MRCOOL®

COMFORT MADE SIMPLE

Hyper Heat Single-Zone 24k-60k
Ducted Air Handler & Condenser

SERVICE MANUAL

Version Date: 06/27/23

Product Features

Contents

1. Display Function

Mode	Priority	G	Y1	Y/Y2	B	W	W1	W2	E/AUX	DH/DS/BK	Display
Shut down	/	0	0	0	0	0	0	0	0	*	00
Fan	7	1	0	0	*	0	0	0	0	*	01
Cooling 1	6	*	1	0	0	0	0	0	0	1	02
Cooling 2		*	*	1	0	0	0	0	0	1	03
Drying 1		*	1	0	0	0	0	0	0	0	04
Drying 2		*	*	1	0	0	0	0	0	0	05
Heating 1	5	*	1	0	1	0	0	0	0	1	06
Heating 2		*	*	1	1	0	0	0	0	1	07
Heating 2		*	*	*	*	1	0	0	0	1	
Electric heating 1	3	*	0	0	*	0	1	0	0	*	08
Electric heating 1		*	0	0	*	0	0	1	0	*	
Electric heating 2		*	0	0	*	0	1	1	0	*	09
Heating 1+Electric heating 1	4	*	1	0	1	0	1	0	0	1	10
Heating 1+Electric heating 1		*	1	0	1	0	0	1	0	1	
Heating 2 +Electric heating 1		*	*	1	1	0	1	0	0	1	
Heating 2 +Electric heating 1		*	*	*	*	1	1	0	0	1	
Heating 2 +Electric heating 1		*	*	1	1	0	0	1	0	1	
Heating 2 +Electric heating 1		*	*	*	*	1	0	1	0	1	
Heating 1+Electric heating 2		*	1	0	1	0	1	1	0	1	11
Heating 2+Electric heating 2		*	*	1	1	0	1	1	0	1	
Heating 2+Electric heating 2		*	*	*	*	1	1	1	0	1	
Emergency heating	1	*	*	*	*	*	*	*	1	*	12
Heating zone control	2	*	1	0	1	0	*	*	0	0	13
Heating zone control		*	*	1	1	0	*	*	0	0	
Heating zone control		*	*	*	*	1	*	*	0	0	

NOTICE:

1 : signal

0 : no signal

*： 1 or 0

If the input does not meet the above, press shutdown for processing.

2. Safety Features

Compressor three-minute delay at restart

Compressor functions are delayed for up to ten seconds upon the first startup of the unit, and are delayed for up to three minutes upon subsequent unit restarts.

Automatic shutoff based on discharge temperature

If the compressor discharge temperature exceeds a certain level for nine seconds, the compressor ceases operation.

Inverter module protection

The inverter module has an automatic shutoff mechanism based on the unit's current, voltage, and temperature. If automatic shutoff is initiated, the corresponding error code is displayed on the indoor unit and the unit ceases operation.

Indoor fan delayed operation

- When the unit starts, the indoor fan will operate after a period of setting time.
- If the unit is in heating mode, the indoor fan is regulated by the anti-cold wind function.

Compressor preheating

Preheating is automatically activated when T4 sensor is lower than setting temperature.

Sensor redundancy and automatic shutoff

- If one temperature sensor malfunctions, the air conditioner continues operation and displays the corresponding error code, allowing for emergency use.
- When more than one temperature sensor is malfunctioning, the air conditioner ceases operation.

3. Basic Functions

3.1 Abbreviation

Unit element abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of evaporator
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
TP	Compressor discharge temperature
TS	Setting temperature
Tsc	Adjusted setting temperature

In this manual, such as CDIFTEMP, HDIFTEMP2,TEH2, TCE1, TCE2...etc., they are well-setting parameter of EEPROM.

3.2 Fan Mode

When fan mode is activated:

- The outdoor fan and compressor are stopped.
- Temperature control is disabled and no temperature setting is displayed.
- The indoor fan speed can be set to low, medium, high, turbo and auto.
- Auto fan: In fan-only mode, AC operates the same as auto fan in cooling mode with the temperature set at 24°C.
- Under 24V control, when only G signal is available, when switching from heating mode or emergency heating mode to fan mode, T4<10°C, the heating mode is sent to the outdoor; when T4>12°C, the normal outdoor control is resumed, the fan mode is sent to the outdoor.

3.3 Cooling Mode

3.3.1 Compressor Control

- If the following conditions are satisfied, the compressor ceases operation.
  - When the frequency value calculated by the GA algorithm is negative compensation.
  - Protection time for temperature shutdown is more than ten minutes.
  - T1 is lower than or equal to (Tsc-CDIFTEMP).
- If one of the following conditions is satisfied, not judge protective time.
  - Compressor running frequency is more than test frequency.
  - When compressor running frequency is equal to test frequency, T4 is more than 15°C or T4 fault.
  - Change setting temperature.
  - Turning on/off Turbo or Silent function.
  - Various frequency limit shutdown occurs.

3.3.2 Indoor Fan Control

1) In cooling mode, the indoor fan operates continuously. The fan speed can be set to low, medium, high, turbo and auto.

2) Auto fan action in cooling mode:

- Descent curve
  - When T1-Tsc is lower than or equal to 3.5°C, fan speed reduces to high;
  - When T1-Tsc is lower than or equal to 1°C, fan speed reduces to medium;
  - When T1-Tsc is lower than or equal to 0.5°C, fan

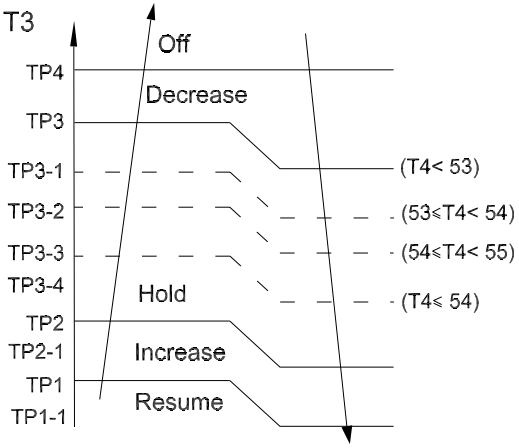
speed reduces to low;

- Rise curve
  - When T1-Tsc is higher than 1°C, fan speed increases to medium;
  - When T1-Tsc is higher than 1.5°C, fan speed increases to high;
  - When T1-Tsc is higher than 4°C, fan speed increases to turbo.

3.3.3 Outdoor Fan Control

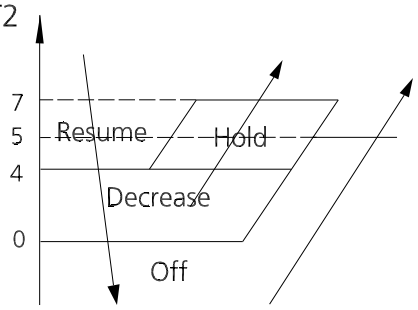
- The outdoor unit will be run at different fan speed according to T4 and compressor frequency.
- For different outdoor units, the fan speeds are different.

3.3.4 Condenser Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level at 0.04Hz/s.
- Hold: Keep the current frequency.
- Increase: Increase the running frequency to the higher level at 1Hz/s
- Resume: No limitation for frequency.

3.3.5 Evaporator Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level per 1 minute.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

3.4 Heating Mode(Heat Pump Units)

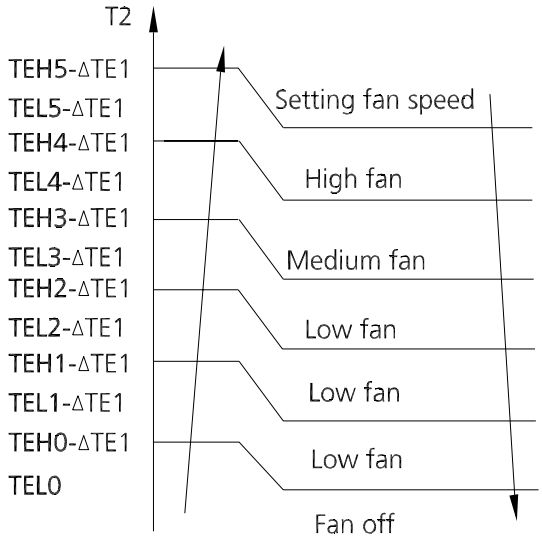
3.4.1 Compressor Control

- If the following conditions are satisfied, the compressor ceases operation.
  - When the frequency value calculated by the GA algorithm is negative compensation.
  - Protection time for temperature shutdown is more than ten minutes.
  - T1 is higher than or equal to Tsc+ HDIFTEMP2.
- If one of the following conditions is satisfied, not judge protective time.
  - Compressor running frequency is more than test frequency.
  - Compressor running frequency is equal to test frequency, T4 is more than 15°C or T4 fault.
  - Change setting temperature.
  - Turning on/off Turbo or Silent function.
- When the current is higher than the predefined safe value, surge protection is activated, causing the compressor to cease operations.

3.4.2 Indoor Fan Control:

1) In heating mode, the indoor fan operates continuously. The fan speed can be set to low, medium, high,turbo and auto.

- Anti-cold air function
  - The indoor fan is controlled by the indoor temperature T1 and indoor unit coil temperature T2.



ΔTE1=0

2) Auto fan action in heating mode:

- Rise curve
  - When T1-Tsc is higher than -1.5°C, fan speed reduces to high;
  - When T1-Tsc is higher than 0°C, fan speed reduces to medium;
  - When T1-Tsc is higher than 0.5°C, fan speed reduces to low;
- Descent curve
  - When T1-Tsc is lower than or equal to 0°C, fan speed increases to medium;
  - When T1-Tsc is lower than or equal to -1.5°C, fan speed increases to high;
  - When T1-Tsc is lower than or equal to -3°C, fan speed increases to turbo.

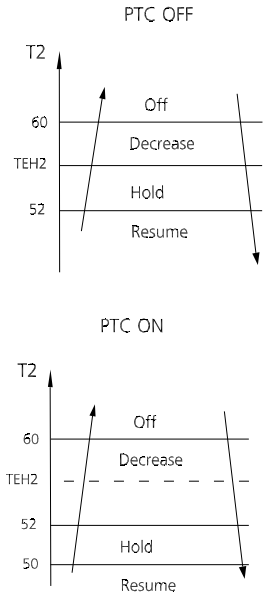
3.4.3 Outdoor Fan Control:

- The outdoor unit will be run at different fan speed according to T4 and compressor frequency.
- For different outdoor units, the fan speeds are different.

3.4.4 Defrosting mode

- The unit enters defrosting mode according to the temperature value of T3 and T4 as well as the compressor running time.
- In defrosting mode, the compressor continues to run, the indoor and outdoor motor will cease operation, the defrost light of the indoor unit will turn on, and the "dF" symbol is displayed.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1.
  - T3 maintained above TCDE2 for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.
- If T4 is lower than or equal to -22°C and compressor running time is more than TIMING_DEFROST_TIME, if any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - Unit runs for 10 minutes consecutively in defrosting mode.
  - T3 rises above 10°C.
- If any one of the following conditions is satisfied, the unit enters defrosting mode
  - If T3 or T4 is lower than -3°C for 30 seconds,Ts-T1 is lower than 5°C and compressor running time is more than EE_TIME_DEFROST7.
  - If T3 or T4 is lower than -3°C for 30 seconds and compressor running time is more than EE_TIME_ DEFROST7+30.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1+4°C.
  - T3 maintained above TCDE2+4°C for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.

3.4.5 Evaporator Coil Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level per 20 seconds.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

3.5 Auto Mode

- This mode can be selected with the remote controller and the temperature setting can be adjusted between 16°C~30°C.
- In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of **Δ**T (**Δ**T =T1-TS).

ΔT	Running mode
ΔT>2°C(3.6°F)	Cooling
-3℃(-5.4°F)<ΔT≤2°C(3.6°F)	Fan-only
ΔT≤-3°C(-5.4°F)	Heating*

Heating*: In auto mode, cooling only models run the fan

- Indoor fan will run at auto fan speed.
- If the machine switches mode between heating and cooling, the compressor will keep stopping for certain time and then choose mode according to **Δ**T.

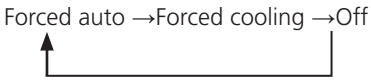
3.6 Drying Mode

- In drying mode, AC operates the same as auto fan in cooling mode.
- All protections are activated and operate the same as they do that in cooling mode.
- Low Room Temperature Protection

If the room temperature is lower than 10°C, the compressor ceases operations and does not resume until room temperature exceeds 12°C.

3.7 Forced Operation Function

Press the AUTO/COOL button, the AC will run as below sequence:



- Forced cooling mode:

The compressor and outdoor fan continue to run and the indoor fan runs at breeze speed. After running for 30 minutes, the AC will switch to auto mode with a preset temperature of 24°C(76°F).

- Forced auto mode:

Forced auto mode operates the same as normal auto mode with a preset temperature of 24°C(76°F).

- The unit exits forced operation when it receives the following signals:
  - Switch off
  - Changes in:
    - mode
    - fan speed
    - sleep mode
    - Follow me

3.8 Timer Function

- The timing range is 24 hours.
- Timer On. The machine turns on automatically at the preset time.
- Timer Off. The machine turns off automatically at the preset time.
- Timer On/Off. The machine turns on automatically at the preset On Time, and then turns off automatically at the preset Off Time.
- Timer Off/On. The machine turns off automatically at the preset Off Time and then turns on automatically at the preset On Time.
- The timer does not change the unit operation mode. If the unit is off now, it does not start up immediately after the "timer off" function is set. When the setting time is reached, the timer LED switches off and the unit running mode remains unchanged.
- The timer uses relative time, not clock time

3.9 Sleep Function

- The sleep function is available in cooling, heating, or auto mode.
- The operational process for sleep mode is as follows:
  - When cooling, the temperature rises 1°C (to not higher than 30°C/86°F) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at low speed.
  - When heating, the temperature decreases 1°C(to not lower than 16°C/60.8°F) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at low speed. Anti-cold wind function takes priority.
- The operating time for sleep mode is 8 hours, after which, the unit exits this mode.
- The timer setting is available in this mode.

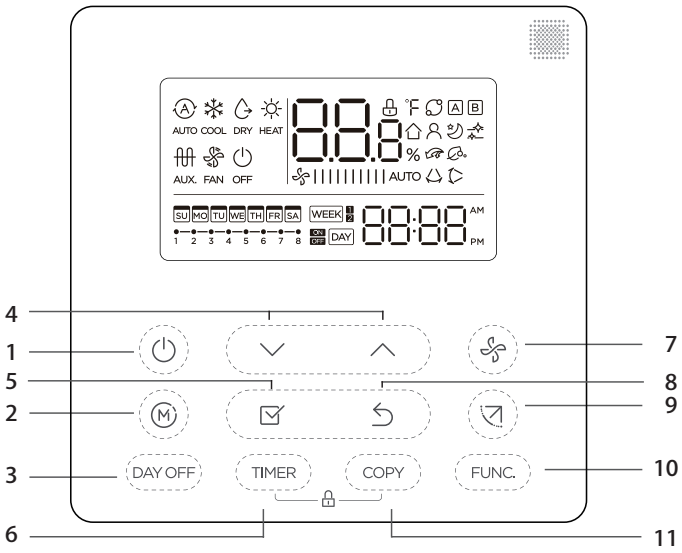
3.10 Auto-Restart Function

- The indoor unit has an auto-restart module that allows the unit to restart automatically. The module automatically stores the current settings and in the case of a sudden power failure, will restore those setting automatically within 3 minutes after power returns.

4. Remote Controller Functions

4.1 LCD Wired Remote Controller- KJR-120X/TFBG-E(Standard)

i) Buttons and Functions



1. POWER button

Turn on of turn off the unit.

2 MODE button

Used to select the operation mode: Auto / Cooling / Drying / Heating / Fan;

3. DAY OFF/DEL button

To set 1 to 2 hours delay off for each day or a whole day off in a weekly timer schedule.

4. Adjust button

To set temperature, time and timer

5. CONFIRM button

To confirm an setting or call up the superior menu

6. TIMER button

To set timer on and timer off time of one day

7. FAN SPEED button

Used to select the fan speed.

8. BACK button

Back to previous operation or superior menu

9. Swing Button

Press to active vertical swing, hold for horizontal swing

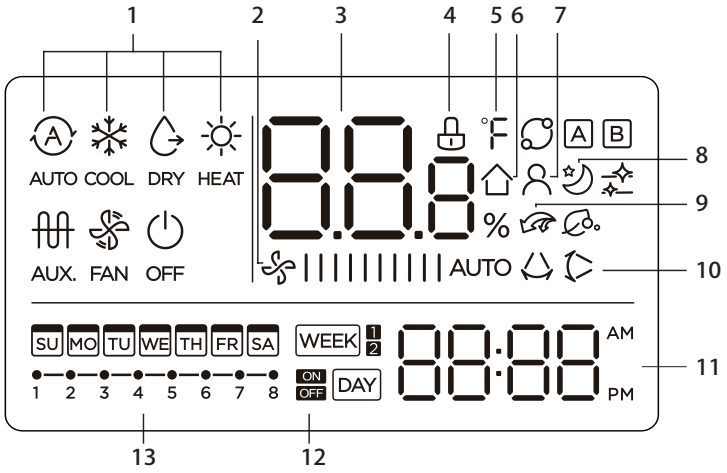
10. FUNC. button

Press the FUNC. button to set the turbo or rotating or Ifeel function.

11. COPY button

To copy timer setting of one day to another in weekly schedule setting.

ii) LCD Screen



1 Operation mode indication

2 Fan speed indication

3 Temperature display

4 Lock indication

5 °C / °F indication

6 Room temperature indication

7 Follow Me function indication

8 Sleep mode indication

9 Electric Auxiliary Heat/Turbo function indication(some models)

NOTE: AHU models only have turbo functions.

10 Left-right swing indication (some models)

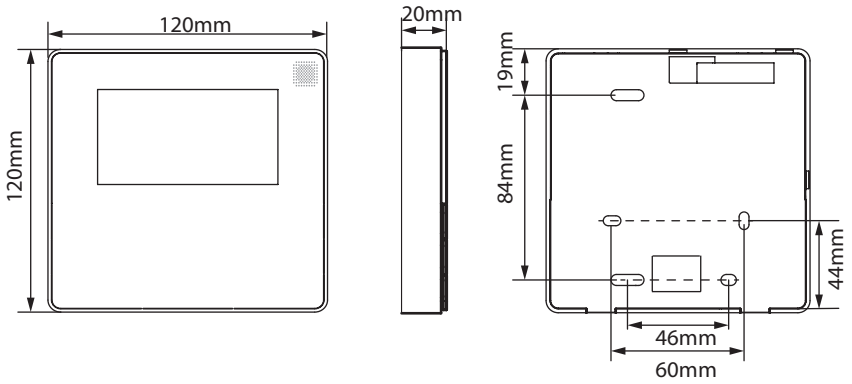
11 Clock display

12 On/Off timer

13 Timer display

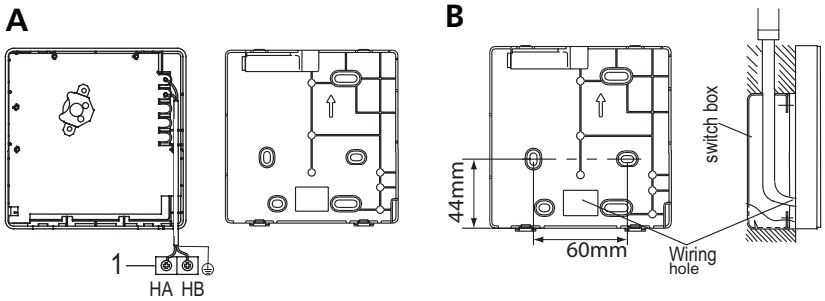
iii) Installation

- **Dimensions**



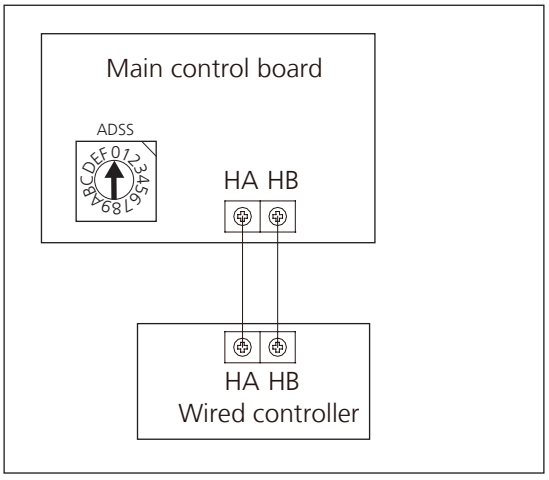
1) Connection

- **Wire with the indoor unit:**

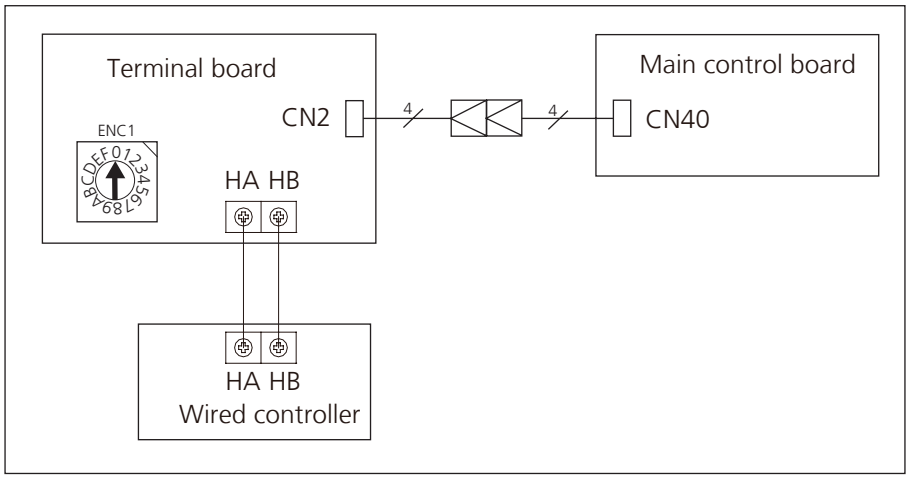


- 1: Indoor Unit.
- 2: Notch the part for the wiring to pass through with a nipper tool.
- Connect the terminals on the remote controller (HA ,HB), and the terminals of the indoor unit. (HA ,HB). (HA and HB do not have polarity.)

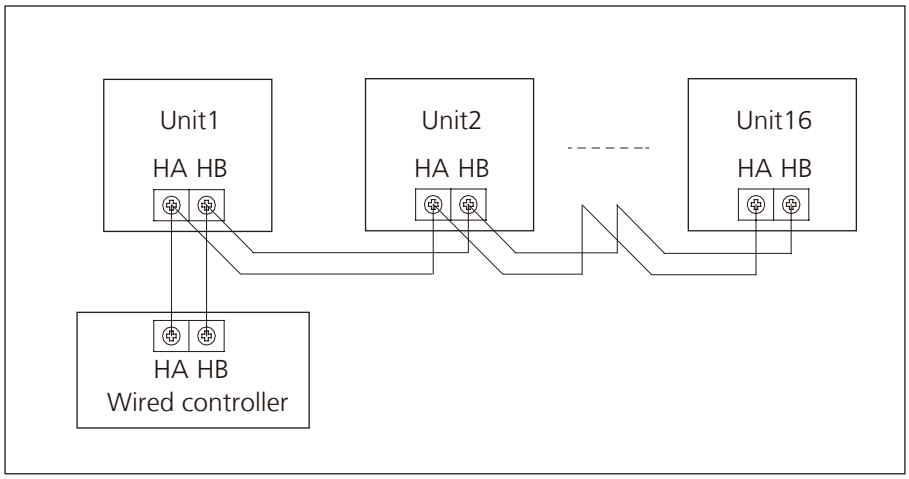
For some models: The wired controller connects to main control board directly.



For some models: The wired controller connects to terminal board, terminal board connects to main control board.



2) Address setting

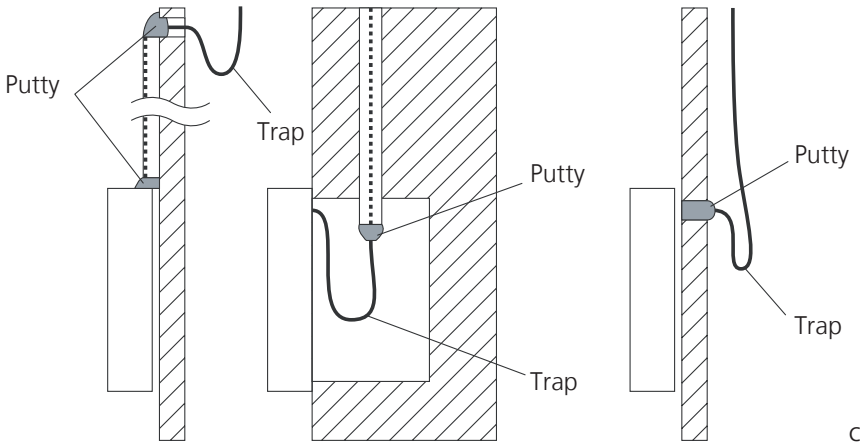


a. One non-polarity controller can control up to 16 indoor units.

b. When the non-polarity controller is connected to several units, every air-conditioner in network has only one network address to distinguish each other.

c. Address code of air-conditioner in LAN is set by code switch ENC1(Duct and Ceiling& Floor) or ADSS(Cassette) of the indoor unit, and the set range is 0-15.

d. Note: The indoor units are controlled at the same time, not independently. The purpose of setting network address is identify the unit when error occurs.



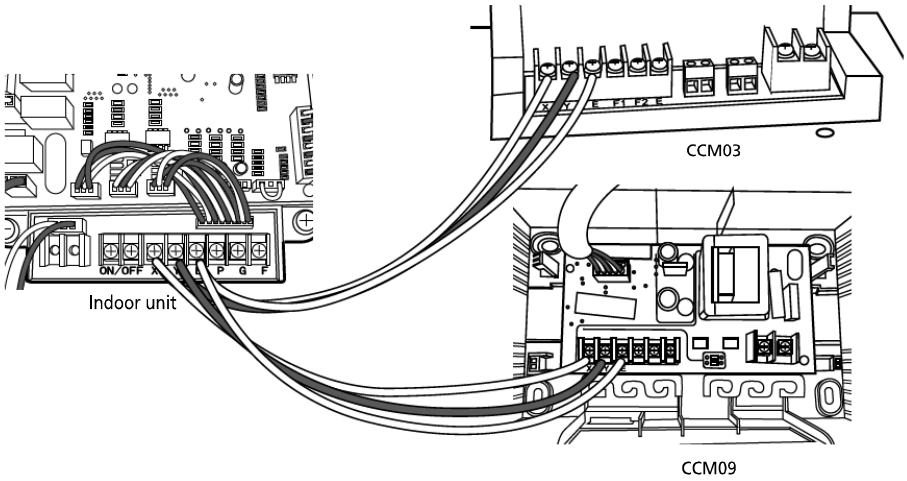
c

Note: DO NOT allow water to enter the remote control. Use the trap and putty to seal the wires.

4.2 Centralized Controller

1) Connection

For Light commercial air conditioner with XYE port, it can be directly connected to Centralized Controller (CCM03, CCM09).



2) Address setting

When setting the address, please make sure the unit is powered off. The address can be set from 0 to 63 by the switch. Turn on the unit, then the address will be effective.

SWITCH	FOR CCM UNIT ADDRESS	
S2 + S1	ON 1 2	ON 1 2
ADDRESS	0~15	16~31
Factory Setting	✓	
S2 + S1	ON 1 2	ON 1 2
ADDRESS	32~47	48~63
Factory Setting		

Note: For light commercial aire conditioner with XYE port, it can be also connected to BMS (Building Management System).

If there is any CAC (central air conditioner) connecting with the central controller at the same time, please set the address from largest (63,62,61…), since the CAC units could obtain address automatically from the smallest (00,01,02…)