SEIZEAIR
EES COMPRESSORS

Display Operation Manual

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Preface

Goodrive300-21 series dual inverter integrated machine for air compressor (hereafter referred to as GD300-21 air compressor integrated machine) is especially developed for synchronous/asynchronous twin screw air compressor. It can be used in combination with HMI touch screen to drive and control the twin screw air compressor.

GD300-21 air compressor integrated machine is capable of providing dual inverter output of master and fan for the air compressor as well as offering +24V power to the touch screen. It supports control of solenoid valve and receiving of temperature and pressure signal. In respect of function, it is a perfect replacement for the original dual inverter electrical control cabinet of air compressor but with a much smaller size and simpler installation and commissioning procedures.

Given the application scenarios and actual demands of air compressor, GD300-21 air compressor integrated machine can realize fast start-up and stable operation of air compressor through dual PID and unique weak magnetic design. It adopts independent air duct, heavy load and high power factor design to effectively cope with challenging grid conditions and application environment. In addition, it can realize IOT application by installing optional parts and accessories.

Read through this manual carefully before installation to ensure correct installation and operation of GD300-21 air compressor integrated machine, thus giving full play to its excellent functions and performance.

If the end user is a military unit or the product is used for weapon manufacturing, please comply with relevant export control regulations in the Foreign Trade Law of the People's Republic of China, and complete necessary formalities.

The manual is subject to change without prior notice.

Contents

1 Product overview

GD300-21 air compressor integrated machine is capable of providing dual inverter output of master and fan for the air compressor as well as offering +24V power to the touch screen. It supports control of solenoid valve and receiving of temperature and pressure signal. In respect of function, it is a perfect replacement for the original dual inverter electrical control cabinet of air compressor but with a much smaller size and simpler installation and debugging procedures.

1.1 Product specifications

Category	Function	Specifications
Power input	Input voltage of inverter (V)	3PH 220V(-15%)–240V(+10%) 3PH 380V(-15%)–440V(+10%)
	Rated input current (A)	See 1.4 Product ratings.
	Rated input frequency (Hz)	50Hz or 60Hz; Allowed range: 47–63Hz
	Efficiency	> 97%
	Power factor	0.9
Power output of main inverter	Output voltage (V)	Equal to the input voltage, with the deviation less than 5%.
	Rated output current (A)	See 1.4 Product ratings.
	Rating output power (kW)	See 1.4 Product ratings.
	Output frequency (Hz)	0–400Hz
Power output of fan inverter	Output voltage (V)	Equal to the input voltage, with the deviation less than 5%.
	Rated output current (A)	See 1.4 Product ratings.
	Rating output power (kW)	See 1.4 Product ratings.
	Output frequency (Hz)	0–50Hz
Other power output	+24VDC power	24W
	220VAC/110VAC	30W
Running control performance	Control mode	Open loop vector, space voltage vector
	Speed ratio	Asynchronous motor (AM): 1:200 (Sensorless vector control), synchronous motor (SM): 1:20 (Sensorless vector control)
	Speed control accuracy	±0.2% (Sensorless vector control)
	Speed fluctuation	±0.3% (SVC)
	Torque response	<20ms (Sensorless vector control)
	Starting torque	For AMs: 0.25Hz150% (Sensorless vector control) For SMs: 2.5Hz150% (Sensorless vector control)
	Overload capacity	Master inverter: 150%/1m Fan inverter: 120%/1m

Category	Function	Specifications
	Specialized function	Sleep and wake-up function, constant pressure control, constant temperature control, accessory maintenance and phase sequence inspection
	Analog input of pressure	Two 4–20mA/0–1.6MPa inputs
	Analog input of temperature	Two temperature analog inputs; resolution rate: 1°C, range: -20°C–150°C
	Digital input	Three regular inputs; max. frequency: 1kHz
	Digital output	One Y terminal output, two relay outputs (NO) 250VAC/3A
	Fault protection	More than 30 protection functions, such as protection against overcurrent, overvoltage, undervoltage, overtemperature, phase loss, and overload
	Communication 485	One 485 communication (two terminal interfaces)
Other	Installation method	Supports wall-mounting and floor-mounting
	Temperature of running environment	-10°C – +50°C; Derating is required if the ambient temperature exceeds 40°C. Derate 1% for each additional 1°C.
	Ingress protection (IP) rating	IP20
	Cooling method	Forced air cooling
	DC reactor	Standard
	EMC filter	Optional external filters can be used to meet the IEC61800-3 C2 requirements.

Note: When the voltage of the integrated machine is above 440VAC, the power frequency transformer inside the integrated machine needs to be customized as needed.

1.2 Product nameplate

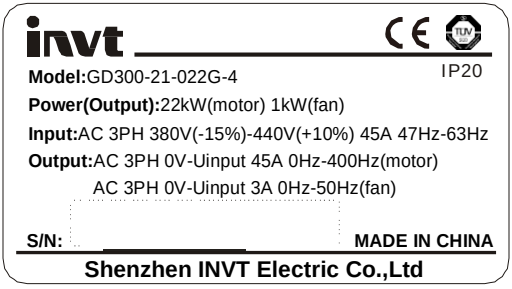


Figure 1-1 Product nameplate

Note: The preceding are standard product nameplate examples. The CE/TUV/IP20 marking on the top right will be marked according to actual certification conditions.

2 Installation guidance

2.1 Wiring and terminal instruction of main circuit

2.1.1 Wiring diagram of the main circuit

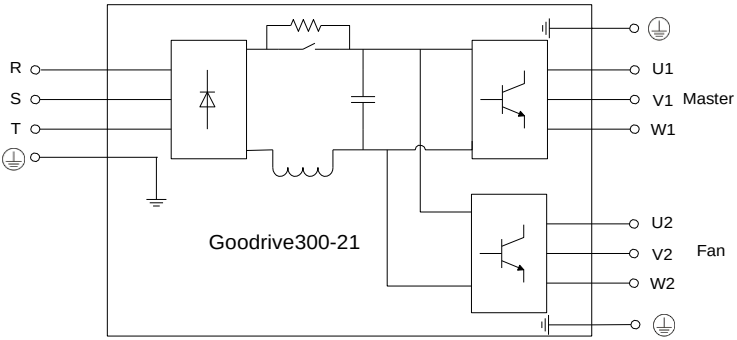


Figure 2-1 Wiring diagram of the main circuit

2.1.2 Terminal diagram of the main circuit

The terminal layout of 15–22kW, 30kW–37kW and 45–90kW main circuit slightly differs from each other. In below figure, 15–22kW and 45–90kW models are taken as examples for terminal layout.

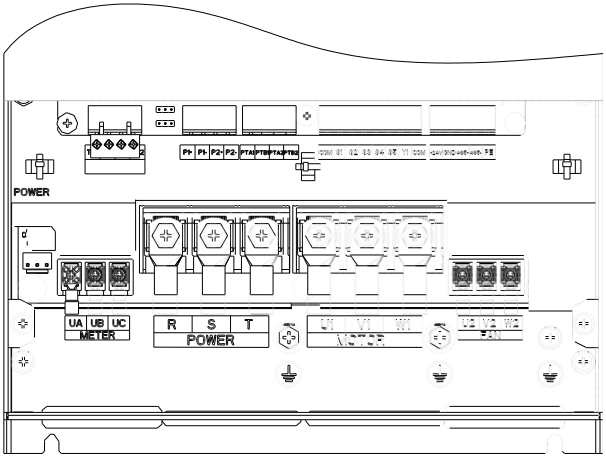


Figure 2-2 AC380V 15–22kW

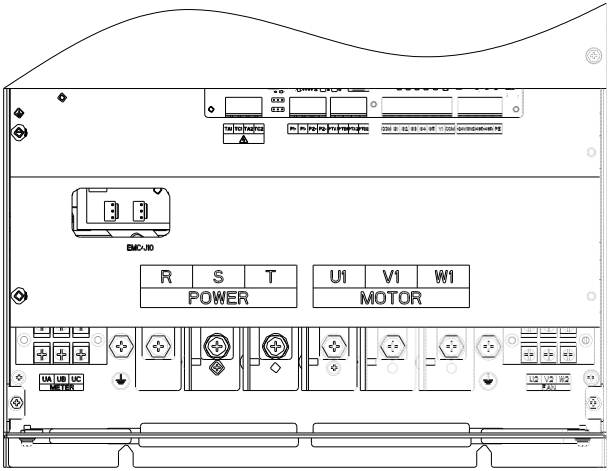


Figure 2-3 AC380V 45–90kW

Table 2-1 Terminal instruction

Symbol	Description
UA, UB, UC	Used for input connection of optional contactor components.
R, S, T	3PH AC input terminals, connecting to the grid
U1, V1, W1	3PH AC output terminal, connected to main motor of air compressor
U2, V2, W2	3PH AC output terminal, connected to the fan
⏚	Grounding terminal of safety protection, each machine must be grounded.

Note:

1. Do not use asymmetrical motor cables. Do not use asymmetrically constructed motor cable. If there is a symmetrically constructed ground conductor in the motor cable in addition to the conductive shielding layer, ground the ground conductor at the inverter end and motor end.
2. Route the motor cable, input power cable and control cable separately.
3. Before powering on the system, ensure that U1/V1/W1 or U2/V2/W2 are not short-circuited to PE on the output side. Otherwise, tripping may occur on the power distribution cabinet when the system is being powered on.

2.2 Wiring and terminal instruction of control circuit

2.2.1 Control circuit layout diagram

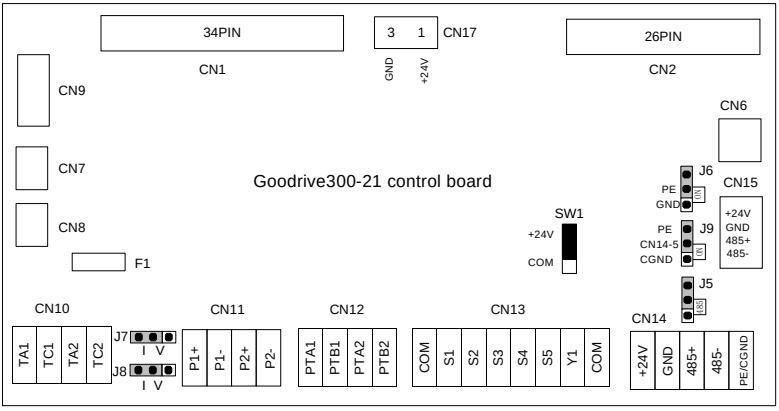


Figure 2-4 Control circuit layout diagram

Table 2-2 Terminal instruction

Symbol	Name	Remarks
CN1	Flat cable interface	Connected to drive board, master control signal wire
CN17	Power interface	Outputs +24V power, can be used to power up external GPRS.
CN2	Flat cable interface	Connected to drive board, fan control signal wire
CN6	Keypad interface	Reserved interface, connected with keypad
CN14	Touch screen interface	Connected to touch screen, provide +24V power and 485 communication interface
CN13	Digital input terminal	Multi-function input terminal
CN12	Temperature detection terminal	Connected to PT100 temperature sensor
CN11	Pressure detection terminal	Connected to pressure sensor
CN10	Relay output terminal	Connected to solenoid valve or contactor coil
F1	Fuse (0.6A/250VAC)	Protection against short circuit of solenoid valve/contactor coil terminal or overcurrent
CN9	220V/110V voltage input terminal	Connected to internal power frequency transformer
CN7	220V voltage selection terminal	Select this terminal with jumpers when users select the solenoid valve with 220V coil or the contactor. **Note:** The default selection is 220V voltage terminal.

Symbol	Name	Remarks
CN8	110V voltage selection terminal	Select this terminal with jumpers when users select the solenoid valve with 110V coil or the contactor.
J5	Access terminal for 485 communication terminal resistor	485 corresponds to access terminal resistor. Does not connect terminal resistor by default.
J6	Short-circuit terminal of PE and GND	ON corresponds to short-circuit. No short circuit by default
J7	Jumper terminal	Corresponds to P1+, P1- pressure analog signal selection. I corresponds to current signal, V to voltage signal. The default is current input signal.
J8	Jumper terminal	Corresponds to P2+, P2- pressure analog signal selection. I corresponds to current signal, V to voltage signal. The default is current input signal.
J9	PE/CGND selection terminal	485 communication is non-isolation mode. CN14-5 is short circuited with PE by default.
SW1	DIP switch	Set to +24V terminal by default. See details at Figure 2-5 and Figure 2-6.

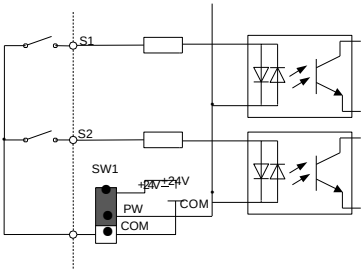


Figure 2-5 Internal power (NPN mode)

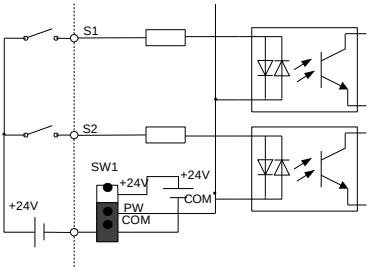


Figure 2-6 External power (PNP mode)

When digital input adopts internal +24V, set the toggle switch according to Figure 2-5 and short circuit +24V with PW. When digital input adopts external +24V, set the toggle switch according to Figure 2-6 and short circuit COM with PW.

2.2.2 Wiring diagram of control circuit

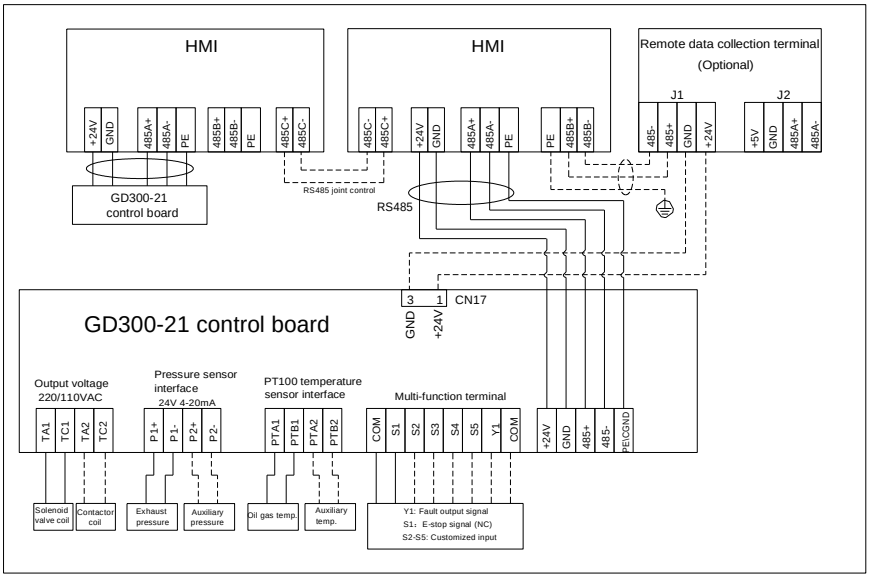


Figure 2-7 Wiring diagram of control circuit

Note: The solid line represents the recommended wiring diagram which carries the least wiring for ensuring system operation. The dotted line represents the wiring diagram used when discrepancy occurred to the configuration of integrated machine.

2.2.3 User terminal instruction of control circuit

Table 2-1 User terminal instruction of control circuit

Category	Symbol	Terminal name	Description
Power supply	+24V	+24V power supply	Used to externally provide +24V±5% power supply, max. output current: 1A Used for powering up GPRS, touch screen module
	GND	+24V power GND	Reference ground of the +24V power supply
PT100 signal input	PTA1	Temperature analog signal 1	1. Resolution rate: 1°C 2. Range: -20°C–150°C 3. Detection precision: 3°C
	PTB1		
	PTA2	Temperature analog signal 2	
	PTB2		
Pressure signal	P1+	Pressure	1. Input range: Current and voltage is optional,

Category	Symbol	Terminal name	Description
input	P1-	analog signal 1	4–20mA/2–10V corresponds to 0–1.6MPa; P1 is switched by jumper J7 while P2 by J8 2. Input impedance: 20kΩ for voltage input; 500Ω for current input 3. Resolution rate: min. 5mV 4. Error: ±1%, 25°C
	P2+	Pressure analog signal 2	
	P2-		
Digital input	S1	Digital input 1	1. Internal impedance: 3.3kΩ 2. 12–30V voltage input is acceptable 3. Max. input frequency: 1kHz
	S2	Digital input 2	
	S3	Digital input 3	
	S4	Digital input 4	
	S5	Digital input 5	
	COM	Digital reference GND	
Digital output	Y1	Digital output	1. Switch capacity: 50mA/30V 2. Output frequency range: 0–1kHz
Communication	485+, 485-	RS485 communication	RS485 communication terminals, using the Modbus RTU protocol
PE/CGND	PE/CGND		PE: When select PE by J9, it can be used in connection terminal of 485 communication shielded cable; CGND: When select CGND by J10, it can be used in connection terminal of 485 communication reference GND or shielded cable.
Solenoid valve	TA1	Solenoid valve coil	1. Contact capacity: 3A/AC250V, 1A/DC30V 2. Cannot used as high frequency switch output 3. Voltage of power supply: 220V/110V, select via CN7/CN8 4. Max. output power of internal power frequency transformer: 30W
	TC1		
	TA2	Contactor coil	
	TC2		

Note: The connection terminal of solenoid valve/contactor cannot be connected to other load. When the power of solenoid valve and contactor coil exceeds 30W, the power frequency transformer inside the integrated machine needs to be customized or connected with external 220V power independently.

3 Instruction for panel display

The panel of GD300-21 series air compressor integrated machine carries three LED indicators (fault, running, power). The position and display state of the indicators are illustrated as below:

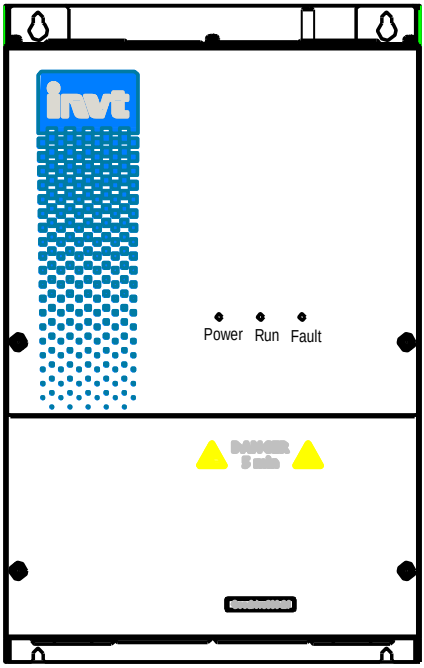


Figure 3-1 Diagram of indicator position

Display state of indicators		State instruction
Power indicator (green)	ON	Bus voltage is normal
	Blinking	Bus voltage is abnormal
Running indicator (green)	ON	Run
	OFF	Stop
Fault indicator (read)	ON	Fault
	OFF	Normal running

4 Commissioning guidelines

4.1 Wiring diagram of integrated machine system

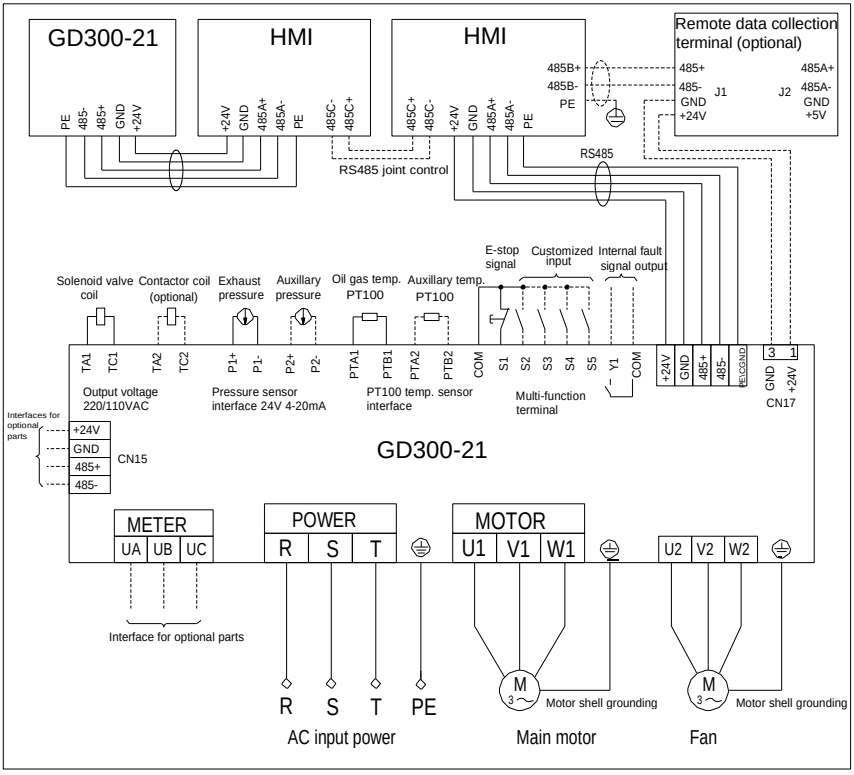


Figure 4-1 Wiring diagram of integrated machine system

Note: The solid line represents the recommended wiring diagram which carries the least wiring for ensuring system operation. The dotted line represents the wiring diagram used when discrepancy occurred to the configuration of integrated machine.

4.2 Recommended wiring process

The terminal layout of 15–22kW, 30kW–37kW and 45–90kW slightly differs from each other. 15–22kW and 45–90kW are taken as examples for wall-mounting wiring.

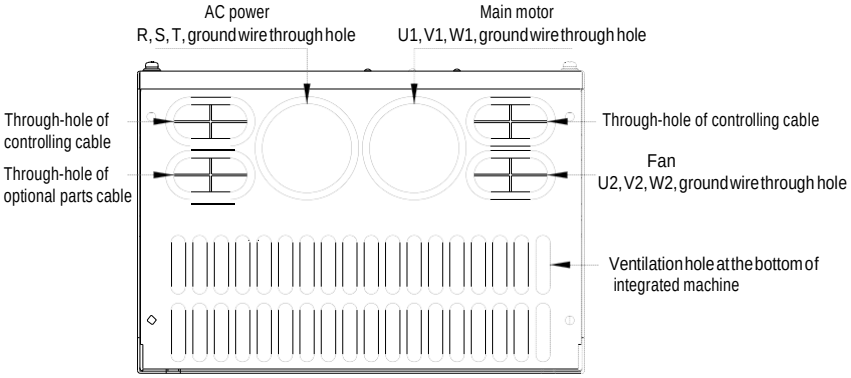


Figure 4-2 Bottom view for 15–22kW

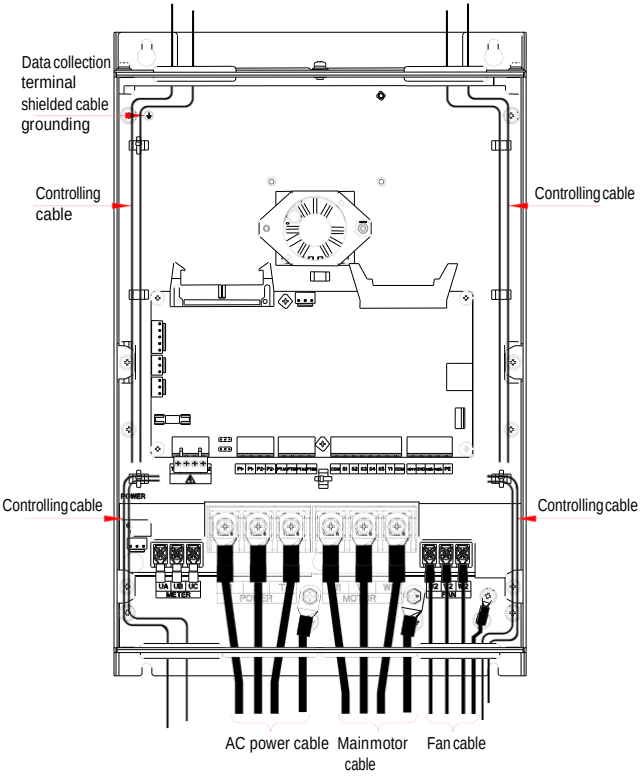


Figure 4-3 Front wiring diagram for 15–22kW

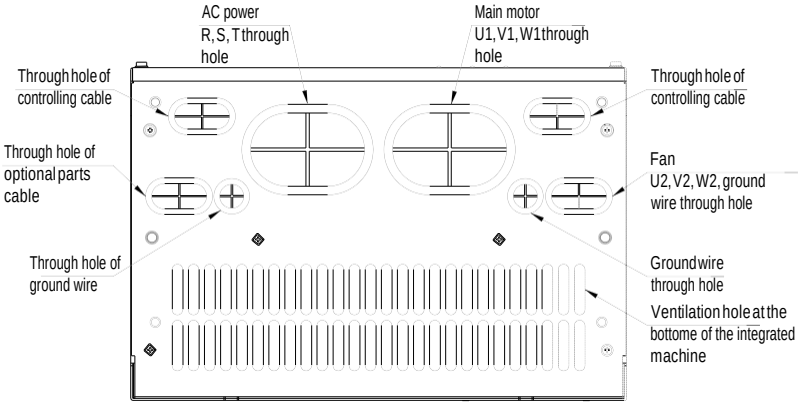


Figure 4-4 Bottom view for 45–90kW

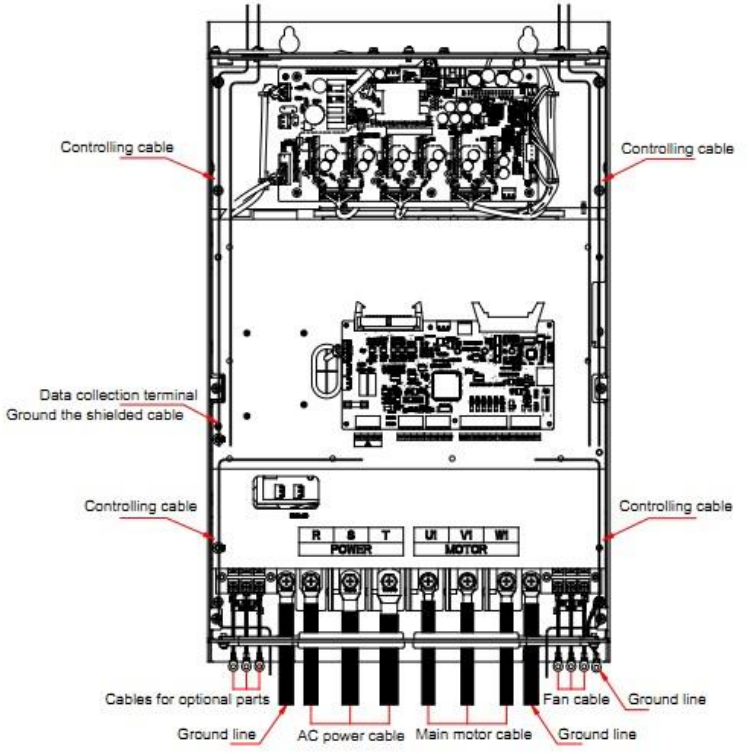


Figure 4-5 Front wiring diagram for 45–90kW

Note:

1. There are two controlling cable through holes on the top and at the bottom of the integrated machine cabinet, users can select which through-hole to use based on wiring condition. It is recommended that the controlling cable is routed via top through-hole to realize separation between controlling cable and motor cable and reduce interference. The motor temperature detection or temperature protection cable which follows the motor power cable can be routed via bottom through-hole.
2. Refer to B.4.3 Installation diagram of optional pedestal for floor installation layout.

4.3 Function commissioning procedure

It is recommended that GD300-21 air compressor integrated machine adopt touch screen for displaying and commissioning. The concrete procedures are listed as follows: (if other controllers are used, contact our technician)

1. Conduct wiring and routing according to “4.1 Wiring diagram of integrated machine system” and “4.2 Recommended wiring process“; check carefully if the wiring is correct and ensure the integrated machine and its shell GND is properly connected.
2. After power on, the touch screen HMI interface is shown as follows:

Figure 4-6 Login interface

3. Click "Enter" to enter the working environment interface, as shown in the following figure:

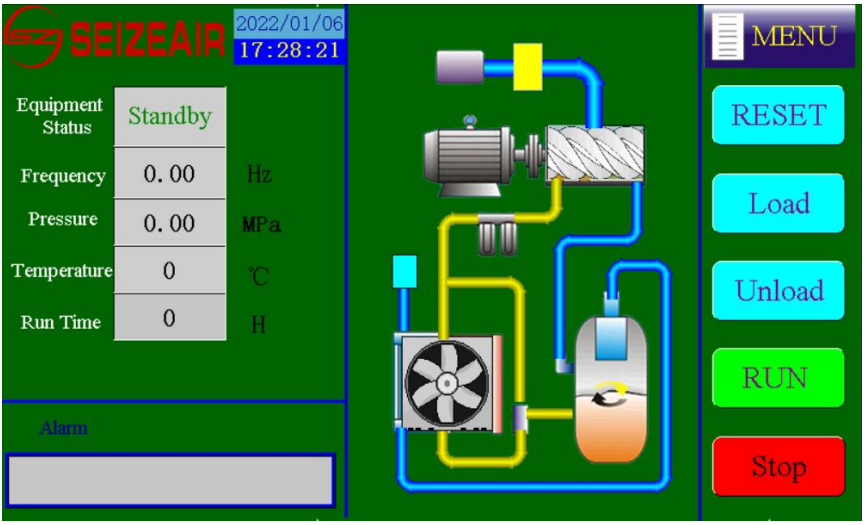


Figure 4-7 Working interface

4. Click "MENU" in above interface and the interface is as follows:

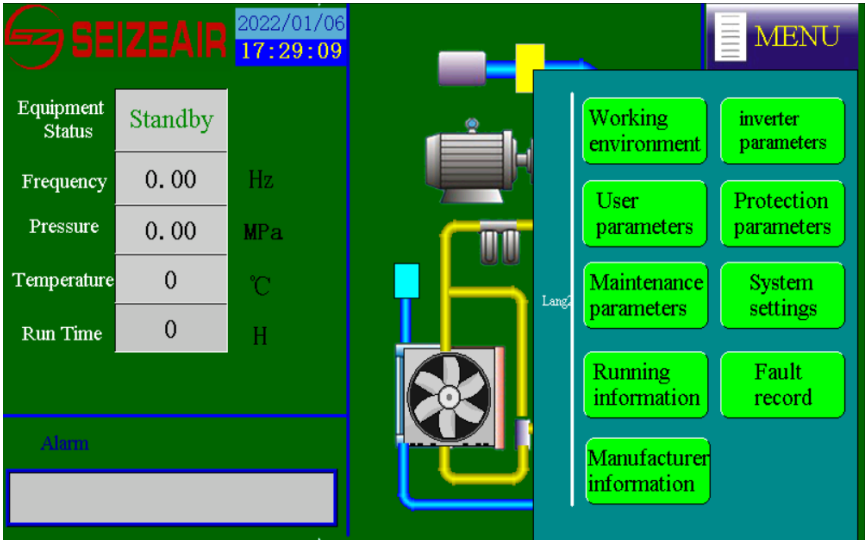


Figure 4-8 Menu interface

5. Click "System configuration" in touch screen menu to enter the system configuration page, as shown in the following figure:

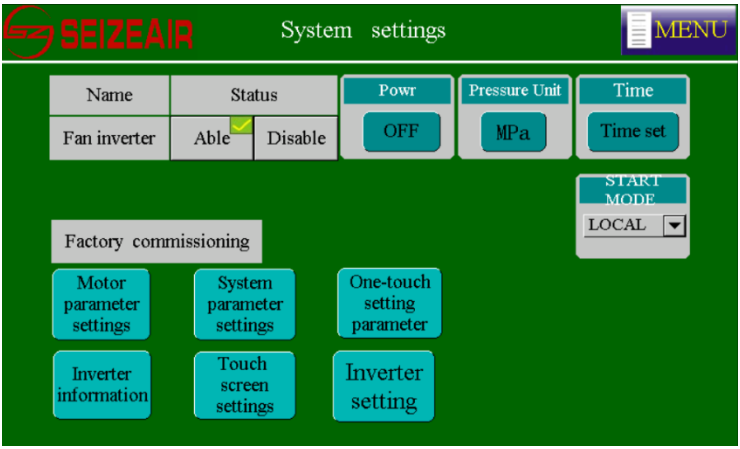


Figure 4-9 System configuration interface

The fan inverter is enabled by default. Debug according to the debugging procedures.

Step 1 Click "Motor parameter setting" in system configuration interface and the interface is shown as follows:

- ✧ If the Motor type is set to "Synchronous", the max. frequency, Rated power, Rated frequency, Rated voltage, Rated current, Pole pairs, and Carrier frequency are required.
- ✧ If the Motor type is set to "Asynchronous", the max. frequency, Rated power, Rated frequency, Rated voltage, Rated current, Rated speed, and Carrier frequency are required.

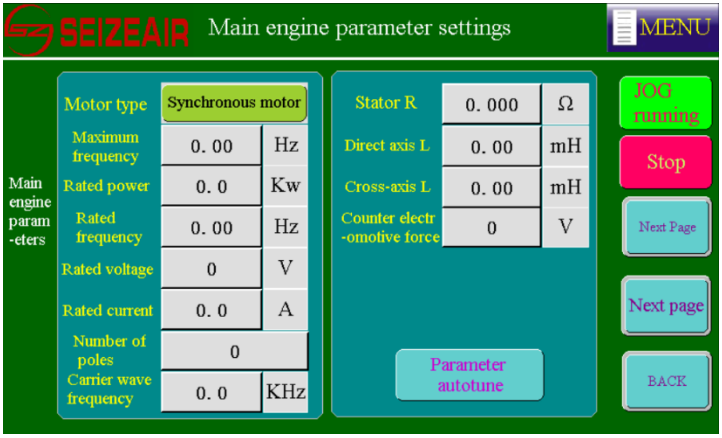


Figure 4-10 Main (synchronous) motor parameters setting interface

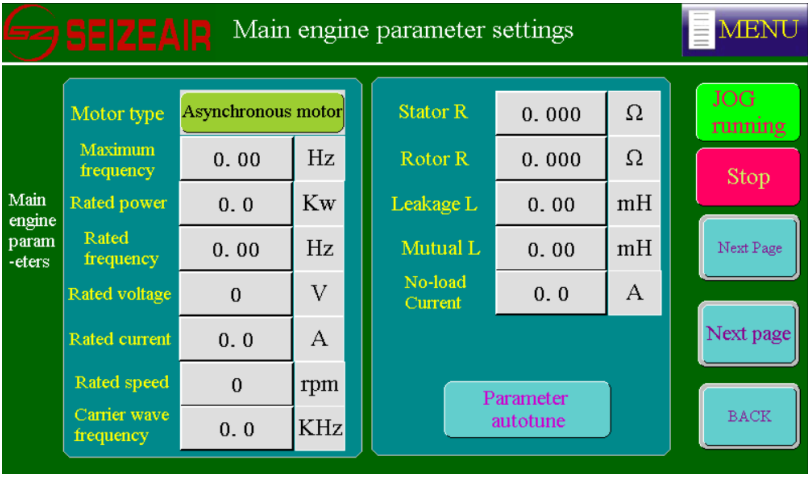


Figure 4-11 Main (asynchronous) motor parameters setting interface

Step 2 After setting motor parameters according to actual motor nameplate parameters, click "Autotun" and after recognition completes, click "Next" and set fan motor parameter (Max. frequency, Rated power, Rated frequency, Rated voltage, Rated current and Rated rotation speed are required.)

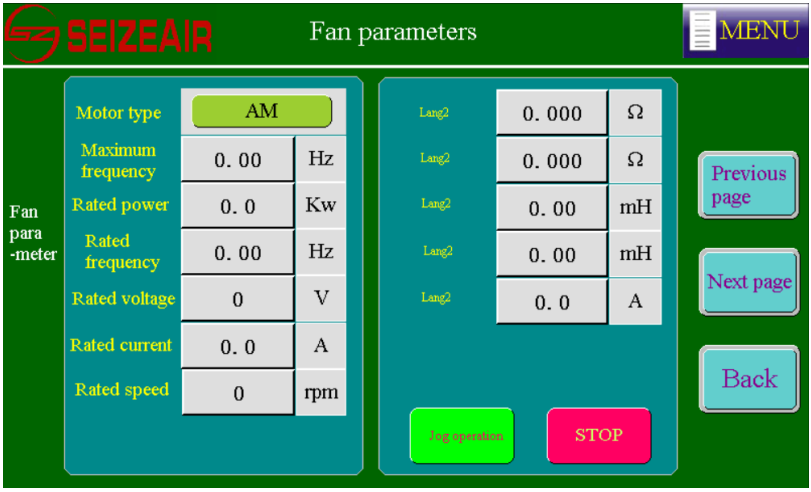


Figure 4-12 Fan motor parameters setting interface

Step 3 In system configuration interface, click "One button setting" button and the system will complete relevant parameter configuration automatically.

For details about parameter configuration, see the following table:

Function code	Configuration value	Description
P00.00	0 or 2	0: Vector control (SM) 2: VF control (AM) Select according to the motor type.
P00.01	2	2: Communication
P00.06	7	Main frequency PID control setting
P01.15	35.00	Stop frequency: 35Hz
P03.27	1	Vector control speed displayed by set value
P09.00	10	Pressure setting for air compressor
P09.02	8	Pressure feedback for air compressor
P11.15	0	No speed deviation protection
P05.01	6	Coast to stop
P05.10	3	Reverse S1, S2 terminal polarities
P05.02	46	External fault (motor over-temperature)
P06.03	28	Solenoid valve control output
P06.04	29	Fan start/stop control
P05.32	2.04	P1 lower limit corresponds to voltage 2.04V

Step 4 In system configuration interface, click “System parameters setting”. When S1 functions as emergency-stop switch, select **NO** or **NC** based on the polarity of the emergency-stop switch. When S2 functions as motor overtemperature switch, select **NC** based on the polarity.

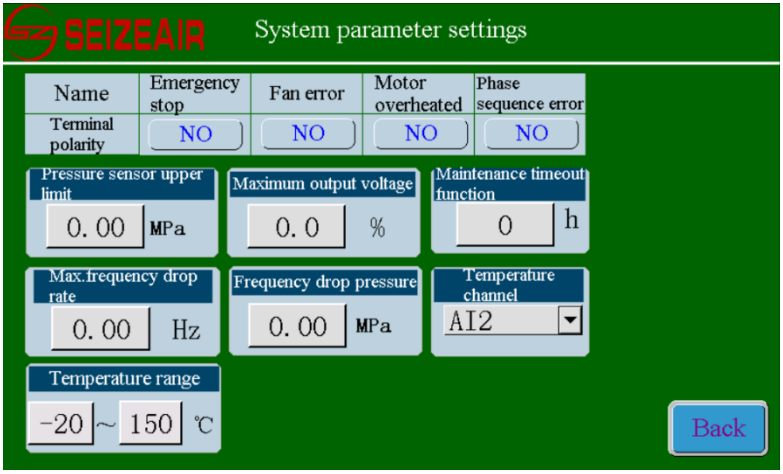


Figure 4-13 System parameter configuration interface

Set pressure sensor parameter, temperature sensor parameter and specialized function parameter according to system sensor configuration condition. Then, click “Return” to enter system configuration page.

Step 5 In system configuration interface, click “Debug mode” and the interface is shown as follows:

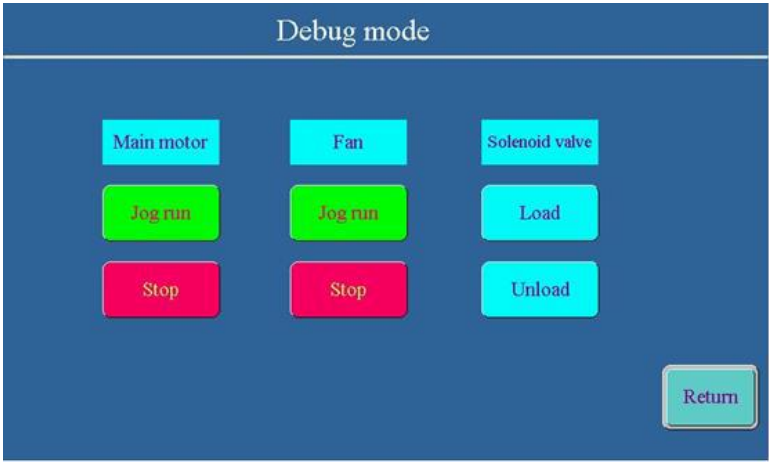


Figure 4-14 Debugging mode interface(Some models don't have this page)

Click "Jog run" for motor and fan to determine motor rotation direction; click "Load" or "Unload" to test the action of solenoid valve. Click "Return" to enter system configuration, then, click “MENU” to return menu interface.

Note: If the motor runs reversely, please adjust the motor wiring sequence.

6. Tap “User parameters” in touch screen menu and the interface is shown as follows:

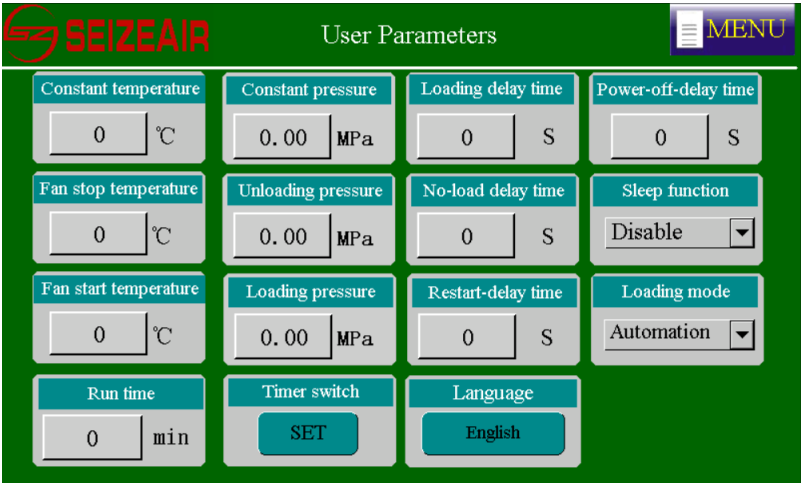


Figure 4-15 User parameter interface

7. Click "Maintenance parameters" in touch screen menu and the interface is shown as follows:

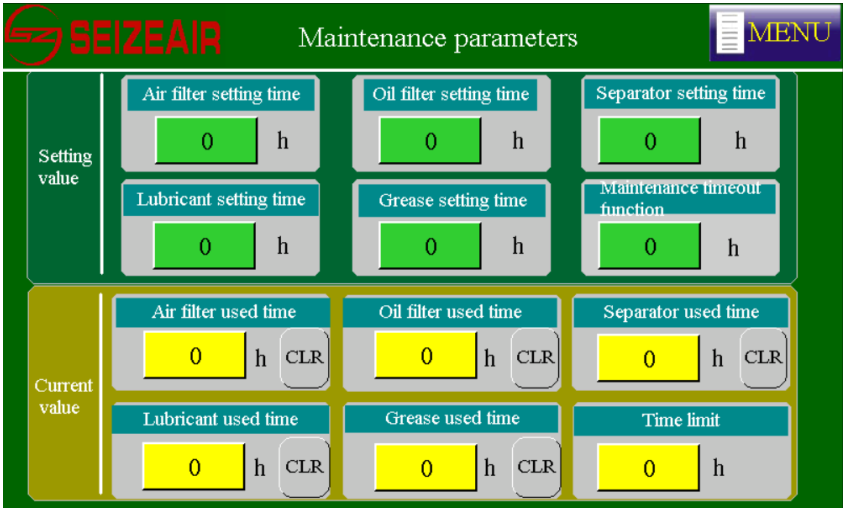


Figure 4-16 Maintenance parameter interface

8. Click "Protection parameters" in the menu and the interface is shown as follows:

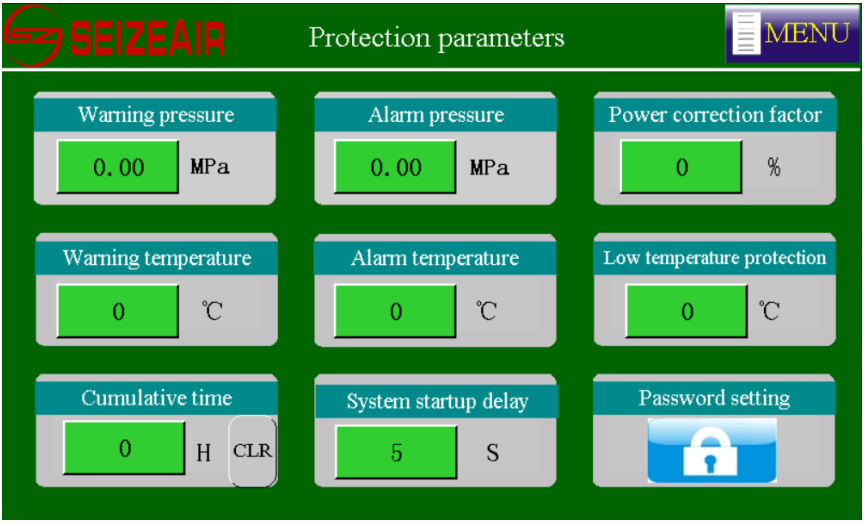


Figure 4-17 Protection parameter interface

9. Click “Running information” in the menu and the interface is shown as follows:

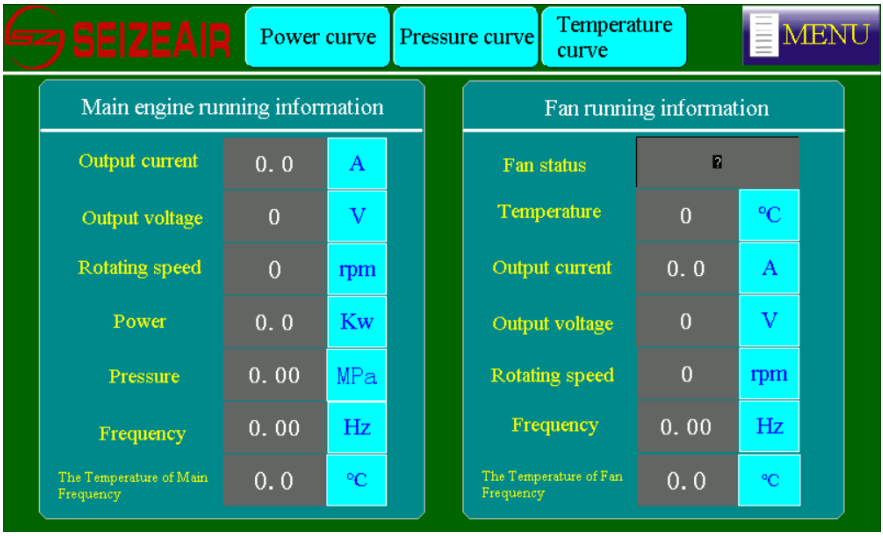


Figure 4-18 Running information interface

10. After adjusting user parameter, factory parameter, maintenance parameter according to touch screen manual, return to the working interface and click “RUN” to run.

Note: All the parameters displayed in 4.3 Function commissioning procedure are for reference only and subject to actual displayed content.

5 Function description

"○" indicates that the value of the parameter can be modified when the inverter is in stopped or running state.

"◎" indicates that the value of the parameter cannot be modified when the inverter is in running state.

"●" indicates that the value of the parameter is detected and recorded, and cannot be modified.

(The inverter automatically checks and constrains the modification of parameters, which helps prevent incorrect modifications.)

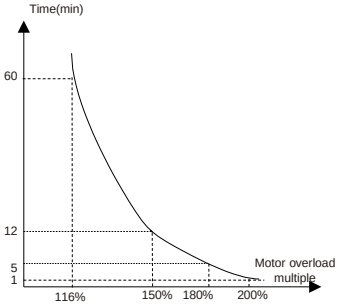
5.1 Function code instruction

Function code	Name	Description	Default	Modify
P00.00	Speed control mode	0: Sensorless vector control (SVC) mode 0 (for AM, SM) 1: SVC mode 1 (for AM) 2: V/F control AM-asynchronous motor SM-synchronous motor	0	◎
P00.01	Channel of running commands	0: Keypad (the indicator is off) 1: Terminal (the indicator blinks) 2: Communication (the indicator is on)	0	○
P00.02	Communication mode of running commands	0: MODBUS communication channel 1–3: Reserved	0	○
P00.03	Max. output frequency	P00.04–600.00Hz (400.00Hz)	50.00Hz	◎
P00.04	Upper limit of running frequency	P00.03–P00.05 (Max. frequency) Setting range: P00.03–P00.06	50.00Hz	○
P00.05	Lower limit of running frequency	0.00Hz–P00.04 (Upper limit of running frequency)	0.00Hz	○
P00.06	Setting channel of A frequency command	0: Keypad 1: Analog P1-setting	0	○
P00.07	Setting channel of B frequency command	2: Reserved 3: Analog P2-setting 4: Reserved 5: Reserved 6: Multi-step speed running 7: PID control 8: MODBUS communication	2	○

Function code	Name	Description	Default	Modify
		9–11: Reserved **Note: A frequency and B frequency cannot be set to the same frequency reference mode. Frequency source can be set by P00.09.**		
P00.08	Reference object of B frequency command	0: Max. output frequency 1: A frequency command	0	○
P00.09	Combination mode of setting source	0: A 1: B 2: (A+B) 3: (A- B) 4: Max(A, B) 5: Min. (A, B)	0	○
P00.10	Frequency set through keypad	0.00 Hz–P00.03 (Max. output frequency)	50.00Hz	○
P00.11	ACC time 1	0.0–3600.0s	Model depended	○
P00.12	DEC time 1	0.0–3600.0s	Model depended	○
P00.13	Running direction	0: Run at the default direction. 1: Run at the opposite direction. 2: Disable reverse running	2	○
P00.14	Carrier frequency	1.0–15.0kHz	Model depended	○
P00.15	Motor parameter autotuning	0: No operation 1: Rotary autotuning 2: Static autotuning 1 (all-around autotuning) 3: Static autotuning 2 (partial autotuning)	0	◎
P00.16	AVR function selection	0: Disable 1: Valid during the whole procedure	1	○
P00.17	Inverter type	0: G type 1: P type	0	◎
P00.18	Function parameter restore	0: No operation 1: Restore default values 2: Clear fault records 3– 6: Reserved	0	◎

Function code	Name	Description	Default	Modify
		7: Parameter 1 for customer 1 8: Parameter 2 for customer 1 9: Parameter for customer 2 10: Parameter for customer 3 **Note:** When the factory setting is restored, the motor parameters in group P02 keep the current value unchanged. In addition, the values of P05.38, P05.40, P05.48, P05.50 in group P05, and P18.04, P18.28, P18.29, P18.32, P18.33, P18.38 in group P18 remain unchanged.		
P01.01	Starting frequency of direct start	0.00–50.00Hz	0.50Hz	◎
P01.08	Stop mode	0: Decelerate to stop 1: Coast to stop	0	○
P01.15	Stop speed	0.00–100.00Hz	0.50Hz	◎
P01.16	Stop speed detection mode	0: Detect by the setting value of the speed (determine the ramps frequency) 1: Detect by the feedback value of the speed (valid only for vector control)	1	◎
P01.17	Feedback speed detection time	0.00–100.00 s (valid when P01.16=1)	0.50s	◎
P02.00	Type of motor 1	0: Asynchronous motor (AM) 1: Synchronous motor (SM)	0	◎
P02.01	Rated power of AM 1	0.1–3000.0kW	Model depended	◎
P02.02	Rated frequency of AM 1	0.01Hz–P00.03 (Max. output frequency)	50.00Hz	◎
P02.03	Rated speed of AM 1	1–36000rpm	Model depended	◎
P02.04	Rated voltage of AM 1	0–1200V	Model depended	◎
P02.05	Rated current of AM 1	0.8–6000.0A	Model depended	◎
P02.06	Stator resistance of AM 1	0.001–65.535Ω	Model depended	○
P02.07	Rotor resistance of AM 1	0.001–65.535Ω	Model depended	○

Function code	Name	Description	Default	Modify
P02.08	Leakage inductance of AM 1	0.1–6553.5mH	Model depended	○
P02.09	Mutual inductance of AM 1	0.1–6553.5mH	Model depended	○
P02.10	No-load current of AM 1	0.1–6553.5A	Model depended	○
P02.11	Magnetic saturation coefficient 1 of iron core of AM 1	0.0–100.0%	80.0%	◎
P02.12	Magnetic saturation coefficient 2 of iron core of AM 1	0.0–100.0%	68.0%	◎
P02.13	Magnetic saturation coefficient 3 of iron core of AM 1	0.0–100.0%	57.0%	◎
P02.14	Magnetic saturation coefficient 4 of iron core of AM 1	0.0–100.0%	40.0%	◎
P02.15	Rated power of SM 1	0.1–3000.0kW	Model depended	◎
P02.16	Rated frequency of SM 1	0.01Hz–P00.03 (Max. output frequency)	50.00Hz	◎
P02.17	Number of pole pairs of SM 1	1–50	2	◎
P02.18	Rated voltage of SM 1	0–1200V	Model depended	◎
P02.19	Rated current of SM 1	0.8–6000.0A	Model depended	◎
P02.20	Stator resistance of SM 1	0.001–65.535Ω	Model depended	○
P02.21	Direct-axis inductance of SM 1	0.01–655.35mH	Model depended	○
P02.22	Quadrature-axis inductance of SM 1	0.01–655.35mH	Model depended	○
P02.23	Counter-emf constant of SM 1	0–10000	350	○

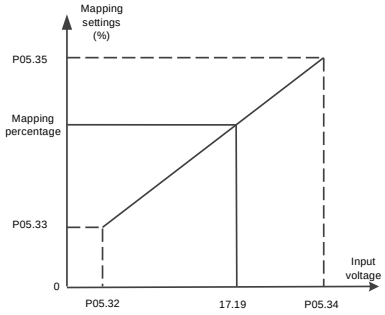
Function code	Name	Description	Default	Modify
P02.26	Overload protection of motor 1	0: No protection 1: Common motor (with low-speed compensation) 2: Frequency-variable motor (without low-speed compensation)	2	◎
P02.27	Overload protection coefficient of motor 1	Motor overload multiples M=Iout/(In*K) “In” is rated motor current, “Iout” is inverter output current, “K” is motor overload protection coefficient. A smaller value of “K” indicates a bigger value of “M”. When M=116%, protection is performed after motor overload lasts for 1 hour; when M=150%, protection is performed after motor overload lasts for 12 minutes; when M=200%, protection is performed after motor overload lasts for 60 seconds; and when M≥400%, protection is performed immediately.  Setting range: 20.0%–120.0%	100.0%	○
P02.28	Power calibration coefficient of motor 1	0.00–3.00	1.00	○
P02.29	Parameter display of motor 1	0: Display based on motor type 1: Display all	0	○
P03.00	Speed-loop proportional gain 1	0–200.0	20.0	○
P03.01	Speed-loop integral time 1	0.000–10.000s	0.200s	○

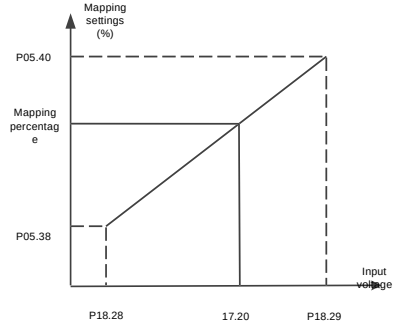
<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Default</th><th>Modify</th></tr>
<tr><td>P03.02</td><td>Low-point frequency for switching</td><td>0.00Hz–P03.05</td><td>5.00Hz</td><td>○</td></tr>
<tr><td>P03.03</td><td>Speed-loop proportional gain 2</td><td>0–200.0</td><td>20.0</td><td>○</td></tr>
<tr><td>P03.04</td><td>Speed-loop integral time 2</td><td>0.000–10.000s</td><td>0.200s</td><td>○</td></tr>
<tr><td>P03.05</td><td>High-point frequency for switching</td><td>P03.02–P00.03 (Max. frequency)</td><td>10.00Hz</td><td>○</td></tr>
<tr><td>P03.06</td><td>Speed-loop output filter</td><td>0–8 (corresponding to 0–2^8/10ms)</td><td>0</td><td>○</td></tr>
<tr><td>P03.07</td><td>Electromotive slip compensation coefficient of vector control</td><td>50%–200.0%</td><td>100%</td><td>○</td></tr>
<tr><td>P03.08</td><td>Vector control power generation slip compensation coefficient</td><td>50%–200.0%</td><td>100%</td><td>○</td></tr>
<tr><td>P03.09</td><td>Current-loop proportional coefficient P</td><td>0–65535
In differing power ranges, the default values of P03.09 and P03.10 are different. Set power ranges by touch screen and they will be set to the following empirical parameters after autotuning.</td><td>Model depended</td><td>○</td></tr>
<tr><td>P03.10</td><td>Current-loop integral coefficient I</td><td>
<table>
<tr><th>Empirical value of P03.09 (for reference only)</th><th>Empirical value of P03.10 (for reference only)</th><th>Motor power</th></tr>
<tr><td>2000</td><td>1000</td><td>15kW</td></tr>
<tr><td>2000</td><td>1000</td><td>18.5kW</td></tr>
<tr><td>2000</td><td>1000</td><td>22kW</td></tr>
<tr><td>2500</td><td>1500</td><td>37kW</td></tr>
<tr><td>3000</td><td>1500</td><td>55kW</td></tr>
<tr><td>3000</td><td>1500</td><td>75kW</td></tr>
<tr><td>3000</td><td>1500</td><td>90kW</td></tr>
</table>
</td><td>Model depended</td><td>○</td></tr>
</table>

Function code	Name	Description	Default	Modify
P03.20	Electromotive torque upper limit set through keypad	0.0–300.0% (of the motor rated current)	180.0%	○
P03.21	Braking torque upper limit set through keypad	0.0–300.0% (of the motor rated current)	180.0%	○
P03.22	Weakening coefficient in constant power zone	0.1–2.0	0.3	○
P03.23	Lowest weakening point in constant power zone	10%–100.0%	20%	○
P03.24	Max. voltage limit	0.0–120.0%	100.0%	○
P03.25	Pre-exciting time	0.000–10.000s	0.300s	○
P03.26	Flux-weakening proportional gain	0–8000	300	○
P03.27	Speed display selection in vector control	0: Display the actual value 1: Display the set value	0	○
P03.28	Injected current at start	0.0–100.0%; setting range: 0–100.0	60.0%	○
P03.29	Inductance coefficient	0.2–4.0; setting range: 0.2–4.0	1.0	○
P04.00	V/F curve setting of motor 1	0: Straight-line V/F curve 1: Multi-point V/F curve 2: Torque-down V/F curve (power of 1.3) 3: Torque-down V/F curve (power of 1.7) 4: Torque-down V/F curve (power of 2.0) 5: Reserved	0	◎
P04.01	Torque boost of motor 1	0.0%: (automatic) 0.1%–10.0%	0.0%	○
P04.02	Torque boost cut-off of motor 1	0.0%–50.0% (of the rated frequency of motor 1)	20.0%	○
P04.03	V/F frequency point 1 of motor 1	0.00Hz–P04.05	0.00Hz	○
P04.04	V/F voltage point 1 of motor 1	0.0%–110.0% (of the rated voltage of motor1)	00.0%	○

Function code	Name	Description	Default	Modify
P04.05	V/F frequency point 2 of motor 1	P04.03–P04.07	00.00Hz	○
P04.06	V/F voltage point 2 of motor 1	0.0%–110.0% (of the rated voltage of motor 1)	00.0%	○
P04.07	V/F frequency point 3 of motor 1	P04.05–P02.02 (Rated frequency of motor 1) / P04.05–P02.16 (Rated frequency of motor 1)	00.00Hz	○
P04.08	V/F voltage point 3 of motor 1	0.0%–110.0% (of the rated voltage of motor 1)	00.0%	○
P04.09	V/F slip compensation gain of motor 1	0.0–200.0%	100.0%	○
P04.10	Low-frequency oscillation control factor of motor 1	0–100	10	○
P04.11	High-frequency oscillation control factor of motor 1	0–100	10	○
P04.12	Oscillation control threshold of motor 1	0.00Hz–P00.03 (Max. output frequency)	30.00Hz	○
P04.26	Energy-saving run	0: Disable 1: Automatic energy-saving run	0	◎
P04.33	Weakening coefficient in constant power zone	1.00–1.30	1.00	○
P04.34	Reactive closed-loop proportional coefficient	0–3000	100	○
P04.35	Reactive closed-loop integral coefficient	0–3000	20	○
P05.00	Reserved	Reserved	0	◎
P05.01	Function of S1	0: No function 1: Run forward 2: Run reversely 3: Three-wire running control	0	◎
P05.02	Function of S2		0	◎
P05.03	Function of S3		0	◎
P05.04	Function of S4		0	◎

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Default</th><th>Modify</th></tr>
<tr><td>P05.05</td><td>Function of S5</td><td>4: Jog forward</td><td>0</td><td>◎</td></tr>
<tr><td>P05.06</td><td>Reserved</td><td>5: Jog reversely
6: Coast to stop
7: Reset faults
8: Pause running
9: External fault input
10–24: Reserved
25: Pause PID control
26–39: Reserved
40: Clear electricity consumption
41: Keep electricity consumption
42: Air filter block signal
43: Oil filter block signal
44: Separator block signal
45: Splitter block signal
46: External fault 1
47: External fault 2
48: Fan running control signal
49: Solenoid valve control signal
50: Cooling fan control signal of main motor
51–63: Reserved</td><td></td><td></td></tr>
<tr><td>P05.10</td><td>Input terminal polarity</td><td>The function code is used to set the polarity of input terminals.
When a bit is 0, the input terminal is positive; when a bit is 1, the input terminal is negative.
<table><tr><td></td><td>BIT8</td><td>BIT7</td><td>BIT6</td><td>BIT5</td></tr><tr><td></td><td>Reserved</td><td>Reserved</td><td>Reserved</td><td>Reserved</td></tr><tr><td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr><tr><td>S5</td><td>S4</td><td>S3</td><td>S2</td><td>S1</td></tr></table>Setting range: 0x000–0x1FF</td><td>0x000</td><td>○</td></tr>
<tr><td>P05.11</td><td>Digital input filter time</td><td>0.000–1.000s</td><td>0.200s</td><td>○</td></tr>
<tr><td>P05.14</td><td>S1 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.15</td><td>S1 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.16</td><td>S2 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.17</td><td>S2 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
</table>

Function code	Name	Description	Default	Modify
P05.18	S3 switch-on delay	0.000–50.000s	0.000s	○
P05.19	S3 switch-off delay	0.000–50.000s	0.000s	○
P05.20	S4 switch-on delay	0.000–50.000s	0.000s	○
P05.21	S4 switch-off delay	0.000–50.000s	0.000s	○
P05.22	S5 switch-on delay	0.000–50.000s	0.000s	○
P05.23	S5 switch-off delay	0.000–50.000s	0.000s	○
P05.32	P1 lower limit	 P05.32 setting range: 0.00V–P05.34 P05.33 setting range: -100.0% –100.0% P05.34 setting range: P05.32–10.00V P05.35 setting range: -100.0% –100.0%	2.00V	○
P05.33	Corresponding setting of P1 lower limit		0.0%	○
P05.34	P1 upper limit		10.00V	○
P05.35	Corresponding setting of P1 upper limit		100.0%	○
P05.36	P1 input filter time	0.000s–10.000s	0.200s	○
P05.37	PT1 lower limit	Corresponding setting of the upper and lower limits are the percentage of temperature calibration point within the total range. The percentage of analog input voltage can be derived from the linear relationship between the limits and their corresponding settings. Current temperature = Corresponding percentage × 160℃ Note: When the factory setting is restored, the value of P05.38/P05.40/P05.48/P05.50 remains unchanged. P05.37 setting range: 0.00V–P05.39 P05.38 setting range: -100.0% –100.0% P05.39 setting range: P05.37–10.00V P05.40 setting range: -100.0% –100.0%	0.00V	○
P05.38	Corresponding setting of PT1 lower limit		12.5%	○
P05.39	PT1 upper limit		10.00V	○
P05.40	Corresponding setting of PT1 upper limit		75.0%	○

Function code	Name	Description	Default	Modify
				
P05.41	PT1 input filter time	0.000s–10.000s	0.300s	○
P05.42	P2 lower limit	0.00V–P05.44	2.00V	○
P05.43	Corresponding setting of P2 lower limit	-100.0%–100.0%	0.0%	○
P05.44	P2 upper limit	P05.42–10.00V	10.00V	○
P05.45	Corresponding setting of P2 upper limit	-100.0%–100.0%	100.0%	○
P05.46	P2 input filter time	0.000s–10.000s	0.200s	○
P05.47	PT2 lower limit	0.00V–P05.49	0.00V	○
P05.48	Corresponding setting of PT2 lower limit	-100.0%–100.0%	12.5%	○
P05.49	PT2 upper limit	P05.47–10.00V	10.00V	○
P05.50	Corresponding setting of PT2 upper limit	-100.0%–100.0%	75.0%	○
P05.51	PT2 input filter time	0.000s–10.000s	0.300s	○
P06.01	Y1 output	0: Disable	5	○
P06.02	Reserved	1: Running	0	○
P06.03	TAC1 output	2: Running forward	0	○
P06.04	TAC2 output	3: Running reversely 4: Jogging 5: Inverter in fault 6–11: Reserved	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Description</th><th>Default</th><th>Modify</th></tr>
<tr><td></td><td></td><td>12: Ready for running
13: Pre-exciting
14–19: Reserved
20: External fault is valid
21–22: Reserved
23: Modbus communication virtual terminal output
24–25: Reserved
26: Special for oil pump (for blower)
27: Auxiliary motor start/stop control (for air compressor)
28: Solenoid valve control output (for air compressor)
29: Cooling fan control of main motor (for air compressor)
30: Reserved</td><td></td><td></td></tr>
<tr><td>P06.05</td><td>Output terminal polarity selection</td><td>The function code is used to set the polarity of output terminals.
When a bit is 0, the input terminal is positive; when a bit is 1, the input terminal is negative.
<table><tr><th>BIT3</th><th>BIT2</th><th>BIT1</th><th>BIT0</th></tr><tr><td>TAC2</td><td>TAC1</td><td>Reserved</td><td>Y</td></tr></table>Setting range: 0–0xF</td><td>0</td><td>○</td></tr>
<tr><td>P06.06</td><td>Y switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.07</td><td>Y switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.08</td><td>Reserved</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.09</td><td>Reserved</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.10</td><td>TAC1 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.11</td><td>TAC1 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.12</td><td>TAC2 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.13</td><td>TAC2 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
</table>

Function code	Name	Description	Default	Modify
P07.00	User password	0–65535	0	○
P07.01	Parameter copy	0: No operation 1: Upload parameters from the local address to the keypad 2: Download parameters (including motor parameters) from the keypad to the local address 3: Download parameters (excluding groups P02 and P12) from the keypad to the local address 4: Download parameters (only including groups P02 and P12) from the keypad to the local address **Note:** After any operation among 1–4 is complete, the parameter restores to 0. The upload and download functions are not applicable to group P29. Tens place: Parameter group setting 0–4: Group 1–group 5 Setting range: 0x00–0x44	0x00	◎
P07.11	Rectifier bridge temperature	0–100.0°C		●
P07.12	Inverter temperature	0–100.0°C		●
P07.13	Control board software version	1.00–655.35		●
P07.14	Local accumulative running time	0–65535h		●
P07.15	Inverter electricity consumption high-order bits	0–65535 kWh (*1000)		●
P07.16	Inverter electricity consumption low-order bits	0.0–999.9 kWh		●
P07.17	Inverter model	0: G type 1: P type		●
P07.18	Inverter rated power	0.4–3000.0kW		●

Function code	Name	Description	Default	Modify
P07.19	Inverter rated voltage	50–1200V		●
P07.20	Inverter rated current	0.1–6000.0A		●
P07.21	Factory bar code 1	0x0000–0xFFFF		●
P07.22	Factory bar code 2	0x0000–0xFFFF		●
P07.23	Factory bar code 3	0x0000–0xFFFF		●
P07.24	Factory bar code 4	0x0000–0xFFFF		●
P07.25	Factory bar code 5	0x0000–0xFFFF		●
P07.26	Factory bar code 6	0x0000–0xFFFF		●
P07.27	Present fault type	0: No fault		●
P07.28	Last fault type	1: Inverter unit U-phase protection (OUt1)		●
P07.29	2nd-last fault type	2: Inverter unit V-phase protection (OUt2)		●
P07.30	3rd-last fault type	3: Inverter unit W-phase protection (OUt3)		●
P07.31	4th-last fault type	4: Overcurrent during acceleration (OC1)		●
P07.32	5th-last fault type	5: Overcurrent during deceleration (OC2) 6: Overcurrent during constant speed running (OC3) 7: Overvoltage during acceleration (OV1) 8: Overvoltage during deceleration (OV2) 9: Overvoltage during constant speed running (OV3) 10: Bus undervoltage fault (UV) 11: Motor overload (OL1) 12: Inverter overload (OL2) 13: Phase loss on input side (SPI) 14: Phase loss on output side (SPO) 15: Rectifier module overheat (OH1) 16: Inverter module overheat (OH2) 17: External fault (EF) 18: RS485 communication fault (CE) 19: Current detection fault (ItE) 20: Motor autotuning fault (tE) 21: EEPROM operation error (EEP) 22: PID feedback offline fault (PIDE) 23: Reserved 24: Running time reached (END)		●

Function code	Name	Description	Default	Modify
		25: Electronic overload (OL3) 26: Keypad communication error (PCE) 27: Parameter upload error (UPE) 28: Parameter download error (DNE) 29–31: Reserved 32: To-ground short-circuit fault 1 (ETH1) 33: To-ground short-circuit fault 2 (ETH2) 34: Speed deviation fault (dEu) 35: Mal-adjustment fault (STo) 36: Underload fault (LL) 37: Auxiliary fan fault (E_FAN) 38: Phase lock failure (PSF) 39–43: Reserved 44: Low auxiliary pressure fault (L-AUP) 45: Handshake failure (HAnd)		
P07.33	Running frequency at present fault		0.00Hz	●
P07.34	Ramp reference frequency at present fault		0.00Hz	●
P07.35	Output current at present fault		0V	●
P07.36	Output current at present fault		0.0A	●
P07.37	Bus voltage at present fault		0.0V	●
P07.38	Max. temperature at present fault		0.0°C	●
P07.39	Input terminal status at present fault		0	●
P07.40	Output terminal status at present fault		0	●
P07.41	Running frequency at last fault		0.00Hz	●
P07.42	Ramp reference frequency at last fault		0.00Hz	●

Function code	Name	Description	Default	Modify
P07.43	Output voltage at last fault		0V	●
P07.44	Output current at last fault		0.0A	●
P07.45	Bus voltage at last fault		0.0V	●
P07.46	Max. temperature at last fault		0.0°C	●
P07.47	Input terminal status at last fault		0	●
P07.48	Output terminal status at last fault		0	●
P07.49	Running frequency at last fault		0.00Hz	●
P07.50	Ramp reference frequency at 2nd-last fault		0.00Hz	●
P07.51	Output voltage at 2nd-last fault		0V	●
P07.52	Output current at 2nd-last fault		0.0A	●
P07.53	Bus voltage at 2nd-last fault		0.0V	●
P07.54	Max. temperature at 2nd-last fault		0.0°C	●
P07.55	Input terminal status at 2nd-last fault		0	●
P07.56	Output terminal status at 2nd-last fault		0	●
P08.15	Bus voltage pre-protection function	0–1	0	○
P08.16	Low voltage protection threshold	0.0V–2000.0V	300.0V	○
P08.17	Overvoltage pre-protection threshold	0.0V–2000.0V	780.0V	○

Function code	Name	Description	Default	Modify
P08.18	Delay time of automatic start-up	0.0–6000.0s	60.0s	○
P08.19	Low voltage frequency-limit running time	0.0–6000.0s	60.0s	○
P08.26	Counting mode of maintenance time	0–1 0: Counting during motor running 1: Counting during motor running and sleeping	0	○
P09.00	PID reference source	0: Keypad (P09.01) 1: Analog P1-reference 2: Reserved 3: Analog P2-setting 4: Reserved 5: Multi-step running 6: MODBUS communication 7–9: Reserved 10: Pressure setting for air compressor-specific function	0	○
P09.01	PID reference preset through keypad	-100.0%–100.0%	0.0%	○
P09.02	PID feedback source	0: Analog P1-feedback 1: Reserved 2: Analog P2-feedback 3: Reserved 4: MODBUS communication feedback 5–7: Reserved 8: Pressure feedback for air compressor-specific function	0	○
P09.03	PID output characteristics selection	0: PID output is positive. When the feedback signal is greater than the PID reference value, the output frequency of the inverter will decrease to balance the PID. Example: PID control on strain during unwinding. 1: PID output is negative. When the feedback signal is greater than the PID reference value, the output frequency of the inverter will	0	○

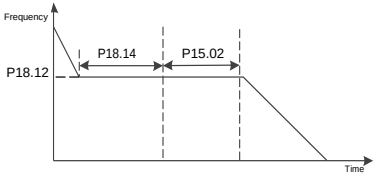
Function code	Name	Description	Default	Modify
		increase to balance the PID. Example: PID control on strain during unwinding.		
P09.04	Proportional gain (Kp)	P determines the strength of the whole PID adjuster. The larger the value of P, the stronger the adjustment intensity. The value 100 indicates that when the difference between the PID feedback value and given value is 100%, the range within which the proportional regulator (ignoring integral function and differential function) can regulate the output frequency command is the max. frequency (P00.03). Setting range: 0.00–100.00	10.00	○
P09.05	Integral time (Ti)	Used to determine the speed of the integral adjustment on the deviation of PID feedback and reference from the PID regulator. When the deviation of PID feedback and reference is 100%, the integral adjuster works continuously during the time (ignoring proportional and differential function) to achieve the max. output frequency (P00.03). Shorter integral time indicates stronger adjustment. Setting range: 0.00–10.00s	2.00s	○
P09.06	Differential time (Td)	Used to determine the strength of the change ratio adjustment on the deviation of PID feedback and reference from the PID regulator. If feedback quantity changes 100% during this time period, the range within which the differential regulator (ignoring integral function and differential function) can regulate is the max. frequency (P00.03). Longer differential time indicates stronger adjustment. Setting range: 0.00–10.00s	1.00s	○
P09.07	Sampling cycle (T)	Used to indicate the sampling cycle of feedback. The regulator calculates in each sampling cycle. A longer sampling cycle	0.100s	○

Function code	Name	Description	Default	Modify
		indicates slower response. Setting range: 0.001–10.000s		
P09.08	PID control deviation limit	The feedback value of the PID system is relative to the max. deviation of the closed loop reference. The PID regulator stops regulating in the range of deviation limit. Set the function parameter properly to adjust the accuracy and stability of the PID system. Setting range: 0.0–100.0%	0.1%	○
P09.09	PID output upper limit	P09.10–100.0% (Max. frequency)	100.0%	○
P09.10	PID output lower limit	-100.0%–P09.09 (Max. frequency)	0.0%	○
P09.11	Feedback offline detection value	0.0–100.0%	0.0%	○
P09.12	Feedback offline detection time	0.0–3600.0s	1.0s	○
P09.13	PID control selection	0x00–0x11 LED ones place: 0: Continue integral control after the frequency reaches upper/lower limit 1: Stop integral control after the frequency reaches upper/lower limit LED hundreds place: 0: Consistent with the set direction 1: Contrary to the set direction	0x01	○
P09.14	Differential filter times	0–60	2	○
P11.00	Protection against phase loss	0x0000–0x1111 LED ones place: 0: Software protection against input phrase loss disabled 1: Software protection against input phrase loss enabled **Note:** The ones place of the LED detects input phase loss by phase sequence detection circuit.	0x0110	○

Function code	Name	Description	Default	Modify
		LED tens place: 0: Output phrase loss protection disabled 1: Output phrase loss protection enabled LED hundreds place: 0: Hardware protection against input phrase loss disabled 1: Hardware protection against input phrase loss enabled **Note:** The hundreds place of the LED detects input phase loss by hardware detection circuit. LED thousands place: 0: Phase sequence protection disabled 1: Phase sequence protection enabled		
P11.01	Frequency drop at transient power-off	0: Disable 1: Enable	0	○
P11.02	Frequency drop rate at transient power-off	0.00Hz–P00.03 (Max. output frequency)/s	10.00Hz/s	○
P11.03	Overvoltage stalling protection	0: Disable 1: Enable	1	○
P11.04	Overvoltage stalling protection voltage	120–150% (standard bus voltage) (380V)	140%	○
P11.05	Current limit mode	0x00–0x11 Ones place: Current limit action selection 0: Invalid 1: Always valid Tens place: Hardware current limit overload alarm 0: Valid 1: Invalid	01	◎
P11.06	Automatic current limit threshold	50.0–200.0%	160.0%	◎
P11.07	Frequency drop rate during current limit	0.00–50.00Hz/s	10.00Hz/s	◎
P11.13	Fault output terminal action upon fault occurring	0x00–0x11 LED ones place: 0: Act upon an undervoltage fault	0x00	○

Function code	Name	Description	Default	Modify
		1: Do not act upon an undervoltage fault LED tens place: 0: Act during automatic reset 1: Do not act during the automatic reset period		
P11.14	Speed deviation detection value	0.0–50.0%	10.0%	○
P11.15	Speed deviation detection time	0.0–10.0s (No speed deviation protection for the value=0.0)	0.5s	○
P11.16	Automatic frequency-reduction during voltage drop	0: Disable 1: Enable	1	○
P13.00	Reduction coefficient of pull-in current	0.0–100.0%	50.0%	○
P13.01	Detection mode of initial pole	0: No detection 1: High frequency superimposition (reserved) 2: Pulse superimposition (reserved)	0	◎
P13.02	Pull-in current 1	0.0%–100.0% (of the motor rated current)	20.0%	○
P13.03	Pull-in current 2	0.0%–100.0% (of the motor rated current)	10.0%	○
P13.04	Source-current switchover frequency	0.00Hz–P00.03 (Max. output frequency)	30.00Hz	○
P13.05	High frequency overlay frequency (reserved)	200Hz–1000Hz	500Hz	◎
P13.06	High frequency superimposed voltage	0.0–300.0% (of the motor rated voltage)	40.0%	◎
P13.08	Control parameter 1	0–FFFF	0x120	○
P13.09	Control parameter 2	0–300.00	5.00	○
P13.11	Maladjustment detection time	Used to adjust the responsiveness of anti-maladjustment function. If the load inertia is large, increase the value of this parameter properly, however, the responsiveness may slow down accordingly. Setting range: 0.0–10.0s	0.5s	○

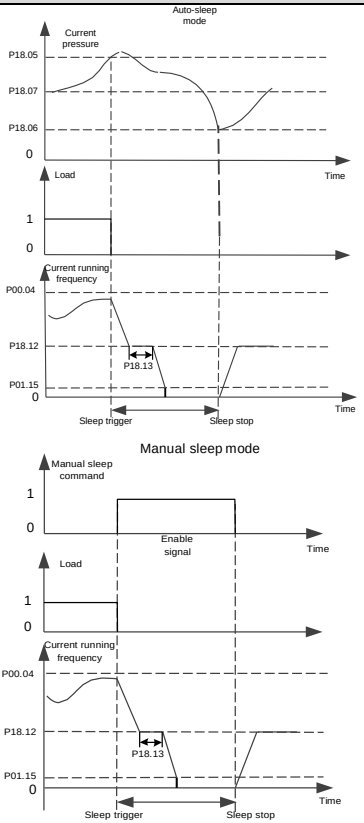
Function code	Name	Description	Default	Modify
P13.12	High frequency compensation coefficient	Valid when the motor speed exceeds the rated speed. If oscillation occurred to the motor, adjust this parameter properly. Setting range: 0.0–100.0%	50.0%	○
P14.00	Local communication address	1–247; 0 indicates a broadcast address	2	○
P14.01	Communication baud rate	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	4	○
P14.02	Data bit check	0: No check (N, 8, 1) for RTU 1: Even check (E, 8, 1) for RTU 2: Odd check (O, 8, 1) for RTU 3: No check (N, 8, 2) for RTU 4: Even check (E, 8, 2) for RTU 5: Odd check (O, 8, 2) for RTU	1	○
P14.03	Communication response delay	0–200ms	5	○
P14.04	Communication timeout time	0.0 (invalid), 0.1–60.0s	0.0s	○
P14.05	Transmission error processing	0: Report an alarm and coast to stop 1: Keep running without reporting an alarm 2: Stop in enabled stop mode without reporting an alarm (applicable only to communication mode) 3: Stop in enabled stop mode without reporting an alarm (applicable to any mode)	0	○
P14.06	Communication processing action	0x00–0x11 LED ones: Writing operation 0: Respond to write operations 1: Not respond to write operations LED tens: Communication encryption 0: Disabled 1: Enabled	0x00	○

Function code	Name	Description	Default	Modify
P14.07	Communication address of auxiliary fan	1–247; 0 indicates a broadcast address	1	○
P15.00	Auxiliary pressure start-up protection	0: Disable 1: Enable	0	◎
P15.01	Auxiliary pressure start-up protection setting value	0.00–20.00MPa The inverter cannot start if current auxiliary pressure (P19.20) is greater than auxiliary pressure start-up protection value (P15.01).	0.30MPa	○
P15.02	Stop delay time of auxiliary pressure start-up protection	0–300s When the auxiliary pressure start-up protection (P15.00=1) is turned on, if the current auxiliary pressure is still greater than the set value of P15.01 after the stop time delay (P18.14), the inverter will keep running at idle frequency and stop running after the delay time of P15.02.  	30s	○
P15.03	Pressure limit after the time threshold reached	0.00–P18.04MPa When the accumulated running time of the device (P19.16) reaches the set value of P15.04, the pressure cannot exceed the value of P15.03.	0.50MPa	○
P15.04	Upper limit of accumulated device running time	0–65535h **Note:** P15.03 is invalid when P15.04 is set to 0.	0	○
P15.05	Device status flag	Bit0: High auxiliary pressure flag 0: None 1: Auxiliary pressure is high. The device is not allowed to start. Bit1: Limited max. set pressure flag 0: None 1: Function limited. Please contact the manufacturer.	0	●

Function code	Name	Description	Default	Modify
P15.06	Delay time of auxiliary pressure detection	0–65535s **Note:** The value 0 indicates that the low auxiliary pressure fault will not be detected.	0	○
P15.07	Auxiliary pressure low protection point	0.00–20.00MPa When the auxiliary pressure protection is enabled (P18.39=1) and the auxiliary pressure is less than the P15.11 set value, an auxiliary pressure low fault is reported. **Note:** Auxiliary pressure low fault detection is disabled when the air compressor is asleep.	0.00	○
P15.08	Dynamic password	0–9999 **Note:** This value is automatically refreshed every time the device is powered on/every 8 hours/every time a new P15.09 value is entered.		●
P15.09	Handshake password	0–9999 **Note:** This is used to turn on or turn off the handshake protocol.	0	◎
P15.10	Handshake timeout time	0–65535s **Note:** If the handshake fails after the time set in P15.10, a HAnd fault is reported, and no fault is reported when it is set to 0.	20s	○
P15.11	Handshake status	0–1 0: Disabled 1: Enabled	0	●
P15.12	Number of decimal points of pressure	0–1 0: 2 bits 1: 3 bits	0	○
P17.00	Set frequency	0.00Hz–P00.03	0.00Hz	●
P17.01	Output frequency	0.00Hz–P00.03	0.00Hz	●
P17.02	Ramp reference frequency	0.00Hz–P00.03	0.00Hz	●
P17.03	Output voltage	0–1200V	0V	●
P17.04	Output current	0.0–3000.0A	0.0A	●
P17.05	Motor rotation speed	0–65535RPM	0 RPM	●
P17.06	Torque current	-3000.0–3000.0A	0.0A	●

Function code	Name	Description	Default	Modify
P17.07	Exciting current	-3000.0–3000.0A	0.0A	●
P17.08	Motor power	-300.0% –300.0% (of the motor rated power)	0.0%	●
P17.09	Output torque	-250.0–250.0%	0.0%	●
P17.10	Estimated motor frequency	0.00–P00.03	0.00Hz	●
P17.11	DC bus voltage	0.0–2000.0V	0V	●
P17.12	Digital input terminal status	0000–00FF	0	●
P17.13	Digital output terminal status	0000–000F	0	●
P17.16	Master fault code	0–45 (See P07.27–P07.32 for details)	0	●
P17.17	Fan fault code	0–38 (See P07.27–P07.32 for details)	0	●
P17.19	P1–input voltage	Displays analog input voltage value of P1-channel. 2.00V–10.00V corresponds to 4–50mA. P05.32-P05.34 corresponds to pressure 0.0-P18.04. When P1-input voltage is detected to be above 9.8V or below 1V, it is deemed as pressure signal fault. Range: 0.00–10.00V	0.00V	●
P17.20	PT1 input voltage	Displays the analog input voltage value of PT1 channel. Connect PT100 thermal resistor temperature sensor in air compressor mode, and different resistance value will be generated under different temperature Different resistance value corresponds to different input voltage. Therefore, the input voltage value can correspond to the corresponding detection temperature. The input voltage P18.28-P18.29 corresponds to -20°C-150°C. Range: 0.00–10.00V	0.00V	●
P17.21	P2–input voltage	Displays analog input voltage value of P2-channel. 2.00V–10.00V corresponds to 4–50mA. P05.42-P05.44 corresponds to pressure 0.0-P18.38. When P2-input voltage is detected to be above 9.8V or below 1V, it is deemed as pressure signal fault. Range: 0.00–10.00V	0.00V	●

Function code	Name	Description	Default	Modify
P17.22	PT2 input voltage	Displays the analog input voltage value of PT2 channel. Connect PT100 thermal resistor temperature sensor in air compressor mode, and different resistance value will be generated under different temperature. Different resistance value corresponds to different input voltage. Therefore, the input voltage value can correspond to the corresponding detection temperature. The input voltage P18.32-P18.33 corresponds to -20°C-150°C. Range: 0.00–10.00V	0.00V	●
P17.23	PID reference value	Displays the set value of exhaust pressure signal. 100.0% corresponds to the upper limit value of exhaust pressure sensor P18.04 (If P18.37=1, 100% corresponds to P18.38). Range: -100.0–100.0%	0.0%	●
P17.24	PID feedback value	Displays detection value of exhaust pressure signal. Range: -100.0–100.0%	0.0%	●
P17.25	Motor power factor	-1.00–1.00	0.0	●
P17.26	Duration of this run	0–65535m	0m	●
P17.28	ASR controller output	-300.0%–300.0% (of the motor rated current)	0.0%	●
P17.29	Magnetic pole angle of SM	0.0–360.0	0.0	●
P17.30	Phase compensation of SM	-180.0–180.0	0.0	●
P17.36	Output torque	-3000.0Nm–3000.0Nm	0.0Nm	●
P17.38	PID output	Displays PID control adjustment output value of exhaust pressure signal. 100.0% corresponds to maximum output frequency P00.03. Setting range: -100.00–100.00%	0.00%	●
P18.00	Air compressor control mode	0: Disable 1: Air compressor control mode **Note:** When P18.00=1, P19 group air compressor state check group is valid.	0	◎

Function code	Name	Description	Default	Modify
P18.01	Sleep function selection	 0: Disable 1: Automatic 2: Manual **Note:** When sleep function is valid and unloading condition is met, the inverter running frequency decelerates to P18.12, after that, if the duration time P18.13 of exhaust pressure is larger than loading pressure P18.06, the inverter will decelerate to stop speed P01.15 and then coast to stop to enter sleep stage. If the exhaust pressure is lower than loading pressure within P18.13, the	1	◎

Function code	Name	Description	Default	Modify
		inverter will carry out loading operation again and pressure PID will regulate accordingly. Manual: set through touch screen or other communication methods		
P18.02	Loading/unloading mode	0: Automatic 1: Manual In manual mode, loading/unloading is conducted manually via touch screen or other communication methods after air compressor starts; In automatic mode, load/unloading will be conducted automatically according to the pressure after air compressor starts. For details, see section 5.2.	0	○
P18.03	Temperature sensor channel	0: head temperature PT1, auxiliary temperature PT2 1: head temperature PT2, auxiliary temperature PT1 2: Temperature display in regular inverter mode (P18.00=0) (head temperature (P19.12) PT1, auxiliary temperature (P19.21) PT2)	0	◎
P18.04	Upper limit of pressure sensor P1	0.00–20.00Mpa It is related to actual range of pressure sensor. The voltage corresponds to P18.04 is P05.34. **Note:** This value stays in current set value during restoring to factory value.	1.60Mpa	◎
P18.05	Unloading pressure	In automatic loading/unloading mode, when air compressor control is valid and air supply of the compressor becomes normal after it starts, if exhaust pressure is detected to be above P18.05, automatic unloading will be applied. If sleep function is valid (P18.01=1), the inverter enters sleep state; when exhaust pressure is detected to be below P18.06, automatic loading will be applied. P18.07 is used to set the air supply pressure when air compressor operation is stable. During loading operation, the rotation speed of the	0.80Mpa	○
P18.06	Loading pressure		0.60Mpa	○
P18.07	Set pressure		0.70Mpa	○

Function code	Name	Description	Default	Modify
		master is controlled by pressure PID. The system keeps exhaust pressure constant by adjusting the rotation speed of the master. Refer to section 5.2 for process logic of pressure control. Setting range: 0.00–P18.04		
P18.08	Starting temperature of the fan	When the head temperature exceeds P18.08, the fan starts. When the head temperature is below P18.09, the fan stops. P18.10 is used to set the target head temperature during stable running of the air compressor. The rotation speed of fan is controlled by constant temperature PID (P18.42=0). Constant temperature control is realized by PID calculation based on P18.10 and the head temperature. Setting range: -20–150	75℃	○
P18.09	Stop temperature of the fan		65℃	○
P18.10	Set temperature		75℃	○
P18.11	Lower limit of loaded running frequency	P18.12–P00.04 (Upper limit of running frequency) Indicates the min. running frequency that the inverter is allowed to output during the loading process.	40.00Hz	○
P18.12	No-load running frequency	P01.15–P18.11 (lower limit of loaded running frequency) It is the working frequency allowed to be output during no-load of air compressor.	38.00Hz	○
P18.13	No-load delay time	When sleep function is valid, the inverter, after unloading, runs at the no-load running frequency until passing the time set by P18.13, then it enters sleep state. Sleep function can be enabled when the gas consumption is relatively small. If sleep function is valid, decrease P18.13 to make the device enter sleep state at faster speed. Setting range: 0–3600s	300s	○
P18.14	Stop delay time	After stop command is valid, the inverter runs at no-load running frequency until passing the	0s	○

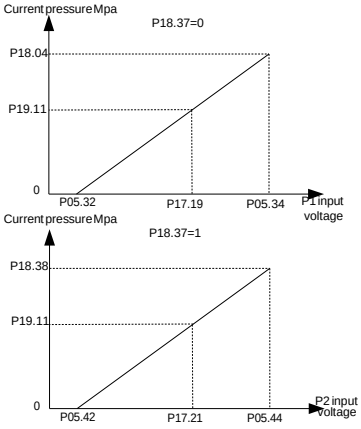
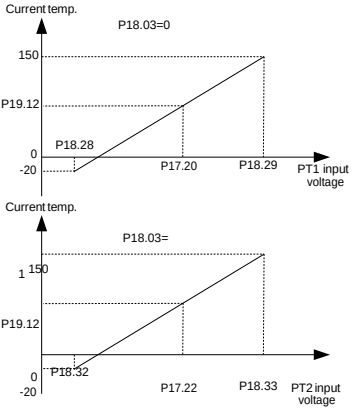
Function code	Name	Description	Default	Modify
		time set by P18.14 and then it stops. Setting range: 0–3600s		
P18.15	Delay time of loading	Loading operation can only be available after the master runs at no-load frequency by the time set by P18.15. Setting range: 0–3600s	10s	○
P18.16	Delay time of restart	After system stops, wait for the time set by P18.16 before determining whether to start again. Setting range: 0–3600s	30s	○
P18.17	Pre-alarm pressure	When the current exhaust pressure is	0.90Mpa	○
P18.18	Alarm pressure	detected to be above P18.17, the system releases pressure pre-alarm by changing BIT8 of P19.13 to 1. When the current exhaust pressure is detected to be above P18.18, the system releases pressure alarm by changing BIT10 of P19.13 to 1 and emergency stop will be applied. Setting range: 0.00–P18.04	1.00Mpa	○
P18.19	Pre-alarm temperature	When head temperature is detected to be above P18.19, system releases temperature	105℃	○
P18.20	Alarm temperature	pre-alarm by changing BIT9 of P19.13 to 1.	110℃	○
P18.21	Low temperature protection threshold	When head temperature is detected to be above P18.20, system releases temperature alarm by changing BIT11 of P19.13 to 1 and emergency stop will be applied. When head temperature is detected to be below P18.21, system releases low temperature pre-alarm by changing BIT14 of P19.13 to 1 and the air compressor will be prohibited from starting. Setting range: -20–150	-10℃	○
P18.22	Power correction coefficient	It is used to correct P19.10. Setting range: 0%–200%	100%	○
P18.23	Temperature PID calculation cycle (Ts)	Used to set the sampling cycle of temperature PID Setting range: 0.0–10.0s	2.0s	○

Function code	Name	Description	Default	Modify
P18.24	Gain coefficient (kp)	It determines the adjustment intensity of temperature PID regulator. The larger the kp, the stronger the intensity, however, too strong the intensity may cause temperature oscillation. It is viable to make adjustment based on factory value according to actual conditions. Setting range: 0.0–100.0	18.0	○
P18.25	Convergence coefficient (K)	It determines the convergence speed of temperature, PID regulator. The larger the value of K, the stronger the intensity, however, too strong the intensity may cause temperature oscillation. It is viable to make adjustment based on factory value according to actual conditions. Setting range: 0.00–1.00	0.12	○
P18.26	Upper limit of temperature PID	It is used to limit the output value of temperature PID adjustment. 100.00% corresponds to the maximum output frequency P00.03 of the fan. Setting range: 0.00–100.00%	100.00%	○
P18.27	Lower limit of temperature PID		10.00%	○
P18.28	Lower limit voltage of PT1 (20°C)	It is used for calibration of temperature detection circuit in the factory: Connect the resistor whose resistance corresponds to PT100 at -20°C, read the voltage value of P17.20 and input it to P18.28. Connect the resistor whose resistance corresponds to PT100 at 120°C, read the voltage value of P17.20 and input it to P18.29. Setting range: 0.00–10.00V **Note:** This value stays in current set value during restoring to factory value.	3.10V	○
P18.29	Upper limit voltage of PT1 (120°C)		8.10V	○
P18.30	Pressure value of descending of upper limit frequency	0.00–P18.04 When current pressure is larger than this pressure value, decrease the upper limit frequency according to P18.31.	0.70Mpa	○

Function code	Name	Description	Default	Modify
P18.31	Reduction rate of upper limit frequency	0.00Hz–10.00Hz It is the reduction quantity of the corresponding upper limit frequency for each additional 0.01Mpa when current pressure is larger than P18.30.	0.00Hz	○
P18.32	Lower limit voltage of PT2 (20°C)	It is used for calibration of temperature detection circuit in the factory:	3.10V	○
P18.33	Upper limit voltage of PT2 (120°C)	Connect the resistor whose resistance corresponds to PT100 at 20°C, read the voltage value of PP17.22 and input it to P18.32. Connect the resistor whose resistance corresponds to PT100 at 120°C, read the voltage value of P17.22 and input it to P18.33 Setting range: 0.00–10.00V **Note:** This value stays in current set value during restoring to factory value.	8.10V	○
P18.34	Auxiliary temperature protection enable	0: Disable 1: Enable	0	◎
P18.35	Auxiliary temperature pre-alarm	-20–150 When P18.34 is enabled and the auxiliary temperature exceeds P18.35, the system releases auxiliary temperature pre-alarm by changing BIT8 of P19.14 to 1.	105℃	○
P18.36	Auxiliary temperature alarm	-20–150 When P18.34 is enabled and the auxiliary temperature exceeds P18.36, system releases auxiliary temperature alarm by changing BIT10 of P19.14 to 1 and emergency stop will be applied.	110℃	○
P18.37	Pressure sensor channel	0: Exhaust pressure P1, auxiliary pressure P2 1: Exhaust pressure P2, auxiliary pressure P1 2: Pressure display in regular inverter mode (P18.00=0) (main pressure (P19.21) P1, auxiliary pressure (P19.20) P2)	0	◎

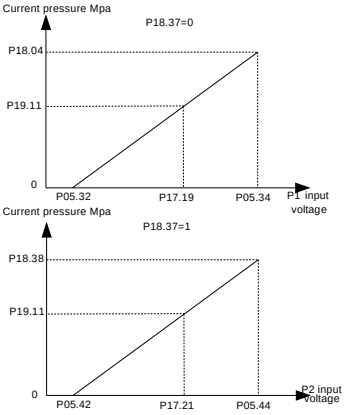
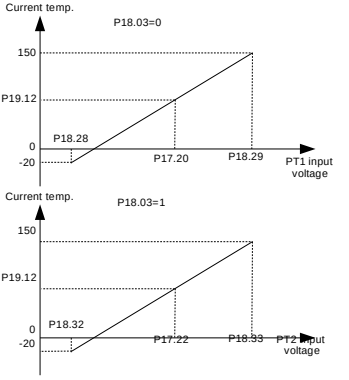
Function code	Name	Description	Default	Modify
P18.38	Upper limit of pressure sensor P2	0.00–20.00Mpa It is related to actual range of pressure sensor. The voltage corresponds to P18.04 is P05.44. **Note:** This value stays in current set value during restoring to factory value.	1.60Mpa	◎
P18.39	Auxiliary pressure protection enable	0: Disable 1: Enable	0	◎
P18.40	Auxiliary pressure pre-alarm	0.00–20.00 When auxiliary pressure protection function P19.39 is enabled, and auxiliary pressure is larger than P18.40, system releases auxiliary pressure pre-alarm by changing BIT7 of P19.14 to 1.	0.90Mpa	○
P18.41	Auxiliary pressure alarm	0.00–20.00 When auxiliary pressure protection function P19.39 is enabled and auxiliary pressure is larger than P18.41, system releases auxiliary pressure alarm by changing BIT9 of P19.14 to 1 and emergency stop will be applied.	1.00Mpa	○
P18.42	Reference mode of fan frequency	0: Temperature PID 1: Analog P2 2: 485 communication (address 0X201C, writing of 1000 corresponds to 100.0%, 100.0% corresponds to the max. output frequency of the fan)	0	◎
P18.43	Fan control mode	0: Air compressor mode, the fan inverter starts and stops automatically based on the temperature 1: Terminal, the fan inverter starts and stops by enabling terminals. 2: 485 communication (address 0X201B, write 1 to start, write 3 to stop)	0	◎
P18.44	Automatic frequency-reduction threshold	0–120% Add automatic frequency reduction function. When output current is larger than automatic frequency reduction threshold, output frequency will be adjusted by the regulator to	120%	○

Function code	Name	Description	Default	Modify
		ensure the running current of the master will not exceed automatic frequency reduction threshold.		
P18.45	Time-out time of maintenance	0–8000h When this parameter is set to "0", the maintenance time-out function is invalid. If it is set to non-zero value, then the system will release maintenance time-out pre-alarm by changing BIT11 of P19.14 to 1 in cases where the working time, after part maintenance pre-alarm, exceeds the value set by P18.45.	0	○
P19.00	Maintenance set time of part 1	P19.00–P19.04 displays the set value of maintenance time on five kinds of parts. When the accumulated working time of the part exceeds the corresponding set value, the system will release pre-alarm by changing the BIT of P19.14 to 1. If set to "0", working time pre-alarm of the parts will be invalid. P19.05–P19.09 displays the working hours of corresponding parts. Range: 0–65535h	0	●
P19.01	Maintenance set time of part 2		0	●
P19.02	Maintenance set time of part 3		0	●
P19.03	Maintenance set time of part 4		0	●
P19.04	Maintenance set time of part 5		0	●
P19.05	Working hours of part 1		0	●
P19.06	Runtime of part 2		0	●
P19.07	Runtime of part 3		0	●
P19.08	Working hours of part 4		0	●
P19.09	Runtime of part 5		0	●
P19.10	Actual output power of motor	It displays the output frequency of the motor and can be calibrated by setting P18.22. Range: 0.0–6553.5kW	0.0kW	●
P19.11	Current pressure	Displays the exhaust pressure value detected currently.	0.00Mpa	●

Function code	Name	Description	Default	Modify
		 Range: 0.00–655.35Mpa		
P19.12	Current temperature	Displays the head temperature currently detected. 	0℃	●
P19.13	Signal state 1	0000–0xFFFF BIT0: Air filter block signal 1: Fault; 0: normal BIT1: Oil filter block signal 1: Fault; 0: normal BIT2: Separator block signal 1: Fault; 0: normal BIT3: Splitter block signal	0	●

Function code	Name	Description	Default	Modify
		1: Fault; 0: normal BIT4: External fault signal 1 1: Fault; 0: normal BIT5: External fault signal 2 1: Fault; 0: normal BIT6: Solenoid valve signal state 1: Load; 0: unload BIT7: Auxiliary motor state 1: Run; 0: Stop BIT8: Pressure pre-alarm signal 1: Pressure pre-alarm; 0: normal BIT9: Temperature pre-alarm signal 1: Temperature pre-alarm; 0: normal BIT10: Pressure alarm signal 1: Pressure alarm; 0: normal BIT11: Temperature alarm signal 1: Temperature pre-alarm; 0: normal BIT12: Pressure signal 1: Pressure signal fault: 0: normal BIT13: Temperature signal 1: Temperature signal fault; 0: normal BIT14: Low temperature protection 1: Low temperature alarm; 0: normal BIT15: Master state 1: Run; 0: Stop		
P19.14	Signal state 2	0–0xFFFF BIT0: Maintenance reminder of part 1 1: maintenance required; 0: normal BIT1: Maintenance reminder of part 2 1: maintenance required; 0: normal BIT2: Maintenance reminder of part 3 1: maintenance required; 0: normal BIT3: Maintenance reminder of part 4 1: maintenance required; 0: normal BIT4: Maintenance reminder of part 5 1: maintenance required; 0: normal BIT5: Auxiliary pressure signal 1: auxiliary pressure signal fault; 0: normal BIT6: Auxiliary temperature signal 1: auxiliary temperature signal fault; 0: normal BIT7: Auxiliary pressure pre-alarm signal	0	●

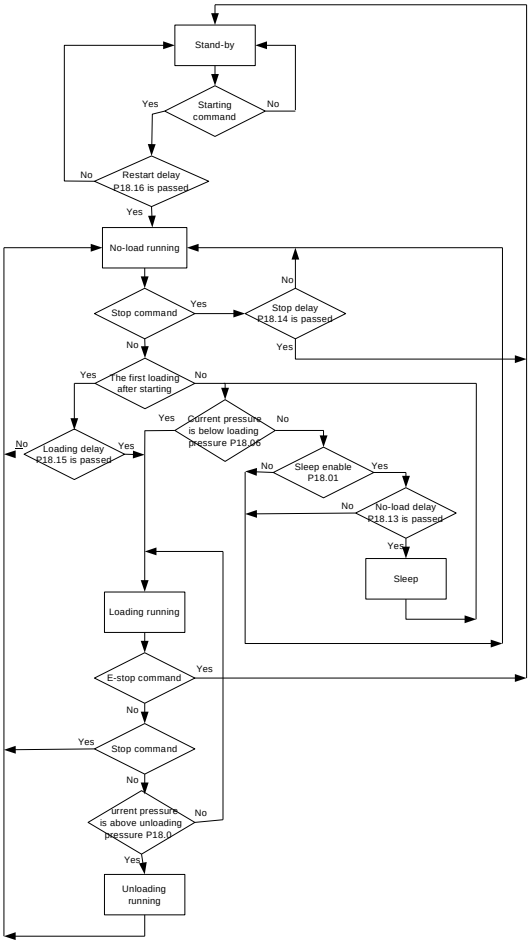
Function code	Name	Description	Default	Modify
		1: Pressure pre-alarm; 0: normal BIT8: Auxiliary temperature pre-alarm signal 1: Temperature pre-alarm; 0: normal BIT9: Auxiliary pressure alarm signal 1: Pressure alarm; 0: normal BIT10: Auxiliary temperature alarm signal 1: Temperature pre-alarm; 0: normal BIT11: Maintenance time-out reminder 1: maintenance time-out reminder; 0: normal BIT12: Phase sequence reminder 1: Fault; 0: normal		
P19.15	Device state	0: Stand-by 1: Run 2: Faulty 3: Emergency-stop 4: Under-voltage 5: Alarm 6: Sleep 7: Stop 8: Restart delay	0	●
P19.16	Accumulated running time of the device	Range: 0–65535h	0	●
P19.17	Accumulated loading running time		0	●
P19.18	Restart count down	It displays the residue time of restart delay. The system enters restart delay state and restart count down after stop to prevent restart immediately. After restart delay time is passed, the system enters stand-by state and it can receive starting command in stand-by state. Range: 0–3600s	0s	●
P19.19	Temperature PID output value	It displays the output value of head temperature PID control adjustment. 100.00% corresponds to the maximum output frequency P00.03 of the fan. Range: 0.00–100.00%	0.00%	●

Function code	Name	Description	Default	Modify
P19.20	Current auxiliary pressure	It displays the auxiliary pressure value detected currently.  Range: 0.00–655.35Mpa	0.00Mpa	●
P19.21	Current auxiliary temperature	It displays the auxiliary temperature value detected currently.  Range: -20–150°C	0℃	●
P19.22	Phase sequence state of input power	If phase sequence detection and input phase loss hardware protection are enabled, the inverter will report fault when negative sequence and any phase loss occurred. If they are not enabled, the inverter will not report the fault. 0: Positive sequence	0	●

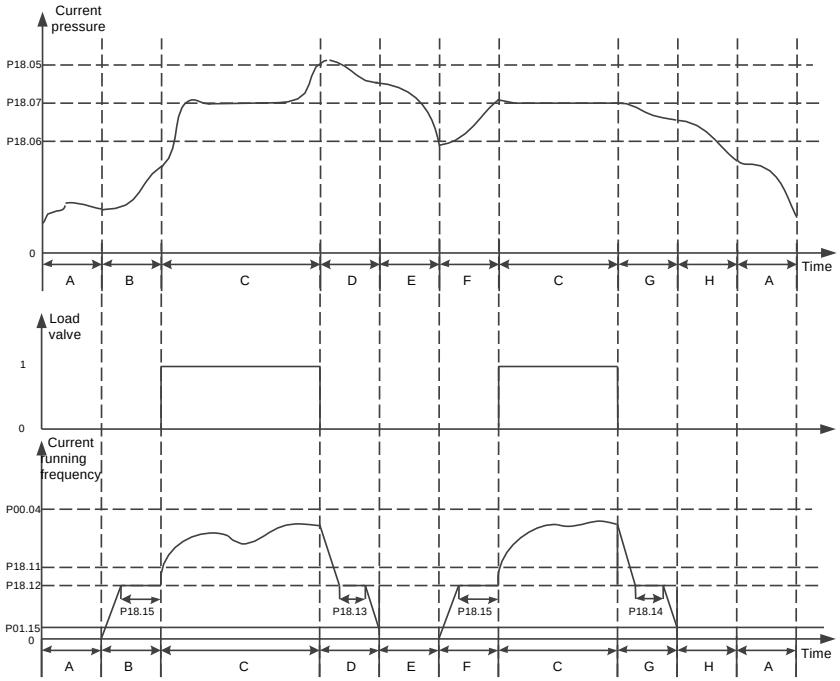
Function code	Name	Description	Default	Modify
		1: Negative sequence 2: R-phase loss 3: S-phase loss 4: T-phase loss		

5.2 Air compressor control logic

(1) The control logic of air compressor is shown as below:



(2) The pressure and running frequency control of air compressor during running is shown as below:



In above figure, P18.05 is unloading pressure, P18.06 is loading pressure and P18.07 is the set pressure.

P00.04 is upper limit frequency, P18.11 is lower limit value of loading running frequency, P18.12 is no-load frequency and P01.15 is stop speed. In the figure, the process instruction for A–H stages are listed as below:

A: Stand-by state

B: Beginning stage of starting, the duration time is P18.15 (including part of ACC time P00.11)

C: Constant pressure exhaust stage of loading, pressure PID adjustment is valid

D: Unloading stage, the duration time includes part of DEC time P00.12 and P18.13

E: Sleep stage, the inverter does not run

F: Wake-up and starting stage, the duration time is P18.15 (including part of ACC time P00.11)

G: Beginning of stop, the duration time includes part of DEC time P00.12 and P18.14

H: Restart delay stage after stop, the duration time is P18.16

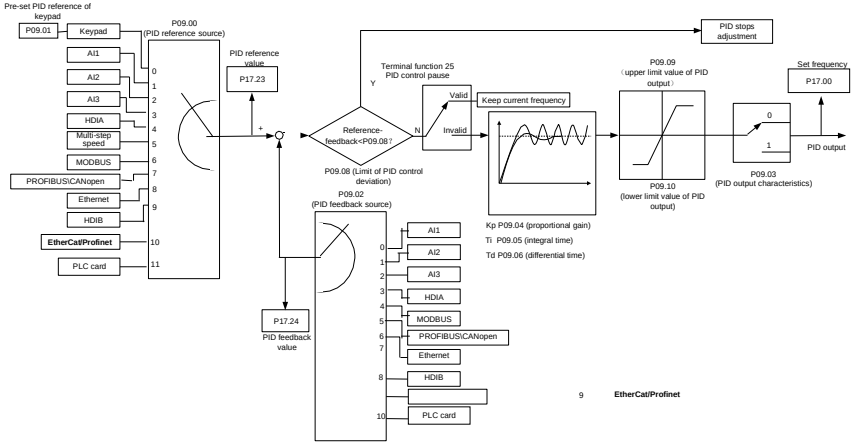
In automatic loading/unloading mode, when air compressor control is valid and air supply of the compressor becomes normal after it starts, if exhaust pressure is detected to be above P18.05, automatic unloading will be applied.

If sleep function is valid, the inverter will enter sleep state. While if sleep function is invalid, the inverter will run continuously at no-load frequency P18.12. When exhaust pressure is detected to be below P18.06, automatic loading will be applied. During loading operation, the rotation speed of the master is controlled by pressure PID. P18.07 is the air supply pressure when setting stable running of air compressor, the inverter keeps exhaust pressure constant by regulating the rotation speed of the master. Constant pressure control adopts PID algorithm, and the frequency reference source of the master is set by P00.06=7, the reference source of PID is P09.00=10, the reference pressure is set by P18.07. The feedback source of PID is P09.02=8, which is gained by detecting pressure signal. P9.04, P9.05 and P9.06 adopts system default values.

Note: In above figure, the stop mode of the inverter is operated by P01.08, the default setting is decelerating to stop. The inverter is in deceleration process under normal stop command and unloading stage; it changes to coast to stop mode when emergency stop or fault occur.

5.3 PID commissioning

PID control, a common mode for process control, is mainly used to adjust the inverter output frequency or output voltage by performing scale-division, integral and differential operations on the difference between feedback signal of controlled variables and signal of the target, thus forming a negative feedback system to keep the controlled variables above the target. It is applicable to flow control, pressure control, temperature control, and so on. The following is the basic schematic block diagram for output frequency regulation.



Introduction to the working principles and control methods for PID control:

Proportional control (Kp):

When the feedback is different from the reference, the output will be proportional to the difference. If such a difference is constant, the regulating variable will also be constant. Proportional control can respond to feedback changes rapidly, however, it cannot eliminate the difference by itself. A larger proportional gain indicates a faster regulating speed, but a too large gain will result in oscillation. To solve this problem, set the integral time to a large value and the differential time to 0, run the system only with proportional control, and then change the reference to observe the difference (that is, static difference) between the feedback signal and reference. If the static difference occurs in the direction of reference change (such as reference increase, where the feedback is always less than the reference after system stabilizes), continue increasing the proportional gain; otherwise, decrease the proportional gain. Repeat this process until the static difference becomes small.

Integral time (Ti):

When feedback is different from reference, the output regulating variable accumulates continuously, if the difference persists, the regulating variable will increase continuously until difference disappears. The integral regulator can be used to eliminate static difference. However, too large regulation may lead to repetitive overshoot, which will cause system instability and oscillation. The feature of oscillation caused by strong integral effect is that the feedback signal fluctuates up and down based on the reference variable, and fluctuation range increases gradually until oscillation occurs. The integral time parameter is generally regulated gradually from large to small until the stabilized system speed fulfills the requirement.

Differential time (Td):

When the difference between feedback and reference changes, there is output of the regulating variable that is proportional to the difference variation rate, and this regulating variable is only related to the direction and magnitude of the difference change rather than the direction and magnitude of the difference itself. Differential control is used to control the feedback signal variation based on the change trend. Exercise caution before using the differential regulator since it may enlarge the system interferences, especially those with high change frequency.

5.3.1 General procedures for PID parameter setup

a. Determining proportional gain P

When determining proportional gain P, first, remove the integral term and derivative term of PID by making Ti=0 and Td=0 (see PID parameter setup for details), thus turning PID into pure proportional control. Set the input to 60%–70% of the max. allowable value, and increase proportional gain P gradually from 0 until system oscillation occurred, and then in turn, decrease proportional gain P gradually from current value until system oscillation disappears, record the proportional gain P at this point and set the proportional gain P of PID to 60%–70% of current value. This is the entire commissioning procedure of proportional gain P.

b. Determine integral time Ti

After proportional gain P is determined, set the initial value of integral time Ti to a large value, and decrease Ti gradually until system oscillation occurs. Then in reverse, increase Ti until system oscillation disappears. Record the value of Ti at this point. Set the integral time constant Ti of PID to 150%–180% of this value. This is the commissioning procedure of integral time constant Ti.

c. Determining derivative time Td

The differential time Td is generally set to 0.

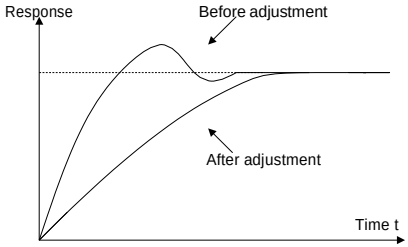
If you need to set Td to another value, the setting method is similar to that for P and Ti, namely, set Td to 30% of the value when there is no oscillation.

d. Empty system load, perform load-carrying joint debugging, and then fine-tune PID parameter until fulfilling the requirement.

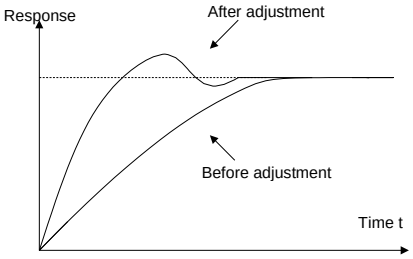
5.3.2 How to fine-tune PID

After setting the parameters controlled by PID, you can adjust these parameters by the following means.

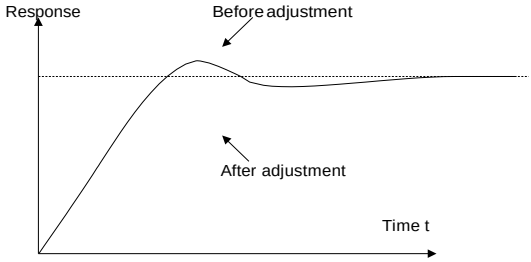
Control overshoot: When overshoot occurred, shorten the derivative time (Td) and prolong integral time (Ti).



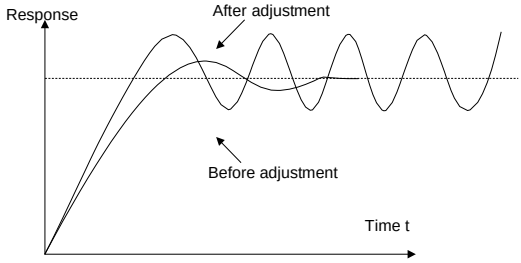
Stabilize the feedback value as fast as possible: When overshoot occurred, shorten integral time (Ti) and prolong derivative time (Td) to stabilize control as fast as possible.



Control long-term vibration: If the cycle of periodic vibration is longer than the set value of integral time (Ti), it indicates the integral action is too strong, prolong the integral time (Ti) to control vibration.



Control short-term vibration: If the vibration cycle is as short almost the same as the set value of differential time (Td), it indicates the differential action is too strong. Shorten the differential time (Td) to control vibration. When the differential time (Td) is set to 0.00 (namely no differential control), and there is no way to control vibration, decrease the proportional gain.



Related parameter list:

Function code	Name	Description	Default
P09.00	PID reference source	0: Keypad (P09.01) 1: Analog P1-reference 2: Reserved 3: Analog P2-setting 4: Reserved 5: Reserved 6: Modbus communication 7–9: Reserved 10: Pressure setting for air compressor-specific function	0
P09.01	PID reference preset through keypad	-100.0%–100.0%	0.0%

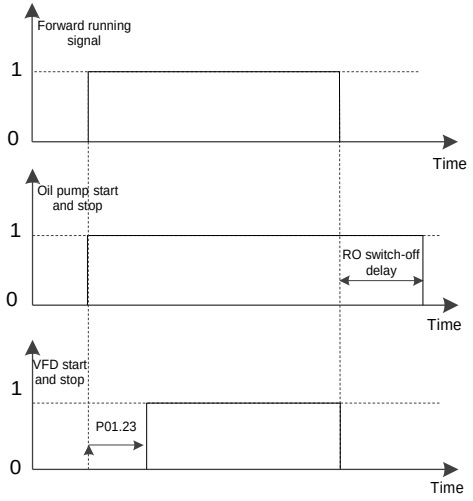
Function code	Name	Description	Default
P09.02	PID feedback source	0: Analog P1-feedback 1: Reserved 2: Analog P2-feedback 3: Reserved 4: Modbus communication 5–7: Reserved 8: Pressure feedback for air compressor-specific function	0
P09.03	PID output characteristics selection	0: PID output is positive. When the feedback signal is greater than the PID reference value, the output frequency of the inverter will decrease to balance the PID. Example: PID control on strain during unwinding. 1: PID output is negative. When the feedback signal is greater than the PID reference value, the output frequency of the inverter will increase to balance the PID. Example: PID control on strain during unwinding.	0
P09.04	Proportional gain (Kp)	P determines the strength of the whole PID adjuster. The value 100 indicates that when the difference between the PID feedback value and given value is 100%, the range within which the proportional regulator (ignoring integral function and differential function) can regulate the output frequency command is the max. frequency (P00.03). Setting range: 0.00–100.00	10.00
P09.05	Integral time (Ti)	Used to determine the speed of the integral adjustment on the deviation of PID feedback and reference from the PID regulator. When the deviation of PID feedback and reference is 100%, the integral adjuster works continuously during the time (ignoring proportional and differential function) to achieve the max. output frequency (P00.03). Shorter integral time indicates stronger adjustment. 0.01–10.00s	2.00s

Function code	Name	Description	Default
P09.06	Differential time (Td)	Used to determine the strength of the change ratio adjustment on the deviation of PID feedback and reference from the PID regulator. If feedback quantity changes 100% during this time period, the range within which the differential regulator (ignoring integral function and differential function) can regulate is the max. frequency (P00.03). Longer differential time indicates stronger adjustment. 0.00–10.00s	1.00s
P09.07	Sampling cycle (T)	0.000–10.000s	0.100s
P09.08	PID control deviation limit	The feedback value of the PID system is relative to the max. deviation of the closed loop reference. The PID regulator stops regulating in the range of deviation limit. Set the function parameter properly to adjust the accuracy and stability of the PID system. 0.0–100.0%	0.1%
P09.09	PID output upper limit	P09.10–100.0% (Max. frequency or voltage)	100.0%
P09.10	PID output lower limit	-100.0%–P09.09 (Max. frequency or voltage)	0.0%
P09.11	Feedback offline detection value	0.0–100.0%	0.0%
P09.12	Feedback offline detection time	0.0–3600.0s	1.0s
P09.13	PID control selection	0x0000–0x1111 Ones place: 0: Continue integral control after the frequency reaches upper/lower limit 1: Stop integral control after the frequency reaches upper/lower limit Tens place: 0: Same as the main reference direction 1: Contrary to the main reference direction Hundreds place:	0x0001

Function code	Name	Description	Default
		0: Limit as per the max. frequency 1: Limit as per A frequency Thousands place: 0: A+B frequency. Acceleration /deceleration of main reference A frequency source buffering is invalid. 1: A+B frequency. Acceleration/ deceleration of main reference A frequency source buffering is valid. The acceleration/deceleration is determined by P08.04 (acceleration time 4).	
P17.00	Set frequency	0.00Hz–P00.03 (Max. output frequency)	0.00Hz
P17.23	PID reference value	-100.0–100.0%	0.0%
P17.24	PID feedback value	-100.0–100.0%	0.0%

5.4 Running logic of blower oil pump

Special function: the RO terminal is enabled when receiving the inverter start command. After the start-up delay time (P01.23), the inverter starts. The inverter stops when receiving the inverter stop command and the RO terminal turns off the output after the corresponding switch-off delay. For details, see the following figure. Please see group P06 for "RO switch-off delay" and set the corresponding RO switch-off delay function code.



6 Troubleshooting

6.1 Faults and countermeasures for integrated machine

Table 6-1 Faults and countermeasures

Fault code	Fault type	Possible cause	Solution
OUt1	Inverter unit U-phase protection	ACC is too fast; IGBT module is damaged; Misacts caused by interference; Drive wires are poorly connected; To-ground short circuit occurs.	Increase ACC time; Replace the power unit; Check drive wires; Check whether there is strong interference surrounding the peripheral device.
OUt2	Inverter unit V-phase protection		
OUt3	Inverter unit W-phase protection		
OV1	Overvoltage during acceleration	Exception occurred to input voltage; Large energy feedback.	Check the input power; Check whether load DEC time is too short; or the motor starts during rotating; or additional dynamic brake components is required.
OV2	Overvoltage during deceleration		
OV3	Overvoltage during constant speed running		
OC1	Overcurrent during acceleration	ACC/DEC is too fast; The voltage of the grid is too low; Inverter power is too small; Load transient or exception occurred; To-ground short circuit or output phase loss occurred; Strong external interference sources.	Increase ACC/DEC time; Check the input power; Select the inverter with larger power; Check if the load is short circuited (to-ground short circuit or line-to-line short circuit) or the rotation is not smooth; Check the output wiring; Check if there is strong interference.
OC2	Overcurrent during deceleration		
OC3	Overcurrent during constant speed running		
UV	Bus undervoltage fault	The voltage of the grid is too low.	Check the grid input power.
OL1	Motor overload	The grid voltage is too low. The motor rated current is set incorrectly. The motor stall occurs or the load transient is too large.	Check the grid voltage. Reset the motor rated current. Check the load and adjust the torque boost quantity.
OL2	Inverter overload	ACC is too fast; The motor in rotating is	Increase ACC time; Avoid restart after stop;

Fault code	Fault type	Possible cause	Solution
		restarted; The voltage of the grid is too low; Load is too large.	Check the grid voltage; Select the inverter with larger power; Select a proper motor.
SPI	Phase loss on input side	Phase loss or violent fluctuation occurred on input R, S, T.	Check the input power; Check the installation wiring.
SPO	Phase loss on output side	Phase loss occurred to U, V,W output (or the three phases of motor is asymmetrical).	Check the output wiring; Check the motor and cables.
OH1	Rectifier module overheating	Air duct is blocked or fan is damaged; Ambient temperature is too high; Long-time overload running.	Ventilate the air duct or replace the fan; Lower the ambient temperature.
OH2	Inverter module overheat		
EF	External fault	S external faulty input terminal action.	Check external device input.
CE	RS485 communication fault	Baud rate is set improperly; Communication line fault; Incorrect communication address; Communication suffers from strong interference.	Set proper baud rate; Check the wiring of communication interfaces; Set the communication address correctly; Replace or change the wiring to enhance the anti-interference capacity.
ItE	Current detection fault	Poor contact of the connector of control board; Hall component is damaged; Exception occurred to amplification circuit.	Check the connector and re-plug; Replace the hall component; Replace the main control board.
tE	Motor autotuning fault	The motor capacity does not match the inverter capacity; Motor parameter is set improperly; The parameters gained from autotuning deviate sharply from the standard parameters; Autotuning timeout.	Change the inverter model; Set proper motor type and nameplate parameters; Empty the motor load and carry out autotuning again; Check the motor wiring and parameter setup; Check whether the upper limit frequency is larger than 2/3 of the rated frequency.

Fault code	Fault type	Possible cause	Solution
EEP	EEPROM operation fault	Error in reading or writing control parameters. The EEPROM is damaged.	Press STOP/RST to reset; Replace the main control board.
PIDE	PID feedback offline fault	PID feedback offline; PID feedback source disappears.	Check PID feedback signal wires; Check PID feedback source.
END	Running time reached	The actual running time of the inverter is longer than the internal set running time.	Ask for the supplier and adjust the set running time.
OL3	Electronic overload fault	The inverter reports overload pre-alarm according to the setting.	Check the load and the overload pre-alarm points.
PCE	Keypad communication fault	Keypad cable connected improperly or disconnected Keypad cable too long, causing strong interference Keypad or mainboard communication circuit error.	Check the keypad cable to determine whether a fault occurs. Check for and remove the external interference source. Replace the hardware and seek maintenance services.
UPE	Parameter upload error	Keypad cable connected improperly or disconnected Keypad cable too long, causing strong interference Keypad or mainboard communication circuit error.	Check for and remove the external interference source. Replace the hardware and seek maintenance services. Replace the hardware and seek maintenance services.
DNE	Parameter download error	Keypad cable connected improperly or disconnected Keypad cable too long, causing strong interference Data storage error occurred to the keypad.	Check for and remove the external interference source. Replace the hardware and seek maintenance services. Re-back up the data on the keypad.
ETH1	To-ground short-circuit fault 1	inverter output is short connected to the ground; There is a fault in the current detection circuit.	Check whether the motor wiring is normal/the motor is short circuited to the ground; Replace the hall component; Replace the main control panel/drive board.

Fault code	Fault type	Possible cause	Solution
ETH2	To-ground short-circuit fault 2	Inverter output is short connected to the ground; There is a fault in the current detection circuit.	Check whether the motor wiring is normal/the motor is short circuited to the ground; Replace the hall component; Replace the main control panel/drive board.
dEu	Speed deviation fault	The load is too heavy or stalled.	Check the load to ensure it is proper, and increase the detection time; Check whether the control parameters are set properly.
STo	Mal-adjustment fault	SM control parameters are set incorrectly. Autotuned parameters are not accurate. The inverter is not connected to the motor.	Check the load and ensure the load is normal. Check whether control parameters are set correctly. Increase the mal-adjustment detection time.
LL	Electronic underload fault	The inverter reports underload pre-alarm according to the setting.	Check the load and the underload pre-alarm points.
E_FAN	Auxiliary fan fault	The fan inverter is in fault.	Check the fault code on the touch screen.
PSF	Phase sequence fault	The phase sequence on the input side of the power is negative.	Swap any two power input cables
	Communication interruption	RS485 communication port is disconnected.	Check whether the communication cable is loose or dropped.
L-AUP	Low auxiliary pressure fault	Auxiliary pressure is too low at start-up.	Check whether P15.06 and P15.07 are set properly.
HAnd	Handshake failure	The handshake process timeout.	Check whether the handshake between the Plott controller and inverter is performed according to the handshake protocol; Check whether P15.10 is set properly.

6.2 Faults and countermeasures for air compressor device

Fault and countermeasures for air compressor device are listed as below:

P19.13	Status type	Possible cause	Solution
BIT0=1	Air filter is blocked	Air filter is abnormal.	Stop and check the air filter
BIT1=1	Oil filter is blocked	Oil filter is abnormal.	Stop and check the oil filter
BIT2=1	Separator is blocked	Separator is abnormal.	Stop and check the separator
BIT3=1	Splitter is blocked	Splitter is abnormal.	Stop and check the splitter
BIT8=1	Pressure pre-alarm	The actual pressure detected by P1 is larger than the pre-alarm pressure set by P18.17.	Check if solenoid valve is normal; Check if pressure control parameters are set correctly.
BIT9=1	Temperature pre-alarm	The actual temperature detected by PT1 is larger than the pre-alarm temperature set by P18.19.	Check if control parameters of the fan are set correctly; Check if the fan operates normally; The fan power is too small for effective cooling; Check if there is lubricating oil.
BIT10=1	Pressure alarm	The actual pressure detected by P1 is larger than the alarm pressure set by P18.18.	Check if solenoid valve is normal; Check if pressure control parameters are set correctly.
BIT11=1	Temperature alarm	The actual temperature detected by PT1 is larger than the alarm temperature set by P18.20.	Check if control parameters of the fan are set correctly; Check if the fan operates normally; The fan power is too small for effective cooling; Check if there is lubricating oil.
BIT12=1	Pressure signal fault	The actual pressure detected by P1 is less than 1V.	Check if pressure detection sensor is abnormal; The input P1 signal wire of pressure detection is dropped; The pressure signal interface does not select current signal.
BIT13=1	Temperature signal fault	PT100 sensor is disconnected.	Check if the wiring of PT100 is normal; Temperature detection sensor is abnormal;

P19.13	Status type	Possible cause	Solution
			Temperature detection circuit is abnormal.
BIT14=1	Low temperature protection pre-alarm	The actual temperature detected by PT1 is less than the low temperature protection threshold set by P18.21.	Temperature detection sensor is abnormal; Temperature detection input circuit is abnormal; The actual temperature is too low. So low temperature pre-alarm is released as normal to prevent air compressor from starting.

P19.14	Status type	Possible cause	Solution
BIT0=1	Part 1 needs maintenance	The part 1 working hours exceeds the set time in P19.00.	Stop and carry out maintenance.
BIT1=1	Part 2 needs maintenance	The part 2 working hours exceeds the set time in P19.01.	Stop and carry out maintenance.
BIT2=1	Part 3 needs maintenance	The part 3 working hours exceeds the set time in P19.02.	Stop and carry out maintenance.
BIT3=1	Part 4 needs maintenance	The part 4 working hours exceeds the set time in P19.03.	Stop and carry out maintenance.
BIT4=1	Part 5 needs maintenance	The part 5 working hours exceeds the set time in P19.04.	Stop and carry out maintenance.
BIT5=1	Auxiliary pressure signal fault	The actual pressure detected by P2 is less than 1V.	Check if pressure detection sensor is abnormal; The input P2 signal wire of pressure detection is dropped.
BIT6=1	Auxiliary temperature signal fault	PT100 sensor is disconnected.	Detect if PT100 wiring is normal; Temperature detection sensor is abnormal; Temperature detection circuit is abnormal.

P19.14	Status type	Possible cause	Solution
BIT7=1	Auxiliary pressure pre-alarm	The actual pressure detected by P2 is larger than the pre-alarm pressure set by P18.17.	Check if pressure detection sensor is abnormal; The set value of pressure is too large; Adjust pressure PID regulator
BIT8=1	Auxiliary temperature pre-alarm	The actual temperature detected by PT2 is larger than the pre-alarm temperature set by P18.19.	Temperature detection sensor is abnormal; Temperature detection input circuit is abnormal; The starting temperature of the fan is set to high; The set temperature of the fan is too high; The fan power is too low for effective cooling.
BIT9=1	Auxiliary pressure alarm	The actual pressure detected by P2 is larger than the alarm pressure set by P18.18.	Check if pressure detection sensor is abnormal; The set value of pressure is too large; Adjust pressure PID regulator
BIT10=1	Auxiliary temperature alarm	The actual temperature detected by PT2 is larger than the alarm temperature set by P18.20.	Temperature detection sensor is abnormal; Temperature detection input circuit is abnormal; The starting temperature of the fan is set to high; The set temperature of the fan is too high; The fan power is too low for effective cooling.
BIT11=1	Maintenance time-out alarm	Any part whose working time exceeds the set time will enter time-out maintenance stage. Then if its working time exceeds the time set by P18.45, system will release alarm.	Conduct maintenance on time-out parts after stop.

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