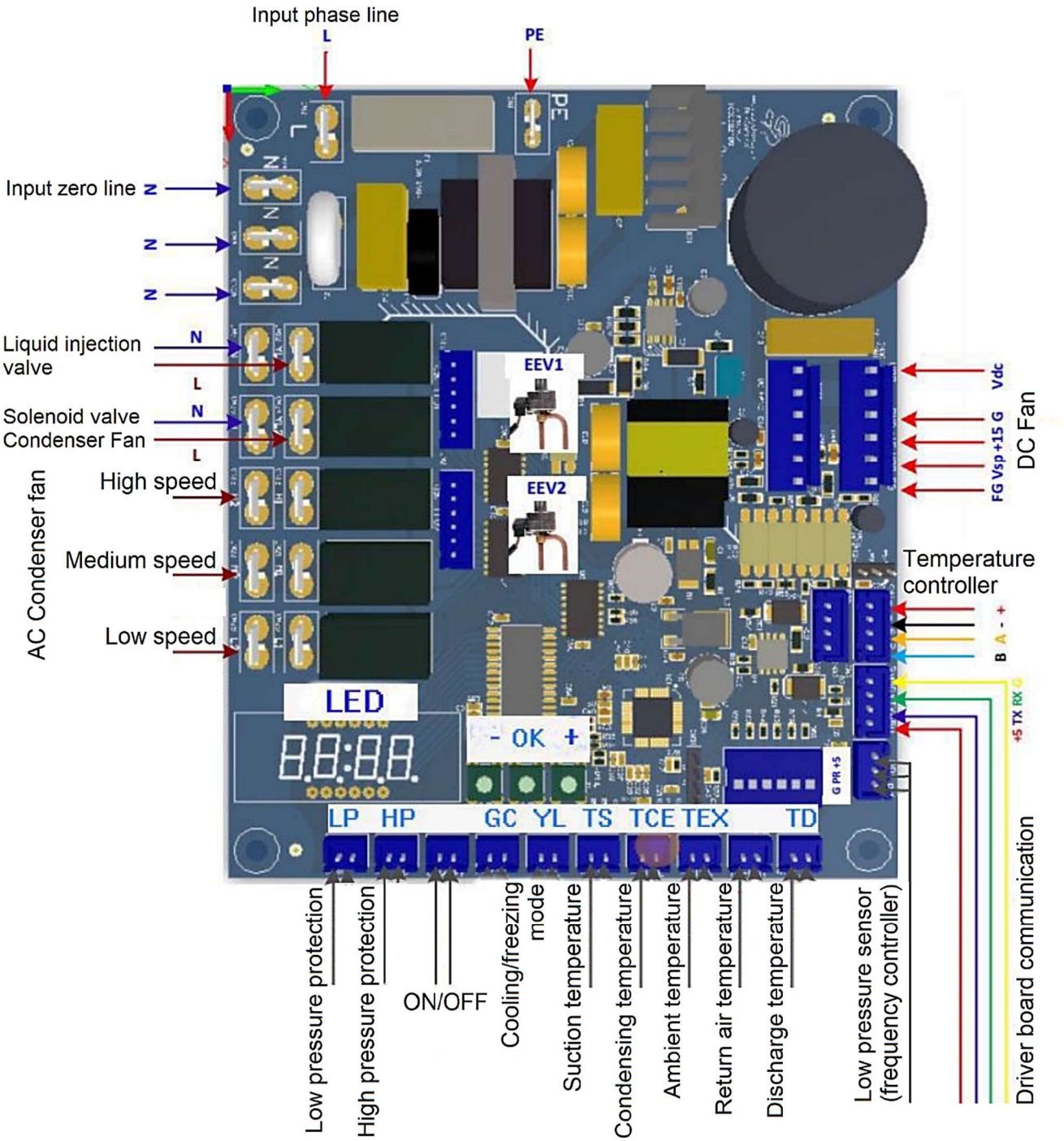
Operating Instructions for Variable Frequency Controller

Low pressure sensor frequency conversion

Schematic Diagram of the functional connection of the main control board



1. Function Description

1.1. Condenser fan control

1) AC FAN

There are three sets of AC fan controls
AC fan control is divided into three levels based on condensation temperature: high/medium/low (configurable), corresponding to three output relays (H/M/L)

2) DC FAN

After the DC fan is set, the wind speed can be automatically adjusted based on the current condensation temperature; When using DC fans, the number of fans must match the current setting.

1.2. Liquid injection valve control

According to the following logic:
When the controller detects that the discharge temperature is greater than 95°C, open the liquid injection solenoid valve; When the controller detects that the discharge temperature is less than 80°C, close the injection solenoid valve. (Settable)

1.3. Protection Function

1) ON/OFF Control

If this port is closed, the whole machine will operate normally according to the target evaporation pressure; If this port is disconnected, the whole machine will stop and the nixie tube will display OFF

2) High/Low pressure protection

If these ports (LP/HP) on the main control board are connected, the system works normally.
If these ports (LP/HP) on the main control board are disconnected, the system stops and a high/low pressure fault message is displayed.
When using the low pressure sensor to control the frequency regulation, the low pressure port is not detected, and the cut-off pressure is determined according to the set cut-off pressure deviation value;

3) Over temperature protection

When the controller detects that the discharge/condensation temperature is too high, perform frequency limiting/shutdown protection.

2. Status, Parameter Setting and Query Function

2.1. Device startup/shutdown mode

1) Under the condition of no fault alarm abnormalities, start/stop and frequency adjustment can be achieved by detecting the current low pressure value

①The default startup pressure of the device is 4.5 bar, and the target pressure is adjusted through the setting value of P02. When the pressure is reached, the device will be started (if P02<P03, it will be started according to the value of P03)
②The default target pressure of the device is 3.5bar. Adjust the target pressure through the setting value of P03, and the device will adjust the frequency to reach this pressure
③The default shutdown pressure of the equipment is 2.5 bar. The target pressure is adjusted through the setting value of P04, stop the machine when it reaches this pressure

2) Actual target pressure calculation

Actual target pressure for P02, P03 and P04**=** Default Pressure (bar)+Set deviation Value * 0.1
Example: If P02 is set to -25, the corresponding actual pressure is 4.5-2.5=2 bar, and the device will start up when the pressure value is greater than 2 bar

2.2. Operation of main control board

Key definition: Down key (-); Confirm key (OK); Up key (+) (from left to right);
Display the current compressor frequency under normal conditions;
Flashes to display the fault type when there is a fault;
You can enter the status query information through up (+) and down keys (-);
Press and hold the confirmation key (3s) to enter or exit the parameter query interface;
In the parameter setting interface; Press the confirm button to enter the parameter setting interface.
you can set parameters by pressing '+' '-';
Click OK to save the setting parameters and return to the query status;

2.3. Control dialing status (DIP)

The dialing code is preset at the factory, please do not change the dialing position arbitrarily.

DIP	Function	(ON)	(OFF)	description
SW1	/	/	/	Default OFF
SW2	Pressure sensor	Enable	Disable	
SW3	Fan type	DC	AC	
SW4	Number of DC fans	2	1	Valid when SW3 selects On
	Ac Fan type	Stacking three speeds	Independent third gear	Valid when SW3 selected OFF
SW5	/	/	/	Default OFF
SW6	Fixed frequency control switch	Fixed frequency	Frequency conversion	When setting a fixed frequency, operate at the set highest frequency

2.4. Status Query Table

Code	Entry name	Note
C00	Operating frequency	
C01	Operating AC current (effective value)	
C02	Operating phase current (peak)	
C03	AC voltage	
C04	Bus voltage	
C05	Drive fault code	EXX corresponds to the driver board FXX, E00 means no fault
C06	Frequency limiting code	
C07	Radiator temperature	
C08	Main control fault code	
C09	Condensation temperature	
C10	Evaporation temperature (reserved)	
C11	Outdoor temperature	
C12	Discharge temperature	
C13	Suction temperature	
C14	Evaporation pressure	
C19	Recent fault records	
C20	Sup heat query (available for A036 version)	
C21	Start Up query (available for A036 version)	0 for power on, 1 for power off

2.5. Settable Parameters:

1) Compression operation related parameters

Code	Description	min	Max	Step	Default	Unit
P00	RS485 communication (Suggest to use the default settings, don't change)	0	50	1	0	
P01	Target Temp (Not valid for low pressure control method)	-30	30	1	-20	°C
P02	Target startup suction pressure deviation (default startup pressure of 45, corresponding to 4.5 bar)	-99	99	1	0	Bar
Note: (Actual target pressure for P02, P03, and P04=default pressure (bar)+set deviation value * 0.1); The target pressure value cannot be set lower than the shutdown pressure, otherwise it will result in the inability to shut down normally;						
P03	Target set suction pressure deviation (set default pressure of 35, corresponding to 3.5 bar)	-99	99	1	0	Bar
P04	Target shutdown suction pressure deviation (default shutdown pressure of 25, corresponding to 2.5 bar)	-99	99	1	0	Bar
P10	Minimum operating frequency of compressor	10	30	1	30	Hz
P11	Maximum operating frequency of the compressor	30	120	1	70	Hz
P12	The PID of Compressor (Function is not enabled)	5	500	5	60	second
P20	Return oil inlet frequency	10	70	1	35	Hz
P21	Return oil operating frequency	10	80	1	50	Hz
P22	Oil return interval time	5	600	5	225	min
P23	Running time of oil return room	5	1000	5	300	second
P24	Low pressure shutdown/fault delay judgment during startup	5	240	10	2	second

P37	Advance opening time of EEV1	0	240	1	10	second
P38	DC fan control temperature	10	35	5	10	°C
P40	Low pressure shutdown/fault delay during startup	0	240	1	0	second
The opening temperature of the DC fan is P38+10 °C, and the closing temperature is P38 value						
P41	Minimum compressor shutdown time	60	1000	10	180	second
P42	Minimum compressor shutdown time	0	5	1	0	
0：R404；1：R448；2：R290；3：454C；4：410A；5:R32；						

2) Parameters of EEV operation

Code	Description	min	Max	Step	Default	Unit
P05	The minimal opening of EEV	50	100	10	50	step
P06	The max. opening of EEV	450	500	10	500	step
P07	The default opening of EEV	100	450	10	180	step
P08	Duration time of EEV default opening	50	500	5	150	second
P09	Cycle of EEV opening valve change	50	1000	5	60	second
P26	Target discharge temp deviation value of EEV (60-90)	1	50	1	30	°C
P27	The KP value of EEV adjustment	1	200	1	3	
P28	The KI value of EEV adjustment	1	200	1	6	
P46	adjust EEV by hand（available for A036 version）	-1	500	10	-1	
-1: closed 0-500: EEV steps						

3) Fan related parameters

Code	Description	min	Max	Step	Default	Unit
P13	DC fan PID adjustment cycle	5	500	5	30	second
P14	Low wind speed of DC fan	50	500	10	100	rpm
P15	High wind speed of DC fan	500	1200	10	900	rpm
P16	Condensate fan stop Temp	5	120	1	10	℃
P17	Low speed Temp of condensate fan	10	100	1	20	℃
P18	Medium speed Temp of condensate fan	10	90	1	30	℃
P19	High speed Temp of condensate fan	10	80	1	38	℃
P25	Speed range of condensing AC fan	1	3	1	3	
1：1 Gear ；2：2 Gear ；3：3 Gear；						
P38	DC fan on-off control temperature	10	35	5	10	°C
The opening temperature of the DC fan is P38+10 ℃, and the closing temperature is P38 value						
P39	Delayed shutdown time of condensation fan	0	240	1	10	second

4) Compressor protection related parameters

Code	Description	min	Max	Step	Default	Unit
P24	Low pressure delay judgment time for startup	5	240	5	60	second
P32	Liquid injection valve opening Temp	60	120	1	95	°C
P33	Liquid injection valve stop Temp	50	120	1	80	°C
P34	Current protects the stop point	100	500	0.5	350	0.5A
P35	Discharge protection shutdown Temp	90	120	1	110	°C
P36	Condensation protection shutdown Temp	40	80	1	55	°C
P40	Low-pressure protection delay action time	0	240	1	0	second
P43	Sup heat Alarm (for A 036 version only, function not available now)	-20	100	1	2	°C
P44	Continuous Alarm Time for Super Heat (for A 036 version only, function not available now)	0	600	10	60	second
P45	Startup delay due to sup heat (for A 036 version only, function not available now)	0	500	10	60	second
P47	Liquid injection valve or Crankshaft heating Choose (for A 036 version only)	0	1	1	0	
0: Клапан впорскування рідини, 1: Підігрів колінчастого вала						
P48	Crankshaft heating Start Temp (for A 036 version only)	0	30	1	20	°C
P49	Sup Heat calculation period (for A 036 version only, function not available now)	0	500	5	10	second
P66	Thermal Protection Function (GC port) (for A 036 version only)	0	1	1	0	
0: without thermal protection, 1: with thermal protection						

5) Defrost related parameters

Code	Description	min	Max	Step	Default	Unit
P29	Defrost Type Choose (function not available now)	0	1	1	0	
P30	Defrost cycle (function not available now)	5	1000	5	150	Min
P31	Continuous Compressor Stop time during defrost (function not available now)	5	1000	5	150	second

6) Related parameters for debugging model

Code	Description	min	Max	Step	Default	Unit
P50	Start debugging model 0: off 1: on	0	1	1	0	
P51	Force the compressor to run at fixed frequency (run at 30HZ when set at 0)	0	120	1	0	Hz
P52	Forced Rotary Speed of FAN1	0	1000	10	0	RPM
P53	Forced Rotary Speed of FAN2	0	1000	10	0	RPM
P54	EEV1 Operation Steps	0	500	10	0	Step
P55	EEV2 Operation Steps	0	500	10	0	Step
P56	Debugging L1 (for A 036 version only)	0	1	1	0	
P57	Debugging M1 (for A 036 version only)	0	1	1	0	
P58	Debugging H1 (for A 036 version only)	0	1	1	0	
P59	Debugging YL1 (for A 036 version only)	0	1	1	0	

P60	Debugging YL2 (for A 036 version only)	0	1	1	0	
P67	Soft Starting (for 485 communication , don't suggest to do any change) (for A 036 version only)	0	1	1	1	

2.6. Fault Code Table

1) Main control board fault code

Code	Fault Type	Reason/Solution
E00	Communication Failure	Check DIP_1 OFF side
E01	Low pressure sensor malfunction	Check if the corresponding sensor on the main control board has poor contact or is damaged
E02	Condensation Temp sensor malfunction	
E04	Environmental Temp sensor failure	
E05	Discharge Temp sensor malfunction	
E06	Suction Temp sensor malfunction	
E07	Low pressure protection	1、Refrigerant is not enough；2、Open value of EEV is too small；3、Evaporator is dirty or blocked/ not enough airflow This is a common reason and can be eliminated first)
E08	High pressure protection	1、Refrigerant overcharged；2、High ambient temp or Poor heat dissipation of the condenser 3、Condenser is dirty or blocked/ not enough airflow This is a common reason and can be eliminated first)
E09	Drive communication failure	Check the connection between the driver board and the motherboard
E10	DC fan failure	Check the connection of the DC fan
E11	Drive failure	Current driver board faults can be viewed through C05
E12	Self-evaporate Pan Frozen (Function not available now)	Temp too low in the Pan
E13	Condensation overload fault	Excessive condensation Temp
E14	Discharge Temp protection fault	Discharge Temp too high
E15	AC current overcurrent fault	Controller current too high
E16	Sup heat too low	1、Refrigerant Overcharged；2、Open value of EEV is too large；3、Evaporator is dirty or blocked/ not enough airflow (This is a common reason and can be eliminated first)
E17	Thermal Protection Faulty	Thermal Protection of the compressor

2) Driver board fault codes

Note: When the main control board generates an E11 drive fault, the current drive fault code can be queried through the main control board C05;

Used for C05 query comparison

Code	Fault Type	Reason/Solution
F01	DC input overvoltage	Check input power
F02	DC input low voltage	Check input power
F03	Phase current output	Abnormal motor
F04	Out of step fault	Abnormal drive board or motor
F05	Missing phase error 0	
F06	Phase loss error 1 (current judgment)	
F07	Inverter IPM fault (edge)	The driver board is abnormal and needs to be updated or replaced
F08	Inverter IPM fault (level)	
F09	PFC_ IPM fault (edge)	
F10	PFC_ IPM fault (level)	
F11	AC power supply	Check input power
F12	AC overcurrent fault	
F13	Total power overload fault	Check compressor operation
F14	Abnormal AC voltage	Check input power
F15	Abnormal bias voltage	Check input power
F22	Communication failure	Check the communication line
F23	Motor parameter setting fault	The driver board is abnormal and needs to be updated or replaced
F24	DC motor fault	Check compressor operation
F28	Control board temperature	Drive board Temp too high
F29	Thermal protection fault	Drive board thermal protection

3. Electrical Schematic Diagram

Note: The unit adopts the on-off signal of passive switch to control the on-off (the factory default is off). It is forbidden to directly input any electrical signal to the ON/OFF terminal to avoid damaging the controller;

The actual controller used may use different drive boards due to the current power of the unit, so the wiring method may vary. Please refer to the configuration of the actual unit.

For reference only