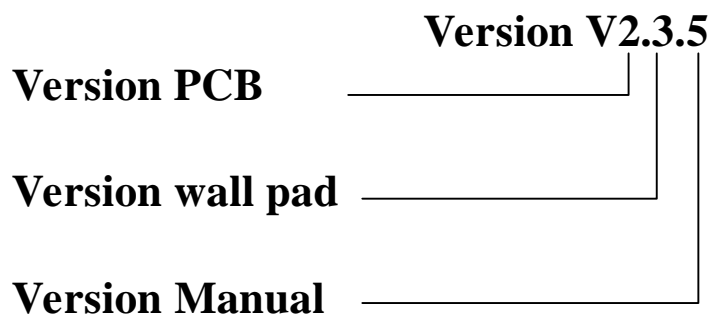


HAC-FF-D WALL PAD

Operating Manual



Contents

1. Main features

2. Main technical data

3. Wall pad

4. Program parameters

5. Faults and codes

6. Factory parameter setting

1. Main features

- ✓ Calendar and hours display
- ✓ Reverse Cycle Air Conditioning units and units with electrical heater.
- ✓ Time clock.
- ✓ Modes selection.
- ✓ Calibrating and compensating the temperature sensors.
- ✓ Low temperature protection for indoor coil on cooling.
- ✓ Superheat protection on both cooling and heating due to poor refrigerant.
- ✓ High condenser temperature protection.
- ✓ Cold supply air inhibit during defrost.
- ✓ Thermal protection for the unit with electrical heater.
- ✓ Overload protection for fans.
- ✓ High pressure cut and low pressure cut.
- ✓ Restarting delay protection for compressors.
- ✓ Available defrost settings under different conditions
- ✓ Fitted with an RS485 serial port

2. Main technical data

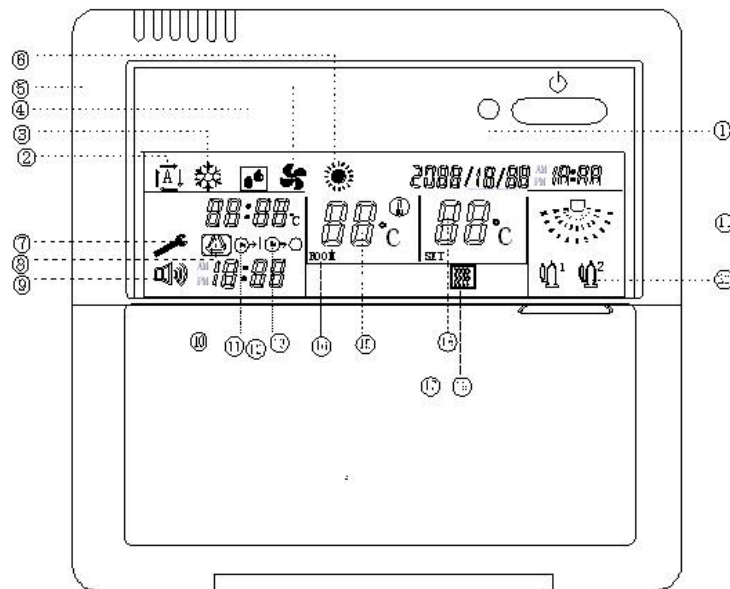
- 2.1 Power Voltage : 240V AC/1 PH/ 50Hz
- 2.2 Environment: Temperature -10°C ~ 60°C.
Relative Humidity : 40% ~ 98%
- 2.3 Accuracy of control: Precise Temperature ($\pm 1^{\circ}\text{C}$.) Control
- 2.4 Maximum cable length: 1) If wall pad is powered by the main control board, the maximum cable length will be 100 meters.
2) If wall pad is powered by local 12VDC voltage, the maximum cable length will be 1.20 kilometers.

3. Wall pad (HOP9023)


Features :

- With backlit LCD display
- Two color LED indicates ON/OFF mode;
Red: OFF
Green: ON
Flashing red: with fault
- Modes to be displayed: Auto, Cooling, Dehumidification, Vent, Heating.
- Fan speed be displayed: Auto, High, Mid, Low
- Available information displayed: Fault Code, Set Point, Room Temperature, Time clock.
- Inquiring all settings: Set Point, Fault Code, Temperatures of sensors buttons except "ON/OFF": TIMER, CLOCK, TIME▲, TIME▼, OPTION, MODE, FAN, and RESET.

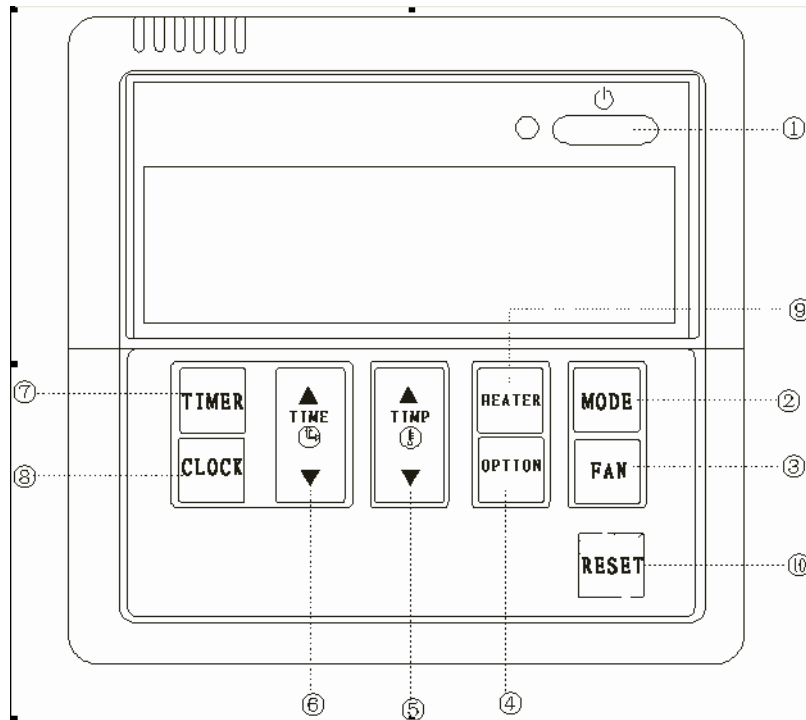
3.1 Panel display of wall pad



- ① Calendar & hour display
- ② Auto mode display
- ③ Cooling mode display
- ④ Dehumidification mode display
- ⑤ Ventilation mode display
- ⑥ Heating mode display
- ⑦ Unit fault
- ⑧ Cycling time clock
- ⑨ Alarm
- ⑩ Time clock display
- ⑪ Timer OFF sign for time clock
- ⑫ Fault code display
- ⑬ Timer ON sign for time clock
- ⑭ Fan speed display: Auto, High, Mid, Low *
- ⑮ Room temperature display
- ⑯ Room temperature
- ⑰ Temperature set-point
- ⑱ Temperature set-point display
- ⑲ Electrical heater setting
- ⑳ Running compressor

* For single speed fan, the display will show “  only”

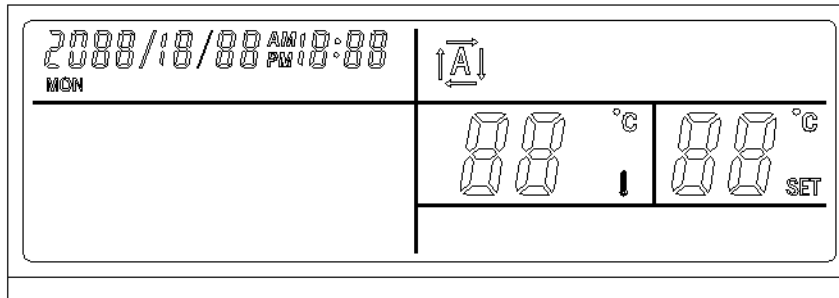
3.2 Buttons



Description of button

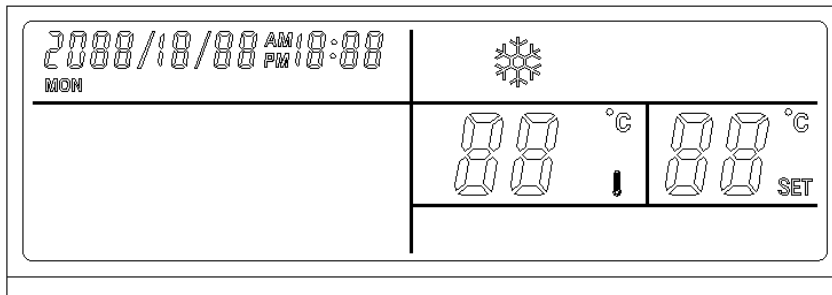
①	ON / OFF	⑥	TIME For parameters relative to time(increasing/decreasing settings)
②	MODE For mode shifting	⑦	TIMER For time clock settings
③	FAN For fan speed selection	⑧	CLOCK For calendar& hour settings
④	OPTION For inquiring	⑨	HEATER For settings of electrical heater
⑤	TEMP For temp setting (increasing/decreasing settings)	⑩	RESET For reset

3.3 AUTO mode



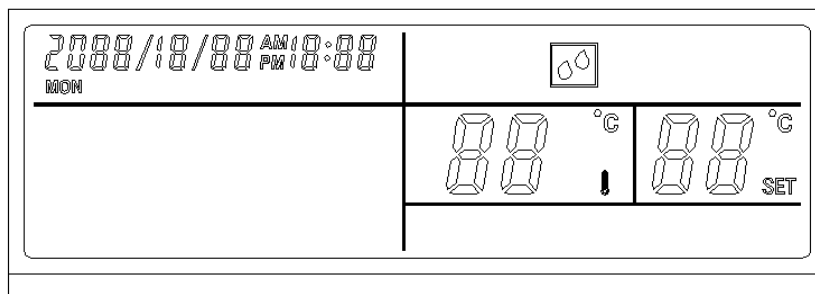
Press the “MODE” button to access the auto mode as shown on the top-left corner of the display. The original set point of temperature is 22°C. Available range is between 20°C and 25 °C.

3.4 COOLING mode



Press the “MODE” button again to access the cooling mode. The default setting temperature for cooling mode is 27°C. Available range is 18°C to 30°C.

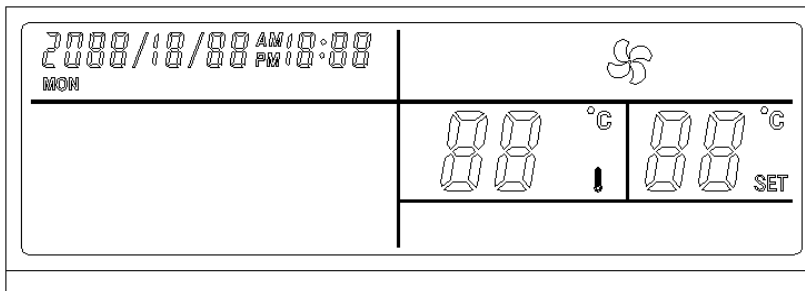
3.5 DEHUMIDIFICATION mode



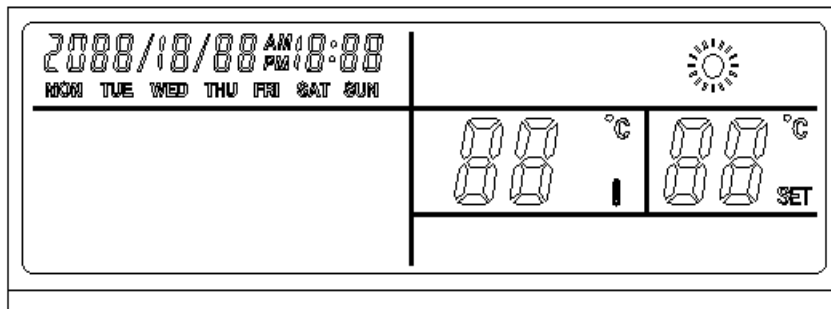
Press the “MODE” button again to shift to the dehumidification mode.

3.6 VENTILATION mode

Press the “MODE” button again to enter the ventilation mode. Under this mode, the unit will stop running except indoor fan.



3.7 HEATING mode



To access the heating mode, press the “MODE” button. The default setting temperature is 20°C for heating mode. Available range is 18°C to 30°C.

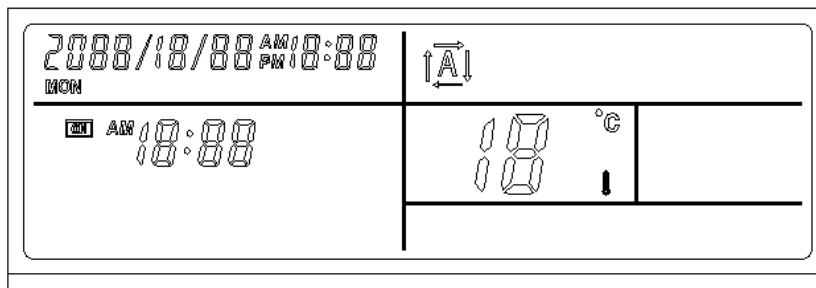
3.8 TIMER Clock

The controller has many time clock operations:

Time on, time off, weekly time on/off. The time is set by the wall pad operator.

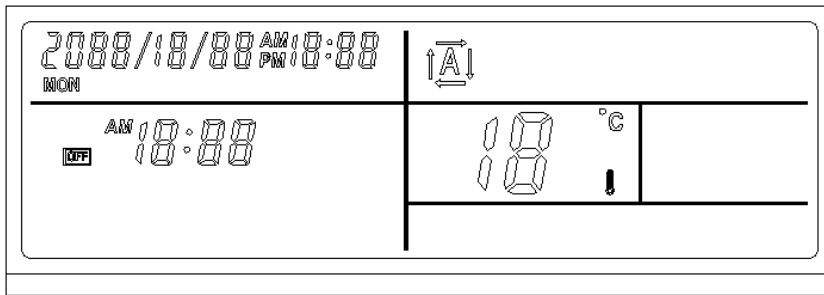
3.8.1 Time on for one time.

In the set time ‘on’ function, when the controller reaches the set time, the unit will turn on. After the unit turns on, the time on function is cancelled. If the unit is turned on, before the set the time, the ‘on’ function will be cancelled.



3.8.2 Time off for one time

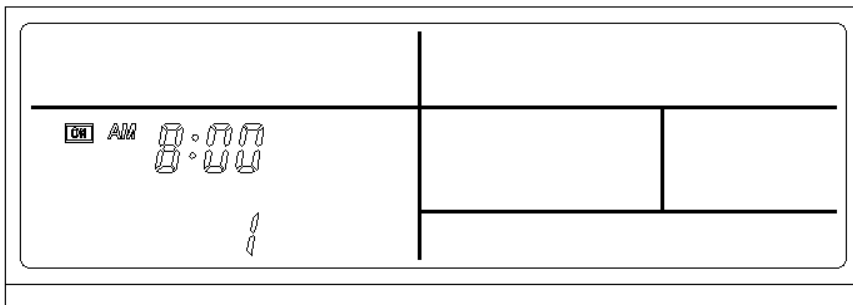
In the set time ‘off’ function, when the controller reaches the set time, the unit will turn off. After the unit turns off, the time ‘off’ function is cancelled. If the unit is turned off, before the set time, the ‘off’ function will be cancelled.



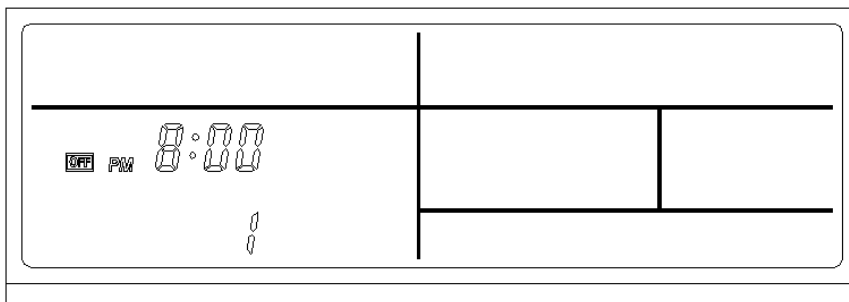
3.8.3 Weekly time on/off

By pressing the ‘time’ button for 5 seconds you can set the time clock for 7 days operation with 2 ‘on’ times and 2 ‘off’ times per day. The time set for Monday will be the same time for every day. It is also possible to turn individual days on or off. See the following photos.

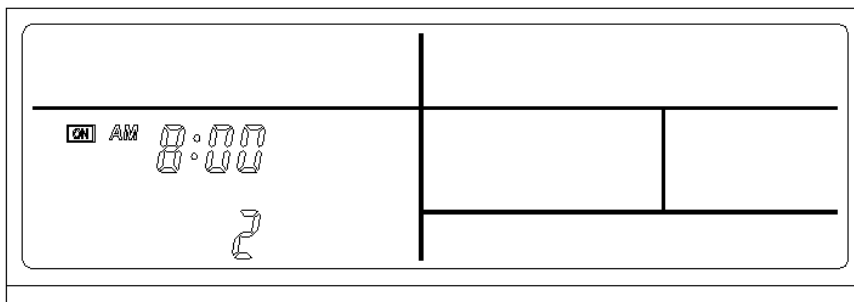
First time on setting:



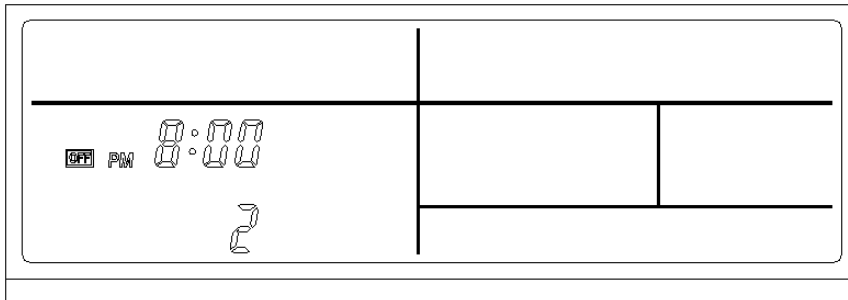
First time off setting:



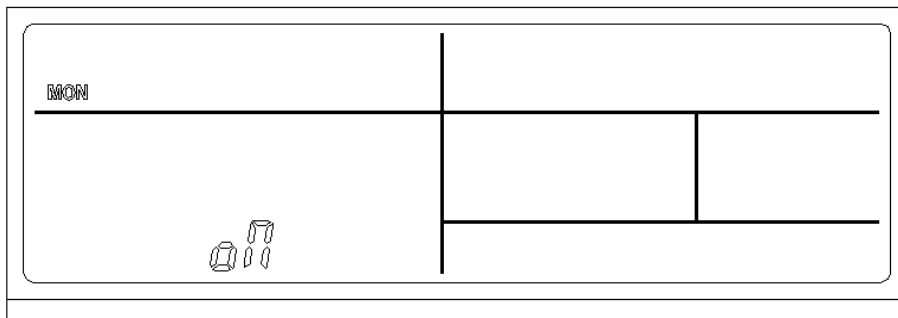
Second time on setting:



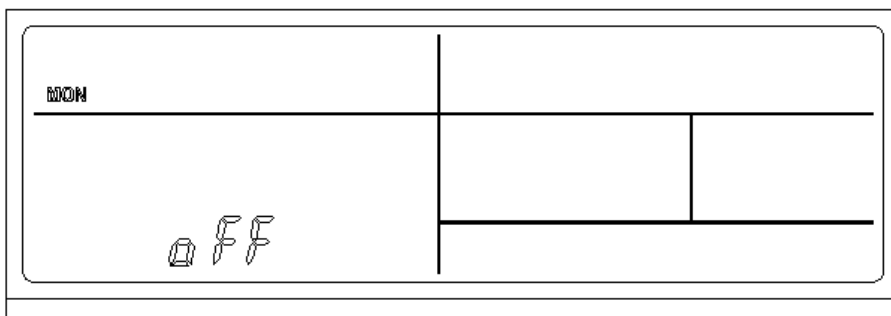
Second time off setting:



Time on for Monday:



Time off for Monday:



3.9 Dip Switch Function

The PC board has a four-pole dip switch which determines the function of PC board to match the different type of a/c unit. The switch should be set according to the type of unit as described below:

Table 3.9 Dip Switch Selections

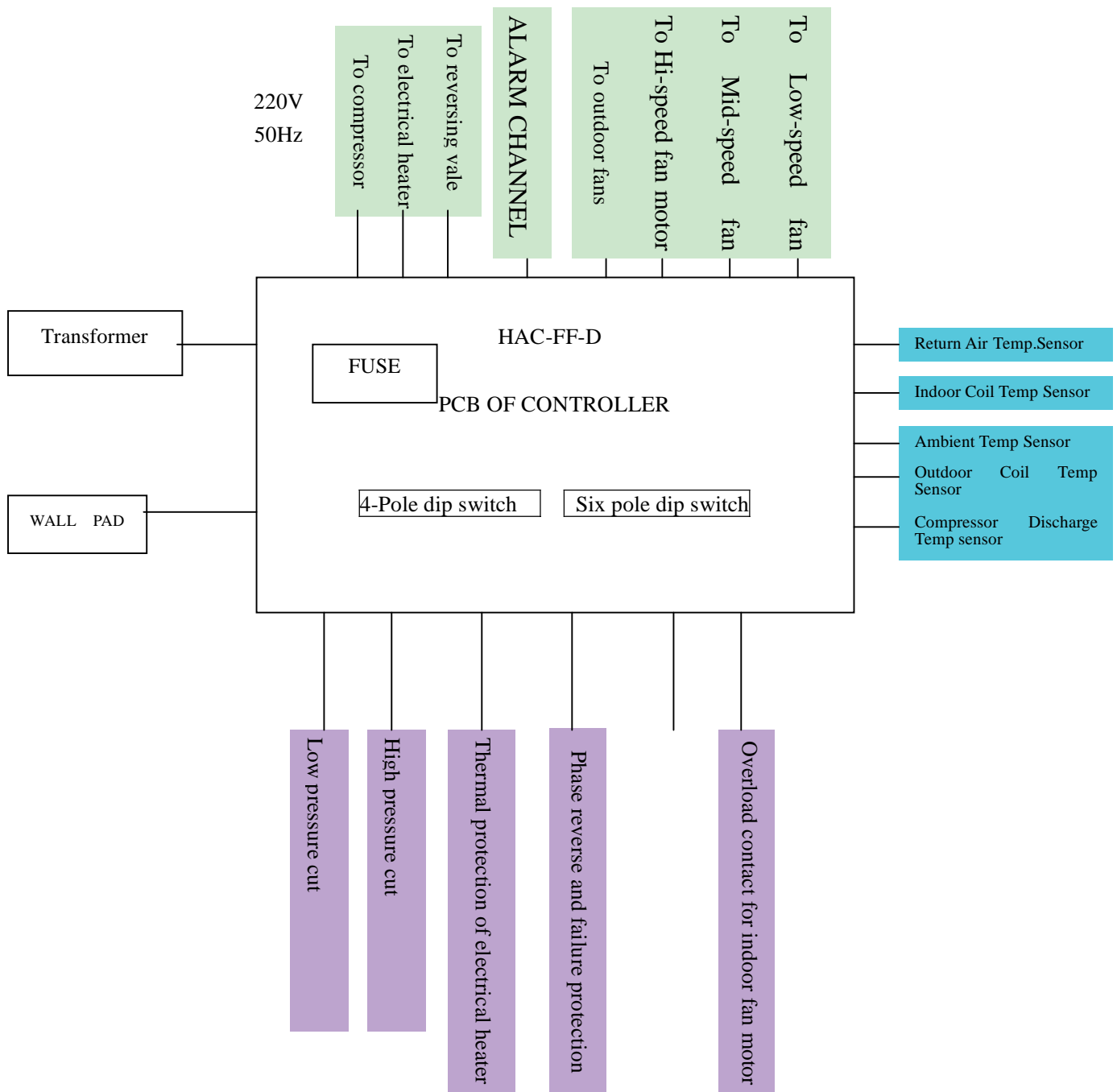
Type of unit	SW 1	SW2	SW3	SW4
Cooling only	ON	OFF	OFF	OFF
Cooling only with Electric heater	OFF	ON	OFF	OFF
Heat Pump	OFF	OFF	ON	OFF

Heat Pump with Electric heater	OFF	OFF	OFF	ON
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3.10 PCB Connections to Protection Cut

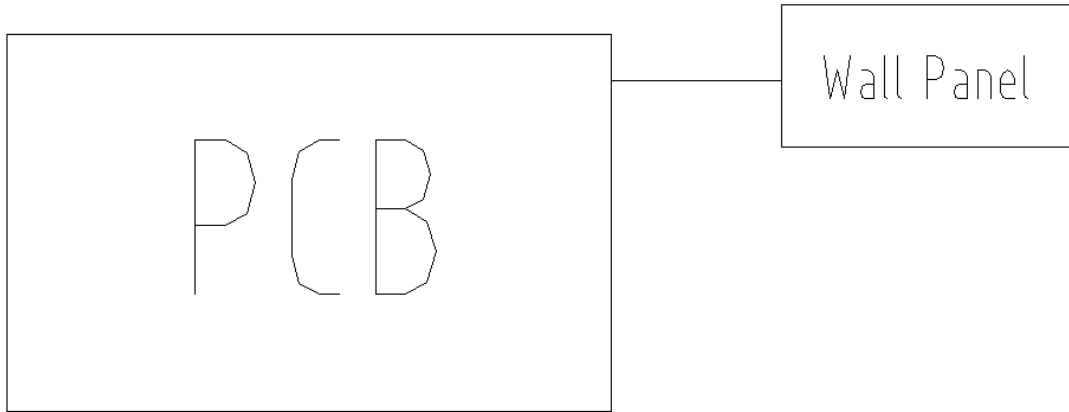
All protection cuts are all normal closed, voltage free contacts. When a protection cut functions, the contact will cutout. The PCB has a six-pole dip switch and a jumper. When a pole of the dip switch is on or the jumper is linked, the input signal of the respective protection cut will be isolated off.

3.11 PCB of The Controller

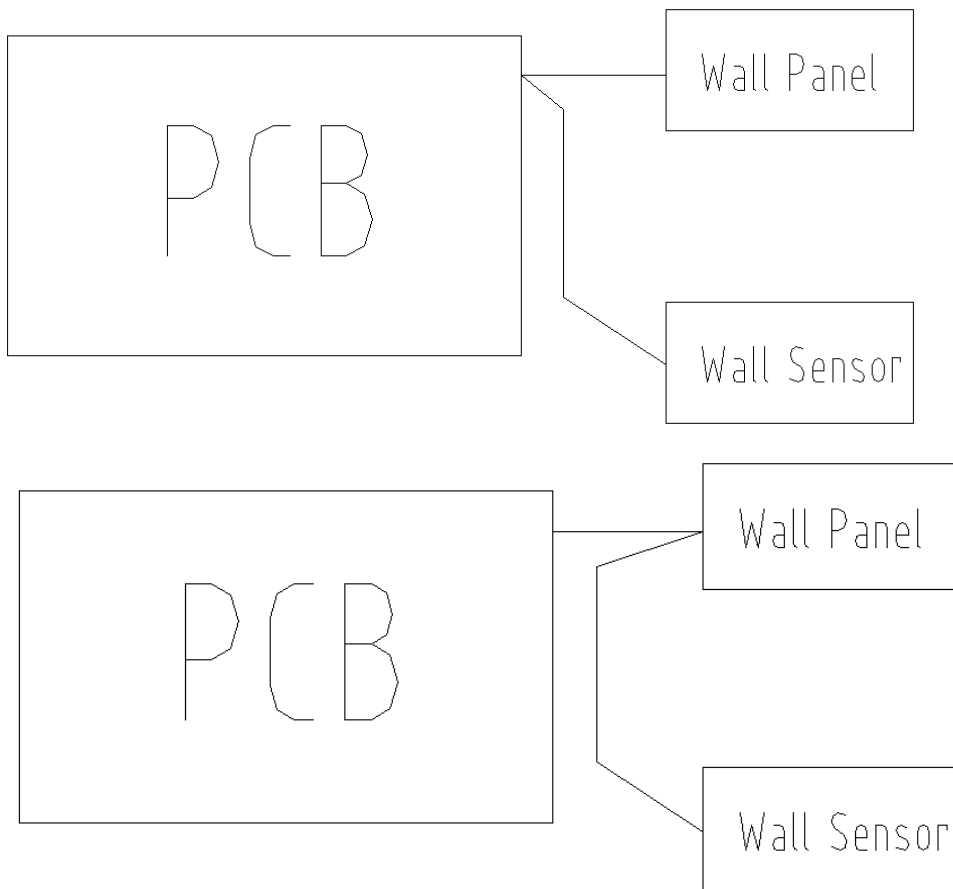


3.12 Temperature Sensor

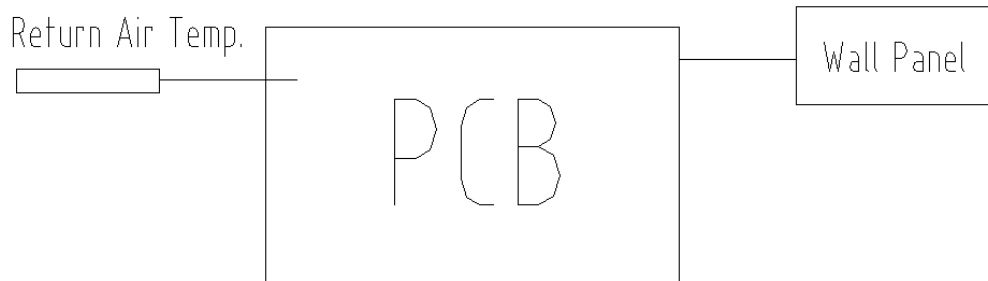
3.12.1 If wall pad built-in temperature sensor is used, the setting of program code PC01 should be “- -“. The wiring is shown on the diagram below:



3.12.2 If a wall sensor is used, the setting of PC01 should be “00”(°C). The wiring is as below:



3.12.3 If PCB built-in temperature sensor is used, the setting of program code PC01 should be “00”(°C) and the wall sensor must be removed. The wiring is shown below:



4. Program parameters

4.1 To enter parameters for inquiring and setting.

- Turn off the unit by pressing “ON/OFF” key on the wall pad.
- Hold the “OPTION” button in for about 5 seconds until a beep is heard.
- Release the button, there will display parameter code on the LCD screen.
- Press the “OPTION” button again and the code will shift one another. Below the code on the display is the correct setting value of the code.
- The code and settings displayed will disappear on the LCD if a delay lasts for about 10 seconds without pressing any button.

4.2 The parameters for configurations of A/C system

There are only two settings “ON” or “OFF” for these parameters.

On entering the parameters, press the “time ▲” or “time ▼” button to set “ON” or “OFF” for the codes. The descriptions for these parameters are listed below:

Table 4.2

Code	Selecting for	Factory setting	“ON” setting	“OFF” setting
SA02 SA03	Indoor fan setting	Different settings as per the unit model	3 speed or 1 speed fans	2 speed fans
			3 speed or 2 speed fans	1 speed fan
SA04	Defrost function	ON	To defrost via defrost settings	Unit turned off while ice melts naturally.
SA05	State of the indoor fans when unit reaches set point temperature.	ON	Indoor fans keep running	Indoor fans stop running
SA07	Changing the mode in on or off mode of the controller.	ON	In either on or off modes	Off mode only
SA08	State of the unit following a blackout.	ON	Unit resumes in state it was	Unit defaults to ‘off’.

			previously in.	
SA09	Time clock	ON	Cycling time clock for every 24 hours.	Time clock only for 24 hours.
SA10	Time clock	OFF	Cycling time clock for every 24 hours except Saturdays and Sundays	As described on SA09.

Note:
For SA 02 and SA03

Indoor fans	SA 02	SA03
3 speed	ON	ON
2 speed	OFF	ON
Single speed	ON	OFF

When the unit is turned on, the LED on the wall pad turns green, and red for turn-off.

4.3 The parameters for calibrating and compensating temperature sensors

These parameters are setting for calibrating and compensating the temperature sensors located at respective positions for different model A/Cs. On entering these parameters, press the “temp.▲” or “temp.▼” to increase or decrease the setting value. Adjusting step is 1 °C for each press. When the setting value reaches the limit of the range (+ 9 °C). The next setting value will turn to “cancelled” condition: “- -”. If no temperature sensor is installed on a specific position, the setting for the respective code should be “- -”.

Table4.3.1Parameter codes for one refrigerant circuit, split A/C

Code	Selecting for	Factory setting	Setting range	Adjusting step
PC01	Calibrating and compensating the return air temperature sensor located at return air inlet.	“- -”	“-9 °C – +9 °C” and “- -”	1 °C
PC02	Calibrating and compensating the indoor coil temperature sensor located between the indoor coil fins.	“- -”	“-9 °C – +9 °C” and “- -”	1 °C
PC04	Calibrating and compensating the ambient temperature sensor.	00 °C	“-9 °C – +9 °C” and “- -”	1 °C
PC05	Calibrating and compensating the outdoor coil temperature sensor located between the outdoor coil fins.	00 °C	“-9 °C – +9 °C” and “- -”	1 °C
PC07	Calibrating and compensating the discharge temperature sensor located on the discharge line of the compressors	00 °C	“-9 °C – +9 °C” and “- -”	1 °C

Table4.3.2 Parameter codes for one refrigerant circuit, rooftop A/C

Code	Selecting for	Factory setting	Setting range	Adjusting step
PC01	Calibrating and compensating the return air temperature sensor located at return air inlet.	“- -”	“-9°C to +9°C” and “- -”	1°C
PC02	Calibrating and compensating the indoor coil temperature sensor located between the indoor coil fins.	00°C	“-9°C to +9°C” and “- -”	1°C
PC04	Calibrating and compensating the ambient temperature sensor.	00°C	“-9°C to +9” and “- -”	1°C
PC05	Calibrating and compensating the outdoor coil temperature sensor located between the outdoor coil fins.	00°C	“-9°C to +9°C” and “- -”	1°C
PC07	Calibrating and compensating the discharge temperature sensor located on the discharge line of the compressors	00°C	“-9°C to +9°C” and “- -”	1°C

Note:

- For PC-01, if there is no sensor installed on return air, offset setting should be “- -” or “00”.
- When PC-01 setting is “00”, the display will show the wall sensor temperature if a wall sensor is installed.
- When PC-01 setting is “- -”, and a return air temperature sensor is not installed, the display will show the wall pad temperature.

4.4 The parameter relative to temperatures

Table4.4

Code	Selecting for	Factory setting	Setting	Adjusting step
------	---------------	-----------------	---------	----------------

			range	
SP01	Dead band for all controlled temperature	1 °C	1 °C to 5 °C	1 °C
SP03	The reset point for electric heater. The temperature sensor located in the indoor coil fins near an electrical heater.	50 °C	20 °C to 80 °C and “- -”	1 °C
SP04	Electrical heater thermal protection set point. The sensor is the same one as SP03.	53 °C	20 °C to 80 °C and “- -”	1 °C

4.5 The parameters relative to times

Table4.5

Code	Selecting for	Factory setting	Setting range	Adjusting step
SC01	Temperature sampling interval	10seconds	5sec.- 60 sec. and “- -”	1second
SC04	The delay time to run the compressors in response to the fan starting.	5seconds	1sec.- 60 sec. and “- -”	1second
SC05	The delay time for outdoor fans shut off	5seconds	1sec.- 60 sec. and “- -”	1second
SC06	Time that the display is backlit	5seconds	3sec.- 60 sec. and “- -”	1second
SC07	Time for changing calendar or other parameters	10seconds	1sec.- 30 sec. and “- -”	1second
SC08 *	The delay time for automatic changeover.	15 min	5min. - 60min. and “- -”	1minites

Note:

* The automatic changeover will take place, depending on not only the shifting temperature but also on the setting time of SC08.

4.6 The parameters relative to the temperatures for protection

Table 4.6

Code	Selecting for	Factory setting	Max value	Setting range	Adjusting step
EP01	The set point of temp sensor located in the indoor coil fins for low evaporative temp protection on cooling.	- -		-5 °C to -7 °C and “- -”	1 °C
EP02	The set point of temp sensor located in the outdoor coil fins for high condenser temp protection on cooling.	- -	80 °C	50 °C to -80 °C and “- -”	1 °C
EP03	The set point of temp sensor located in the indoor coil fins for superheat protection on cooling, due to poor refrigerant.	- -	40 °C	10 °C to -40 °C and “- -”	1 °C

EP04	The set point of temp sensor located in the indoor coil fins for high condensing temp protection on heating.	--	80 °C	45 °C to -80 °C and “- -”	1 °C
EP05	The set point of temp sensor located in the outdoor coil fins for superheat protection on heating, due to low refrigerant charge.	--	45 °C	15 °C to -45 °C and “- -”	1 °C
EP06	The set point of temp sensor located in the discharge line of compressor to prevent high discharge temp.	25 °C	50 °C	-19 °C to -50 °C and “- -”	1 °C

Notes:

1). Low evaporative temp protection on cooling –EP01.

● The protection will act only when:

- (1) The compressor is continuously working for at least 2 minutes.
- (2) The temperature on indoor coil is lower than the set point of EP01 for 2 minutes.

The PR03 fault code will flash on LCD and the compressor will go off.

● The protection will reset automatically only when the temperature on indoor coil is 8 degC higher than the set point of EP01. The displayed fault code PR03 will disappear, and the compressor will go on after a period time as EC01 setting value.

2). High condenser temperature protection on cooling-EP02.

● The protection will act only when :

- (1) The compressor is working.
- (2) The temperature on outdoor coil is higher than the setting value of EP02.

As a result, the compressor will go off, the outdoor fans keep running and the PR04 fault code will flash on LCD.

● The protection will reset automatically when the temperature of outdoor coil is not higher than 50 degC., and the fault code will disappear on the LCD and the compressor will go on after a period of time as EC01 setting value.

3).Superheat protection on cooling due to poor refrigerant charge–EP03.

● The protection will act only when:

- (1) The compressor is working for more than a period of EC08 setting time.

(2) The temperature on indoor coil is not lower than the set point of EP03.

Then the compressor will go off and the fault code ER03 will flash on the LCD.

● Only after the causes of the fault are removed and the “RESET” button is pressed, the protection will be reset.

4). High condensing temperature protection on heating- EP04.

When the temperature on the indoor coil is 3 degC higher than the set point of SP04, the corresponding outdoor fans will go off. If indoor coil temperature drops lower than the set point of SP04, the fans go on. If indoor coil temperature rises continuously up 7degC higher than the set point of SP04 for 5 minutes, the protection will act.

If the indoor coil temperature reaches the set point of EP04, the protection will act; the compressor goes off, the indoor fans keep running and the fault code ERO2 displays.

The protection will reset only after the causes of the fault are removed and the “RESET” button is pressed.

5).The superheat protection on heating due to the poor refrigerant-EP05

The protection will act only when:

(1)The compressor keeps on working for a period of time as the set point of EC08.

(2)The temperature on indoor coil is higher than the set point of EP05

Then the compressor will go off and ER03 fault code will be displayed.

The protection will reset only when the causes of the fault are removed and the “RESET” button is pressed.

6). High compressor discharge temperature protection EP06.

The real set point is the setting value added by 100,

If setting value is 20degC, the real set point is 120 degC.

If setting value is -19 degC, the real set point is 81 degC.

4.7 The parameters relative to the times for protection

Table 4.7

Code	Selecting For	Factory setting	Setting range	Adjustment step
EC01	Restarting delay time for compressor	3minutes	1minute~10 minutes	1minute
EC02	Minimum run time for compressor	3minutes	1minute~10 minutes	1minute
EC03	Cold supply air inhibit time on heating	30seconds	5seconds~120seconds and “--”	1second
EC04	Supply air fan shut off delay time on heating	45seconds	5seconds~120seconds and “--”	1second
EC05	Low pressure cut delay	3minutes	0mins~10mins and “--”	1minute
EC06	Safety device output signal delay time	3seconds	1second~10seconds	1second

EC08	Superheat protection delay time both on heating and cooling due to the poor gas charge	--	5minutes~60minutes and "--"	1minute
------	----------------------------------------------------------------------------------------	----	-----------------------------	---------

Note:

- EC02 When a compressor starts to run, it should not shut off immediately, and must keep running at least for a period.
- EC03 If defrost operation functions on heating mode, the indoor fan should stop running to prevent cold air supply.
- EC04 If a unit stops on heating, the indoor fan should keep running for a period of time to recover the residuary heat of the coil.
- EC05 If low pressure cut functions, the unit will not stop until time delay lapses.
- EC06 When a safety device gives a signal to the controller the controller will not respond at once, a time delay will ensure that the signal is really sent by the device, not by any interference.
- EC08 A delay time setting corresponds to EP03 and EP05. The superheat protection will act only in both conditions of EC08 and EP03 for cooling mode or in both conditions of EC08 and EP05 for heating mode.

4.8 The parameters for defrost

The parameters for defrost includes both time and temperature. The set point of time is set by pressing “time ▲ ” and “time ▼”button: and the temperature by “temp ▲” and “ temp ▼” button.

Code	Selecting For	Factory setting	Setting range	Adjustment
HF01	Maximum ambient temperature for defrost	“ - - ”	0°C to 20°C and “ - - ”	1°C
HF02	Difference between ambient temperature and outdoor coil temperature for defrost to activate	“ - - ”	0°C to 20°C and “ -- ”	1°C
HF03	Temperature in outdoor coil which will activate defrost.	-2°C	-19°C to 0°C and “ -- ”	1°C
HF04	Temperature in outdoor coil for stopping a defrost cycle.	10°C	0°C to 20°C and “ -- ”	1°C
HF05	Minimum run time for the compressor from the end of the previous defrost cycle.	30minutes	30minutes~120minutes	1minute
HF06	Maximum time period for the defrost cycle.	10minutes	2minutes~15minutes	1minute

5. Faults and codes

There are two kinds of faults for the A/C units; namely automatic reset faults and manual reset faults. If the cause of a fault is fixed, the unit will restart automatically; this kind of fault is automatic reset fault. If the unit will restart only when the

“RESET” button is pressed after the fault being removed, this kind of fault is manual reset fault.

5.1 Automatic-reset-fault

Table 5.1

Fault code	Displayed For	Possible Cause	note
Pr: 01	Indoor coil sensor fails	Short circuit or broken	Sensor may not be installed, check and compare to parameter settings.
Pr: 02	Outdoor coil sensor fails	Short circuit or broken	
Pr: 03	Acting of protection of EP01	Low evaporator temperature on cooling	When the protection functions, the compressor shuts off .When the temperature of the sensor is normal the compressor will restart.
Pr: 04	Acting of protection of EP02	High condenser temperature on cooling	When the protection functions, the compressor shuts off. When the temperature of the sensor is normal, the compressor will restart.
Pr : 05	Discharge line sensor fails	Short circuit or broken	Sensor may not be installed, check and compare to parameter settings.

Fault code	Displayed For	Possible cause	Fault
Po: 01	Return air sensor fails	Short circuit or broken	Sensor may not be installed, check and compare to parameter settings.
Po: 02	Ambient sensor fails	Short circuit or broken	Sensor may not be installed, check and compare to parameter settings.

5.2 Manual-reset-fault

Table 5.2

Fault code	Displayed For	Possible cause	Note
Er: 01	Protection of EP06	High discharge line temperature of compressor	The unit shuts off
Er: 02	Protection of EP04	High condenser temperature on heating	The unit shuts off
Er: 03	Protection of EP05	Superheat protection both on heating and on cooling due to poor refrigerant charge	The unit shuts off
Er: 04	High pressure cut	High condensing pressure	The unit shuts off
Er: 05	Low pressure cut	Low evaporating pressure	The unit shuts off
Er: 06	Overload protection for outdoor fan motor	Overload of the motor	The unit shuts off

Fault code	Displayed For	Possible causes	Note
Eo: 00	Communication fault	Connections problems between PCB and the wall pad	No reflection of the wall pad's operation.
Eo: 01	Overload cut for indoor fan motor	Overload of indoor fan motor	The unit shuts off
Eo: 03	Phase reverse protection (optional)	Open circuit of the protection	The unit shuts off
Eo: 04	Protection of SP04	Electrical heater thermal protection	The unit shuts off

6. Factory parameter setting and fault codes for different models.

For SHS(L) 6/8/10/12/15/18/20-Ad2

Code	Factory setting
SA02	ON
SA03	OFF
SA04	ON
SA05	ON
SA07	ON
SA08	ON
SA09	ON
SA10	OFF
PC01	--
PC02	--
PC04	00
PC05	00
PC07	00
SP01	1 °C

SP03	50 °C
SP04	53 °C
SC01	10 SEC
SC04	5 SEC
SC05	5 SEC
SC06	5 SEC
SC07	10 SEC
SC08	15 MIN
EP01	--
EP02	--
EP03	--
EP04	--
EP05	--
EP06	25 °C
EC01	3 MIN
EC02	3 MIN
EC03	30 SEC
EC04	45 SEC
EC05	3 MIN
EC06	3 SEC
EC08	30 MIN
HF01	--

HF02	--
HF03	-2 °C
HF04	10 °C
HF05	30 MIN
HF06	10 MIN

For SHS25/30/35-Ad2

Code	Factory setting
SA02	ON
SA03	OFF
SA04	ON
SA05	ON
SA07	ON
SA08	ON
SA09	ON
SA10	OFF
PC01	--
PC02	--
PC04	00
PC05	00
PC07	00
SP01	1 °C
SP03	50 °C

SP04	53 °C
SC01	10 SEC
SC04	5 SEC
SC05	5 SEC
SC06	5 SEC
SC07	10 SEC
SC08	15 MIN
EP01	--
EP02	--
EP03	--
EP04	--
EP05	--
EP06	25 °C
EC01	3 MIN
EC02	3 MIN
EC03	30 SEC
EC04	45 SEC
EC05	3 MIN
EC06	3 SEC
EC08	30 MIN
HF01	--
HF02	--

HF03	-2°C
HF04	10°C
HF05	30 MIN
HF06	10 MIN

For PHS8/10-Ad2

Code	Factory setting
SA02	ON
SA03	OFF
SA04	ON
SA05	ON
SA07	ON
SA08	ON
SA09	ON
SA10	OFF
PC01	--
PC02	00
PC04	00
PC05	00
PC07	00
SP01	1°C
SP03	50°C
SP04	53°C

SC01	10 SEC
SC04	5 SEC
SC05	5 SEC
SC06	5 SEC
SC07	10 SEC
SC08	15 MIN
EP01	--
EP02	--
EP03	--
EP04	--
EP05	--
EP06	25 °C
EC01	3 MIN
EC02	3 MIN
EC03	30 SEC
EC04	45 SEC
EC05	3 MIN
EC06	3 SEC
EC08	30 MIN
HF01	--
HF02	--
HF03	-2 °C

HF04	10 °C
HF05	30 MIN
HF06	10 MIN

For PHS12/15/18/20/25/30/35-Ad2

Code	Factory setting
SA02	ON
SA03	OFF
SA04	ON
SA05	ON
SA07	ON
SA08	ON
SA09	ON
SA10	OFF
PC01	--
PC02	00
PC04	00
PC05	00
PC07	00
SP01	1 °C
SP03	50 °C

SP04	53 °C
SC01	10 SEC
SC04	5 SEC
SC05	5 SEC
SC06	5 SEC
SC07	10 SEC
SC08	15 MIN
EP01	--
EP02	--
EP03	--
EP04	--
EP05	--
EP06	25 °C
EC01	3 MIN
EC02	3 MIN
EC03	30 SEC
EC04	45 SEC
EC05	3 MIN
EC06	3 SEC
EC08	30 MIN
HF01	--
HF02	--

HF03	-2 °C
HF04	10 °C
HF05	30 MIN
HF06	10 MIN