VRF Centralized controller

User's Manual

Contents

1. Overview

This specification describes the standard use conditions and control functions of centralized monitors. This specification is applicable to centralized monitors, but the centralized monitor described in this article has its functions or display data contents in need of support by the air conditioner main control panel. This specification includes the following several parts:

I. Basic conditions for use of electronic controller

II. Classification of electric controller functions

III. Description of each part functions

IV. Technical specifications and requirements

2. Basic conditions for use of electronic controller

(I) Applicability of supply voltage: input voltage: single-phase 198V -242V; AC input power frequency: 50Hz/60Hz compatible;

(II) Electric control working temperature: $-15℃\sim+43℃$; Electronic control working humidity: RH40%~RH90%;

3. Classification of electric controller functions

The electric controller functions are classified as follows:

(I) System constitution;

(II) Key words and general functions;

(III) Descriptions of remote controller electric control functions;

(IV) Technical specifications and requirements.

4. Description of each part functions

4.1 System constitution

1. The centralized monitor is used to achieve centralized control and data query of network air conditioners, each centralized monitor can form an air conditioner LAN (Local Area Network) at most with 64 sets of air conditioners through the outdoor unit, with the wire connection (RS485) adopted for communication to realize centralized monitoring of the network air conditioners.

2. The centralized monitor can achieve the interfaces with computers or gateways, able to have the computers achieve such functions as the centralized management and control of all air conditioners on the network, parameter setting and status query. Each local computer or gateway can connect up to 16 centralized monitors (reserved).

3. The master-slave response mode is adopted for communications between the centralized monitor and the air conditioners, as well as between the computers and the centralized monitor. Moreover, in the local area network consisting of the centralized monitor and air conditioners, the centralized monitor acts as a host, while the outdoor units as slave devices; in the local area network consisting of computers and centralized monitors, the computers or gateways act as hosts, while the centralized monitors as slave devices.
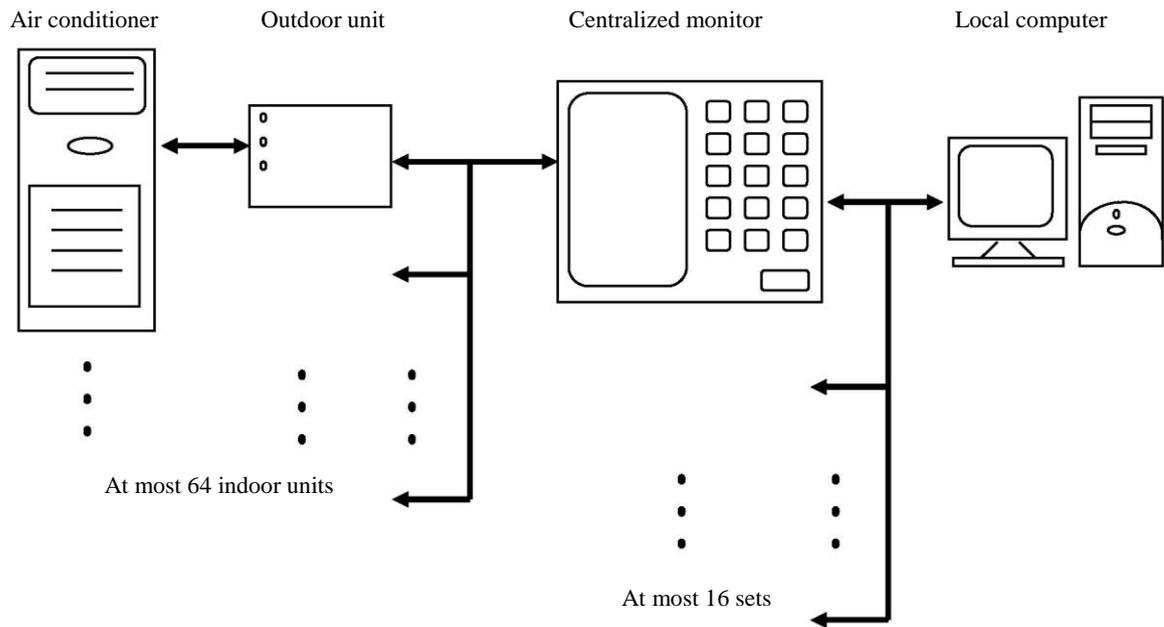
Air conditioner   Outdoor unit   Centralized monitor   Local computer

At most 64 indoor units

At most 16 sets

Figure 1   Structure of air conditioner network control system

4.2 Key words and general function descriptions

1. Power-on or reset

After power-on or reset of the centralized monitor, at first, the liquid crystal display will have its all display sections lighting up for 2 seconds, in 1 second after all sections have gone out, the system will enter the state of normal display, and the centralized monitor will be in the state of the homepage display to show the data of the first page and search the air conditioners online in the network.

2. Centralized monitor network area address (reserved)

The local computer or gateway can be connected to 16 centralized monitors at most for communications, and as an area of an air conditioner network, each centralized monitor can be distinguished by the centralized monitor through dialing to select the corresponding address, with the setting range of 0~ 15.

3. Status indicator

If any air conditioner online in the network has failed, or the centralized monitor network itself has any fault, the indicator will flash at the frequency of 2Hz.

If one or more air conditioners online in the network are running, including the timing operation, the indicator will light up and if idle, the indicator will flash at the frequency of 1Hz.

4. Centralized monitor lock (reserved)

On receiving the centralized monitor locking command sent by the computer, the centralized monitor will not allow for switching on or off the air conditioner, as well as any mode setting operation, and at the same time a command will be sent for remote control locking of all air conditioners within the centralized monitor network. On receiving the unlocking command, the centralized monitor will be actuated to conduct switching-on/off operations, and simultaneously send a command to disable the remote controller locking state of all air conditioners.

The remote control locking state can be locked or unlocked separately by any computer or the centralized monitor.

After the monitor has its power cut off, the centralized monitor locking state will be memorized, and will not be eliminate after power recovery, unless an unlocking command is received.

3

5. Mode locking function (reserved)

On receiving the mode locking switching-on/off command, the command is forwarded to the air conditioner, and simultaneously the centralized monitor is upset allowing for selection of the startup mode set without any conflict to the locked mode. After the command is received to disable the mode locking, the shutdown state can be free to choose the startup mode.

4.3 Function descriptions

4.3.1 Button operations

1) "Query" button

At any time, press the button, and then the operation mode is selected as querying the operation state of the air conditioner. By default, the first online air conditioner will be queried, and you can use the "Add (+)" and "Minus (-)" buttons to change the parameter pages for query, or you can use the "Previous" and "Next" buttons to change the address for querying other online air conditioners.

2) "Setting" button

In any other display mode, press this button to enter the setting mode with the default of setting a single unit to display the first online air conditioner. While setting the operation mode, again press this button, and then select to operate all air conditioners in the network, and repeatedly press this button to switch between single settings and full setting.
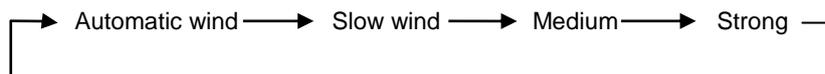
```
  ┌──────→ Single ──────→ Full ──┐
  └───────────────────────────────┘
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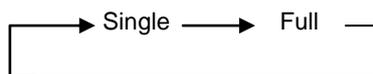
3) "Mode" button

While setting the operation mode, press this button, and then select to set the air conditioner operation mode as the refrigeration mode, or heating mode, or air supply mode.

```
  ┌──→ Refrigeratio ──→ Heating ──→ Air supply only ──→ Shutdown ──┐
  └─────────────────────────────────────────────────────────────────┘
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4) "Wind Speed" button

While setting the operation mode, press this button, and then select to set the running mode of the air conditioner indoor machine fans as automatic wind, strong wind, medium wind, or slow wind.

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  ┌──→ Automatic wind ──→ Slow wind ──→ Medium ──→ Strong ──┐
  └──────────────────────────────────────────────────────────┘
```

5) "Timing" button

While setting the operation mode, press this button, and then select to set the timed startup time of the air conditioner; again press this button, and then select to set the timed shutdown time of the air

conditioner; and again press this button to select to quit the timing setting and come back to the normal operation mode of the conditioning temperature setting.

```
  ┌──→ Timed startup ──→ Timed shutdown ──→ Conditioning
  │                                          temperature setting ──┐
  └────────────────────────────────────────────────────────────────┘
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6) "Swing" button

While setting the operation mode, press this button, and then select to enable or disable the swing function, but if all air conditioners currently selected have no swing function or no wind speed status, this button shall be invalid.

7) "Previous" button

In the "Query" mode, once press this button, then it will display the operation status data of the previous air conditioner, and if already at the first unit, then again press this button to display the data of the last unit. If this button is long pressed, then the address will decrease progressively.

In the "Setting" mode, once press this button, and if the operation targets a single unit, then select the previous air conditioner with an online address number. If it is a full operation mode, this button shall be invalid.
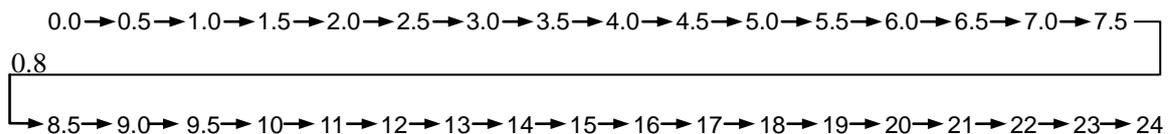
8) "Next" button

In the "Query" mode, once press this button, then it will display the operation status data of the next air conditioner, and if already at the last unit, then again press this button to display the data of the first unit. If this button is long pressed, then the address will increase progressively.

In the "Setting" mode, once press this button, and if the operation targets a single unit, then select the next air conditioner with an online address number. If it is a full operation mode, this button shall be invalid.

9) "Add (+)" button

On the homepage or in the "Query" mode, once press this button, then it will display the next page data of the current page, but if already on the last page, then press this button once again to display the data of the first page.
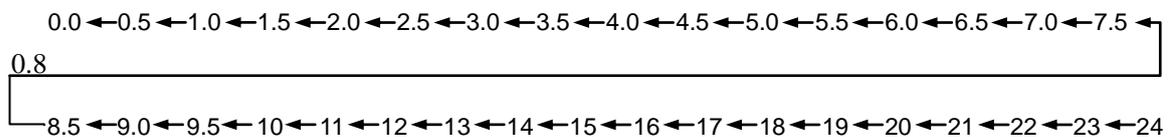
In the "Setting" mode, once press this button, and if it is in the temperature conditioning mode, then the set temperature will increase by 1 degree, but will stop increasing any more up to the highest temperature allowed to be set; if it is the setting mode of timed starting or shutdown time, then select the next time setting, and if there is no timing, it will show 0.0, with the specific changes as follows:

$$0.0 \rightarrow 0.5 \rightarrow 1.0 \rightarrow 1.5 \rightarrow 2.0 \rightarrow 2.5 \rightarrow 3.0 \rightarrow 3.5 \rightarrow 4.0 \rightarrow 4.5 \rightarrow 5.0 \rightarrow 5.5 \rightarrow 6.0 \rightarrow 6.5 \rightarrow 7.0 \rightarrow 7.5$$
0.8
$$8.5 \rightarrow 9.0 \rightarrow 9.5 \rightarrow 10 \rightarrow 11 \rightarrow 12 \rightarrow 13 \rightarrow 14 \rightarrow 15 \rightarrow 16 \rightarrow 17 \rightarrow 18 \rightarrow 19 \rightarrow 20 \rightarrow 21 \rightarrow 22 \rightarrow 23 \rightarrow 24$$

10) "Minus (-)" button

On the homepage or in the "Query" mode, once press this button, then it will display the previous page data of the current page, but if already on the first page, then press this button once again to display the data of the last page.

In the "Setting" mode, once press this button, and if it is in the temperature conditioning mode, then the set temperature will decrease by 1 degree, but will stop decreasing any more up to the lowest temperature allowed to be set; if it is the setting mode of timed starting or shutdown time, then select the previous time setting, and if there is no timing, it will show 0.0, with the specific changes as follows:

$$0.0 \leftarrow 0.5 \leftarrow 1.0 \leftarrow 1.5 \leftarrow 2.0 \leftarrow 2.5 \leftarrow 3.0 \leftarrow 3.5 \leftarrow 4.0 \leftarrow 4.5 \leftarrow 5.0 \leftarrow 5.5 \leftarrow 6.0 \leftarrow 6.5 \leftarrow 7.0 \leftarrow 7.5$$
0.8
$$8.5 \leftarrow 9.0 \leftarrow 9.5 \leftarrow 10 \leftarrow 11 \leftarrow 12 \leftarrow 13 \leftarrow 14 \leftarrow 15 \leftarrow 16 \leftarrow 17 \leftarrow 18 \leftarrow 19 \leftarrow 20 \leftarrow 21 \leftarrow 22 \leftarrow 23 \leftarrow 24$$

11) "Startup / Shutdown" button

At any time, once press this button to complete centralized startup/shutdown operation on all air conditioners currently online within the centralized controller network. If all air conditioners online in the network are at the OFF state, then press this button to complete the startup operation; if it is currently on the page for mode setting with the startup mode, temperature, wind speed and other parameters selected, then it will follow the selected parameters for startup; if there is no mode currently selected, but shutdown, or it is currently at other display pages, then it shall be the default startup mode, namely it will be started in the refrigeration mode and strong wind, with the set temperature of 24℃ and the swing function enabled, the default startup mode will be locked according to the system mode or judged by other restriction conditions; if there is any conflict, it will be automatically adjusted to the next mode without

conflict; if all modes are subject to conflicts, the startup will be impossible. If one or more air conditioners online in the network are at the startup mode (including the timing process of timed startup or shutdown), then press the button to complete all shutdown operations.

12) "Lock" button

In the "Mode Setting" mode, press the "Remote Controller Lock" button to lock / unlock the remote controller of the air conditioner currently selected, with the operation mode as follows: if you select "Single Unit Setting", then only operate the air conditioner of the current address; if the air conditioner is in the state of remote controller locking, then it will send a command for unlocking, or send a command for locking. If you have not selected "Single Unit Setting", then if one or more air conditioners currently selected are in the state of remote controller locking, then it will send a command for unlocking and if the air conditioners currently selected are all in an unlocking state, then it will send a command for remote controller locking.

If the remote controller is in the locking state, the air conditioner does not receive the remote control signals from its remote controller and wire controller, until unlocked and restored to its normal receiving.

If it is currently in the state of button locking, then press the locking button to unlock it, but if it is currently in the state of unlocking, then press the button to lock it. If it is in the state of button locking, except for the unlocking operation, any other button operation shall be invalid.

13) "OK" button

In the setting mode, press the button to have the mode status and auxiliary functions currently selected sent to the air conditioner already selected.

After the air conditioner has already had its operation mode, auxiliary functions and status information selected, if the "OK" button is not pressed, then the selected information will not be sent to the air conditioner, and the current operation of the air conditioner will not be affected.

You do not need the "OK" button for the remote control locking and unlocking operations, but only need to directly send the command information by pressing the locking button.

14) "Reset" button

Press the button at any time, and the centralized monitor will reset, with the result identical to that after power-off recovery.

4.3.2 Air conditioner settings

1) The centralized monitor can be set through the panel buttons.

a. Select the "Operation Settings" page, on which you can select the operation target as a single unit or all air conditioners.

b. The operation mode can be selected by means of the "Mode" button, and normally, you can select such modes as refrigeration, heating and air supply only.

c. When the address is first selected of an air conditioner to be set, if the air conditioner is running, then the default operation mode will display and continue to maintain the setting as the current operating status, but you can select other startup modes by the mode selector button, and use other buttons to select the temperature setting, wind speed and timing, or select to shut down, and the mode selection is subject to mode conflicts and mode locking judgment. If the air conditioner is in its shutdown state, the default should be the status of startup, and the default startup mode parameters should be followed. If the default startup parameters have any conflict with the system line running state in mode, then select the next mode free of conflicts. The startup can not be selected if all startup modes are subject to conflicts (For example, when a single cooler is running in the heating mode).

d. The running fan speed can be selected through the wind speed button, and normally, you can select the automatic wind, strong wind, medium wind and slow wind.

e. The temperature can be set through the temperature control button, with the temperature setting range of

17~30℃.

f.   You can select to set the timed startup or shutdown time by means of the timer button, and if the time is set as 0, it indicates there is no timing operation. The first timing operation is set as 0 by default, namely, there is no timing.

g.   Enable or disable the swing auxiliary function through the auxiliary function button.

h.   Enter the setting page for the first time, and the default should be a single mode. If the air conditioner is in the state of shutdown, the default startup parameters should be as follows: refrigeration mode, temperature set as 24℃, strong wind and no timing, with the swing function enabled???.

i.   At any time, press the ON / OFF button to enable or disable all air conditioners currently online. As long as one of the air conditioner online is running, including running in the state of delay shutdown, press the button, and all online air conditioners will shut down. If all the air conditioners currently online are in the state of shutdown, then the startup command shall be sent as follows: If the button is pressed in the mode of page setting, then follow the currently selected mode, wind speed, set temperature, timing, auxiliary function and other options for startup. If the button is pressed anytime else, with no selected mode setting data and no mode limit, the startup will be enabled by default following the refrigeration mode, temperature set as 24℃, strong wind and no timing, with the swing function enabled.

2)   Settings through the computer (reserved)

After receipt of the mode information sent from the computer, if there is no mode or function conflict with the selected air conditioner, then the mode setting information is forwarded to the network interface module and air conditioner, with the setting results sent to the computer. If there is any conflict or the mode setting is not successful, then the fault information will be transmitted to the upper computer.

4.3.3   Centralized monitor use instructions

Before use of the centralized monitor, please confirm that the centralized monitoring system has its wiring; address setting for the outdoor unit and centralized monitor, and installation of computer monitoring software are in the correct state.

1.   Initial power-on, address setting and state display of the centralized monitor

(1) Power-on or reset display state

After power-on or reset of the centralized monitor, at first, the liquid crystal display will have its all display sections lighting up for 2 seconds, in 1 second after all sections have gone out, the system will enter the state of normal display, and the centralized monitor will be in the state of the homepage display to show the data of the first page. **In case of initial power-on, you must be waiting for 15 seconds before button operations.**

(2) Centralized monitor network area address setting (reserved)

The local computer or gateway can be connected to 16 centralized monitors at most for communications, and as an area of an air conditioner network, each centralized monitor can be distinguished by code dialing to select the address, with the setting range of 0~ 15.

(3) Status indicator

If any air conditioner online in the network has failed, or the centralized monitor network itself has any fault, the indicator will flash at the frequency of 2Hz.

If one or more air conditioners online in the network are running, including the timing operation, the indicator will light up and if idle, the indicator will flash at the frequency of 1Hz.
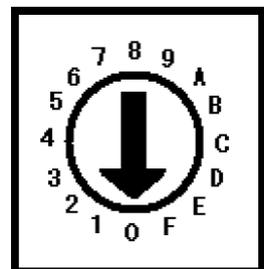
2.   Basic functions of the centralized monitor

(1) Network control function of the centralized monitor

Control and regulate the status, parameters and on/off state of the indoor units of all air conditioners in the network.

(2) Locking functions of the centralized monitor and remote controller

On receiving the centralized monitor locking command sent from the computer, the centralized monitor does not allow for air conditioner on/off and mode setting operations, and at the same time, all the air conditioners within the centralized monitor network will have their remote controllers locked. On receiving the unlocking command, the centralized monitor will be actuated to complete on/off operations, and simultaneously send a command to unlock the remote controllers of all air conditioners.

Locking state of remote controllers: The locking or unlocking operations can be completed by an individual computer or you can press the remote controller locking button to complete the locking or unlocking operations (Irrespective of a single indoor unit or several indoor ones, if originally locked, then unlock it; if not locked, then lock it).
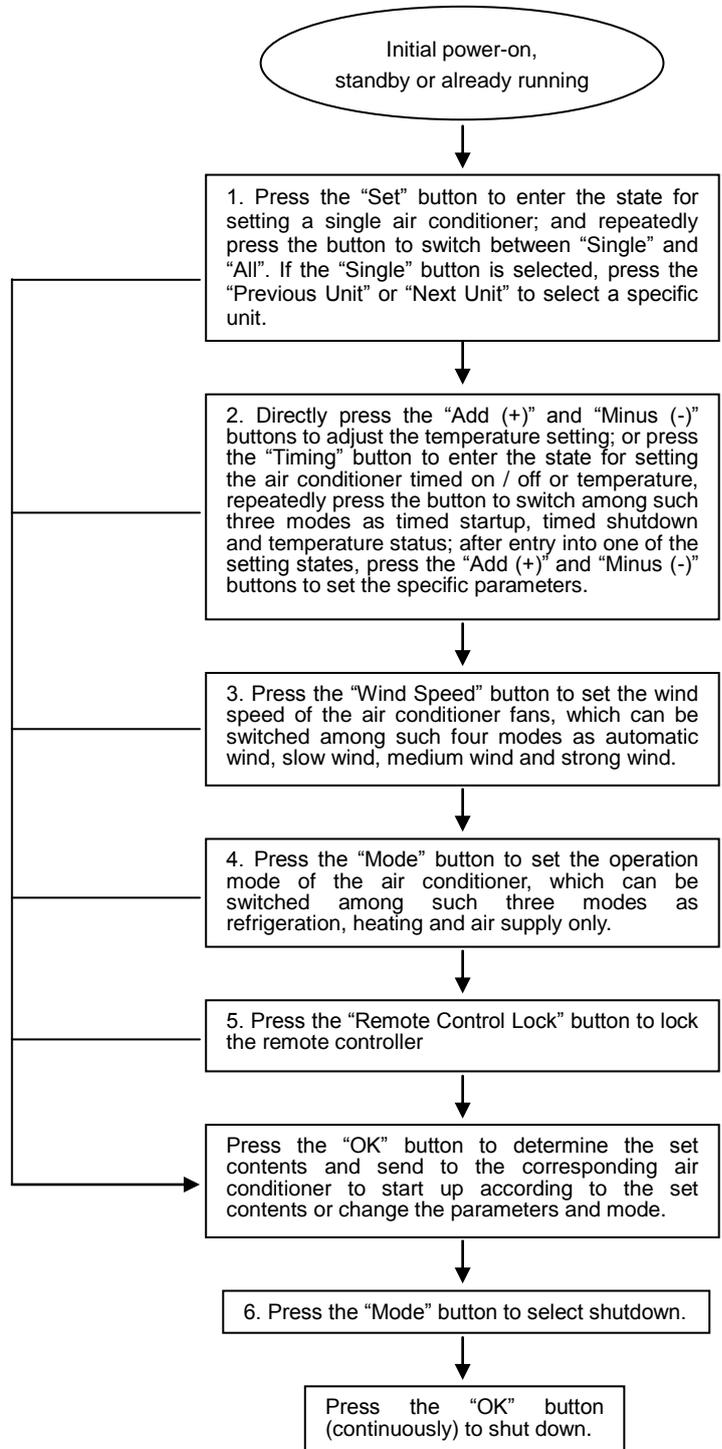
(3) Mode locking function (reserved)

On receiving the computer-mode ON/OFF locking command, the air conditioner will be locked to the fixed mode, at the same time, the centralized monitor only allows selection of the set starting mode without conflict with the locking mode, and the machines with conflicts between the current operation mode and the locking mode will automatically shut down. On receiving the command to disable the mode locking, you can be free to choose the starting mode in the shutdown state.

3. Centralized monitor ON / OFF operation procedure

At any time, if the ON / OFF button is directly pressed, you can complete the centralized ON / OFF operations on all air conditioners currently online within the centralized controller network to send the parameters and mode currently displayed on the interface to the air conditioner; if necessary, some individual or all air conditioners can be started after such operations as mode and parameter setting are completed. Please refer to the flow chart 1.

In this operation process, Steps 1, 2, 3, 4, 5 and 6 can be performed separately, but not necessarily in order; after a certain step is set, you can press the "OK" button to continuously set the next step and then press the "OK" button; or you can set all the contents or only set a certain step, and then press the "OK" button. Note: Once you press the "OK" button, the

Initial power-on, standby or already running

1. Press the "Set" button to enter the state for setting a single air conditioner; and repeatedly press the button to switch between "Single" and "All". If the "Single" button is selected, press the "Previous Unit" or "Next Unit" to select a specific unit.

2. Directly press the "Add (+)" and "Minus (-)" buttons to adjust the temperature setting; or press the "Timing" button to enter the state for setting the air conditioner timed on / off or temperature, repeatedly press the button to switch among such three modes as timed startup, timed shutdown and temperature status; after entry into one of the setting states, press the "Add (+)" and "Minus (-)" buttons to set the specific parameters.

3. Press the "Wind Speed" button to set the wind speed of the air conditioner fans, which can be switched among such four modes as automatic wind, slow wind, medium wind and strong wind.

4. Press the "Mode" button to set the operation mode of the air conditioner, which can be switched among such three modes as refrigeration, heating and air supply only.

5. Press the "Remote Control Lock" button to lock the remote controller

Press the "OK" button to determine the set contents and send to the corresponding air conditioner to start up according to the set contents or change the parameters and mode.

6. Press the "Mode" button to select shutdown.

Press the "OK" button (continuously) to shut down.

FLOW CHART 1

8

machine will soon receive the instruction information and operate as required.

4. Centralized monitor search procedures

Centralized monitor search procedures refers to the flow chart 2.

5. Display legend

4.3.4 Centralized monitor operation considerations

a. Selection of the mode button - In time of a single-unit operation, if the air conditioner is only a cooler, then the heating mode can not be selected; in time of the full-control mode, as long as there is only one set of cooling and heating air conditioner, then you can select the heating mode, but if there are some single coolers among the air conditioners already selected, it will prompt function conflicts, but the mode setting operations will not be limited.

b. If the set time is 0, it indicates that there is no timing operation. In time of first entry into the timing operation, the default time is 0, namely, no timing.

```
    ┌──────────────────────────┐
    │   Standby or already      │
    │        running            │
    └──────────────────────────┘
                 │
                 ▼
  ┌────────────────────────────────┐
  │ Press the "Search" button to   │
  │ search the running state of the│
  │ first air conditioner by       │
  │ default.                       │
  └────────────────────────────────┘
                 │
                 ▼
  ┌────────────────────────────────┐
  │ Press the "Previous/Next"      │
  │ button to search the running   │
  │ state of other online air      │
  │ conditioners by default.       │
  └────────────────────────────────┘
                 │
                 ▼
  ┌────────────────────────────────┐
  │ Press the "Add (+)" or "Minus  │
  │ (-)" button to search the      │
  │ running state of other online  │
  │ air conditioners by default.   │
  └────────────────────────────────┘
                 │
                 ▼
  ┌────────────────────────────────┐
  │ Press the "Search" button to   │
  │ exit.                          │
  └────────────────────────────────┘
```

FLOW CHART 2

c. Swing auxiliary function – Only if the auxiliary function button selection is enabled or disabled, and as long as one of all air conditioners selected for operations can support the selected auxiliary functions, then this function can be enabled. Otherwise, it can not be enabled. As long as one of all air conditioners selected for operations can not support the auxiliary functions selected as "Enabled", then it will prompt function conflicts, but the mode setting operations will not be limited.

d. In time of first entry into the setting page, the default mode is a single unit, if the air conditioner is idle, it will follow the cooling mode by default for startup - The temperature is set as 24℃, featuring strong wind and no timing, with the swing function enabled.

e. At any time, press the ON / OFF button to enable or disable all air conditioners currently online. As long as one of the air conditioner online is running, including running in the state of delay shutdown, press the button, and all online air conditioners will shut down. If all the air conditioners currently online are in the state of shutdown, then the startup command shall be sent as follows: If the button is pressed in the mode of page setting, then follow the currently selected mode, wind speed, set temperature, timing, auxiliary function and other options for startup. If the button is pressed anytime else, with no selected mode setting data, the startup will be enabled by default following the refrigeration mode, temperature set as 24℃, strong wind and no timing, with the swing function enabled or according to the contents displayed on the current page.

4.3.5 Communication to the upper computer (reserved)

Once receiving the data sent to the local address from the upper computer, it will enter the network control state, but if not for 1 consecutive minute, it will exit from the network control state. If the data communication has produced frame errors or data check errors, then it will result in communication fault between the centralized monitor and the computer, with the fault code of "03#", and the fault will be removed after the communication has become normal or exited from the network control state.
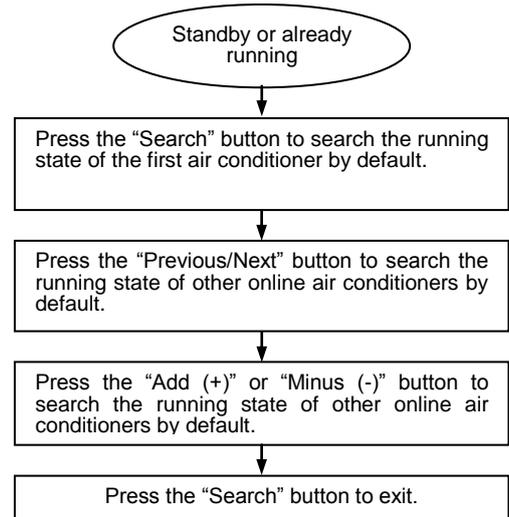
5. Table for faults and protection codes

Fault Code	Fault Contents	Protection Code	Protection Contents
Air conditioner faults and protection			
EF	Other faults	PF	Other protections
EE	Water level detection fault	PE	Reserved
ED	Outdoor unit fault protection	PD	Reserved
EC	Fresh fault (reserved)	PC	Reserved
EB	Frequency conversion module protection (reserved)	PB	Reserved
EA	Compressor overflow (four times) (reserved)	PA	Reserved
E9	Main board and display board communication fault	P9	Reserved
E8	Wind speed detection runaway (reserved)	P8	Compressor overflow
E7	EEPROM error (reserved)	P7	Power supply overvoltage and under voltage protection
E6	Zero crossing detection fault (reserved)	P6	Exhaust low pressure protection
E5	T3 sensor fault or T4 or digital compressor discharge temperature sensor fault (reserved)	P5	Exhaust high pressure protection
E4	T2B sensor fault	P4	Exhaust pipe temperature protection
E3	T2A sensor fault	P3	Compressor temperature protection
E2	T1 sensor fault	P2	Condenser high temperature protection
E1	Indoor and outdoor communication fault (frequency conversion or digital type) (reserved)	P1	Anti-cold wind or defrosting protection
E0	Phase sequence error or phase missing (reserved)	P0	Evaporator temperature protection
Network fault			
03#	Communication fault between the centralized monitor and the computer (gateway)		
02#	Communication fault between the centralized monitor and the function module		
01#	Communication fault between the centralized monitor and the network interface module		
00#	Communication fault between the network interface module and the main control panel		

6. Technical specifications and requirements

1. EMC and EMI accord with the CE certification requirements.
2. The electrical safety accords with the requirements of GB4706.32-1996 and GB/T7725-1996