



GMV IV

THE 4TH GENERATION OF

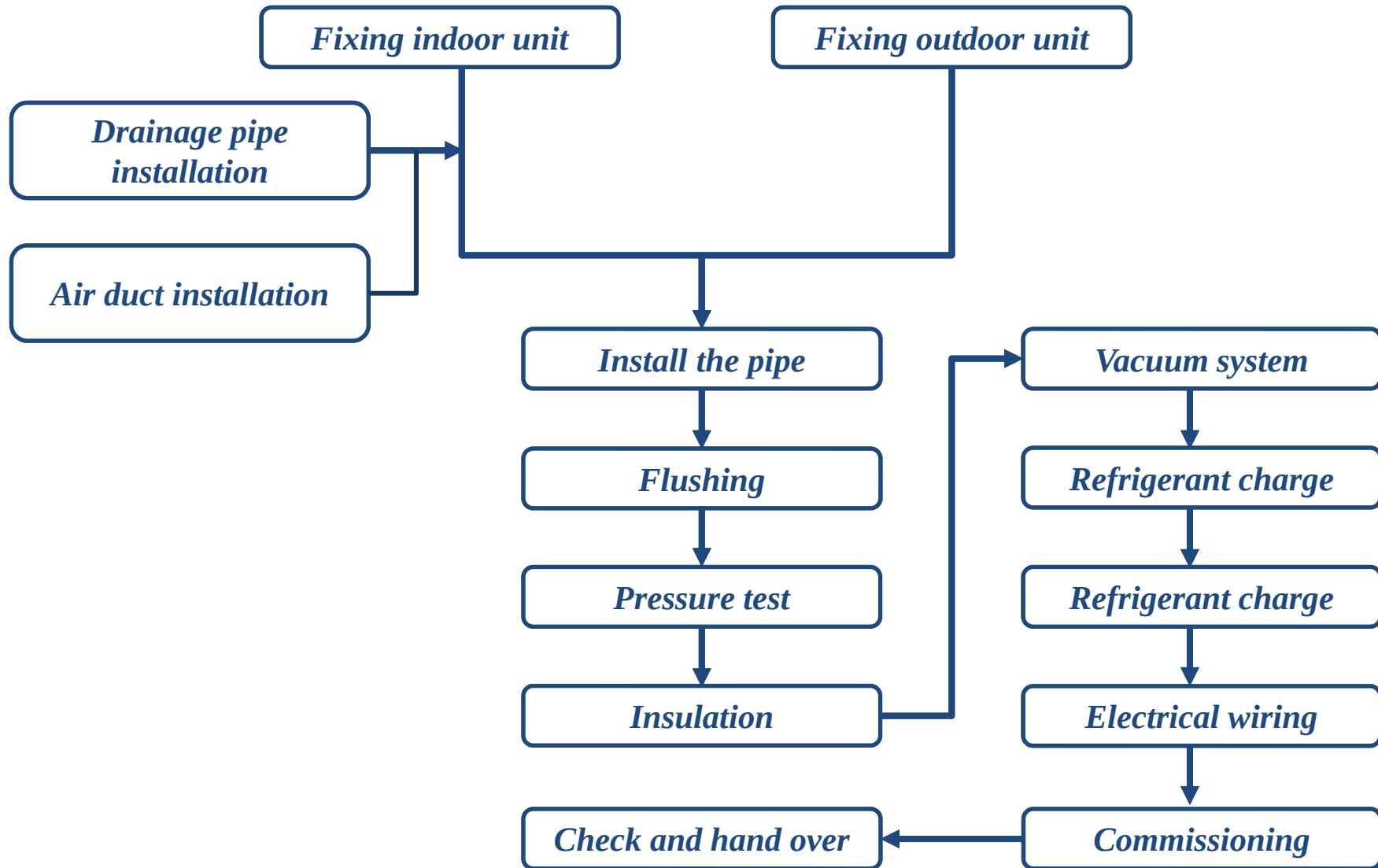
GREE MULTI VRF SYSTEM

Installation

Installation



GREE-Yeong
Dec.21th, 2011



1.Indoor unit installation

2.Outdoor unit installation

3.Piping/Pressure/Vacuum

4.Electrical wiring

5.Tools

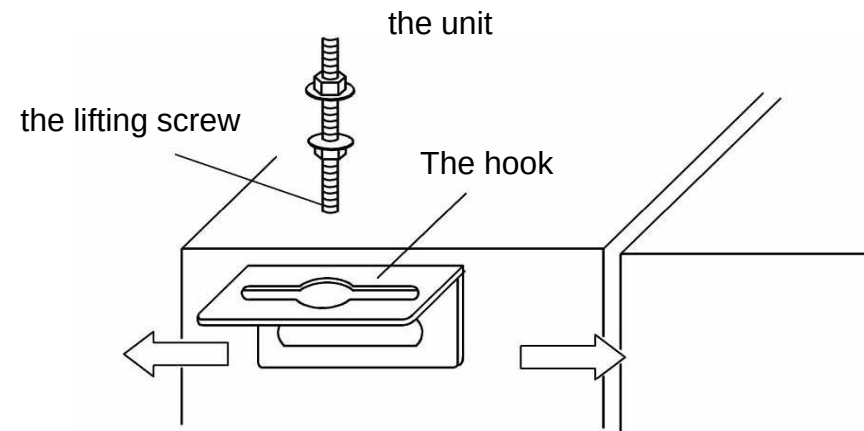
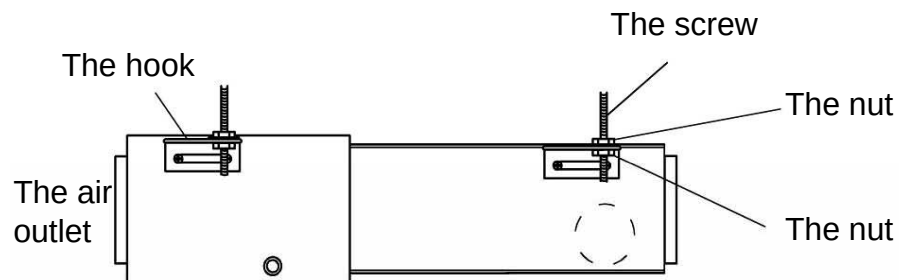
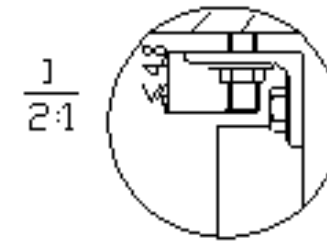
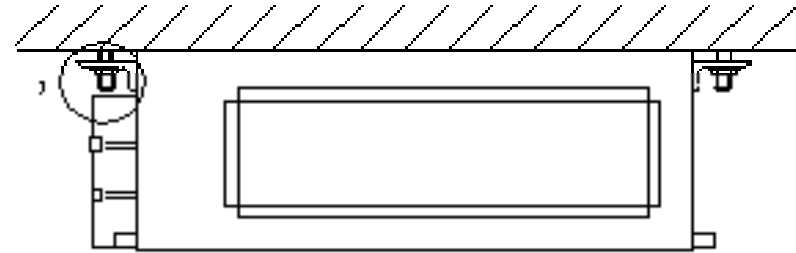
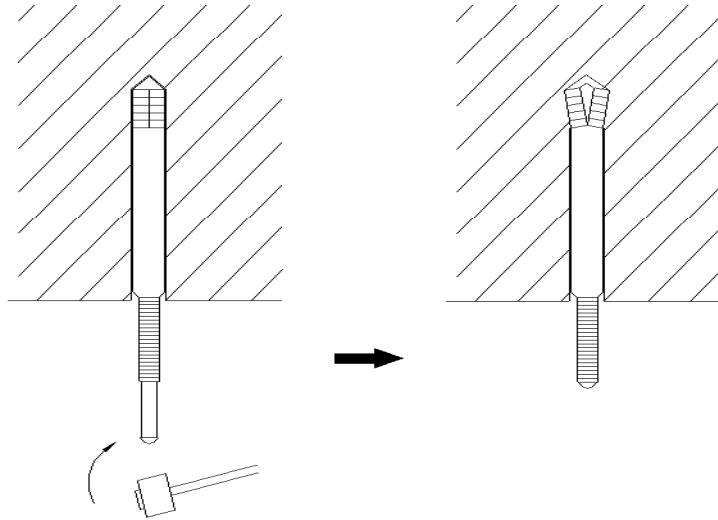
1. Indoor unit installation

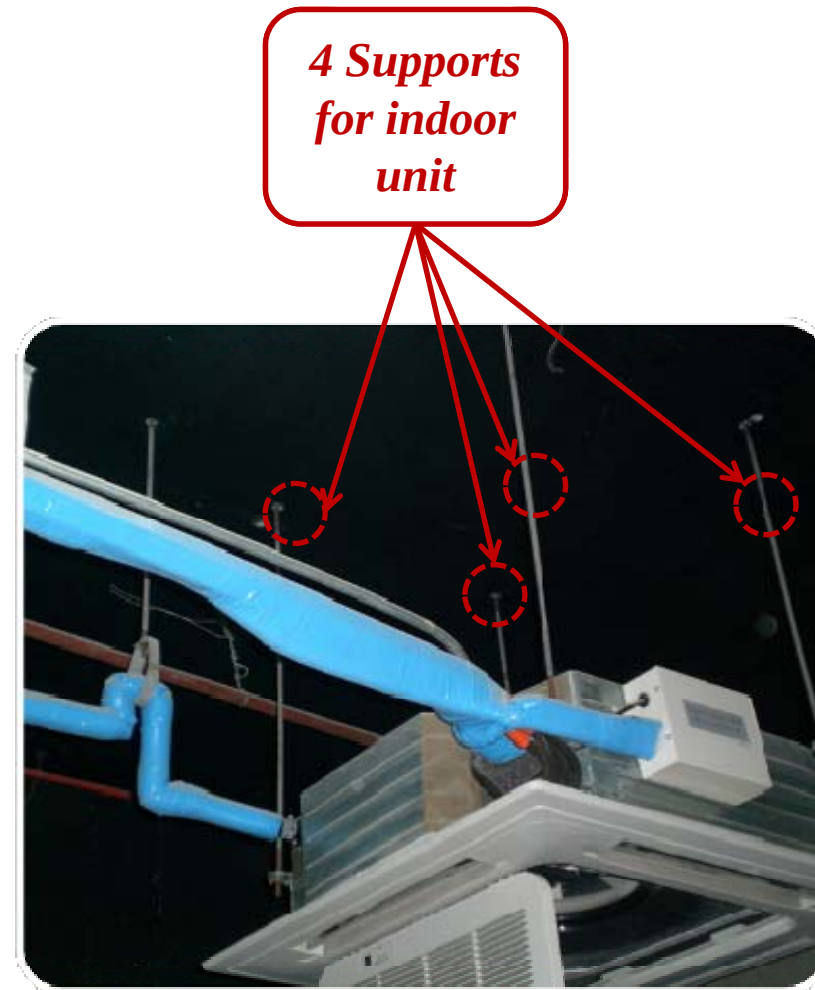
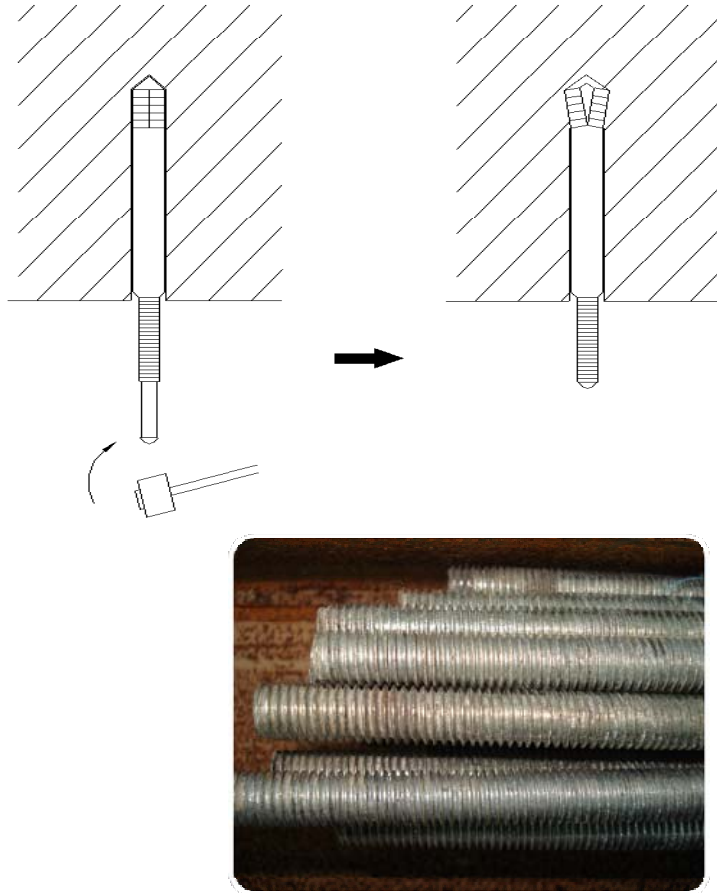
2. Outdoor unit installation

3. Sizing/Pressure/Volumetric

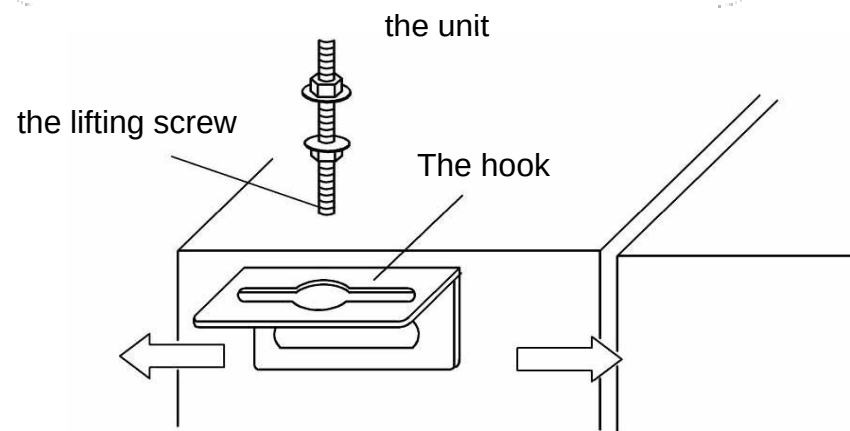
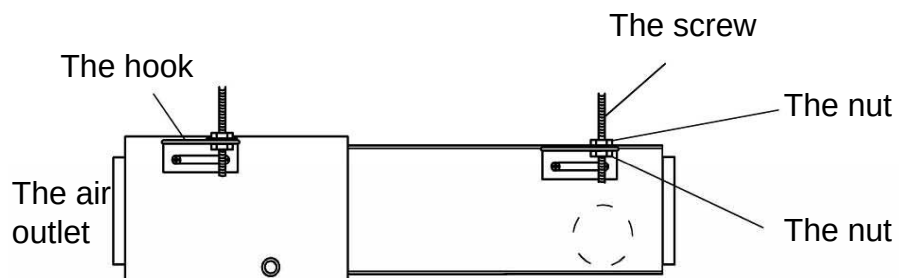
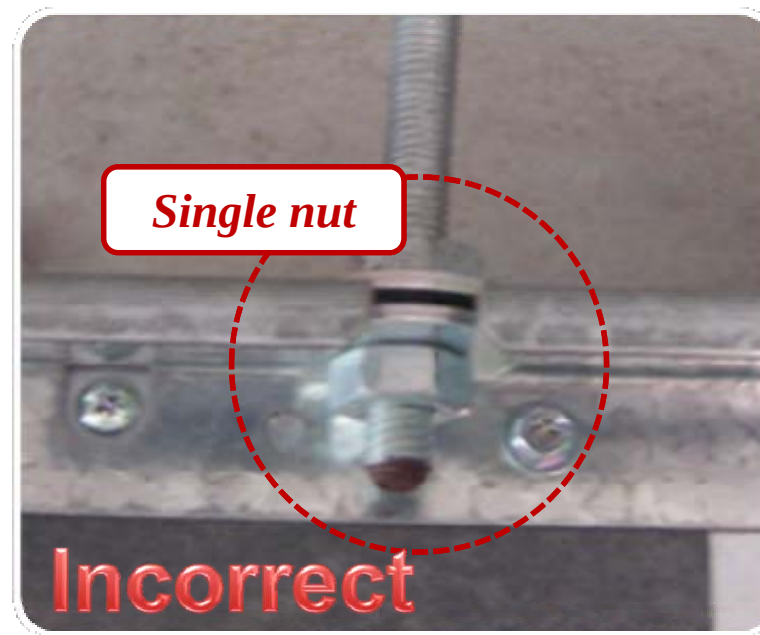
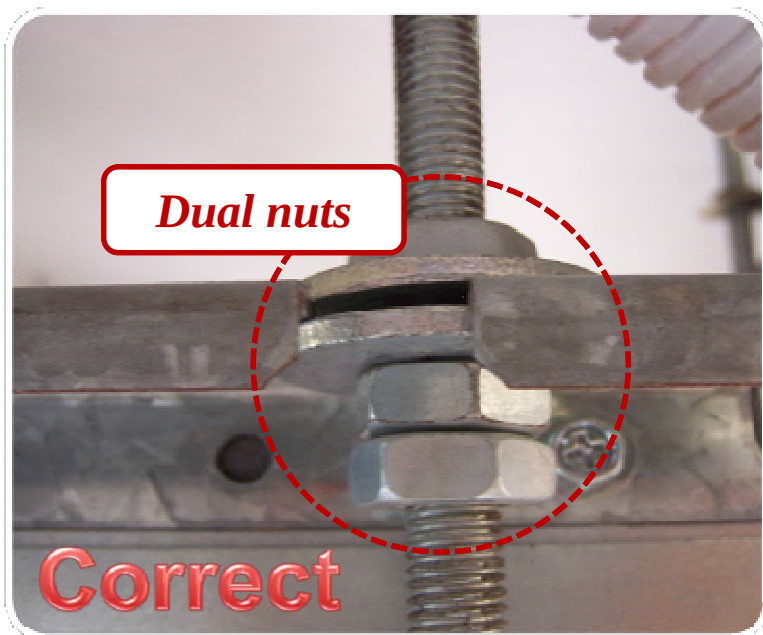
4. Leaked Winch

5. Tools

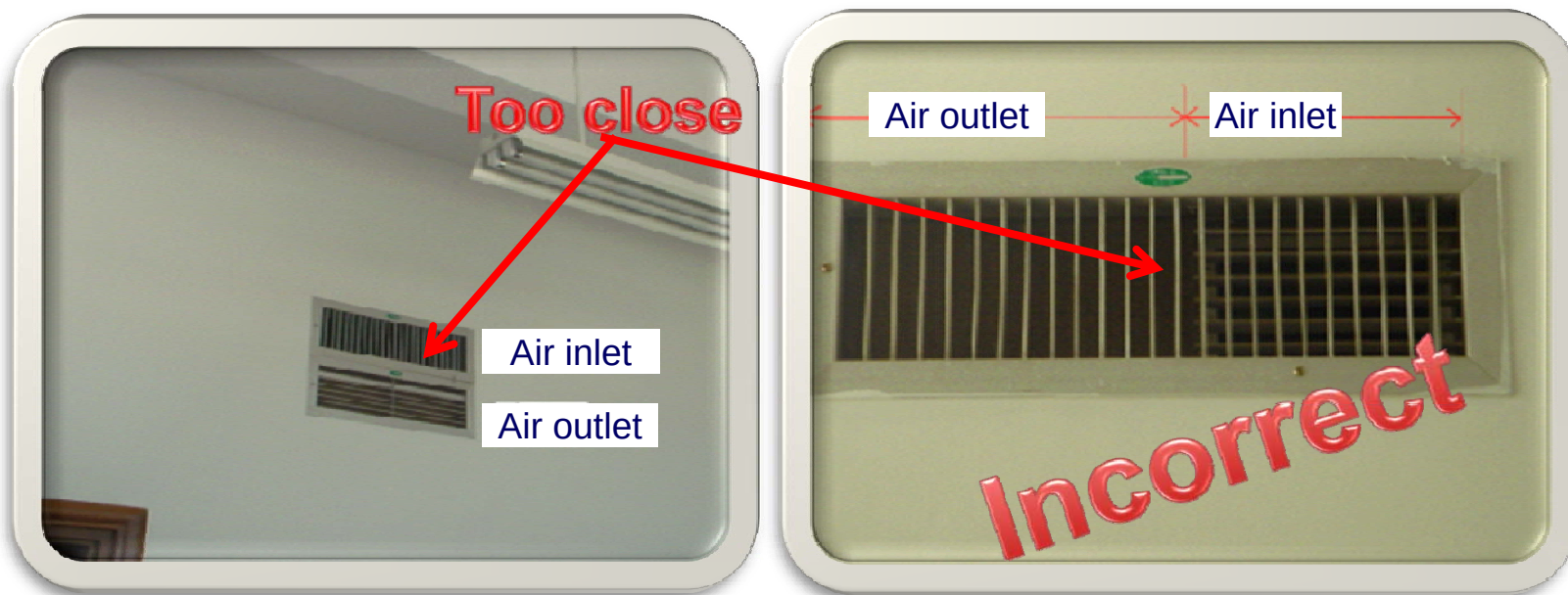




The diameter of the Supports is better if it is larger than 10 mm







1. Indoor unit installation

2. Outdoor unit installation

3. Piping/Pressure/Vacuum

4. Electrical wiring

5. Tools

The unit can't normally exchange heat and the service for the unit is not convenient

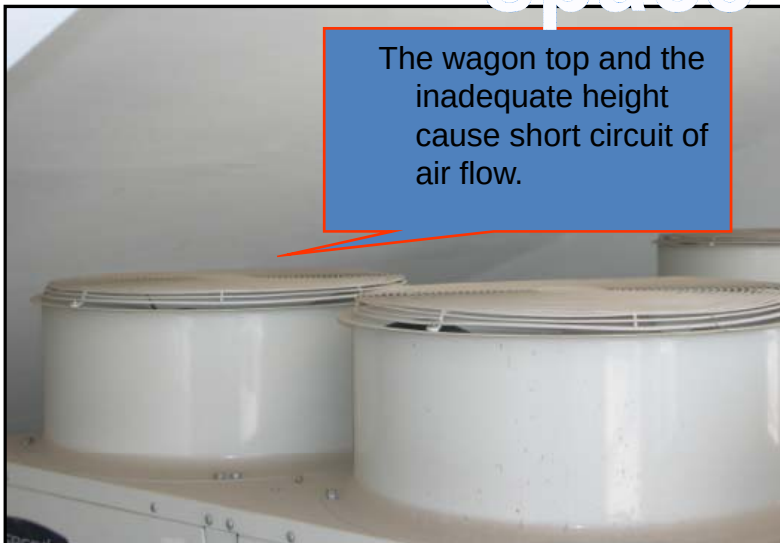


These units are placed in a small room, which can't not eliminate heat

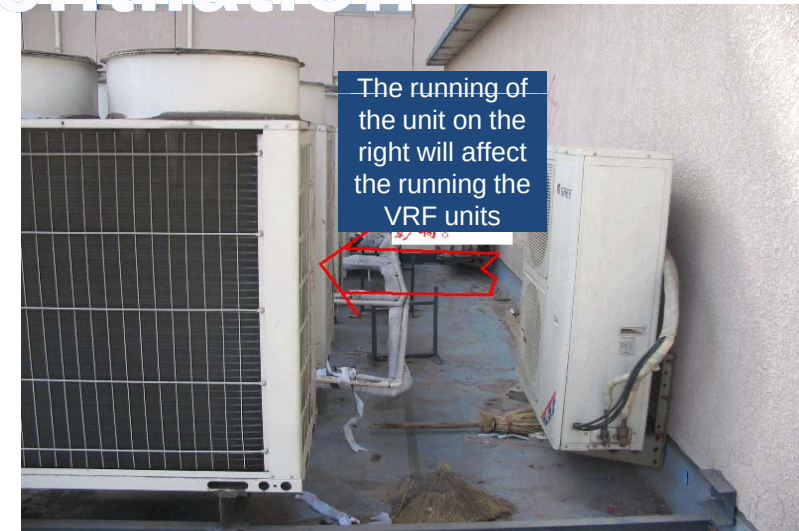


Make sure there is enough space for ventilation

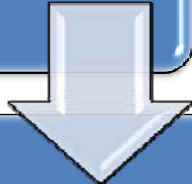
The wagon top and the inadequate height cause short circuit of air flow.



The running of the unit on the right will affect the running the VRF units



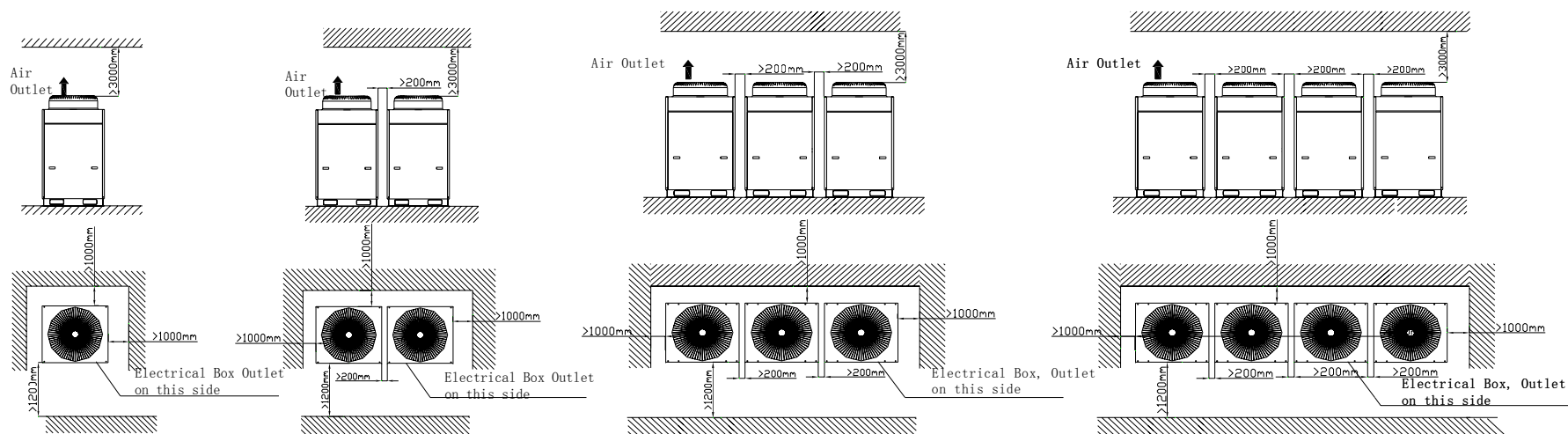
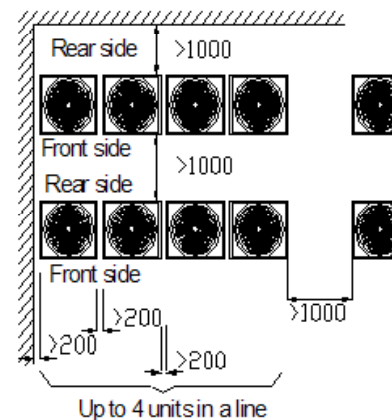
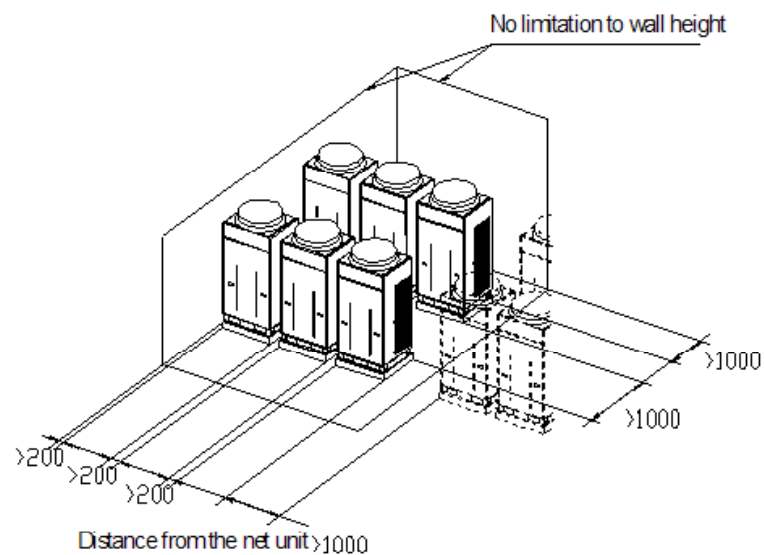
The outdoor unit should be placed neatly, and reserve enough space for maintenance.



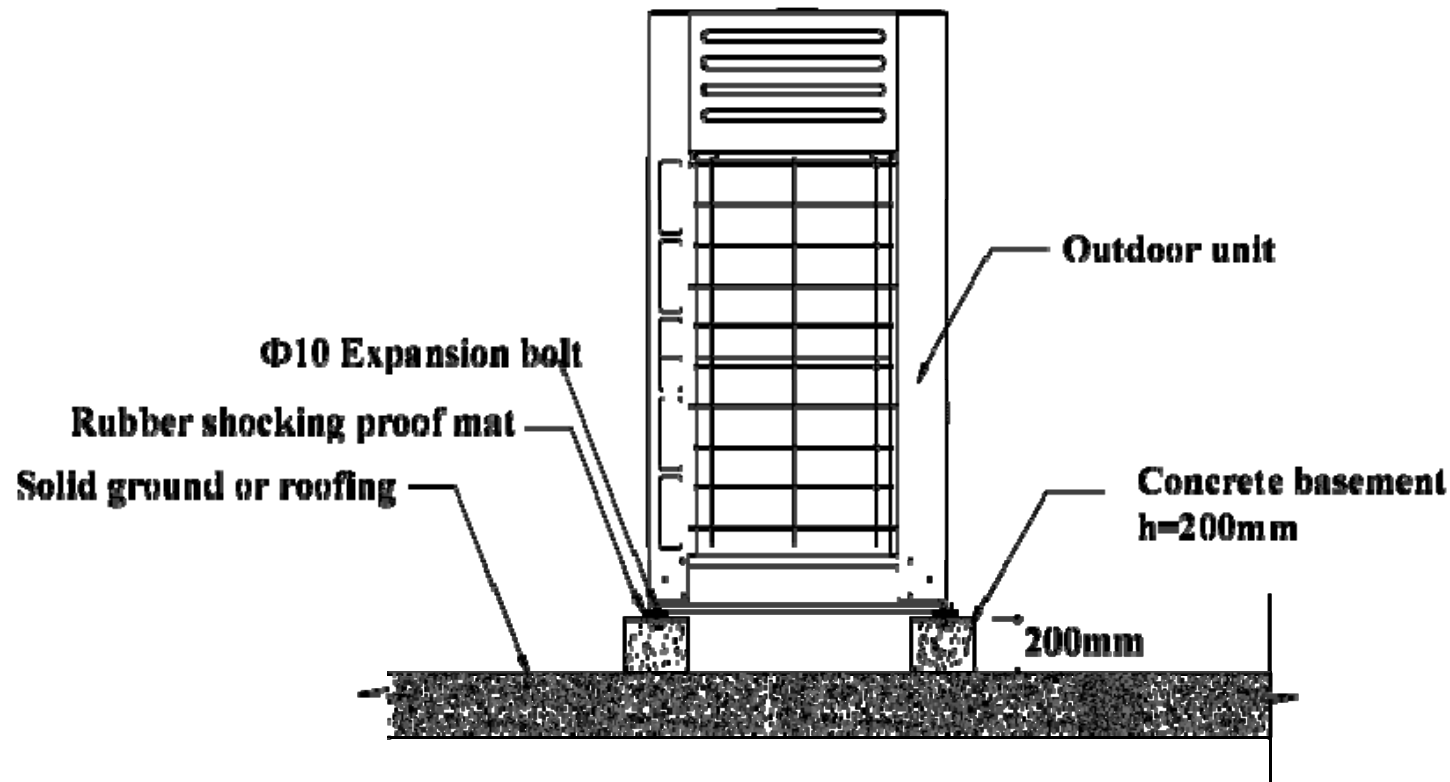
The outdoor unit should be installed in the place that is dry, well-ventilation and close to the indoor units .



Make sure that the floor or the rooftop is strong enough to support the outdoor unit.



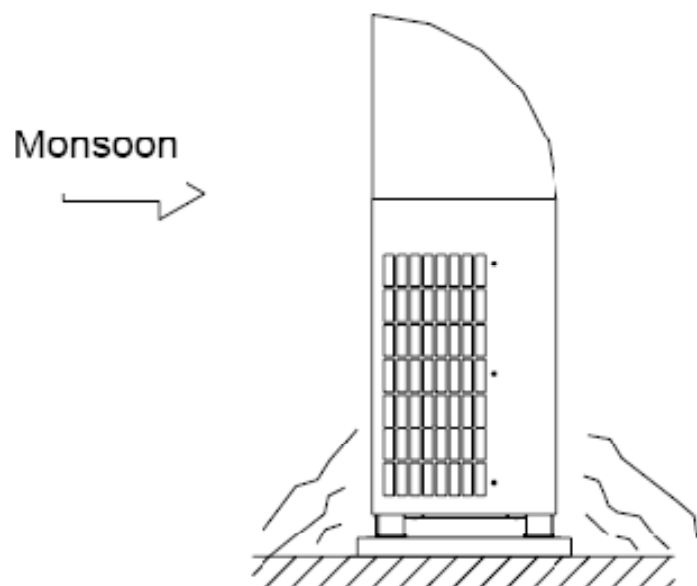
The foundation can be made of channel steel or concrete.



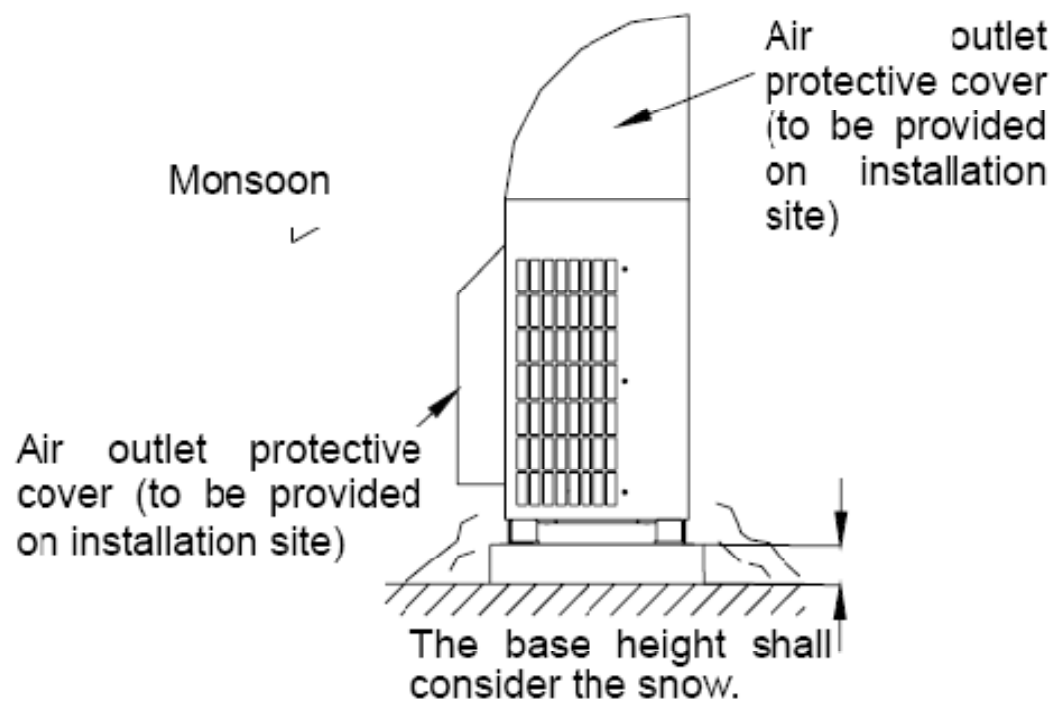
Reserve the space for discharging condensate water from outdoor units

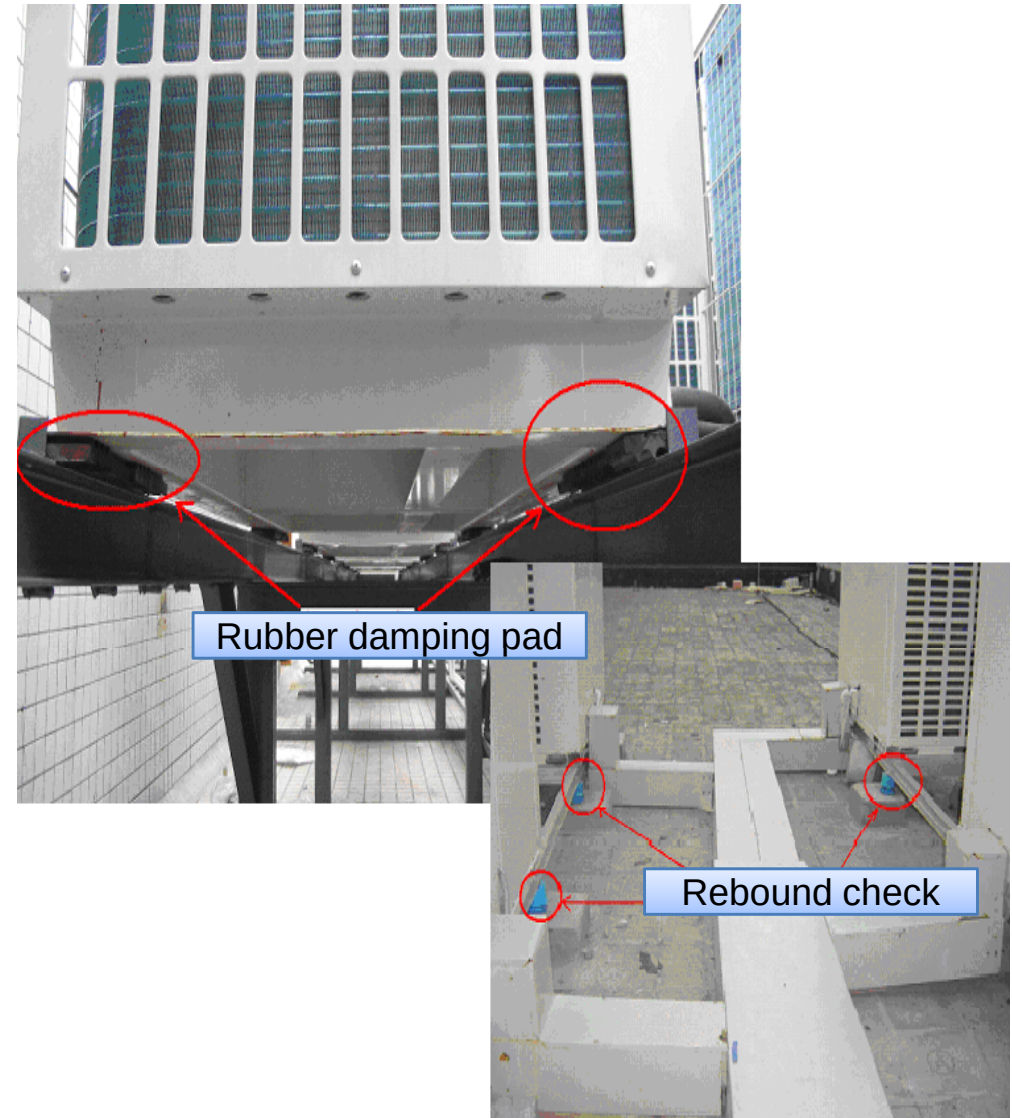
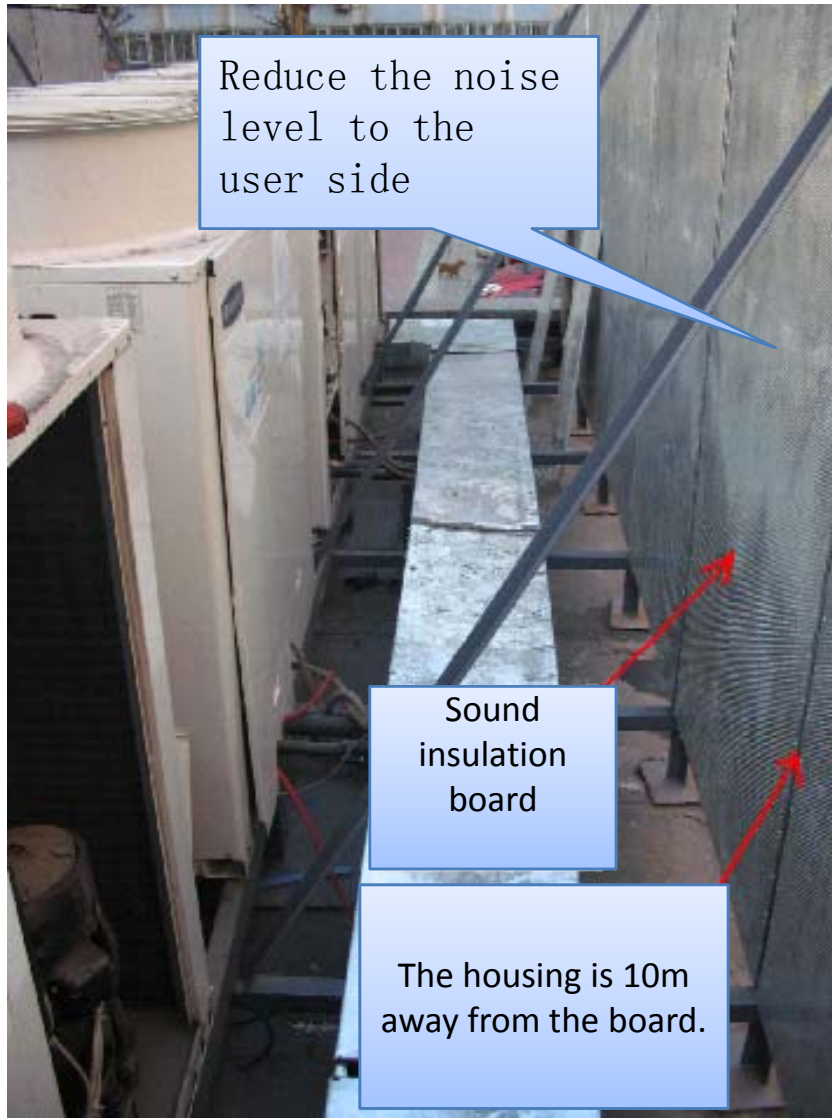


Incorrect



Correct





1. Indoor unit installation

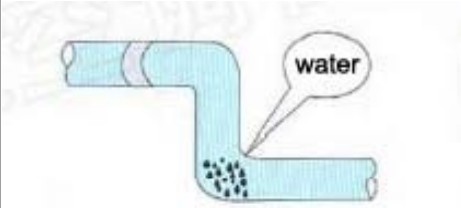
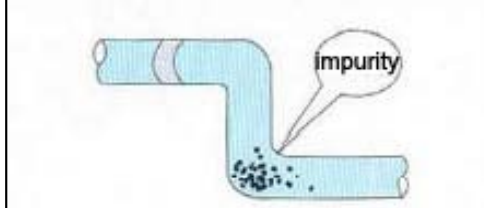
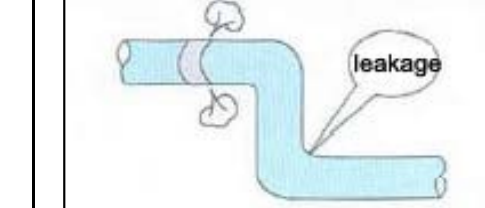
2. Outdoor unit installation

3. Piping/Pressure/Vacuum

4. Electrical wiring

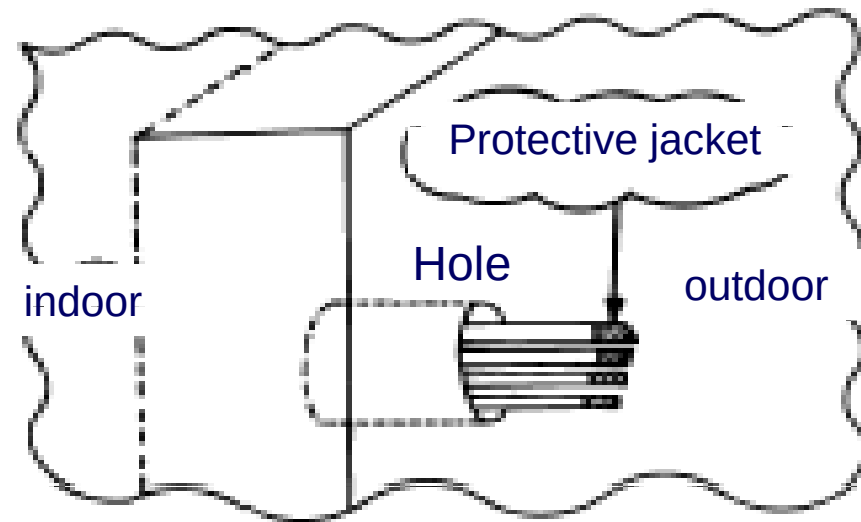
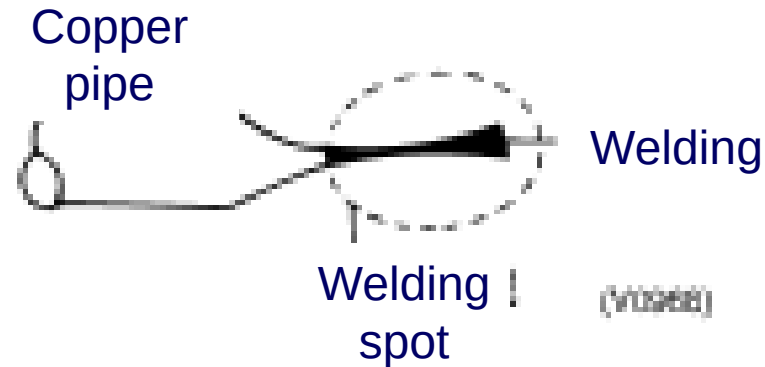
5. Tools

Please make sure the inner pipe is **dry, clear & airtight**.

	Dry	Clean	Airtight
	No Water	No Impurity	No Leakage
Illustration			
Reason	1. Water, such as rainy water from outside. 2. Condensing water in piping.	1. Oxid generated during soldering. 2. Outside dust for example dirty & oil from outside	1. poor soldering 2. Wrong bell-mouthed assembly & torque force.
Failure sign	1. capillary & expansion valve blocked 2. no cooling or heating air 3. Lubricant oil degradation 4. Compressor malfunction	1. capillary & expansion valve blocked 2. no cooling or heating air 3. Lubricant oil degradation 4. Compressor malfunction	1. Gas refrigerant not enough 2. no cooling or heating air 3. discharge temp rise 4. Lubricant oil degradation 5. Compressor malfunction
Preventive Actions	1. Piping maintenance 2. Washing 3. Vacuum treatment	1. Piping maintenance 2. Washing 3. Vacuum treatment 4. Don't use the used refrigerant equipment	1. comply with brazing operating rules 2. comply the right way to make a bell-mouth 3. comply flange connection operating rules 4. test airtightness

Protection of Copper Pipe

- If the copper pipe is not connected to indoor unit or outdoor unit, its nozzle must be seal.
 - ① It can be sealed with rubber belt in a short time.
 - ② It must be sealed via welding in a long time. (clamp the nozzle and weld it. Charge 2~5kgf/cm² nitrogen)
- It must be sealed when mounted with insulating sleeve and led through the wall.





acceptable

unacceptable

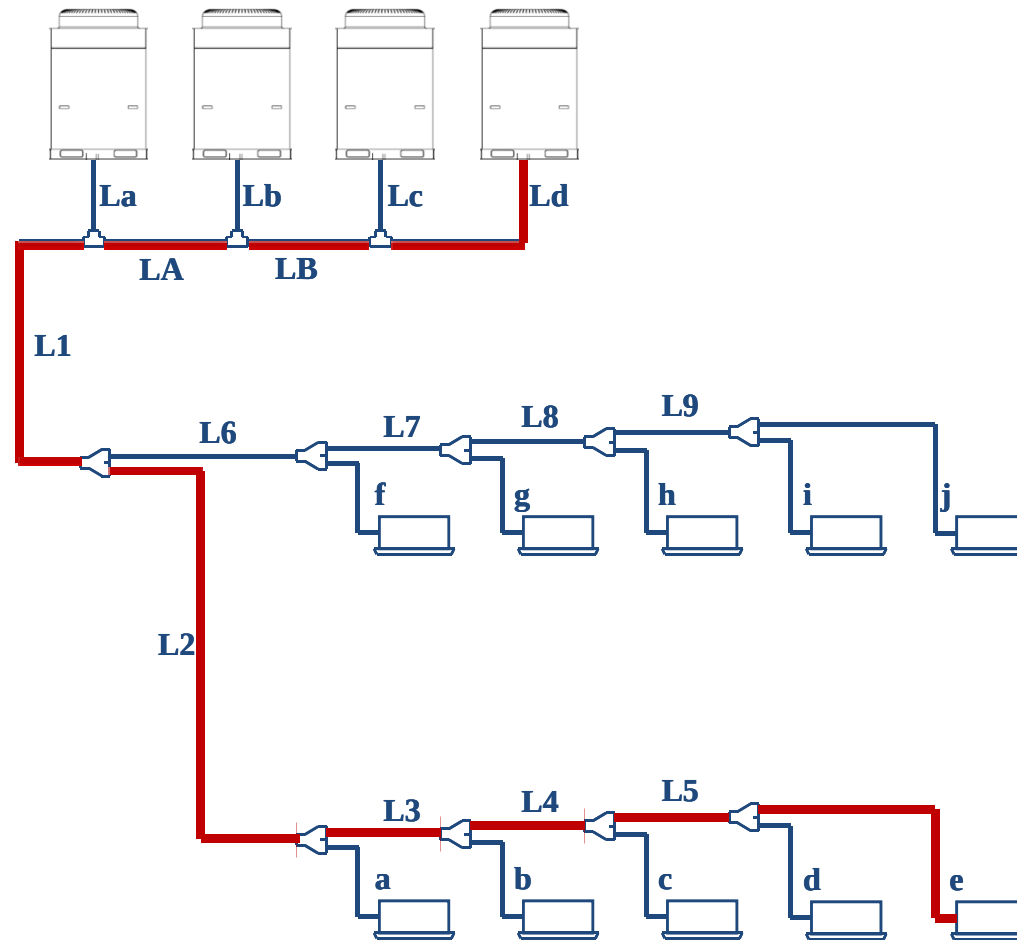


➤ *The permitted length, drop difference and Y-joint models(R410A)*

		Allowable (m/ft) value	Fitting pipe
Total length (actual length) of fitting pipe		500/1640	$L_1+L_2+L_3+L_4+\dots+L_8+a+b+\dots+i$
Length of the furthest fitting pipe	Actual length	150/492	$L_1+L_5+L_6+L_7+L_7+L_8+i$
	Equivalent length	175/574	
Equivalent length of fitting pipe from the 1 st branch joint to farthest indoor unit L (m)		40/131	$L_5+L_6+L_7+L_7+L_8+i$
Height differences between indoor unit and outdoor unit	Outdoor unit at upper	50/164	—
	Outdoor unit at lower	40/131	—
Height differences between indoor units		15/49	—

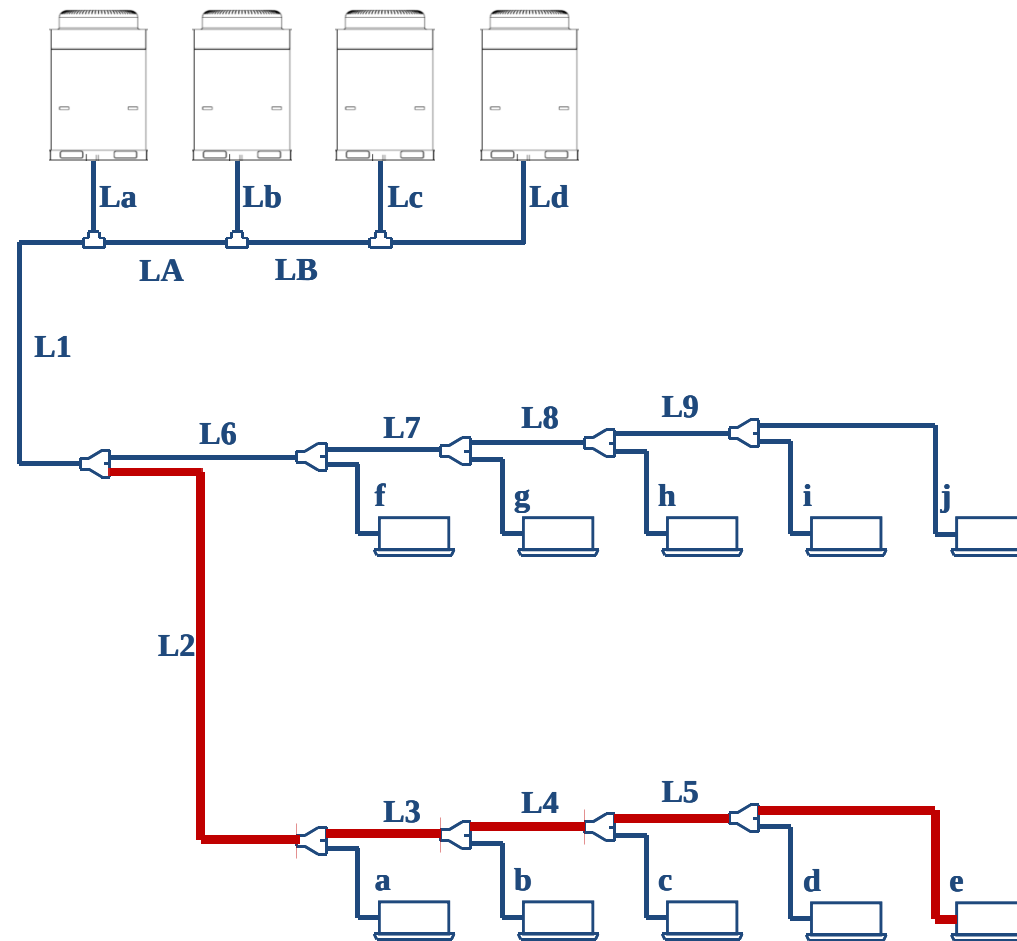
R410a refrigerant system	Total Capacity of the Downstream Indoor Unit (X)	Model
Y-Type Branch Pipe	$X \leq 200$	FQ01A/A
	$200 < X \leq 300$	FQ01B/A
	$300 < X \leq 700$	FQ02/A
	$700 < X \leq 1350$	FQ03/A
	$1350 < X$	FQ04/A

➤ *The longest pipe length(single loop)*



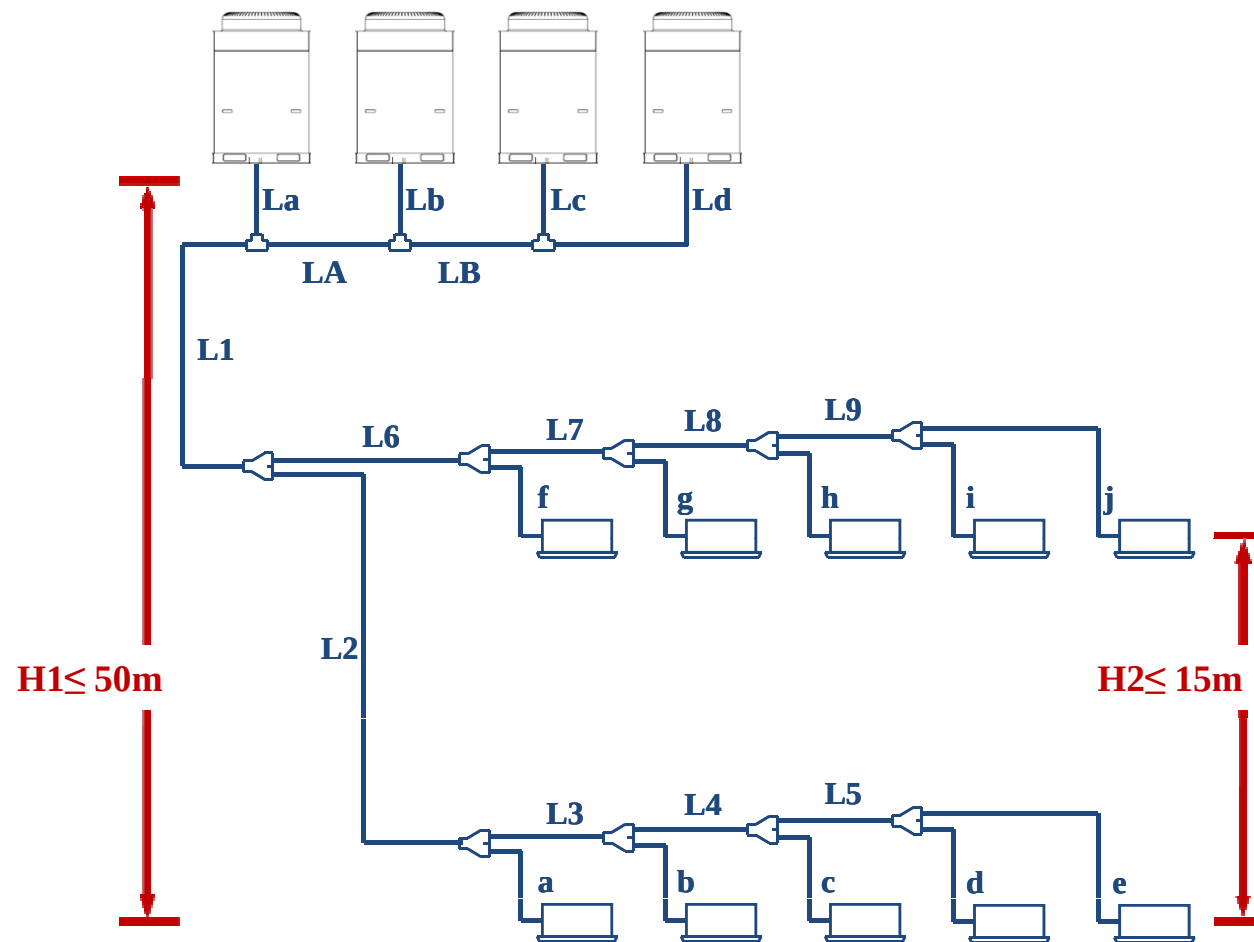
$$Ld+LA+LB+L1+L2+L3+L4+L5+e \leq 150 \text{ m}$$

- *The longest pipe length from 1st branch to furthest indoor unit*



$$L2+L3+L4+L5+e \leq 40 \text{ m}$$

- *Vertical height difference between outdoor unit and the lowest indoor unit*
- *Vertical height difference between indoor units*



➤ *Specification for copper pipe R410a*

R410a refrigerant system			
External Diameter(mm/inch)	Thickness(mm)	External Diameter(mm/inch)	Thickness(mm)
φ6.35	≥0.8	φ25.4	≥1.5
φ9.52	≥0.8	φ28.6	≥1.5
φ12.7	≥1	φ34.9	≥1.5
φ15.9	≥1	φ41.3	≥2.0
φ19.05	≥1	φ44.5	≥2.0
φ22.2	≥1.5	φ54.1	≥2.0

**** Copper pipe for R22 is not allowed to be charged with R410a***

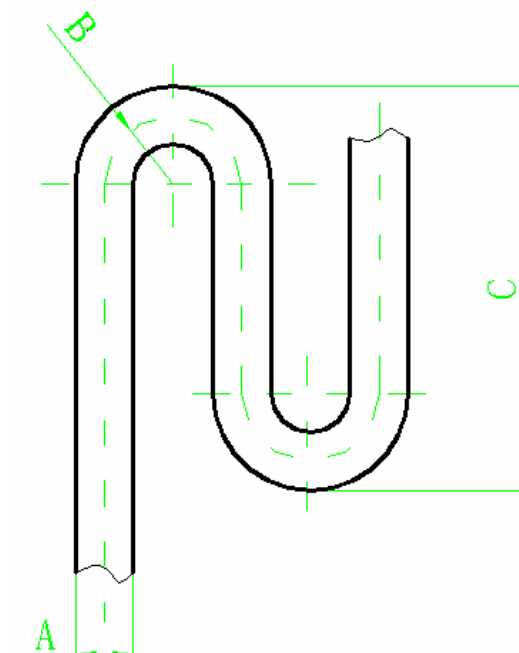
- The refrigerant pipe will extend and shrink with each start or stop of the air conditioner unit (5~10 times / hour). Under a temperature difference of 80°C, this extension may reach 13.84mm for every 10m. To prevent failure, the pipes must be reinforced as follows

Outer diameter of pipe (mm)	6.35-8.52	Over 12.7
Spacing between supports (m)	Below 1.2	Below 1.5

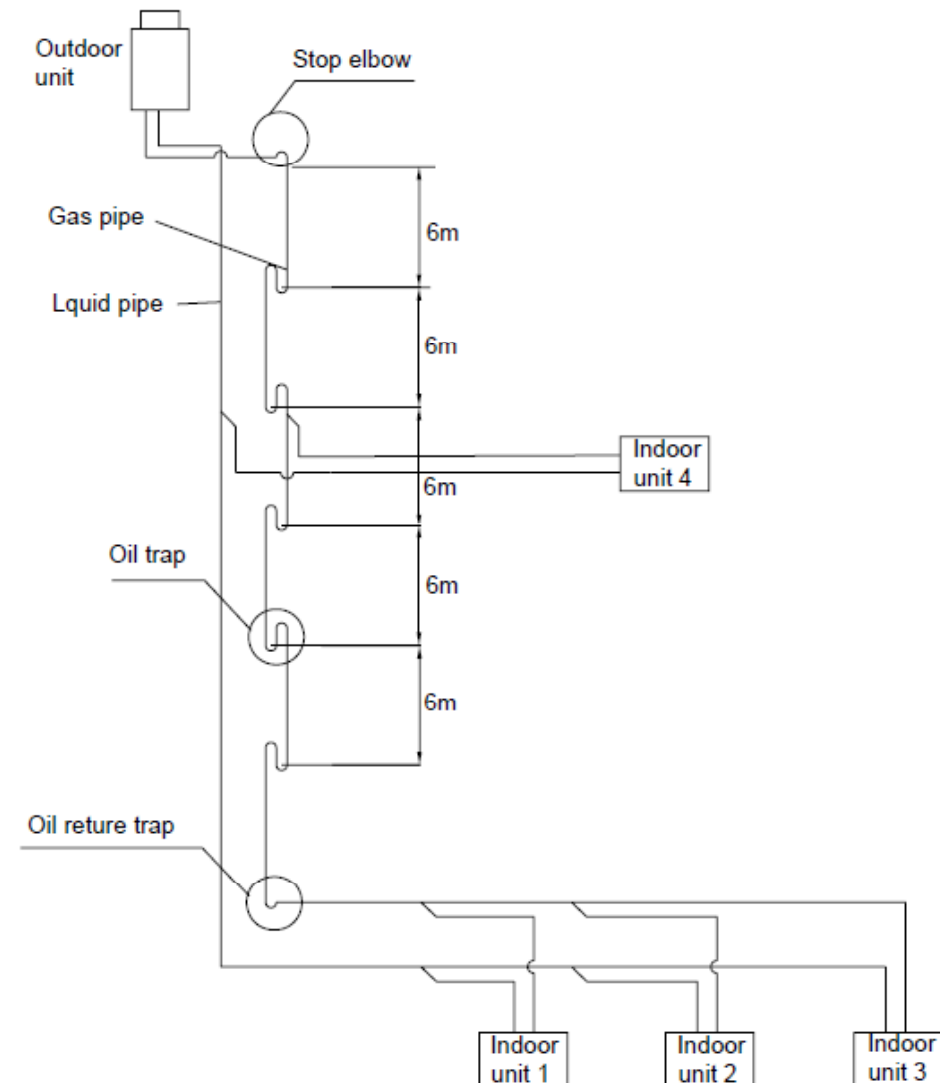
- Note: If the gas pipe and liquid pipe are suspended together, the size of liquid pipe shall prevail..

Oil trap

A		B(mm)	C(mm)
mm	inch		
Φ19.0	3/4	≥34	≤150
Φ22.2	7/8	≥31	≤150
Φ25.4	1/1	≥45	≤150
Φ28.6	9/8	≥45	≤150
Φ34.9	1 1/8	≥60	≤250
Φ38.1	1 1/2	≥60	≤350
Φ41.3	1 3/8	≥80	≤450
Φ44.45	7/4	≥90	≤500
Φ54.1	1 7/8	≥90	≤500



- *All the traps installed on the gas pipe*
- *Stop elbow and oil return trap are needed*
- *Each 6m for one oil trap on the vertical pipe*



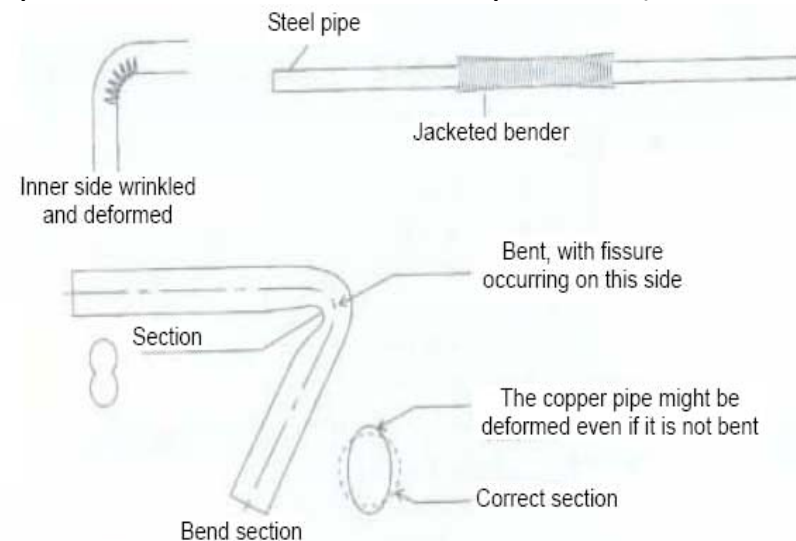


Bend by hand Suitable to fine copper pipe ($\phi 6.35\text{mm}$ - $\phi 12.7\text{mm}$).

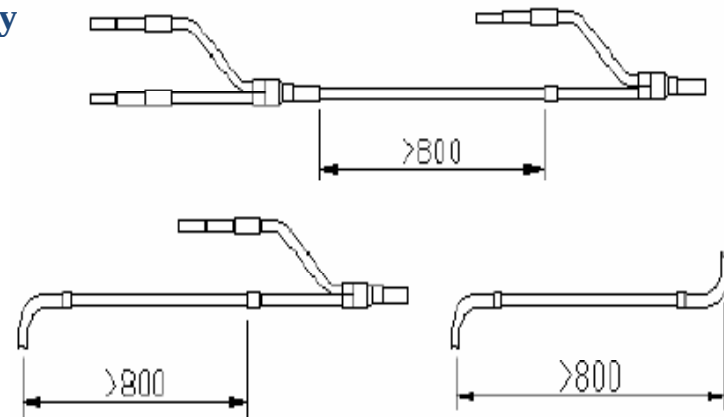
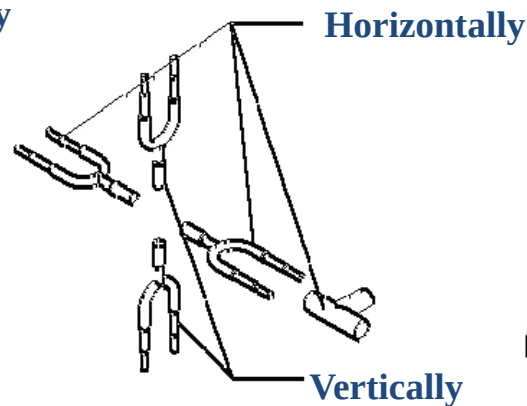
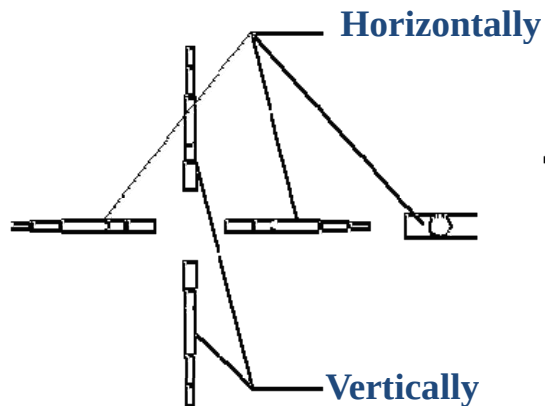
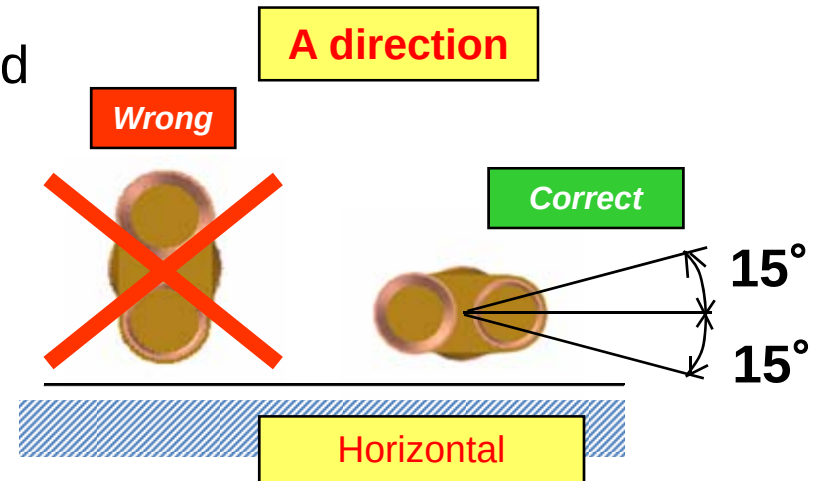
Bend by hand-operated pipe bender.....Use the pipe bender of suitable dimension ($\phi 6.35\text{mm}$ - $\phi 22.2\text{mm}$).

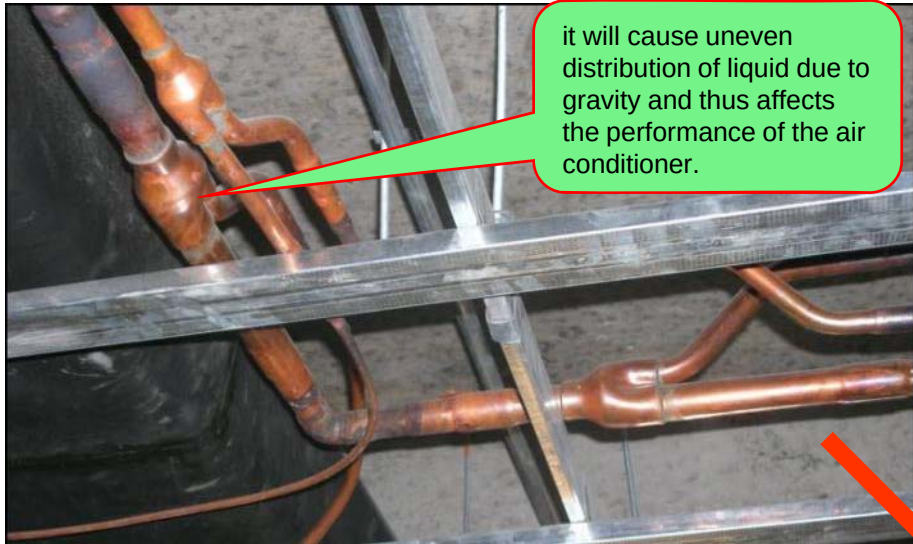
◆ Cautions:

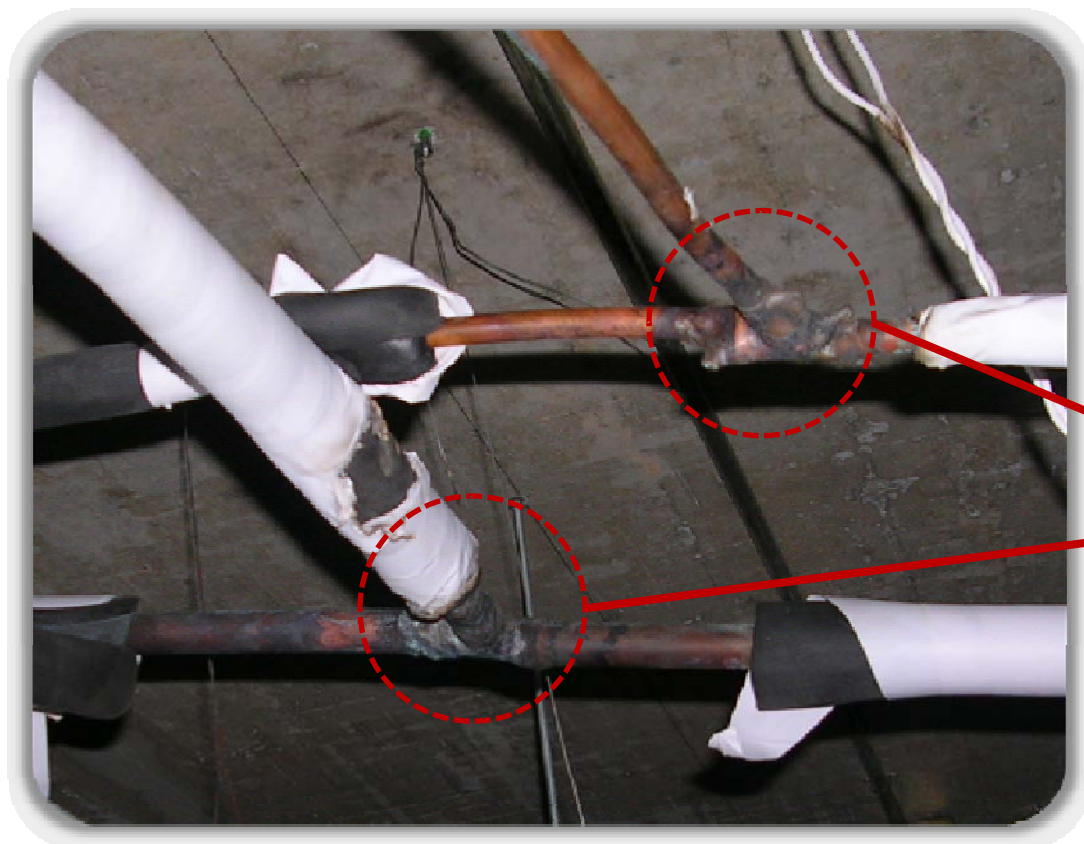
- ※ During bending, there shall be no wrinkling or deformation on the inner side of the copper pipe.
- ※ Spring pipe bend
- ※ The bender inserted into the copper pipe must be cleaned.
- ※ Do not bend over 90° . (Otherwise, wrinkling may be formed on the inner side of copper pipe and in the future, the copper pipe will be broken from this position.)



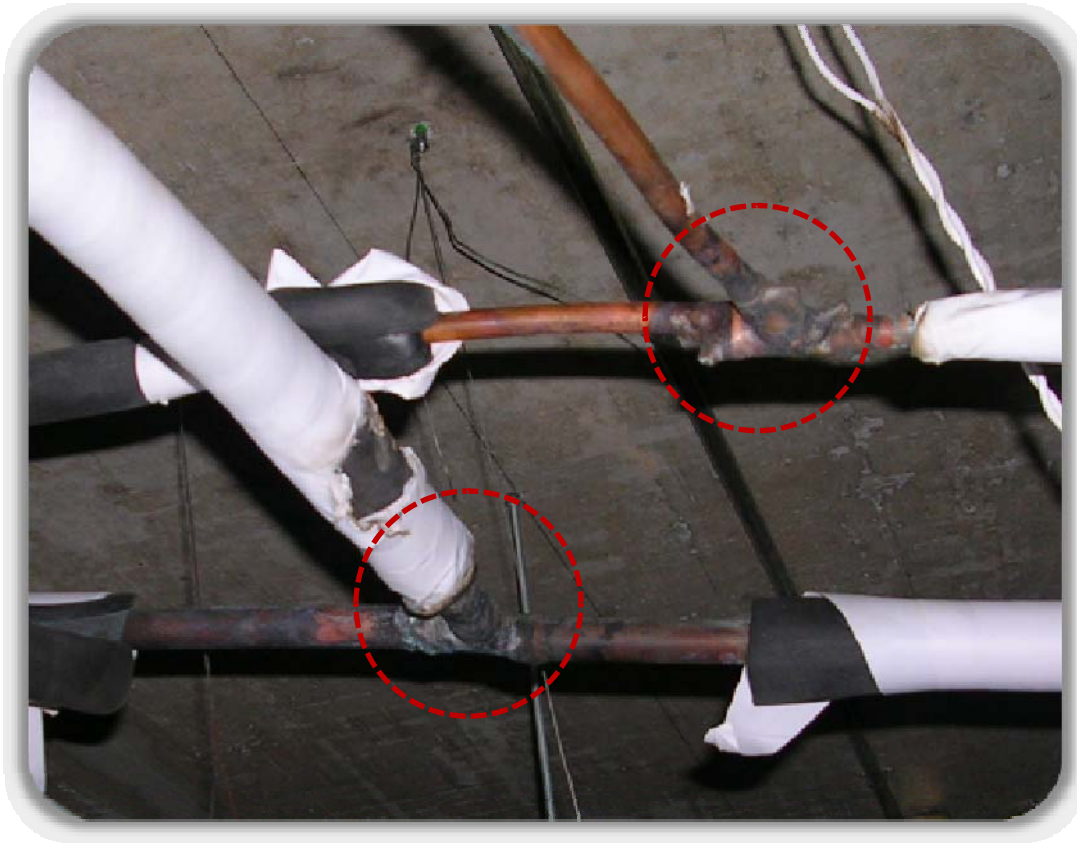
1. The branch pipe shall be level or vertical
2. The straight pipe between branch pipe and indoor unit should be longer than 800mm;
3. The straight pipe between branch pipes should be longer than 800mm;





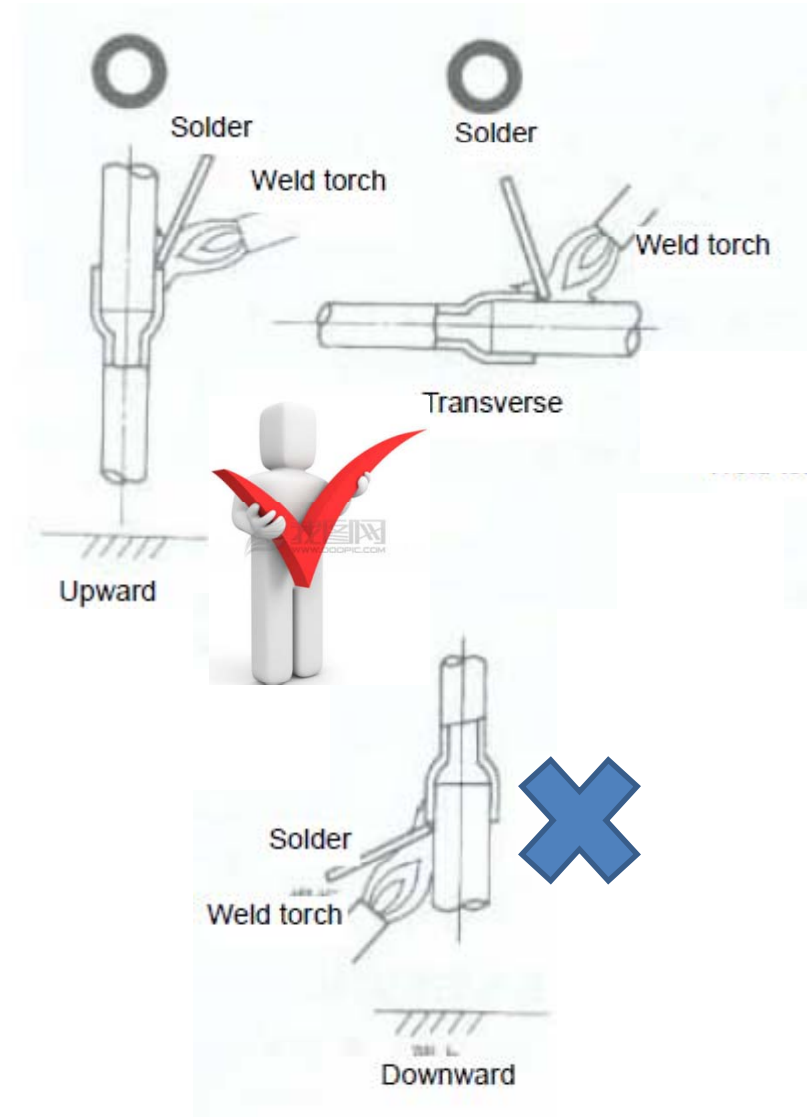
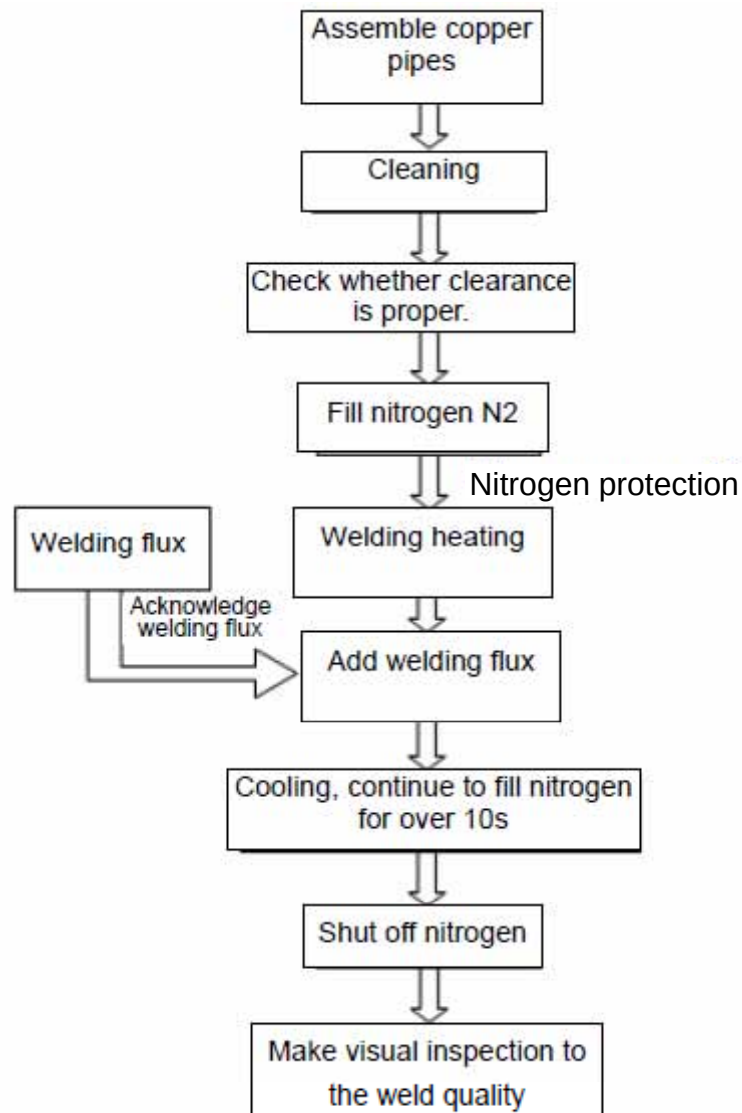


Not allowed



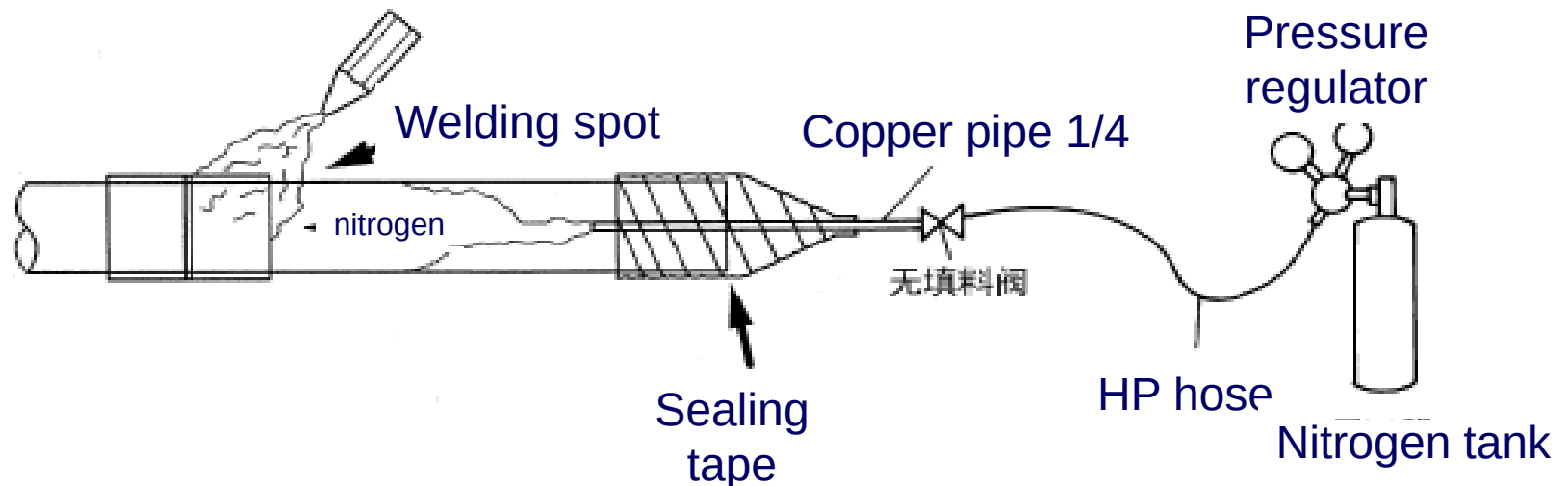
1.Bad refrigerant distribution

2.Too much welding impurity

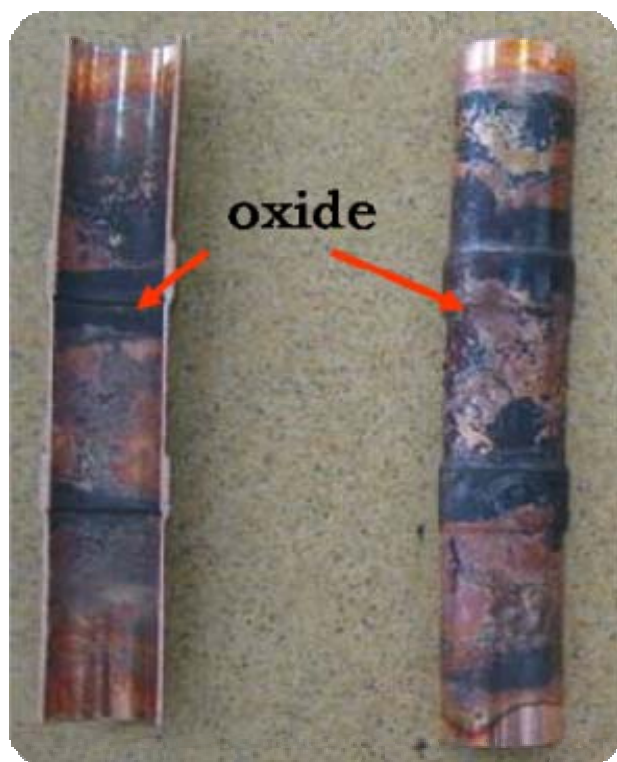


- Reason: if nitrogen is not applied for protection during welding, there will be oxide on the copper pipe. If the oxide enters refrigerant system, it will damage valve and compressor .
- Method: refer to the following diagram. The pressure of nitrogen is 0.02~0.05kgf/cm².

Note: cover the left side of copper pipe and reserve a little space.



Without nitrogen

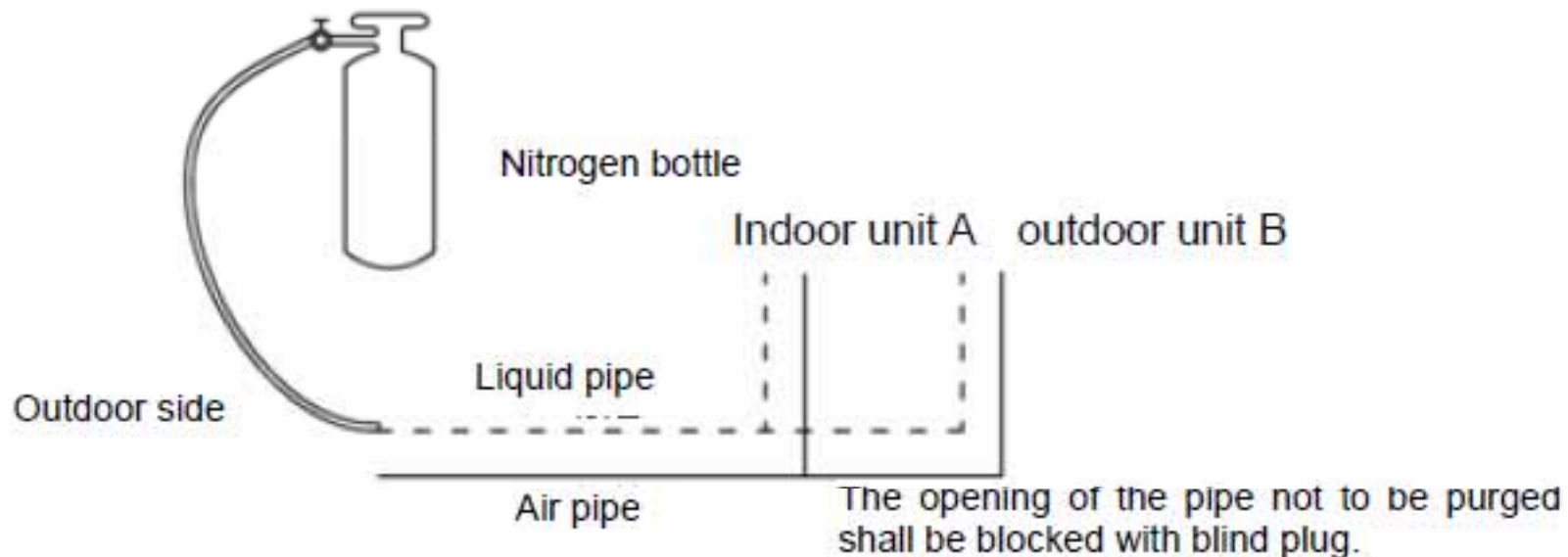


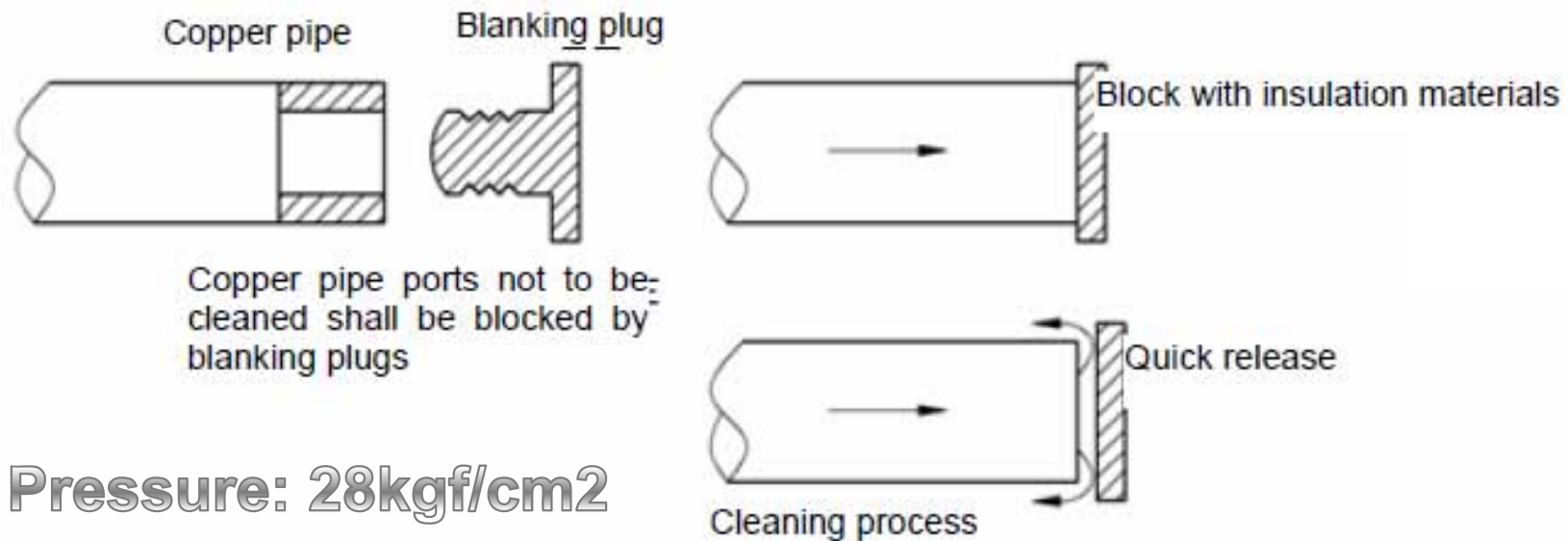
With nitrogen



Flushing

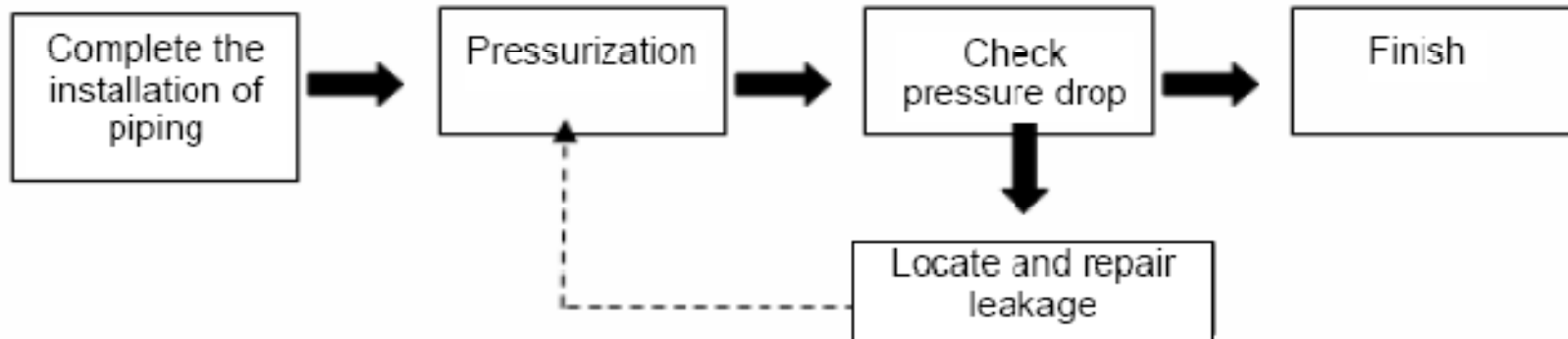
- 1.To eliminate oxide caused by insufficiency of nitrogen-filled protection during pipe welding.
- 2.To remove foreign substances and water that may enter the piping due to improper storage and transport.
- 3.To check whether big leakage is existent at connections of the piping between indoor unit and outdoor unit





Pressure: 28kgf/cm²

The mouth of the pipe shall be blocked with insulation material held by hand until pressure rises to a level difficult to be withstood, and at the moment the insulation material shall be released quickly. And then the mouth shall be blocked again. Repeat such procedures several times. Afterwards, use a wood board posted with white paper to check it. If there is not evident dirt on the white paper, the pipe will be considered clean.



- 1) Point: The pressure must be 40kgf/cm² for 24hours.
- 2) Purpose: Piping system does not leak.
- 3) Step: Pressurize the liquid pipe and gas pipe with nitrogen.

Step	Pressure	Duration	Function
①	0.4MPa(3kgf/cm ²)	More than 3 min	Extremely serious leakage
②	2.1MPa(15kgf/cm ²)	More than 3 min	Serious leakage
③	4.0MPa(40kgf/cm ²)	More than 24 hours	Slight leakage

1. Except for temperature influences (pressure changes about 0.01MPa for temperature change of 1 °C), if pressure drop is not more than 0.02MPa within 24h, the system will be eligible. For example, nitrogen is filled to reach 2.5MPa at 30 °C; after 24 hours, when temperature becomes 25 °C, the system will be eligible if pressure is over 2.43 MPa and ineligible below 2.43 MPa.
2. If ineligible, leak sources must be located. After leak sources are found, re-welding or repair welding is necessary. Then, the above procedures shall be repeated. Nitrogen is filled, pressurized and maintained until pressure drop remains within required range.

➤ *For example:*

Temp. : 30 °C

N2 pressure when charging: 2.5 MPa

Temp. after 24 hours: 25 °C

N2 pressure after 24hours

$$= 2.5 \text{ MPa} + (25 \text{ °C} - 30 \text{ °C}) \times 0.01 \text{ MPa/ °C}$$

$$= 2.5 \text{ MPa} - 0.05 \text{ MPa}$$

$$= 2.45 \text{ MPa}$$

**Tolerance
0.02Mpa**

If the actual pressure after 24hours is lower than 2.43 MPa, you need to check whether there's leakage or not.

Insulation



- Avoid any condensing water



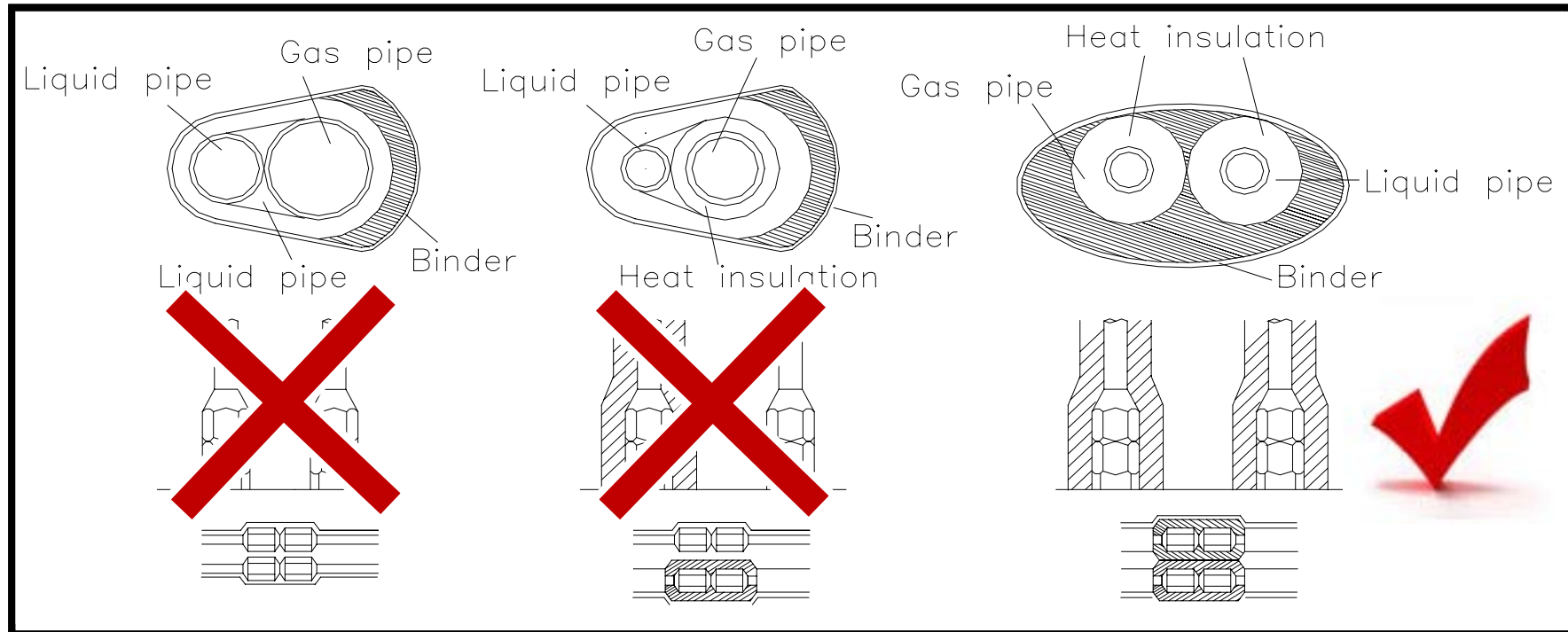
- Prevent any heat burn



- Prevent heating/cooling energy loss

Refrigerant Pipe (mm) (Outer Dia. x Thickness)	Thickness of Thermal Insulation Materials (mm)
$\Phi 6.35 \times 0.5$	≥ 10
$\Phi 9.52 \times 0.71$	≥ 10
$\Phi 12.7 \times 1$	≥ 15
$\Phi 15.9 \times 1$	≥ 15
$\Phi 19.05 \times 1$	≥ 15
$\Phi 22.2 \times 1.5$	≥ 20
$\Phi 25.4 \times 1.5$	≥ 20
$\Phi 28.6 \times 1.5$	≥ 20
$\Phi 34.9 \times 1.5$	≥ 20

*The clearance between thermal insulation pipes shall be sealed with self-adhesive sticker.



Gas and liquid pipe should be insulated separately!!



Vacuum

- Checking point

	Unit	Standard air pressure	Vacuum degree
Relative pressure	kg/cm ²	0	-1.033
Absolute pressure	kg/cm ²	1.033	0
mmHg	mmHg	0	-755

Vacuum

- What pump should we choose

Features of a vacuum pump shall be determined by two factors as follows:

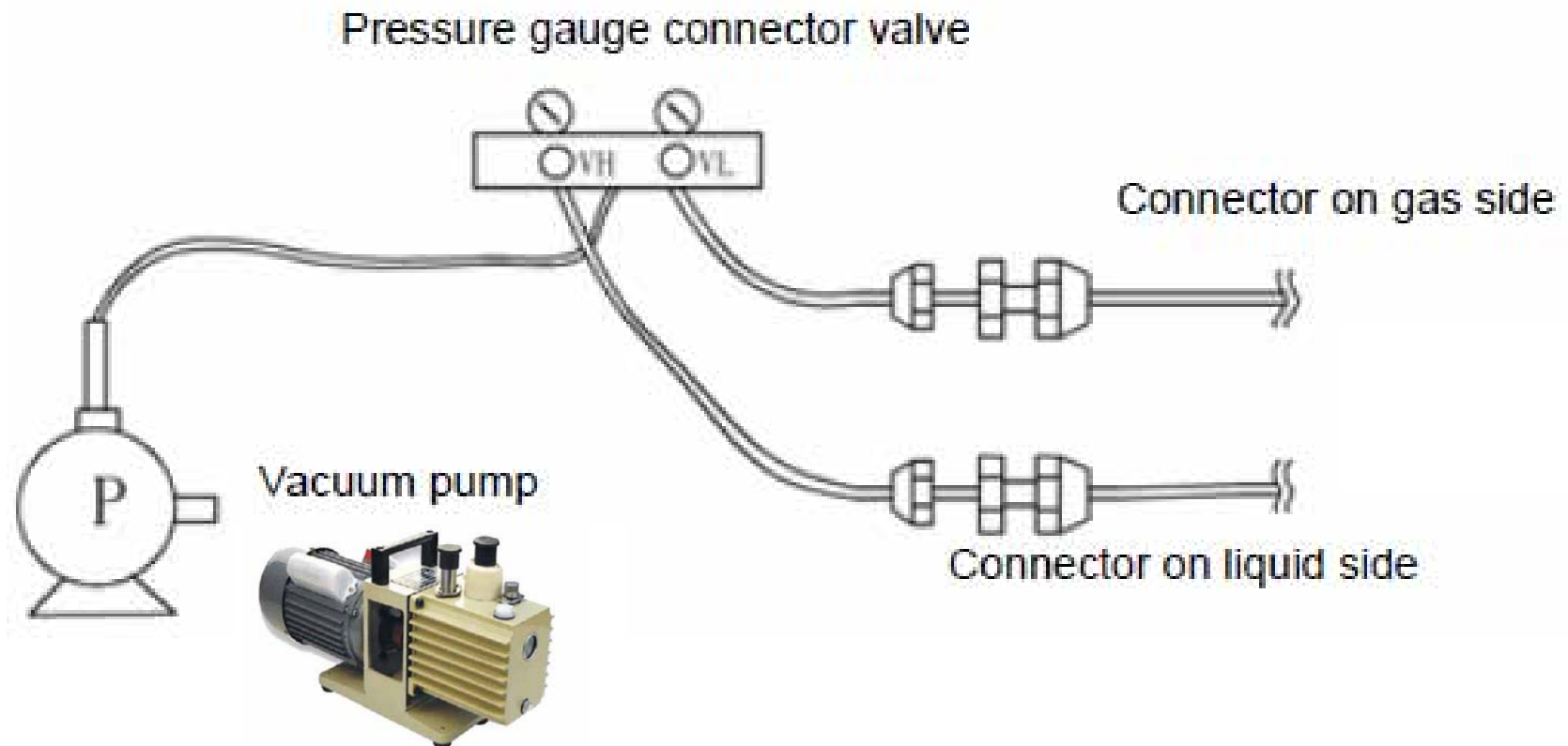
1. Selection of a pump that can meet expected requirement (i.e. gauge pressure of -0.1MPa shall be obtained)
2. Exhaust flow is high (over 40L/min).

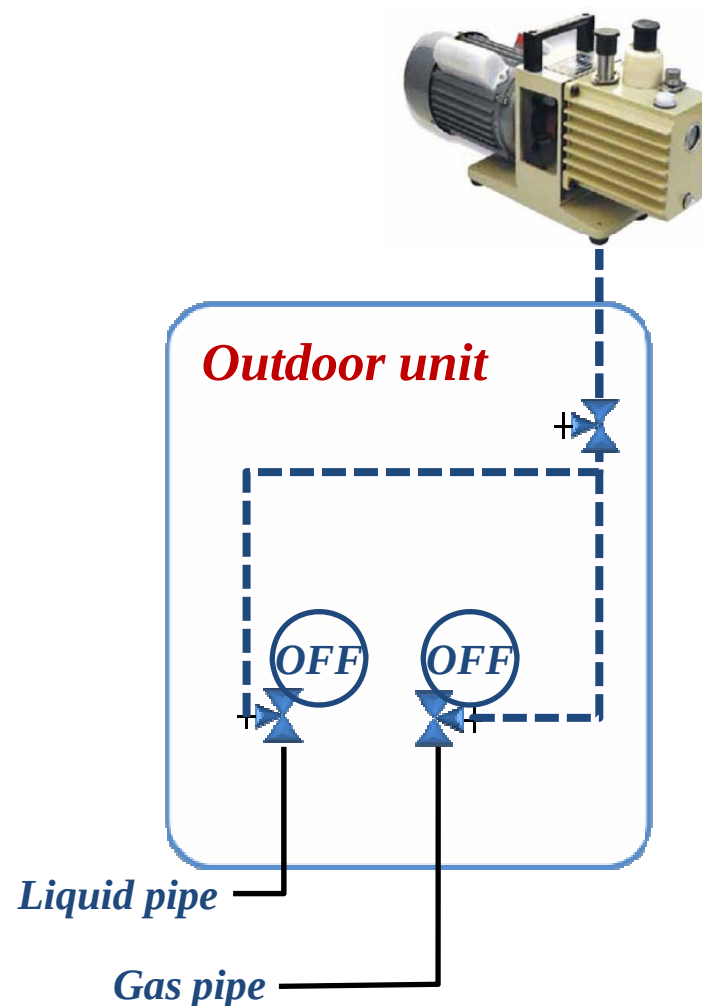
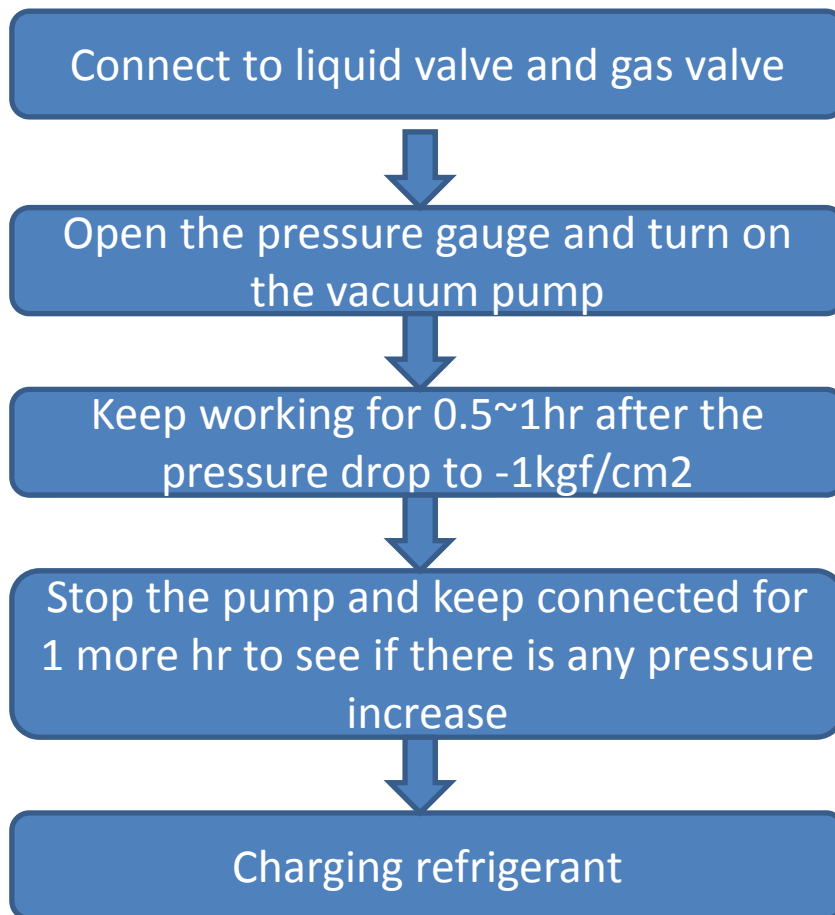
The following vacuum pumps are recommended:

Model	Maximum vacuum air displacement	Use	
		Air discharge	Vacuum drying
Lubricant shaft pump	100L/min	Suitable	Suitable
Non-lubricant shaft pump	50L/min	Suitable	Suitable

Vacuum

- Where to connect?





Refrigerant charge

1) Calculation method for refrigerant charging

Refrigerant shall be charged according to calculated amount specified in engineering drawings.

Method for calculation of added refrigerant volume (based on liquid pipe)

Mass of refrigerant to be charged = Σ length of liquid pipe $\times$ refrigerant charge amount of every meter of liquid pipe

Amount of refrigerant charge for every meter of liquid pipe (kg/m)					
Φ22.2	Φ19.05	Φ15.9	Φ12.7	Φ9.52	Φ6.35
0.35	0.25	0.17	0.11	0.054	0.022

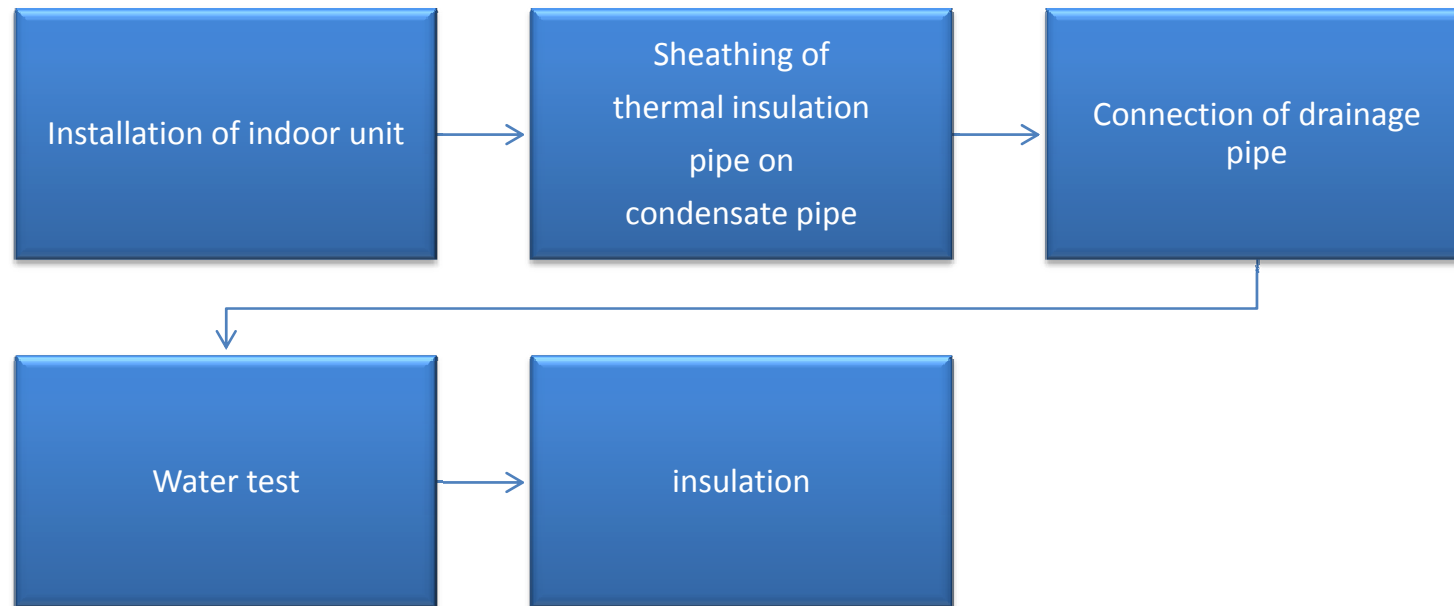
a. Standard pipe length is 15m. If refrigerant piping (L) is shorter than or equal to 15m, no additional refrigerant is needed. If piping is longer than 15m (based on liquid pipe), more refrigerant shall be added. The previous table shows how much refrigerant shall be charged for each additional meter of pipe.

b. Electronic balance shall be used for refrigerant charge.

c. Thickness of pipe wall shall be 0.5~1.0mm and pressure-bearing capability shall be 3.0MPa.

d. The longer the piping, the more refrigerating capacity and heating capacity shall be weakened.

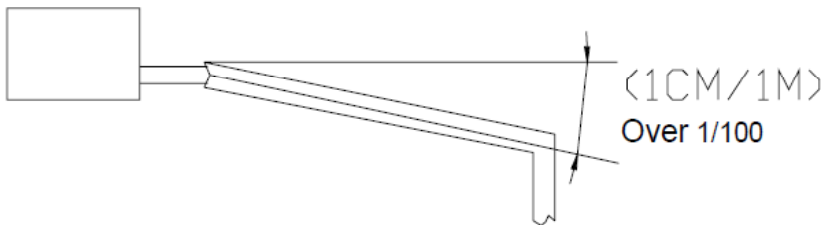
Drainage pipe



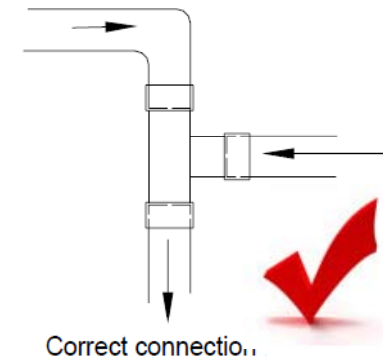
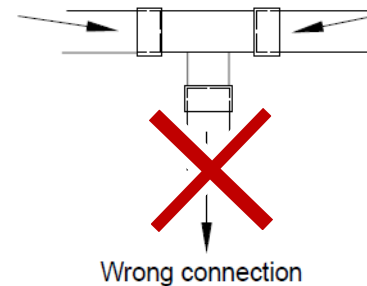
Determine the direction and elevation of condensate pipe before installation. To ensure the gradient smooth and straight, avoid intersecting with other pipelines. The height of the clamp fixing the pipe hanger frame shall be adjustable and fixed from the outer of thermal insulation.

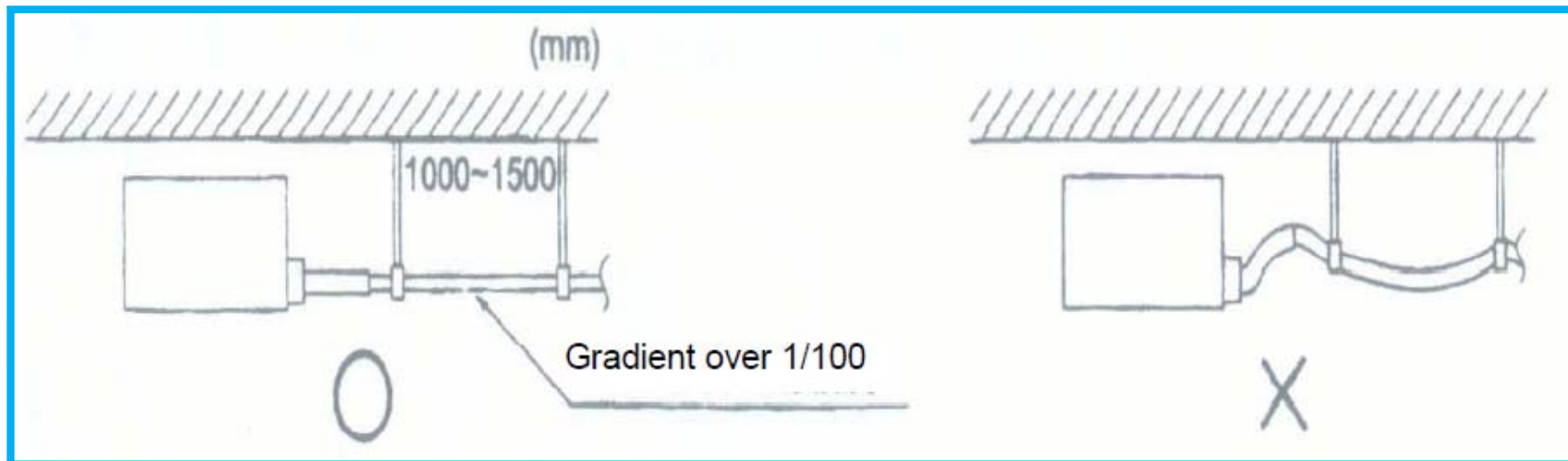
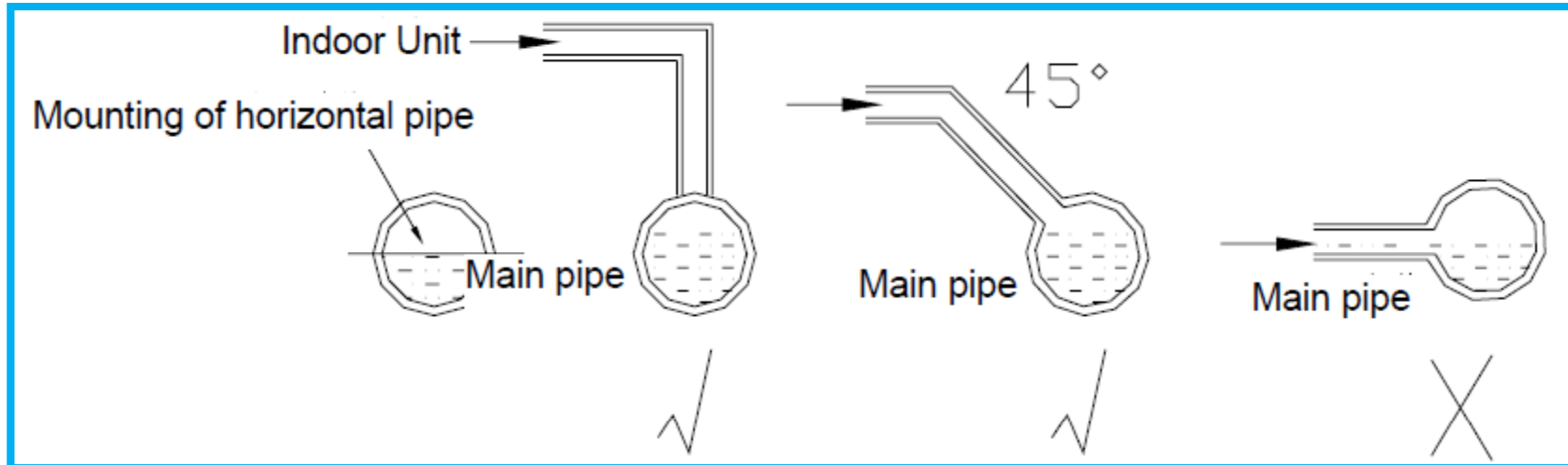
Outer diameter of water pipe (mm)	$\phi \leq 25$	$32 > \phi \geq 25$	$\phi \geq 32$
Spacing between horizontal pipes (mm)	800	1000	1500
Spacing between standpipes (mm)	1500		2000

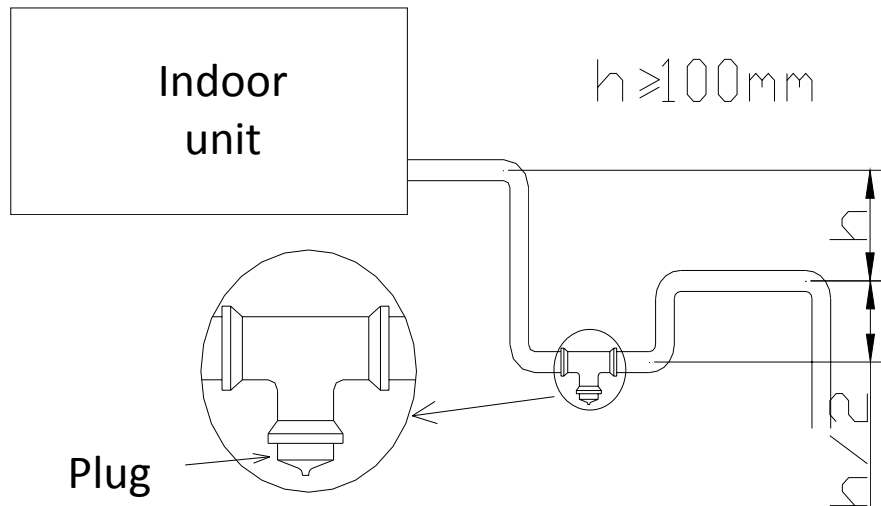
The gradient of condensate pipe shall be over 1% and the gradient of main pipe shall not be less than 0.3%, while there shall be no overhanging slope



When connecting the 3-way section of condensate pipe, the 2-way straight section on 3-way pipe shall be on the same gradient. The two ends of 2-way section shall not have different gradient.

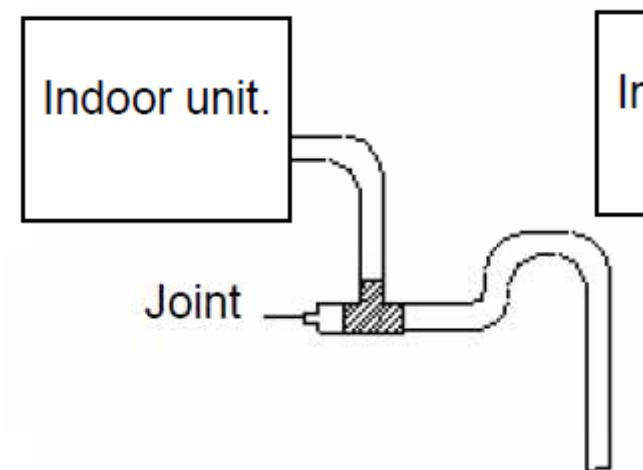




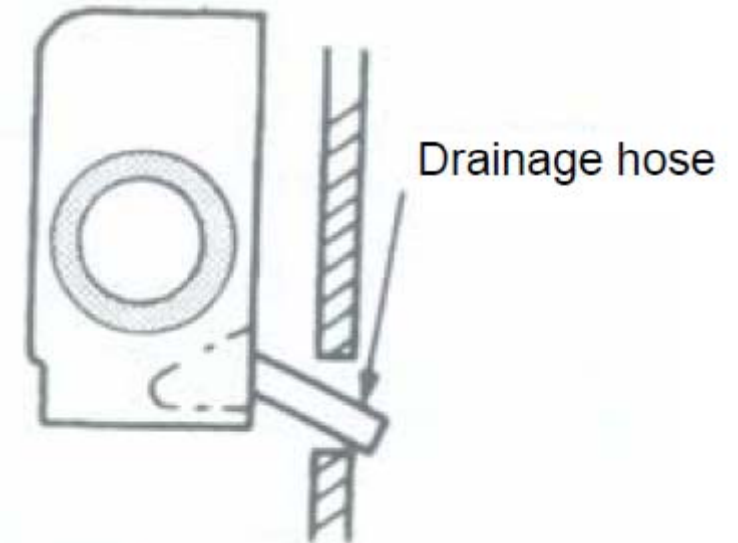
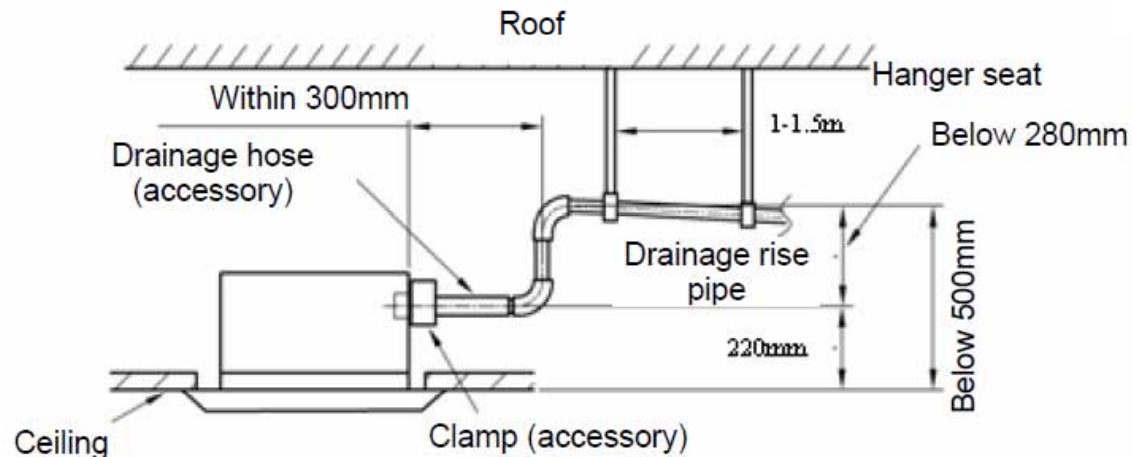


- *If the pressure at the connection of the drain pipe is negative, it needs to be fixed a drainage trap.*
- *A plug should be designed to make clean easy*

or



cassette



Wall mount

*Water test is needed before making any insulation

- The thermal insulation material fireproof level: B1.
The thermal conductivity shall not be higher than $0.035 \text{ W/(m}\cdot\text{K)}$ when the average temperature is 0°C .
- The thickness of thermal insulation layer on condensate pipe shall be over **10**mm.
- The joint of thermal insulation materials must be adhered by using special glue and then wrapped with plastic tape having a width not less than 5cm to avoid condensing.
- Thermal insulation is not required for the outdoor section of condensate pipe.



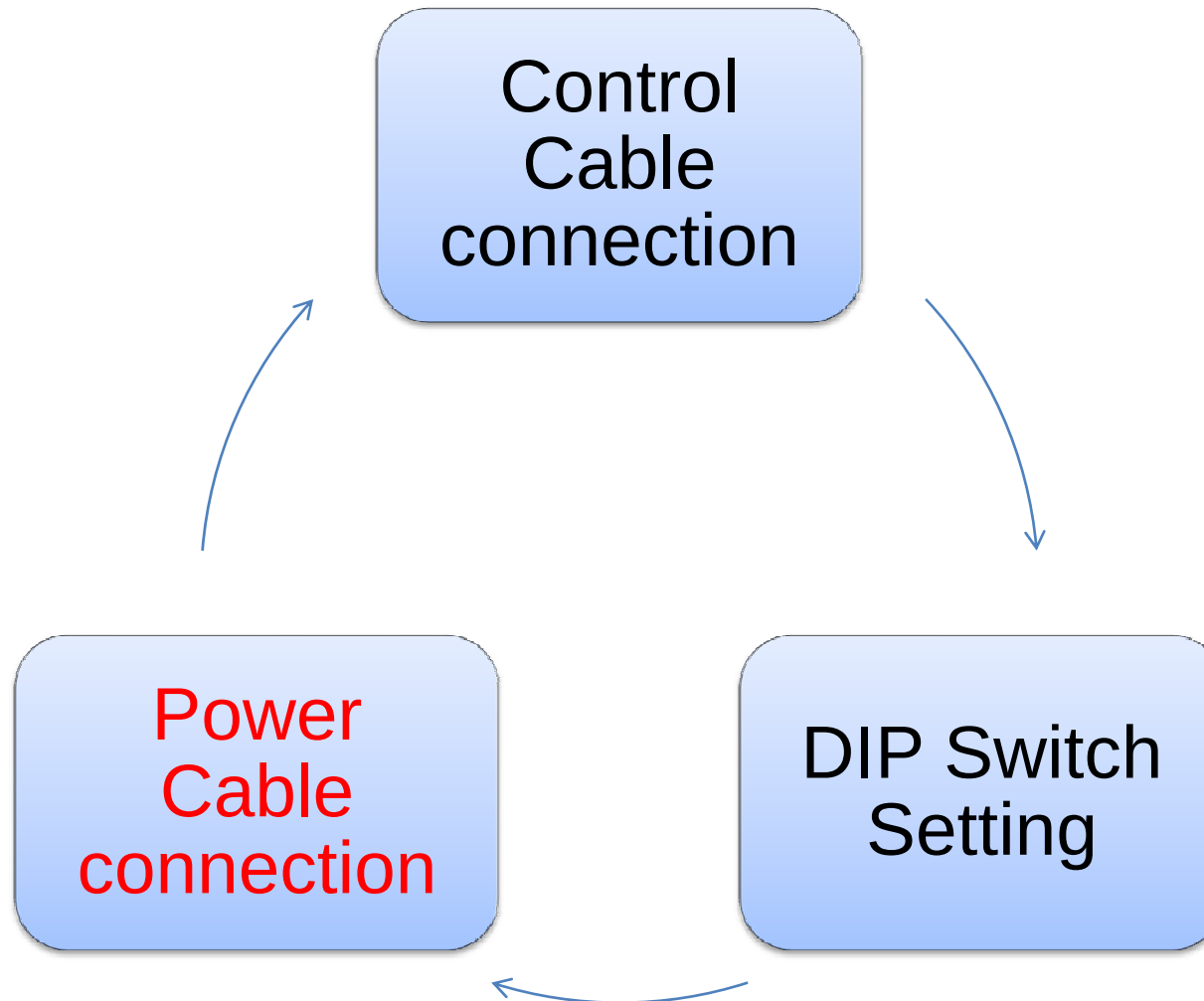
1. Indoor unit installation

2. Outdoor unit installation

3. Piping/Pressure/Vacuum

4. Electrical wiring

5. Tools

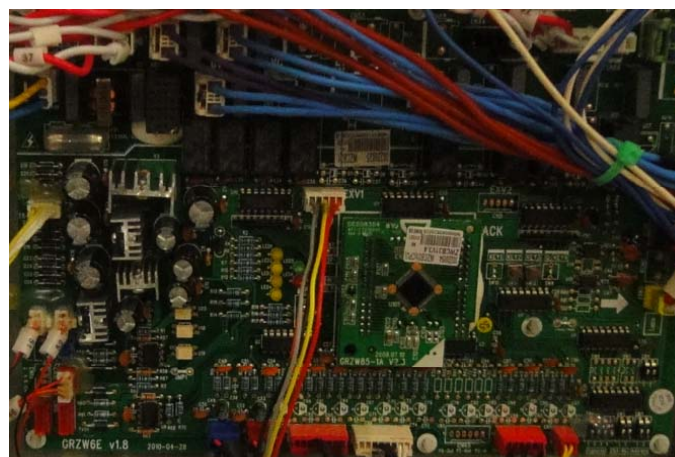
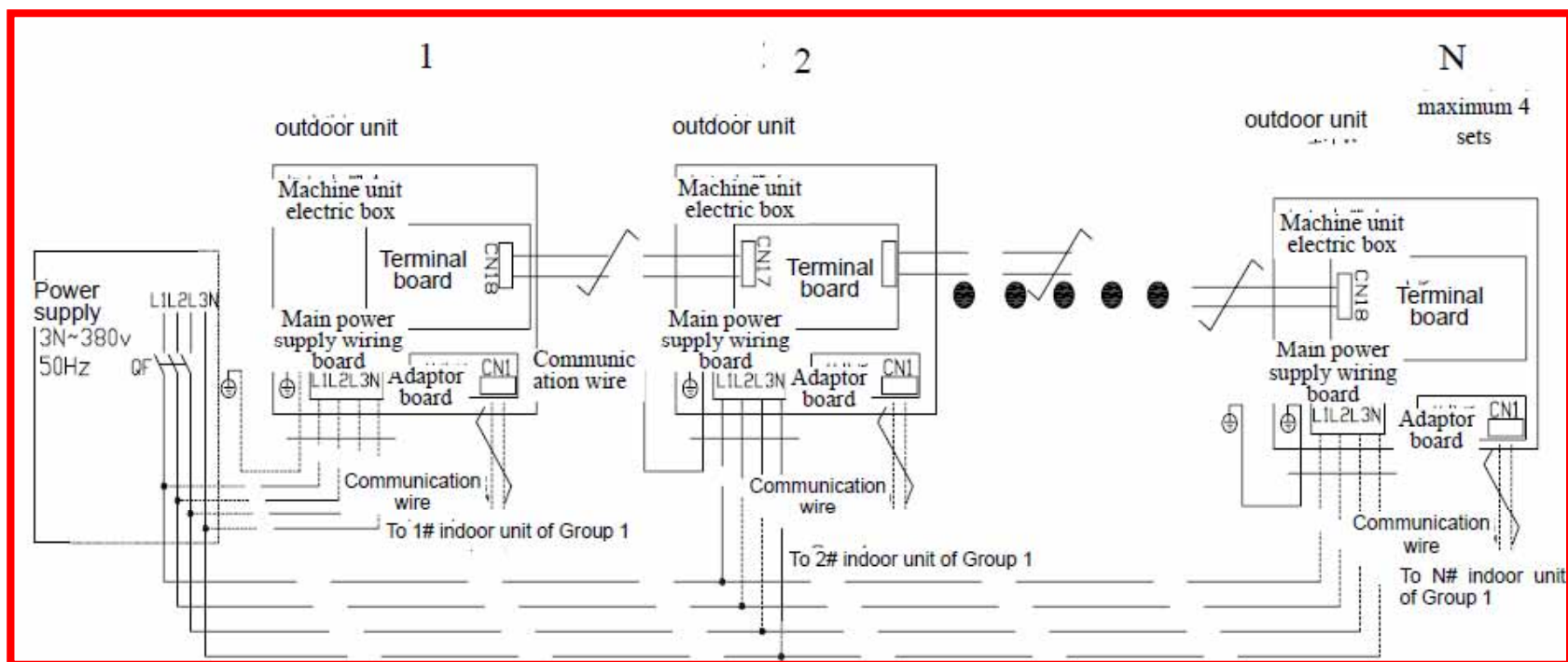


8/10HP



12/14/16HP



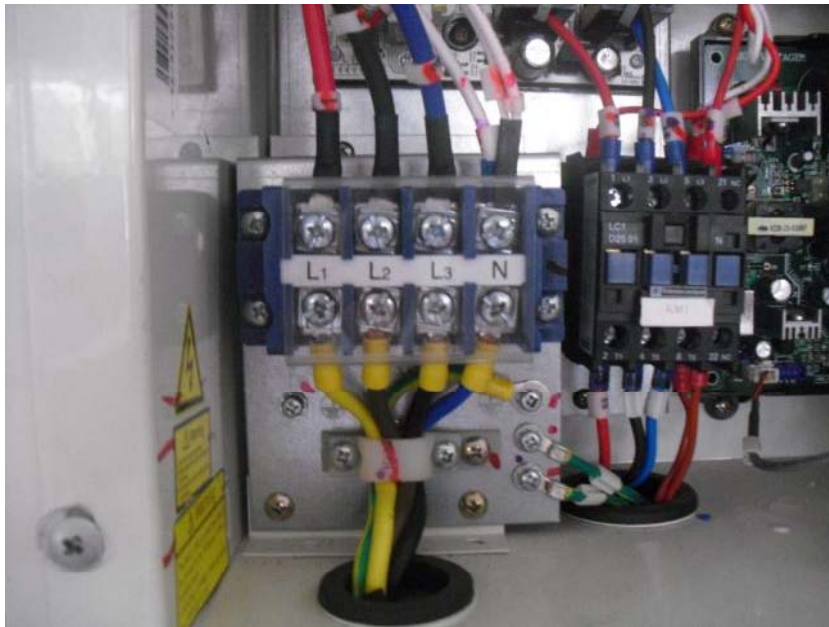


check the L1 L2 L3 to be in the same sequence

L1 → L2 → L3

L2 → L3 → L1

L3 → L1 → L2



50Hz: 3phases/5cables
60Hz: 3phases/4cables

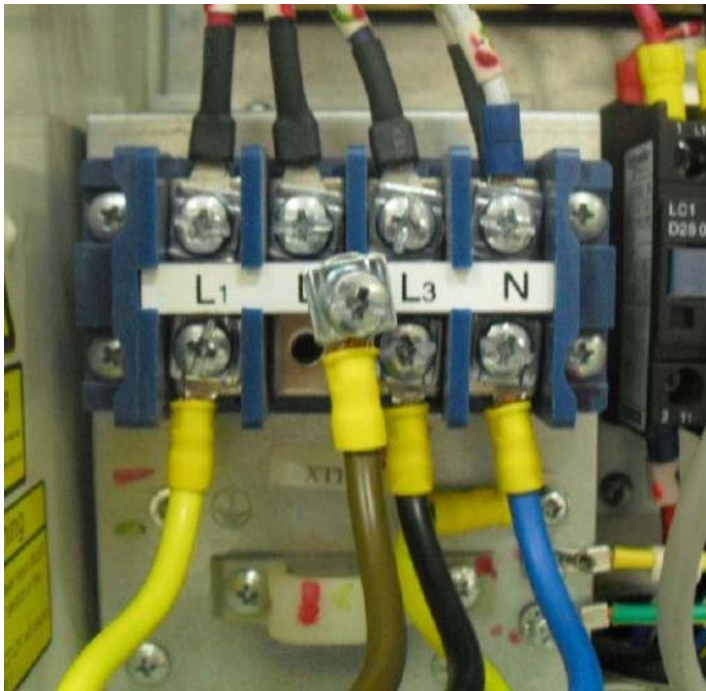
8/10HP



PASS!!!

Light on

Less-phase protection



One phase
lost



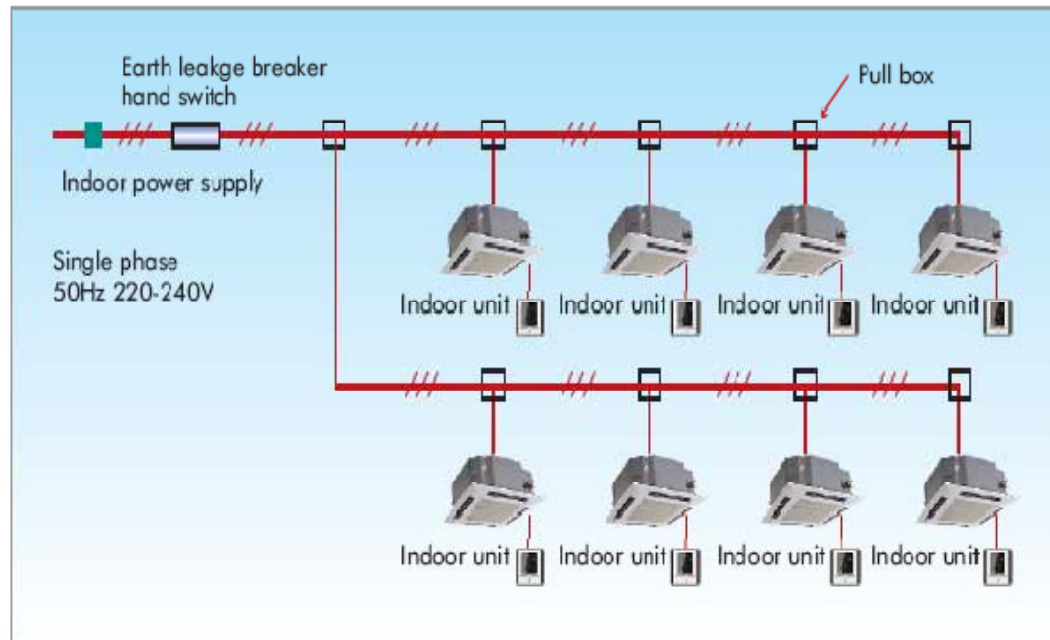
LIGHT OFF!

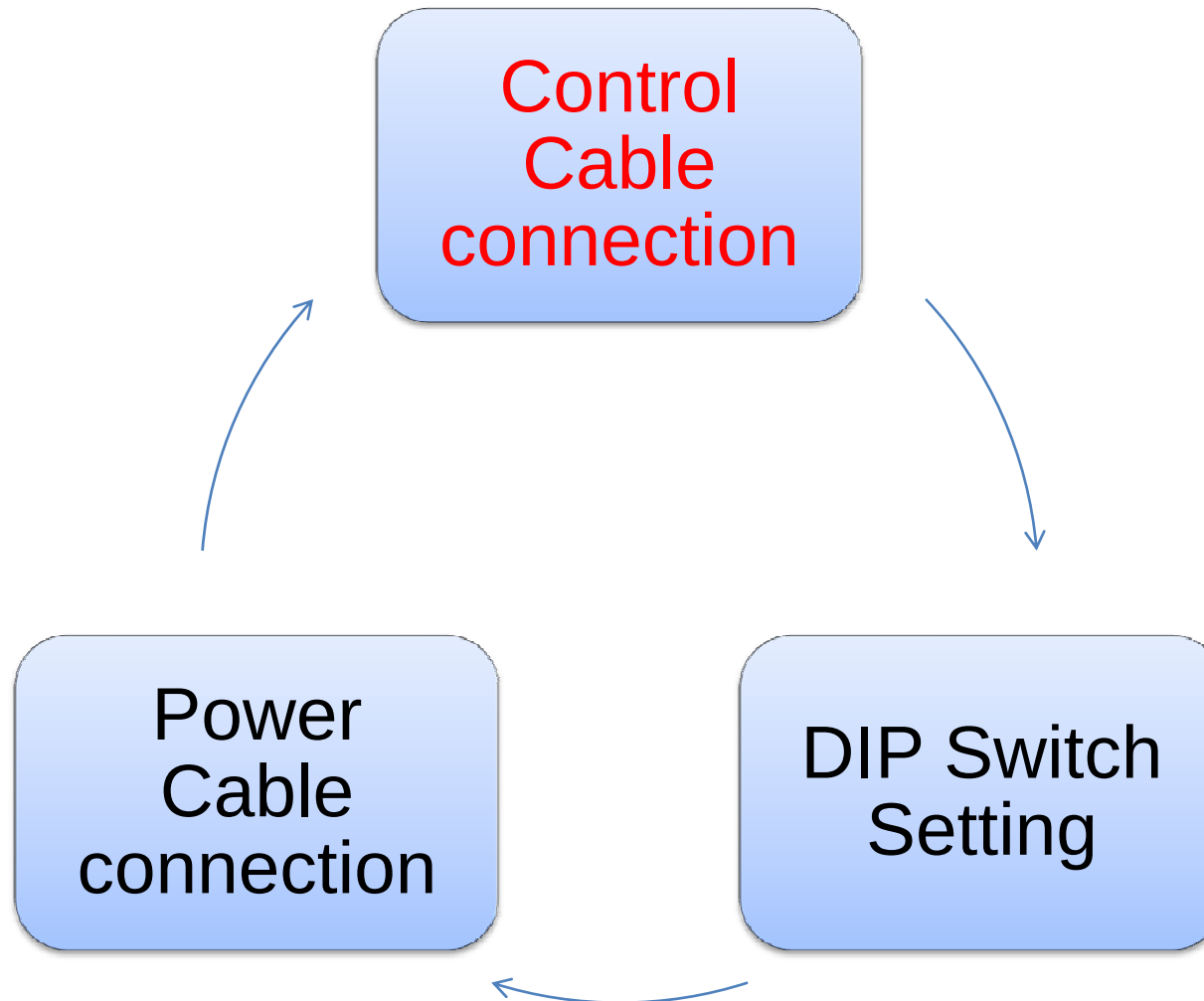
FAILED!!

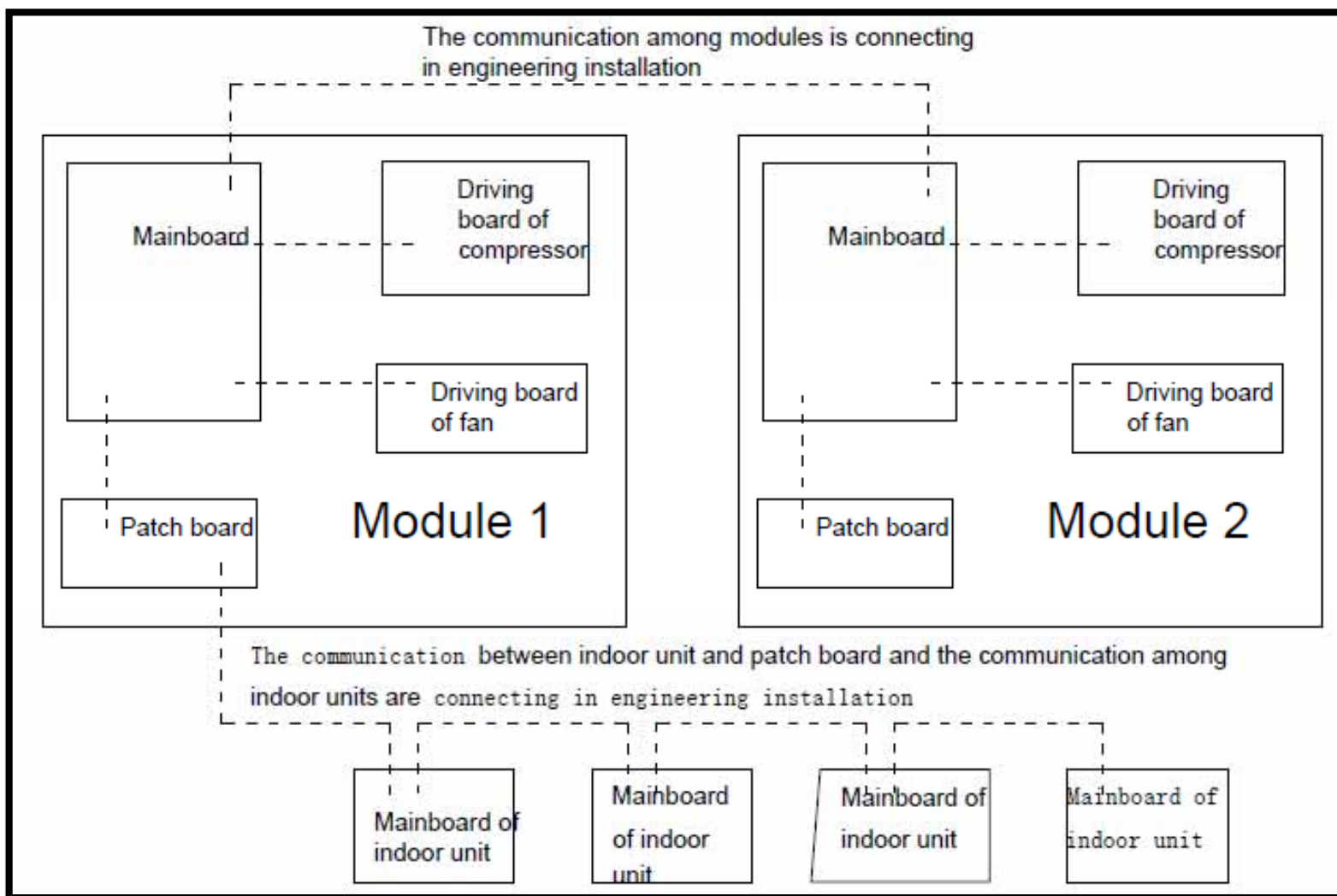
● Electrical Cable Connection

Cautions:

- ☆ Outdoor unit and indoor unit may be of unified power supply or separate power supply. But the **indoor units must be of unified power supply**.
- ☆ Be sure install a circuit breaker that can cut off the power of complete system.
- Connection of power cord:
 1. Cable passes through the rubber loop.
 2. Connect power cord to terminals that marks “L1, L2, L3 and N” or “L, N, PE” and earth screw.
 3. Tighten the cable by wire clamp.







Main board

Sockets for different valve

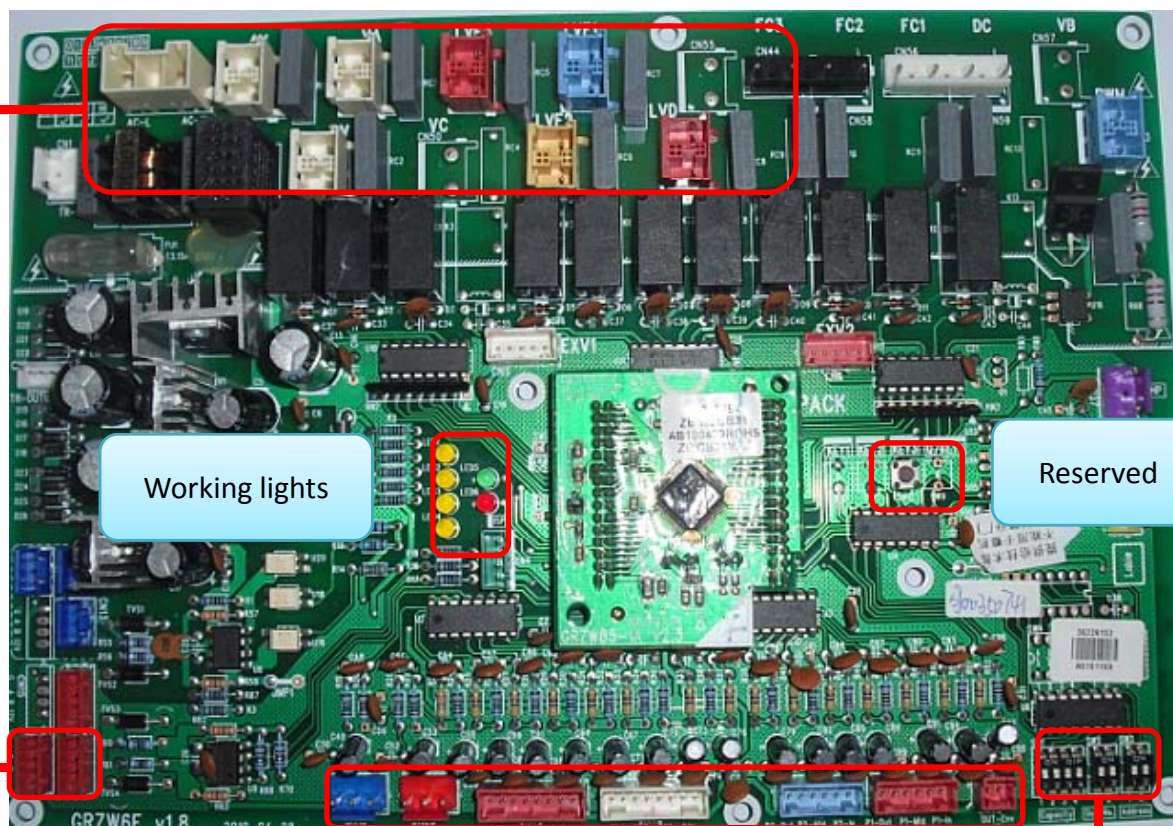
Working lights

CN17/18: socket for connection between different outdoor units

All the sockets for HP/LP sensors, temperature sensors and so on.

Reserved

Dip switches



Pin board

LED displayer: show
unit address/Error
codes

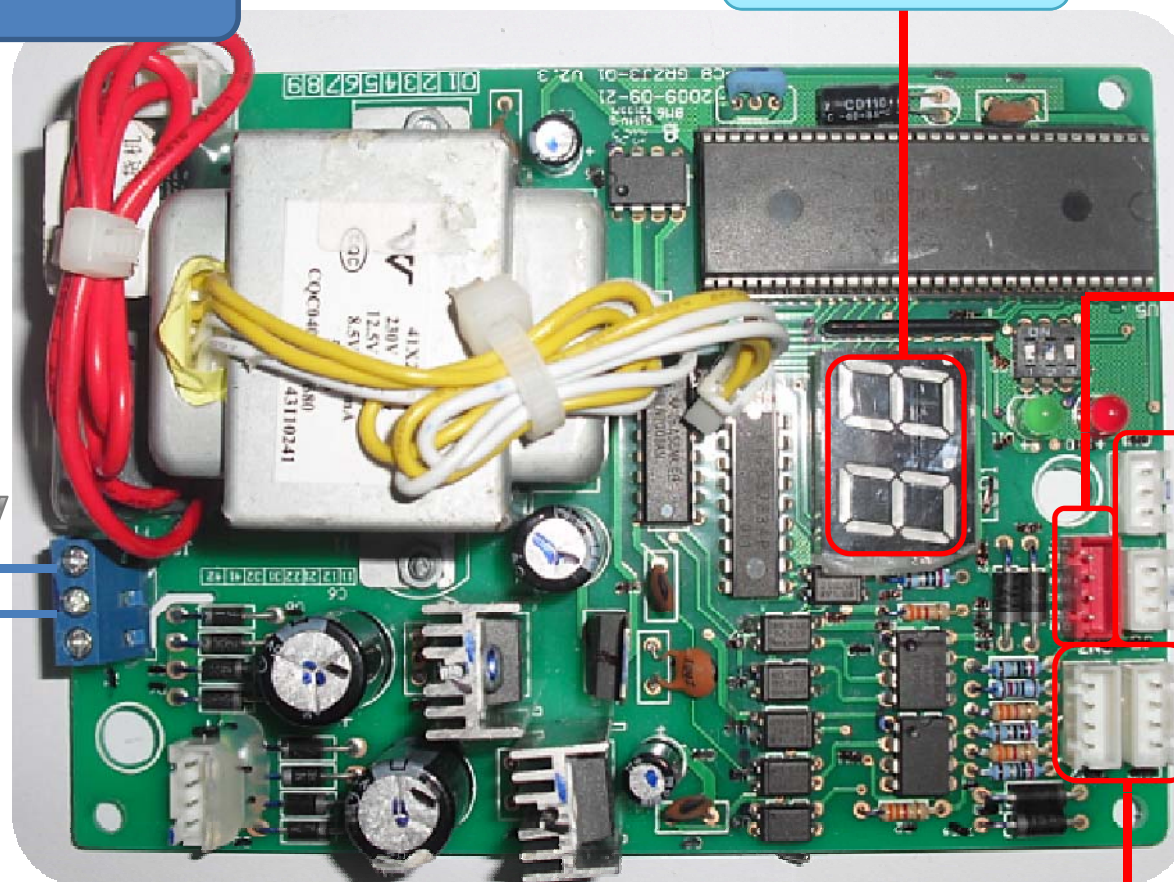
Socket for central
control system or
commission tools

Connect to
communication
cable from indoor
unit

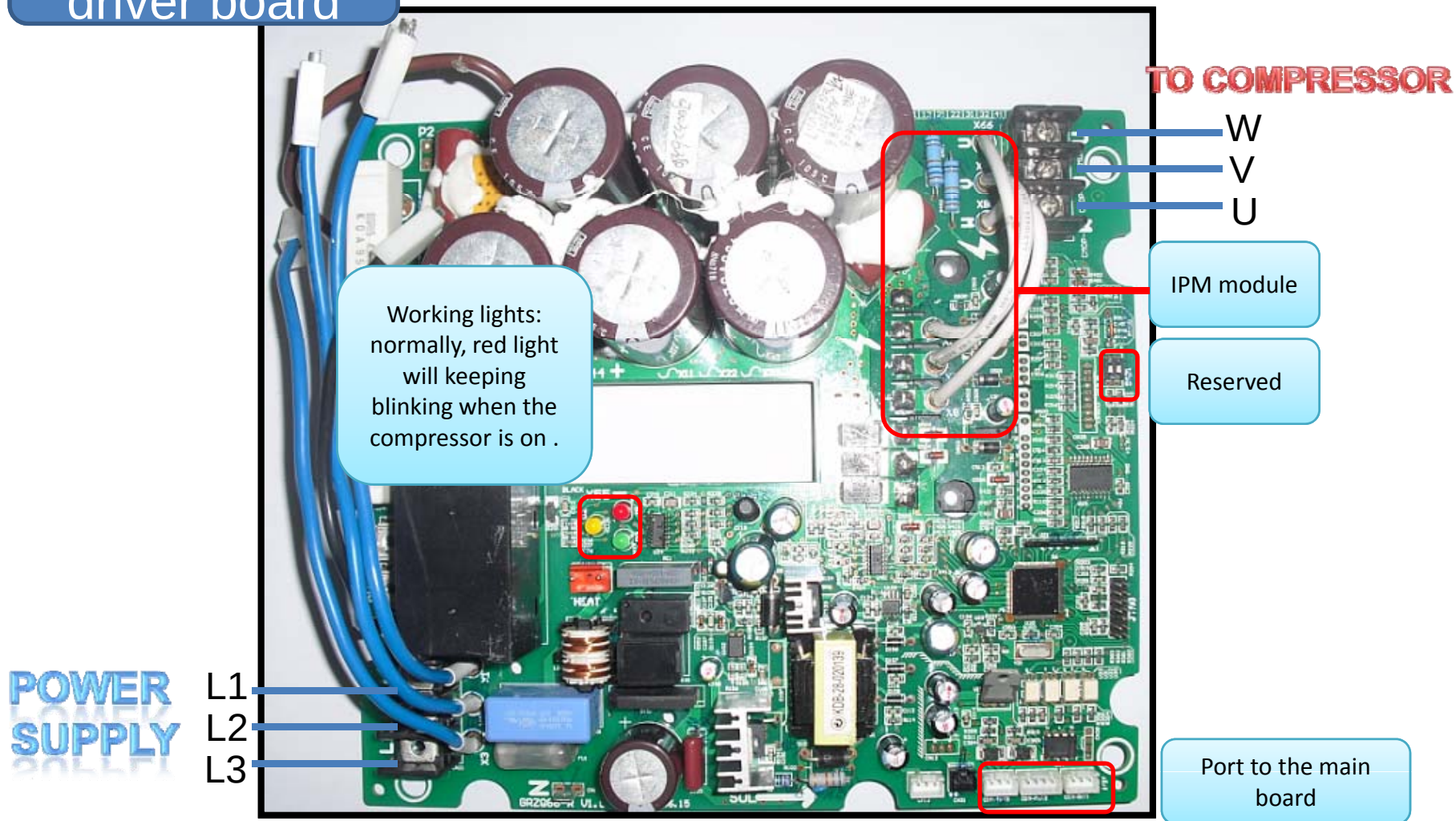
Connecting sockets
to the main board

Power supply

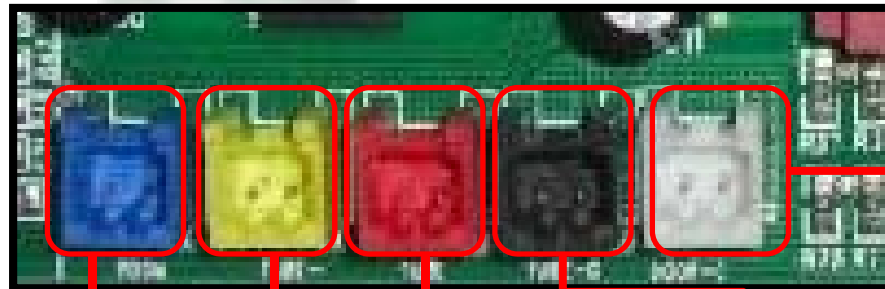
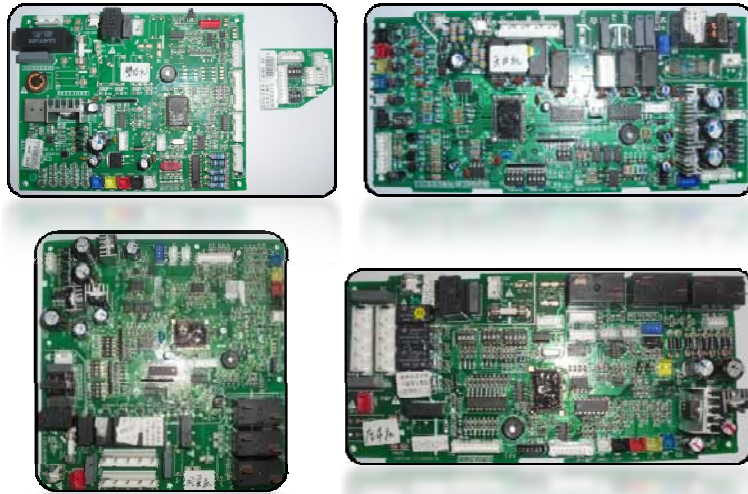
L
N



Compressor driver board



Indoor unit board



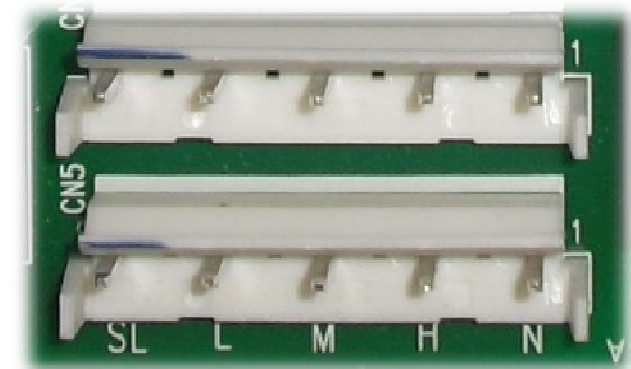
Indoor room temperature sensor

Evaporator inlet T sensor

Evaporator middle T sensor

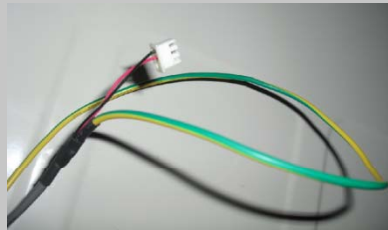
Evaporator outlet T sensor

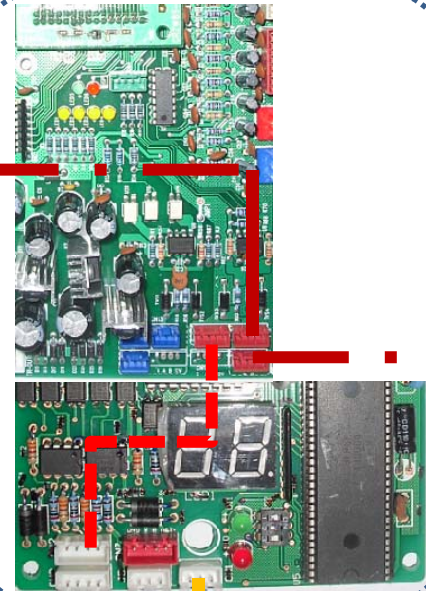
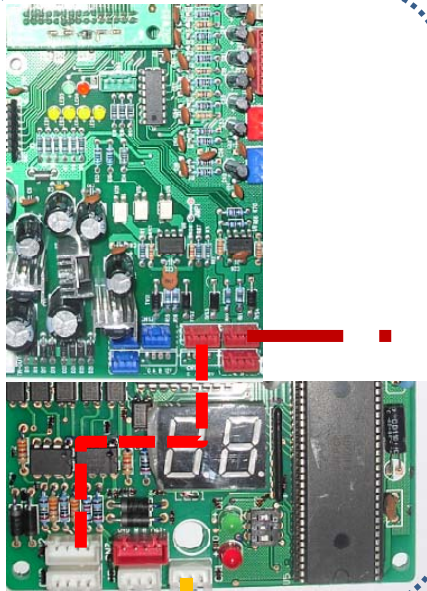
Exit control system port



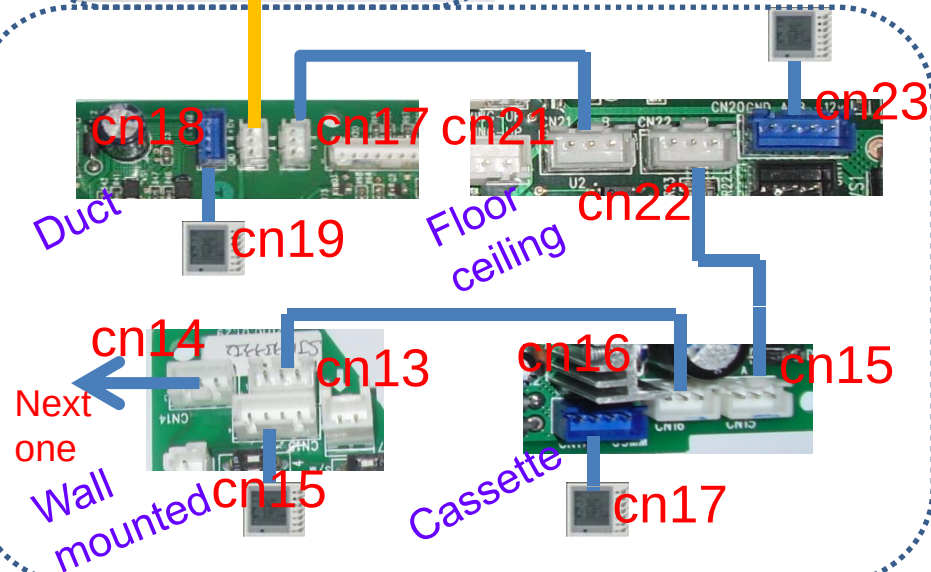
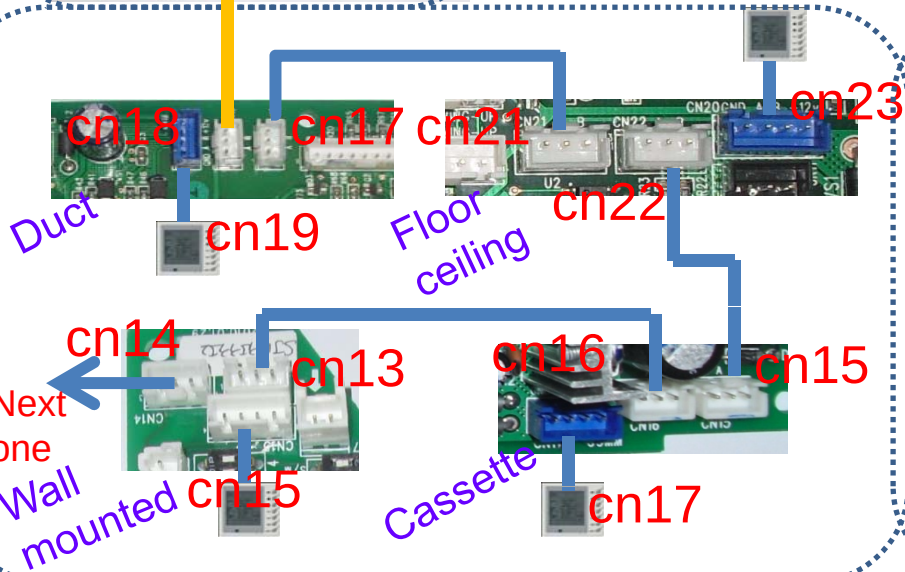
Connecting to fan motor
High/Middle/Low/S Low

Communication cable connection

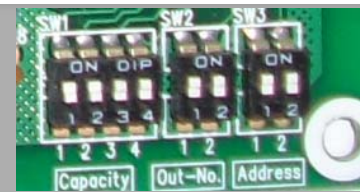
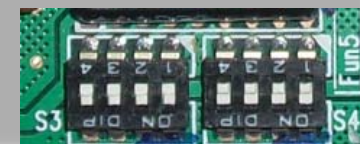
From	To	Spec.	Picture
Outdoor main board	Outdoor main board	4 pins/2 cores Middle two pins represent A and B	
Outdoor pin board	Indoor main board	3 pins/2cores/1 ground wire 2, 3 pin means A and B. Magnetic ring needed.	
Indoor main board	Indoor main board	3 pins/2cores/1 ground wire 2, 3 pin means A and B. Magnetic ring needed.	



To next one



Address setting

where	What	How	See
Outdoor main board	Outdoor unit quantity code Outdoor unit address code	value from 1-4	
Outdoor pin board	Quantity code	Value from 1-8	
Indoor main board	Indoor unit address code Indoor unit function code	Value from 1-16	
Wired controller	Wired controller address code	Value from 1-16	
Communication module	Module address code	Value from 1-255	

Example

1

- 3 outdoor units
- Modular type



2

- 15 indoor units

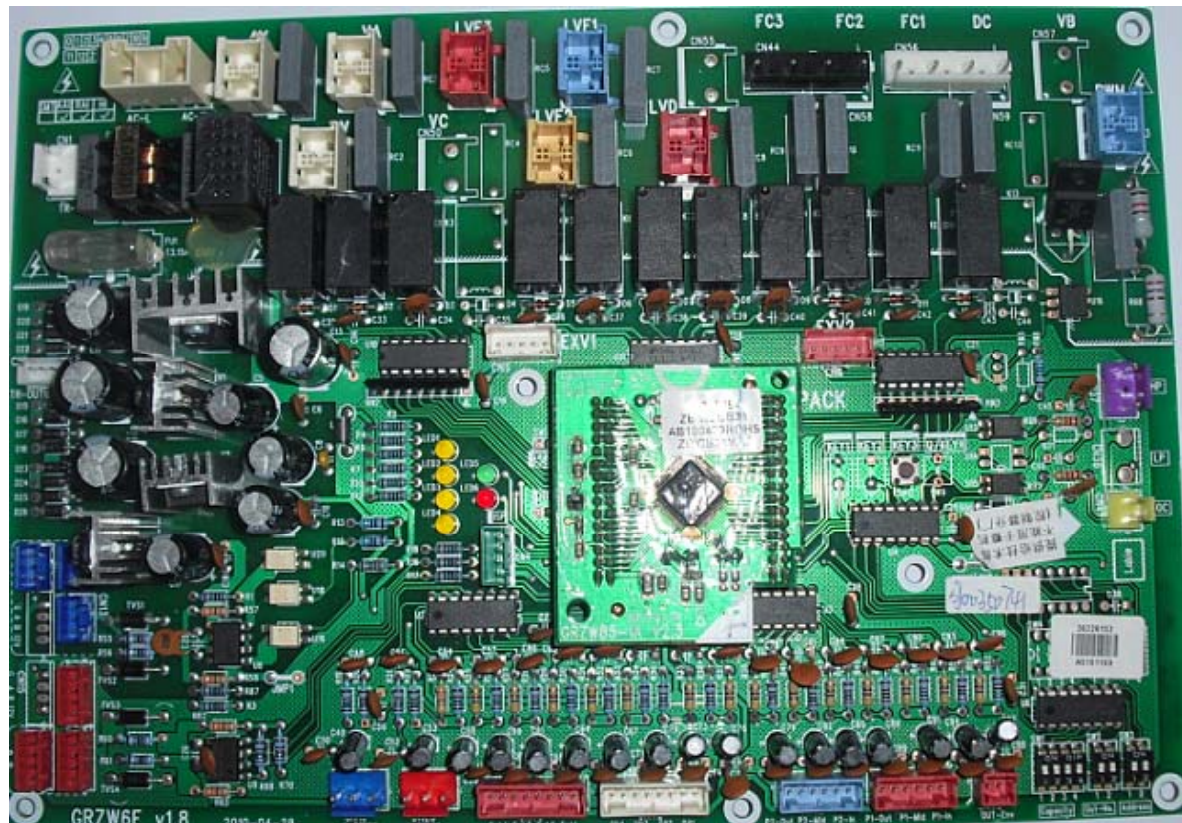


3

- 1 set central controller

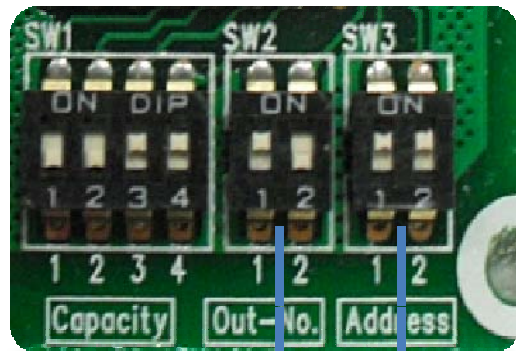


Setting for the outdoor



Setting for the outdoor—
main board

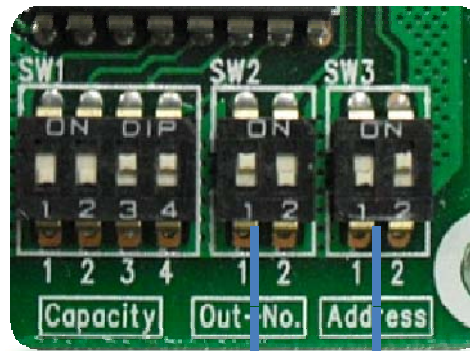
OUT 1



Value 3

Value 1

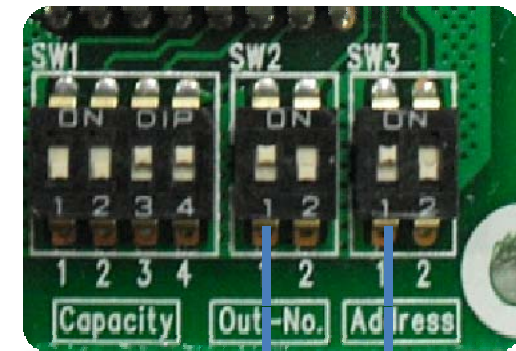
OUT 2



Value 3

Value 2

OUT 3

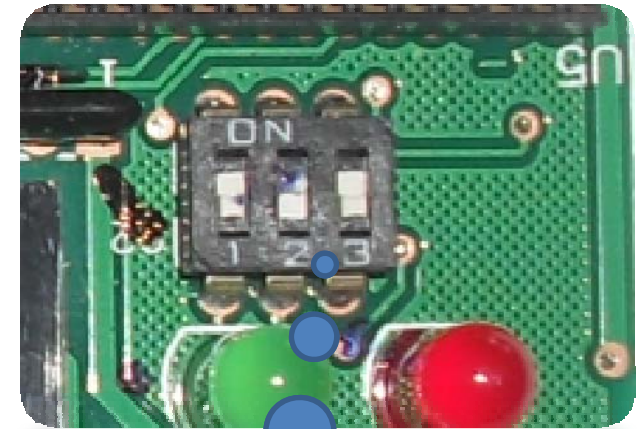
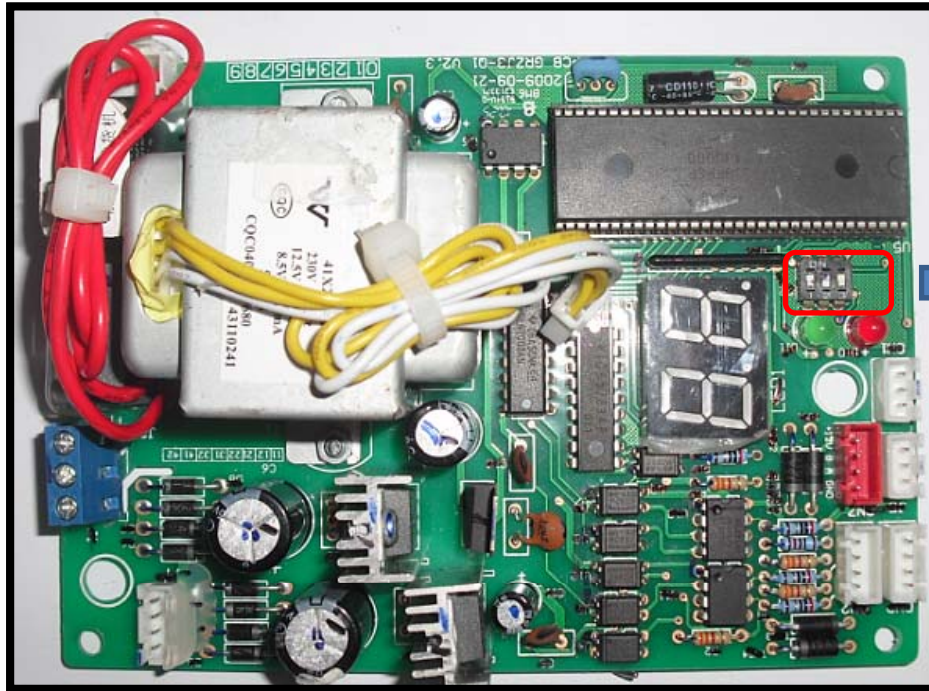


Value 3

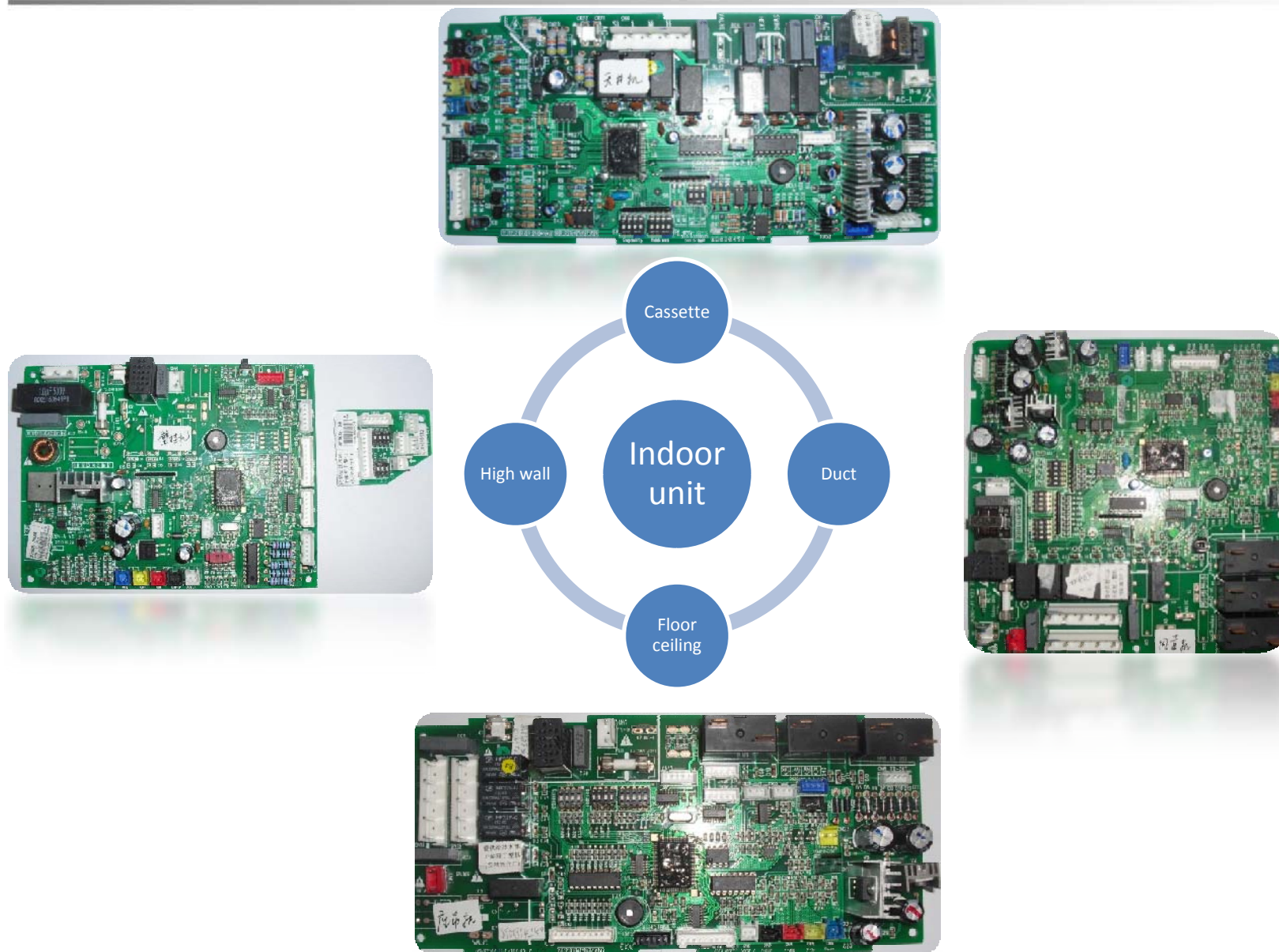
Value 3



Setting for the outdoor—pin board

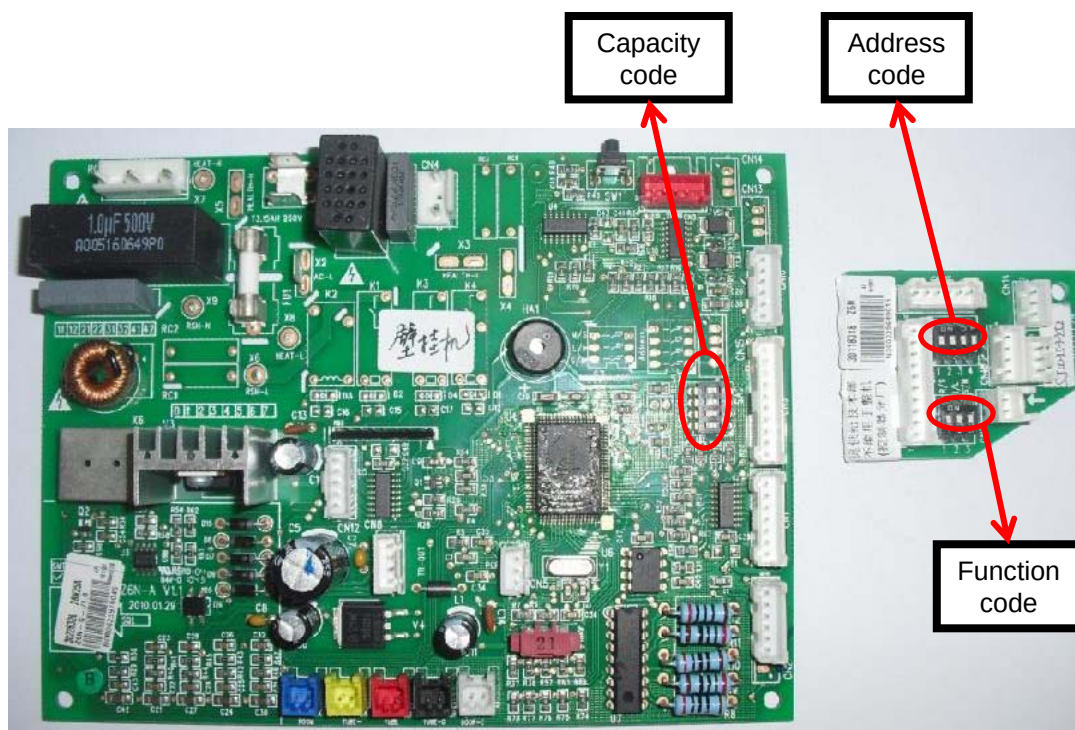


You need to set
when you have more
than one pin board

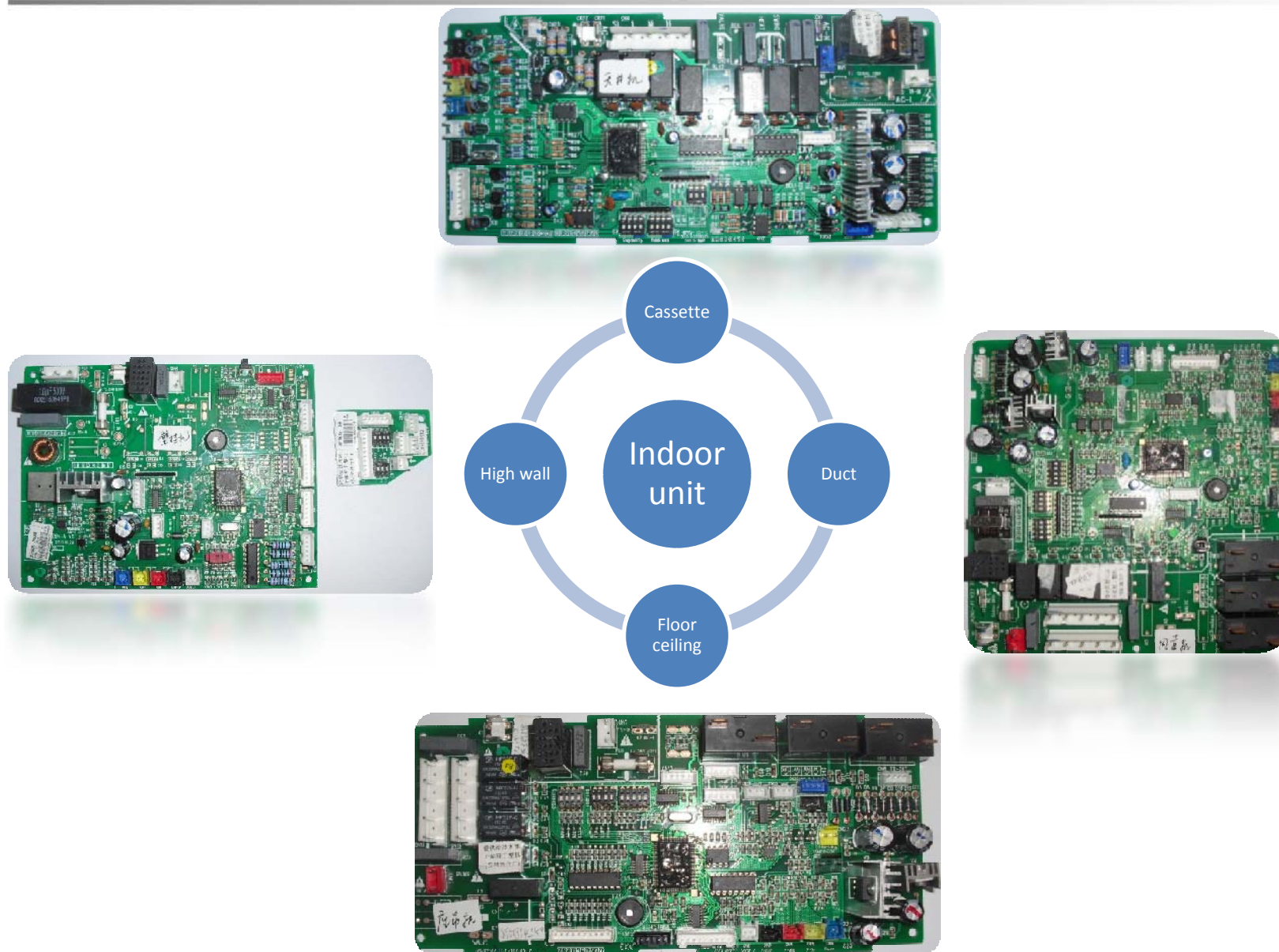


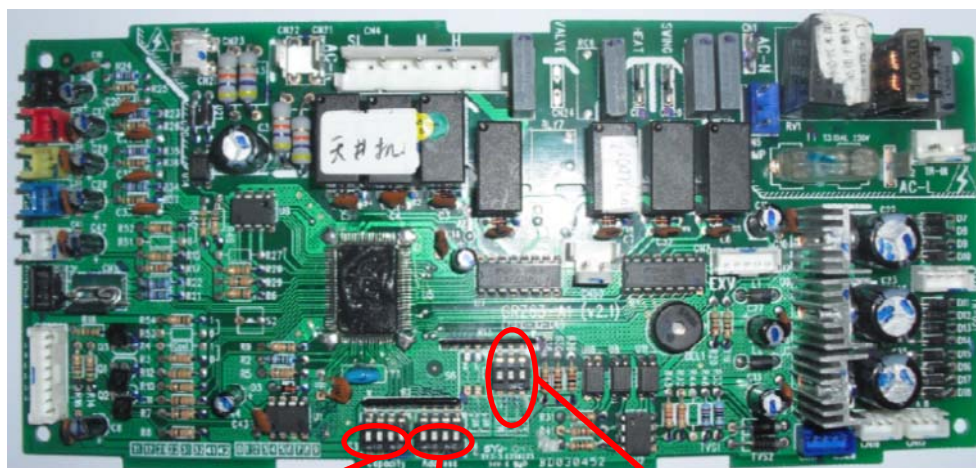


Functional dial switch S7



DIP switch	Functional Description	Dial-up Setting	
		"ON" side	No. side
1(S/R)	Setting of memory mode	Standby(S)	Restore(R)
2(L/I)	Setting of control mode	Wired control(L)	wireless remote control(I)
3(M/S)	Setting of master/slave indoor unit	Master indoor unit(M)	Slave indoor unit(S)





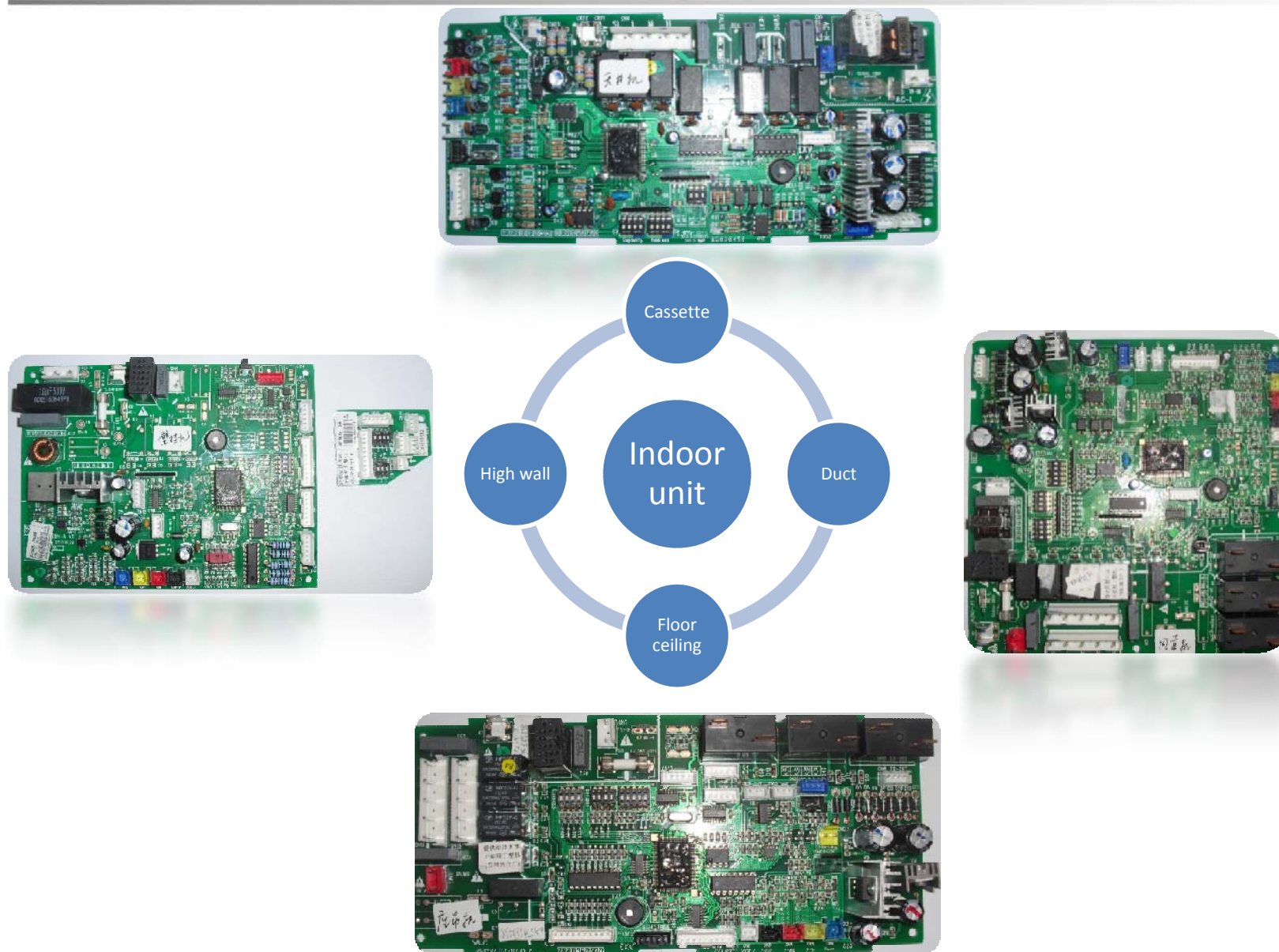
Capacity
code

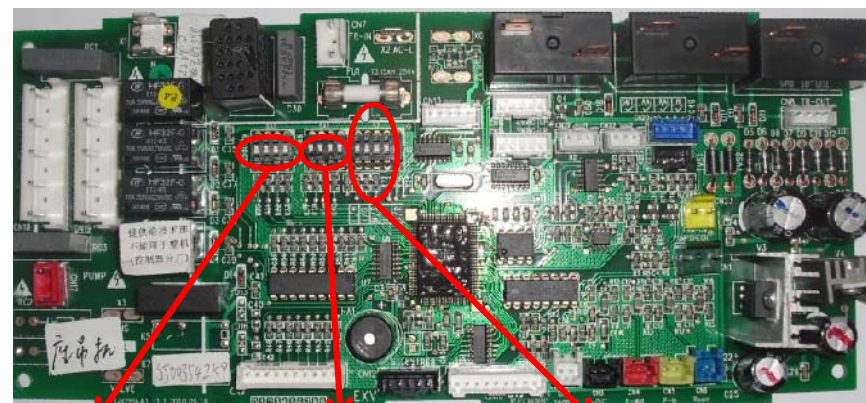
Address
code

Function
code

Functional dial switch S7

DIP switch	Funcional Description	Dial-up Setting	
		"ON" side	No. side
1(S/R)	Setting of memory mode	Standby(S)	Restore(R)
2(L/I)	Setting of control mode	Wired control(L)	wireless remote control(I)
3(M/S)	Setting of master/slave indoor unit	Master indoor unit(M)	Slave indoor unit(S)





Capacity
code

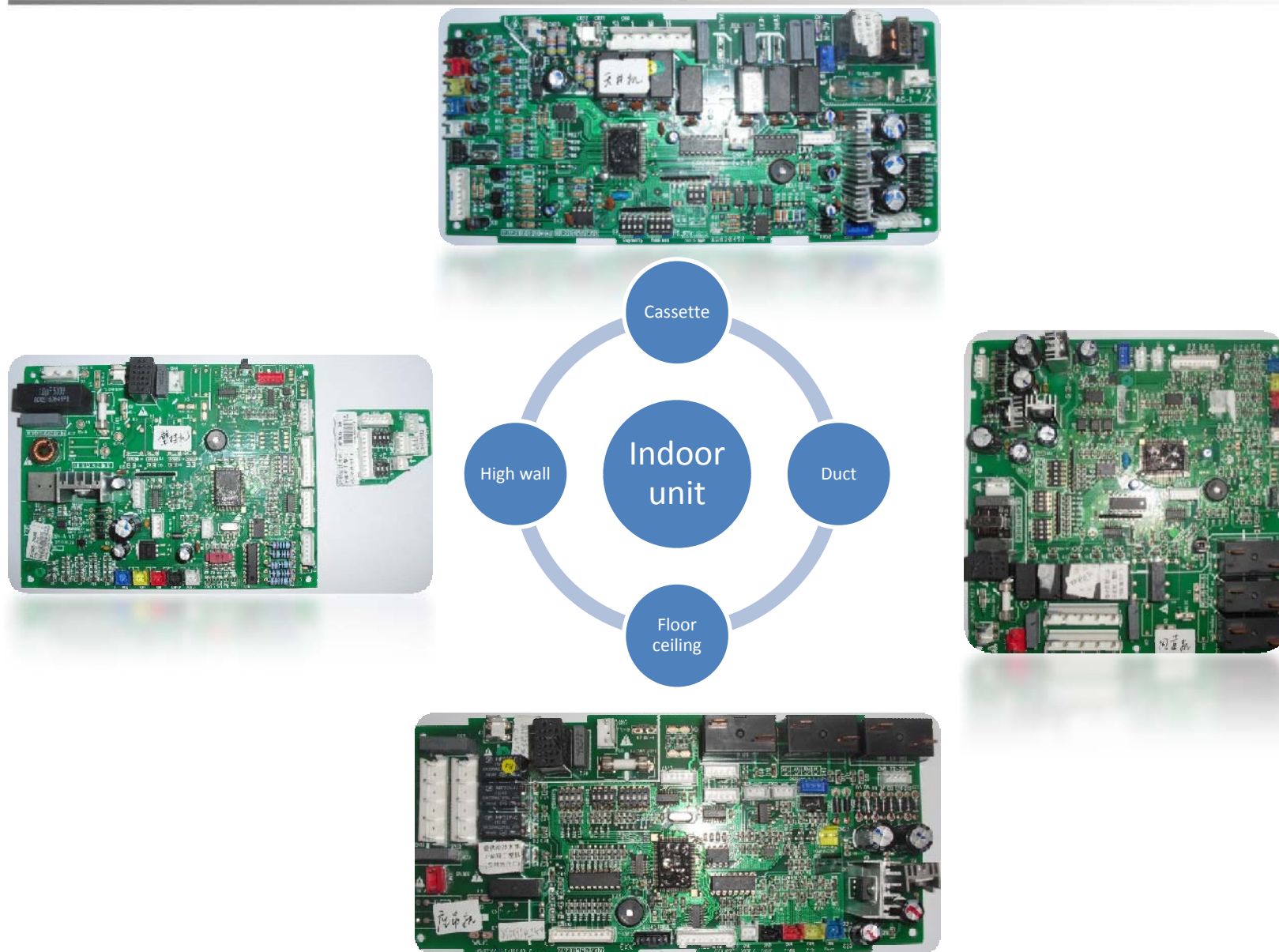
Address
code

function
code

Functional dial switch S7

DIP switch	Functional Description	Dial-up Setting	
		"ON" side	No. side
1(S/R)	Setting of memory mode	Standby(S)	Restore(R)
2(L/I)	Setting of control mode	Wired control(L)	wireless remote control(I)
3(M/S)	Setting of master/slave indoor unit	Master indoor unit(M)	Slave indoor unit(S)
4(I/O)	Setting of ambient temperature acquisition point	Return air inlet(I)	Receiver(O)
5(L/H)	Setting of high/low static pressure fan	Low static pressure(L)	High static(H)

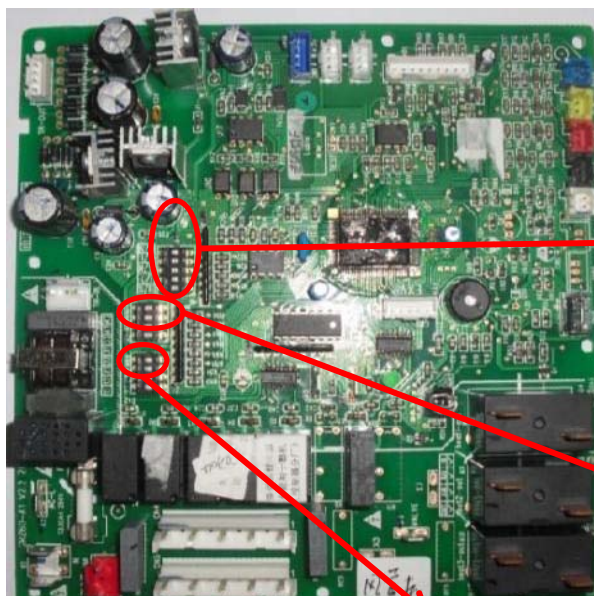






Functional dial switch S7

DIP switch	Functional Description	Dial-up Setting	
		"ON" side	No. side
1(S/R)	Setting of memory mode	Standby(S)	Restore(R)
2(L/I)	Setting of control mode	Wired control(L)	wireless remote control(I)
3(M/S)	Setting of master/slave indoor unit	Master indoor unit(M)	Slave indoor unit(S)
4(I/O)	Setting of ambient temperature acquisition point	Return air inlet(I)	Receiver(O)
5(L/H)	Setting of high/low static pressure fan	Low static pressure(L)	High static(H)



Function code

Capacity code

Address code

This 4th Switch 4(I/O) is function only when 2nd Switch 2(L/I) is set to "I" (wireless remote control), and Setting of ambient temperature acquisition point need to be done through Wired Remote Control, when the 2nd Switch 2(L/I) is set to "L" (wired remote control).

Dip code

Dial-up Table (4-bit Dial-up Switch)				
4-bit	3-bit	2-bit	1-bit	Address
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
0	0	1	1	4
0	1	0	0	5
0	1	0	1	6
0	1	1	0	7
0	1	1	1	8
1	0	0	0	9
1	0	0	1	10
1	0	1	0	11
1	0	1	1	12
1	1	0	0	13
1	1	0	1	14
1	1	1	0	15
1	1	1	1	16

Notes:

1. All the indoor units under the same condensing unit should be set with different addresses;
2. You have to keep the address of wired controller and linked indoor unit the same;
3. Maximal 16 indoor units can be connected to the same condensing unit;
4. If the indoor unit is set to be controlled by wireless controller, the connected wired controller would display E6.

	Indoor units			Communication modules
	ODU1	ODU2	ODU3	
Case 1	15	0	0	1
Case 2	1-14	1-14	0	2
Case 3	1-13	1-13	1-13	3

Case1 : All the indoor units are connected to one of the three condenser units, only need one communication module.

Case2 : All the indoor units are separated into two groups, equally or whatever, connect with two different condensing units, another one without any indoor unit. Two communication modules are needed.

Case3: All the indoor units are separated into three groups, equally or whatever, connect all the condensing units. Three communication modules are needed.

1. Indoor Unit Installation

2. Outdoor Unit Installation

3. Piping/Pressure/Vacuum

4. Technical Writing

5. Tools

Tools for refrigerant charge

			
Refrigerant tank	Electric scale	Pressure gauge s	Vacuum pump
			
Leak detector	Vacuometer		

Tools for piping

				
Cutter	Pipe bender	Welding tools	Wrench spanner	Flaring tool

Tools for wiring

				
Crimper	Electrodrill	Clamp meter	Infrared thermometer	Vice



Thanks for your attention!

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