H0U-88B1G With ACC Program Manual

English Version

V2.0

Contents

Chapter 1 Preface

The H0U-88B1G controller is a general purpose industrial controller that is designed with user programmable function. With the specific ACC program provided by Inovance, you can realize smart control of screw compressor. This manual describes the design and usage of the control functions of the H0U-88B1G controller as well as ACC program.

The controller is easily installed and tested, highly reliable and cost effective. The configured LCD supports display in both Chinese and English, making the interface easy to understand.

The manual mainly introduces the function of our program designed for screw air compressor control, which is suitable for MDI or Power-line driving system.

Chapter 2 Functions and Configuration

2.1 Function overview

The H0U-88B1G with ACC program supports the following applications:

- It can work together with the high-performance MD320 Series inverter to form the electric and drive system of inverter-based screw compressor.
- It can be used for control of the screw compressor driven by power-line supply.
- Supporting main motor and fan of screw compressor driven by dual-MDIs respectively. The intake pressure and compressor temperature can be kept constant through the built-in PID operation.
- Supporting main motor and fan of screw compressor driven by power-line. The MDI drive mode and power line drive mode can be freely combined or switched online so as to maximize the system reliability and control flexibility.
- Supporting detection of voltage, through which you can set under-voltage protection, and detection of phase sequence through which motor reverse rotation is prevented.
- Making screw compressor begin to load after startup, and will not stop the compressor until heat radiation completes in normal state. It will immediately close all control outputs upon emergency stop.
- Auto Sleep function on the condition of less air consumption, helping to save energy and lower equipment deterioration.
- Over-temperature alarm and over-temperature stop protection functions.
- Over pressure protection function to ensure safety of user’s air pipe network and devices.
- Fault detecting, instant protection and alarm on temperature and pressure sensors.
- Able to detect and display operating current of main motor and fan,

and separately set motor overload and lack-phase protection.

- Able to detect clog signals and give alarm.
- 2-channel independent RS485 communication ports that can be used for communication with host computer and the MDI, respectively.
- Able to realize remote monitor by PC.
- Maintenance reminder 100 hours in advance according to maintenance plans
- Built-in display in English and Chinese that can be switched online.
- Concise display interface without special learning or memorizing requirements.
- Direct browsing of operating parameters and status of screw compressor.
- Seamless connection with the MD320 Series inverter without the requirement to manually set the inverter's functional parameters.
- Real-time calendar.
- Inquiry of 16 pieces of fault records and historical data. Each fault record has related time stamp.
- Multi-level password protection for operator, agent (or owner) and screw compressor manufacturer. Multi-level setting of parameters according to displayed pages helps to prevent unauthorized operation.

2.2 Hardware Configuration

Table 2-1 Hardware Configuration and Signal Logic Description

Terminal Type	Attribute	Function	Remark
Digital input	X0	Emergency-stop signal	close in normal state. open upon emergency stop.
	X1	MDI/power-line selection	close in power-line drive mode for main motor. open in MDI drive mode for main motor.
	X2	Air filter clog signal	close upon clog occurring.
	X3	Oil filter clog signal	close upon clog occurring.
	X4	Separator clog signal	close upon clog occurring.
	X5	fine separator clog signal	close upon clog occurring.
	X6	Thermal relay signal	defined in “Configuration functions”.
	X7	PTC signal	motor coil over-temp. protection
Digital Output	Y0	Intake valve	
	Y1	Fan contactor	
	Y2	MDI contactor	
	Y3	Power-line contactor	
	Y4	Y-type contactor	
	Y5	△-type contactor	
	Y6, Y7	(reserved)	
Analog input	AI1	Compressor outlet pressure signal	4 mA-20mA pressure transducer input
	PT1	Compressor screw temperature signal	PT100 sensor input
	CT1	Main motor current sensor signal	(phases a and b)
	CT2	Fan motor current sensor signal	(phases a and b)

Terminal Type	Attribute	Function	Remark
A/B/C detecting	A/B/C	three-phase 380VAC	Detecting A/B/C voltage and phase sequence
Comm. port	RS485 A1/B1	Communication with MDI	Inverters of the main motor and fan
	RS485 A2/B2	Online or background communication	
Power input	L/N	Controller power supply input	220VAC

Table 2-2 There are 3 LEDs on panel, which are defined as follows:

LED	Status	Definition
POWER	Off	The controller is powered down.
	On	The controller is powered on.
RUN	Off	The screw compressor is shut down.
	On	The screw compressor runs.
	Blink	The compressor is in sleep mode.
ALARM	Off	The compressor runs normally with no fault, or fault has been cleared.
	On	Fault occurs to the screw compressor and an alarm is given.

Chapter 3 Mounting and Wiring

3.1 Wiring the Controller

The H0U-88B1G controller is connected with the MD 320 Series inverter using the RS485 signal twisted cables at the communication ports (485A1 and 485B1).
Both contactor coil and solenoid valve are inductive components. Electric spark will be produced between the contacts upon switch-on/switch-off operation, which will incur magnetic interference and influence the service life of the controller output contacts. Thus, remember to connect RC absorption components to these components in parallel. For details on connection, see the wiring diagram.

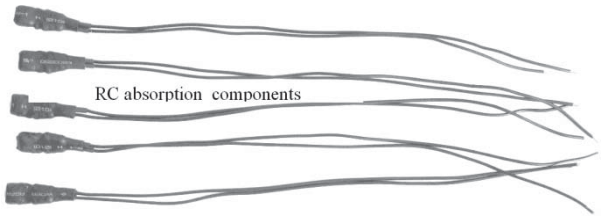


Figure 3-1 RC Absorption Component for Inductive Load

3.2 Drive Modes of Screw compressor

The screw compressor applies to the following drive modes through the H0U-88B1G controller:

1） Main motor: power-line drive (Y-△ startup)
Fan: power-line drive
2） Main motor: MDI drive
Fan: power-line drive
3） Main motor: MDI drive
Fan: MDI drive
4） Main motor: MDI/power-line (Y-△ startup) compatible drive
Fan: power-line drive
5） Main motor: inverter/power-line (Y-△ startup) compatible drive

Fan: MDI/power-line compatible drive

Wiring specifications for each drive mode

Arrangement No.	Drive Mode	Power Wiring	Controlling Signal Wiring
1	Main motor: power-line with (Y-△ startup) Fan: power-line	Fig. 3-3	Fig. 3-4
2	Main motor: MDI Fan: power-line	Fig. 3-5	Fig. 3-6
3	Main motor: MDI Fan: MDI	Fig. 3-7	Fig. 3-8
4	Main motor: MDI/power-line (Y-△ startup) compatible Fan: power-line	Fig. 3-9	Fig. 3-10
5	Main motor: MDI/power-line (Y-△ startup) compatible Fan: MDI/power-line compatible	Fig. 3-11	Fig. 3-12

3.3 Controller Terminal Diagram

All the terminals are detachable,

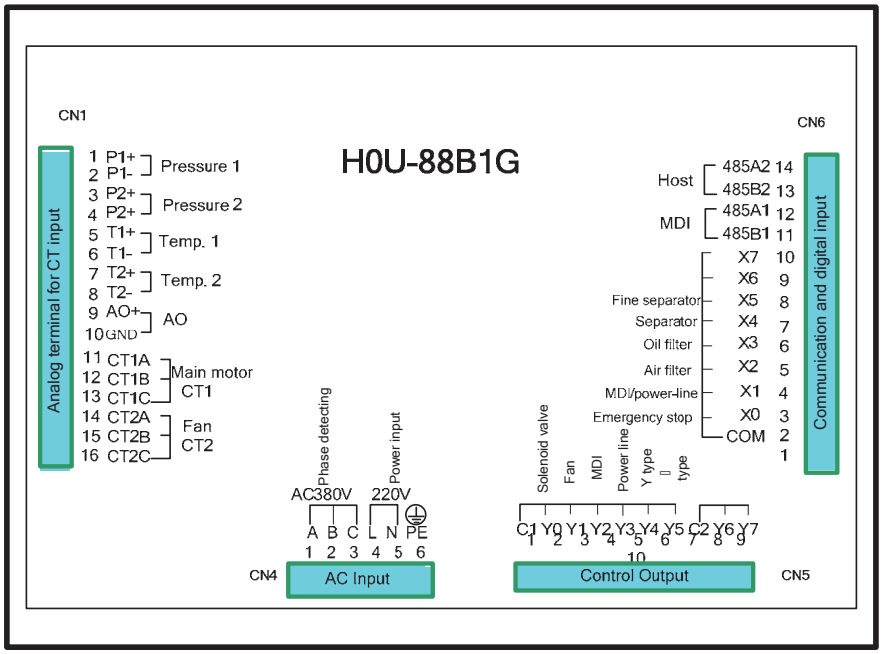
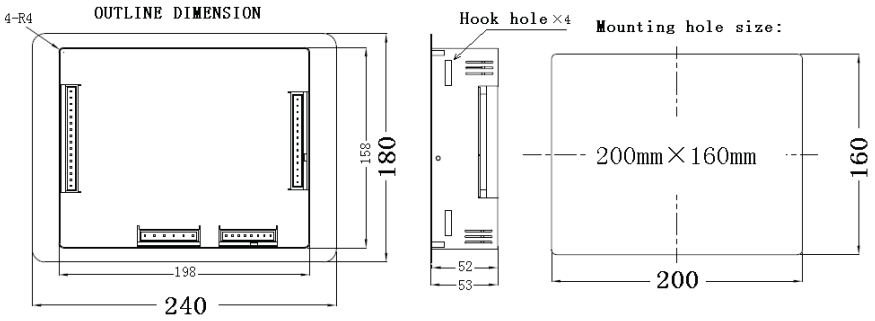


Figure 3-2 H0U-88B1G with ACC controller wiring terminals

3.4 Dimension and Installation:



3.5 Arrangement 1: Both main motor and fan are driven by power-line

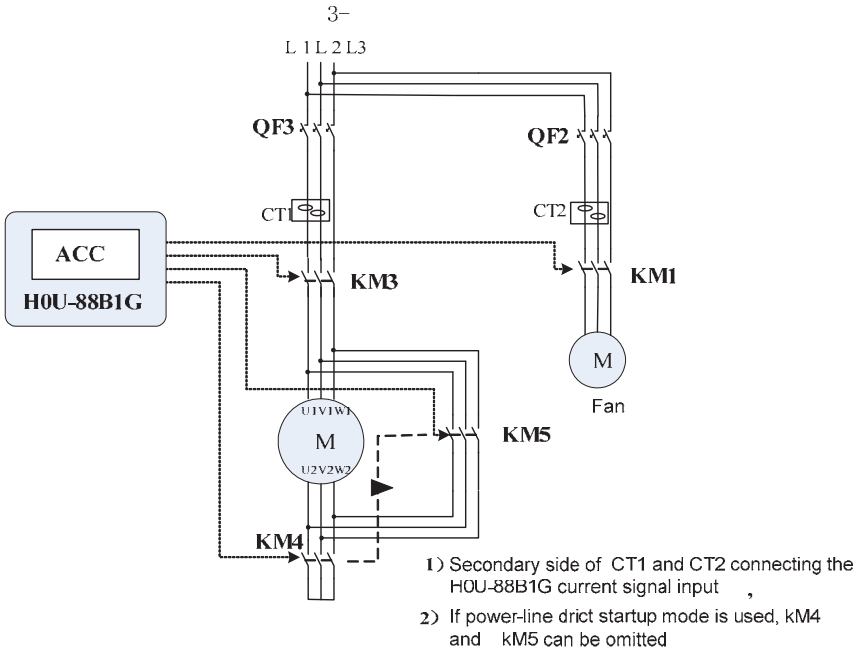


Figure 3-3 Power wiring in power-line with Y-△ startup

3.6 Arrangement 1: Controlling Signal Wiring Diagram

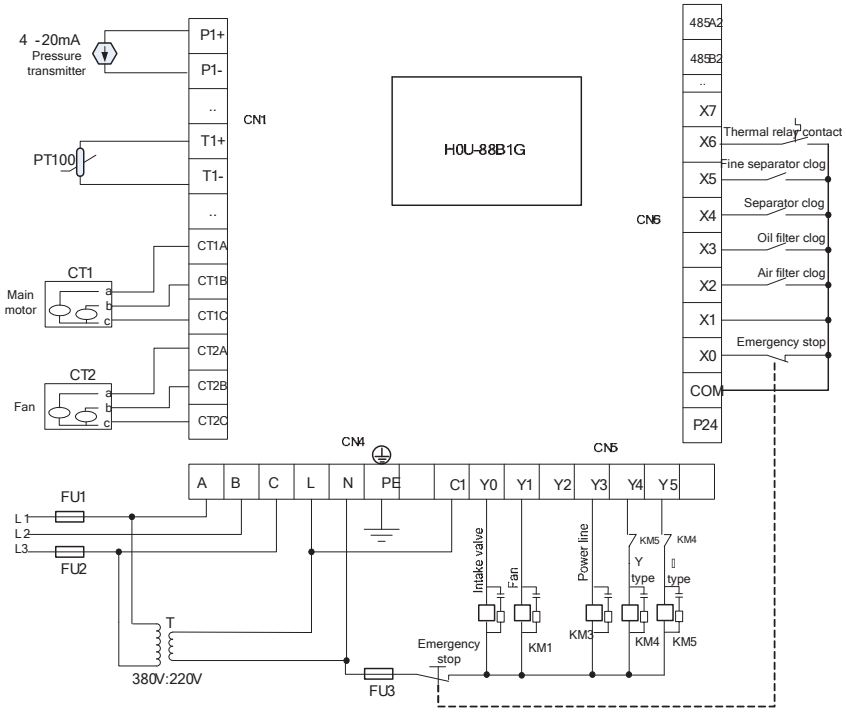


Figure 3-4 Controlling signal wiring diagram：Both main motor and fan are driven by power-line

Note:

- The main motor adopts the Y-△ startup mode. If power-line direct startup mode is used, kM4 and kM5 can be omitted.
- The 380V/220V transformer in Figure 3-4 is isolation type controlling transformer. You can select the model with capacity of approximate 50VA.

3.7 Arrangement 2: Power Wiring Diagram

Main Motor driven by MDI and Fan by Power-line

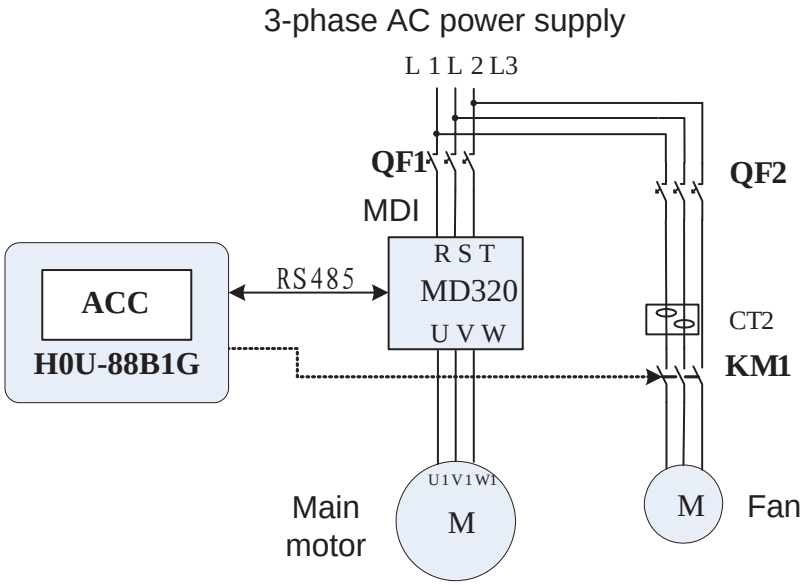


Figure 3-5 Main Motor Driven by MDI and Fan by Power-line

3.8 Arrangement 2: Controlling Signal Wiring Diagram

When Main Motor Driven by MDI and Fan by Power-line

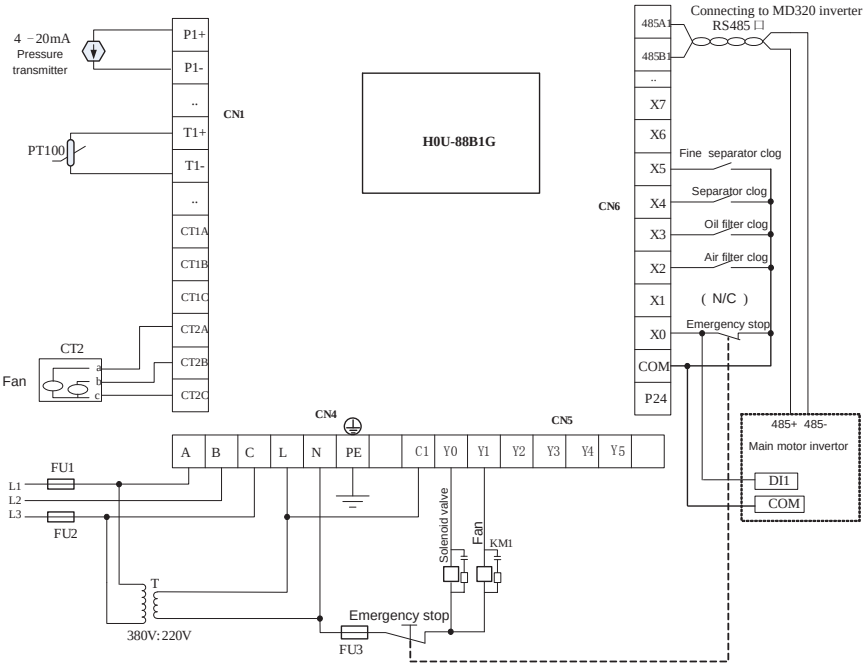


Figure 3-6 Controlling signal wiring diagram when main motor is driven by MDI and fan is driven by power-line

3.9 Arrangement 3: Power Wiring Diagram

Both Main Motor and Fan Driven by MDI

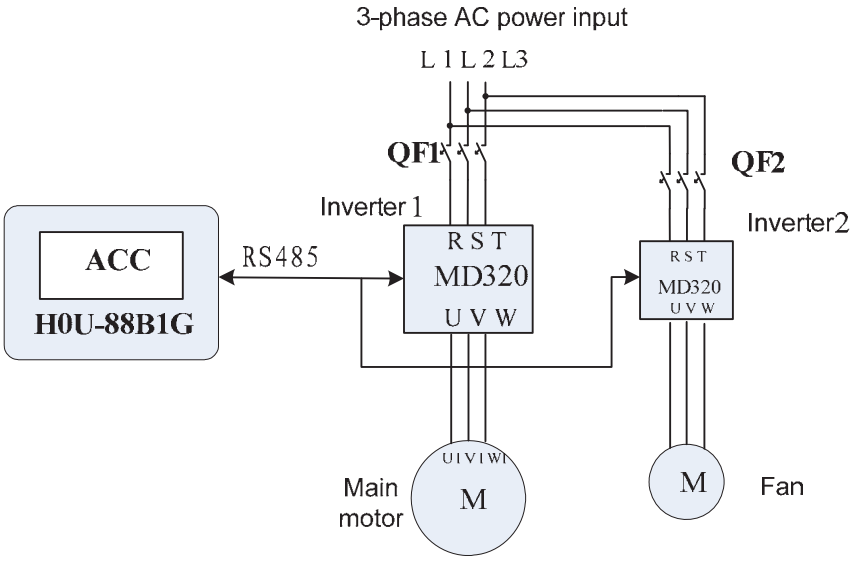


Figure 3-7 Both main motor and fan driven by MDI

3.10 Arrangement 3: Controlling Signal Wiring Diagram

Both Main Motor and Fan Driven by MDI

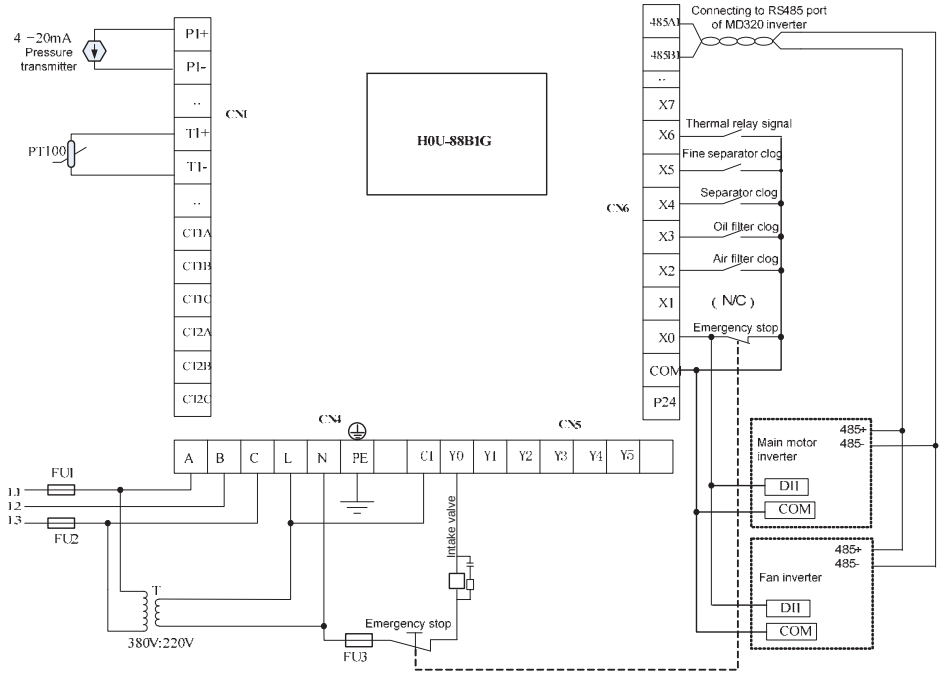


Figure 3-8 Controlling signal wiring diagram when both main motor and fan are driven by MDIs

3.11 Arrangement 4: Power Wiring Diagram

Main Motor Driven by MDI/Power-line Compatible, While Fan by Power-line

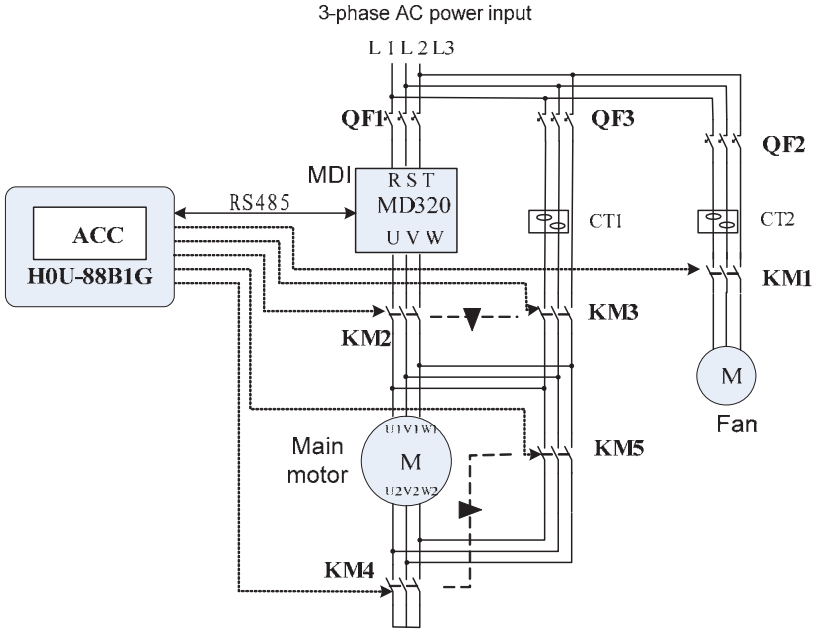


Figure 3-9 Power wiring diagram: main motor driven by MDI/Power-line compatible,while fan by power-line

3.12 Arrangement 4: Controlling Signal Wiring Diagram

Main Motor Driven by MDI/Power-line, While Fan by Power-line

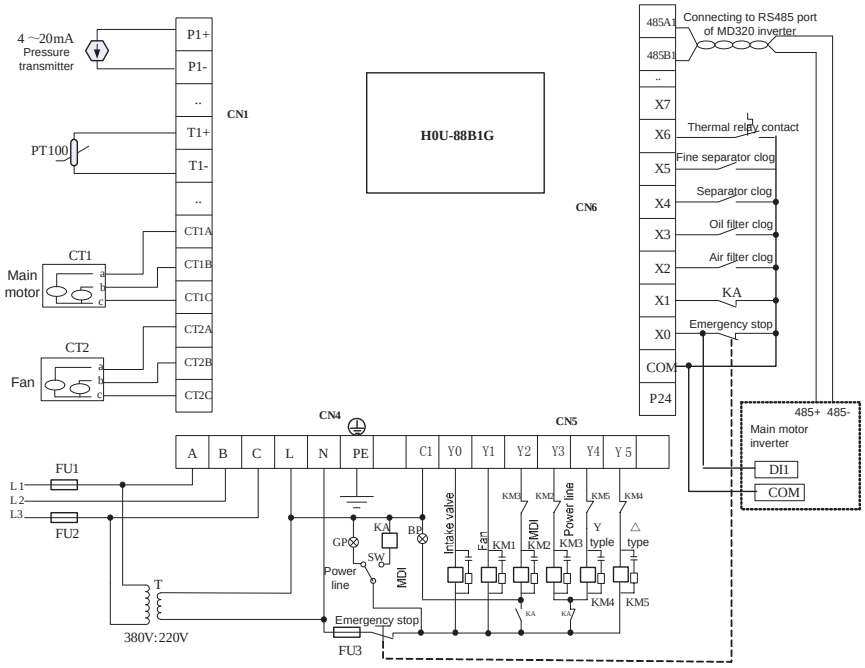


Figure 3-10 Controlling signal wiring diagram: main motor driven by MDI/Power-line compatible,while fan by power-line

3.13 Arrangement 5: Power Wiring Diagram

Main Motor Driven by MDI/Power-line, While Fan by Power-line

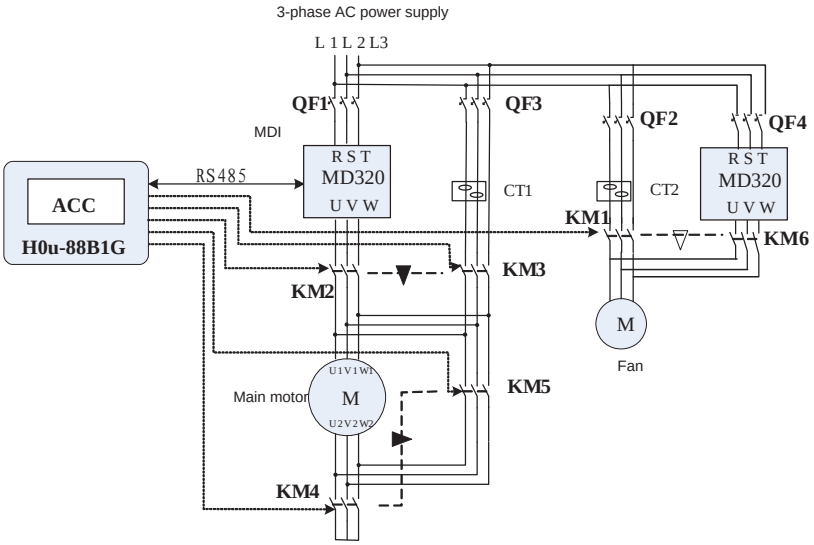


Figure 3-11 Power wiring diagram: Main motor driven by MDI/Power-line, while fan by Power-line

3.14 Arrangement 5: Controlling Signal Wiring Diagram

Both Main Motor and Fan Adopt the MDI/Power-line Compatible Drive Mode

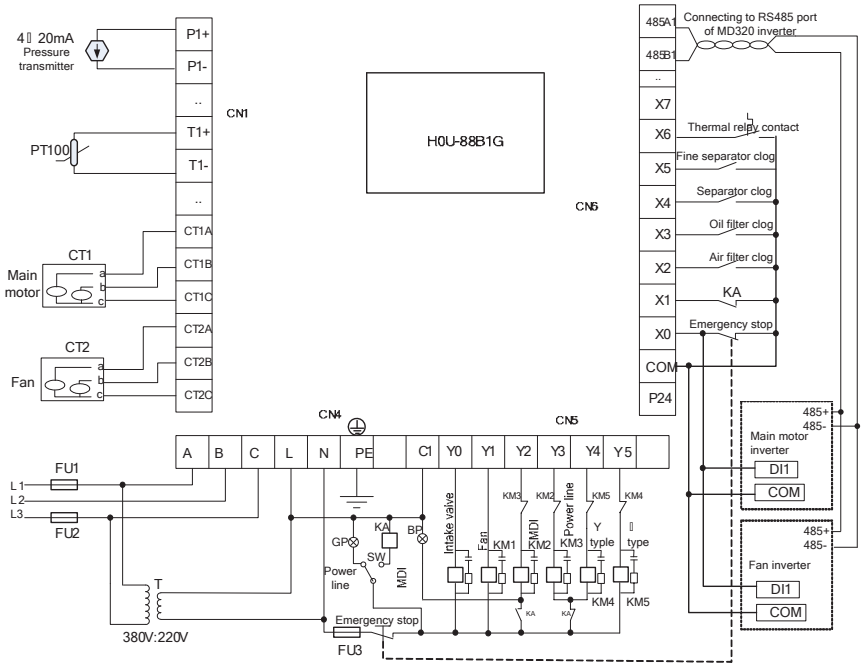


Figure 3-12 Controlling signal wiring diagram when both main motor and fan adopt the MDI/power-line compatible drive mode

Note:

Thermal relay is optional for protection. Signal logic can be set on the controller. If the motor current is detected by CT, thermal relay is unnecessary.

Chapter 4 Description on How to Operate the Controller

4.1 Description of Functions of the Controller Keys

There are 8 keys on the controller panel with thin film structure. The keys have the same functions and operation style as general human-machine interface does. The menu is presented in tree-like structure. The functions are described as follows:

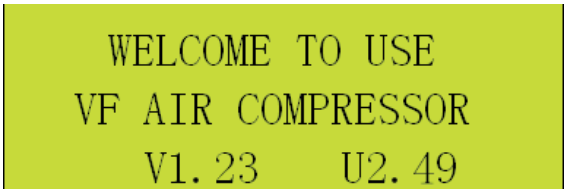
Key	Name	Function Description
	Run	1) When the screw compressor is in the stop/standby status and in local control mode, you can let the screw compressor start to run by pressing the key if the controller displays the default interface. 2) In some interfaces, the key is defined as “Confirm” function (prompted on the screen).
	Stop	When the screw compressor is in the run status and the controller displays the default interface, you can stop the screw compressor by pressing the key.
	ESC/PRG	1) Under the default interface, enter the main menu by pressing the key to browse and edit the parameters of screw compressor and inverter. 2) On the menu or parameters editing interface, press the key to go back or cancel the operation.
	Set	1) If the screen has editable register parameters and editing is allowed, you can enter the editing status by pressing the key. 2) In parameter editing status, give up editing the current parameter and enter the editing status

Key	Name	Function Description
		of next parameter. If there is no next parameter to be edited, then escape the editing status; 3) If the screen has no editable parameter or the editing is not allowed, this key is disabled.
	Down	1) In default screen, press this key to browse the current alarm information, and commonly used running parameters of screw compressor inverter. 2) In menu screen, if a cursor line is selected, press this key to move to the next cursor line. 3) In parameter or function code editing status, press this key to decrease the value of the cursor bit. 4) If there is no cursor line, press this key to move to the next screen.
	Up	1) In menu screen, if a cursor line is selected, press this key to move to the previous cursor line 2) In parameter or function code editing status, press this key to increase the value of the cursor bit; 3) If there is no cursor line, press this key to move to the previous screen; 4) In default screen, press this key to enter alarm screen, and browse the alarm information of current screw compressor and inverter.
	Shift	1) In parameter editing status, press this key to move the cursor to right. 2) In power-line drive mode, you can manually perform loading/unloading operation by pressing this key.

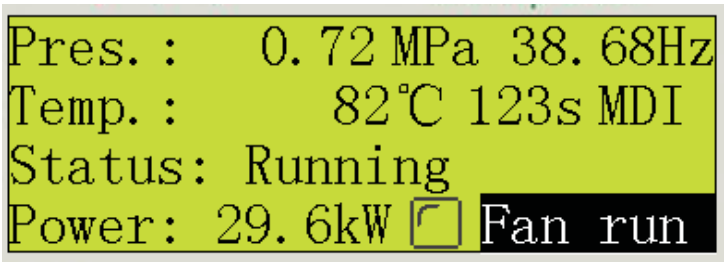
Key	Name	Function Description
ENT	Enter	1) In the menu with cursor line, press this key to enter the lower level menu of cursor line or browse the information of selected parameter. 2) In parameter editing status, press this key to validate the edited parameter, that is, save and then escape the editing of this parameter and start editing the next parameter. 3) In default screen, press this key to silence the audible alarm if there is an alarm or alarm.

4.2 Display Screens of Controller

After the system is powered on, the LCD displays the welcome information for 5 seconds. The display may vary depending on the version.



Then the default screen is displayed as follows:



Only in the default screen, press the running key (I) or the stop key (O) on the right side of the panel to turn on or turn off the screw compressor.

In the display screen of controller, you can browser the running

parameters, control setting values and statistic data of the screw compressor. Each data is classified in menu structure that is shown in the following figure. You can browse the data according to the prompt in the figure.

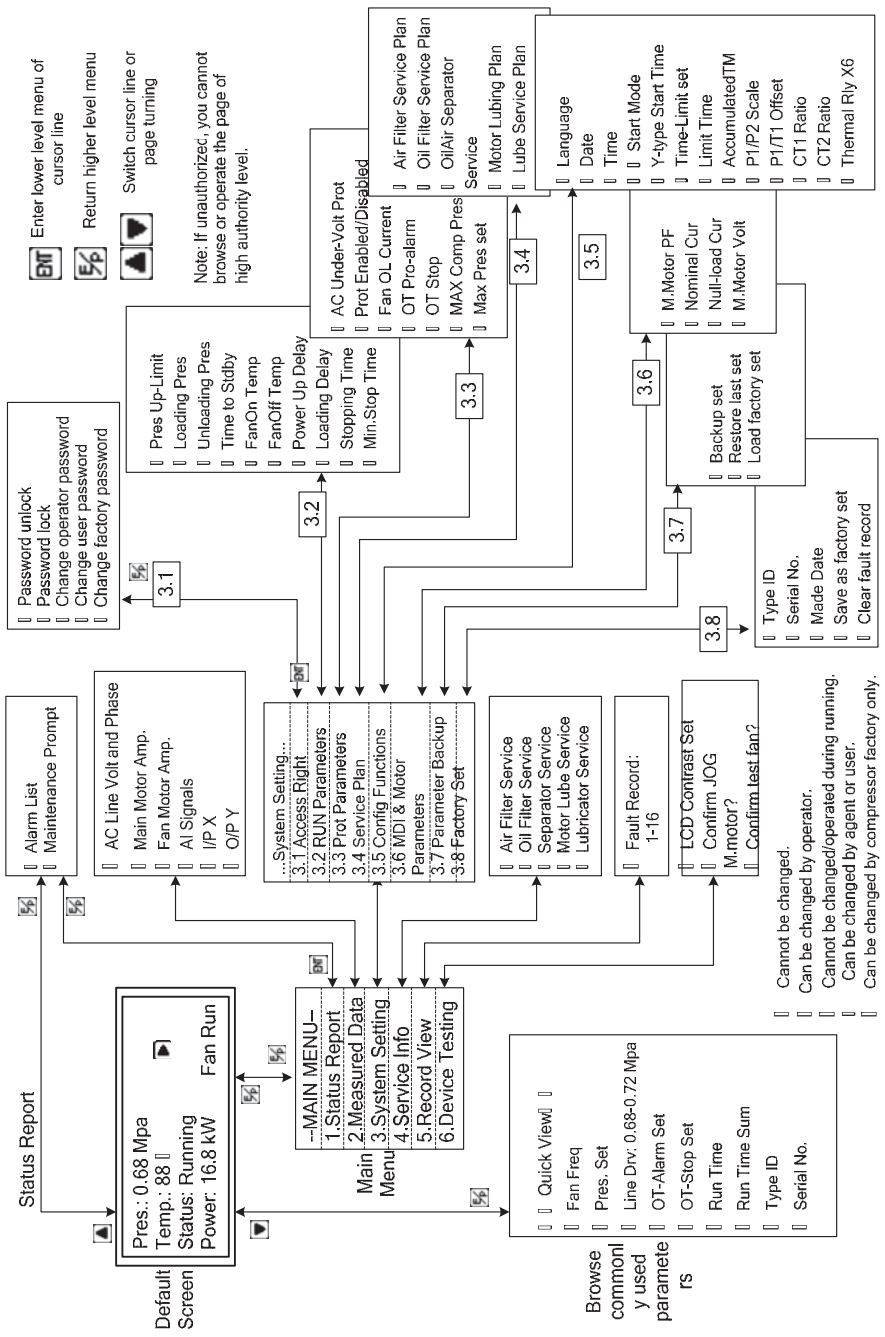


Figure 4-1 Illustration of menu structure of ACC

4.3 List of Menu Items

In the default screen, press the 

key to enter the main menu of the controller. The main menu contains the following six items,you can press UPKEY or DOWNKEY to view all of them:

-System menu-
Status Report
Measured Data
System Setting
Service Information
Record Review
Device Testing

The specific contents and default value of each menu are shown as below (Details in the table may vary due to version upgrade):

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
Status Report	1) System status 2) Service reminder 3) Inverter alarm code	If exists, fault type displays. Upon maintenance time, reminder displays.	0		
Actually Measured Parameter	1) AC power line voltage 2) Voltage phase sequence		0		
	1) Motor working current 2) Fan working current		0		
	Terminal value	Values of P1, P2 and T1 terminals	0		
	DI/DO Signal status	Status of X0-X7- Status of Y0-Y7	0		
Parameter Setting	Authority setting	Password unlock	0	System locked upon power-on, and will	0-99999999
		Password lock	0		

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
				be auto locked	
		Change operator password	1		0-99999999
		Change user password	2		0-99999999
		Change factory password	3		0-99999999
	Running parameters	Upper limit of intake pressure	0/1	0.74MPa	0.10MPa - upper limit of equipment pressure
		Preset value of intake pressure		0.70MPa	0.10MPa -upper limit of intake pressure
		Sleep mode awaking pressure		0.60MPa	0.10MPa -preset value of intake pressure
		Sleep mode judging pressure		180s	0-6000s

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		(Power-line drive mode active) Power-line loading pressure	0/1	0.62MPa	0.10MPa – preset unloading pressure
		Power-line unloading pressure		0.78MPa	0.10MPa - upper limit of equipment pressure
		Upper limit of main motor MDI	2	50.00Hz	Lower limit of running frequency -50.00Hz
		Lower limit of main motor MDI		5.00Hz	4.00Hz-Upper limit of running frequency
		Pressure PID Kp		2.00	1.00-20.00
		Pressure PID Ti		1.2s	0.1s-20.0s
		MDI control temperature	2	85℃	Fan stopping temperature-150

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
					℃
		MDI fan stopping temperature		80℃	Control temperature-0℃
		Power-line starting fan temperature		88℃	Power-line fan stopping temperature-150℃
		Power-line fan stopping temperature		75℃	0℃-Power-line starting fan temperature
		Upper limit of fan MDI	2	50.00Hz	Lower limit of fan MDI-100.00Hz
		Lower limit of fan MDI		10.00Hz	5.00Hz-Upper limit of fan MDI
		Temperature PID Kp		4.00%	1.00-40.00%
		Temperature PID Ti		2.0s	0.1s-20.0s

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		Power-on self-detecting time	3	6s	6s-60s
		Power-line loading delay		10s	10s-600s
		Preparation time for stopping		60s	10s-360s
		Minimum stopping time		120s	10s-2000s
	Protection parameters	AC under voltage protection enabled	2	Disabled	Disabled Enabled
		AC under voltage judging value- Under voltage resuming volume		320V-340V	100 V-400V
		Fan protection current		3.00A	1.00A-20.00A
		Air outlet alarm temperature	3	105℃	80℃-115℃
		Air outlet and stopping temperature		110℃	80℃-120℃

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		Intake and stopping pressure		1.00MPa	0.50 MPa-1.30MPa
		Upper limit of equipment pressure		0.88MPa	Intake and stopping pressure -1.5MPa
	Maintenance plan	Air filter maintenance cycle	2	2000h	100h-9999h
		Oil filter maintenance cycle		2000h	100h-9999h
		Separator maintenance cycle	2	2000h	100h-9999h
		Cycle for adding lube grease to motor		2000h	100h ～ 9999h
		Lube oil Maintenance cycle	2	2000h	100h ～ 9999h
	Configuration functions	Language selection	1	Chinese	Chinese/ English
		Date Time	1	Real time	It displays real time if internal battery is normal.

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		Fan drive mode	2	1	0: power-line1: MDI
		Power-line drive mode	3	Y-△	(Y-△), Direct start
		Y-type startup time		10s	4s-60s
		Timed running function	3	0	0: Disabled 1: Enabled
		Timed running time		0	Hour
		Accumulative running time		0	Hour
		P1/P2 transmitter measurement range	3	1.60MPa	0.20 MPa-2.00MPa
		P1 deviation value		0 MPa	-0.03 MPa-0.03 MPa used for rectifying P1 deviation
		T1 deviation value		0℃	0-6℃
		Transformation ratio of		1000:1	(1-9999): 1

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		main motor CT1			
		Transformation ratio of fan CT2		1000:1	(1-9999): 1
		Thermal relay protection X6		0	0: none；1: normally closed；2: normally opened
		M.MDI Ver		0	0: high power 1: low power
	Inverter and motor parameters	(Main motor) Acceleration time	2	20.0s	1.0s-600.0s
		(Main motor) Deceleration time		5.0s	1.0s-600.0s
		(Main motor) Maximum frequency		50.00Hz	0.01Hz-100.00Hz
Parameter Setting		Control algorithm	2	Open loop vector	Open loop vector/ Close loop vector /VF

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		Upper limit of torque		125.0%	5.0%-150.0%
		Rated voltage of main motor		380V	
		Rated frequency of main motor		50.00Hz	
		Main motor power factor	2	0.80	0.10-0.95
		Motor rated current		45.0A	0.00A-655.00A
		Motor rated rotation speed		1440	1 RPM-9999RPM
		Motor current at zero load		19.60A	0.01A-650.00A
		(Fan MDI) Maximum frequency	2	50.00Hz	50.00 Hz-300.00Hz
		(Fan) motor rated frequency		50.00Hz	0-Maximum frequency
		(Fan) motor rated voltage		380V	0V-440V
		1) Back up the current setting 2) Resume previous			User (owner, administrator or agent)

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		parameters 3) Resume factory parameters			password protection
	3.7 Parameter backup	Product Model	3	Set by air Compress factory, protected by factory password	0-99999999
	Factory setting	Made date	3 3	Set by factory	0-99999999
					0-99999999
		Set current Parameters as factory settings			
		Clear historical faults	3	Protected by factory password	Read only
Maintenance Information Update	Air filter maintenance	Service plan	R	Setting value	Can be reset
		Total operating time	0/1	Can be cleared	Read only
	Oil filter maintenance	Service plan	R	2000h	Can be reset
		Total operating	0/1	Can be cleared	Read only

First-level Menu	Display Contents	Information property	Access Authority	Default Value	Setting Range
		time			
	Separator maintenance	Service plan	R	2000h	Can be reset
		Total operating time	0/1	Can be cleared	Read only
	Adding lube oil to motor	Service plan	R	2000h	Can be reset
		Total operating time	0/1	Can be cleared	Read only
	Maintenance of lube grease	Service plan	R	2000h	Can be reset
		Total operating time	0/1	Can be cleared	Latest 16 records, protected by factory password
Alarm Record Query	Fault record query	Record 1-16. Fault type and time stamp.	R	Latest 16 records, protected by factory password	
Equipment Commissioning	LCD contrast setting		1	4	1-7，
	Main motor jog		1		
	Test fan		1		

Note:

“Access authority” indicates that you must correctly enter the password

before browsing or making modification.
“0” indicates you do not need to enter password
“0/1” indicates you can browse without the need to enter password, but the operator’s authority is required.
“1” indicates the operator’s authority is required.
“2” indicates the authority of user or agent is required.
“3” indicates the authority of screw compressor factory is required.
In default screen, you can have a quick browsing of system commonly used parameters by pressing  . The following parameters cannot be edited in browsing status (What you see on screen may be its abbreviation):

Current rotation speed of motor Power consumption of motor Current frequency of fan
Preset value of pressure Loading/Unloading pressure(in power-line drive mode) Over temperature alarm value Over temperature stopping value
Drive mode of fan Power-line fan starting temperature/MDI control temperature Fan stopping temperature
Operating time Accumulative operating time
Product Model Factory S/N

4.4 Access Authority of the Controller

The controller has 3-level authority management: screw compressor factory password, user password and operator password, which correspond to authority values 3, 2 and 1, respectively. The factory password has the highest authority level, and the operator password is

the lowest. The access authority corresponds to password. What authority you have is dependent on what password you enter.
During unlocking, if you enter correct factory password, you can browse all the screens, and you can change the factory settings, user parameters, and you can even modify or clear user password and operating password.
During unlocking, if you enter correct user password, you can browse the user setting screen, and you can set the user parameters, modify or clean operator password. But you cannot check and set factory parameters.
After correctly entering operator password, you can only modify some basic parameters for actual system running.
After correctly entering operator password, you can only modify some basic parameters for actual system running.
To unlock the password, enter the password after selecting“3 Parameter setting” > “3.1 Password unlock” in the main menu.
On the top right corner of “Parameter setting the screen, the authority information is displayed. When the password is locked, “ 0” is displayed. After unlocking, “ 1” or “ 2” or “ 3” is displayed and the number indicates the authority level.
If no key or button is pressed within 5 minutes, the controller will lock the password automatically. You can also lock the password in “3 Parameter setting” > “3.2 Password lock”.

4.5 Setting of Function Parameters

To prevent unauthorized modification of the operation and protection parameters of screw compressor, you must enter the password with corresponding authority before you make parameter settings.
The menu of the controller uses tree-type structure in different levels, and is classified according to function parameters. The operator can easily browse the desired parameters, but cannot browse those without corresponding operating authority.
The method of setting parameters is similar to that of most HMI (human-machine interface). You can select the parameters that need to

be modified in the current screen by pressing SET, modify parameters by pressing , and save the parameters by pressing the key ENT.

If no parameters need to be modified, the SET key is disabled.

4.6 Data Backup and Management

To facilitate the user to manage the data, the controller provides four commands: “Back up the current setting”, “Resume the previous setting”, “Resume factory settings” and “Save parameters as factory settings”.

The controller has a built-in memory unit that store parameter settings for long. As shown in the following figure, the “Current parameter setting area” is the memory unit. The operator can directly modify data in this area only.
To facilitate the user to resume parameter settings during commissioning (For example, resume the previous setting or factory settings), the controller provides “User parameter setting backup area” and “Factory parameter setting backup area”.

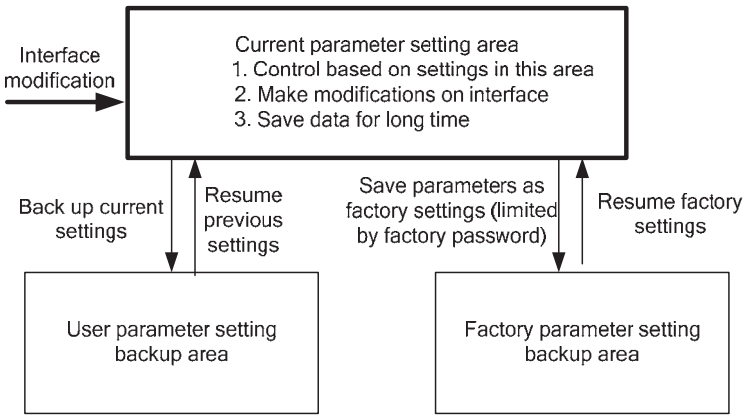


Figure 4-3 Parameter saving interface of controller

The first 3 commands are used by screw compressor users and manufacturer, while “Save parameters as factory settings” can only be used by the manufacturer. This command is used to save the parameter settings as factory settings. The screw compressor manufacturer can set a batch of parameters using the software provided by Inovance, and perform parameter pre-setting operations in these three parameter areas simultaneously, so as to improve the production efficiency.

4.7 Browse and Cancel Alarm Information

When a fault alarm is given, the controller will automatically display text alarm information on screen together with LED lighting and alarm sound.

In default screen, pressing ENT can silence the alarm sound, but cannot clear the alarm information.

The operator can query the current fault details and clear alarm information in “Status report” menu.

In default screen, press the up key to directly switch to the screen of alarm information list. If there is an alarm, the screen will display fault alarm or maintenance prompt information.

If you need to query the historical fault information, you can select “5. Query record” \ “Alarm information query” in the system menu. There are a total of 16 historical fault records that record major fault information.

When the accumulative running time of components of screw compressor reaches the maintenance planning time, maintenance prompt information will be displayed. The prompt will not affect the operation of screw compressor. The user needs to maintain or replace relevant components. Once maintenance is complete, you can clear “Total operating time” to 0 in “4 Maintenance information” in system menu.

Chapter 5 Description on How to Operate Screw Compressor

5.1 Precautions on Operation

Notes:
1) Be sure to check whether the power cables and signal cables are correctly connected prior to first-time operation after wiring is complete. For the equipment that may be driven by power-line, connect the L1, L2 and L3 wires of the motor must correspondingly to terminals A, B and C of the controller that are used for detecting phase sequence so as to ensure correct detecting of phase sequence. You can test the running of the screw compressor through jog operation of main motor and trial operation of the fan provided by the controller.
2) When connecting or plugging/unplugging the signal cables, ensure that there is no power supply to the compressor system or wait for 10 minutes after the compressor system is powered off. Otherwise, electrical shock or component damage may result.
3) When powering on the equipments for the first time, ensure to power on the H0UB1G controller and the MD320 Series inverter simultaneously or power on the inverter first. Otherwise, the MD320 inverter cannot work normally because the controller cannot detect it and so cannot initialize it.
4) If you want to switch the drive mode between inverter and power-line, ensure that the screw compressor is in stop status and the system suffers no electrical or mechanical shock.

5.2 Operate Screw Compressor in MDI Drive Mode

When screw compressor is in stop status and the controller displays the default screen, press the key Ⓘ on the right side of the panel. The screw compressor starts up immediately.

In running status, press Ⓞ on the right side of the panel, the screw compressor is ready to stop and stops after some delay. The control

process of the compressor is performed by the controller automatically.
When the screw compressor runs, the controller performs PID close loop control of the output frequency of the inverter based on the feedback of the setting pressure and output pressure so as to finely stabilize the output pressure of the screw compressor.
If the screw compressor is configured with an intake valve, the controller will perform loading operation through the solenoid valve after the motor has started up for some time, and shut down the solenoid valve before stopping.

5.3 Operate Screw Compressor in Power-line Drive Mode

When screw compressor is in stop status and the controller displays the default screen, press  on the right side of the panel. The screw compressor starts up immediately.

In running status, press  on the right side of the panel. The screw compressor immediately shuts down the intake valve and is ready to stop. After some delay, it stops.
The control process of the compressor is performed by the controller automatically.
When the screw compressor runs, the controller checks the output pressure. If the output pressure is lower than the preset loading pressure, the controller opens the intake valve to perform loading operation. If the output pressure is higher than the preset loading pressure, the controller shuts down the intake valve to perform unloading operation so that the output pressure of the screw compressor is between the loading pressure and unloading pressure.

5.4 Switch the Drive Mode

For the screw compressor that uses the H0U-88B1G controller, both its main motor and fan can work in the MDI drive mode or power-line drive mode. For the screw compressor that is designed to support the inverter/power-line incompatible drive mode, if you need to switch the

drive mode manually, please perform the switching in stop status of the screw compressor. Otherwise, short circuit may occur to electric arc at the output side of the inverter.
If you operate the main motor's inverter/power-line switch (X1) when screw compressor runs, the controller will make the screw compressor emergency stop.
If you need to switch the drive mode of the fan, you have to enter user password in the run status of the screw compressor and then perform the modification under the ""Parameter setting" > "Configuration functions" menu.

5.5 Description of Control Process of Screw compressor Controller

5.5.1 Control Process in MDI Drive Mode

In MDI drive mode, the controller detects the outlet pressure of the screw compressor and performs PID operation based on the preset outlet pressure so as to control the output frequency of the inverter and keep the outlet pressure stable at "preset exhaust pressure". When the output frequency of inverter is lower than 50Hz, the system efficiency in MDI mode is higher than that in power-line drive mode.
When the air volume decreases, and the running time at lower limit of frequency is shorter than the preset "Sleep mode judging time", the controller will stop the inverter and make the screw compressor enter sleep mode (also called stopping mode), so as to achieve further energy saving and reduce equipment wearing.
The Control process in the MDI drive mode is shown as follows:

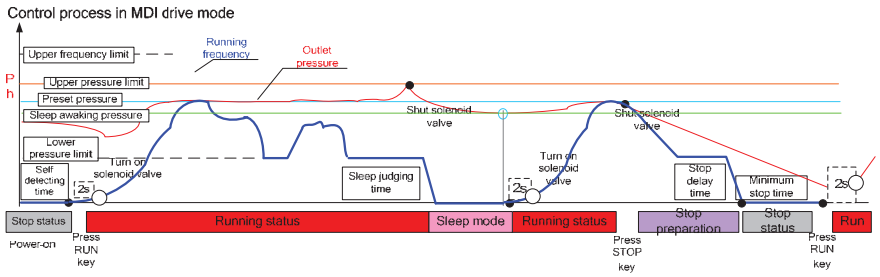


Figure 5-1 Control process in the MDI drive mode

After the MDI drives the main motor to run for 2 seconds, the controller opens the open the intake valve and adjusts the air outlet pressure through the PID operation.

In normal running status, once you press the “Stop” command key, the controller will immediately turn off the solenoid valve to shut down the intake valve and reduce the output frequency of the inverter to lower limit of frequency, which makes the screw compressor continue to run for some time at zero load condition (called “Preparation time for stopping”) so as to let the screw compressor cool off before stopping the inverter and turning off the fan.

5.5.2 Control Process in the Power-line Drive Mode

In power-line drive mode, the controller detects the outlet pressure of the screw compressor. Then it turns on or turns off the intake valve based on the preset “Loading pressure” and “Unloading pressure” so as to keep outlet pressure stable between the “Loading pressure” and “Unloading pressure”.

When the air volume decreases, and the operating time at the unloading status is shorter than the preset “Sleep mode judging time”, the controller will stop the main motor and make the screw compressor enter sleep mode (also called stopping mode), so as to save energy and reduce equipment wearing.

The Control process in the power-line drive mode is shown as follows:

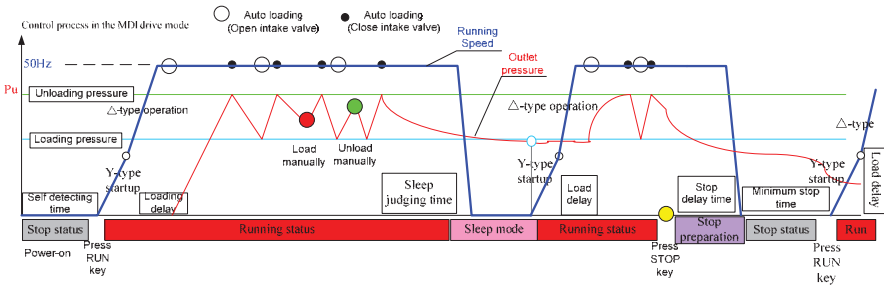


Figure 5-2 Control process in the MDI drive mode

Because the screw compressor prevents reverse rotating, the controller will detect the phase sequence of the AC power supply of the compressor. If the phase sequence is abnormal, the controller will give an alarm and stop the system from entering running status.

To reduce the surge current during startup of the motor, when the motor capacity is big, we usually use Y-△ startup mode. For each startup, the controller will close the contactor of Y-wiring and perform Y-type startup. After some time (Y-type startup time), the controller opens the Y-type contactor and then closes △-type contactor to switch to the wiring for normal operation. After the time of “loading delay”, the controller opens the intake valve. Then the compressor enters air outlet running status. This mode can reduce the impact to power grid in startup process and reduce the heating of the motor.
In normal running status, once you press the “Stop” command key, the controller will turn off the solenoid valve to shut down the intake valve and let the screw compressor continue to run at zero load condition for some time (called “Preparation time for stopping”) so as to let the screw compressor cool off before stopping the main motor and the fan.
The controller will detect the working current of the main motor in real time. Once continuous overload or lack phase occurs, it will give an alarm and stop the main motor.

5.5.3 Control of the Fan

The fan can be driven by power-line or inverter. The controller will perform control and regulation based on “System Configuration”.
When the fan works in power-line drive mode, to stop or start the fan depends on the air outlet temperature. When the air outlet temperature is higher than “Fan start temperature”, the fan starts to cool down the screw compressor. When the exhaust air temperature is lower than the “Fan stop temperature”, the fan stops to ensure the temperature of the compressor lube oil of the compressor is in proper temperature range. The fan start and stop temperatures can be set by the user.
When the fan works in MDI drive mode, the controller will adjust the

output frequency of the inverter based on the current air outlet temperature (detected by PT1 terminal) of the screw compressor and the present control temperature so as to change intensity of heat radiation and keep the air outlet temperature stable at the preset temperature approximately. When the air outlet temperature is lower than the “Fan stop temperature”, the controller stops the inverter and the fun and will not restart them until the air outlet temperature rises to the preset value.
The controller will detect the working current of the fan in real time. Once continuous overload or lack phase occurs, it will give an alarm and stop the fan.

5.5.4 Handling Abnormal Signals

1) When cable broken fault to pressure transmitter or cable broken fault/short circuit to temperature sensor is detected, the controller will stop and give an alarm. The system will not restart until the sensor fault is cleared.
2) When the detected air outlet temperature exceeds the “Over temperature stop threshold”, the controller will immediately stop the screw compressor and give an alarm. When the air outlet temperature exceeds the “Over temperature alarm threshold” only, the controller gives an over temperature alarm.
3) When the detected air outlet pressure exceeds the “over pressure stop threshold” or the “allowable top pressure”, the controller will immediately stop the screw compressor and give an over pressure alarm.
4) When the detected air outlet pressure exceeds the “Over pressure stop threshold” or the “allowable top pressure”, the controller will immediately stop the screw compressor and give an over pressure alarm.
5) When the controller finds external “Emergency stop” signal is effective, it will stop the inverter and closes all control outputs. The system will not run until the “Emergency stop” signal is released.

6) In power-line drive mode, if the phase sequence of AC power supply is wrong, the controller will give a wrong phase sequence alarm. The screw compressor's operation will be limited until the phase sequence recovers to normal
7) If motor overload is detected by CT1 and CT2 and continues for some time, the controller will stop and give an alarm.
8) If X6 (X6 terminal enabled) detects thermal relay operation. The controller will stop and give an alarm
9) If the "Timed operation function" is activated and the accumulative running time hits the "Timed operation time", the screw compressor will automatically stops and restrict startup until the parameter is modified or prevented by Inovance.
10) The controller provides the digital inputs for the faults such as air filter clog, oil filter clog, separator clog and fine separator clog. If these fault signals are detected, the controller will give an alarm, but will not limit the operation of screw compressor.
11) The controller records the maintenance information of air filter, oil filter, separator and fine separator, and lubricating unit. If it is set to reach the preset maintenance time, a maintenance reminder is given to remind the user to arrange maintenance. The operation of screw compressor is not limited.

Chapter 6 Troubleshooting

Phenomenon	Possible Cause	Checking Item	Handling Method
Screw compressor cannot start.	Emergency stop button is not released.	Check whether terminal X0 in "Actually measured parameter" is in close loop status.	
	Voltage and phase	Check the	Adjust phase

Phenomenon	Possible Cause	Checking Item	Handling Method
	sequence error	status of power supply and phase sequence in “Actually measured parameter”.	sequence of power supply cable
	Power supply under voltage		
	Temperature sensor fault	Check the wiring	
	Pressure sensor fault	Check the wiring	
	Inverter fault is not cleared	There is fault prompt in “status report”.	
	Fault is not cleared.	The default screen should not have blinking LED.	Press clear button in “Status report”.
	Effective when pressing the start key in the default screen.		Go back to the default screen.
Screw compressor cannot stop.	Effective when pressing the stop key in the default screen.		Go back to the default screen.
Inverter communication failure prompt	The communication cable between controller and MD320 is not	Check the connection of two ends of the cable.	

Phenomenon	Possible Cause	Checking Item	Handling Method
	connected or becomes loose.		
	The function codes related to inverter communication are set incorrectly.	Check the FD function codes of the inverter.	FD-00=5;FD-01=0 FD-02=1;FD-05=0
Fan inverter communication failure prompt	If the fan is driven by power-line	Change the fan drive mode to “Power-line” in “Configuration functions” of the controller.	
	The communication cable between controller and MD320 is not connected or becomes loose.	Check the connection of two ends of the cable.	
	The function codes related to inverter communication are set incorrectly.	Check the FD function codes of the inverter.	FD-00=5;FD-01=0 FD-02=2;FD-05=0
The inverter reports Err15 fault.	The DI1/COM terminal of the inverter is not connected to the emergency stop switch point, or the emergency stop switch point has been pressed.	Ensure that the DI1/COM terminal of the inverter is not connected to the emergency stop switch point. If this switch point	

Phenomenon	Possible Cause	Checking Item	Handling Method
		has been pressed, the fault is normal.	
The inverter reports Err16 fault	The communication between the inverter and the controller is abnormal. The controller is powered down. The controller is abnormal.	Check the function codes. Check the connection of RS485 communication cable. The fault is normal if it is in the power-line drive mode and there is no need to run the inverter.	
Over current fault is reported in running process.	Acceleration time of inverter is not set properly. Too large Kp or too small Ti in PID parameters results in rapid speed regulation by the motor, finally leading to over current.	Increase the “Acceleration time”. The bigger the power is, the longer the acceleration time is. Properly decrease Kp (less than 2.0). Properly increase Ti (1.0-2.0 seconds).	
	Motor parameters are not matched.	Check whether the power level of motor is suitable.	Check the parameters of same power level and make corresponding

Phenomenon	Possible Cause	Checking Item	Handling Method
			modifications.
		Parameter Identification by inverter is not correct.	Perform parameter identification at zero load of the motor
Air outlet pressure is not stable	The Kp of pressure PID is not set properly or Ti is not set properly.	Check whether there is a great difference of Kp and Ti and factory settings.	Properly decrease Kp (less than 2.0). Properly increase Ti (1.0-2.0 seconds).
In MDI drive mode, the intake pressure seems not to be affected by “Unloading pressure” and “Loading pressure”.	When the main motor is in the MDI drive mode, the air outlet pressure keeps stable around the “Preset air outlet pressure”. “Unloading pressure” and “Loading pressure” take effect only when the main motor is in the power-line drive mode.		
Frequently turn on and turn off the intake valve.	The “Upper limit of intake pressure” is close to the preset pressure, or the PID parameter setting is too sensitive.		Properly increase the “Upper limit of intake pressure”, or properly decrease the Kp value.
The screw compressor does not enter the sleep mode, or frequently sleeps and awakes	The “Sleep mode awaking pressure” is close to the preset pressure.		”Properly decrease the “Sleep mode awaking pressure”.

Phenomenon	Possible Cause	Checking Item	Handling Method
Over current occurs in power-line drive mode.	The transformation ratio setting of CT1 is not accurate. The main motor rated current setting is not accurate.	Check whether the actually measured current of the main motor displayed on the controller is in line with the main motor rated current.	”Ensure that “Protection current” is greater than “rated current”.
Over current fault is reported by the fan.	The transformation ratio setting of CT2 is not accurate. The fan rated current setting is not accurate.	Check whether the actually measured current of the fan displayed on the controller is in line with the fan rated current. Check whether the protection current is too low.	Ensure that “Protection current” is greater than “rated current”.

Appendix: Description of alarm code of the MD320 Series inverter

Alarm Code	Description of Fault
0	Normal, no fault alarm
1	Inverter unit is in protection
2	Acceleration over current
3	Deceleration over current
4	Constant speed over current
5	Acceleration over voltage
6	Deceleration over voltage
7	Constant speed over voltage
8	Control power supply fault
9	Under voltage fault
10	-
11	Motor overload
12	Lack phase at input side
13	Lack phase at output side
14	Module overheating
15	External device fault
16	Communication fault
17	-
18	Current detection fault
19	Motor auto tuning fault
20	PG fault
21	Data overflow
22	Inverter hardware fault
22	Grounding short circuit fault

Appendix: H0U-88B1G Optional Accessories

Power-line current transformer

The H0U-88B1G controller applies to the screw compressor system directly driven by power-line. By using current transformer (CT), the controller can:

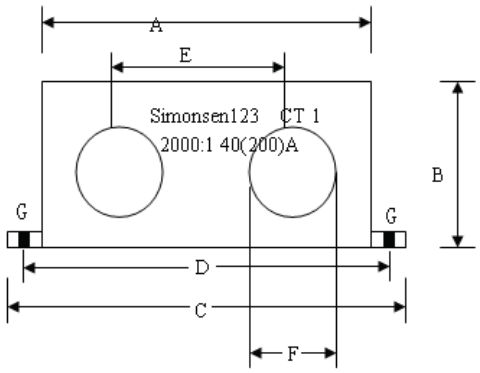
1. Detect the power-line current to the main motor or fan,
2. Monitor the working status of the motor
3. Implement short circuit, overload and lack phase protections of the motor.
4. Flexibly set protection operation parameters based on specific requirements of the screw compressor system.

The CT can replace overload relay and helps to reduce the costs of the protection system of screw compressor.

Currently, there are three CT models for the user to choose, which are used for fan current detection and main motor current detection, respectively.

Purpose	Model	Rated Primary Current	Applied Motor Power	Current Transformation Ratio	Order No.
CT1 for main motor	CT-038	80-400A	55-160kW	4000: 1	13050003
	CT-032	40-200A	11-55kW	2000: 1	13050002
CT2 for fan	CT-033	20-80A	0.7-5.5kW	1000: 1	13050001

Appearance and dimension:

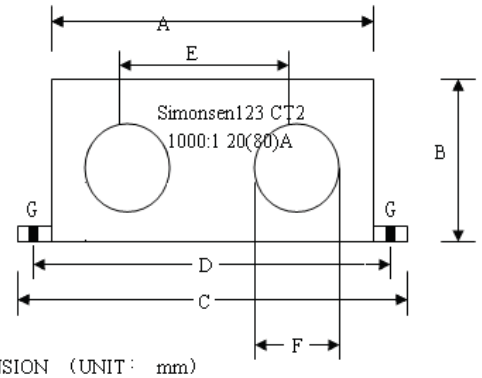


CT1 Dimension

CT-032
CT-038

DIMENSION (UNIT : nm)

A	B	C	D	E	F	G	H
126±1.5	65±1.0	145±1.0	135 ±0.5	60±1.0	38.4±0.5	5.0	24±1.0



CT2 Dimension

CT-033

DIMENSION (UNIT: mm)

A	B	C	D	E	F	G	H
72±1.5	45±1.0	90±1.0	81 ±0.5	32±1.0	8.8±0.5	5.0	20±1.0

Prompt: When the CT sees current flow in the primary side, open circuit is prevented in the secondary side. Otherwise, high-voltage electric shock, personal injury or insulation resistance inside the CT may result. Thus, please carefully check and ensure cables are reliably connected before