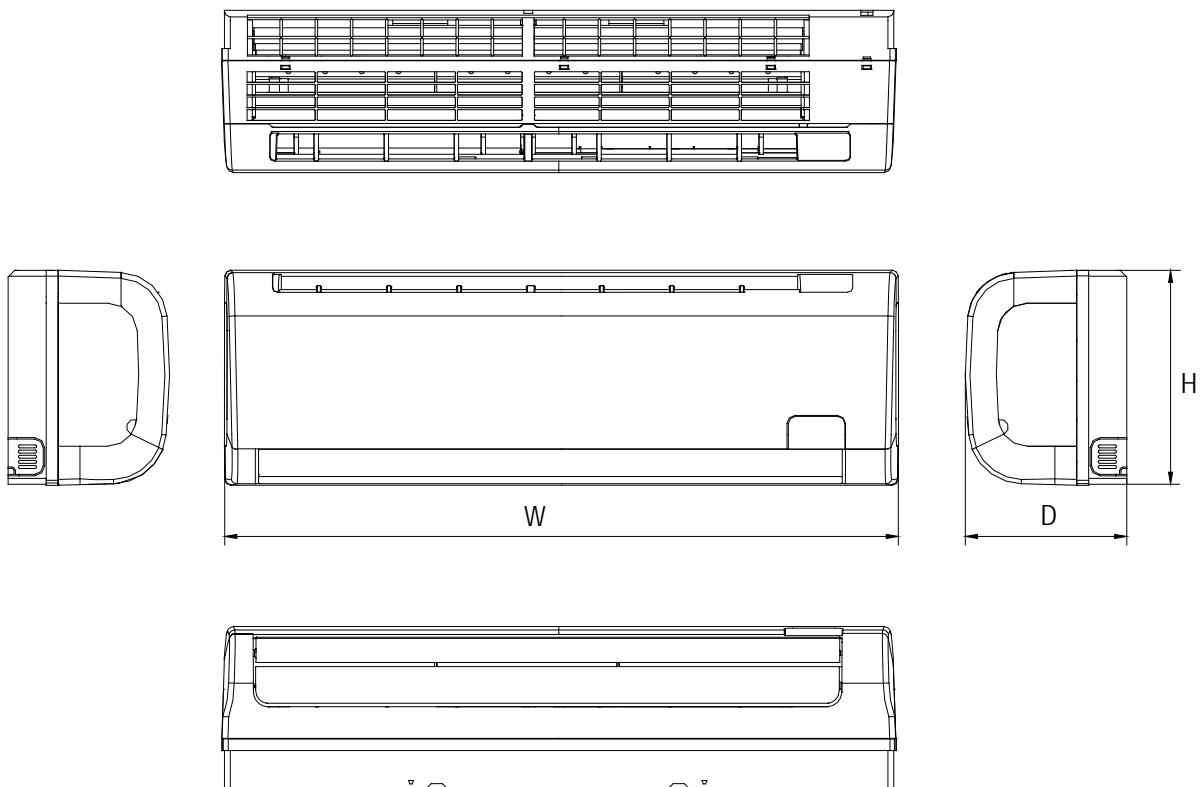
Series	Capacity	Indoor units	Outdoor units
On-Off	7k	MS9A-07HRN1-QB6	MOK-07HN1-QB6
		MS9A-07HRN1-QB6	MOK1-07HN1-QB6
		MS9A-07HRN1-QC2	MOK1-07HN1-QC2
	9k	MS9A-09HRN1-QB6	MOK1-09HN1-QB6
		MS9A-09HRN1-QB8	MOK-09HN1-QB8
		MS9A-09HRN1-QC2	MOA1-09HN1-QC2
		MS9A-09HRN1-QC2	MOA3-09HN1-QC2
		MS9A-09HRN1-QC7G	MOB1-09HN1-QC7
	11k	MS9A-11HRN1-QB8	MOA-11HN1-QB8
	12k	MS9A-12HRN1-QC2	MOB1-12HN1-QC2
		MS9A-12HRN1-QC2	MOB3-12HN1-QC2
		MS9A-12HRN1-QC7G	MOB-12HN1-QC7
	16k	MS9A-16HRN1-QB8(A)	MOB1-18HN1-QB6
		MS9A-16HRN1-QB6	MOB3-16HN1-QB6
	17k	MS9A-17HRN1-QC0	MOC-17HN1-QC0
	18k	MS9A-18HRN1-QC0	MOC-18HN1-QC0
		MS9A-18HRN1-QB6	MOB1-18HN1-QB6
		MS9A-18HRN1-QC5	MOF3-18HN1-QC5
	24k	MS9A-24HRN1-QB8W	MOP-24HN1-QB8W
		MS9A-24HRN1-QB8W	MOF1-24HN1-QB8W



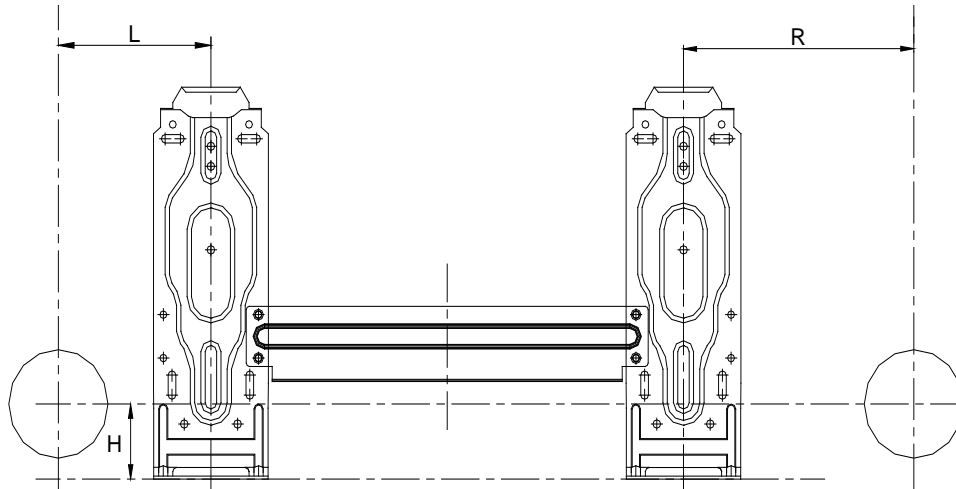
O: optional function

3. Dimension

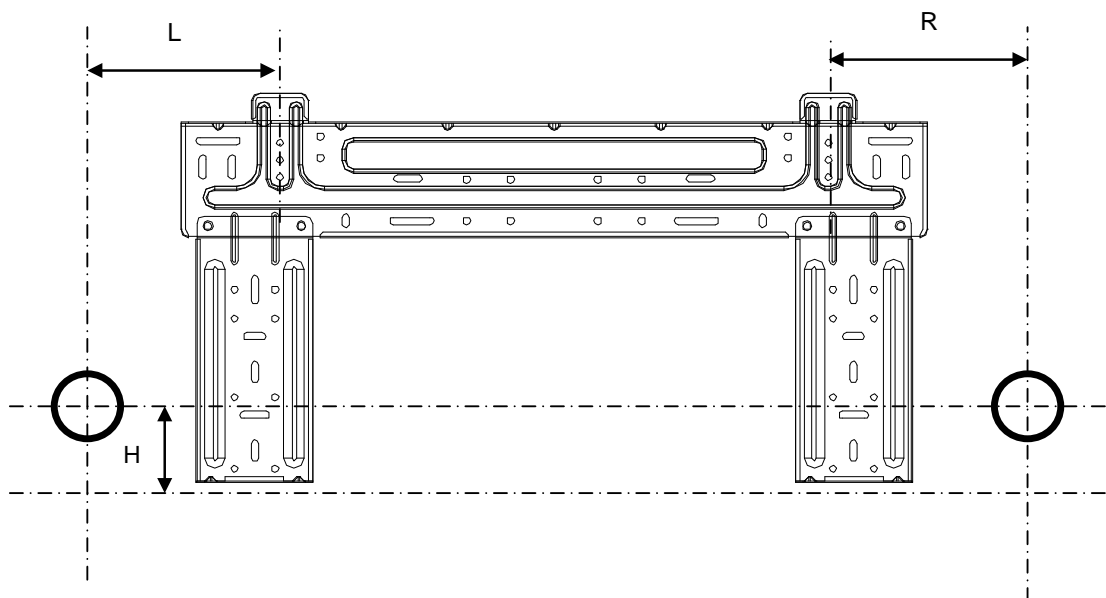
3.1 Indoor Units



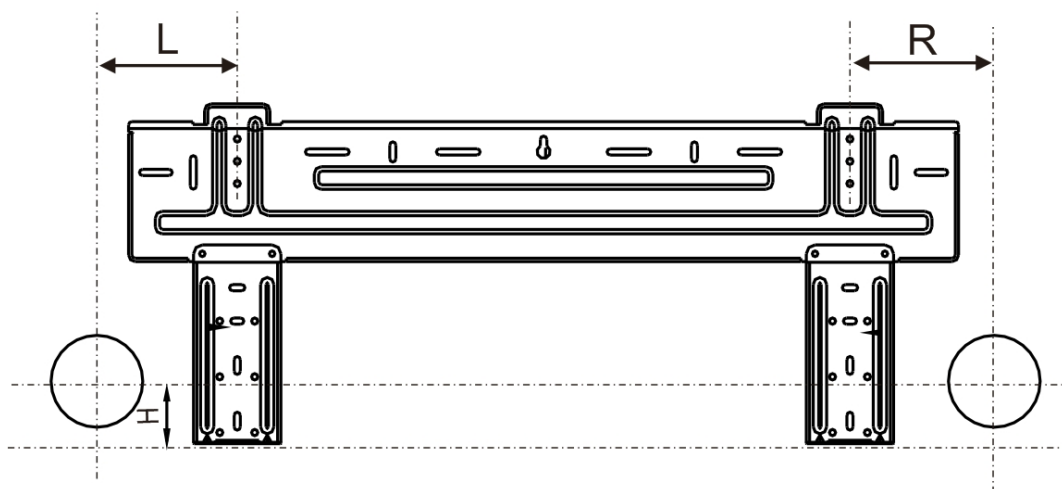
Model	W	D	H
MS9A-07HRN1-QB6	710	190	250
MS9A-07HRN1-QC2			
MS9A-09HRN1-QC2			
MS9A-09HRN1-QB8			
MS9A-09HRN1-QB6			
MS9A-09HRN1-QC7G	790	198	265
MS9A-11HRN1-QB8			
MS9A-12HRN1-QC2			
MS9A-16HRN1-QB8(A)			
MS9A-12HRN1-QC7G			
MS9A-16HRN1-QB6	920	223	292
MS9A-17HRN1-QC0			
MS9A-18HRN1-QB6			
MS9A-18HRN1-QC0			
MS9A-18HRN1-QC5			
MS9A-24HRN1-QB8W	998	240	322



Model	R(mm)	L(mm)	H(mm)	Dimension of installation hole(mm)
MS9A-07HRN1-QB6	110	100	45	∅ 65
MS9A-07HRN1-QC2				
MS9A-09HRN1-QB6				
MS9A-09HRN1-QB8				
MS9A-09HRN1-QC2				
MS9A-09HRN1-QC7G	150	100	45	
MS9A-11HRN1-QB8				
MS9A-12HRN1-QC2				
MS9A-16HRN1-QB8(A)				

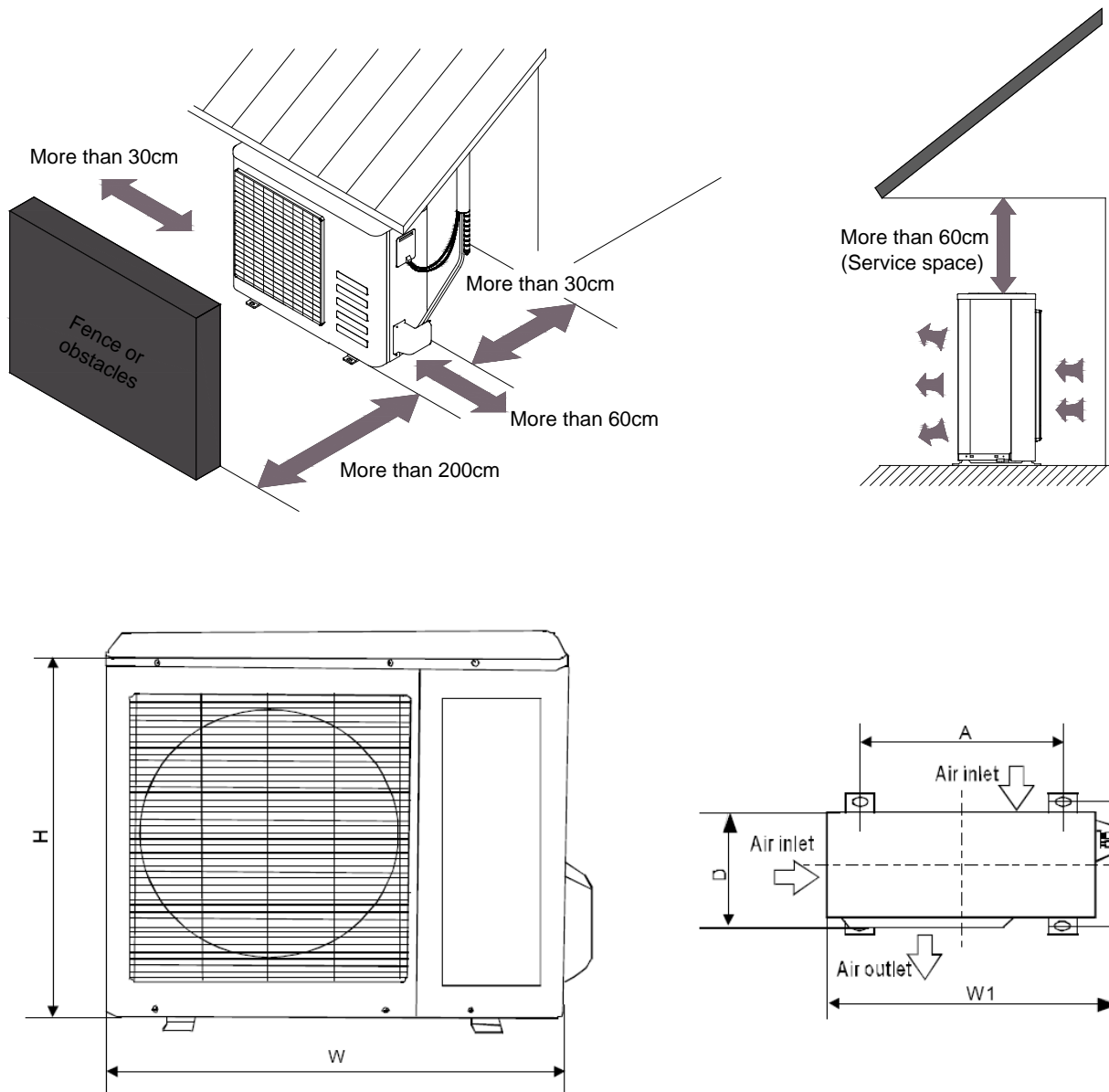


Model	R(mm)	L(mm)	H(mm)	Dimension of installation hole(mm)
MS9A-12HRN1-QC7G	185	150	45	Ø 65
MS9A-16HRN1-QB6				
MS9A-17HRN1-QC0				
MS9A-18HRN1-QB6				
MS9A-18HRN1-QC0				



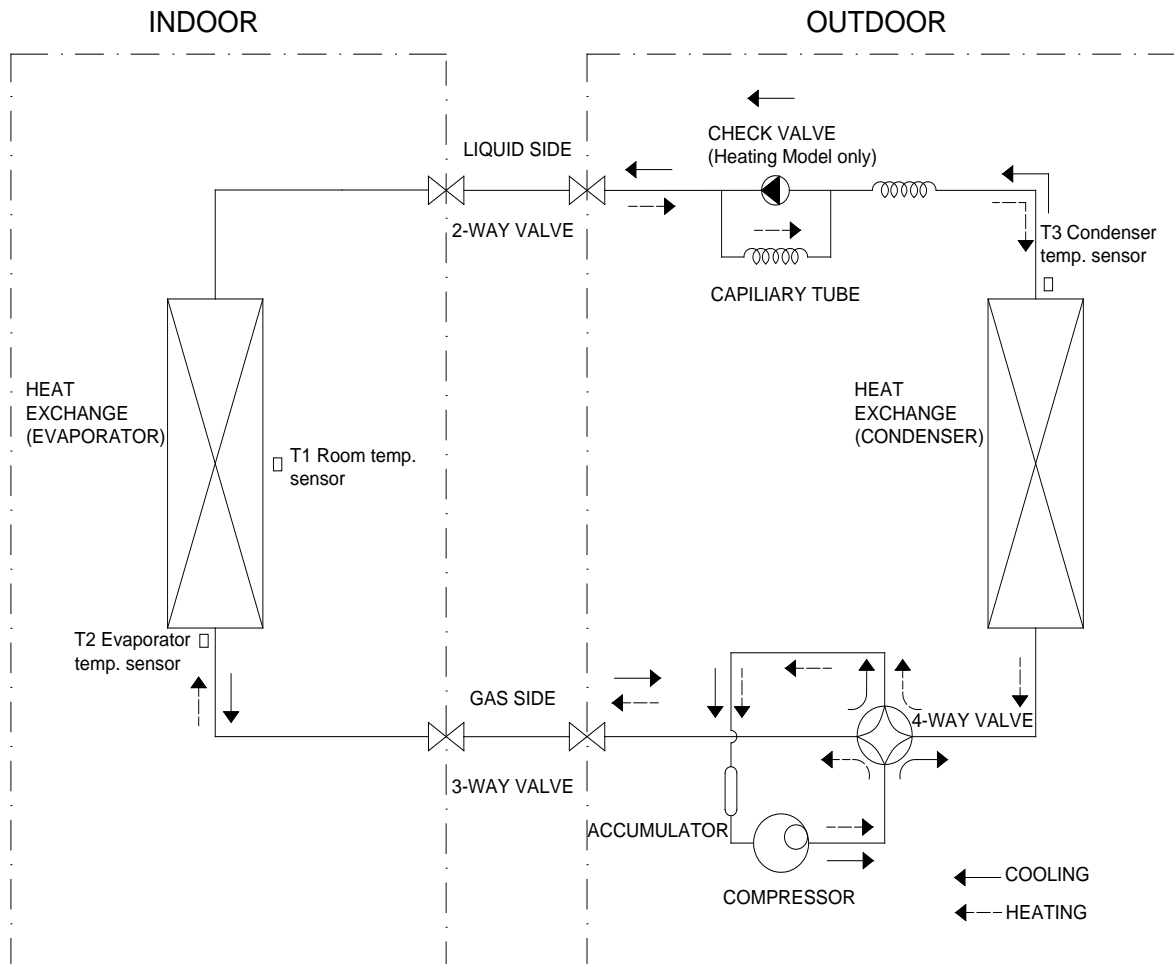
Model	R(mm)	L(mm)	H(mm)	Dimension of installation hole(mm)
MS9A-18HRN1-QC5	120	100	45	Ø 65
MS9A-24HRN1-QB8W				

3.2 Outdoor Units



Model	W	D	H	W1	A	B
MOK-07HN1-QB6	685	260	430	742	460	276
MOK1-07HN1-QB6						
MOK1-07HN1-QC2						
MOK1-09HN1-QB6						
MOK-09HN1-QB8						
MOA1-09HN1-QC2	700	240	540	757	458	250
MOA3-09HN1-QC2						
MOA-11HN1-QB8						
MOB1-09HN1-QC7	780	250	540	843	549	276
MOB-12HN1-QC7						
MOB3-16HN1-QB6						
MOB1-12HN1-QC2						
MOB3-12HN1-QC2						
MOB1-18HN1-QB6						
MOC-17HN1-QC0	760	285	590	823	530	290
MOC-18HN1-QC0						
MOP-24HN1-QB8W	820	330	595	870	523	340
MOF3-18HN1-QC5	845	320	700	908	560	335
MOF1-24HN1-QB8W						

4. Refrigerant Cycle Diagram

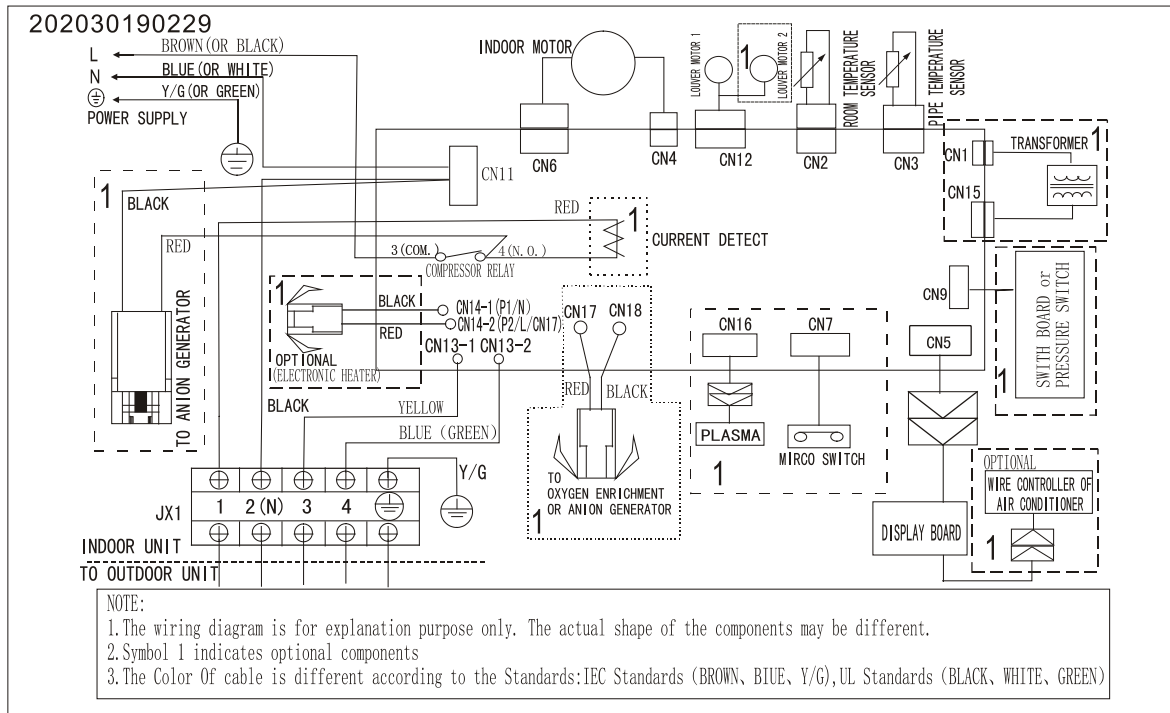


T3 temp. sensor is only for 21k,24k models.

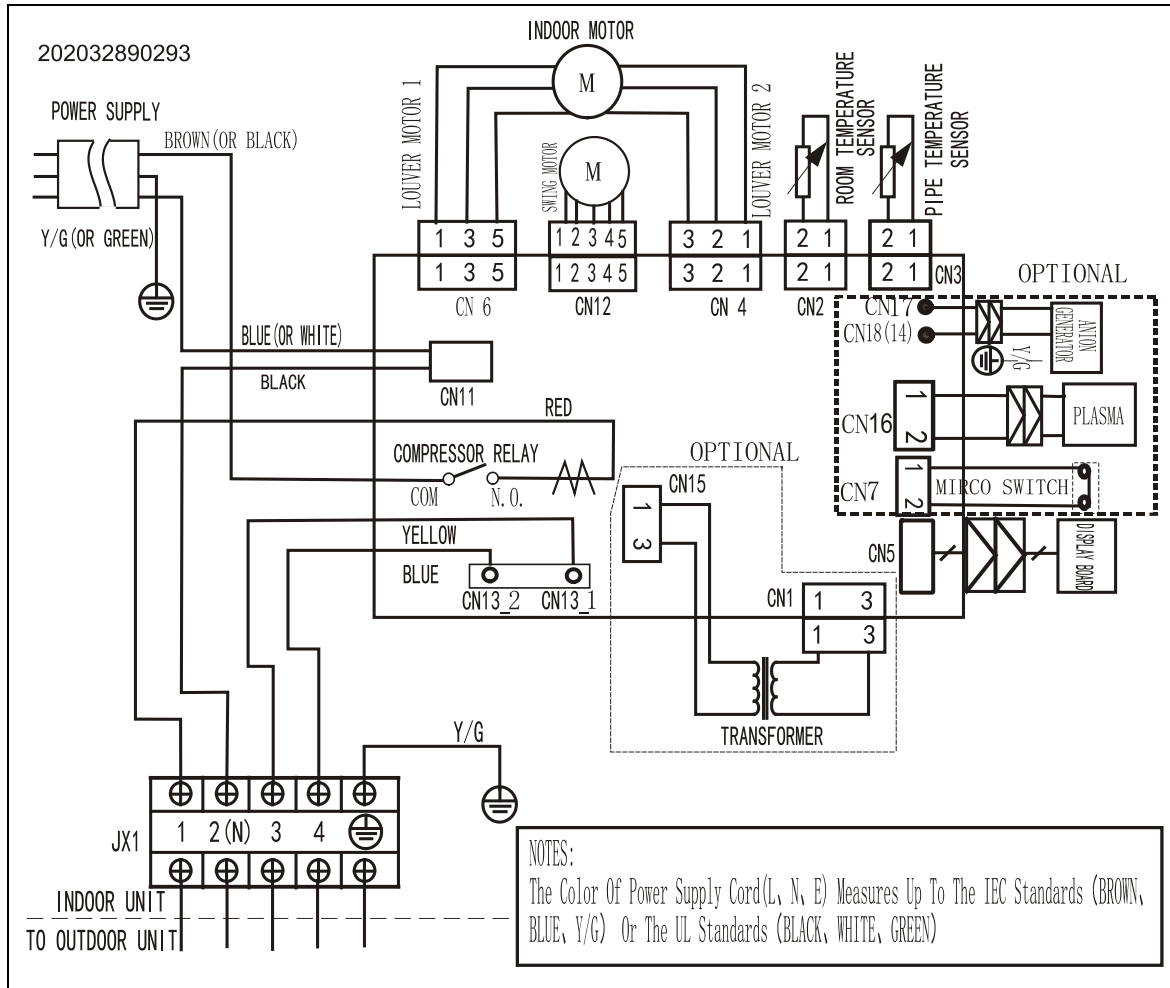
5. Wiring Diagram

5.1 Indoor Units

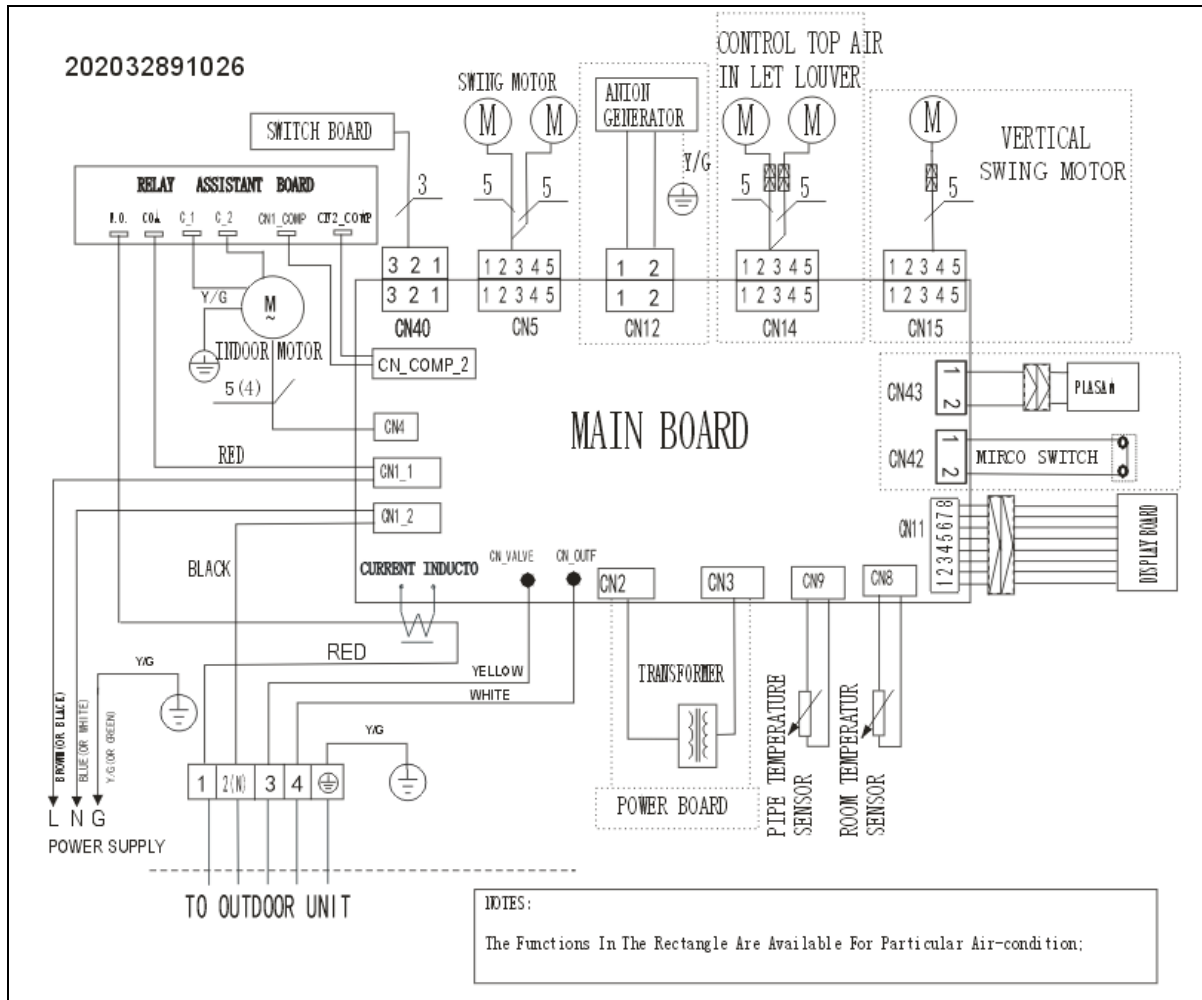
**MS9A-07HRN1-QB6, MS9A-07HRN1-QC2, MS9A-09HRN1-QB6, MS9A-09HRN1-QB8,
MS9A-09HRN1-QC2, MS9A-09HRN1-QC7G, MS9A-11HRN1-QB8, MS9A-12HRN1-QC2,
MS9A-16HRN1-QB6,MS9A-16HRN1-QB8(A),MS9A-17HRN1-QC0, MS9A-18HRN1-QB6,
MS9A-18HRN1-QC0**



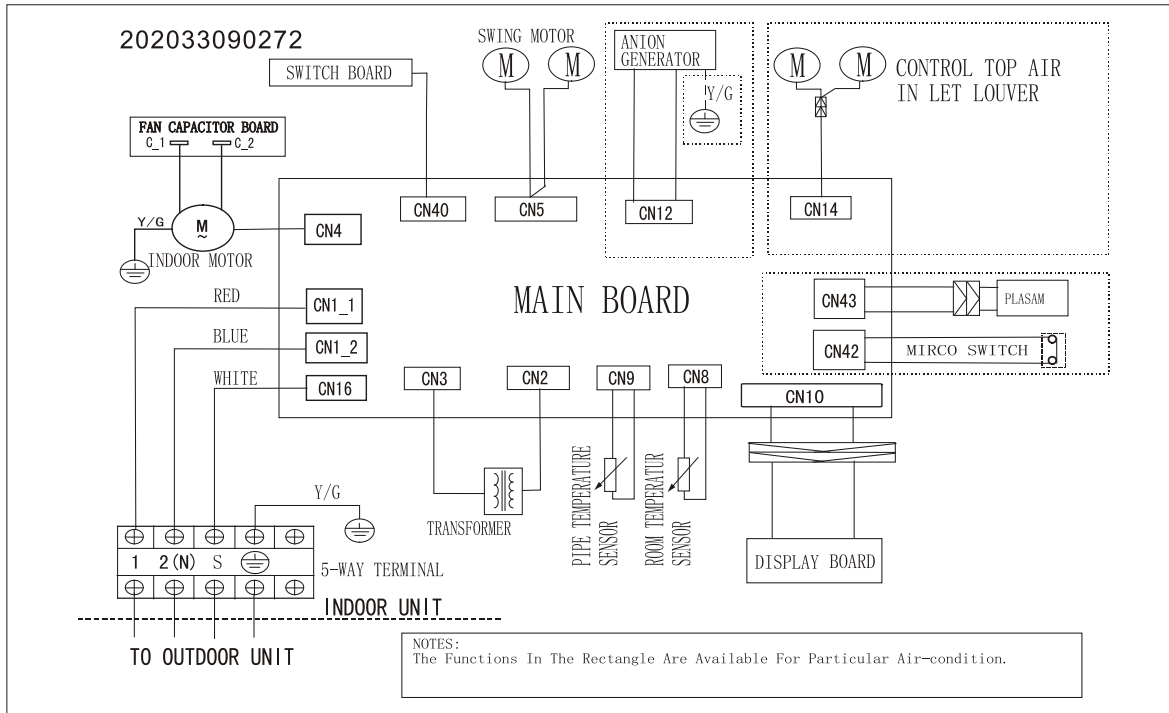
MS9A-12HRN1-QC7G



MS9A-18HRN1-QC5



MS9A-24HRN1-QB8W



MOK-07HN1-QB6, MOK1-07HN1-QB6, MOK1-07HN1-QC2, MOK1-09HN1-QB6, MOK-09HN1-QB8, MOA1-09HN1-QC2, MOA3-09HN1-QC2, MOB1-09HN1-QC7, MOA-11HN1-QB8, MOB-12HN1-QC7, MOB3-12HN1-QC2, MOB1-12HN1-QC2, MOB3-16HN1-QB6, MOB1-18HN1-QB6



TO INDOOR UNIT

1 2(N) 3 4

OVERLOAD RELAY

RED BLUE BLUE 4-WAY BLACK

BLACK

COMPRESSOR

R C BLUE R S WHITE

Y/G

COMPRESSOR CAPACITOR

FAN MOTOR

Y/G

RED BLUE

FAN CAPACITOR

--- This symbol indicates the element is optional, the actual shape shall prevail

TO INDOOR UNIT

1 2(N) 3 4

OVERLOAD RELAY

RED BLUE BLUE BLACK

4-WAY

BLACK

BLACK

COMPRESSOR

Y/G

COMPRESSION CAPACITOR

FAN MOTOR

Y/G

FAN CAPACITOR

RED BLUE

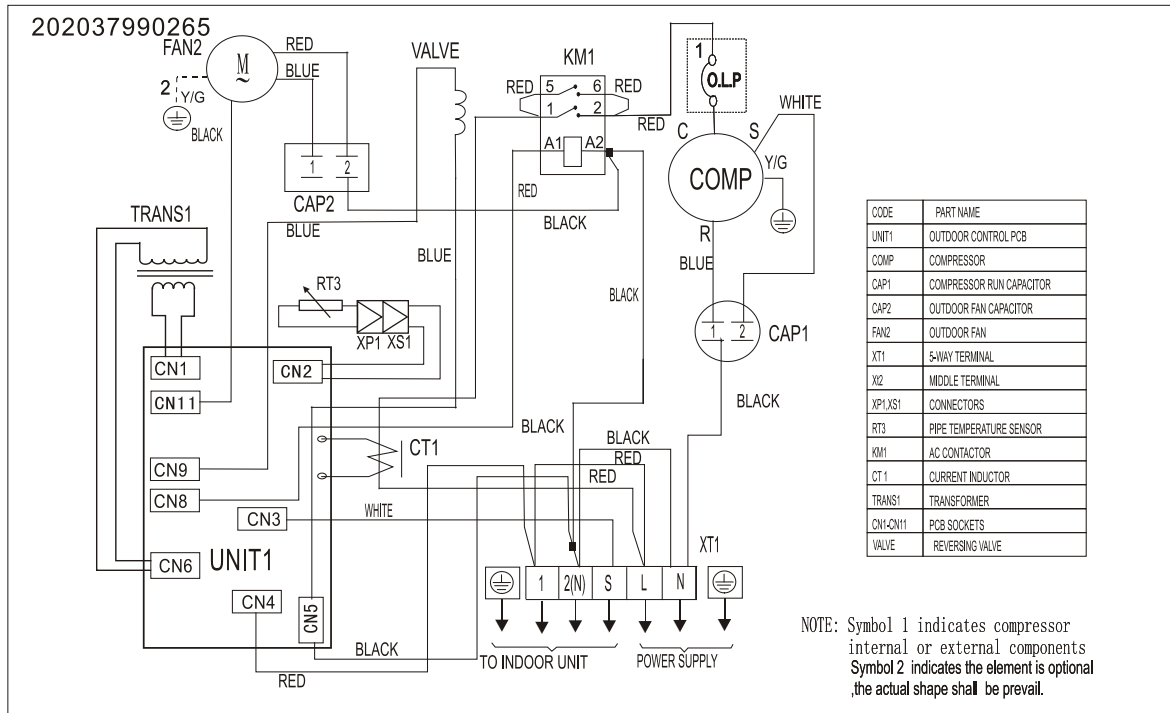
WHITE

COMPRESSION CAPACITOR

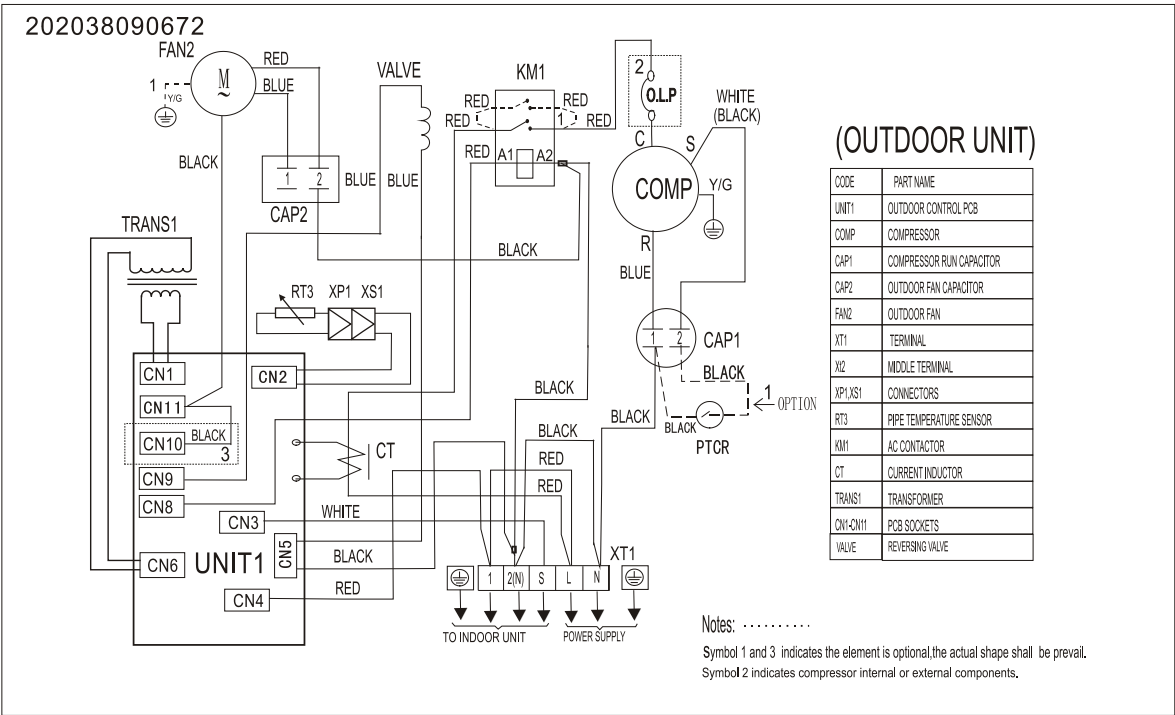
FAN CAPACITOR

— This symbol indicates the element is optional, the actual shape shall prevail

MOP-24HN1-QB8W



MOF1-24HN1-QB8W



6. Installation details

6.1 Wrench torque sheet for installation

Outside diameter		Torque	Additional tightening torque
mm	inch	N.cm	N.cm
Φ6.35	1/4	1500(153kgf.cm)	1600(163kgf.cm)
Φ9.52	3/8	2500(255kgf.cm)	2600(265kgf.cm)
Φ12.7	1/2	3500(357kgf.cm)	3600(367kgf.cm)
15.9	5/8	4500(459kgf.cm)	4700(479kgf.cm)
Φ19	3/4	6500(663kgf.cm)	6700(683kgf.cm)

6.2 Connecting the cables

The power cord of connect should be selected according to the following specifications sheet.

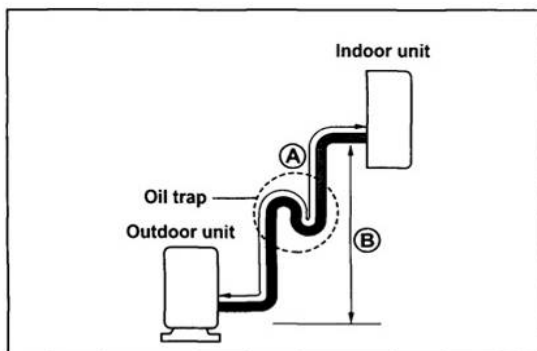
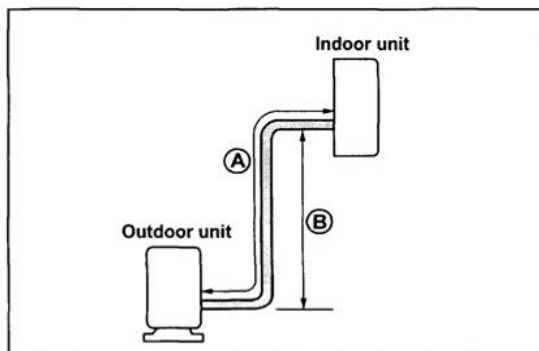
Rated current of appliance	Nominal cross-sectional area (mm ²)
>3 and ≤6	0.75
>6 and ≤10	1
>10 and ≤16	1.5
>16 and ≤25	2.5

The cable size and the current of the fuse or switch are determined by the maximum current indicated on the nameplate which located on the side panel of the unit. Please refer to the nameplate before selecting the cable, fuse and switch.

6.3 Pipe length and the elevation

The pipe length and refrigerant amount:

Model	Pipe size		Standard length (m)	Max. Elevation B (m)	Max. Length A (m)	Additional refrigerant (g/m)
	Gas	Liquid				
MS9A-07HRN1-QB6+MOK-07HN1-QB6	3/8" (Φ9.52)	1/4" (Φ6.35)	5	8	20	20
MOK1-07HN1-QB6+MOK1-07HN1-QB6						
MS9A-07HRN1-QC2+MOK1-07HN1-QC2						
MS9A-09HRN1-QB6+MOK1-09HN1-QB6						
MS9A-09HRN1-QB8+ MOK-09HN1-QB8						
MS9A-09HRN1-QC2+MOA1-09HN1-QC2						
MS9A-09HRN1-QC2+MOA3-09HN1-QC2						
MS9A-09HRN1-QC7G+ MOB1-09HN1-QC7						
MS9A-12HRN1-QC2+MOB1-12HN1-QC2						
MS9A-11HRN1-QB8+MOA-11HN1-QB8	1/2" (Φ12.7)	1/4" (Φ6.35)	5	8	20	20
MS9A-12HRN1-QC2+MOB3-12HN1-QC2						
MS9A-12HRN1-QC7G+ MOB-12HN1-QC7						
MS9A-18HRN1-QB6+MOB1-18HN1-QB6						
MS9A-16HRN1-QB6+MOB3-16HN1-QB6						
MS9A-16HRN1-QB8(A)+ MOB1-18HN1-QB6						
MS9A-17HRN1-QC0+MOC-17HN1-QC0	1/2" (Φ12.7)	1/4" (Φ6.35)	5	10	25	20
MS9A-18HRN1-QC0+ MOC-18HN1-QC0						
MS9A-18HRN1-QC5+MOF3-18HN1-QC5	5/8" (15.9)	3/8" (Φ9.52)	5	10	25	40
MS9A-24HRN1-QB8W+MOP-24HN1-QB8W						
MS9A-24HRN1-QB8W+MOF1-24HN1-QB8W						



Caution:

The capacity test is based on the standard length and the maximum permissive length is based on the system reliability.

The oil trap should be installed per 5-7 meters.

6.4 Installation for the first time

Air and moisture in the refrigerant system have undesirable effects as below:

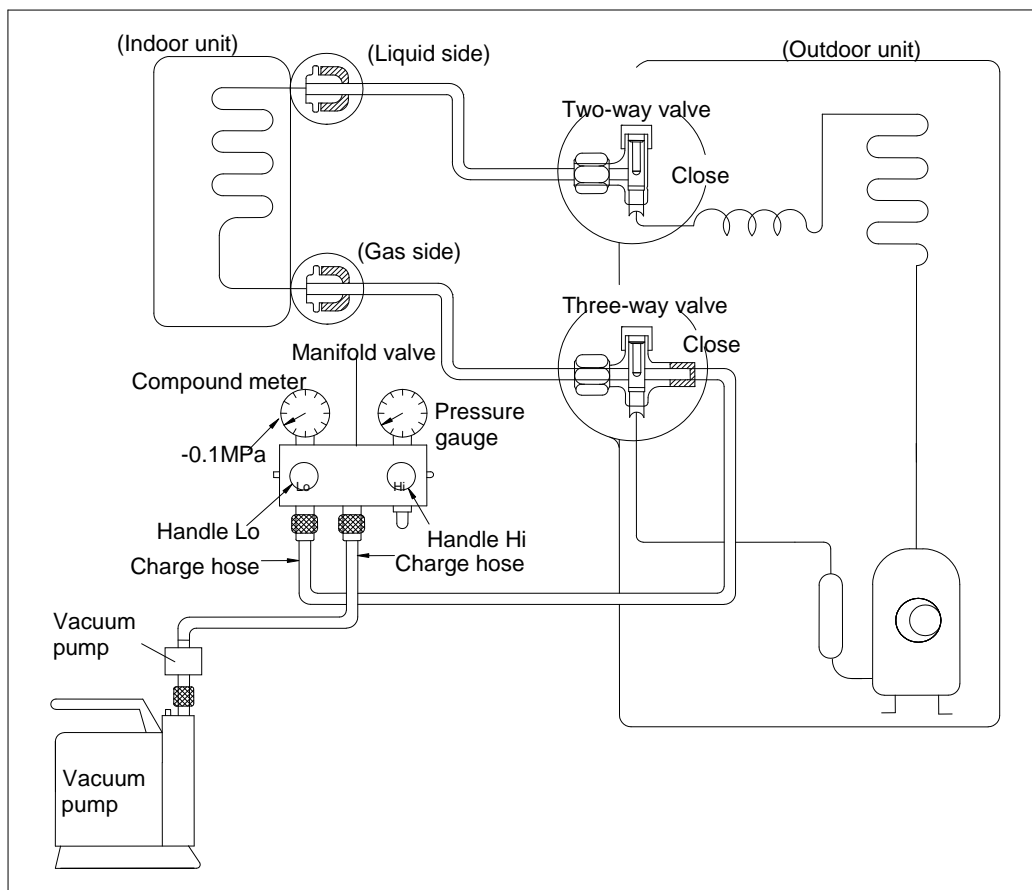
- Pressure in the system rises.
- Operating current rises.
- Cooling or heating efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigerant system.

Therefore, the indoor units and the pipes between indoor and outdoor units must be leak tested and evacuated to remove gas and moisture from the system.

Gas leak check (Soap water method):

Apply soap water or a liquid neutral detergent on the indoor unit connections or outdoor unit connections by a soft brush to check for leakage of the connecting points of the piping. If bubbles come out, the pipes have leakage.

1. Air purging with vacuum pump



- 1) Completely tighten the flare nuts of the indoor and outdoor units, confirm that both the 2-way and 3-way valves are set to the closed position
- 2) Connect the charge hose with the push pin of handle lo to the 3-way valves gas service port..
- 3) Connect the charge hose of handle hi connection to the vacuum pump.
- 4) Fully open the handle Lo of the manifold valve.
- 5) Operate the vacuum pump to evacuate.
- 6) Make evacuation for 30 minutes and check whether the compound meter indicates -0.1Mpa. If

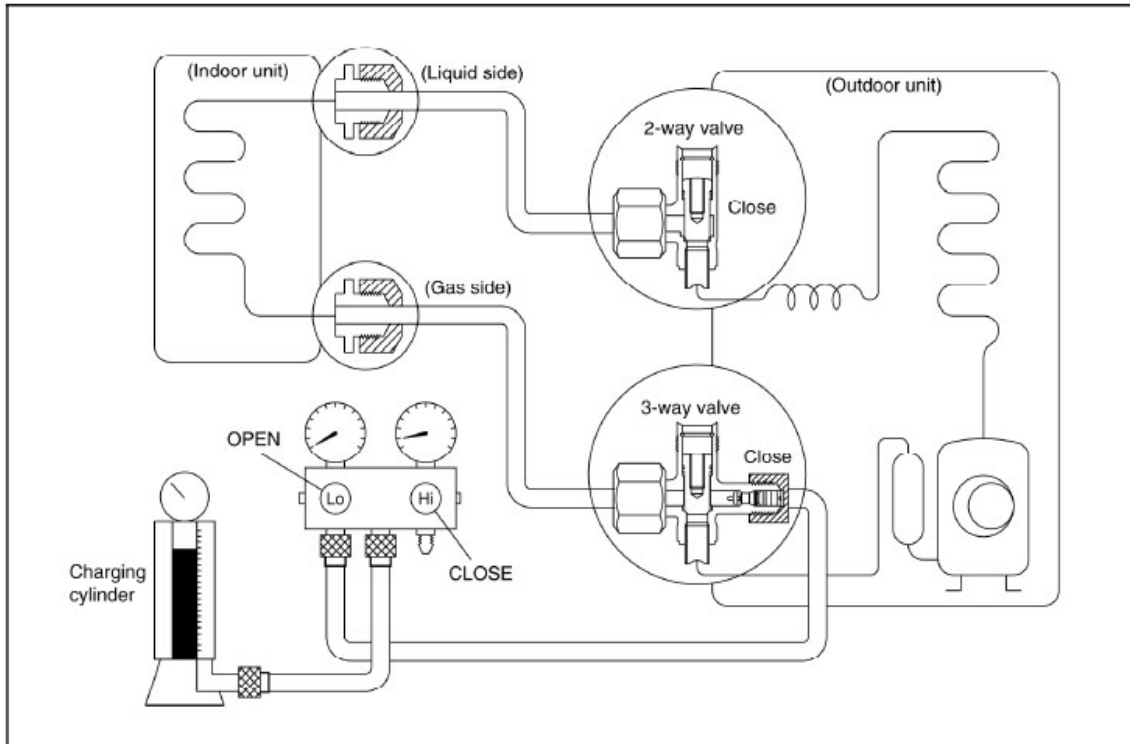
the meter does not indicate -0.1Mpa after pumping 30 minutes, it should be pumped 20 minutes more. If the pressure can't achieve -0.1Mpa after pumping 50 minutes, please check if there are some leakage points.

Fully close the handle Lo valve of the manifold valve and stop the operation of the vacuum pump. Confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).

7) Turn the flare nut of the 3-way valves about 45° counterclockwise for 6 or 7 seconds after the gas coming out, then tighten the flare nut again. Make sure the pressure display in the pressure indicator is a little higher than the atmosphere pressure. Then remove the charge hose from the 3 way valve.

8) Fully open the 2 way valve and 3 way valve and securely tighten the cap of the 3 way valve.

2. Air purging by refrigerant



Procedure:

- 1). Confirm that both the 2-way and 3-way valves are set to the closed position.
- 2). Connect the charge set and a charging cylinder to the service port of the 3-way valve.
- 3). Air purging

Open the valves on the charging cylinder and the charge set. Purge the air by loosening the flare nut on the 2-way valve approximately 45° for 3 seconds then closing it for 1 minute; repeat 3 times.

After purging the air, use a torque wrench to tighten the flare nut on the 2-way valve.

- 4). Check the gas leakage

Check the flare connections for gas leakage.

- 5). Discharge the refrigerant

Close the valve on the charging cylinder and discharge the refrigerant by loosening the flare nut on the 2-way valve approximately 45' until the gauge indicates 0.3 to 0.5 Mpa.

6). Disconnect the charge set and the charging cylinder, and set the 2-way and 3-way valves to the open position.

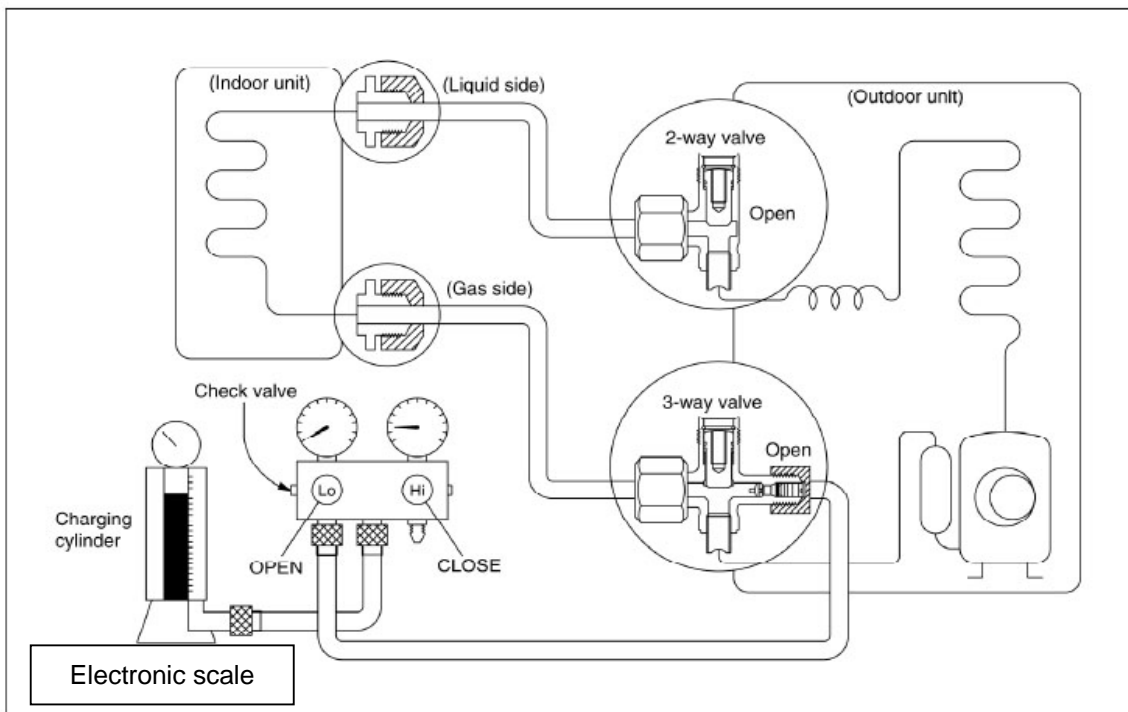
Be sure to use a hexagonal wrench to operate the valve stems.

7). Mount the valve stems nuts and the service port cap.

Be sure to use a torque wrench to tighten the service port cap to a torque 18N·m.

Be sure to check the gas leakage.

3. Adding the refrigerant if the pipe length >5m



Procedure:

1). Connect the charge hose to the charging cylinder, open the 2-way valve and the 3-way valve.

Connect the charge hose which you disconnected from the vacuum pump to the valve at the bottom of the cylinder. If the refrigerant is R410A, make the cylinder bottom up to ensure the liquid charge.

2). Purge the air from the charge hose

Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).

3) Put the charging cylinder onto the electronic scale and record the weight.

4) Operate the air conditioner at the cooling mode.

5) Open the valves (Low side) on the charge set and charge the system with liquid refrigerant.

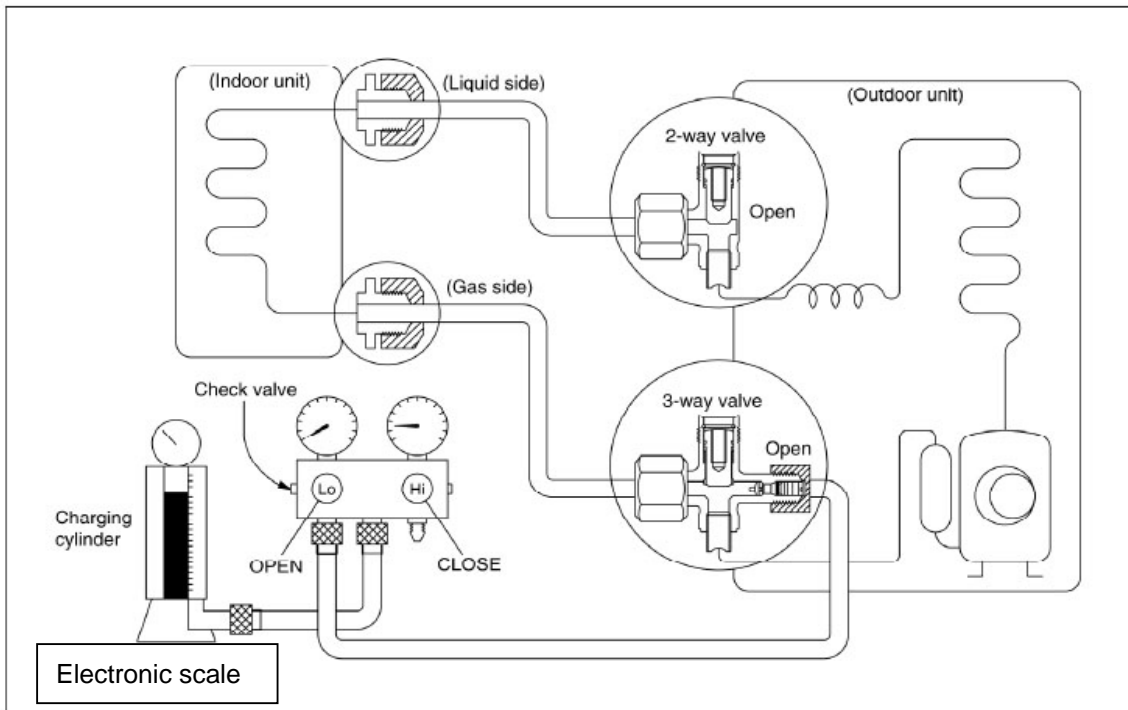
6). When the electronic scale displays the proper weight (refer to the table), disconnect the charge hose from the 3-way valve's service port immediately and turn off the air conditioner before disconnecting the hose.

7). Mount the valve stem caps and the service port

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

6.5 Adding the refrigerant after running the system for many years



Procedure:

- 1). Connect the charge hose to the 3-way service port, open the 2-way valve and the 3-way valve. Connect the charge hose to the valve at the bottom of the cylinder. If the refrigerant is R410A, make the cylinder bottom up to ensure liquid charge.
- 2). Purge the air from the charge hose
Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).
- 3) Put the charging cylinder onto the electronic scale and record the weight.
- 4) Operate the air conditioner at the cooling mode.
- 5) Open the valves (Low side) on the charge set and charge the system with liquid refrigerant.

6). When the electronic scale displays the proper weight (refer to the gauge and the pressure of the low side), disconnect the charge hose from the 3-way valve's service port immediately and turn off the air conditioner before disconnecting the hose.

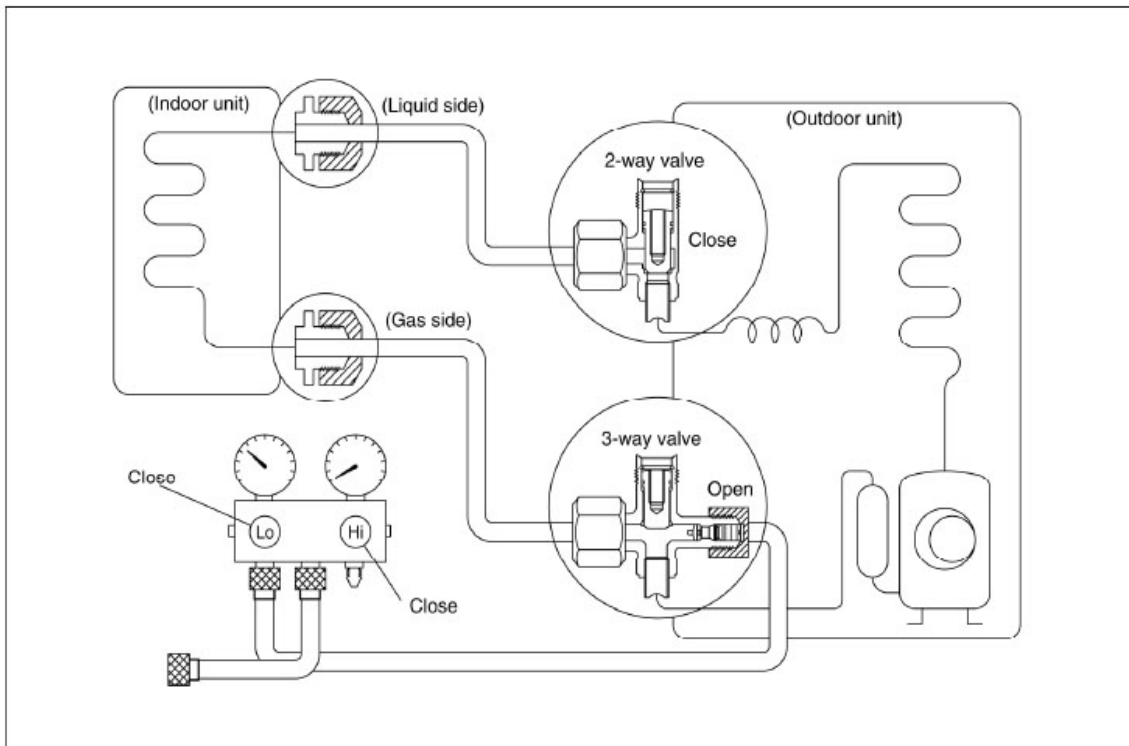
7). Mount the valve stem caps and the service port

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

6.6 Re-installation while the indoor unit need to be repaired

1. Collecting the refrigerant into the outdoor unit



Procedure

1). Confirm that both the 2-way and 3-way valves are set to the opened position.

Remove the valve stem caps and confirm that the valve stems are in the opened position.

Be sure to use a hexagonal wrench to operate the valve stems.

2). Connect the charge hose with the push pin of handle lo to the 3-way valves gas service port.

3). Air purging of the charge hose

Open the handle Lo valve of the manifold valve slightly to purge air from the charge hose for 5 seconds and then close it quickly.

4). Set the 2-way valve to the close position

- 5). Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 0.1MPa.
- 6). Set the 3-way valve to the closed position immediately.

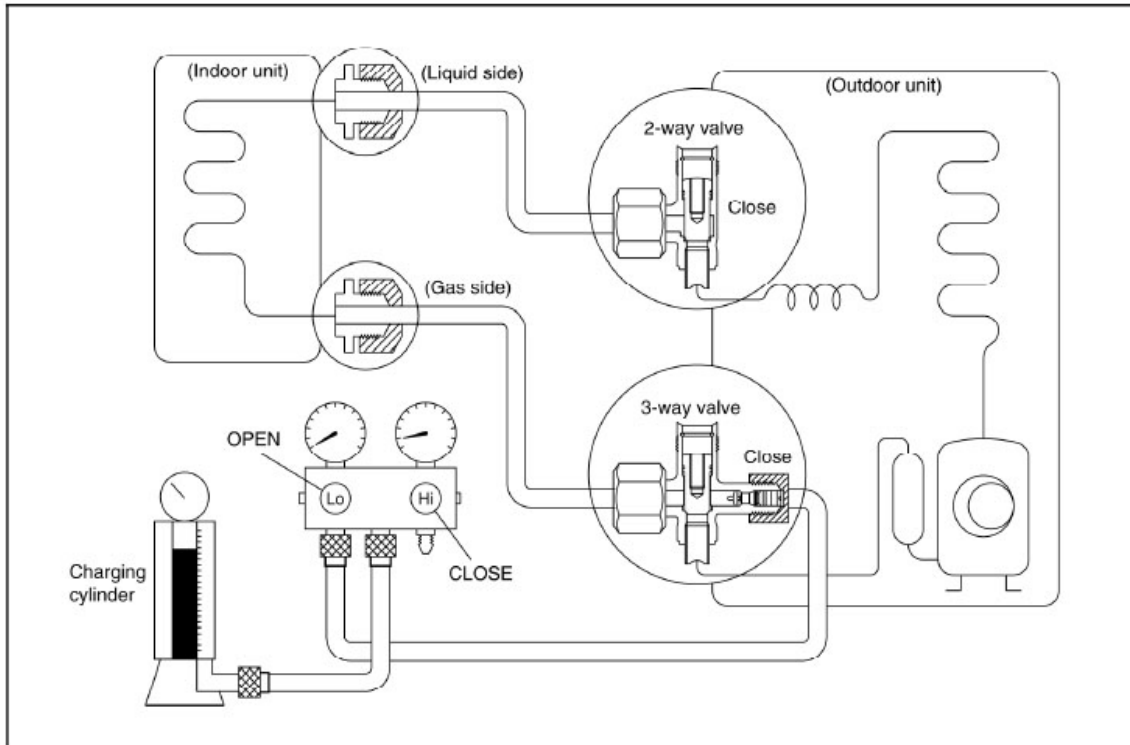
Do this quickly so that the gauge ends up indicating 0.3 to 0.5Mpa.

Disconnect the charge set, and tighten the 2-way and 3-way valve's stem nuts.

Use a torque wrench to tighten the 3-way valves service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

2. Air purging by the refrigerant



Procedure:

- 1). Confirm that both the 2-way and 3-way valves are set to the closed position.
- 2). Connect the charge set and a charging cylinder to the service port of the 3-way valve.

Leave the valve on the charging cylinder closed.

3). Air purging

Open the valves on the charging cylinder and the charge set. Purge the air by loosening the flare nut on the 2-way valve approximately 45' for 3 seconds then closing it for 1 minute; repeat 3 times.

After purging the air, use a torque wrench to tighten the flare nut on the 2-way valve.

4). Check the gas leakage

Check the flare connections for gas leakage.

5). Discharge the refrigerant

Close the valve on the charging cylinder and discharge the refrigerant by loosening the flare nut on the 2-way valve approximately 45' until the gauge indicates 0.3 to 0.5 Mpa.

6). Disconnect the charge set and the charging cylinder, and set the 2-way and 3-way valves to the open position.

Be sure to use a hexagonal wrench to operate the valve stems.

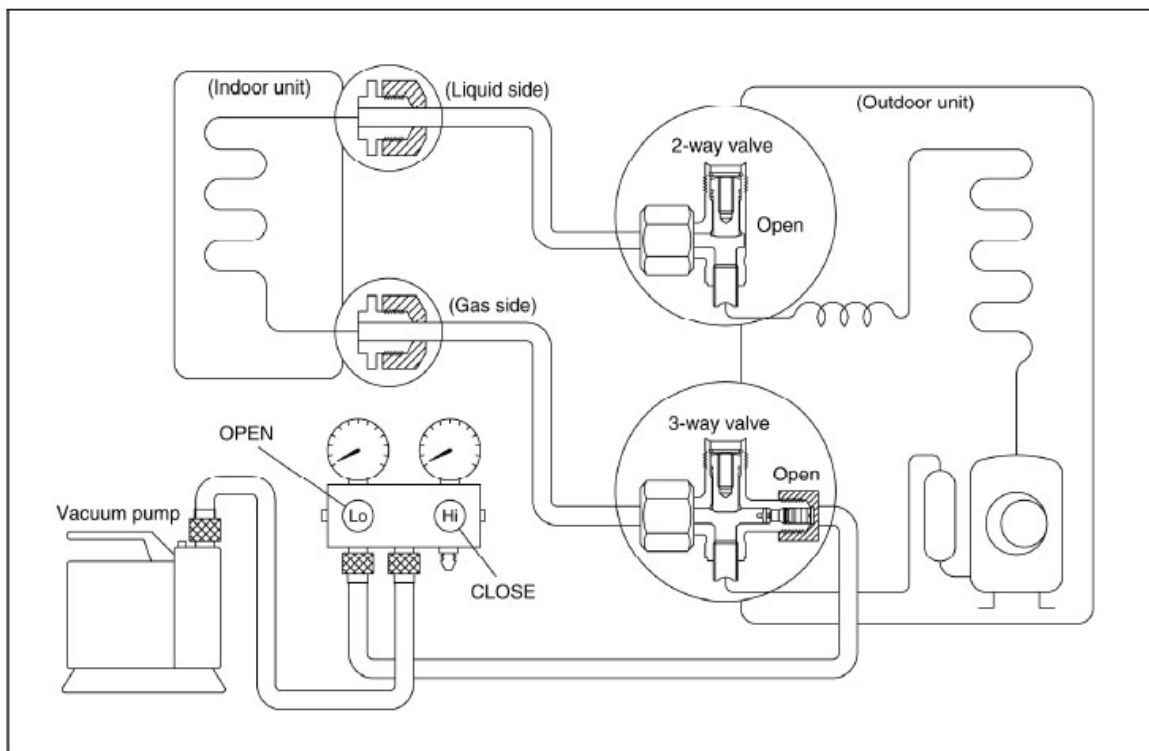
7). Mount the valve stems nuts and the service port cap.

Be sure to use a torque wrench to tighten the service port cap to a torque 18N.m.

Be sure to check the gas leakage.

6.7 Re-installation while the outdoor unit need to be repaired

1. Evacuation for the whole system



Procedure:

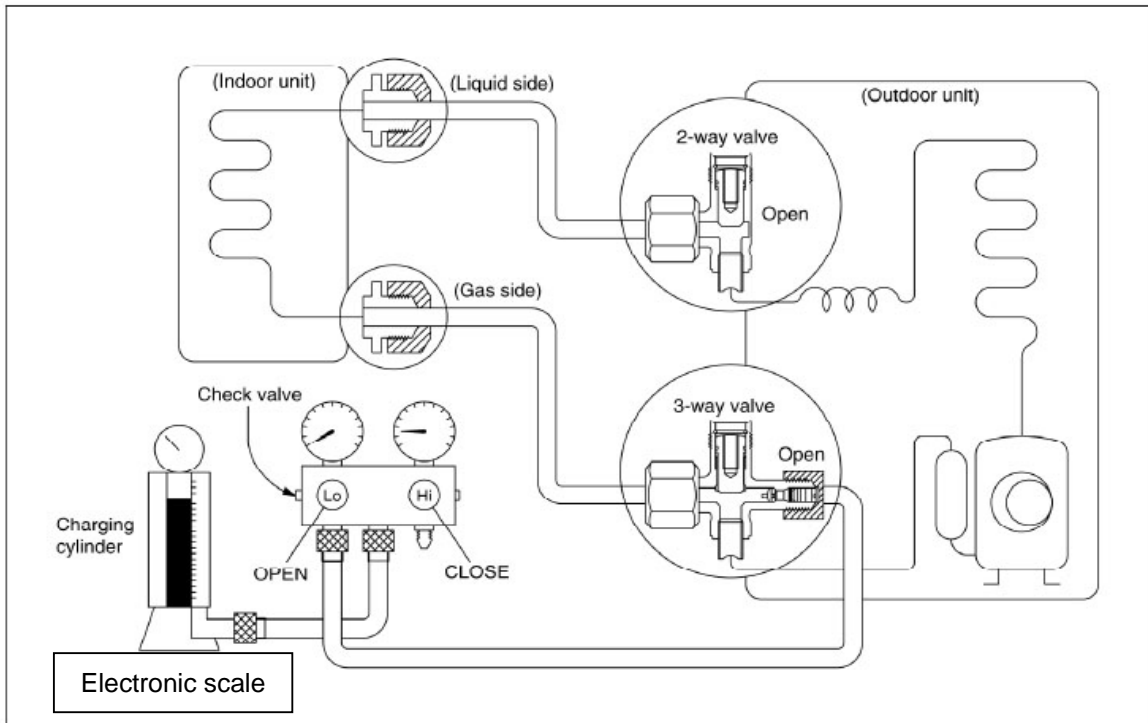
- 1). Confirm that both the 2-way and 3-way valves are set to the opened position.
- 2). Connect the vacuum pump to 3-way valve's service port.
- 3). Evacuation for approximately one hour

Confirm that the compound meter indicates -0.1Mpa.

- 4). Close the valve (Low side) on the charge set, turn off the vacuum pump, and confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).

5). Disconnect the charge hose from the vacuum pump.

2. Refrigerant charging



Procedure:

1). Connect the charge hose to the charging cylinder, open the 2-way valve and the 3-way valve.

Connect the charge hose which you disconnected from the vacuum pump to the valve at the bottom of the cylinder. If the refrigerant is R410A, make the cylinder bottom up to ensure liquid charge.

2). Purge the air from the charge hose

Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).

3) Put the charging cylinder onto the electronic scale and record the weight.

4). Open the valves (Low side) on the charge set and charge the system with liquid refrigerant.

If the system cannot be charge with the specified amount of refrigerant, or can be charged with a little at a time (approximately 150g each time) , operating the air conditioner in the cooling cycle; however, one time is not sufficient, wait approximately 1 minute and then repeat the procedure.

5).When the electronic scale displays the proper weight, disconnect the charge hose from the 3-way valve's service port immediately.

If the system has been charged with liquid refrigerant while operating the air conditioner, turn off the air conditioner before disconnecting the hose.

6). Mounted the valve stem caps and the service port

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

7. Operation characteristics

Model Temperature	Cooling operation	Heating operation	Drying operation
Room temperature	17°C~32°C	0°C~30°C	10°C~32°C 17°C~32°C
Outdoor temperature	18°C~43°C	-7°C~24°C	11°C~43°C 18°C~43°C
	(-7°C~43°C: For the models with low temperature cooling system)		18°C~52°C (For special tropical models)
	(18°C~52°C: For special tropical models)		

CAUTION:

1. If the air conditioner is used beyond the above conditions, certain safety protection features may come into operation and cause the unit to operate abnormally.
2. The room relative humidity should be less than 80%. If the air conditioner operates beyond this figure, the surface of the air conditioner may attract condensation. Please set the vertical air flow louver to its maximum angle (vertically to the floor), and set HIGH fan mode.
3. The optimum performance will be achieved during this operating temperature zone.

8. Electronic function

8.1 Abbreviation

T1: Indoor room temperature

T2: Coil temperature of evaporator

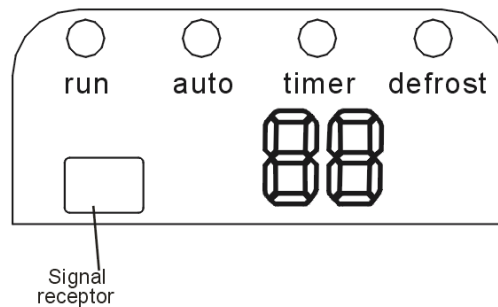
T3: Coil temperature of condenser

T4: Outdoor ambient temperature

T5: Compressor discharge temperature

8.2 Display function

8.2.1 Icon explanation on indoor display board.



Run indication lamp:	This lamp illuminates when the air conditioner is in operation.
Auto indication lamp:	Lights up during the Auto operation.
Timer indication lamp:	Lights up during Timer operation.
Defrost indication lamp:	This indicator illuminates when the air conditioner starts defrosting automatically or when the anti-cold wind function is activated in heating operation.
Digital display indication lamp:	Displays current setting temperature or malfunction codes when the air conditioner is in operation.

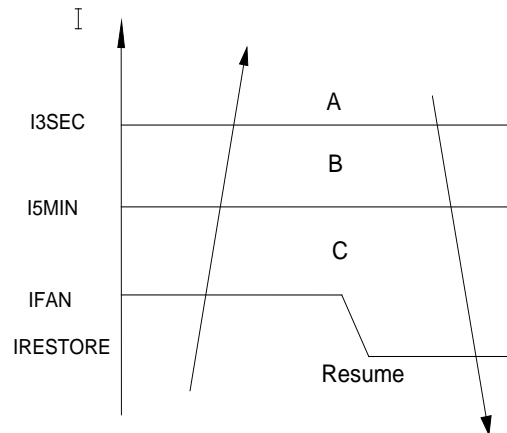
8.3 Main Protection

8.3.1 Time Delay at restart for the compressor

8.3.2 Fan Speed is out of control.(except MS9A-24HRN1-QB8W models)

----When the indoor fan speed keeps too low or too high for certain time, the unit will stop and the LED will display the failure

8.3.3 Current protection



A zone : The current exceeds I_{3SEC} for 5 seconds, the compressor and outdoor fan will shut off.

B zone: The current exceeds I_{5min} for 5 minutes, the compressor and outdoor fan will shut off.

C zone: The current exceeds I_{FAN} , the outdoor fan will shut off if AC is in heating mode. If AC is in cooling mode, the indoor fan will run at low speed.

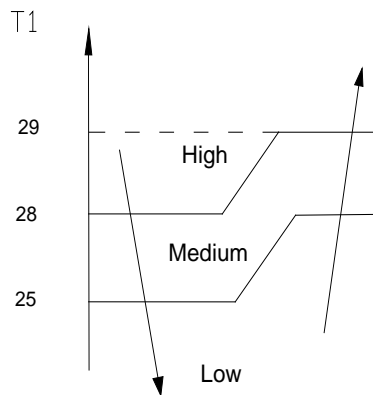
8.3.4 Zero crossing detection error protection(except MS9A-24HRN1-QB8W models)

If AC can not detect zero crossing signal for 4 minutes or the zero crossing signal time interval is not correct, the unit will stop and the LED will display the failure. The correct zero crossing signal time interval should be between 6-13ms.

8.4 Operation Modes and Functions

8.4.1 Fan mode

- (1) Outdoor fan and compressor stop.
- (2) Temperature setting function is disabled, and no setting temperature is displayed.
- (3) Indoor fan can be set to high/med/low/auto.
- (4) The louver operates the same as in cooling mode.
- (5) Auto fan:

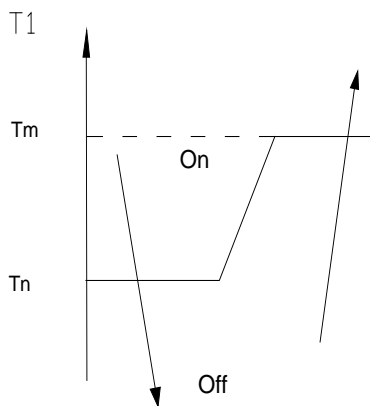


8.4.2 Cooling Mode

8.4.2.1 Compressor running rules

Once the compressor starts up, it will follow the below rules:

When indoor room temp. T_1 is lower than T_n , the compressor and outdoor fan will shut off. When T_1 is higher than T_m , the compressor and outdoor fan will start up.



$T_m = T_s + 1$, $T_n = T_s - 1$ for MS9A-24HRN1-QB8W models

$T_m = T_s + 1$, $T_n = T_s$ for other models.

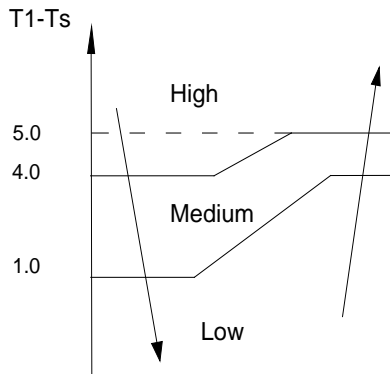
8.4.2.2 Outdoor fan running rules

The outdoor units have single fan speed. The outdoor fan will run following the action of the

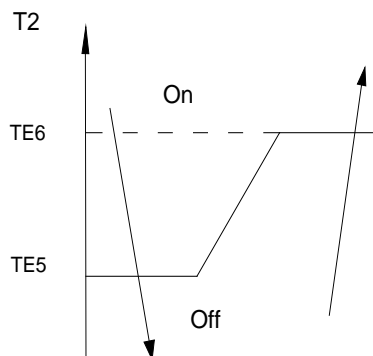
compressor except when AC is in evaporator high temp. protection in heating mode ,defrosting mode and the current protection.

8.4.2.3 Indoor fan running rules

In cooling mode, indoor fan runs all the time and the speed can be selected as high, medium, low and auto.



8.4.2.4 Low evaporator coil temperature T2 protection



When the evaporator coil temp.T2 keeps lower than TE5 for 5 minutes, the compressor and outdoor fan will shut off.

When T2 is higher than TE6, the compressor and outdoor fan will restart up.

8.4.2.5 Condenser high temperature T3 protection(For MS9A-24HRN1-QB8W models)

When $T3 \geq 65^{\circ}\text{C}$, the compressor will stop and restart until $T3 < 55^{\circ}\text{C}$.

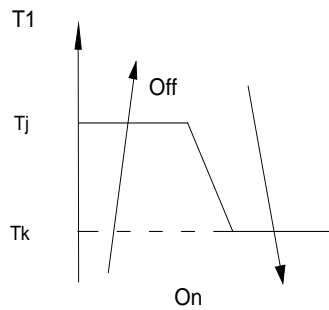
During the protection, the outdoor fan keeps working.

8.4.3 Heating Mode

8.4.3.1 Compressor running rules

Once the compressor starts up, it will follow the below rules:

When the indoor room temp.T1 is higher than T_j , the compressor and outdoor fan will shut off. When T1 is lower than T_k , the compressor and outdoor fan will start up.



$$T_j = T_s + T_c$$

$$T_k = T_s + T_c - 1.$$

8.4.3.2 Outdoor fan running rules

The outdoor units have single fan speed. The outdoor fan will run following the action of the compressor except when AC is in evaporator high temp. protection in heating mode ,defrosting mode and the current protection.

8.4.3.3 Indoor fan running rules

Indoor fan can be set to high/med/low/auto when the compressor is on. And when the compressor is off, the indoor fan will run at low speed and the louver will locate at the anti cold wind angle.

Anti-cold wind function:

When evaporator coil temp. T2 is getting higher,

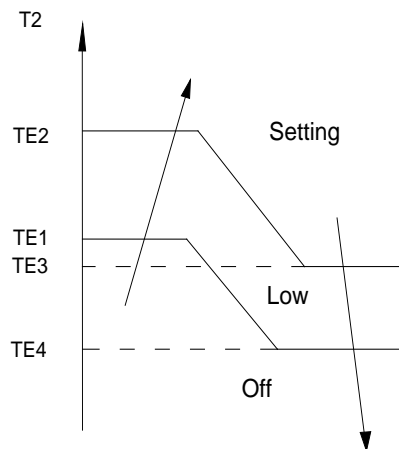
$T_2 > TE_2$, the indoor fan will run at setting speed.

$TE_1 < T_2 < TE_2$, the indoor fan will run at low speed.

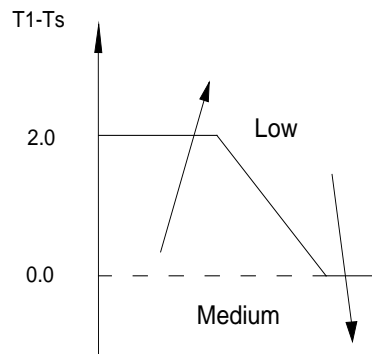
When T2 is getting lower,

$TE_4 < T_2 < TE_3$, the indoor fan will run at low speed.

$T_2 < TE_4$, the indoor fan will shut off.



Auto fan action:



When $T1-Ts > 2^{\circ}\text{C}$, the indoor fan will run at low speed. When $T1-Ts \leq 0^{\circ}\text{C}$, the indoor fan will run at medium speed.

8.4.3.4 Defrosting mode

- **Condition of defrosting:**

For 7k,9k,12k,16k,17k,18k models:

AC will enter defrosting mode if any of the following items is satisfied.

(1) Both A and B are satisfied

A: The compressor keeps running for 40 minutes.

B: The evaporator coil temp. $T2$ -Indoor room temp. $T1$ meets the below table.

$^{\circ}\text{C}$	$T2 - T1$
High speed	$< TH_{\text{DEFROST}}$
Medium speed	$< TM_{\text{DEFROST}}$
Low speed	$< TL_{\text{DEFROST}}$
Breeze/off	No need to compare the $T2$ and $T1$

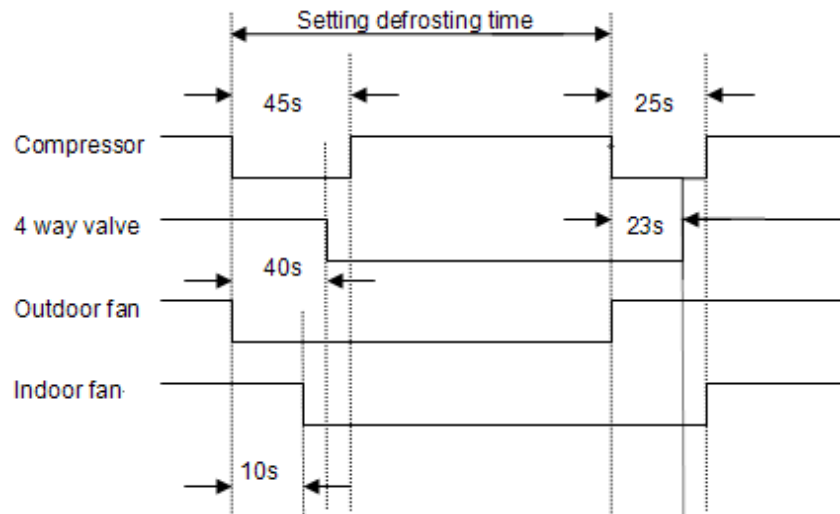
(2) After the last defrosting, the time that the outdoor fan is off but the compressor is on in high $T2$ protection cumulates up to 90 minutes.

- **Condition of ending defrosting:**

If any one of the following items is satisfied, the defrosting will terminate and the machine will turn to normal heating mode.

- (1) The defrosting time is reached to the setting value.
- (2) The compressor current has reached or exceeded I_{DEFROST} for 7 seconds.

- **Defrosting action:**



About the setting defrosting time:

- (1) Condition 1 of defrosting;

If case B happens before case A and lasts till case A happens, the setting defrosting time is 10 minutes.

Otherwise the defrosting time is 7.5 minutes.

- (2) Condition 2 of defrosting.

The defrosting time is 10 minutes.

- (3) No matter what condition of the defrosting is, if the defrosting time keeps 7.5 minutes for 3 times, it will be 10 minutes in the 4th defrosting.

For MS9A-09HRN1-QB8, MS9A-09HRN1-QC2(2T0032300908),MS9A-11HRN1-QB8,

MS9A-16HRN1-QB8(A):

Condition of defrosting:

If any one of following items is satisfied, defrosting will start.

Condition 1: Both the following conditions are satisfied:

A: If the working time of the compressor accumulates to 42 min and one continuous working time is more than 330s.

B: Check the temperature difference between T2 and T1

Fan speed	°C	T2-T1	Note
High		$< T_{H_DEFROST}$	If indoor fan is in high speed and $T2-T1 < T_{H_DEFROST}$, start defrosting
Medium		$< T_{M_DEFROST}$	If indoor fan is in medium speed and $T2-T1 < T_{M_DEFROST}$, start defrosting
Low		$< T_{L_DEFROST}$	If indoor fan is in low speed and $T2-T1 < T_{L_DEFROST}$, start defrosting
Breeze or stop		/	If indoor fan is breezing or stopped, start defrosting

Capacity	T2-T1		
	$T_{H_DEFROST}$	$T_{M_DEFROST}$	$T_{L_DEFROST}$
MS9A-16HRN1-QB8(A)	16	18	19

Condition 2: If the accumulated time of outdoor fan stopped but the compressor keep working due to evaporator high temperature protection mode reaches 90 min from the end of last defrosting mode.

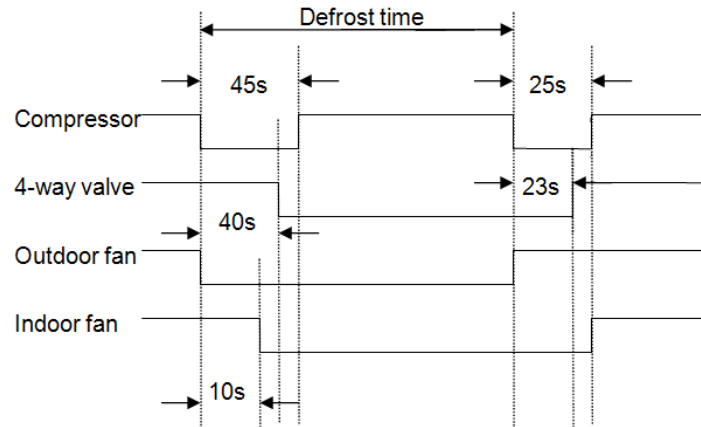
Condition of defrosting stop:

If any one of following conditions occurs, the defrosting will finish and the machine will turn to normal heating mode.

Condition 1: Reached the defrosting time.

Condition 2: The current of compressor is more than $I_{defrost}$ continuously more than 7s. The value of $I_{defrost}$ is depending on the exactly machine.

Defrosting actions:



During the defrosting mode, if the machine stopped or transferred to other mode, the defrosting mode will stop, and all the defrosting conditions will be cleared.

For 21k,24k models:

- **Condition of defrosting:**

AC will enter defrosting mode if any of the following items is satisfied.

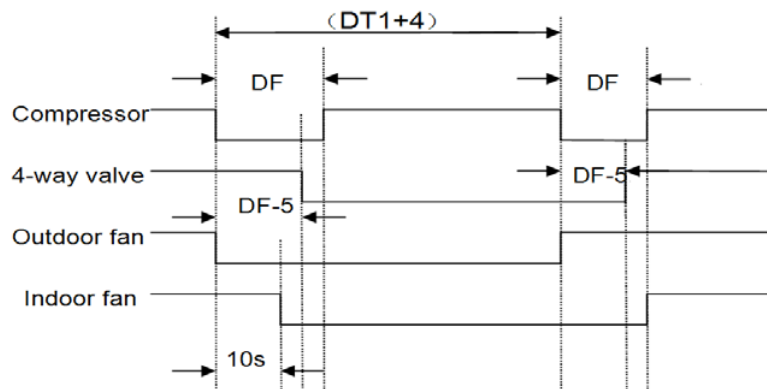
- (1) If $T3 < TC1$ and the compressor keeps running over 45 minutes. Meanwhile $T3 < TC3$ for 3 minutes.
- (2) After the last defrosting, the time that the outdoor fan is off but the compressor is on in high $T2$ protection cumulates up to 90 minutes.

- **Condition of ending defrosting:**

If any one of the following items is satisfied, the defrosting will terminate and the machine will turn to normal heating mode.

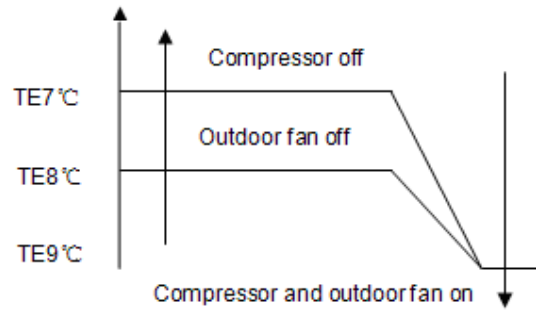
- (1) $T3$ rises to be higher than $TC2$.
- (2) The machine has run for 10 minutes in defrosting.

- **Defrosting action:**

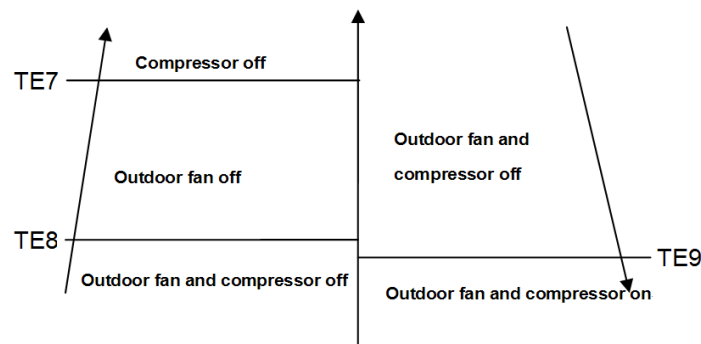


8.4.3.5 High evaporator coil temp.T2 protection

For 7k,9k,12k,16k,17k,18k models:



For 21k,24k models:



8.4.4 Auto-mode

The machine will choose cooling, heating or fan-only mode according to ΔT ($\Delta T = T1 - Ts$).

$\Delta T = T1 - Ts$	Running mode
$\Delta T > 2\text{ }^{\circ}\text{C}$	Cooling
$-1^{\circ}\text{C} \leq \Delta T \leq 2^{\circ}\text{C}$	Fan-only
$\Delta T < -1\text{ }^{\circ}\text{C}$	Heating (for cooling only models, they will run at fan-only mode)

AC will run in auto mode in the below cases:

- (1) Pressing the forced auto button.
- (2) If AC is off, it will run in auto mode when the timer on function is active.
- (3) After setting the mode, AC will run in auto mode if the compressor keeps not running for 15 minutes.

8.4.5 Drying mode

For 7k,9k,12k,16k,17k,18k models:

8.4.5.1 The indoor fan will run following the action of the compressor. If the compressor is on, the indoor fan will run at low speed. If the compressor is off, the indoor fan will run at breeze.

Running rules:

No	Condition	Indoor fan	Compressor
1	$T1 - T_s \geq 2$	Low Breeze	ON 6 minutes OFF 4 minutes
2	$0 \leq T1 - T_s < 2$	Low Breeze	ON 5 minutes OFF 5 minutes
3	$T1 - T_s < 0$	Low Breeze	ON 4 minutes OFF 6 minutes

In drying mode, if the room temperature is lower than 10°C, the indoor fan will run at breeze while the compressor and outdoor fan will stop and not resume until room temperature exceeds 13°C.

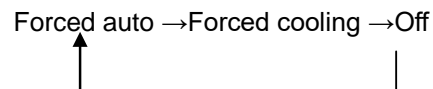
For 21k,24k models:

8.4.5.2 The indoor fan keeps run at low speed. The compressor and outdoor fan run the same as in cooling mode.

8.4.5.3 The system protection is active in this mode.

8.4.6 Forced operation function

Press the touch button continually, the AC will run as below sequence:



Forced cooling mode:

The compressor and outdoor fan keep running and the indoor fan runs at low speed. After running for 30 minutes, AC will turn to drying mode with 24°C setting temperature.

Forced auto mode:

The action of forced auto mode is the same as normal auto mode with 24°C setting temperature.

When AC receives signals, such as switch on, switch off, timer on, timer off, mode setting, fan speed setting, sleep mode setting, follow me setting, it will quit the forced operation.

8.4.7 Timer function

8.4.7.1 Timing range is 24 hours.

8.4.7.2 Timer on. The machine will turn on automatically when reaching the setting time.

8.4.7.3 Timer off. The machine will turn off automatically when reaching the setting time.

8.4.7.4 Timer on/off. The machine will turn on automatically when reaching the setting "on" time, and

then turn off automatically when reaching the setting “off” time.

8.4.7.5 Timer off/on. The machine will turn off automatically when reaching the setting “off” time, and then turn on automatically when reaching the setting “on” time.

8.4.7.6 The timer function will not change the AC current operation mode. Suppose AC is off now, it will not start up firstly after setting the “timer off” function. And when reaching the setting time, the timer LED will be off and the AC running mode has not been changed.

8.4.7.7 The setting time is relative time.

8.4.8 Sleep function mode

8.4.8.1 Operation time in sleep mode is 7 hours. After 7 hours running, the AC will quit this mode and turn off.

8.4.8.2. Operation process in sleep mode is as follow:

After pressing ECONOMIC or SLEEP button on the controller, the machine will turn into sleep mode.

When cooling, the setting temperature rises 1 °C (be lower than the indoor fan is fixed as low speed.

For heat pump models, when they are in heating, the setting temperature decreases 1 °C (be higher than 17 °C). The indoor fan is fixed as low speed. (Anti-cold wind function has the priority)

8.4.8.3 Timer setting is available

8.4.8.4 When user uses timer off function in sleep mode (or sleep function in timer off mode), if the timing is less than 7 hours, sleep function will be cancelled when reaching the setting time. If the timing is more than 7 hours, the machine will not stop until reaches the setting time in sleep mode.

8.4.9 Auto-Restart function

The indoor unit is equipped with auto-restart function, which is carried out through an auto-restart module. In case of a sudden power failure, the module memorizes the setting conditions before the power failure. The unit will resume the previous operation setting (not including swing function) automatically after 3 minutes when power returns.

If the memorization condition is forced cooling mode, the unit will run in cooling mode for 30 minutes and turn to drying mode with 24 °C setting temp.

If AC is off before power off and AC is required to start up now, the compressor will have 20 seconds

delay when power on. If AC is on before power off and AC is required to start up now, the compressor will have 3 minutes delay when power on.

indoor fan restarts after malfunctions being eliminated and anti-cold-wind being released, Ionizer will be available again.

8.4.10 8°C Heating(optional)

In heating operation, the preset temperature of the air conditioner can be as lower as 8°C, which keeps the room temperature steady at 8°C and prevents household things freezing when the house is unoccupied for a long time in severe cold weather.

9. Troubleshooting

9.1 Indoor unit error display

For MS9A-09HRN1-QB8, MS9A-09HRN1-QC2(2T0032300908), MS9A-11HRN1-QB8, MS9A-16HRN1-QB8(A):

Display	LED STATUS
E1	EEPROM error
E2	Zero crossing signal detection error
E3	Indoor fan speed has been out of control
E4	Over current protection of the compressor occurs 4 times
E5	Open circuit or short circuit of room temperature sensor
E6	Evaporator temperature sensor open circuit or short circuit

For 21k,24k models:

Display	LED STATUS
E1	EEPROM error
E4	Over current protection of the compressor occurs 4 times
E5	Indoor room temperature sensor T1 open circuit or short circuit
E6	Evaporator coil temperature sensor T2 open circuit or short circuit
E7	Condenser coil temperature sensor T3 open circuit or short circuit
E9	Indoor / outdoor units communication error

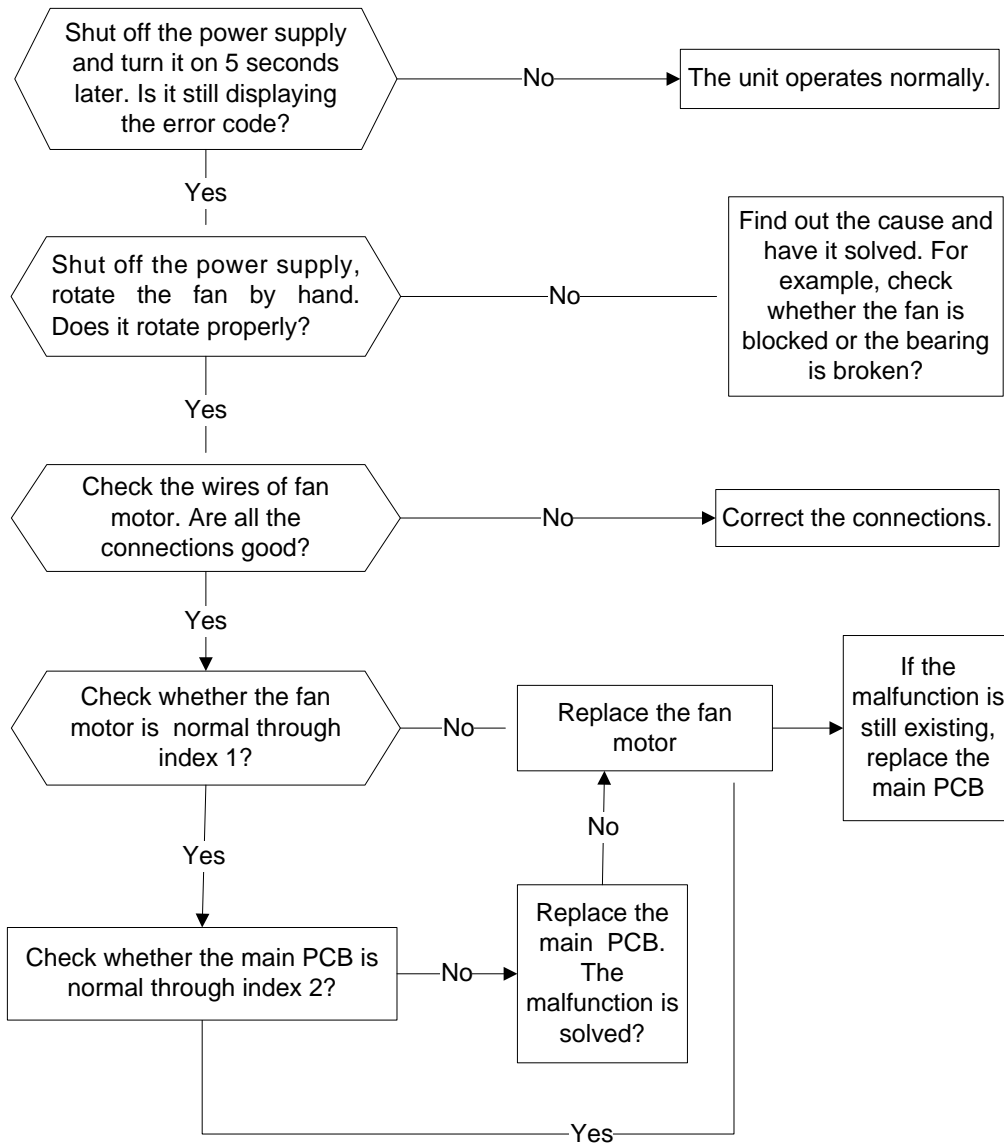
For other models

Operation lamp	Timer lamp	Failure
☆	X	Indoor fan speed has been out of control
☆	O	The T1 or T2 sensor is open circuit or short circuit
X	☆	Over current protection occurs 4 times(for MS9A-12HRN1-QC2 with BOM code 220032402100,it doesn't have this kind of protection)
O	☆	EEPROM error
☆	☆	Zero crossing signal detection error

O (light) X (off) ☆ (flash)

9.2 Diagnosis and Solution

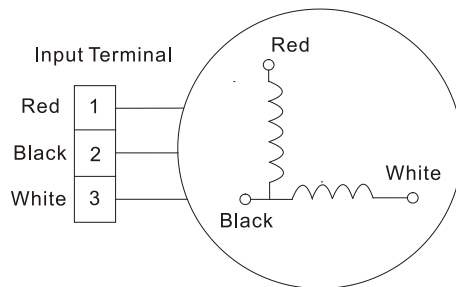
9.2.1 Indoor fan speed has been out of control diagnosis and solution



Index 1:

1. Indoor AC Fan Motor

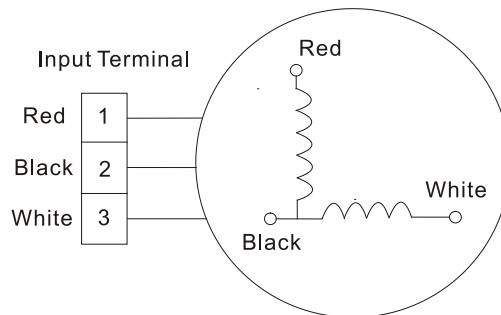
Measure the resistance value of each winding by using the tester.



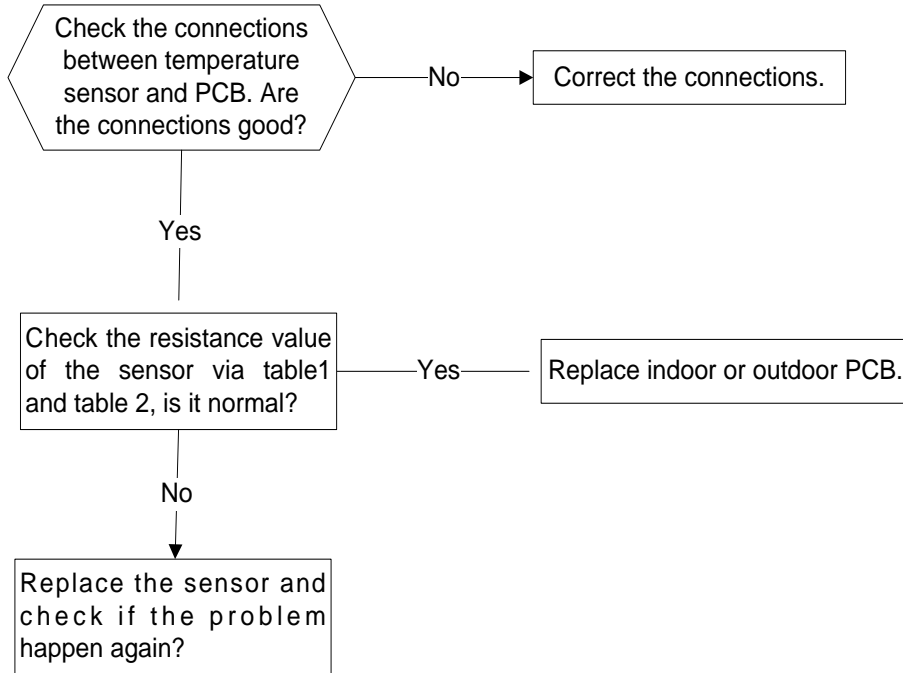
Index2:

1: Indoor AC Fan Motor

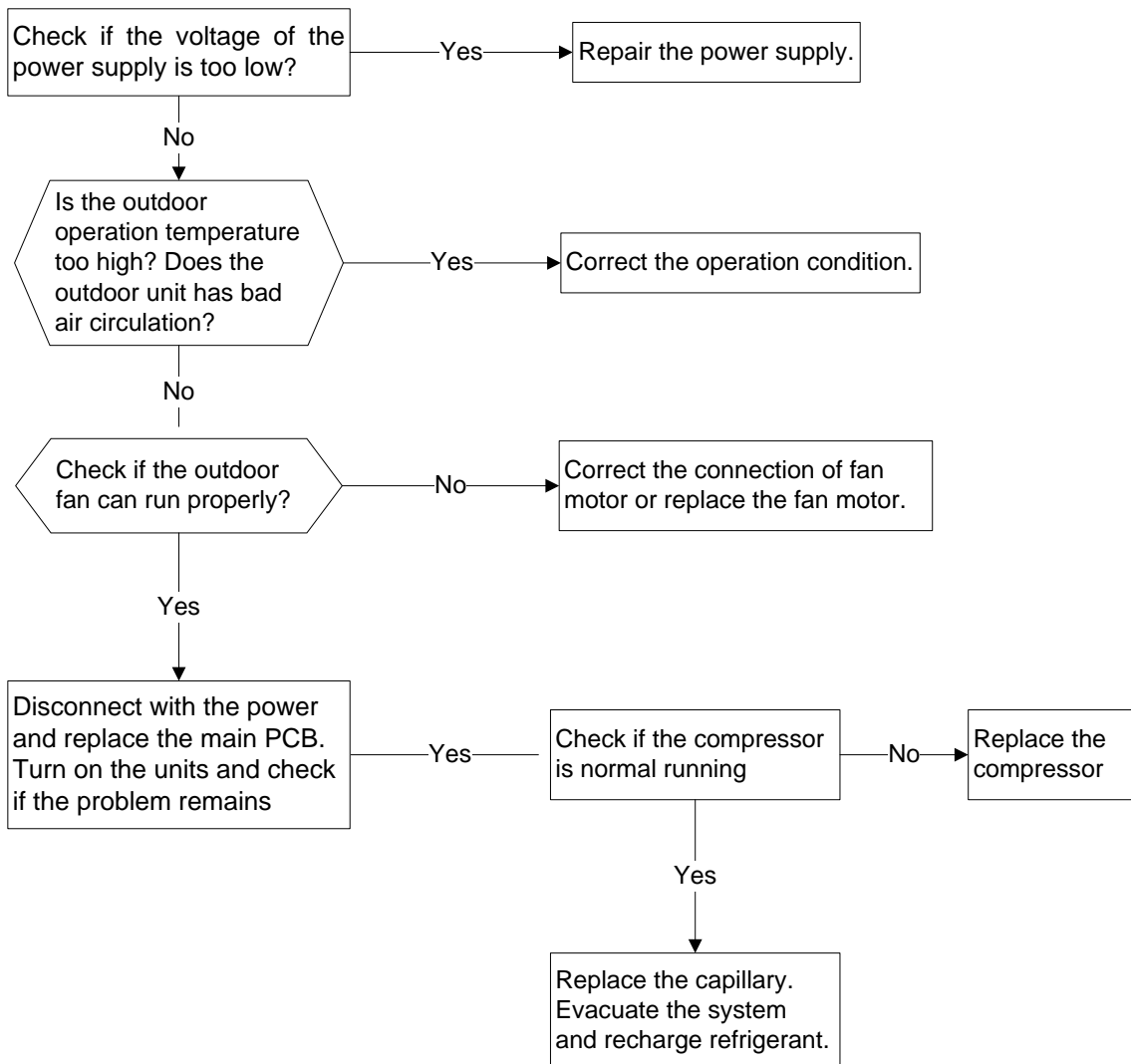
Power on and set the unit running in fan mode at high fan speed. After running for 15 seconds, measure the voltage of pin1 and pin2. If the value of the voltage is less than 100V(208~240V power supply) or 50V(115V power supply), the PCB must have problems and need to be replaced.



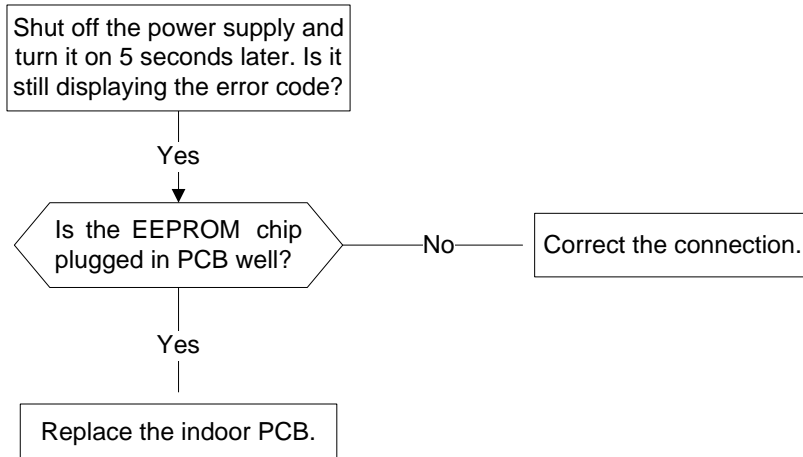
9.2.2 The temp sensor is open circuit or short circuit diagnosis and solution



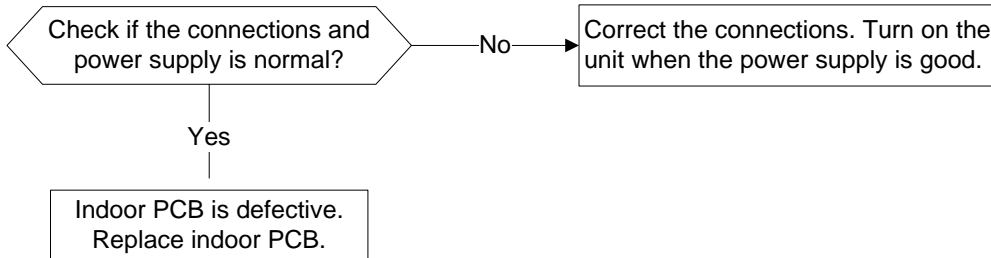
9.2.3 Over current protection occurs 4 times diagnosis and solution



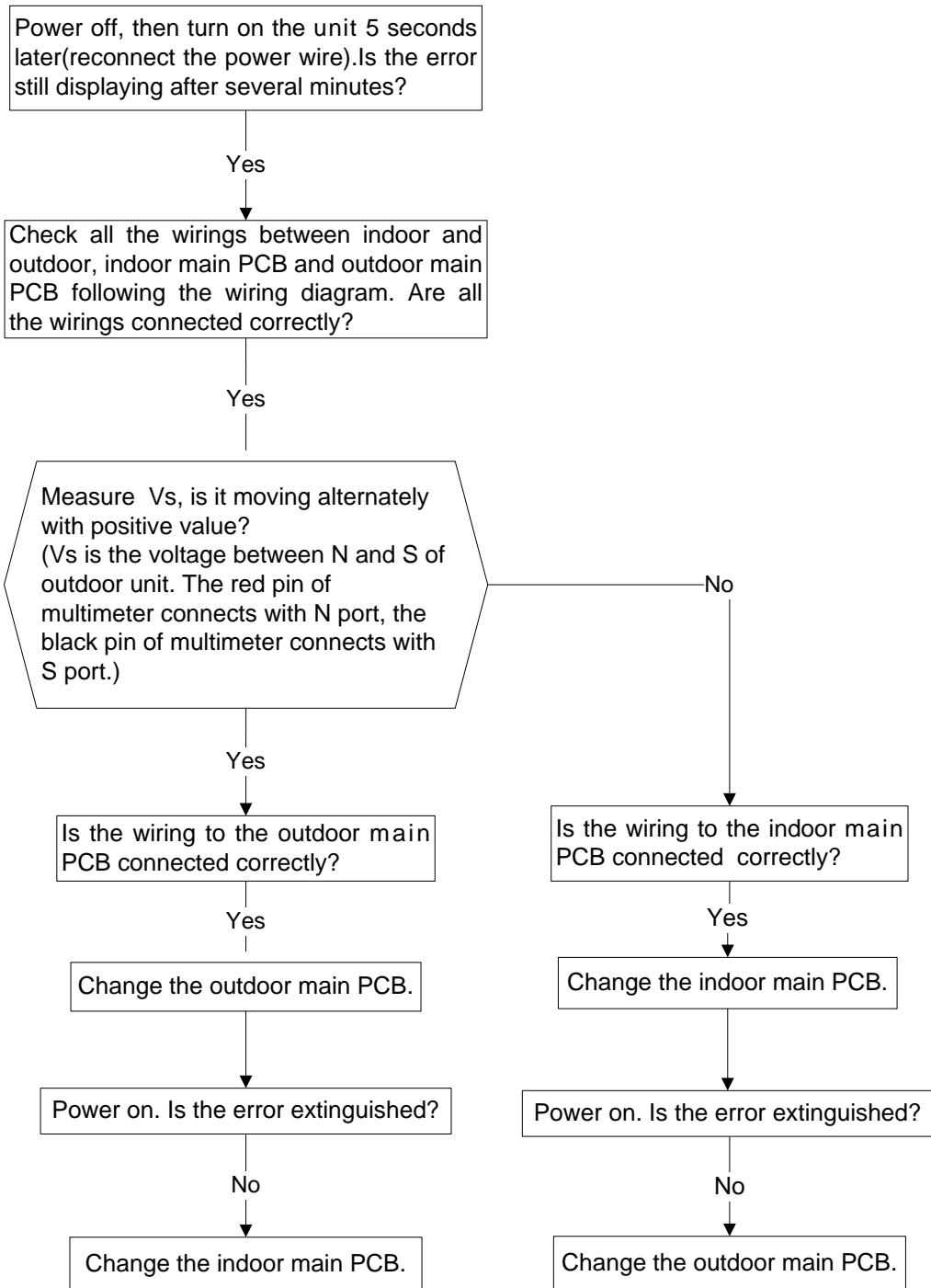
9.2.4 EEPROM parameter error diagnosis and solution



9.2.5 Zero crossing detection error diagnosis and solution



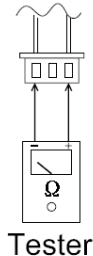
9.2.6 Indoor unit and outdoor unit communication malfunction diagnosis and solution



Main parts check

1. Temperature sensor checking

Disconnect the temperature sensor from PCB, measure the resistance value with a tester.



Temperature Sensors.

Room temp.(T1) sensor,

Indoor coil temp.(T2) sensor,

Outdoor coil temp.(T3) sensor,

Outdoor ambient temp.(T4) sensor,

Compressor discharge temp.(T5) sensor.

Measure the resistance value of each winding by using the multi-meter.

Table1:Some frequently-used R-T data for T1,T2,T3 and T4 sensor:

Temperature (°C)	5	10	15	20	25	30	40	50	60
Resistance Value (KΩ)	26.9	20.7	16.1	12.6	10	8	5.2	3.5	2.4

Table 2:Some frequently-used R-T data for T5 sensor:

Temperature (°C)	5	15	25	35	60	70	80	90	100
Resistance Value (KΩ)	141.6	88	56.1	36.6	13.8	9.7	6.9	5	3.7

Resistance value (KΩ)

