Technical Manual of PC1002 (Electric Part)

PHNIX

2018

Project description	**Controller info** **1.Controller: 35005-310569 V2.3** **2.Wire Controller: 35005-310500 V2.0**
Document version	
First edition	
Last edition	

Change history

Version	Date	Author	Description
V1.0	2016.09.23	Bryant	
V1.1	2016.11.21	Bryant	
V2.0	2018.5.31	Justin	

Contents

I. Color screen wire controller interface introduction

1. Main interface

1.1 Main interface

1.2 Button Description

NO.	Name	The button function
①	ON/OFF	Press to start /shut off the unit
②	Parameter	Click this button to view the unit state and the parameter
③	CLOCK	Press to set the clock, the timer on or timer off
④	Fault display	Click to view fault history
⑤	Silent set	Click to turn on/off silent function and to set timingLow speed function.
⑥	MODE	Click to enter the mode switch interface
⑦	Temp. curve	Click to view the temp. and power curve
⑧	Water Inlet Temp.	Click to enter mode setting and the target tempSetting interface

Figure 1.1

2. Color screen wire controller function introduction

2.1 Booting and shutdown

As shown in figure 1.1:

In shutdown status, click ① then the unit will be start up.

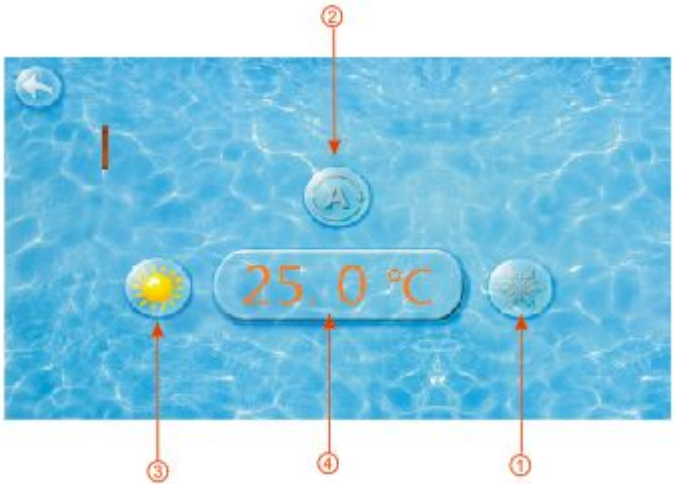
In booting status, click ① then the unit will be shut down.

2.2 Mode switch and target temperature Setting

2.2 1 Mode switch

In the main interface, click ⑧ to change the inlet water temperature and change unit mode,

The interface displays as follows:



Click the cooling mode button ①, automatic mode button ② or heating mode button ③ ,then you can select the corresponding mode.

Note: when the unit is designed for single automatic mode or single heating mode, the mode can't be changed.

2.2 2 Target temp setting

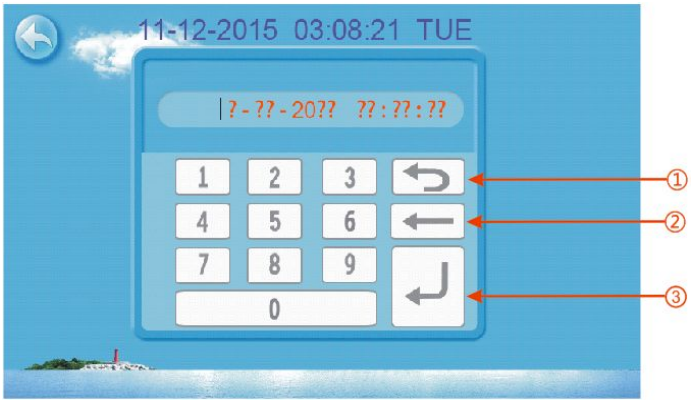
Click the temperature set button ④, then you can set the target temperature.

2.3 Clock setting

In the main interface, click button ③ to set the clock, the interface displays as follows:

2.3.1The operation of time setting

Click on the time Settings button ① ,interface displays as follows:



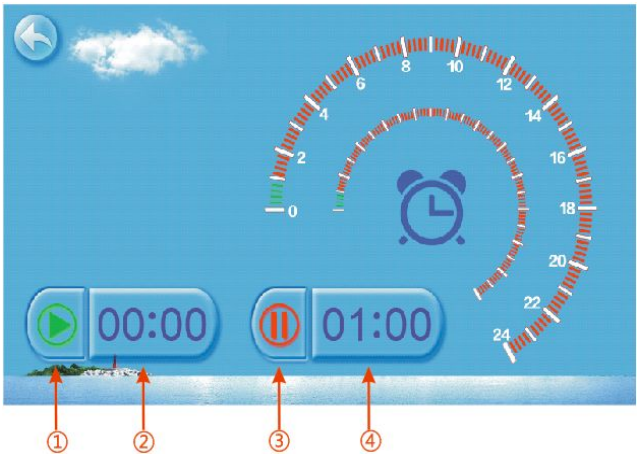
Click the value to set time directly, ① is backspace button,② is revoke button and ③ is confirm button, click confirm button to save the Settings.

For example: if you want to setup time: the 02-25-2016 15:00:00, then input 02 25 16 15 00 00

Note: The input number from left to right are “month, day, year hour, minute, second ”, it is regulated with this sequence, if the input format is not correct, the setting can’t be saved by clicking confirm button.

2.3.2 The operation of timing setting

Click the timing set button ② to enter timing set interface



NO.	Name	Button color	Button function
①	Timing start button	Start: green End: gray	Click this button to start or end timing start setting function
②	Timing on setting		Click to set start time of the timing
③	Timing end button	Open: red End: gray	Click this button to start or end timing end setting function
④	Timing off setting		Click to set end time of the timing

For example above: without any action, the default start time is 0 o 'clock and the default end time is 1o 'clock.

2.4 Silent mode setting and silent mode timing setting

Click the silent setting button ⑤ on the main interface ,and the interface displays as follows:

2.4.1The silent button

Click the silent button ①, the unit will enter the silent mode, and the interface displays as follows:

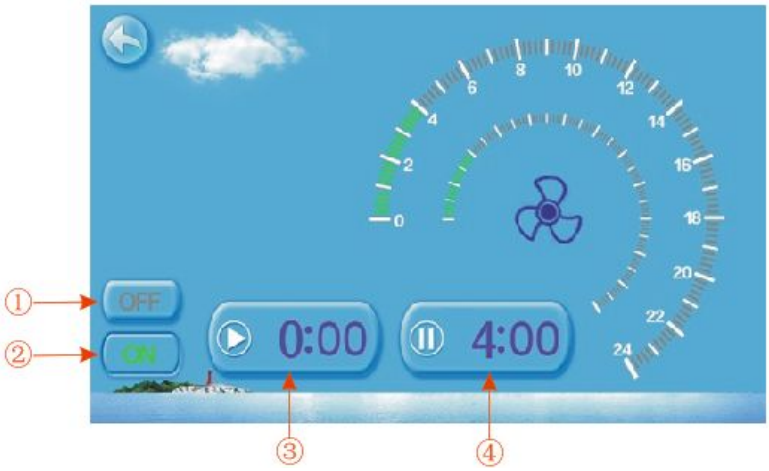
Click the silent button ① again, to exit the silent mode.

Note: hen in silent mode , the silent mode button will display as  ,

When in normal mode , the silent mode set button will display as  .

2.4.2Timing silent function setting

Click timing silent button ②, and interface displays as follows:



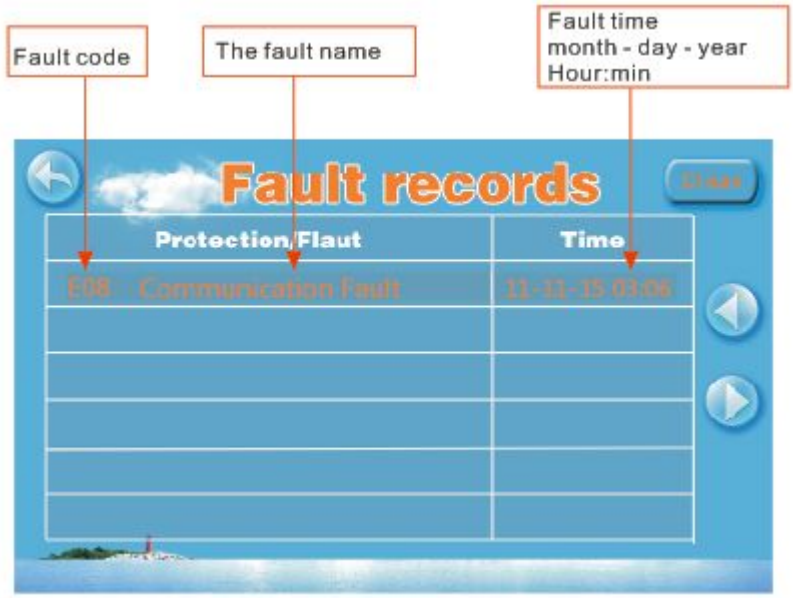
NO.	Name	Colur	Function
①	Timing silent off	Used: red Unused:gray	Click to use or unuse timing off function
②	Timing silent on	Use:green Unused:gray	Click to use or unuse timing on function
③	Timing silent start time		Click this button to set the timing silent start time
④	Timing silent end time		Click this button to set the timing silent end time

Start time and end time setting value must be among the range of 0:00-23:00, and setting value can be precise to minute digit.

For example above, click "ON" to use timing silent, the unit will start the silent at 23:00 points and end at 8:00;click "OFF" to stop the timing silent, but if the unit is in timing silent mode, it will exit silent timing immediately.

2.5 History of the fault

In the main screen click fault display key, interface displays as follows:



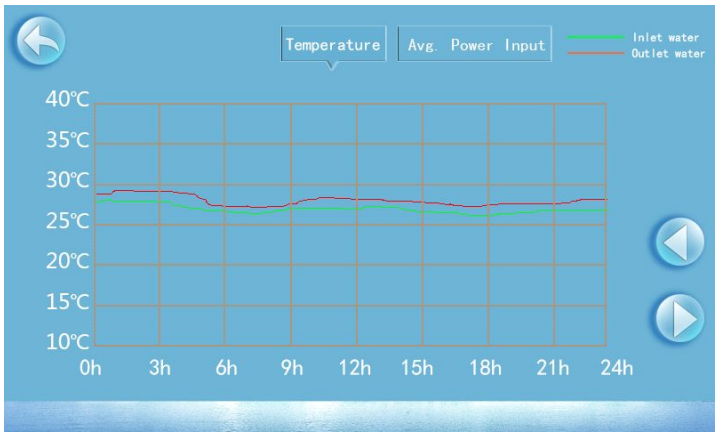
If no fault, main interface displays static " " When fault occurs, the fault button will flashing between the"⚠"and "⚠".the fault interface will record time, code, name of the fault. After troubleshooting, if you do not check the fault record, the main interface will display static"⚠"if you check the failure record, the main interface will displays static "⚠" .Failure record is in reverse order, the earliest fault will display in the last and the newest fault will display in the topside according to the happening time. Press the "clean" key, you can delete the fault record.

2.6 Temperature curve

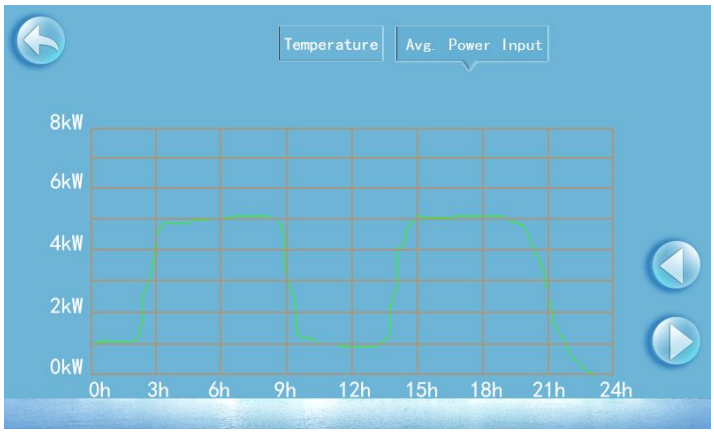
In the main interface, click the curve display button, interface displays as follows:

Click temperature or Avg. power input can get different interface,

2.6.1 Temperature recording curve is as follows:



2.6.2 The average power curve is as follows:

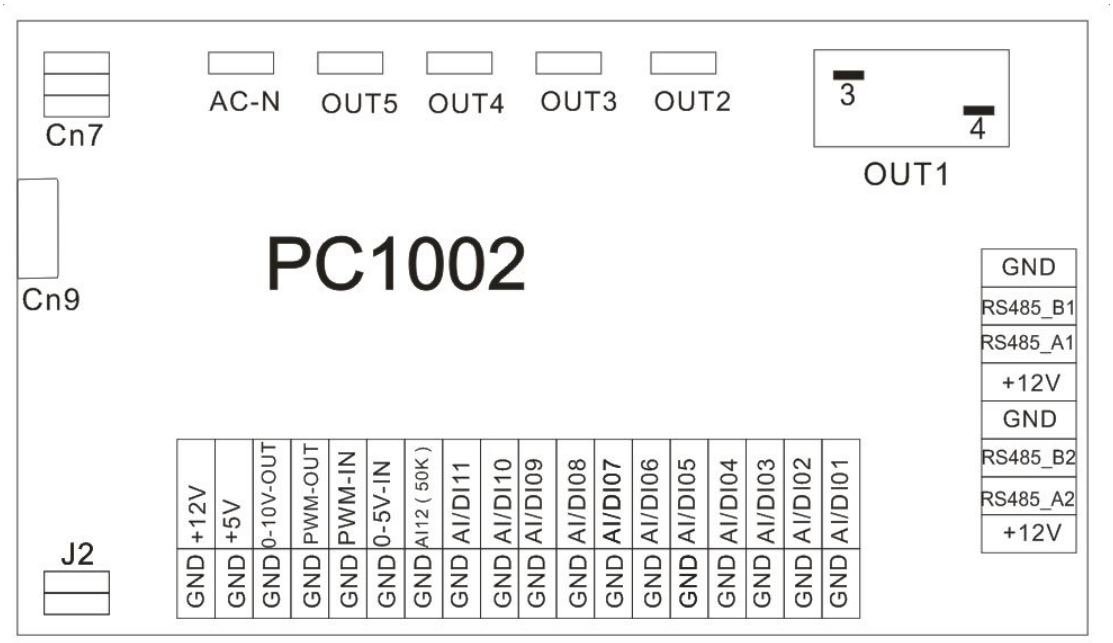


Temperature curve automatically updates every one hour, and the curve record can be stored for 60 days;

Start from the latest curve saved time, if power is off and curve data collecting time is less than one hour, the data in this period will not be saved;

II. PCB I/O Ports description

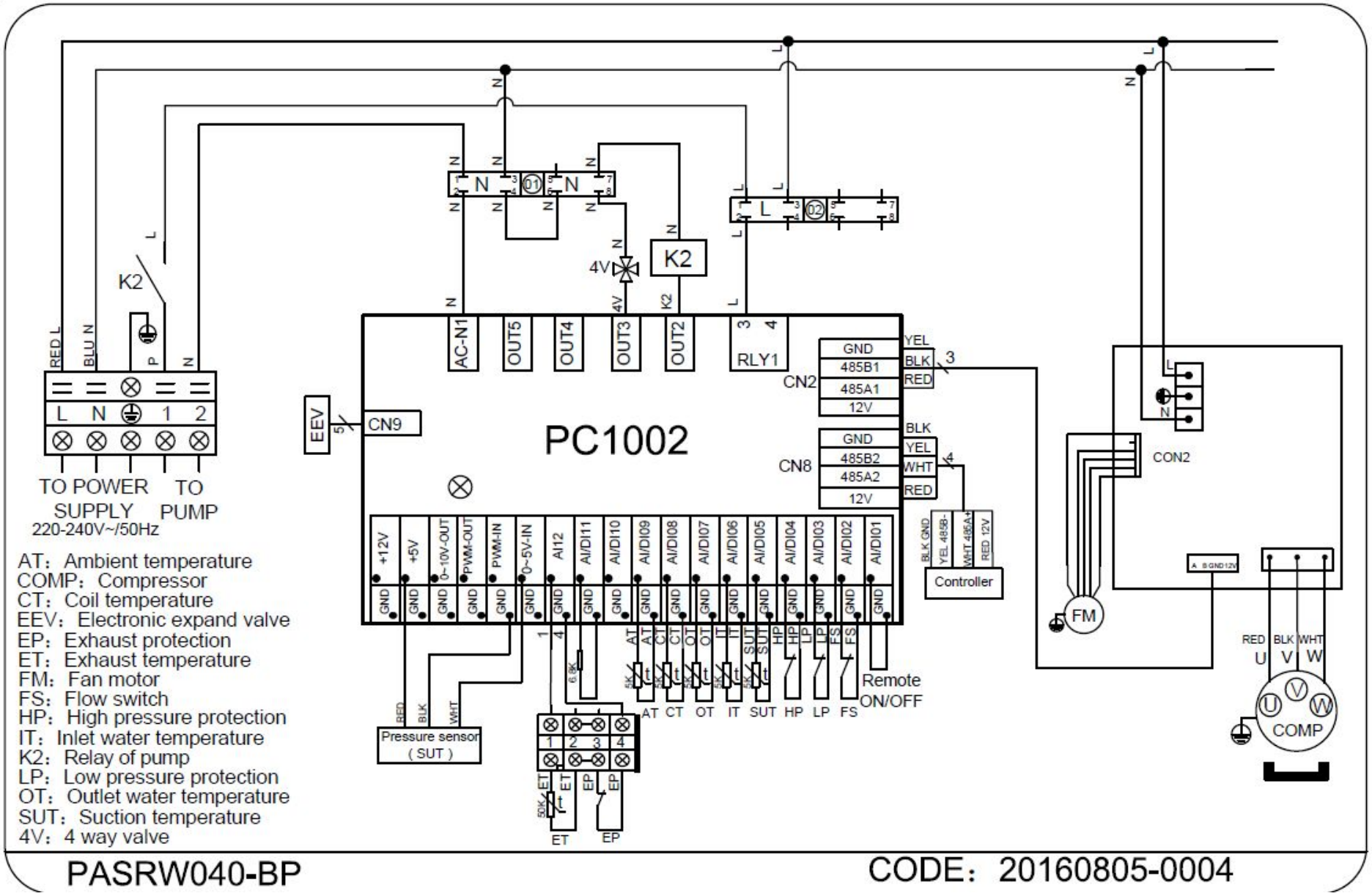
1. Connection of PCB illustration



2. Connections explanation

Number	Sign	Meaning
01	OUT1	Compressor output~220-230VAC~
02	OUT2	Water pump output~220-230VAC~
03	OUT3	4-way valve output~220-230VAC~
04	OUT4	High speed of fan output~220-230VAC~
05	OUT5	Low speed of fan output~220-230VAC~
06	AC-N	Live line
07	AI/DI01	Emergency switch input
08	AI/DI02	Water flow switch protection input
09	AI/DI03	System low pressure protection
10	AI/DI04	System high pressure protection
11	AI/DI05	System high pressure protection ~input~
12	AI/DI06	System 1 high pressure protection ~input~
13	AI/DI07	Water output temperature in put
14	AI/DI08	System fan coil temperature~ input~
15	AI/DI09	Ambient temperature~ input~
16	AI/DI10	No use
17	AI/DI11	Antifreeze temperature
18	AI12(50K)	System Exhaust temperature ~input~
19	0_5V_IN	Compressor current detection/pressure sensor (input)
20	PWM_IN	No use
21	PWM_OUT	Fan control output
22	0_10V_OUT	No use
23	+5V	No use
24	+12V	No use
25	GND	Frequency conversion board communications
26	RS485_B1	
27	RS485_A1	
28	+12V	
29	GND	Color line controller communication
30	RS485_B2	
31	RS485_A2	
32	+12V	
33	J2	Transformer secondary voltage
34	CN7	Transformer primary voltage
35	CN9	Electronic expansion valve .

3. Wiring diagram (4hp inverter heat pump)



AT：Ambient temperature
COMP：Compressor
CT：Coil temperature
EEV：Electronic expand valve
EP：Exhaust protection
ET：Exhaust temperature
FM：Fan motor
FS：Flow switch
HP：High pressure protection
IT：Inlet water temperature
K2：Relay of pump
LP：Low pressure protection
OT：Outlet water temperature
SUT：Suction temperature
4V：4 way valve

PASRW040-BP

CODE：20160805-0004

III. Parameter list

Parameter	Meanings	Default value	Modbus	Remarks
D	**Parameters of defrosting**			
D01	Start defrosting temperature	-7℃	1101	D01=0：-7℃ D01=1：2℃ When H12=0 it displays with ℃
	the pressure value to start defrost	5.5bar	1102	When H12≠0, it displays with bar
D02	End defrost temperature	13℃	1103	
D03	Defrosting cycle	45min	1104	
D04	Maximum defrosting time	8min	1105	
D06	Defrosting mode (0-normal/1-economy)	0	1106	
D07	The ambient temperature to start slide defrosting	2℃	1107	
D08	The difference of coil temperature after starting slide defrosting	5℃	1108	When H12=0 or H38=0, this function is valid
	The difference of defrosting pressure after starting slide defrosting	2bar	1109	When H12≠0 and H38=1, this function is valid
D09	The difference of ambient temperature after starting slide defrosting	5℃	1110	
D10	Coil temperature for ending defrost sliding	-18℃	1111	When H12=0 or H38=0, this function is valid
	Pressure for ending defrost sliding	2.8bar	1112	When H12≠0 and H38=1, this function is valid
E	**Parameters of EEV**			
E01	EEV mode(0-manual/1-automatic/2-auxiliary)	1	1116	
E02	super heat	Depend on which model	1117	
E03	initial opening		1118	
E04	the minimum opening		1119	
E05	defrosting opening		1120	

E06	cooling opening		112	
E07	the setting temperature of exhaust temperature	60℃	1122	When E01=2, this parameter is valid
E09	P value of PID control	2	1123	
E10	I value of PID control	10	1124	
E11	D value of PID control	0	1125	
E12	Super heat compensation difference	0℃	1126	
F	**parameters of fan motor**			
F01	parameters of fan motor (0-single speed mode(high speed)/ 1-dual speed mode / 2-AC / 3-one DC(stepless speed regulation)/ 4-two DC / 5- EC)	Depend on which model	1048	
F02	the coil temperature of fan in high speed mode when cooling	40℃	1049	When F10=0/1, it displays with ℃
	the running pressure of fan in high speed mode when cooling	15bar	1050	When H12≠0, it displays with bar
F03	the coil temperature of fan in low speed mode when cooling	15℃	1051	When F10=0/1, it displays with ℃
	the running pressure of fan in low speed mode when cooling	7bar	1052	When H12≠0, it displays with bar
F04	the coil temperature of fan stop when cooling	10℃	1053	When F10=0/1 it displays with ℃
	the running pressure of fan stop when cooling	2bar	1054	When H12≠0, it displays with bar
F05	the coil temperature of fan in high speed mode when heating	10℃	1055	When F10=0/1, it displays with ℃
	the running pressure of fan in high speed mode when heating	3bar	1056	When H12≠0 it displays with bar
F06	the coil temperature of fan in low speed mode when heating	20℃	1057	When F10=0/1, it displays with ℃
	the running pressure of fan in low speed mode when heating	9bar	1058	When H12≠0, it displays with bar
F07	the coil temperature of fan stop when heating	30℃	1059	When F10=0/1, it displays with ℃
	the running pressure of fan stop when heating	11bar	1060	When H12≠0, it displays with bar
F10	Fan speed regulating temp selection (0-coil	0	1061	When F01=2, and

	temp/1-ambient temp)			H12=0 it will display this parameter
F11	Maximum speed fan operating duty ratio	100%	1060	When F01=2, it displays with %
	the highest speed of fan	1060r	1063	When F01=3 it displays with r
F12	Minimum speed fan operating duty ratio when in cooling	50%	1064	When F01=2, it displays with %
	the lowest speed of fan in cooling	600r	1065	When F01=3 it displays with r
F13	Minimum speed fan operating duty ratio when in heating	50%	1066	When F01=2, it displays with %
	the lowest speed of fan in heating	600r	1067	When F01=3 it displays with r
F14	the start time for silent running mode timing	0h	1068	When F17=1, it will display this parameter
F15	the end time for silent running mode timing	6h	1069	When F17=1, it will display this parameter
F16	the proportion of time connected to electricity in silent running mode in a pulse circulation	50%	1070	When F01=2, it will display this parameter
	fan speed in silent running mode	600r	1071	When F01=3, it will display this parameter
F17	if to use silent running mode timing function(0-no/1-yes)	0	1072	
F18	if to use adjust fan speed or low speed function by manual (1-no/1-yes)	0	1073	
F19	the rated operating duty ratio of AC fan motor	50%	1074	When F01=2, it displays with %
	the rated DC fan speed	600r	1075	When F01=3 it displays with r
F20	Function of port AI/DI 11 (0-PWM Detect / 1-water pipe Antifreeze temperature sensor)	Automatically changed by F01	1077	When F05 = 5, then F20 = 0. When F05≠5, then

				F20 = 1.
H	**System and system protection parameter**			
H01	If with disable automatic restart (0-no/1-yes)	1	1018	
H02	Mode (0-cooling mode only/1-automatic heating and cooling modes/2-heating mode only	1	1019	
H03	Temperature unit (0-【℃】/1-【℉】)	0	1145	
H06	The minimum frequency of compressor in heating	30Hz	1020	When H12=0, unit without this parameter
H07	The minimum frequency of compressor in cooling	40Hz	1021	When H12=0, unit without this parameter
H08	The maximum frequency of compressor in heating	85Hz	1022	When H12=0, unit without this parameter
H09	The maximum frequency of compressor in cooling	80Hz	1023	When H12=0, unit without this parameter
H10	The time of delay constant temperature for stopping unit	20min	1024	When H12=0, unit without this function
H11	Delay time for testing the inlet temperature after constant temperature stop unit in automatic mode	-	1025	Reserve
H12	Type of compressor(0-ON OFF compressor/ 1-TNB220FLHMC_TUV/2-SNB172FJGMC_TUV / 3-MNB36FAAMC_TUV/4-TNB306FPGMC_TUV / 5-TNB220FUEMC_UL/6-MNB36FAUMC-L_UL/ 7-TNB306FVPMC_UL/8-SNB150FGAMC/9-SNB140FCAMC/ 10-MNB36FABMC/ 11-MNB42FFDMC)	Depend on which model	1026	When H12≠0, unit is inverter heat pump
H13	The frequency of compressor when defrosting	80Hz	1027	
H14	The frequency adjust cycle of 0.2℃ inlet water difference	45min	1028	
H15	The set point of compressor overcurrent protect		1029	When H12=0, unit has this function

H16	Type of refrigerant (0-R410a/1-R407c)		1030	When H12=0, unit without this function
H17	The low ambient temperature for starting compensation in cooling	15℃	1031	
H18	The low ambient temperature for ending compensation in cooling	5℃	1032	
H19	The high target frequency for low ambient compensation in cooling	40℃	1033	
H20	The high ambient temperature for starting compensation in cooling	35℃	1034	
H21	The high ambient temperature for ending compensation in cooling	43℃	1035	
H22	The high frequency for high ambient compensation in cooling	40℃	1036	
H23	The low ambient temperature for starting compensation in heating	15℃	1037	
H24	The low ambient temperature for ending compensation in heating	-10℃	1038	
H25	The high target frequency for low ambient compensation in heating	90Hz	1039	
H26	The high ambient temperature for starting compensation in heating	35℃	1040	
H27	The high ambient temperature for ending compensation in heating	43℃	1041	
H28	The highest frequency for high ambient compensation in heating	85Hz	1042	
H29	Maximum Pressure sensor value(Reserve)		1043	
H30	Minimum pressure sensor value(Reserve)		1044	
H31	The ambient temperature for starting super heat compensation	2℃	1045	
H32	The ambient temperature for ending super heat compensation	-12℃	1046	
H33	Maximum frequency of compressor in silent mode	60Hz	1047	
H34	The ambient temperature for stopping the heat pump	-15℃	1144	
H35	The temperature difference for restart the	1℃	1146	

	compressor(only for inverter heat pump)			
H36	The start frequency when the compressor restarts	50Hz	1147	
H37	Unit address	1-247	1148	Could not be 98
H38	Pressure measurement	0-OFF/1-ON	1173	
P	**Parameter of water pump**			
P01	Operating mode of water pumps (0-Normal/1-Special/2-Interval)	2	1081	
P02	Operating time interval of water pumps	30min	1082	
P03	Operating duration of water pumps	3min	1083	
P04	Advanced water pump run time of compressors	1min	1084	
P05	Water pump filtration	0-OFF/1-ON	1085	
P06	Water pump filtration start time 1	10h	1086	
P07	Water pump filtration end time 1	12h	1087	
P08	Water pump filtration start time 2	15h	1088	
P09	Water pump filtration end time 2	17h	1089	
R	**Parameter of temperature**			
R01	The setting value of inlet in cooling	27℃	1135	
R02	The setting value of inlet in heating	27℃	1136	
R03	Target setting temperature for automatic mode	27℃	1137	
R04	The return difference for starting unit	1℃	1138	
R05	Shutdown temp difference at constant temp	1℃	1139	
R08	Minimum cooling set point	8℃	1140	
R09	Maximum cooling set point	35℃	1141	
R10	Minimum heating set point	15℃	1142	
R11	Maximum heating set point	35℃	1143	
R12	Return temp difference	1℃	1166	
U	**parameters of water flow**			Reserve function
U02	The pulse number of flow gauge in 1L water	205	1149	Reserve function
O	**Condition of load**			
O01	Compressor output	on/off	2019	
O02	Circulation water pump output	on/off	2019	
O03	4-way valve output	on/off	2019	
O04	Fan motor high speed output	on/off	2019	
O05	Fan motor low speed output	on/off	2019	
O06	EEV output	0~500N	2020	

O07	The output frequency of compressor	0Hz~H08	2021	
O08	Compressor current	0~100A	2022	
O09	IPM temperature	-55~200℃	2023	
S	**Condition of switch**			
S01	HP switch	on/off	2034	
S02	LP switch	on/off	2034	
S03	Water flow switch	on/off	2034	
S04	Remote switch	on/off	2034	
S05	Mode switch	on/off	2034	
S06	Master/Slave switch	on/off	2034	
T	**Condition of temperature**			
T01	Suction temperature	-30~97℃	2045	
T02	Inlet water temperature	-30~97℃	2046	
T03	Outlet water temperature	-30~97℃	2047	
T04	Coil temperature	-30~97℃	2048	
T05	Ambient temperature	-30~97℃	2049	
T06	Exhaust temperature	-9~159.5℃	2050	
T07	Current of compressor	0~24.5A	2051	
T08	Output of AC fan motor	0~100%	2052	
T09	Water flow(reserve)		2053	
T10	Pressure sensor	0~20bar	2054	
T11	Super heat		2060	
T12	Fan motor speed	0~1100rpm	2061	
T13	Target super heat after compensation	-20~20℃	2062	
T14	Input voltage of inverter driver board	0~255VAC	2063	Only when H12≠0, it is valid
T15	Water pipe antifreeze temperature	-30~97℃	2065	Only when F20=1, it is valid
T16	EC fan motor speed	0~1100rpm	2066	Only when F20=0, it is valid
T17	Speed of fan motor1	0-1100rpm	2067	Only when F01=3/4/6/7, it is valid
T18	Speed of fan motor2	0-1100rpm	2068	Only when F01=4/7, it is valid

IV. Mean of parameter

D——Defrost parameter

D01——Start defrost temperature or pressure

If H12=0 and D06=0, the start defrost temperature is -7℃

If H12=0 and D06=1, the start defrost temperature is 2℃

If H12=1, the start defrost pressure is 5bar

To start the defrost cycle; the condition must be valid for the time d03.

D02——End defrost temperature

Establishes the temperature above which the defrost cycle ends.

D03——Defrosting cycle

Represents delay between two successive defrost cycle. The first time, when coil temperature is lower than D01, there must be valid for the time d03 to start defrost.

D04——Max defrosting duration

Represents the maximum duration of the defrost cycle (the defrost ends when the maximum duration has been arrived, even if the defrost hasn't finished)

D06——Defrosting modes

If D06=0, Defrosting mode is in normal mode

If D06=1, Defrosting mode is in economy mode

D07——the ambient temperature for starting slide defrosting

D08——

If H12=0, D08 is the difference of coil temperature after starting slide defrosting.

If H12≠0, D08 is the difference of defrosting pressure after starting slide defrosting.

D09——the value of coil temperature offset or coil pressure after unit started slide defrosting

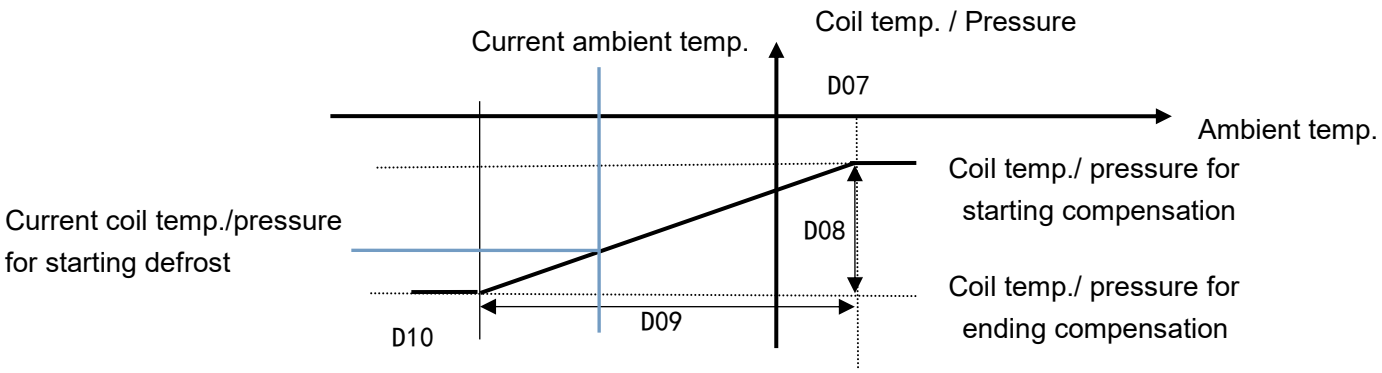
Above, the actual temperature get into defrosting is D08 plus D09

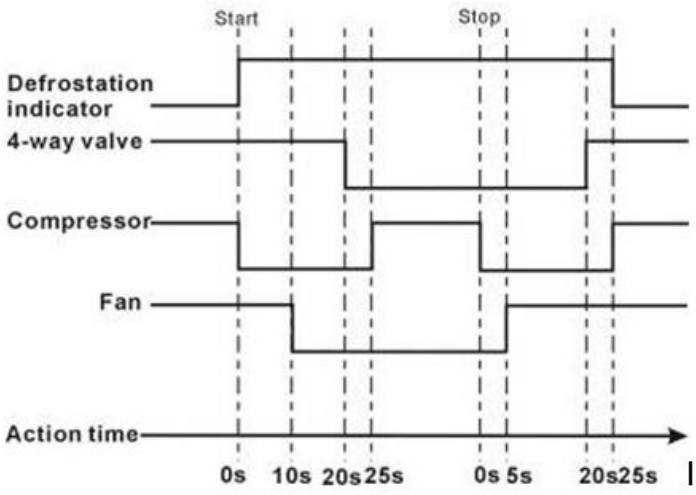
Attention: The situation of defrost abnormal end

D10——the value of ambient temperature offset after unit started slide defrosting

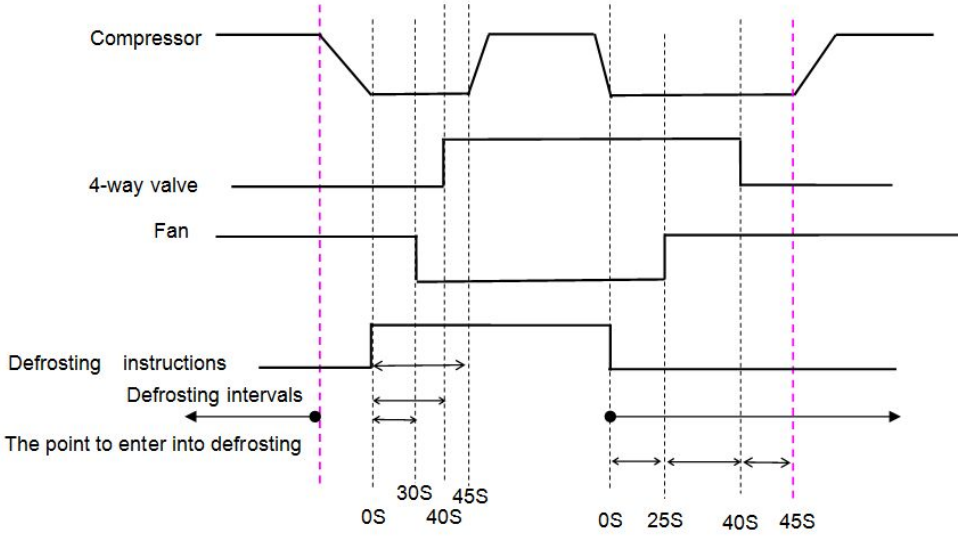
If H12=0, D10 is the Coil temperature for ending defrost sliding.

If H12≠0, D10 is the pressure value for ending defrost sliding.





Defrosting action for on/off heat pump (when H12=0)



Defrosting action for inverter heat pump (when H12≠0)

Defrosting protection

1) System show antifreeze protection during defrosting, then unit will be shut off and show this malfunction. After recovering it, system goes on defrosting.
2) Shut off the unit during defrosting, system will continue running defrost until it has finished.
3) HP switch has broken during defrosting, then unit will be shut off and show HP malfunction. After recovering it, system enters to normal heating mode.
4) LP switch has broken during defrosting, the unit will skip LP malfunction and exit defrosting and back to normal heating mode, then system will check LP switch after 5min.
5) Flow switch has broken during defrosting, then unit will be shut off and show Flow Malfunction. After recovering this malfunction, system goes on defrosting.

6) Exhaust temperature is too high during defrosting, then unit will be shut off and show this malfunction. After recovering it, system goes on defrosting.
7) Temperature difference between inlet and outlet during defrosting, then unit will be shut off and show this malfunction. After recovering it, system goes on defrosting.

E——EEV parameter

E01——EEV mode, there are 3 modes for operating EEV

E01=0: EEV is running by manual operation;

E01=1: EEV is running by automatic operation;

E01=2: EEV is running by auxiliary operation;

E02——Target Super heat

E03——Initial position

If E01=0, represents expansive valve fix this position always.

If E01=1, represents expansive valve initiation position

E04——Minimum position

E05——Defrost position

Fix the EEV position during system is defrosting.

E06——Cooling position

Fix the EEV position during system at cooling mode.

E07——Target value of exhaust temperature

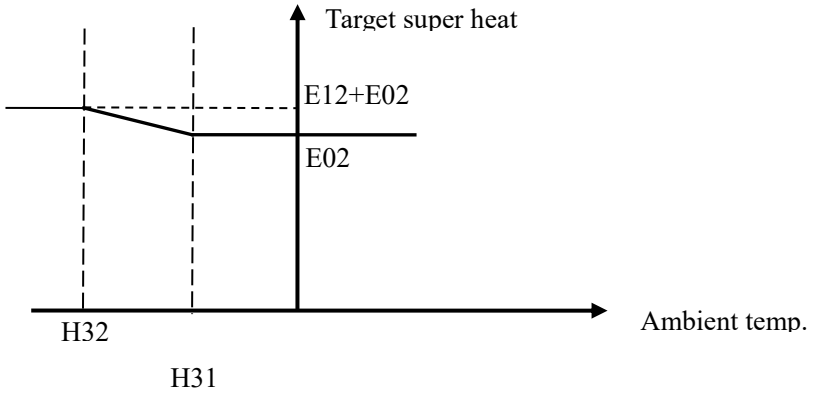
It is valid when E01=2

E09——parameter P value of aperture control

E10——parameter I value of aperture control

E11——parameter D value of aperture control

E12——Super heat compensation difference



F——Fan parameter

Normally, Fan will start up 5 seconds ahead of Compressor and 30 seconds later to shut off. When at defrosting, Fan running situation is according to defrosting control.

F01——Fan parameter

F01=0: in high speed fan mode;(only high speed)

F01=1: in high or low speed fan mode;

F01=2: the fan is a AC fan motor

F01=3: the fan is a DC fan motor. Fan speed is adjusted by stepless speed regulation.

F01=4: the unit has two DC fan motors. Fan speed is adjusted by stepless speed regulation.

F01=5: the fan is a EC fan motor. Fan speed is adjusted by stepless speed regulation.

F02——Coil temperature or pressure set point for high speed fan mode (Cooling)

This represents if the temperature or pressure above F02, the fan will on high speed (Cooling)

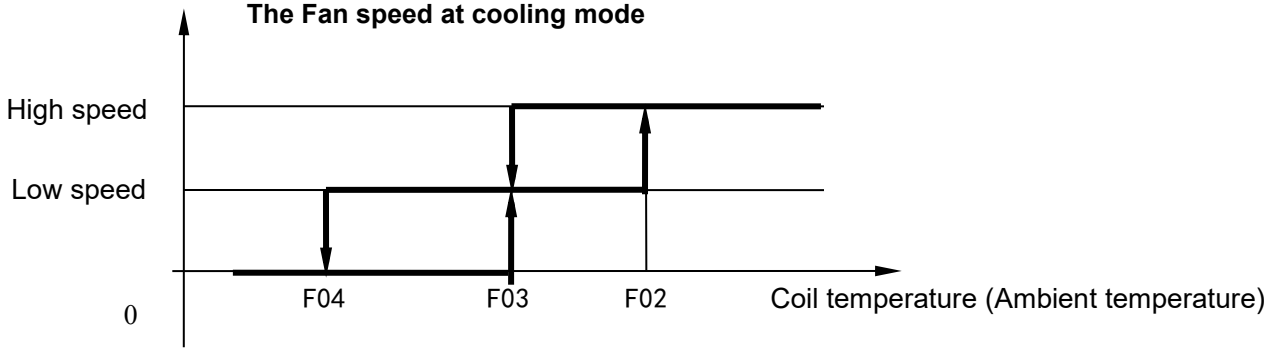
F03——Coil temperature or pressure set point for low speed fan mode (Cooling)

This represents if the temperature or pressure below which the fans remain on at low speed (Cooling)

F04——Coil temperature or pressure set point for the fan stop (Cooling)

This represents the temperature or pressure in reference to F03 below which the fans are stopped.

The Fan speed at cooling mode



F05——Coil temperature or pressure set point for high speed fan mode (Heating)

This represents the temperature or pressure above which the fans remain on at high speed (Heating)

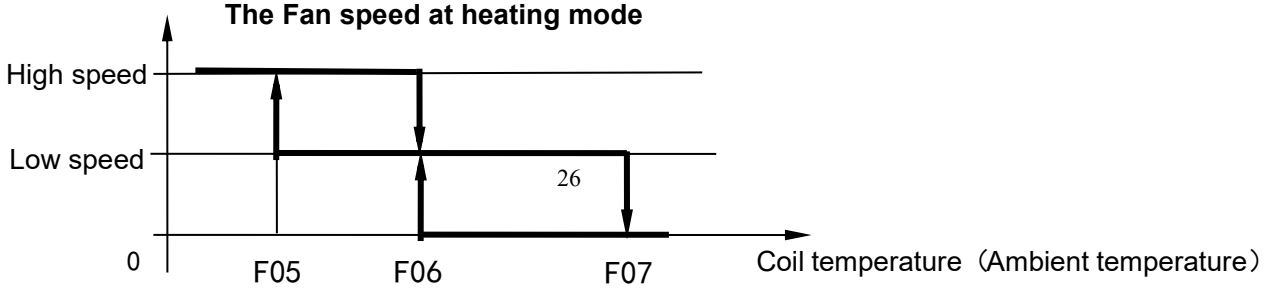
F06——Coil temperature or pressure set point for low speed fan mode (Heating)

This represents the temperature or pressure below which the fans remain on at low speed (Heating)

F07——Coil temperature or pressure set point for the fan stop (Heating)

This represents the temperature or pressure in reference to F06 below which the fans are stopped.

The Fan speed at heating mode



F10——Fan speed control temp.

When F01=0, Fan speed is controlled by coil temperature;

When F01=1, Fan speed is controlled by ambient temperature.

It is valid only if F01=1/2/3 and H12=0.

F11——Maximum speed fan operating duty ratio (it means in a pulse circulation the ratio of time connected to electric) or the highest speed of fan

If F01=2, the highest ratio is 100% and the value will display by %

If F01=3, the highest running speed is 1060r and the value will display by r.

F12——Minimum speed fan operating duty ratio (it means in a pulse circulation , the proportion of time connected to electricity) or the lowest speed of fan in cooling

If F01=2, the highest ratio is 50% and the value will display by %

If F01=3, the highest running speed is 600r and the value will display by r.

F13——Minimum speed fan operating duty ratio (it means in a pulse circulation , the proportion of time connected to electricity) or the lowest speed of fan in heating

If F01=2,the highest ratio is 50% and the value will display by %

If F01=3,the highest running speed is 600r and the value will display by r.

F14——the start time for silent running mode timing,

It is valid only if F17=1

F15——the end time for silent running mode timing,

It is valid only if F17=1

F16——In a pulse circulation, the proportion of time connected to electricity in silent running mode or fan speed in silent running mode

If F01=2,it is 50%.

If F01=3,it is 600r.

F17——if to use silent running mode timing function

If F17=0, unit without timing function

If F17=1, unit with timing function

F18——if to use adjust fan speed or low speed function by manual

If F18=0, people can not adjust the fan speed by manual

If F18=1, people can adjust the fan speed by manual

F19——the rated operating duty ratio of AC fan motor or the rated DC fan speed

If F02=1, it is 50% and the value will display by %.

If F01=3, it is 600r and the value will display by r.

F20——Function of port AI/DI 11 (0-PWM Detect / 1-water pipe Antifreeze temperature sensor)

F20 is automatically changed by F01.

If F01=5, F20 is set to 0. The function of port AI/DI is ‘PWM Detect’.

If F01≠5, F20 is set to 1. The function of port AI/DI is ‘Water pipe antifreeze temperature sensor’.

H——System Parameter

H01——Automatic restart

H01=0: disable automatic restart;

H01=1: enable automatic restart

H02——Mode

H02=0: only cooling;

H02=1: heating, cooling and automatic;

H02=2: only heating.

H06——the over current protection of compressor

It is valid only if H12 is not 0.

H07——the minimum frequency of compressor

It is valid only if H12 is not 0.

H08——the maximum frequency of compressor in heating

It is valid only if H12 is not 0.

H09——the maximum frequency of compressor in cooling

It is valid only if H12 is not 0.

H10——the time of delay constant temperature for stopping unit

It is valid only if H12 is not 0.

H11——Delay time for testing the inlet temperature after constant temperature stop unit in automatic mode

It is valid only if H12 is not 0.

H12——type of compressor

If H12=0,it is a ON/OFF compressor.

If H12=1, the model of inverter compressor is TNB220FLHMC_TUV.

If H12=2, the model of inverter compressor is SNB172FJGMC_TUV.

If H12=3, the model of inverter compressor is MNB36FAAMC_TUV.

If H12=4, the model of inverter compressor is TNB306FPGMC_TUV.

If H12=5, the model of inverter compressor is TNB220FUEMC_UL.

If H12=6, the model of inverter compressor is MNB36FAUMC-L_UL.

If H12=7, the model of inverter compressor is TNB306FVPMC_UL.

If H12=8, the model of inverter compressor is SNB150FGAMC.

If H12=9, the model of inverter compressor is SNB140FCAMC.

If H12=10, the model of inverter compressor is MNB36FABMC.

If H12=11, the model of inverter compressor is MNB42FFDMC.

H13——parameter P value of compressor control

H14——parameter I value of compressor control

H15——parameter D value of compressor control

H16——type of refrigerant

There are two types of refrigerant

If H16=0, the refrigerant is R410a

If H16=0, the refrigerant is R407c

H17——the lowest temperature for starting compensation in cooling

H18——the lowest temperature for ending compensation in cooling

H19——the highest target frequency for low ambient compensation in cooling

H20——the highest temperature for starting compensation in cooling

H21——the highest temperature for ending compensation in cooling

H22——the highest target frequency for high ambient compensation in cooling

H23——the lowest temperature for starting compensation in heating

H24——the lowest temperature for ending compensation in heating

H25——the highest target frequency for low ambient compensation in heating

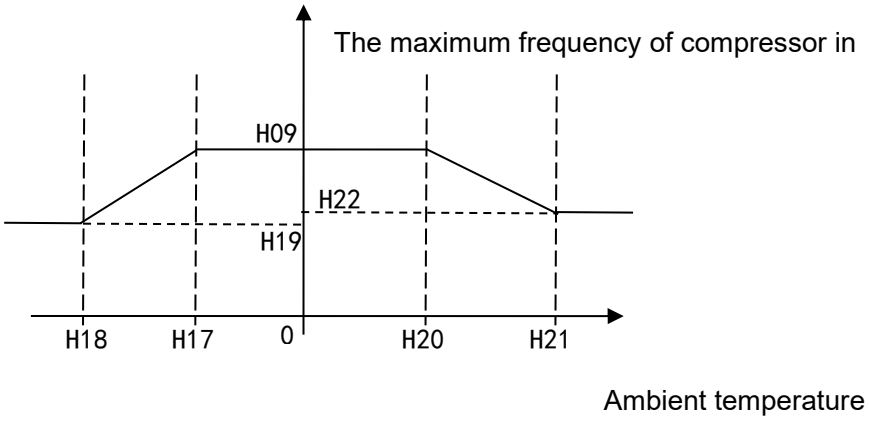
H26——the highest temperature for starting compensation in heating

H27——the highest temperature for ending compensation in heating

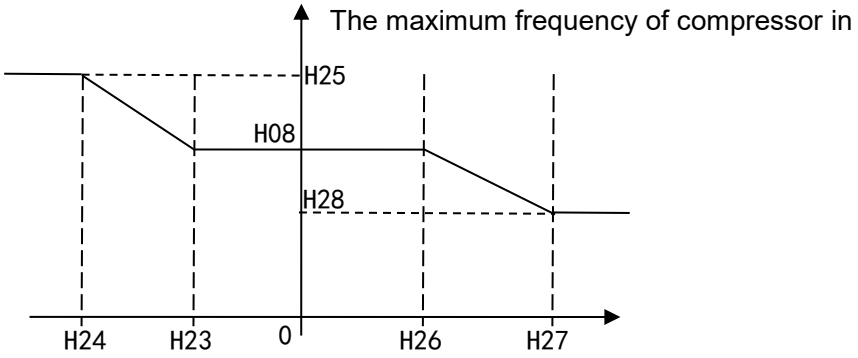
H28——the highest target frequency for high ambient compensation in heating

Parameters from H17 to H28 are used for protecting unit when ambient temperature is too low or too high. The diagram to display the parameters are as follows：

1) Cooling



2) Heating



Ambient temperature

H29——Maximum Pressure sensor value(Reserve)

H30——Minimum pressure sensor value(Reserve)

H31——The ambient temperature for starting super heat compensation

See the graph in E parameter.

H32——The ambient temperature for ending super heat compensation

See the graph in E parameter.

H33——Maximum frequency of compressor in silent mode

H34——The ambient temperature for stopping the heat pump

When the ambient temperature is lower than H34, the unit will stop. Notice, no error code is displayed.

H35——The temperature difference for restart the compressor(only for inverter heat pump)

H36——The start frequency when the compressor restarts

H37——Unit address

H38——If enable the pressure sensors

P——Water pump parameters

P01——Water pump model

P01=0, water pump will always on except on standby and alarm.

P01=1, water pump will operate depend on compressor, and has 2 minutes delay after the compressor has stopped;

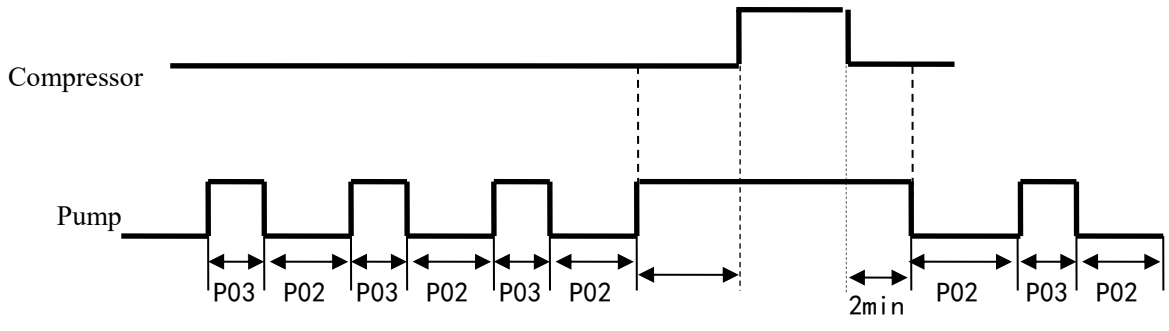
P01=2, water pump will be started and stopped at regular intervals after compressor stop. Depend on P02 and P03.

P02—— Minimum off time before the next pump start.

P03—— minimum on time that the pump remains on.

P04——the time of pump advance compressor to start up.

The action sequence of pump and compressor



P05——If enable water pump filtration function

P06——Water pump filtration start time 1

P07——Water pump filtration end time 1

P08——Water pump filtration start time 2

P09——Water pump filtration end time 2

R——Temperature parameter

R01——Cooling set point

Inlet water setting temp. (Cooling)

R02——Heating set point

Inlet water setting temp. (Heating)

R03——AUTO set point (Auto mode)

Target setting temperature for auto mode.

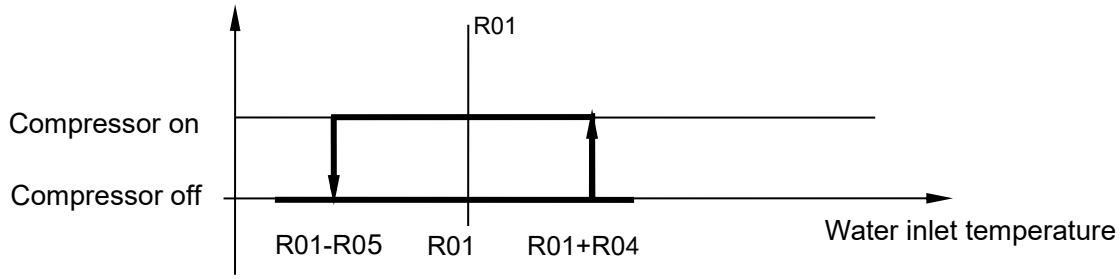
R04——Start differential of cooling

This represents the difference between R01 and start cooling point.

R05——Stop differential of cooling

This represents the difference between R01 and stop cooling point.

Compressor action at cooling mode



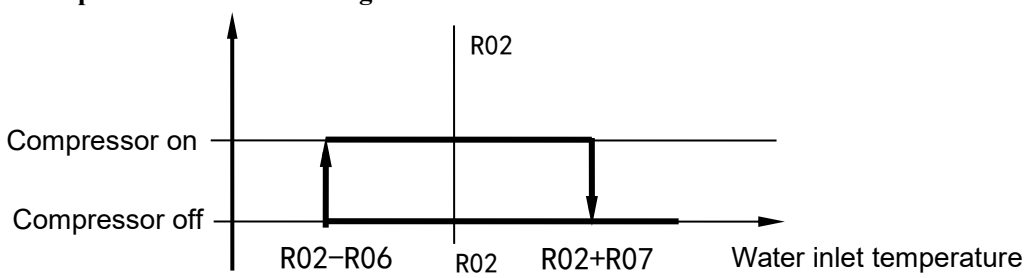
R06——Start differential of heating

This represents the difference between R02 and start heating point.

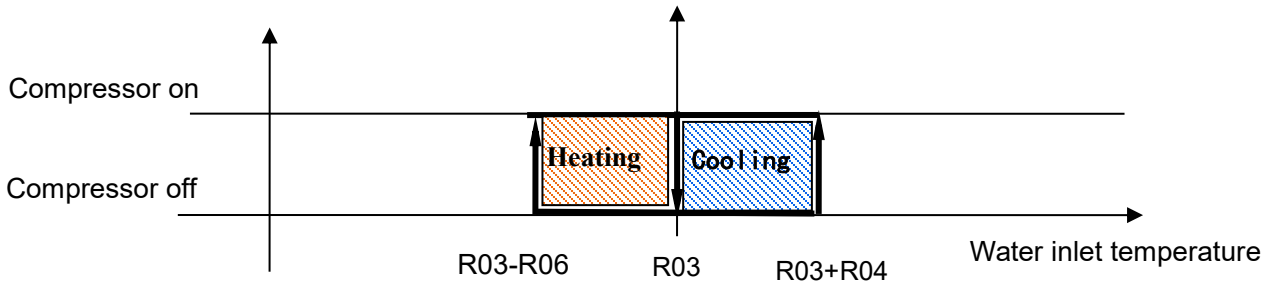
R07——Stop differential of heating

This represents the difference between R02 and stop heating point.

Compressor action at heating mode



Compressor action at Automatic mode



R08——Min. set point in Cooling

Establishes the minimum limit for setting the Cooling set point

R09——Max. Cooling set point

Establishes the maximum limit for setting the Cooling set point

R10——Min. Heating set point

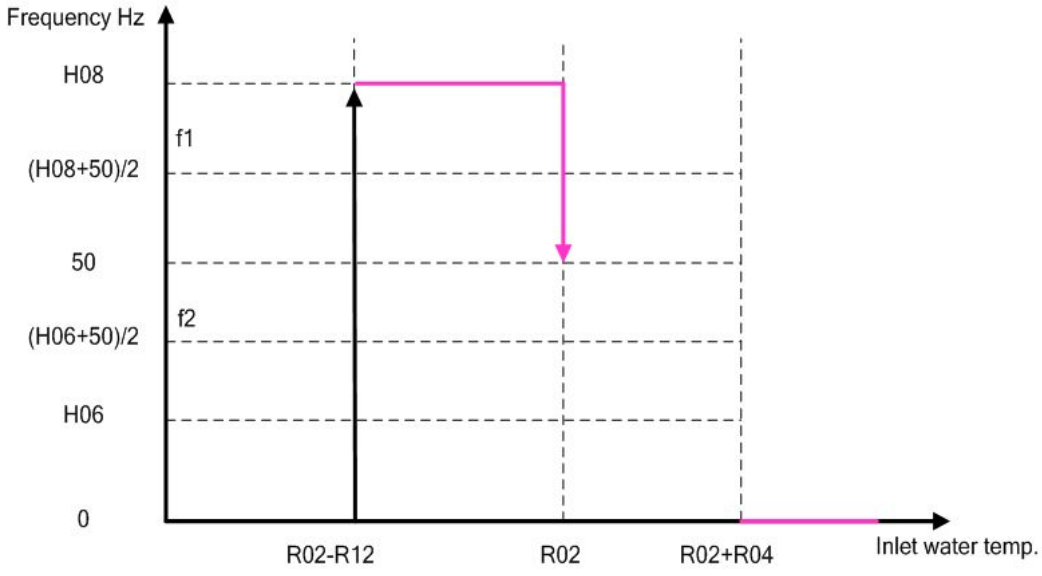
Establishes the minimum limit for setting the Heating set point

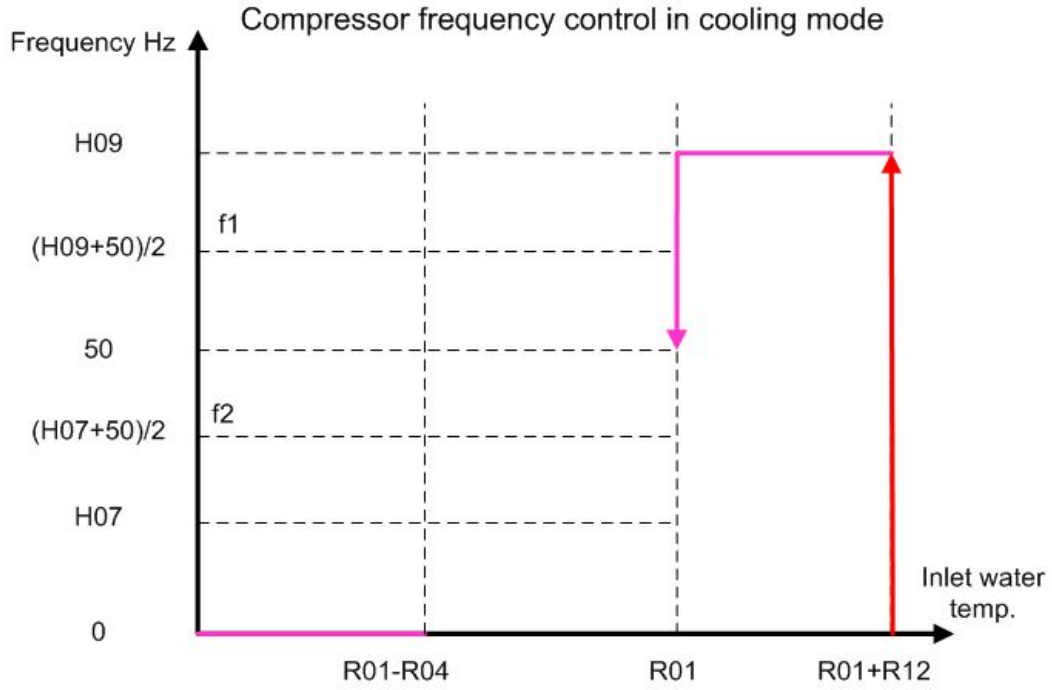
R11——Max. Heating set point

Establishes the maximum limit for setting the Heating set point

R12——Return temp difference

Compressor frequency control in heating mode





U——Flow parameter

U02——the pulse number of flow gauge in 1L water

0——condition of load

001——compressor output

Whether compressor is switch on or off

002——circulation water pump output

Whether circulation water pump is switch on or off

003——four way valve output

Whether four way valve output is switch on or off

004——fan motor high speed output

Whether fan motor high speed output is switch on or off

005——fan motor low speed output

Whether fan motor low speed output is switch on or off

006——EEV output

The step of EEV ranges from 0-500N

007——the output frequency of compressor

The frequency of compressor is ranges from 0Hz-08Hz

S——condition of switch

S01——emergency switch

Whether the emergency switch is switch on or off

S02——water flow switch

Whether water flow switch is switch on or off

S03——LP switch

Whether LP switch is switch on or off

S04——HP switch

Whether HP switch is switch on or off

S05——Mode switch

Whether mode switch is switch on or off

S06——Master/Slave switch

Whether Master/Slave switch is switch on or off

T——condition of temperature

T01——suction temperature

T02——inlet water temperature

T03——outlet water temperature

T04——coil temperature

T05——ambient temperature

T06——exhaust temperature

T07——check if the current of compressor is overload

T08——output of AC fan motor

T09——input of water flow

It is a reserve port

T10——pressure sensor

Only when H12≠0, it is valid

T11——Super heat

T12——Target speed of fan motor

T13——Super heat after compensation

T14——Ac input voltage of frequency driver board

Only when H12≠0, it is valid

T15——Antifreeze Temp.

Only when F20=1, it is valid

T16——EC fan motor speed

Only when F20=0, it is valid

T17——Speed of fan motor 1

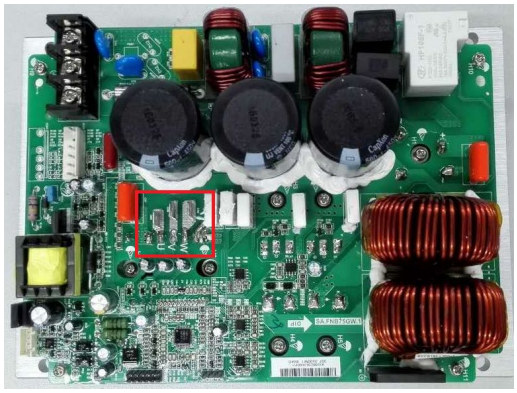
Only when F01=3/4/6/7, it is valid

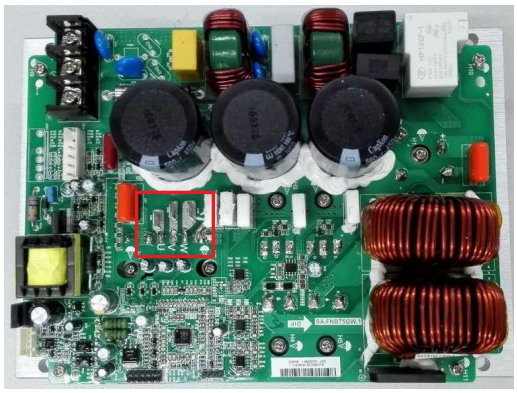
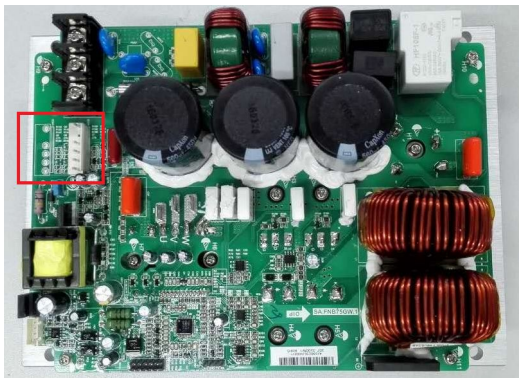
T18——Speed of fan motor 2

Only when F01=4/7, it is valid

V. PC1002 Error Code and description

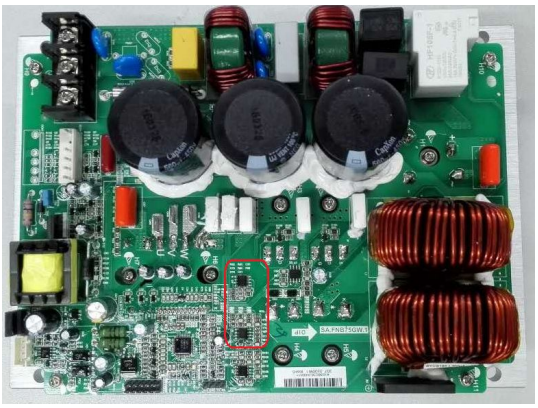
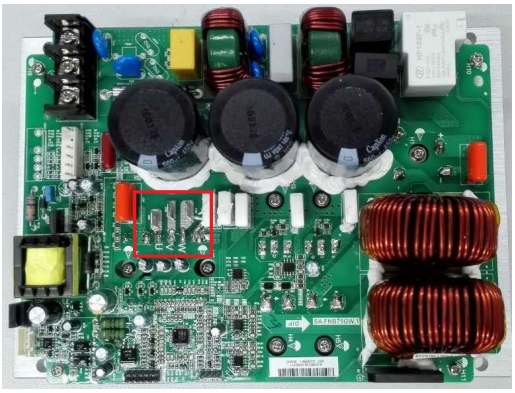
Code NO	Definition	Action
P01	Water Inlet Temperature Failure	When it detects water inlet temperature sensor short circuit or open circuit, sensor error code shows.
P02	Water outlet temperature failure	
P04	Ambient temperature failure	
P05	Coil temperature failure	
P07	Suction temperature failure	
P09	Water pipe antifreeze temperature failure	
P081	Discharge temperature failure	
P082	Too high discharge temperature protection	When discharge temperature is larger than 120 degree and the compressor is running, P082 shows and the unit stops running.
E01	High pressure protection	When it detects the high pressure switch circuit open and the compressor is running, E01 shows and the unit stops running.
E02	Low pressure protection	When it detects the low pressure switch circuit open and the compressor has been running for more than 5 minutes, E02 shows and the unit stops running.
E03	Water flow failure	When it detects the water flow switch circuit open, E03 shows and the unit stops running.
E05	Water pipe antifreeze protection	When water pipe temperature is less than 2 degree and the compressor is running, E05 shows and the unit stops running.
E06	Too big difference between inlet and outlet water temperature	When difference between the outlet temp. and inlet temp. is bigger than 13℃ in cooling mode, the E06 shows and the unit stops running except the pump.
E07	Antifreeze protection	When outlet temperature is less than 4 degree and the compressor has been running for more than 1 minutes, E07 shows and the unit stops running.

E19	Primary winter antifreeze protection	When one of inlet temperature, outlet temperature, water pipe temperature is between 2 degree and 4 degree, and the ambient temperature is less than 0 degree, and the heat pump is in standby mode, E19 shows and the circulation pump starts running.
E29	Secondary winter antifreeze protection	When one of inlet temperature, outlet temperature, water pipe temperature is less than 2 degree, and the ambient temperature is less than 0 degree, and the heat pump is in standby mode, E29 shows and the unit starts heating.
E051	Compressor Over Current Protection	Driver board real-time detect the compressor's UVW of any phase current Instantaneous value.(means the peak,it shows on the current meter of effective value), when the compressor is detected phase current instantaneous value exceeds the set value(the set value can check on specifications), then alarm the failure. 
F01	MOP Drive Warning	Driver board real-time calculate the current power, when the input power is detected exceeds the set value(Single-phase Unit of 3P-4P set value is 3800W, Single-phase Unit of 5P-7P set value is 5700W, the same horses power is in the same power range), maintaining constant power, then alarm the failure.
F02	Converter Board Off-line	Logic board periodicity detect the RS485 communication signal of converter board, when not detected signal A/B, then alarm the failure.

		
F03	IPM Protection	Drive board periodically detect the pipe Fo level state of IPM module, when the Fo is detected driving down, then alarm the failure.
F04	Compressor Start-up Failure	When starting the compressor, phase current waveform feedback irregular, chaotic waveform or no current feedback. 
F05	DC fan drive fault	Turn on the fan, drive board periodically detect the fan rotate speed, when the fan is detected stop, then alarm the failure. 
F06	IPM input current is overcurrent protection	Drive board periodically detect the pipe Fo level state of IPM module, when the Fo is detected driving down, then alarm the failure, after the power restart can clean the failure.

F07	Converter DC Over Voltage	Drive board periodically detect the busbar DC voltage, when DC voltage is detected exceeds 420V, then alarm the failure. 
F08	Converter DC Under Voltage	Drive board periodically detect the busbar DC voltage, when DC voltage is detected under 340V, then alarm the failure. 
F09	Power Input Under Voltage	Drive board periodically detect the input AC voltage effective value, when AC voltage is detected under 175V, then alarm the failure.

		
F10	Power Input Under Voltage	Drive board periodically detect the input AC voltage effective value, when AC voltage is detected exceeds 255V, then alarm the failure. 
F11	Sampling Voltage Failure	When Drive board get power, it periodically detect the bias voltage of sampling voltage circuit, when voltage is detected exceeds 1.75V or under 1.45V, then alarm the failure.

		
F12	DSP and PFC Connection Failure	Drive board periodically detect the cnk signal of PFC, when cnk signal is not detected, then alarm the failure.(none)
F13	DSO and SPPB Connection Failure	Drive board periodically detect the cnk signal of SPPB, when cnk signal is not detected, then alarm the failure.(none)
F14	DSP and MCU Connection Failure	Drive board periodically detect the cnk signal of MCU, when cnk signal is not detected, then alarm the failure.(none)
F15	IPM Overheat Protection	Drive board periodically detect the temp. of IPM Module, when the temp. of IPM Module is detected exceeds 95℃, then alarm the failure.
F16	Weak-magnetic Protection	Drive board periodically detect weak-magnetic current, when weak-magnetic is detected exceeds the set value of compressor, then alarm the failure.
F17	Converter Input Lost Phase	Drive board periodically detect three-phase current, when the current of one phase is detected close to 0 , then alarm the failure. 
F18	IPM Sampling Current Failure	When Drive board is power on, it periodically detect the bias voltage of sampling voltage circuit, when voltage is detected exceeds 1.75V or under

		1.45V, then alarm the failure. 
F19	Radiator Temperature Sensing Failure	Drive board real time detect the temp. Of IPM module, when the temp. is detected under -30℃ or exceeds 120℃, then alarm the failure.(none)
F20	Converter Overheat Protection	Drive board periodically detect the temp. of IPM module, when temp. is detected exceeds 95℃, then alarm the failure.(none)
F22	Converter Overheat Warning	Drive board periodically detect the temp. of IPM module, when temp. is detected exceeds 95℃, then alarm the failure.
F23	Compressor Over Current Warning	Drive board periodically detect the DC current(the effective value of UVW), when DC current is detected exceeds the set value(3P-4P set value is 10A, 5P-7P set value is 29A), then alarm the failure.
F24	Input Over Current Warning	Drive board periodically detect the effective value of AC input current, when AC current is detected exceeds the set value(3P-4P set value is 14A, 5P-7P set value is 25A), then alarm the failure.
F25	EEPROM Error Warning	1.Drive board fetch the data from EEPROM to detect if not satisfy the Check-sum, then alarm the failure. 2.When the fetching data is not the same with written data, then alarm the failure.(none)
F26	Input Over Current	Drive board periodically detect the effective value of AC input current, when AC current is detected exceeds the set value(3P-4P set value is 17A,

		5P-7P set value is 29A), then alarm the failure.
F27	PFC Failure	Drive board periodically detect the current instantaneous value of pipe Mos, when the instantaneous current is detected exceeds the set value(25A), then alarm the failure. 
F28	V15V Over/Under Voltage Failure	Drive board periodically detect the power supply of VCC15, when VCC15 is detected under 13V or exceeds 16.5V, then alarm the failure. 
PP	Pressure sensor failure	
E08	Communication Failure	It detects communication failure between the main controller and wire controller.

VI. PC1002 Maintenance

Code NO	Definition	Solution
P01	Water Inlet Temp Failure	Detect the connection and measure the resistance of sensor, if it's lower than 100Ω or higher than 500kΩ, please replace a new one;
P02	Water outlet temperature failure	
P04	Ambient temperature failure	
P05	Coil temperature failure	
P07	Suction temperature failure	
P09	Water pipe antifreeze temperature failure	
P081	Discharge temperature failure	
E01	High pressure protection	Measure the pressure value when heat pump is heating(cooling), if it's higher than 42.0 bar, it means heat pump has got really higher pressure protection: 1. Detect EEV step, low pressure and suction temp.; 2. Detect the inlet/outlet water temp.; 3. Maybe there is some air in the refrigeration system;
E02	Low pressure protection	Measure the pressure value when heat pump is heating(cooling), if it's lower than 1.5bar, it means heat pump has got really low pressure protection: 1. Detect the ambient temp. and inlet/outlet temp.; 2. Detect EEV step, low pressure and suction temp.; 3. Detect the leakage in the refrigeration system;
E03	Water Flow Failure	1. Detect the connection of cables; 2. Detect the flow switch; 3. Detect the water valve is opened or opened fully; 4. Detect the water pump;
E05	Water pipe antifreeze protection	1. Check the water pipe sensor; 2. Check the installation of water pipe sensor; 3. Check the water pipe temperature;
E06	Too big difference between inlet and outlet water temperature	1. Check the water flow; 2. Check the circulation pump; 3. Check the inlet and outlet water sensor;

E07	Antifreeze protection	1. Check the water flow; 2. Check the outlet water sensor;
E19	Primary winter antifreeze protection	It is the protection in winter. Once the water temperature rises up to 8 degree, the error code disappears.
E29	Secondary winter antifreeze protection	
E051	Compressor Over Current Protection	1.Detect the compressor type setting; 2.Detect the high and low pressure difference of compressor, whether the load is too heavy, whether the compressor is locked rotor; 3.Detect the compressor start up high and low pressure difference, whether to start the compressor of high and low pressure difference in a very low temperature; 4.Detect whether the statue of the system is normal
F01	MOP Drive Alarm	1.Test whether the drive input power is greater than or close to the set value.
F02	Converter Board Off-line	1.Detect the signal connection wire between logic board and drive board
F03	IPM Protection	1.Detect the pipe Fo level state of IPM module,whether it is 0V, if it continue to be lower than replace the driver board.
F04	Compressor Start-up Failure	1.Monitor compressor Start-up current, if current is exceeds the set value(3P-4P set value is 6A, 5P-7P set value is 10A), then preheating the compressor to start-up. 2.If the start-up current does not exceed the set value, then replace the drive board. 3.Detect whether the compressor type selected correctly, whether UVW lines are wrong;
F05	DC Fan Drive Failure	1.Detect whether DC fan plug in or poor contact; 2.Detect whether DC fan is blocked.
F06	IMP Input Over Current Protection	1.Detect the pipe Fo level state of IPM module, Whether it is low, if continue to be low than replace driver board.
F07	Converter DC Over Voltage	1.Detect whether the DC voltage is exceeds 420V; 2.Detect whether there is the board power restart insufficient, the relay is not disconnect and get power on;

		3.Detect whether in a higher operation frequency the unit lost power.
F08	Converter DC Under Voltage	1.Detect whether the DC voltage is under 340V; 2.Detect whether there is the board power restart insufficient, the relay is not disconnect and get power on; 3.Detect whether in a higher operation frequency the unit lost power.
F09	Power Input Under Voltage	1、1.Detect whether the input voltage is under 175V; 2.If the input voltage is normal, and voltage is detected under 175V, then replace the driver board.
F10	Power Input Over Voltage	1.Detect whether the input voltage is exceeds 255V; 2.If the input voltage is normal, and voltage is detected exceeds 255V, then replace the driver board.
F11	IPM Sampling Voltage Failure	1.Detect the bias voltage of sampling circuit, if the voltage is exceeds 1.75 V or 1.45 V, then replace the driver board.
F12	DSP and PFC Connection Failure	1.Detect the connection between the PFC and DSP board.
F13	DSO and SPPB Connection Failure	1.Detect the connection between the DSO and SPPB board.
F14	DSP and MCU Connection Failure	1.Detect the connection between the DSP and MCU board.
F15	IPM Overheat Protection	1.Detect whether DC fan does not running or at a low speed; 2.Detect the installation environment, whether no ventilation, or at a high ambient temperature(>50°); 3.Confirm whether the unit keep running at a high frequency in a long term (>70 Hz) and heat accumulation; 4.Detect the radiator installation position, whether it is right, or did not sink into the air duct; 5.Detect the radiator stud, whether there is loose or poor contact.

F16	Weak Magnetic Protection	1.Replace the compressor; 2.Replace the driver board.
F17	Converter Input Voltage Lost Phase	1.Detect the connection between driven board and the compressor
F18	IPM Sampling Current Failure	1.Detect the bias voltage of sampling circuit, if voltage is exceeds 1.75V or 1.45V, then replace the driver board.
F19	Converter Driver board radiator sensor Failure	1.Detect the pipe Fo level state of IPM module, Whether it is 0, if continue to be low than replace driver board.
F20	Converter Driver Board Overheat Protection	1.Detect whether the IPM temperature is exceeds the set value of 95℃; 2.Detect the compressor high and low pressure difference and the compressor rotate speed,whether it is overload operation.
F22	Converter Driver Board Overheat Alarm	1.Detect whether the IPM temperature is exceeds the alarm set value; 2.Detect the compressor high and low pressure difference and the compressor rotate speed, whether it is overload operation.
F23	Compressor Over Current Protection	1.Detect whether the DC current is exceeds the alarm set value; 2.Detect the compressor high and low pressure difference, whether it is overload operation.
F24	Input Over Current Alarm	1.Detect whether the DC current is exceed the alarm set value; 2.Detect the compressor high and low pressure difference, whether it is overload operation.
F25	EEPROM Error Alarm	1.Replace EEPROM 2.Replace Drive Board
F26	Input Over Current Failure	1.Detect whether the input current is exceed the set value; 2.Detect the compressor high and low pressure difference, whether it is overload operation.
F27	PFC Failure	1.Detect the busbar DC voltage, if the busbar voltage is under 380V, then replace the driver board; 2.Detect the quality of power grid, whether the voltage is instability.

F28	V15V Over/Under Voltage Failure	1.Detect the drive board power supply voltage VCC15 , when the voltage is detected under 13V or greater than 16.5V, then replace the board.
PP	Pressure Sensor Failure	
E08	Communication Failure	

Appendix

NTC R-T Table （R25=5KΩ　B25/50=3470K）

T(℃)	R(KΩ)		T(℃)	R(KΩ)		T(℃)	R(KΩ)
-30.0	63.7306		14.0	7.7643		58.0	1.5636
-29.0	60.3223		15.0	7.4506		59.0	1.5142
-28.0	57.1180		16.0	7.1513		60.0	1.4666
-27.0	54.1043		17.0	6.8658		61.0	1.4206
-26.0	51.2686		18.0	6.5934		62.0	1.3763
-25.0	48.5994		19.0	6.3333		63.0	1.3336
-24.0	46.0860		20.0	6.0850		64.0	1.2923
-23.0	43.7182		21.0	5.8479		65.0	1.2526

-22.0	41.4868		22.0	5.6213		66.0	1.2142
-21.0	39.3832		23.0	5.4048		67.0	1.1771
-20.0	37.3992		24.0	5.1978		68.0	1.1413
-19.0	35.5274		25.0	5.0000		69.0	1.1068
-18.0	33.7607		26.0	4.8108		70.0	1.0734
-17.0	32.0927		27.0	4.6298		71.0	1.0412
-16.0	30.5172		28.0	4.4566		72.0	1.0100
-15.0	29.0286		29.0	4.2909		73.0	0.9800
-14.0	27.6216		30.0	4.1323		74.0	0.9509
-13.0	26.2913		31.0	3.9804		75.0	0.9228
-12.0	25.0330		32.0	3.8349		76.0	0.8957
-11.0	23.8424		33.0	3.6955		77.0	0.8695
-10.0	22.7155		34.0	3.5620		78.0	0.8441
-9.0	21.6486		35.0	3.4340		79.0	0.8196
-8.0	20.6380		36.0	3.3113		80.0	0.7959
-7.0	19.6806		37.0	3.1937		81.0	0.7730
-6.0	18.7732		38.0	3.0809		82.0	0.7508
-5.0	17.9129		39.0	2.9727		83.0	0.7293
-4.0	17.0970		40.0	2.8688		84.0	0.7086
-3.0	16.3230		41.0	2.7692		85.0	0.6885
-2.0	15.5886		42.0	2.6735		86.0	0.6690
-1.0	14.8913		43.0	2.5816		87.0	0.6502
0.0	14.2293		44.0	2.4934		88.0	0.6320
1.0	13.6017		45.0	2.4087		89.0	0.6144
2.0	13.0057		46.0	2.3273		90.0	0.5973
3.0	12.4393		47.0	2.2491		91.0	0.5808
4.0	11.9011		48.0	2.1739		92.0	0.5647
5.0	11.3894		49.0	2.1016		93.0	0.5492
6.0	10.9028		50.0	2.0321		94.0	0.5342
7.0	10.4399		51.0	1.9656		95.0	0.5196
8.0	9.9995		52.0	1.9015		96.0	0.5055
9.0	9.5802		53.0	1.8399		97.0	0.4919
10.0	9.1810		54.0	1.7804		98.0	0.4786
11.0	8.8008		55.0	1.7232		99.0	0.4658
12.0	8.4385		56.0	1.6680		100.0	0.4533
13.0	8.0934		57.0	1.6149			

1) When there is some malfunction, test resistance value by multimeter, and compare the practical temperature with the above table, then you will know whether this NCT

resistance is OK or not.

2) Generally, from above table, you can know the temperature by testing NTC resistance value.

Appendix Ⅱ

NTC R-T Table （R25=50.000KΩ B25/50=3950K）

(Appendix Ⅱ is for NTC resistance of exhaust temperature.)

T(℃)	R(KΩ)		T(℃)	R(KΩ)		T(℃)	R(KΩ)		T(℃)	R(KΩ)
-40.0	2009.2		0.0	168.10		40.0	26.507		80.0	6.3515
-39.0	1869.0		1.0	159.46		41.0	25.464		81.0	6.1541
-38.0	1739.6		2.0	151.32		42.0	24.468		82.0	5.9639
-37.0	1620.2		3.0	143.66		43.0	23.517		83.0	5.7805
-36.0	1509.8		4.0	136.43		44.0	22.608		84.0	5.6037
-35.0	1407.8		5.0	129.62		45.0	21.740		85.0	5.4333
-34.0	1313.5		6.0	123.19		46.0	20.911		86.0	5.2690
-33.0	1226.2		7.0	117.12		47.0	20.118		87.0	5.1105
-32.0	1145.3		8.0	111.39		48.0	19.359		88.0	4.9576
-31.0	1070.4		9.0	105.98		49.0	18.634		89.0	4.8104
-30.0	1001.0		10.0	100.87		50.0	17.940		90.0	4.6678
-29.0	936.58		11.0	96.040		51.0	17.276		91.0	4.5304
-28.0	876.76		12.0	91.470		52.0	16.641		92.0	4.3978
-27.0	821.21		13.0	87.148		53.0	16.032		93.0	4.2690
-26.0	769.58		14.0	83.057		54.0	15.450		94.0	4.1462
-25.0	721.58		15.0	79.185		55.0	14.892		95.0	4.0268
-24.0	676.92		16.0	75.519		56.0	14.357		96.0	3.9114
-23.0	635.35		17.0	72.045		57.0	13.845		97.0	3.8000
-22.0	596.63		18.0	68.754		58.0	13.353		98.0	3.6923
-21.0	560.55		19.0	65.634		59.0	12.882		99.0	3.5887
-20.0	526.92		20.0	62.676		60.0	12.430		100.0	3.4876
-19.0	495.54		21.0	59.870		61.0	11.997		101.0	3.3903
-18.0	466.26		22.0	57.207		62.0	11.581		102.0	3.2978
-17.0	438.91		23.0	54.679		63.0	11.182		103.0	3.2052
-16.0	413.37		24.0	52.279		64.0	10.799		104.0	3.1172
-15.0	367.69		25.0	50.000		65.0	10.431		105.0	3.0320
-14.0	367.16		26.0	47.834		66.0	10.078		106.0	2.9497

-13.0	346.26		27.0	45.775		67.0	9.7393		107.0	2.8699
-12.0	326.70		28.0	43.818		68.0	9.4134		108.0	2.7927
-11.0	308.38		29.0	41.956		69.0	9.1002		109.0	2.7180
-10.0	291.22		30.0	40.185		70.0	8.7991		110.0	2.6457
-9.0	275.13		31.0	38.500		71.0	8.5096		111.0	2.5756
-8.0	260.05		32.0	36.896		72.0	8.2313		112.0	2.5077
-7.0	245.89		33.0	35.368		73.0	7.9637		113.0	2.4420
-6.0	232.60		34.0	33.913		74.0	7.7061		114.0	2.3783
-5.0	220.13		35.0	32.527		75.0	7.4584		115.0	2.3166
-4.0	208.40		36.0	31.206		76.0	7.2199		116.0	2.2568
-3.0	197.38		37.0	29.947		77.0	6.9904		117.0	2.1989
-2.0	187.02		38.0	28.746		78.0	6.7694		118.0	2.1427
-1.0	177.27		39.0	27.600		79.0	6.5566		119.0	2.0882
									120.0	2.0354

1) When there is some malfunction, test resistance value by multimeter, and compare the practical temperature with the above table, then you will know whether this NCT resistance is OK or not.
2) Generally, from above table, you can know the temperature by testing NTC resistance value.