Operation Manual

Goodrive300-01A Series VFD for Air Compressor

SHENZHEN INVT ELECTRIC CO., LTD.

Preface

The Goodrive300-01A series variable-frequency drive (VFD) for air compressors (hereinafter referred to as Goodrive300-01A VFD) is designed and optimized based on Goodrive300-01 to be applied in synchronous/asynchronous air compressor for optimal control performance.

The Goodrive300-01A VFD carries air compressor-specific control logic to connect to various signals of the air compressor directly eg emergency-stop, pressure and temperature signals, fan transformer and fault signals. It can realize control over solenoid valve and provide 24V power to HMI. It also carries Modbus communication interface to fit the HMI without external controller or PLC, simplifying the electrical design while realizing excellent frequency-conversion control.

Goodrive300-01A VFD has undergone compatibility test with multiple mainstream motor or master manufacturers based on the application features and actual needs of air compressor industry. It adopts dedicated PID and unique flux-weakening design to enable the air compressor to start quickly and run smoothly with max driving frequency reaching 400Hz and above. Through high-power density design and compact structure, it simplifies commissioning procedures and downgrades product size. It adopts independent air duct, heavy-load and high power factor design to cope with challenging field and grid environment.

The Goodrive300-01A VFD in the range of 7.5–15kW supports built-in contactor units, low-frequency transformer and low-frequency fan. It can provide 220V/110V power to supply the solenoid valve (hereinafter referred to as Goodrive300-01A single VFD integrated machine) and act as the extended application of the small power of Goodrive300-21 dual VFD integrated machine, thus satisfying diversified application needs of integrated machine.

Read this manual carefully before installation to ensure Goodrive300-01A VFD can be installed and operated correctly to give full play to its excellent performance.

If the product is ultimately used for military affairs or manufacture of weapon, it will be listed on the export control formulated by the *Foreign Trade Law of the People's Republic of China*. Rigorous review and necessary export formalities are needed when exported.

Our company reserves the right to update the information of our products.

Contents

1 Safety precautions

1.1 Contents of this chapter

Read this manual carefully and follow all safety precautions before moving, installing, operating and servicing the variable-frequency drive (VFD). Should the safety precautions be ignored, physical injury or death may occur, or damage may occur to the devices.

If any physical injury or death or damage to the devices occurs due to neglect of the safety precautions in the manual, our company will not be responsible for any damages and we are not legally bound in any manner.

1.2 Definition of safety information

Danger: Serious physical injury or even death may occur if related requirements are not followed

Warning: Physical injury or damage to the devices may occur if related requirements are not followed

Note: Procedures which must be taken to ensure proper operation.

Qualified electricians: People working on the equipment should take part in professional electrical and safety training, receive related certification and be familiar with all steps and requirements related to installation, commissioning, operation and maintenance of the equipment to prevent any emergency.

1.3 Warning symbols

Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment, and advice on how to avoid the danger. Following warning symbols are used in this manual:

Sign	Name	Description	Abbreviation
 **Danger**	Danger	Serious physical injury or even death may occur if related requirements are not followed.	
 **Warning**	Warning	Physical injury or damage to the devices may occur if related requirements are not followed.	
 **No touch**	Electrostatic discharge	Damage to the PCBA board may occur if related requirements are not followed.	
 **Hot**	Hot side	The VFD base may become hot. Do not touch.	
Note	Note	Procedures which must be taken to ensure proper operation.	**Note**

1.4 Safety instruction

	✧ Only well-trained and qualified personnel are allowed to operate on the VFD. ✧ Do not carry out wiring, inspection or component replacement when the power supply is applied. Ensure all the input power supplies are

<table>
<tr><td></td><td>disconnected before wiring and inspection, and always wait for at least the time designated on the VFD or until the DC bus voltage is less than 36V. The waiting time is shown as below.
<table>
<tr><th colspan="2">VFD model</th><th>Minimum waiting time</th></tr>
<tr><td>380V</td><td>7.5kW-200kW</td><td>5 minutes</td></tr>
</table></td></tr>
<tr><td>  </td><td>✧ Do not refit the VFD unless authorized; otherwise, fire, electric shock or other injuries may occur.</td></tr>
<tr><td>  </td><td>✧ The base of the radiator may become hot during running. Do not touch to avoid hurt.</td></tr>
<tr><td>  </td><td>✧ The electrical parts and components inside the VFD are electrostatic-sensitive. Take proper measurements to avoid electrostatic discharge during related operation.</td></tr>
</table>

1.4.1 Shipment and installation

<table>
<tr><td>  </td><td>✧ Install the VFD on fire-retardant material and keep the VFD away from combustible materials.
✧ Connect the optional brake parts (brake resistors, brake units or feedback units) according to the wiring diagram.
✧ Do not operate on the VFD if there is any damage or components loss to the VFD.
✧ Do not touch the VFD with wet items or body; otherwise, electric shock may occur.</td></tr>
</table>

Note:

✧ Select appropriate moving and installing tools to ensure a safe and normal running of the VFD and avoid physical injury or death. For physical safety, the installer must take mechanical protective measures, such as wearing exposure shoes and working uniforms.

✧ Ensure the VFD suffers no physical impact or vibration during moving and installation.

✧ Do not carry the VFD by its front cover only as the cover may fall off.

✧ Installation site must be away from children and other public places.

✧ The VFD cannot meet the requirements of low voltage protection in IEC61800-5-1 if the altitude of the installation site is above 2000m.

✧ The application environment should be proper and appropriate (see details in *Installation environment*)

✧ Prevent the screws, cables and other conductive objects from falling into the VFD.

✧ The leakage current of the VFD may be above 3.5mA during operation. Ground with proper techniques and ensure the grounding resistor is less than 10Ω. The conductivity of PE grounding conductor is the same as that of the phase conductor (with the same cross sectional area).

✧ R, S and T are the input terminals of the power supply, while U, V and W are the output motor terminals. Connect the input power cables and motor cables correctly; otherwise, damage to the VFD may occur.

1.4.2 Commissioning and running

	✧ Disconnect all power supplies of the VFD before terminal wiring and wait for at least the designated time after disconnecting the power supply. ✧ High voltage is present inside the VFD during running. Do not carry out any operation on the VFD except for keypad setting. ✧ The VFD may start up by itself when P01.21=1. Do not get close to the VFD and motor. ✧ The VFD cannot be used as “Emergency-stop device” ✧ The VFD cannot be used to brake the motor suddenly. A mechanical brake device must be installed.

Note:

✧ Do not switch on or off the input power supply of the VFD frequently.

✧ For VFDs that have been stored for a long time, check and fix the capacitance and try pilot run first before actual application.

✧ Close the front cover before running the VFD; otherwise, electric shock may occur.

1.4.3 Maintenance and component replacement

	✧ Only well-trained and qualified professionals are allowed to carry out maintenance, inspection, and component replacement of the VFD. ✧ Disconnect all power supplies of the VFD before terminal wiring. Wait for at least the time designated on the VFD after disconnecting the power supply. ✧ Take proper measures to prevent screws, cables and other conductive objects from falling into the VFD during maintenance and component replacement.

Note:

✧ Select proper torque to tighten the screws.

✧ Keep the VFD and its parts and components away from combustible materials during maintenance and component replacement.

✧ Do not carry out any insulation voltage-endurance test on the VFD or measure the control circuit of the VFD by megameter.

✧ Take anti-static measures on internal parts during maintenance and component replacement.

1.4.4 Scrap treatment

	There are heavy metals in the VFD. Treat with it as industrial effluent.
	When the life cycle ends, the product should enter the recycling system. Dispose of it separately at an appropriate collection point instead of placing it in the normal waste stream.

2 Product overview

2.1 Product specification

Category	Function	Specification
Power input	Input voltage of the VFD (V)	3PH 380V (-15%)–440V (+10%)
	Rated input current (A)	Refer to 2.4 "Rated specifications".
	Rated input frequency (Hz)	50Hz or 60Hz, allowed range: 47–63Hz
	Power	＞97%
	Power factor	0.9
Frequency -conversion power output	Output voltage(V)	Equal to input voltage, error ratio: less than 5%
	Rated output current (A)	Refer to 2.4 "Rated specifications".
	Rated output power (kW)	Refer to 2.4 "Rated specifications".
	Output frequency(Hz)	0–400Hz
Power –frequency fan output (single VFD integrated machine)	Output voltage (V)	Equal to input voltage, error ratio: less than 1%
	Rated output current (A)	Refer to 2.4 "Rated specifications".
	Rated output power (kW)	Refer to 2.4 "Rated specifications".
	Output frequency (Hz)	Equal to input frequency, error ratio: less than 1%
Power output	+24VDC power	24W
	220VAC/110VAC	15W (for single VFD integrated machine)
Running control performance	Control mode	Open loop vector, space voltage vector
	Speed regulation ratio	Asynchronous motor: 1:200 (SVC); Synchronous motor: 1:20 (SVC)
	Speed control precision	±0.2% (SVC)
	Speed fluctuation	±0.3% (SVC)
	Torque response	<20ms (SVC)
	Starting torque	Asynchronous motor: 0.25Hz 150% (SVC) Synchronous motor: 2.5Hz 150% (SVC)
	Frequency reference mode	PID control, Modbus communication, P1- and P2- analog input, keypad digital input
	Overload capacity	1min at 150%
	Dedicated function	Sleep and wake-up function, constant pressure control, constant temperature control, parts maintenance, phase sequence detection, fan overload protection
	Analog pressure input	Two 4–20mA/0–1.6MPa inputs
	Analog temperature input	Two analog temperature inputs; resolution rate: 1°C; Range: -20°C–150°C; precision error: 3°C
	Digital input	Five normal inputs, max frequency: 1kHz
	Digital output	Two relay outputs (NO) 250VAC/3A; one convertible relay output 250VAC/3A

Category	Function	Specification
	Fault protection function	Over 30 kinds of fault protection functions: overcurrent, overvoltage, undervoltage, overtemperature, phase loss, overload, fan current imbalance, etc.
	Fan protection function	Overload protection: 1 min at 120% overload; 48s at 130% overload; 24s at 150% overload; 8s at 160% overload; 5s at 200% overload; 1s at 300% overload
		Current imbalance protection: when any two phases differ from each other by 60–75%, stop at fault, action time ≤5s
		Output short-circuit protection: the protection can be implemented by using the internal fuse (applicable to single VFD integrated machine only)
		Output short-to-ground protection: the protection can be implemented by using the internal fuse (applicable to single VFD integrated machine only)
	Solenoid valve port protection	220V/110V output short-circuit protection: the protection can be implemented by using the internal fuse (applicable to single VFD integrated machine only)
	485 communication	One 485 communication (three terminal interfaces)
Others	Installation mode	Wall installation, flange installation
	Temperature of running environment	-10–50°C, derating is required if the temperature exceeds 40°C; derate by 1% for every increased 1°C
	Protection level	IP20
	Pollution level	Level 2
	Cooling mode	Forced-air cooling
	DC reactor	Optional built-in DC reactor for 7.5–11kW; Built-in DC reactor is included in standard configuration for 15–110kW; Optional external DC reactor for 132–200kW
	EMC filter	Built-in C3 filter is included in standard configuration. ECM filter is set to be invalid by default, if it is necessary to enable it, users can connect J10 (see 3.1.3 and 3.1.4 for the

Category	Function	Specification
		position of J10). Users can choose the optional external filter which fulfills the requirements of IEC61800-3 C2.

Note:

1. Only single VFD integrated machine supports power-frequency fan output and 220V/110V power output, for example, GD300-01A-7R5G-4-CT, GD300-01A-011G-4-CT, and GD300-01A-015G-4-CT.
2. When the input voltage exceeds 440VAC, the power-frequency transformer inside the single VFD integrated machine will need to be customized.

2.2 Product nameplate

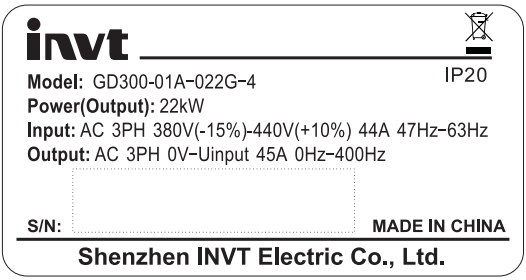


Figure 2-1 Product nameplate

Note: This is an example of the standard model. CE, TUV, and IP20 are marked according to the actual certification condition.

2.3 Model description

The model code contains product information. Users can find the model code on the VFD nameplate or simple nameplate.

GD300-01A – 015 G – 4 -CT
① ② ③ ④ ⑤

Figure 2-2 Product model

Sign	Description	Content
①	Abbreviation of product series	Goodrive300-01A: GD300-01A VFD for air compressor
②	Power class	015: 15kW
③	Load type	G: Constant torque load
④	Voltage class	4: AC 3PH 380V(-15%)–440V(+10%)
⑤	Power-frequency fan/ Built-in transformer	No character: VFD dedicated for single-VFD air compressor
		Single-VFD air compressor integrated machine C: Built-in contactor units, supports power-frequency fan output

Sign	Description	Content
		T: Built-in power-frequency transformer, providing 220V/110V power supply

2.4 Rated specifications

2.4.1 Rated specifications of single-VFD products

Product model	Output power (kW)	Input current (A)	Output current (A)
GD300-01A-7R5G-4	7.5	25	18.5
GD300-01A-011G-4	11	32	25
GD300-01A-015G-4	15	32	32
GD300-01A-018G-4	18.5	37	38
GD300-01A-022G-4	22	44	45
GD300-01A-030G-4	30	58	60
GD300-01A-037G-4	37	72	75
GD300-01A-045G-4	45	87	92
GD300-01A-055G-4	55	106	115
GD300-01A-075G-4	75	140	150
GD300-01A-090G-4	90	170	180
GD300-01A-110G-4	110	202	215
GD300-01A-132G-4	132	265	260
GD300-01A-160G-4	160	310	305
GD300-01A-185G-4	185	345	340
GD300-01A-200G-4	200	385	380

Note:

1. Rated input current is the actually measured result under 380V input voltage; 7.5–11kW and 132–200kW are the actually measured results in cases where there is no DC reactor; 15–110kW is the actually measured result in cases where there is DC reactor.
2. Rated output current is defined as the output current under 380V output voltage.

2.4.2 Rated value of single-VFD integrated machine

Model	Rated input current of the integrated machine (A)	Frequency conversion of main motor		Power frequency of the fan	
		Rated output power (kW)	Rated output current (A)	Rated output power (kW)	Rated output current (A)
GD300-01A-7R5G-4-CT	28	7.5	18.5	0.75	2.5
GD300-01A-011G-4-CT	35	11	25	0.75	2.5
GD300-01A-015G-4-CT	34	15	32	0.75	2.5

Note:

1. Rated input current is the actually measured result under 380V input voltage without DC reactor.
2. Rated output current is defined as the output current under 380V output voltage.

3 Wiring instruction

3.1 Main circuit wiring and terminal description

3.1.1 Main circuit wiring diagram of single VFD

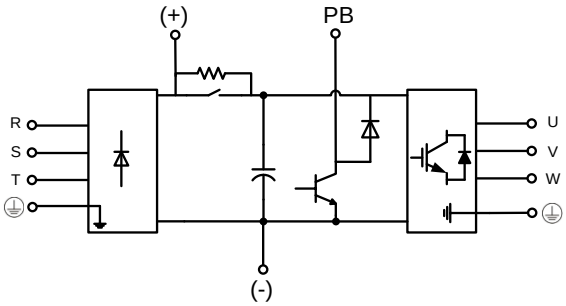


Figure 3-1 7.5kW main circuit wiring diagram

Note: There is brake circuit but no DC reactor for 7.5kW

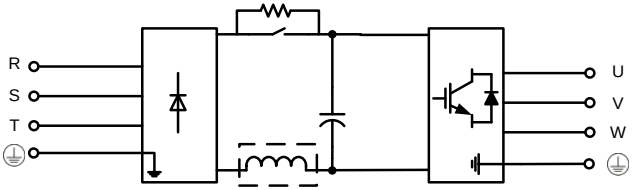


Figure 3-2 11–15kW main circuit wiring diagram

Note: There is optional built-in DC reactor for 11kW and standard built-in DC reactor for 15kW.

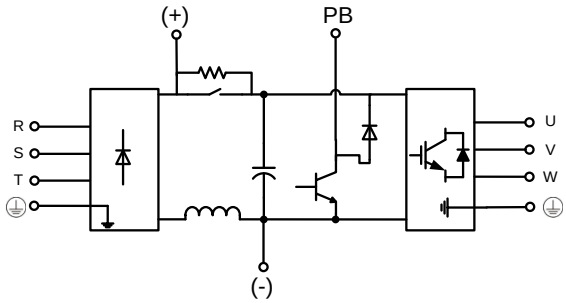


Figure 3-3 18.5–110kW main circuit wiring diagram

Note: There is internal brake circuit for 18.5–22kW; there is no internal brake circuit for 30–110kW; there is standard internal DC reactor for 18.5–110kW.

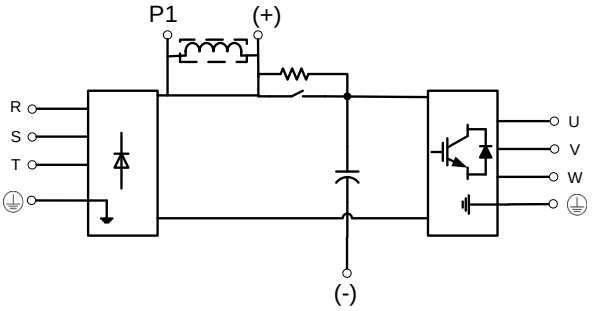


Figure 3-4 132–200kW main circuit wiring diagram

Note:

1. Optional external DC reactor for 132–200kW.
2. See *Appendix B* for filter and reactor model selection.

3.1.2 Main circuit wiring diagram of single-VFD integrated machine

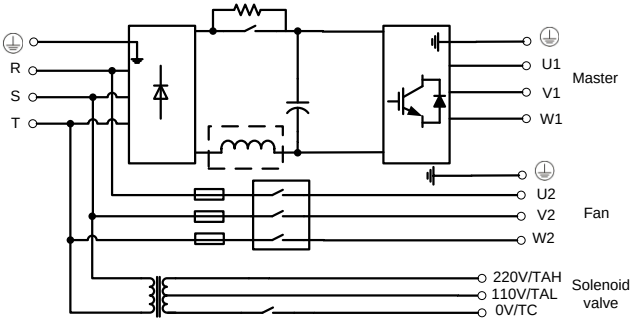


Figure 3-5 Main circuit wiring diagram for 7.5–15kW single-VFD integrated machine

Note: Optional built-in DC reactor for 7.5–11kW.

3.1.3 Main circuit terminal diagram of single VFD

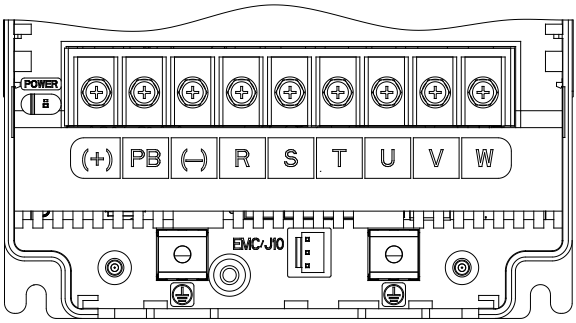


Figure 3-6 7.5kW main circuit terminal diagram

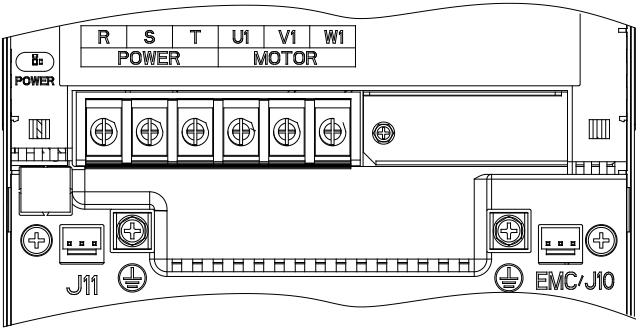


Figure 3-7 11–15kW main circuit terminal diagram

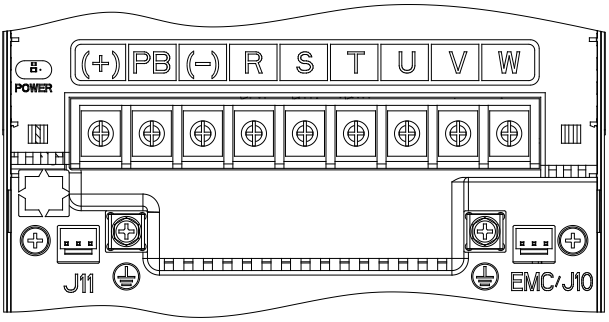


Figure 3-8 18.5–22kW main circuit terminal diagram

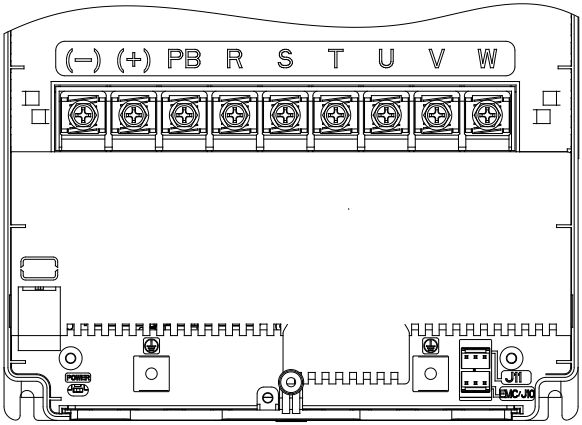


Figure 3-9 30–37kW main circuit terminal diagram

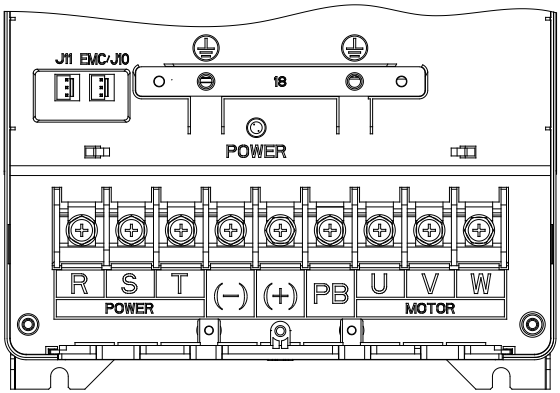


Figure 3-10 45–55kW main circuit terminal diagram

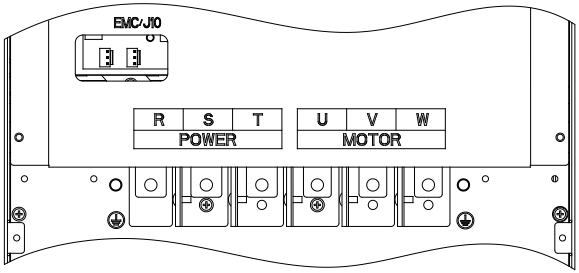


Figure 3-11 75kW main circuit terminal diagram

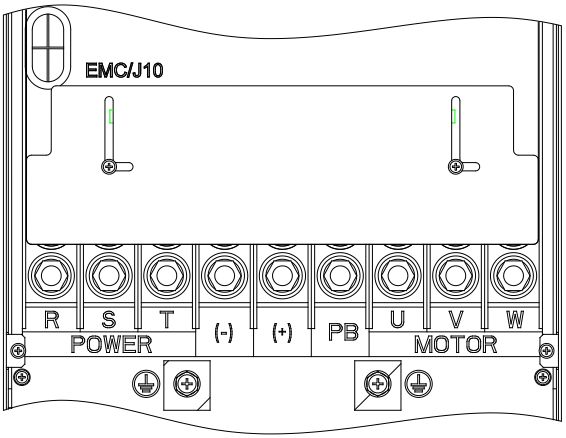


Figure 3-12 90–110kW main circuit terminal diagram

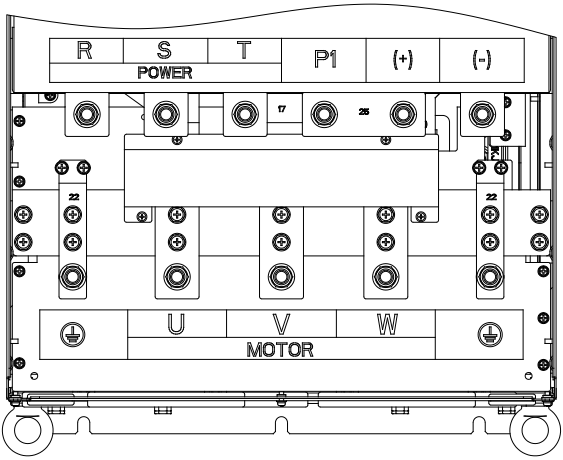


Figure 3-13 132–200kW main circuit terminal diagram

Table 3-1 Screw specification and torque of main circuit terminals of 7.5kW-200kW single VFD

Power range (kW)	Terminal screw specification	Torque of torque driver (N·m)
7.5–15	M5	2.5
18.5–37	M6	3.5
45–110	M8	10
132–200	M12	35

Table 3-2 Main circuit terminal description of single VFD

Terminal sign	Terminal name			Terminal function
	11–15kW	7.5kW and 18.5–110kW	132kW and above	
R, S, T	Main circuit power input			3PH AC input terminal, connected to the grid
P1	None		DC reactor terminal 1	P1, (+) connect to DC reactor terminal
(+)	None	Reserved	DC reactor terminal 2	
(-)	None	Reserved	Reserved	
PB	None	Reserved	None	
U, V, W	VFD output			3PH AC output terminal, connected to the motor
⏚	Ground terminal for safety protection			Each machine must be grounded; two PEs are provided; and grounding resistance is less than 10Ω.

3.1.4 Main circuit terminal diagram of single-VFD integrated machine

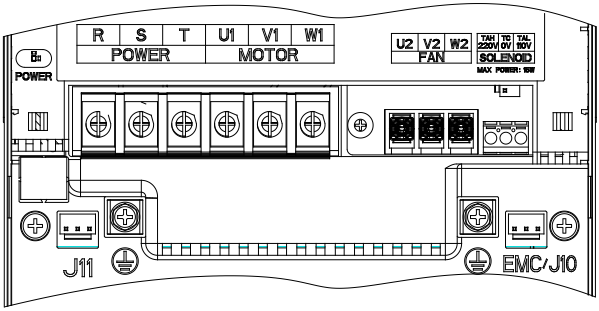


Figure 3-14 Main circuit terminal diagram of 7.5–15kW single-VFD integrated machine

Table 3-3 Screw specification and torque of main circuit terminal of 7.5kW–15kW single-VFD integrated machine7.5kW–15kW

Power range (kW)	Terminal screw specification	Torque of torque driver (N·m)
7.5-15	M5	2.5

Table 3-4 Main circuit terminal description of single VFD integrated machine

Terminal sign		Function
POWER	**R, S, T**	3PH AC input terminal, connected to the grid
MOTOR	**U1, V1, W1**	3PH AC output terminal, connected to the main motor of air compressor
FAN	**U2, V2, W2**	3PH AC output terminal, connected to the fan
SOLENOID	**220V/TAH, 110V/TAL, 0V/TC**	220V/110V output terminal, connected to solenoid valve coil Note: 1. Max. output power of internal power-frequency transformer: 15W 2. When users choose the solenoid valve with 220V coil, connect the solenoid coil to 220V and 0V connecting terminals; 3. When users choose the solenoid valve with 110V coil, connect the solenoid coil to 110V and 0V connecting terminals.
⏚		Each machine must be grounded, three PEs, grounding resistance is less than 10Ω

Note: Do not connect the connecting terminal of solenoid valve to other external loads; if the power of solenoid valve coil exceeds 15W, the power-frequency transformer inside the integrated machine will need to be customized or connected to external 220V/110V power independently.

3.2 Control circuit wiring and terminal description

3.2.1 Control circuit wiring diagram

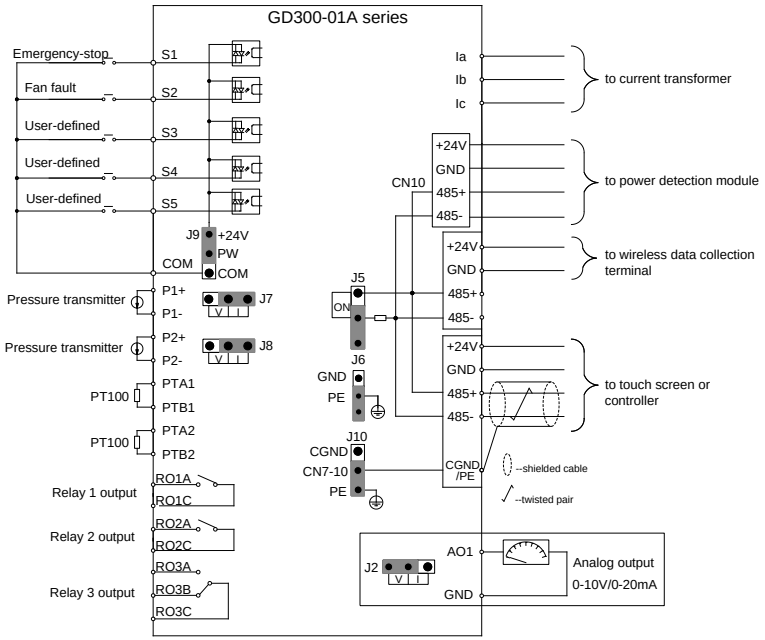


Figure 3-15 Control circuit wiring diagram

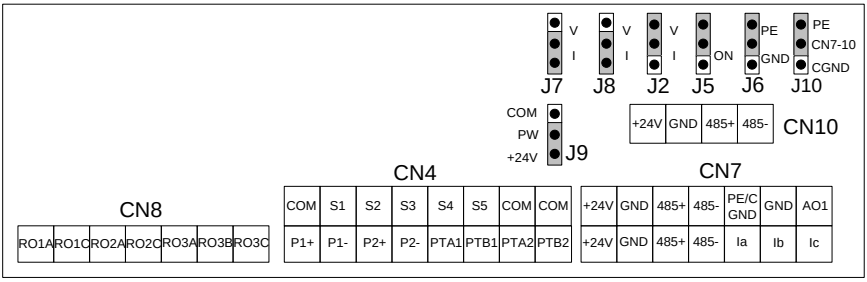


Figure 3-16 Control circuit terminal diagram

Table 3-4 User terminal description of control circuit

Category	Sign	Name	Function
Power	+24V	+24V power	Provide +24V±5% power to the external, max. output current: 1A Can be used to power up GPRS, touch screen and power detection module
	GND	+24V, AO1, Ia, Ib, Ic	+24V, AO, Ia, Ib, Ic reference ground

Category	Sign	Name	Function
		reference ground	
PT100 signal input	PTA1	Analog temperature signal 1	1. Resolution rate: 1°C 2. Range: -20°C–150°C 3. Detection precision: 3°C
	PTB1		
	PTA2	Analog temperature signal 2	
	PTB2		
Pressure signal input	P1+	Analog pressure signal 1	1. Input range: current/voltage is optional, 0–20mA/0–10V; of which P1 is switched via J7 and P2 via J8 2. Input impedance: 20kΩ during voltage input; 500Ω during current input 3. Resolution rate: 5mV (minimum value) 4. Error: ±1%, 25°C
	P1-		
	P2+	Analog pressure signal 2	
	P2-		
Analog output	AO1	Analog output signal 1	1. Output range: 0–10V voltage or 0–20mA current; voltage or current output is set by the jumper; AO1 is switched via J2. 2. Error: ±1%, 25°C
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 ground	
Communication	485+, 485-	485 communication	485 communication terminal, adopting the Modbus RTU protocol
	PE/CGND		PE: When selecting PE through J10, it can be used as the connecting terminal of 485 communication shielded cable; CGND: When selecting CGND through J10, it can be used as the connecting terminal of 485 communication shielded cable
Relay output	RO1A	NO contact of relay 1	1. Contact capacity: 3A/AC250V, 1A/DC30V 2. Cannot be used as high-frequency switch output **Note:** RO1 port of single-VFD integrated machine is connected to solenoid coil port by default.
	RO1C	Public contact of relay 1	
	RO2A	NO contact of relay 2	
	RO2C	Public contact of relay 2	
	RO3A	NO contact of relay 3	
	RO3B	NC contact of relay 1	
	RO3C	Public contact of relay 3	
Current input	Ia	A-phase current input of	1 Range: 0–40A

Category	Sign	Name	Function
		the fan	2. Error±3%, 25°C 3. Input impedance: 50Ω **Note:** See *Appendix C* for model selection of current transformer.
	Ib	B-phase current input of the fan	
	Ic	C-phase current input of the fan	
Jumper terminal	J7	P1-Analog signal selection terminal	I corresponds to current signal, V corresponds to voltage signal, and the default is current input signal.
	J8	P2-Analog signal selection terminal	I corresponds to current signal, V corresponds to voltage signal, and the default is current input signal.
	J2	AO1 analog output signal selection terminal	I corresponds to current signal, V corresponds to voltage signal, and the default is voltage output signal.
	J5	Connection terminal of 485 communication terminal resistor	ON corresponds to terminal resistor. ON is not connected to terminal resistor by default.
	J6	Short-connect terminal between PE and GND	No short connection by default
	J9	Internal/external power selection terminal	PW is connected to +24V by default. See details in fig 3.19 and fig 3.20.
	J10	PE/CGND selection terminal	For products below 75kW, 485 communication adopts non-isolation mode, and CN7-10 is short connected to PE by default. For 75kW and above products, 485 communication adopts isolation mode, and CN7-10 is short connected to CGND by default, as shown in fig 3.18.

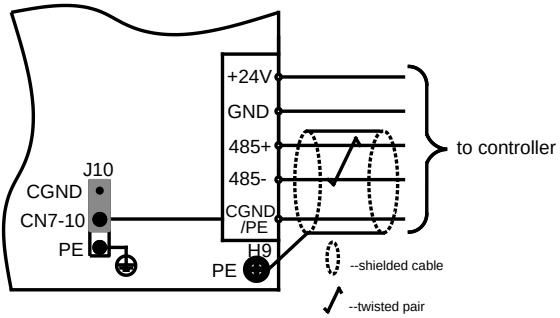


Figure 3-17 485 communication wiring diagram (isolation mode) for 75kW and above

Note: When users choose to use the controller, for 75kW and above models, J10 cap can be adjusted and above wiring mode can be adopted to enhance anti-interference performance.

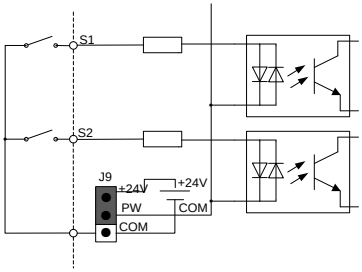


Figure 3-18 Internal power (NPN mode)

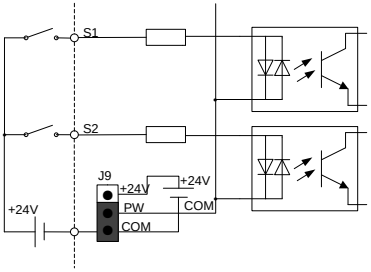


Figure 3-19 External power (PNP mode)

When the digital input uses internal +24V, set J9 according to Figure 3-18, and short +24V to PW. When digital input uses external +24V, set J9 according to Figure 3-19, and short COM to PW.

4 Commissioning instruction

4.1 Commissioning instruction for the dual-VFD air compressor

4.1.1 Wiring diagram of the dual-VFD air compressor system

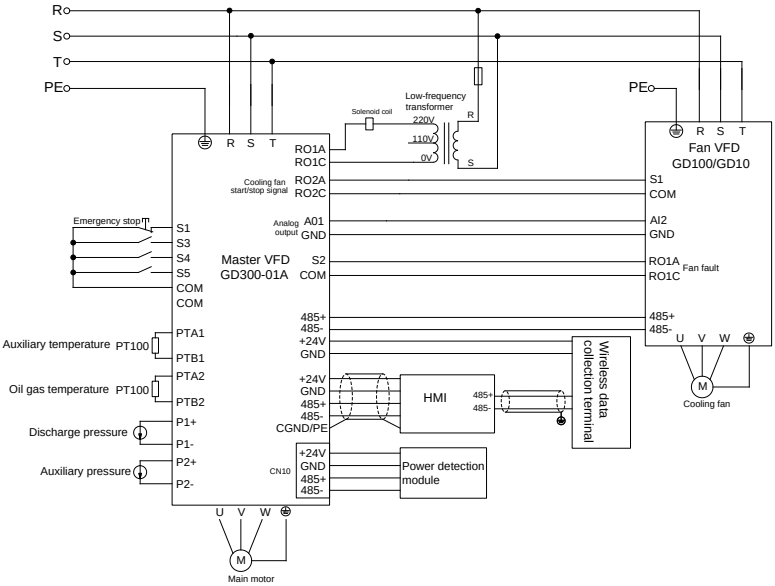


Figure 4-1 Wiring diagram of dual-VFD air compressor system

4.1.2 Commissioning steps for the dual-VFD air compressor

It is recommended to use touch screen for display and commissioning, and the commissioning steps are shown below (if the controller used is made by other manufacturers, contact our technician for details).

1. Perform wiring according to Figure 4.1 and ensure that the VFD for air compressor and the housing of the air compressor are grounded properly.
2. After power up, the following page is displayed on the HMI.

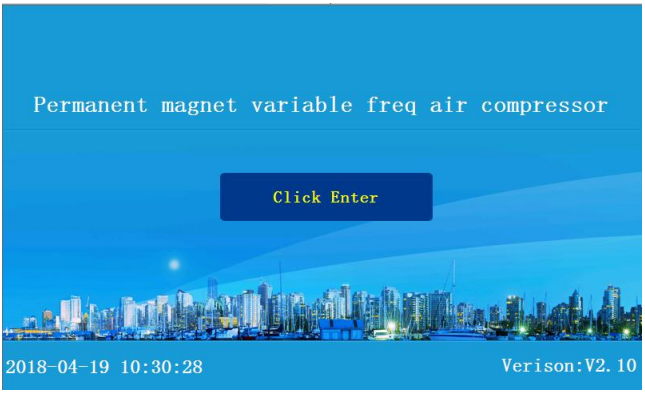


Figure 4-2 Login interface

3. Click **Click Enter** to enter the working environment interface, as shown in Figure 4-3.

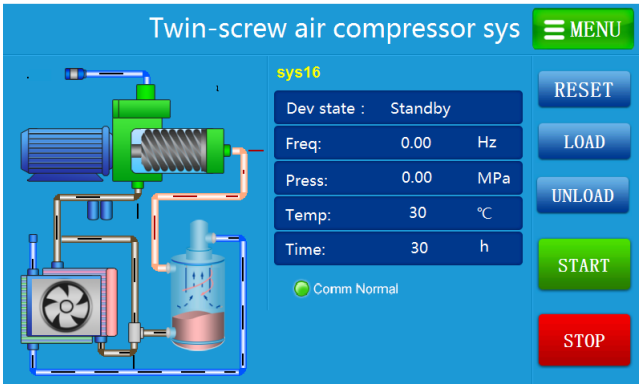


Figure 4-3 Working interface

4. Click **Menu** on the interface. The page shown in Figure 4-4 is displayed.

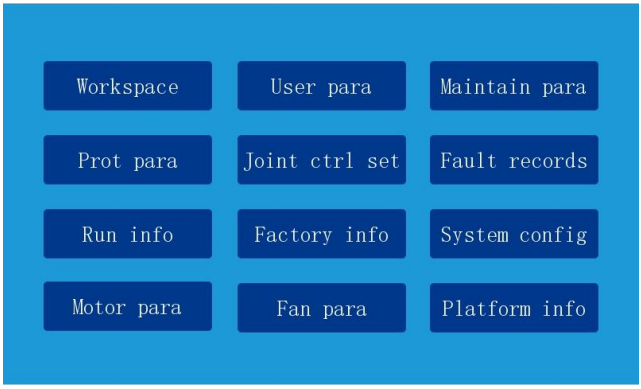


Figure 4-4 Menu interface

5. Click **System config** in the touch screen to enter the system configuration interface, as shown in Figure 4-5.

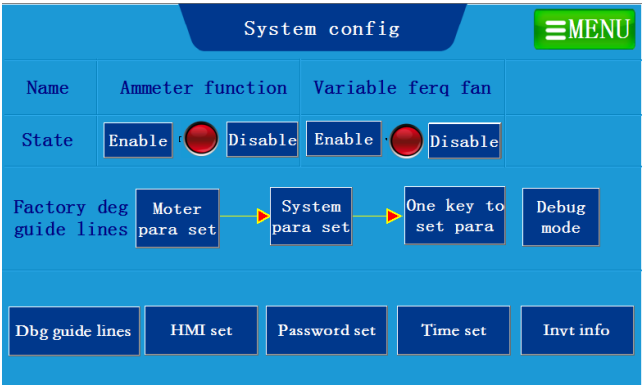


Figure 4-5 System configuration interface

Click **Enable** for the fan VFD, and perform commissioning according to the commissioning guide.

Step 1: Click **Dbg guide lines** on the system configuration interface. The page shown in Figure 4-6 is displayed.

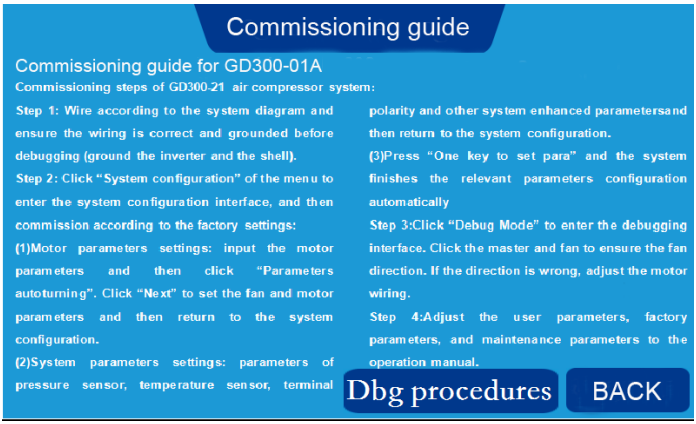


Figure 4-6 Commissioning guide page

After reading through the commissioning guide, click **BACK** to enter system configuration.

Step 2: Click **Motor Para Set** on the system configuration interface, as shown in Figure 4-7.

Select motor type, if selecting "SM", it is necessary to set the maximum frequency, rated frequency, rated power, rated voltage, rated current, pole pairs, and carrier frequency, as shown in Figure 4-7; if selecting "AM", it is necessary to set the maximum frequency, rated frequency, rated power, rated voltage, rated current , rated speed, and carrier frequency.

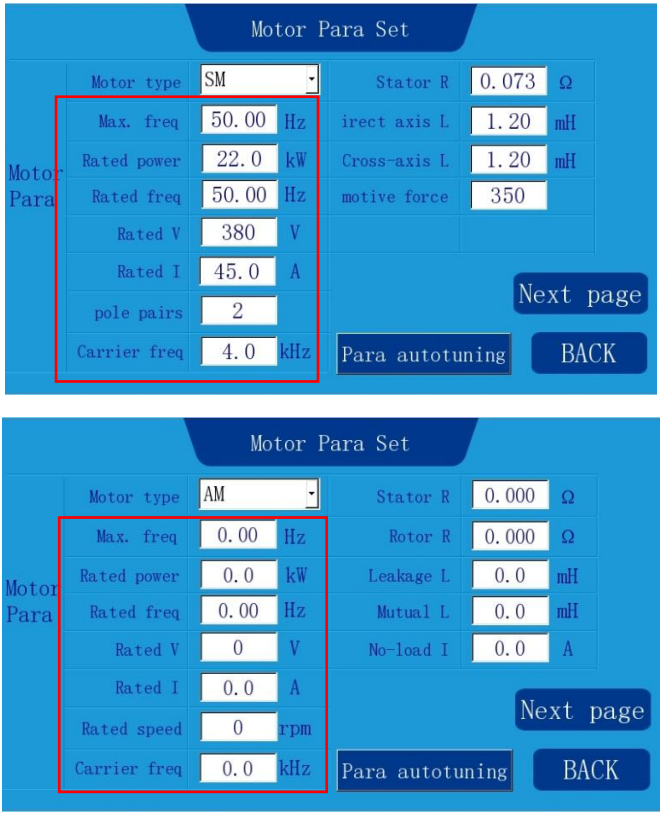


Figure 4-7 Master parameter setup interface

After setting the motor parameters based on the parameters on motor nameplate, click **Para autotuning**, and after parameter autotuning is done, click **Next page** to set fan motor parameters (max. frequency, rated frequency, rated power, rated voltage, rated current, and rated speed need to be set).

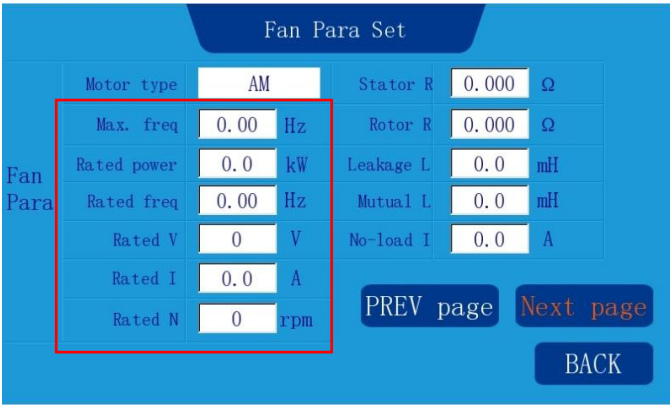


Figure 4-8 Fan parameter setup interface

Step 3: Click **Next page** to enter **System Para Config** or click **BACK** to return to system configuration. On the system configuration interface, click **System Para Config**. S1 functions as emergency-stop switch, select NO/NC based on the polarity of the emergency-stop switch, as shown in Figure 4-9.

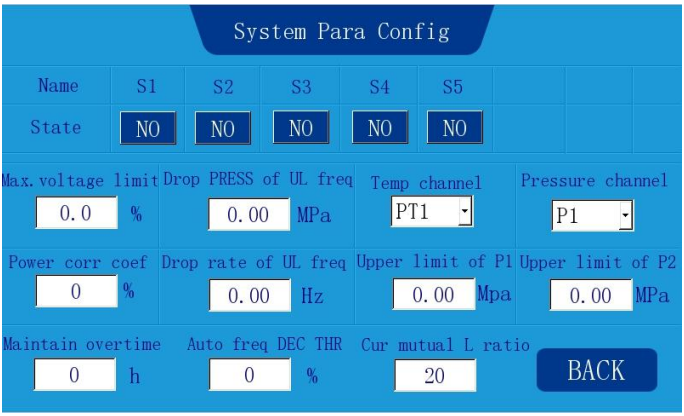


Figure 4-9 System parameter configuration interface

Set pressure sensor parameters, temperature sensor parameters and specialized function parameters according to system sensor configuration. Then, click **BACK** to enter the system configuration page.

Step 4: On the system configuration interface, click **One-key to Set Para**. The system completes the related parameter configuration automatically.

Step 5: On the system configuration interface, click **Debug Mode**. The page shown in Figure 4-10 is displayed.

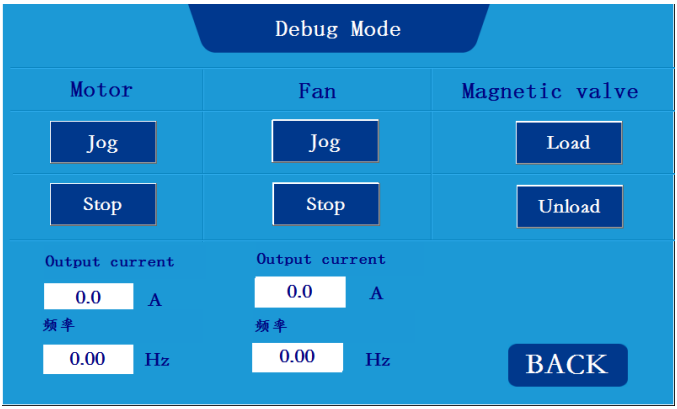


Figure 4-10 Debug mode interface

Click **Jog** for the motor and the fan to determine the motor rotation direction; click **Load** or **Unload** to test the action of solenoid valve. Click **BACK** to enter system configuration, then, click **Menu** to return to the menu interface.

Note: If the motor rotates reversely, adjust the wiring sequence of the motor cable.

6. Choose **User Para** in the touch screen menu. The page shown in Figure 4-11 is displayed.

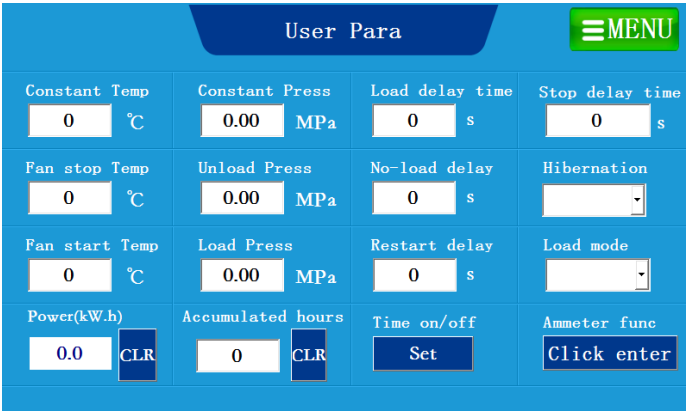


Figure 4-11 User parameter interface

7. Choose **Maintain Para** in the touch screen menu. The page shown in Figure 4-12 is displayed.

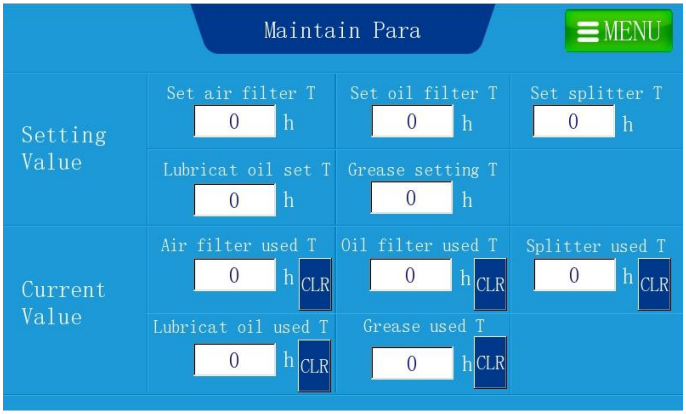


Figure 4-12 Maintenance parameter interface

8. Choose **Protection Para** in the menu. The page shown in Figure 4-13 is displayed.

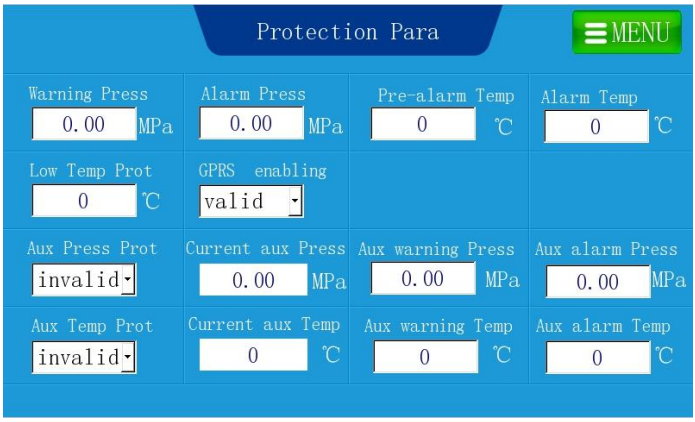


Figure 4-13 Protection parameter interface

9. Choose Running Info in the menu. The page show in Figure 4-14 is displayed.

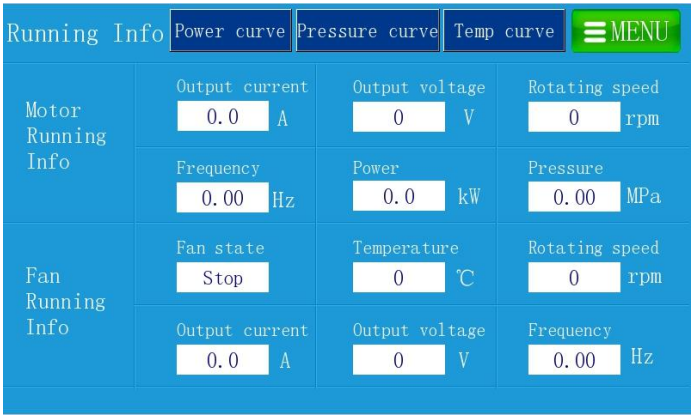


Figure 4-14 Running information interface

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

Note: All the parameters displayed in the interfaces in “4.1.2 Commissioning steps for dual-VFD air compressor” are for reference only and subject to actual displayed content.

4.2 Commissioning guidance for single-VFD air compressor

4.2.1 Wiring diagram for single-VFD air compressor system

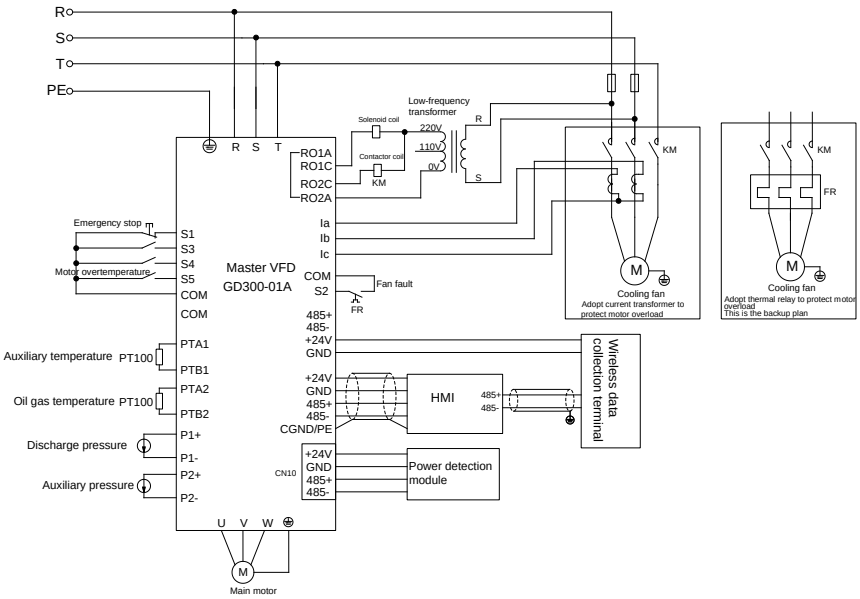


Figure 4-15 Wiring diagram for single-VFD air compressor system

Note: Pay attention to the dotted terminals during installing and wiring the current transformer,

see *Appendix C Reactors* for precautions.

4.2.2 Commissioning steps for single-VFD air compressor

1. Refer to *4.1.2 Commissioning steps for dual-VFD air compressor*, select to turn off the frequency-conversion fan on the **System Config** page, and after commissioning on the**System Config** page is done according to commissioning guidance, return to the menu page as shown in Figure 4-16.

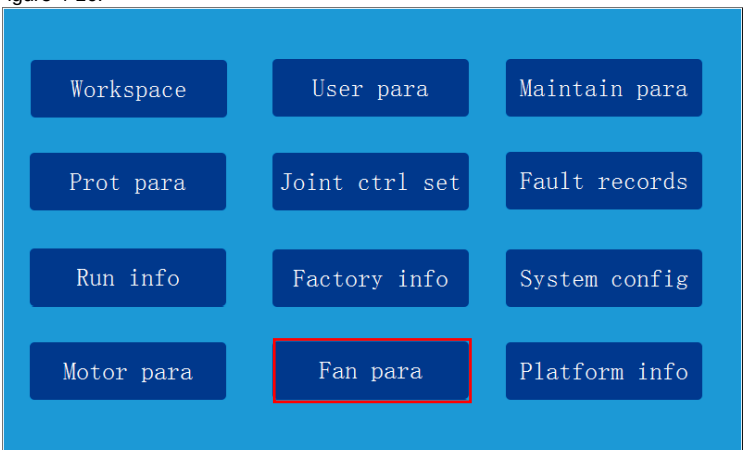


Figure 4-16 Menu interface

2. Choose **Fan Para**. The page shown in Figure 4-17 is displayed.

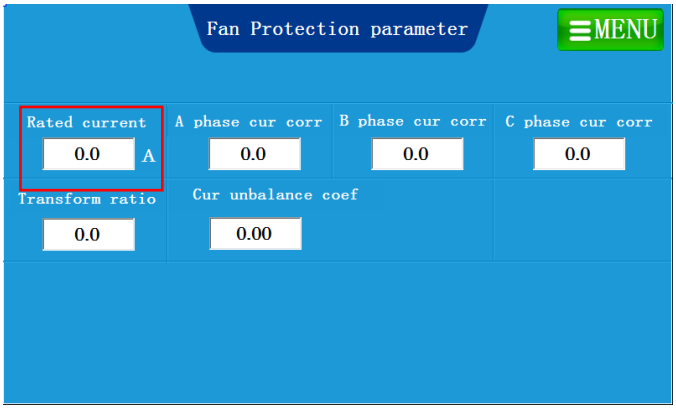


Figure 4-17 Fan protection parameter interface

Set **Rated current** of the fan according to the parameters on fan nameplate.

3. After adjusting user parameters, factory parameters and maintenance parameters according to the touch screen manual, return to “working environment” interface, and click “start” to run.

Note: Pay attention to the dotted terminals during installing and wiring the current transformer, see *Appendix C Reactors* for precautions.

4.3 Commissioning guidance for single-VFD integrated machine

4.3.1 Wiring diagram for single-VFD integrated machine

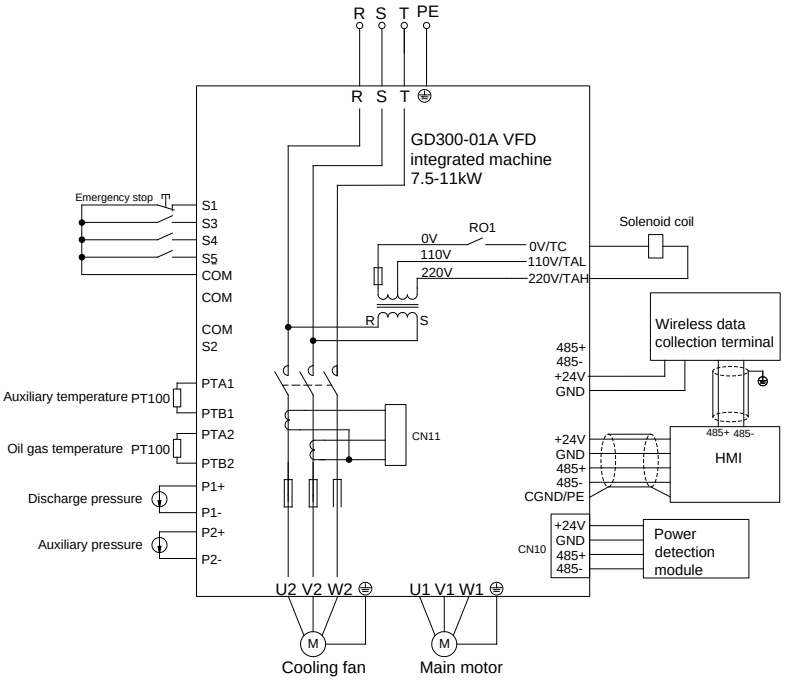


Figure 4-18 Wiring diagram for single-VFD integrated machine system

Note:

1. RO1 port of single-VFD integrated machine is connected to solenoid valve coil port by default before delivery. If the touch screen used are made by other manufactures other than INVT, please set RO1 to solenoid valve control (P06.03=28).
2. Refer to *4.2.2 Commissioning guidance for single-VFD air compressor* for the commissioning guidance of single-VFD integrated machine.

5 Function code description

"○" indicates the parameter value can be modified during stop and running;

"◎" indicates the parameter value cannot be modified when the VFD is running;

"●" indicates the parameter value is the actually detected value which cannot be modified.

(The modification attribute of each parameter has been restricted automatically by the VFD to avoid inadvertent modification)

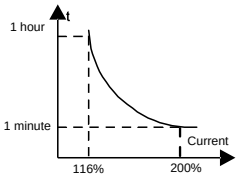
5.1 Function codes

Function code	Name	Parameter description	Default value	Modify
P00.00	Speed control mode	0: SVC mode 0 (applicable to AM,SM) 1: SVC mode 1(applicable to AM) 2: V/F control 3: VC mode (applicable to SM) **Note:** AM-Asynchronous Motor; SM-Synchronous Motor; If vector mode is adopted, it is a must to carry out motor parameter autotuning on the VFD first.	0	◎
P00.01	Running command channel	0: Keypad (LED off) 1: Terminal (LED blinks) 2: Communication (LED on)	0	○
P00.02	Communication running command channel	0: Modbus communication 1–3: Reserved	0	○
P00.03	Max. output frequency	P00.04–600.00Hz (400.00Hz)	50.00Hz	◎
P00.04	Upper limit of running frequency	P00.05–P00.03 (max. frequency)	50.00Hz	◎
P00.05	Lower limit of running frequency	0.00Hz–P00.04 (upper limit of running frequency)	0.00Hz	◎
P00.06	A frequency command selection	**Note:** A frequency and B frequency cannot be set to the same frequency reference mode.	0	○
P00.07	B frequency command selection	You can set the frequency source through P00.09. 0: Set via keypad digits 1: Set via analog P1- 2: Reserved 3: Set via analog P2- 4: Reserved 5: Reserved	2	○

Function code	Name	Parameter description	Default value	Modify
		6: Set via multi-step speed running 7: Set via PID control 8: Set via Modbus communication 9–11: Reserved		
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. frequency)	50.00Hz	○
P00.11	Acceleration time 1	0.0–3600.0s	Depend on model	○
P00.12	Deceleration time 1	0.0–3600.0s	Depend on model	○
P00.13	Running direction	0: Run by default direction 1: Run by reverse direction 2: Reverse running prohibited	2	○
P00.14	Carrier frequency setting	1.0–15.0kHz	Depend on model	○
P00.15	Motor parameter autotuning	0: No operation 1: Rotary autotuning 2: Static autotuning 1 (comprehensive autotuning) 3: Static autotuning 2 (partial autotuning)	0	◎
P00.16	AVR function selection	0: Invalid 1: Valid during the whole time	1	○
P00.17	VFD type	0: G type 1: P type	0	◎
P00.18	Function parameter restoration	0: No operation 1: Restore to default value 2: Clear fault history **Note:** When restoring to default values, the motor parameters in P02 group will stay in current value; in addition, P18.04, P18.28, P18.29, P18.32, P18.33, P18.38 in P18 group	0	◎

Function code	Name	Parameter description	Default value	Modify
		and P21.04, P21.05, P21.06 in P21 group will stay in present value.		
P01.01	Starting frequency of direct startup	0.00–50.00Hz	0.50Hz	◎
P01.08	Stop mode selection	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 as per the set speed value (judge the ramps frequency) 1: Detect as per the speed feedback value (valid for vector control only)	1	◎
P01.17	Feedback speed detection time	0.00–100.00 s (valid only when P01.16=1)	0.50s	◎
P02.00	Type of motor 1	0: Asynchronous motor 1: Synchronous motor	0	◎
P02.01	Rated power of asynchronous motor 1	0.1–3000.0kW	Depend on model	◎
P02.02	Rated frequency of asynchronous motor 1	0.01Hz–P00.03 (max. frequency)	50.00Hz	◎
P02.03	Rated speed of asynchronous motor 1	1–36000rpm	Depend on model	◎
P02.04	Rated voltage of asynchronous motor 1	0–1200V	Depend on model	◎
P02.05	Rated current of asynchronous motor 1	0.8–6000.0A	Depend on model	◎
P02.06	Stator resistor of asynchronous motor 1	0.001–65.535Ω	Depend on model	○
P02.07	Rotor resistor of asynchronous motor 1	0.001–65.535Ω	Depend on model	○
P02.08	Leakage inductance of asynchronous motor 1	0.1–6553.5mH	Depend on model	○
P02.09	Mutual inductance of asynchronous motor 1	0.1–6553.5mH	Depend on model	○
P02.10	No-load current of asynchronous motor 1	0.1–6553.5A	Depend on model	○
P02.11	Saturation coefficient 1 of the iron core of asynchronous motor 1	0.0–100.0%	80.0%	◎
P02.12	Saturation coefficient 2	0.0–100.0%	68.0%	◎

Function code	Name	Parameter description	Default value	Modify
	of the iron core of asynchronous motor 1			
P02.13	Saturation coefficient 3 of the iron core of asynchronous motor 1	0.0–100.0%	57.0%	◎
P02.14	Saturation coefficient 4 of the iron core of asynchronous motor 1	0.0–100.0%	40.0%	◎
P02.15	Rated power of synchronous motor 1	0.1–3000.0kW	Depend on model	◎
P02.16	Rated frequency of synchronous motor 1	0.01Hz–P00.03 (max. frequency)	50.00Hz	◎
P02.17	Pole pairs of synchronous motor 1	1–50	2	◎
P02.18	Rated voltage of synchronous motor 1	0–1200V	Depend on model	◎
P02.19	Rated current of synchronous motor 1	0.8–6000.0A	Depend on model	◎
P02.20	Stator resistor of synchronous motor 1	0.001–65.535Ω	Depend on model	○
P02.21	Direct-axis inductance of synchronous motor 1	0.01–655.35mH	Depend on model	○
P02.22	Quadrature-axis inductance of synchronous motor 1	0.01–655.35mH	Depend on model	○
P02.23	Counter-emf constant of synchronous motor 1	0–10000	350	○
P02.26	Overload protection selection of motor 1	0: No protection 1: Normal motor (with low speed compensation) 2: Frequency-conversion motor (without low speed compensation)	2	◎
P02.27	Overload protection coefficient of motor 1	Motor overload multiple M = Iout/(In*K) In is rated motor current, Iout is VFD output current, K is motor overload protection coefficient. The smaller the K is, the larger the value of M is; the smaller the value of M is, the easier the protection is.	100.0%	○

Function code	Name	Parameter description	Default value	Modify
		When M=116%, protection will be applied at 1h overload; when M=150%, protection will be applied at 12 min overload; when M=180%, protection will be applied at 5 min overload; when M=200%, protection will be applied at 60s overload; when M≥400%, protection will be applied immediately.  Setting range: 20.0%–120.0%		
P02.28	Power calibration coefficient of motor 1	0.00–3.00	1.00	○
P02.29	Parameter display selection of motor 1	0: Displayed according to the motor type 1: All displayed	0	○
P03.00	ASR proportional gain 1	0–200.0	20.0	○
P03.01	ASR integral time 1	0.000–10.000s	0.200s	○
P03.02	Switching low point frequency	0.00Hz–P03.05	5.00Hz	○
P03.03	ASR proportional gain 2	0–200.0	20.0	○
P03.04	ASR integral time 2	0.000–10.000s	0.200s	○
P03.05	Switching high point frequency	P03.02–P00.03 (max. frequency)	10.00Hz	○
P03.06	ASR output filter	0–8 (corresponds to 0–2^8/10ms)	0	○
P03.07	Vector control electromotion slip compensation coefficient	50%–200%	100%	○
P03.08	Vector control power generation slip compensation coefficient	50%–200%	100%	○
P03.09	ACR proportional coefficient P	0–65535 The default value of P03.09 and P03.10 is	Depend on	○

<table>
<tr><th>Function code</th><th>Name</th><th>Parameter description</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>different within differing power ranges, and</td><td>model</td><td></td></tr>
<tr><td>P03.10</td><td>ACR integral coefficient I</td><td>the default value will be configured as below after autotuning and setting power range via the touch screen.
<table><tr><th>P03.09 value (reference)</th><th>P03.10 value (reference)</th><th>Motor power</th></tr><tr><td>2000</td><td>1000</td><td>7.5–22kW</td></tr><tr><td>2500</td><td>1500</td><td>30–37kW</td></tr><tr><td>3000</td><td>1500</td><td>45–90kW</td></tr><tr><td>3500</td><td>2000</td><td>110–132kW</td></tr><tr><td>4000</td><td>2000</td><td>160–200 kW</td></tr></table></td><td>Depend on model</td><td>○</td></tr>
<tr><td>P03.20</td><td>Keypad setting of the upper limit of electromotive torque</td><td>0.0–300.0% (rated motor current)</td><td>180.0%</td><td>○</td></tr>
<tr><td>P03.21</td><td>Keypad setting of the upper limit of brake torque</td><td>0.0–300.0% (rated motor current)</td><td>180.0%</td><td>○</td></tr>
<tr><td>P03.22</td><td>Flux-weakening coefficient in constant power area</td><td>0.1–2.0</td><td>0.3</td><td>○</td></tr>
<tr><td>P03.23</td><td>Min. flux-weakening point in constant power area</td><td>10%–100%</td><td>20%</td><td>○</td></tr>
<tr><td>P03.24</td><td>Max. voltage limit</td><td>0.0–120.0%</td><td>100.0%</td><td>○</td></tr>
<tr><td>P03.25</td><td>Pre-excitation time</td><td>0.000–10.000s</td><td>0.300s</td><td>○</td></tr>
<tr><td>P03.26</td><td>Flux-weakening proportional gain</td><td>0–8000</td><td>300</td><td>○</td></tr>
<tr><td>P03.27</td><td>Vector control speed display selection</td><td>0: Display as per actual value
1: Display as per the set value</td><td>0</td><td>○</td></tr>
<tr><td>P04.00</td><td>V/F curve setting of motor 1</td><td>0: Straight V/F curve
1: Multi-point V/F curve
2: Torque step-down V/F curve (1.3 order)
3: Torque step-down V/F curve (1.7 order)
4: Torque step-down V/F curve (2.0 order)
5: Reserved</td><td>0</td><td>◎</td></tr>
<tr><td>P04.01</td><td>Torque elevation of motor 1</td><td>0.0%: (automatic)0.1%–10.0%</td><td>0.0%</td><td>○</td></tr>
<tr><td>P04.02</td><td>Torque elevation cut-off of motor 1</td><td>0.0%–50.0% (relative to rated frequency of motor 1)</td><td>20.0%</td><td>○</td></tr>
</table>

Function code	Name	Parameter description	Default value	Modify
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% (rated voltage of motor 1)	00.0%	○
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% (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% (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 vibration control factor of motor 1	0–100	10	○
P04.11	High-frequency vibration control factor of motor 1	0–100	10	○
P04.12	Vibration control threshold of motor 1	0.00Hz–P00.03 (max. frequency)	30.00Hz	○
P04.26	Energy conservation running selection	0: No action 1: Automatic energy-saving running	0	◎
P04.33	Flux-weakening coefficient in constant power area	1.00–1.30	1.00	○
P05.00	Reserved	Reserved	0	◎
P05.01	S1 terminal function selection	0: No function 1: Forward running 2: Reverse running 3: Three-line running control 4: Forward jogging 5: Reverse jogging 6: Coast to stop 7: Fault reset 8: Running pause 9: External fault input 10–24: Reserved	0	◎
P05.02	S2 terminal function selection		0	◎
P05.03	S3 terminal function selection		0	◎
P05.04	S4 terminal function selection		0	◎
P05.05	S5 terminal function selection		0	◎
P05.06	Reserved			◎

<table>
<tr><th>Function code</th><th>Name</th><th>Parameter description</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>25: PID control pause
26–39: Reserved
40: Zero out power consumption
41: Maintain power consumption
42: Air filter blockage signal
43: Oil filter blockage signal
44: Separator blockage signal
45: Precision splitter blockage signal
46: External fault 1 (motor overtemperature)
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 selection</td><td>This function code is used to set the input terminal polarity.
When the bit is set to 0, input terminal polarity is positive;
When the bit is set to 1, input terminal polarity is negative.
<table>
<tr><td></td><td>BIT8</td><td>BIT7</td><td>BIT6</td><td>BIT5</td></tr>
<tr><td></td><td colspan="4">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 filter time</td><td>0.000–1.000s</td><td>0.200s</td><td>○</td></tr>
<tr><td>P05.14</td><td>S1 terminal switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.15</td><td>S1 terminal switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.16</td><td>S2 terminal switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.17</td><td>S2 terminal switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.18</td><td>S3 terminal switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.19</td><td>S3 terminal switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P05.20</td><td>S4 terminal switch-on</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
</table>

Function code	Name	Parameter description	Default value	Modify
	delay			
P05.21	S4 terminal switch-off delay	0.000–50.000s	0.000s	○
P05.22	S5 terminal switch-on delay	0.000–50.000s	0.000s	○
P05.23	S5 terminal switch-off delay	0.000–50.000s	0.000s	○
P05.32	Lower limit value of P1	0.00V–P05.34	2.00V	○
P05.33	Corresponding setting of lower limit of P1	-100.0%–100.0%	0.0%	○
P05.34	Upper limit value of P1	P05.32–10.00V	10.00V	○
P05.35	Corresponding setting of upper limit of P1	-100.0%–100.0%	100.0%	○
P05.36	P1 input filter time	0.000s–10.000s	0.200s	○
P05.37	PT1 lower limit value	0.00V–P05.39	0.00V	○
P05.38	Corresponding setting of lower limit of PT1	-100.0%–100.0%	-12.5%	○
P05.39	PT1 upper limit value	P05.37–10.00V	10.00V	○
P05.40	Corresponding setting of upper limit of PT1	-100.0%–100.0%	93.8%	○
P05.41	PT1 input filter time	0.000s–10.000s	0.300s	○
P05.42	P2 lower limit value	0.00V–P05.44	2.00V	○
P05.43	Corresponding setting of lower limit of P2	-100.0%–100.0%	0.0%	○
P05.44	P2 upper limit value	P05.42–10.00V	10.00V	○
P05.45	Corresponding setting of upper limit of P2	-100.0%–100.0%	100.0%	○
P05.46	P2 input filter time	0.000s–10.000s	0.200s	○
P05.47	PT2 lower limit value	0.00V–P05.49	0.00V	○
P05.48	Corresponding setting of lower limit of PT2	-100.0%–100.0%	-12.5%	○
P05.49	PT2 upper limit value	P05.47–10.00V	10.00V	○
P05.50	Corresponding setting of upper limit of PT2	-100.0%–100.0%	93.8%	○
P05.51	PT2 input filter time	0.000s–10.000s	0.300s	○
P06.01	Reserved	0: Invalid	0	○
P06.02	RO3 output selection	1: In running	0	○
P06.03	RO1 output selection	2: In forward running	0	○
P06.04	RO2 output selection	3: In reverse running	0	○

<table>
<tr><th>Function code</th><th>Name</th><th>Parameter description</th><th>Default value</th><th>Modify</th></tr>
<tr><td></td><td></td><td>4: In jogging
5: VFD fault
6–11: Reserved
12: Ready to run
13: In pre-exciting
14–19: Reserved
20: External fault is valid
21–22: Reserved
23: Modbus communication virtual terminal output
24–26: Reserved
27: Fan start/stop control
28: Solenoid valve control output
29: Cooling fan control of main motor
30: Reserved</td><td></td><td></td></tr>
<tr><td>P06.05</td><td>Output terminal polarity selection</td><td>This function code is used to set the output terminal polarity.
When the bit is set to 0, output terminal polarity is positive;
When the bit is set to 1, output terminal polarity is negative.
<table><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr><tr><td>RO2</td><td>RO1</td><td>RO3</td><td>Reserved</td></tr></table>Setting range: 0–0xF</td><td>0</td><td>○</td></tr>
<tr><td>P06.06</td><td>Reserved</td><td></td><td></td><td></td></tr>
<tr><td>P06.07</td><td>Reserved</td><td></td><td></td><td></td></tr>
<tr><td>P06.08</td><td>RO3 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.09</td><td>RO3 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.10</td><td>RO1 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.11</td><td>RO1 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.12</td><td>RO2 switch-on delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.13</td><td>RO2 switch-off delay</td><td>0.000–50.000s</td><td>0.000s</td><td>○</td></tr>
<tr><td>P06.14</td><td>AO1 output selection</td><td>0: Running frequency
1: Set frequency
2: Ramps reference frequency
3: Running speed
4: Output current (relative to two times the rated current of the VFD)
5: Output current (relative to two times the</td><td>24</td><td>○</td></tr>
</table>

Function code	Name	Parameter description	Default value	Modify
		current of the motor) 6: Output voltage 7: Output power 8: Reserved 9: Output torque 10–13: Reserved 14: Value 1 set through Modbus communication 15: Value 2 set through Modbus communication 16–21: Reserved 22: Torque current (relative to three times the rated current of the motor) 23: Ramp frequency reference (with sign) 24: Temperature PID output 25–30: Reserved		
P06.17	Lower limit of AO1 output	-100.0%–P06.19	0.0%	○
P06.18	Corresponding AO1 output of lower limit	0.00V–10.00V	0.00V	○
P06.19	Upper limit of AO1 output	P06.17–100.0%	100.0%	○
P06.20	Corresponding AO1 output of upper limit	0.00V–10.00V	10.00V	○
P06.21	AO1 output filter time	0.000s–10.000s	0.000s	○
P07.00	User password	0–65535	0	○
P07.01	Function parameter copy	0: No operation 1: Uploading function parameters from the machine to keypad 2: Downloading function parameters (including the motor parameters) from the keypad to machine 3: Downloading function parameters (excluding motor parameters of the P02 and P12 groups) from the keypad to machine 4: Downloading function parameters (only motor parameters of the P02 and P12 groups) from the keypad to machine **Note:** After the parameter is set to 1, 2, 3 or 4, and	0	◎

Function code	Name	Parameter description	Default value	Modify
		the operation is executed, the parameter is automatically restored to 0.		
P07.11	Temperature of rectifier bridge module	0–100.0°C		●
P07.12	Temperature of inverter module	0–100.0°C		●
P07.13	Software version of control board	1.00–655.35		●
P07.14	Accumulated running time	0–65535h		●
P07.15	High bit of power consumption of the VFD	0–65535 kWh (*1000)		●
P07.16	Low bit of power consumption of the VFD	0.0–999.9 kWh		●
P07.17	VFD model	0: G type 1: P type		●
P07.18	Rated VFD power	0.4–3000.0kW		●
P07.19	Rated VFD voltage	50–1200V		●
P07.20	Rated VFD current	0.1–6000.0A		●
P07.21	Factory barcode 1	0x0000–0xFFFF		●
P07.22	Factory barcode 2	0x0000–0xFFFF		●
P07.23	Factory barcode 3	0x0000–0xFFFF		●
P07.24	Factory barcode 4	0x0000–0xFFFF		●
P07.25	Factory barcode 5	0x0000–0xFFFF		●
P07.26	Factory barcode 6	0x0000–0xFFFF		●
P07.27	Type of present fault	0: No fault		●
P07.28	Type of the last fault	1: Inverter unit U phase protection (OUt1)		●
P07.29	Type of the last but one fault	2: Inverter unit V phase protection (OUt2) 3: Inverter unit W phase protection (OUt3)		●
P07.30	Type of the last but two fault	4: Overcurrent at acceleration (OC1) 5: Overcurrent at deceleration (OC2)		●
P07.31	Type of the last but three fault	6: Overcurrent at constant speed (OC3) 7: Overvoltage at acceleration (OV1)		●
P07.32	Type of the last but four fault	8: Overvoltage at deceleration (OV2) 9: Overvoltage at constant speed (OV3) 10: Bus undervoltage fault (UV) 11: Motor overload (OL1)		●

Function code	Name	Parameter description	Default value	Modify
		12: VFD 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: 485 communication fault (CE) 19: Current detection fault (ItE) 20: Motor autotuning fault (tE) 21: EEPROM operation fault (EEP) 22: PID feedback offline fault (PIDE) 23: Reserved 24: Running time reached (END) 25: Electronic overload (OL3) 26: Panel 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: Maladjustment fault (STo) 36: Underload fault (LL) 37: Reserved 38: Phase sequence fault (PSF) 39: 3PH current imbalance of the fan (SPOF) 40: Fan overload (OLF) 41: Encoder offline fault (ENC1O) 42: Encoder reverse fault (ENC1D) 43: Encoder Z pulse offline fault (ENC1Z)		
P08.15	Bus voltage pre-protection function	0–3	2	○
P08.16	Low-voltage protection threshold	0.0V–2000.0V	300.0V	○
P08.17	Overvoltage pre-protection threshold	0.0V–2000.0V	780.0V	○
P08.18	Automatic restart delay	0.0–6000.0s	60.0s	○
P08.19	Low-voltage frequency limit running time	0.0–6000.0s	60.0s	○

Function code	Name	Parameter description	Default value	Modify
P08.20	High-frequency current loop proportional gain	0–20000	1000	○
P08.21	High-frequency current loop integral time	0–20000	1000	○
P08.23	High-frequency current loop switching frequency	0.0–100.0% (max. output frequency P00.03)	100.0%	○
P08.24	Fan control enable selection	0–1 0: Enable fan control 1: Disable fan control Note: Applicable to 7.5–15kW single-VFD integrated machine only, used to control the start/stop of power-frequency fan.	0	○
P08.25	Keypad lock enable	0: Do not lock keypad 1: Allow to lock keypad Lock: Press PRG key+DATA key simultaneously Unlock: Keep DATA key pressed down and then click V key by three times.	0	○
P08.26	Maintenance timing mode	0: No timing during sleep 1: Timing during sleep	0	○
P09.00	PID reference source	0: Keypad digits (P09.01) 1: Analog P1- 2: Reserved 3: Analog P2- 4: Reserved 5: Multi-step 6: Modbus communication 7–9: Reserved 10: Pressure setting of dedicated function of air compressor	0	○
P09.01	Keypad pre-set PID reference	-100.0%–100.0%	0.0%	○
P09.02	PID feedback source	0: Analog P1- 1: Reserved 2: Analog P2- 3: Reserved 4: Modbus communication 5–7: Reserved 8: Pressure feedback of dedicated function of	0	○

Function code	Name	Parameter description	Default value	Modify
		air compressor		
P09.03	PID output characteristics selection	0: PID output characteristic is positive: the feedback signal is larger than PID reference, which requires the VFD output frequency to decrease to balance PID, eg tension PID control of winding. 1: PID output characteristic is negative: feedback signal is larger than PID reference, which requires the VFD output frequency to increase to balance PID, eg tension PID control of unwinding.	0	○
P09.04	Proportional gain (Kp)	It determines the regulation intensity of the whole PID regulator, the larger the P is, the stronger the regulation intensity is. if this parameter is 100, it means the regulation amplitude made on output frequency command by the proportional regulator (ignoring integral and differential actions) is the max. frequency (P00.03) when the deviation between PID feedback quantity and reference quantity is 100%. Setting range: 0.00–100.00	10.00	○
P09.05	Integral time (Ti)	It determines the speed of integral regulation made on the deviation between PID feedback quantity and reference quantity by PID regulator. When the deviation between PID feedback quantity and reference quantity is 100%, the regulation quantity (ignoring proportional and differential actions) of integral regulator can reach max. output frequency (P00.03) through continuous regulation in the time set by P09.05. The shorter the integral time, the stronger the regulation intensity. Setting range: 0.00–10.00s	2.00s	○
P09.06	Differential time (Td)	It determines the intensity of variation regulation made on the deviation between PID feedback quantity and reference quantity by PID regulator. If the feedback quantity changes by 100% during the time set by	1.00s	○

Function code	Name	Parameter description	Default value	Modify
		P09.06, the regulation quantity of differential regulator (ignoring proportional and integral actions) is the max. output frequency (P00.03). The longer the differential time, the stronger the regulation intensity. Setting range: 0.00–10.00s		
P09.07	Sampling cycle (T)	It means the sampling cycle of feedback quantity. The regulator calculates once during each sampling cycle. The longer the sampling cycle, the slower the response speed. Setting range: 0.001–10.000s	0.100s	○
P09.08	Final limit of PID control deviation	It means the max. allowed deviation quantity of the PID system feedback value relative to closed-loop reference value. Within the deviation limit, PID regulator stops regulating, this parameter can be used to regulate the precision and stability of PID system. Setting range: 0.0–100.0%	0.1%	○
P09.09	Upper limit value of PID output	P09.10–100.0% (max. frequency)	100.0%	○
P09.10	Lower limit value of PID output	-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 regulation selection	0x00–0x11 LED ones: 0: Continue integral regulation when the frequency reaches upper/lower limit 1: Stop integral regulation when the frequency reaches upper/lower limit LED hundreds: 0: the same with the set direction 1: contrary to the set direction	0x01	○
P09.14	Differential filter times	0–60	2	○
P11.00	Phase loss protection	0x0000–0x1111 LED ones: 0: Disable input phase loss software	0x0110	○

Function code	Name	Parameter description	Default value	Modify
		protection 1: Enable input phase loss software protection Note: LED ones detects input phase loss by phase sequence detection circuit LED tens: 0: Disable output phase loss protection 1: Enable output phase loss protection LED hundreds: 0: Disable input phase loss hardware protection 1: Enable input phase loss hardware protection Note: LED hundreds detects input phase loss by hardware detection circuit LED thousands: 0: Disable phase sequence protection 1: Enable phase sequence protection		
P11.01	Frequency drop at transient power dip	0: Disable 1: Enable	0	○
P11.02	Frequency drop rate at transient power dip	0.00Hz–P00.03/s (max. frequency)	10.00Hz/s	○
P11.03	Overvoltage stall protection	0: Disable 1: Enable	1	○
P11.04	Overvoltage stall protection voltage	120–150% (standard bus voltage) (380V)	140%	○
P11.05	Current limit selection	0x00–0x11 Ones: Current-limit action selection 0: Current-limit action is invalid 1: Current-limit action is always valid Tens: Hardware current-limit overload alarm selection 0: Hardware current-limit overload alarm is valid 1: Hardware current-limit overload alarm is invalid	01	◎
P11.06	Automatic current-limit level	50.0–200.0%	160.0%	◎
P11.07	Frequency drop rate at current limit	0.00–50.00Hz/s	10.00Hz/s	◎
P11.13	Fault output terminal	0x00–0x11	0x00	○

Function code	Name	Parameter description	Default value	Modify
	action during fault	LED ones: 0: Acts during undervoltage fault 1: Do not act during undervoltage fault LED tens: 0: Acts during automatic reset period 1: Do not act during 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 during 0.0)	0.5s	○
P11.16	Automatic frequency reduction during voltage drop	0: Invalid 1: Valid	1	○
P13.00	Pull-in current reduction coefficient	0.0–100.0%	50.0%	○
P13.01	Initial magnetic pole detection mode	0: Do not detection 1: High frequency superposition (reserved) 2: Pulse superposition (reserved)	0	◎
P13.02	Pull-in current 1	0.0%–100.0% rated motor current	20.0%	○
P13.03	Pull-in current 2	0.0%–100.0% rated motor current	10.0%	○
P13.04	Switching frequency of pull-in current	0.00Hz–P00.03 (max. frequency)	30.00Hz	○
P13.05	High-frequency superposing frequency (reserved)	200Hz–1000Hz	500Hz	◎
P13.06	High frequency superposing voltage	0.0–300.0% rated motor 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	Adjust the responsiveness of the function used to prevent maladjustment. Increase the value of P13.11 if load inertia is too large, however, the response speed will be impacted if the value is increased. Setting range: 0.0–10.0s	0.5s	○
P13.12	High-frequency compensation coefficient	When the motor runs at rated speed, this parameter is valid. If motor vibration occurs, adjust this parameter properly. Setting range: 0.0–100.0%	50.0%	○

Function code	Name	Parameter description	Default value	Modify
P14.00	Local communication address	1–247, 0 is broadcast address	2	○
P14.01	Communication baud rated setup	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	4	○
P14.02	Data bit check setup	0: No parity check (N, 8, 1) for RTU 1: Even parity (E, 8, 1) for RTU 2: Odd parity (O, 8, 1) for RTU 3: No parity check (N, 8, 2) for RTU 4: Even parity (E, 8, 2) for RTU 5: Odd parity (O, 8, 2) for RTU	1	○
P14.03	Communication response delay	0–200ms	5ms	○
P14.04	Communication timeout fault time	0.0 (invalid), 0.1–60.0s	0.0s	○
P14.05	Transmission error processing	0: Alarm and coast to stop 1: Do not alarm and continue running 2: Do not alarm and stop as per stop mode (under communication control mode only) 3: Do not alarm and stop as per stop mode (under all control modes)	0	○
P14.06	Communication processing action selection	0x00–0x11 LED ones: write operation action 0: There is response for write operation 1: There is no response for write operation LED tens: Communication encryption processing 0: Communication encryption setting is invalid 1: Communication encryption setting is valid	0x00	○
P17.00	Setting frequency	0.00Hz–P00.03	0.00Hz	●
P17.01	Output frequency	0.00Hz–P00.03	0.00Hz	●
P17.02	Ramps 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 speed	0–65535RPM	0 RPM	●

Function code	Name	Parameter description	Default value	Modify
P17.06	Torque current	-3000.0–3000.0A	0.0A	●
P17.07	Excitation current	-3000.0–3000.0A	0.0A	●
P17.08	Motor power	-300.0%–300.0% (relative to rated motor 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 state	0000–00FF	0	●
P17.13	Digital output terminal state	0000–000F	0	●
P17.16	Master fault code	0–43 (see P07.27–P07.32 for details)	0	●
P17.17	Reserved	0–38	0	●
P17.19	P1-input voltage	Display analog input voltage value of P1-channel, 2.00V-10.00V corresponds to 4-20mA; P05.32-P05.34 corresponds to pressure 0.0-P18.04. If P1- input voltage is larger than 9.8V or less than 1V, it indicates pressure signal fault occurs. Range: 0.00–10.00V	0.00V	●
P17.20	PT1 input voltage	Display analog input voltage value of PT1 channel. Under air-compressor mode, connect to PT100 thermal resistor temperature sensor, different temperature generates different resistor value, and different resistor value corresponds to different input voltages, therefore, the input voltage value can correspond to corresponding detection temperature. Input voltage P18.28-P18.29 corresponds to -20°C to +150°C. Setting range: 0.00–10.00V	0.00V	●
P17.21	P2- input voltage	Display analog input voltage value of P2-channel, 2.00V-10.00V corresponds to 4-20mA; P05.42-P05.44 corresponds to pressure 0.0- P18.38. When the input voltage of P2- is larger than 9.8V or less than 1V, it indicates pressure signal fault occurs.	0.00V	●

Function code	Name	Parameter description	Default value	Modify
		Setting range: 0.00–10.00V		
P17.22	PT2 input voltage	Display analog input voltage value of PT2 channel. Under air-compressor mode, connect to PT100 thermal resistor temperature sensor, different temperature generates corresponding resistor value, and different resistor value corresponds to corresponding input voltage, therefore, input voltage value can correspond to corresponding detection temperature. Input voltage P18.32- P18.33 correspond to -20°Cto +150°C. Setting range: 0.00–10.00V	0.00V	●
P17.23	PID reference value	Display the set value of discharge pressure signal. 100% corresponds to the upper limit value of discharge pressure sensor (P18.04) (if P18.37=1, 100% corresponds to P18.38). Setting range: -100.0–100.0%	0.0%	●
P17.24	PID feedback value	Display the detection value of discharge pressure signal. Setting range: -100.0–100.0%	0.0%	●
P17.25	Motor power factor	-1.00–1.00	0.0	●
P17.26	Current running time	0–65535m	0m	●
P17.28	ASR controller output	-300.0%–300.0% (rated motor current)	0.0%	●
P17.29	Magnetic pole angle of synchronous motor	0.0–360.0	0.0	●
P17.30	Phase compensation quantity of synchronous motor	-180.0–180.0	0.0	●
P17.36	Output torque	-3000.0Nm–3000.0Nm	0.0Nm	●
P17.38	PID output value	Display the output value of PID control of discharge pressure signal; 100% corresponds to max. output frequency P00.03. Setting range: -100.00–100.00%	0.00%	●
P18.00	Air compressor control mode	0: Invalid; 1: Air-compressor control mode Note: When P18.00=1, P19 air-compressor state checking group is valid.	0	◎
P18.01	Sleep function	0: Invalid	1	◎

Function code	Name	Parameter description	Default value	Modify
	selection	1: Valid Note: When sleep function is valid and unloading conditions are fulfilled, the VFD decelerates to P18.12 [no-load running frequency], and then, if discharge pressure is larger than P18.06 [loading pressure] during the time set by P18.13, the VFD will decelerate to P01.15 [stop speed] and then coast to stop to enter sleep stage. If the discharge pressure is less than loading pressure during P18.13, the VFD will perform loaded running again, and pressure PID will regulate accordingly.		
P18.02	Loading/unloading mode	0: Automatic; 1: Manual When setting to manual state, after air compressor starts, loading/unloading manually; when setting to automatic mode, the air compressor loads/unloads automatically after starting.	0	○
P18.03	Temperature sensor channel	0: Machine head temperature PT 1, auxiliary temperature PT2 1: Machine head temperature PT 2, auxiliary temperature PT1	1	◎
P18.04	Upper limit of pressure sensor P1	0.00–20.00 Mpa Related to the actual range of pressure sensor, the corresponding voltage of P18.04 is P05.34. Note: When restoring to default value, this value stays in currently set value.	1.60Mpa	◎
P18.05	Unloading pressure	Under automatic loading/unloading mode, when air compressor control is valid and the air compressor supplies air as normal, if the discharge pressure is higher than P18.05, unloading automatically. If sleep function is valid (P18.01=1), the VFD enters sleep state; if the discharge pressure is lower than P18.06, loading automatically. P18.07 is used to set the air-supply pressure when the air compressor runs stably. During load-carrying	0.80Mpa	○
P18.06	Loading pressure		0.60Mpa	○
P18.07	Set pressure		0.70Mpa	○

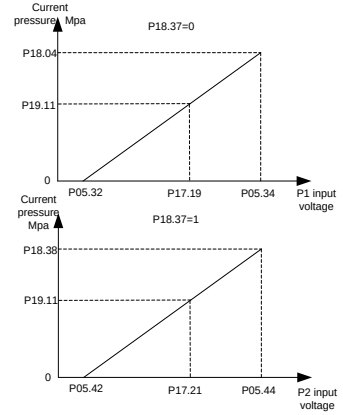
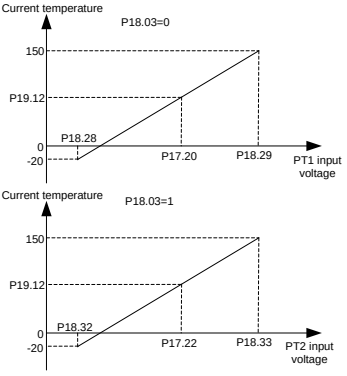
Function code	Name	Parameter description	Default value	Modify
		running, the motor speed is controlled by pressure PID, and the system keeps the discharge pressure constant via adjusting master speed. See 5.2 for details on pressure control process logic. Setting range: 0.00–P18.04		
P18.08	Starting temperature of the fan	When the machine head temperature is higher than P18.08, the fan starts; When the machine head temperature is lower than P18.09, the fan stops; P18.10 is used to set the target temperature of the machine head when the air compressor runs stably, the fan speed is controlled by thermostatic PID (P18.42=0), PID calculation is carried out via P18.10 and the machine head temperature to realize thermostatic control. Setting range: -20–150	75°C	○
P18.09	Stop temperature of the fan		65°C	○
P18.10	Setting temperature		75°C	○
P18.11	Lower-limit frequency at load-carrying running	P18.12–P00.04 (upper limit of running frequency) During regulating, if the pressure exceeds the set working pressure but lower than the unloading pressure, the allowed min. working frequency is P18.11.	40.00Hz	○
P18.12	No-load running frequency	P01.15–P18.11 (lower-limit frequency of load-carrying running) The output working frequency allowed during no-load of air compressor.	38.00 Hz	○
P18.13	No-load delay time	When sleep function is valid, after unloading, the VFD runs at no-load frequency in the time set by P18.13, and then enters sleep state. When air consumption quantity is small, users can enable sleep function; if sleep function is valid, it is necessary to lower down P18.13 to make the device enter sleep state quicker. Setting range: 0–3600s	300s	○
P18.14	Stop delay time	After stop command becomes valid, the VFD will first run at no-load frequency in the time set by P18.14, and then stops. Setting range: 0–3600s	0s	○

Function code	Name	Parameter description	Default value	Modify
P18.15	Loading delay time	Loading operation is available only after the motor runs at no-load frequency in the time set by P18.15. Setting range: 0–3600s	10s	○
P18.16	Restart delay time	After the system stops, it is necessary to wait until the time set by P18.16 elapsed before restart. Setting range: 0–3600s	30s	○
P18.17	Pre-alarm pressure	When current discharge pressure is higher than P18.17, the system indicates pressure pre-alarm by setting BIT8 of P19.13 to 1. When current discharge pressure is higher than P18.18, the system indicates pressure alarm by setting BIT10 of P19.13 to 1, and emergency-stop will be applied. Setting range: 0.00–P18.04	0.90Mpa	○
P18.18	Alarm pressure		1.00Mpa	○
P18.19	Pre-alarm temperature	When machine head temperature is higher than P18.19, the system indicates temperature pre-alarm by setting BIT9 of P19.13 to 1. When the machine head temperature is higher than P18.20, the system indicates temperature alarm by setting BIT11 of P19.13 to 1, and emergency-stop will be applied. When machine head temperature is lower than P18.21, the system indicates low-temperature pre-alarm by setting BIT14 of P19.13 to 1, and air compressor cannot start. Setting range: -20–150	105°C	○
P18.20	Alarm temperature		110°C	○
P18.21	Low-temperature protection threshold		-10°C	○
P18.22	Power calibration coefficient	It is used to calibrate the displayed value of P19.10 [actual motor output power]. Setting range: 0%–200%	100%	○
P18.23	Temperature PID calculation cycle (Ts)	Set the sampling cycle of temperature PID. Setting range: 0.0–10.0s	2.0s	○
P18.24	Gain coefficient (kp)	It determines the regulation intensity of temperature PID regulator, the larger the value of kp, the stronger the regulation intensity, however, if it is too large, temperature oscillation may occur, users can fine-tune based on the default value.	18.0	○

Function code	Name	Parameter description	Default value	Modify
		Setting range: 0.0–100.0		
P18.25	Convergence coefficient (K)	It determines the converging speed of temperature PID regulator, the larger the value of K, the stronger the converging intensity, however, if it is too large, temperature oscillation may occur, users can fine-tune based on the default value. 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, of which 100% corresponds to the P00.03 max. output frequency of 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 to calibrate temperature detection circuit before shipment.	0.65V	○
P18.29	Upper limit voltage of PT1 (150°C)	Connect to the resistor whose resistance is the same with that of PT100 at -20°C, read the voltage value of P17.20 and input it to P18.28. Connect to the resistor whose resistance is the same with that of PT100 at 150°C, read the voltage value of P17.20 and input it to P18.29. Setting range: 0.00–10.00V Note: This value will stay in currently set value when restoring to default values.	9.70V	○
P18.30	Pressure drop value of upper limit frequency	0.00–P18.04 When current pressure is larger than this pressure value, decrease the upper limit frequency as per the set value of P18.31.	0.70Mpa	○
P18.31	Drop rate of upper limit frequency	0.00Hz–10.00Hz When current pressure is larger than the pressure drop value of upper limit frequency, this value is the reduction quantity of the corresponding upper limit frequency at every additional 0.01Mpa.	0.00Hz	○
P18.32	Lower limit voltage of PT2 (-20°C)	It is used to calibrate the temperature detection circuit: Connect to the resistor whose resistance is the same with that of PT100 at -20°C, read the voltage value of P17.22, and input it to	0.65V	○
P18.33	Upper limit voltage of PT2 (150°C)		9.70V	○

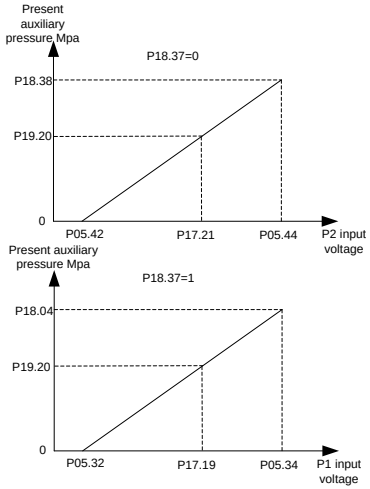
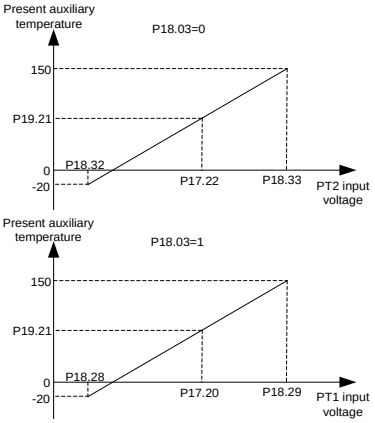
Function code	Name	Parameter description	Default value	Modify
		P18.32. Connect to the resistor whose resistance is the same with that of PT100 at 150°C, read the voltage value of P17.22, and input it to P18.33. Setting range: 0.00–10.00V Note: When restoring to default values, this value will stay in current value.		
P18.34	Auxiliary temperature protection enable	0: Invalid 1: Valid	0	◎
P18.35	Auxiliary temperature pre-alarm	-20–150 When P18.34 is enabled and auxiliary temperature is higher than P18.35, the system indicates auxiliary temperature pre-alarm by setting BIT8 of P19.14 to 1.	105°C	○
P18.36	Auxiliary temperature alarm	-20–150 When P18.34 is enabled and auxiliary temperature is higher than P18.36, the system indicates auxiliary temperature alarm by setting BIT10 of P19.14 to 1, and emergency-stop will be applied.	110°C	○
P18.37	Pressure sensor channel	0: Discharge pressure P1, auxiliary pressure P2 1: Discharge pressure P2, auxiliary pressure P1	0	◎
P18.38	Upper limit of pressure sensor P2	0.00–20.00 Mpa It is related to the actual range of pressure sensor, the corresponding voltage of P18.04 is P05.44. Note: When restoring to default values, the value will stay in current value.	1.60Mpa	◎
P18.39	Auxiliary pressure protection enable	0: Invalid 1: Valid	0	◎
P18.40	Auxiliary pressure pre-alarm	0.00–20.00 When P18.39 is enabled and the auxiliary pressure is larger than P18.40, the system indicates auxiliary pressure pre-alarm by setting BIT7 of P19.14 to 1.	0.90Mpa	○
P18.41	Auxiliary pressure alarm	0.00–20.00 When P18.39 is enabled and the auxiliary	1.00Mpa	○

Function code	Name	Parameter description	Default value	Modify
		pressure is larger than P18.41, the system indicates pressure alarm by setting BIT9 of P19.14 to 1, and emergency stop will be applied.		
P18.43	Fan control mode	0: Air compressor mode, the power-frequency fan starts/stops as per the temperature; 1: Terminal, the power-frequency fan starts/stops via 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 the output current is larger than automatic frequency reduction threshold, it will adjust the output frequency via regulator to ensure the running current of the master is below the automatic frequency reduction threshold.	120%	○
P18.45	Maintenance timeout time	0–8000h When it is set to “0”, maintenance timeout function will be invalid. When it is set to a non-zero value, after parts maintenance pre-alarm is reported, if the VFD continues working until exceeding the value set by P18.45, the system will report maintenance timeout pre-alarm, and BIT11 of P19.14 will be set to “1”.	0	○
P19.00	The set time of maintenance on part 1	P19.00–P19.04 displays the set time of maintenance on five kinds of parts. If the accumulated running time of the part exceeds the corresponding set value, the BIT of P19.14 will be set to 1 to indicate pre-alarms; if it is set to “0”, the running time pre-alarm will be invalid. P19.05–P19.09 displays the running time of corresponding parts. Range: 0~65535h	0	●
P19.01	The set time of maintenance on part 2		0	●
P19.02	The set time of maintenance on part 3		0	●
P19.03	The set time of maintenance on part 4		0	●
P19.04	The set time of maintenance on part 5		0	●
P19.05	Running time of part 1		0	●
P19.06	Running time of part 2		0	●

Function code	Name	Parameter description	Default value	Modify
P19.07	Running time of part 3		0	●
P19.08	Running time of part 4		0	●
P19.09	Running time of part 5		0	●
P19.10	Actual output power of the motor	Display motor output power, it can be calibrated by P18.22. Range: 0.0–6553.5kw	0.0kw	●
P19.11	Present pressure	Display the discharge pressure value detected currently.  Range: 0.00–655.35Mpa	0.00Mpa	●
P19.12	Present temperature	Display the machine head temperature detected currently.  Range: -20–150°C	0°C	●
P19.13	Signal state 1	0000–0xFFFF BIT0: Air filter blockage signal 1: Fault; 0: Normal	0	●

Function code	Name	Parameter description	Default value	Modify
		BIT1: Oil filter blockage signal 1: Fault; 0: Normal BIT2: Separator blockage signal 1: Fault; 0: Normal BIT3: Precision splitter blockage signal 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: Fan 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 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	0	●

Function code	Name	Parameter description	Default value	Modify
		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 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 alarm; 0: Normal BIT11: Maintenance timeout remainder 1: Maintenance timeout remainder; 0: Normal BIT12: Phase sequence remainder 1: Fault; 0: Normal		
P19.15	Device state	0: Standby 1: Run 2: Fault 3: Emergency stop 4: Undervoltage 5: Alarm 6: Sleep 7: In stop 8: Restart delay	0	●
P19.16	Accumulated running time of the equipment	Display range: 0–65535h	0	●
P19.17	Accumulated load-carrying running time		0	●
P19.18	Restart count-down	Display the remaining time of restart delay. After the system stops, it will enter restart delay state and restart count-down to prevent immediate restart. After restart delay time is up, the system enters standby state. Under standby state, start command can be received. Setting range: 0–3600s	0s	●
P19.19	Output value of	Display the output value of temperature PID	0.00%	●

Function code	Name	Parameter description	Default value	Modify
	temperature PID	regulation of machine head, 100% corresponds to P00.03 [the max. output frequency of the fan]. Setting range: 0.00–100.00%		
P19.20	Present auxiliary pressure	Display the auxiliary pressure value detected at present.  Range: 0.00–655.35Mpa	0.00Mpa	●
P19.21	Present auxiliary temperature	Display the auxiliary temperature value detected at present.  Range: -20–150°C	0°C	●
P19.22	Input power phase	If the VFD enables phase sequence detection	0	●

Function code	Name	Parameter description	Default value	Modify
	sequence state	and input phase loss hardware protection, corresponding fault will be reported when negative sequence and any phase loss occurs; otherwise, fault will not be reported. 0: Positive sequence 1: Negative sequence 2: R phase loss 3: S phase loss 4: T phase loss		
P19.23	State of phase sequence detection flat cable	0: Normal, indicating the flat cable is plugged in properly 1: Abnormal, indicating the flat cable is not plugged in	0	●
P20.00	Encoder type selection	0–1: Reserved 2: Resolver-type encoder 3: Reserved	2	◎
P20.01	Number of PPR (pulse per revolution) of encoder	0–60000 (number of resolver pole pairs*1024)	1024	◎
P20.02	Encoder direction	0: Forward 1: Reverse	0	◎
P20.03	Encoder offline detection time	0.0–10.0s	0.8s	○
P20.04	Encoder reverse detection time	0.0–100.0s	0.8s	○
P20.05	Encoder detection filter times	Ones: Low speed filter times Tens: High speed filter times	0x33	○
P20.06	Speed ratio between motor and encoder	0–65.535	1.000	○
P20.07	Control parameters of synchronous motor	Bit0: Z pulse calibration enable Bit1: Encoder angle calibration enable Bit2: SVC speed measurement enable Bit3: Resolver speed measurement mode selection Setting range: 0x0–0xF	0x3	○
P20.08	Z pulse offline detection enable	0–1	0	○
P20.09	Initial angle of Z pulse	0–359.99	0.00	○
P20.10	Initial angle of magnetic pole	0–359.99	0.00	○

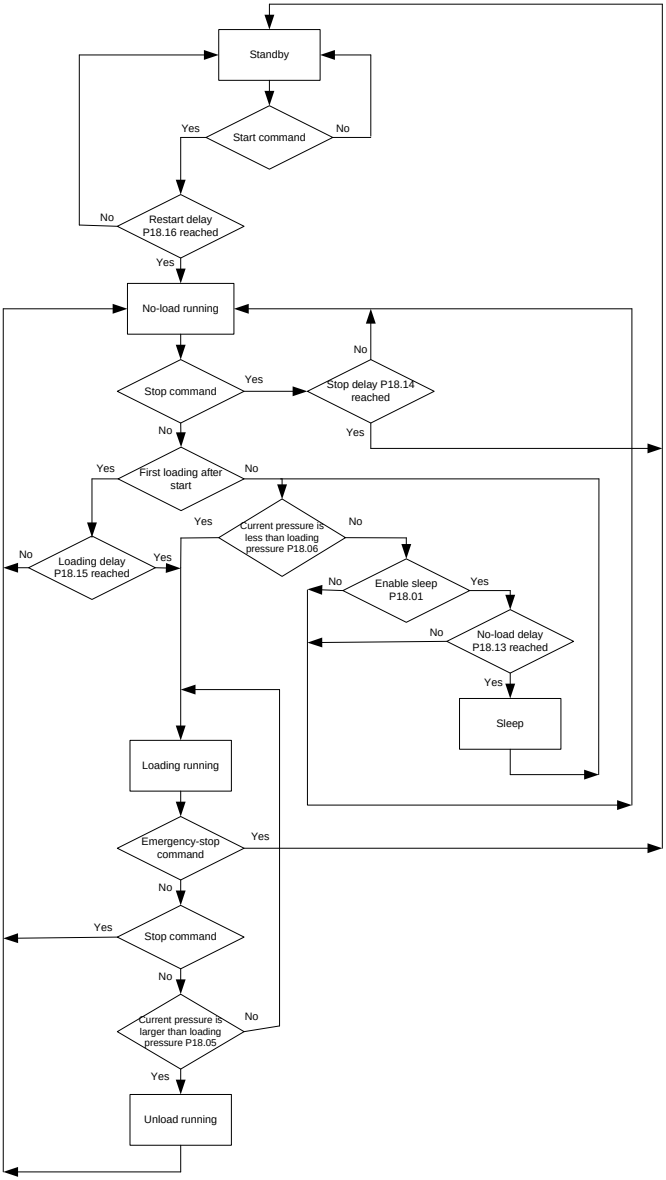
Function code	Name	Parameter description	Default value	Modify
P20.11	Autotuning of initial angle of magnetic pole	0–1 0: No operation 1: Rotary autotuning	0	◎
P20.12	Actually detected frequency of the encoder	-3276.8–3276.7Hz	0.0Hz	●
P20.13	Counting value of encoder position	0–65535	0	●
P20.14	Z pulse position of encoder	0–65535	0	●
P20.15	Z pulse angle	0–359.99	0	●
P20.16	Error times of Z pulse	0–65535	0	●
P20.17	Counting value of resolver	0–65535	0	●
P20.18	Resolver angle	0–359.99	0.00	●
P20.19	Magnetic pole angle	0–359.99	0.00	●
P21.00	Rated fan current	0.0–40.0A This function code is related to current detection and overload protection function of power-frequency fan. Set to 0 will disable this function.	0.0A	○
P21.01	Current transformation ratio of the fan	1.0–4000.0	1000.0	○
P21.03	Current imbalance coefficient	1.00–3.00 Among the current of three phases of the fan, if the ratio between max. current and min. current is larger than P21.03, the VFD displays fan current imbalance fault.	1.60	○
P21.04	Calibration coefficient of A phase current of the fan	0.0–150.0% Actual current=display current*current calibration coefficient Note: When restoring to default values, this value will stay in currently set value.	100.0%	○
P21.05	Calibration coefficient of B phase current of the fan		100.0%	○
P21.06	Calibration coefficient of C phase current of the fan		100.0%	○
P21.07	User-defined fault action selection 1	Ones: Motor overload (OL1) 0: Coast to stop	0x0000	○

Function code	Name	Parameter description	Default value	Modify
		1: Runs at alternative frequency of P21.10 Tens: Electronic overload (OL3) 0: Process as per P11.08 1: Run at alternative frequency of P21.10 Hundreds: Rectifier module overheat (OH1) 0: Coast to stop 1: Run at alternative frequency of P21.10 Thousands: Inverter module overheat fault (OH2) 0: Coast to stop 1: Run at alternative frequency of P21.10		
P21.08	User-defined fault action selection 2	Ones: Underload (LL) 0: Process as per P11.08 1: Run at alternative frequency of P21.10 Tens: External fault 1 signal 0: Coast to stop 1: Run at alternative frequency of P21.10 Hundreds: External fault 2 signal 0: Coast to stop 1: Run at alternative frequency of P21.10 Thousands: Reserved 0: Coast to stop 1: Run at alternative frequency of P21.10	0x0000	○
P21.09	User-defined fault action selection 3	Ones: 485 communication fault (CE) 0: Coast to stop 1: Run at alternative frequency of P21.10 Tens: EEPROM operation fault (EEP) 0: Coast to stop 1: Run at alternative frequency of P21.10 Hundreds: Current overload of power-frequency fan (OLF) 0: Coast to stop 1: Run at alternative frequency of P21.10 Thousands: 3PH current imbalance of power-frequency fan (SPOF) 0: Coast to stop 1: Run at alternative frequency of P21.10	0x0000	○
P21.10	Alternative frequency	0.0–100.0% (max. output frequency)	50.0%	○
P21.11	Running time of alternative frequency	0.0–6000.0s Note: When user-defined fault occurs to the	60.0s	○

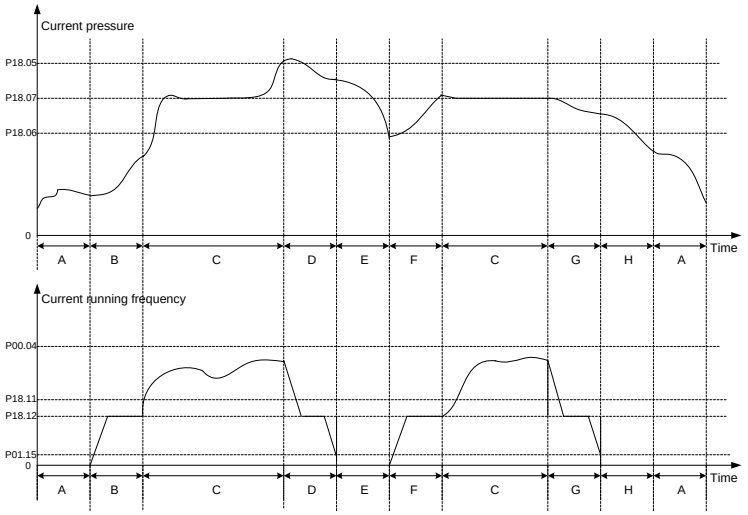
Function code	Name	Parameter description	Default value	Modify
		VFD, if the fault persists after the VFD continues running at alternative frequency of P21.10 in the time set by P21.11, the VFD will coast to stop; if the fault no longer occurs during P21.11, the VFD restores to normal mode.		
P21.13	Display current of A phase of the fan	0.0–40.0A	0.0A	●
P21.14	Display current of B phase of the fan	0.0–40.0A	0.0A	●
P21.15	Display current of C phase of the fan	0.0–40.0A	0.0A	●
P21.20	Fan state	0X0000 – 0XFFFF Bit0: when it is 1, it means power-frequency fan is started	0x0000	●

5.2 Control logic of the air compressor

(1) The following figure shows the control logic of the air compressor.



(2) The following figure shows the pressure and running frequency control during the running of the air compressor.



In above figure, P18.05 is unloading pressure; P18.06 is loading pressure; P18.07 is the set pressure. P00.04 is upper limit frequency, P18.11 is lower limit value of load-carrying running frequency, P18.12 is no-load frequency, P01.15 is stop speed. Description of A-H stage control process is shown below:

A: Standby state

B: Starting stage of startup, duration is P18.15 (including part of the acceleration time P00.11);

C: Constant discharge stage of loading, pressure PID regulation is valid;

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

E: Sleep stage, the VFD does not run;

F: Starting stage of wake-up, duration is P18.15 (including part of the acceleration time P00.11);

G: Starting stage of stop, duration includes part of deceleration time P00.12 and P18.14;

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

When air compressor control is valid and under automatic loading/unloading mode, the air compressor enters normal air supply state after starts. When the discharge pressure is higher than P18.05, automatic unloading will be applied, and the VFD enters sleep state. If sleep function is invalid, the VFD will continue running at no-load frequency P18.12. When the discharge pressure is lower than P18.06, automatic loading will be applied, and during load-carrying running, the master speed is controlled by pressure PID. P18.07 is used to set the air supply pressure when the air compressor runs stably. The VFD keeps the discharge pressure constant by regulating the master speed. Constant-pressure control adopts PID algorithm, and the frequency reference source of the master is set by P00.06=7, the PID reference source selects P09.00 = 10, reference pressure is set via P18.07. The feedback source of PID P09.02 = 8, which is obtained by detecting the pressure signal. PID parameter P9.04, P9.05 and P9.06 adopts system default values.

Note: In above figure, the VFD stops as per P01.08, default setting is decelerate to stop.

Normal stop command and unloading stage are deceleration process; the VFD will change to coast to stop during emergency-stop operation and faults.

6 Fault information and troubleshooting

6.1 VFD faults and solutions

Fault contents and solutions for Goodrive300-01A VFD are shown below.

Fault code	Fault type	Possible cause	Solution
OUt1	Inverter unit U phase protection	• Acceleration is too fast. • Internal damage occurs to the IGBT of this phase. • Misacts caused by interference. • Drive wires are connected improperly. • Short-circuited to ground.	• Increase acceleration time. • Replace power unit. • Check the drive wires. • Check whether peripheral equipment suffers from strong interference source.
OUt2	Inverter unit V phase protection		
OUt3	Inverter unit W phase protection		
OV1	Overvoltage at acceleration	• The input voltage is abnormal. • There is large energy feedback.	• Check the input power. • Check if the deceleration time of the load is too short or the motor starts during the rotating, or dynamic brake units needs to be installed.
OV2	Overvoltage at deceleration		
OV3	Overvoltage at constant speed		
OC1	Overcurrent at acceleration	• Acceleration or deceleration is too fast. • Grid voltage is too low. • VFD power is too low. • Load transients or is abnormal. • Short-circuited to ground, output phase loss. • There is strong external interference.	• Increase acceleration /deceleration time. • Check the input power. • Adopt the VFD with a larger power. • Check if the load is short circuited (short circuited to ground or between wires) or stall occurs. • Check the output wiring. • Check if there is strong interference.
OC2	Overcurrent at deceleration		
OC3	Overcurrent at constant speed		
UV	Bus undervoltage fault	Grid voltage is too low.	Check the grid input power.
OL1	Motor overload	• Grid voltage is too low. • Rated motor current is set improperly. • Motor stalls or load transients	• Check grid voltage. • Reset rated motor current. • Check load and adjust torque boost quantity
OL2	VFD overload	• Acceleration is too fast. • The motor is restarted	• Increase acceleration time. • Restart the motor after stop.

Fault code	Fault type	Possible cause	Solution
		during rotating. • The grid voltage is too low. • The load is too large.	• Check grid voltage. • Adopt the VFD with a larger power. • Select a proper motor.
SPI	Phase loss on input side	Phase loss or fluctuation occurs to input R, S and T.	• Check input power. • Check installation wiring.
SPO	Phase loss on output side	Phase loss output occurs to U, V and W (or serious 3PH imbalance occurs to the load).	• Check the output wiring. • Check the motor and cable.
OH1	Overheat of rectifier module	• Air duct blocked or fan damaged. • Ambient temperature is too high. • Long-time overload running.	• Ventilate the air duct or replace the fan. • Lower down the ambient temperature.
OH2	Overheat of inverter module		
EF	External fault	S external fault input terminal acts.	Check external equipment input.
CE	485 communication fault	• Baud rate is set improperly. • Communication line fault. • Communication address error. • Communication suffers strong interference.	• Set proper baud rate. • Check the wiring of communication interface. • Check the wiring of communication interfaces. • Set correct communication address. • Replace or change the wiring to improve anti-interference capacity.
ItE	Current detection fault	• Poor contact of controller board connector. • Hall components are damaged. • Amplifying circuit is abnormal.	• Check the connector and re-plug wires. • Replace the hall. • Replace the main control board.
tE	Motor autotuning fault	• Motor capacity does not match VFD capacity. • Motor parameters are set improperly. • The deviation between the parameters obtained from autotuning and the	• Change the VFD model. • Set motor type and nameplate parameters correctly. • Empty the motor load and identify again. • Check the motor wiring and

Fault code	Fault type	Possible cause	Solution
		standard parameter is huge. • Autotuning timeout.	parameter setup. • Check whether upper limit frequency is larger than 2/3 of the rated frequency.
EEP	EEPROM operation fault	• Error occurred to the writing/reading of control parameters. • EEPROM 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 wire. • Check PID feedback source
END	Running time is up	The actual running time of the VFD is larger than the internally set time.	Ask supplier for help. Adjust the set running time.
OL3	Electronic overload fault	The VFD reports overload pre-alarm according to the set value.	Check the load and overload pre-alarm threshold.
PCE	Keypad communication fault	• Keypad wire is poorly contacted or disconnected. • Keypad wire is too long and suffers strong interference. • Keypad or communication circuit is faulty.	• Check the keypad wire and confirm whether fault exists. • Check the environment and rule out interference source. • Replace the hardware, and ask for maintenance service.
UPE	Parameter upload error	• Keypad line is poorly contacted or disconnected. • Keypad wire is too long or suffers strong interference. • Keypad or mainboard communication circuit is faulty.	• Check the environment and rule out the interference source. • Replace the hardware, ask for maintenance service. • Replace the hardware, ask for maintenance service.
DNE	Parameter download error	• Keypad line is poorly contacted or disconnected. • Keypad wire is too long or suffers strong interference. • Storage data in the keypad is wrong.	• Check the environment and rule out the interference source. • Replace the hardware, ask for maintenance service. • Re-copy the data in the keypad.
ETH1	To-ground short	• VFD output is short	• Check whether motor wiring

Fault code	Fault type	Possible cause	Solution
	circuit fault 1	circuited to ground.	is normal/motor is short
ETH2	To-ground short circuit fault 2	• Current detection circuit is faulty. • Actual motor power setup differs sharply from the VFD power.	circuited to ground. • Replace the hall. • Replace main control board/drive board. • Reset correct motor parameters.
dEu	Speed deviation fault	Load is too heavy or stall.	• Check the load and ensure it is normal, increase the detection time. • Check whether control parameters are proper.
STo	Maladjustment fault	• Control parameters of synchronous motor is set improperly. • Autotuning parameters are inaccurate. • VFD is not connected to the motor.	• Check the load and ensure the load is normal. • Check whether control parameters are set correctly. • Increase maladjustment detection time.
LL	Electronic underload fault	The VFD reports underload pre-alarm according to the set value.	Detect the load and underload pre-alarm threshold.
PSF	Phase sequence fault	The phase sequence on power input side is negative.	Swop any two of the power input cables.
OLF	Current overload of power-frequency fan	• Rated fan current is set improperly. • Fan power is too small. • Fan stalls.	• Check whether the set value of P21.00 is the same with the rated current of the fan nameplate. whether the current transformation ratio P21.01 is the same with current transformer nameplate. • Actually detected fan current is too large, it is recommended to increase the power. • Check whether the fan stalls.
SPOF	3PH current imbalance of	• Phase loss occurs to 3PH wiring of the fan.	• Check whether the fan is disconnected or poorly

Fault code	Fault type	Possible cause	Solution
	power-frequency fan	• Stator winding of 3PH of the fan is abnormal. • Poor grid quality.	contacted. • Measure whether the 3PH winding impedance of the fan is balanced. • Increase the set value of P21.03 properly to lower down the sensitivity during determining imbalance degree.
ENC1O	Encoder offline	• Encoder line sequence error. • Encoder damaged.	• Check encoder wiring. • Check whether the pulse number setting of P20.01 encoder is set correctly. • Replace the encoder.
ENC1D	Encoder reversal	Encoder speed signal is contrary to the motor running direction.	Reset P20.02 encoder direction.
ENC1Z	Encoder Z pulse offline	Z signal wire disconnected.	Check the wiring of Z signal wire.
	Touch screen communication interrupted	485 communication port is disconnected.	Check whether communication line is loosened.

6.2 Fault contents and solutions of air compressor equipment

Abnormal state and solutions of air compressor equipment:

P19.13	State type	Possible cause	Solution
BIT0=1	Air filter blocked	Air filter is abnormal.	Check air filter after stop.
BIT1=1	Oil filter blocked	Oil filter is abnormal.	Check oil filter after stop.
BIT2=1	Separator blocked	Separator is abnormal.	Check the separator after stop.
BIT3=1	Precision splitter blocked	Precision splitter is abnormal.	Check the precision splitter after stop.
BIT8=1	Pressure pre-alarm	Actual voltage is detected by P1 to be larger than the pre-alarm voltage set by P18.17.	• Check whether solenoid valve is normal. • Check whether pressure control parameters are set correctly.
BIT9=1	Temperature pre-alarm	Actual temperature detected by PT1 is higher than the pre-alarm temperature set by P18.19.	• Check whether fan control parameters are set correctly. • Whether the fan operates normally.

P19.13	State type	Possible cause	Solution
			• Fan power is too small to dissipate heat effectively. • Check whether there is lubricating oil.
BIT10=1	Pressure alarm	Actual voltage detected by P1 is larger than the alarm voltage set by P18.18.	• Check whether solenoid valve is normal. • Check whether pressure control parameters are set correctly.
BIT11=1	Temperature alarm	Actual temperature detected by PT1 is higher than the alarm temperature set by P18.20.	• Check whether fan control parameters are correct. • Whether fan operates normally. • Fan power is too small to dissipate heat effectively. • Check whether there is lubricating oil.
BIT12=1	Pressure signal fault	The actual voltage is detected by P1 to be less than 1V.	• Pressure detection sensor is abnormal. • Pressure detection input P1 signal wire is disconnected. • Pressure signal interface does not select current signal.
BIT13=1	Temperature signal fault	PT100 sensor is disconnected.	• Check whether the wiring of PT100 is normal. • Check whether temperature detection sensor is abnormal. • Temperature detection input 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. • Actual temperature is too low, and low -temperature pre-alarm is reported accordingly, and therefore the air compressor cannot start.

P19.14	State type	Possible cause	Solution

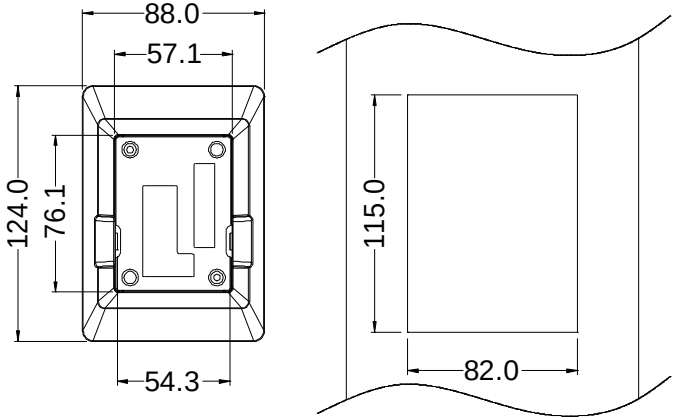
P19.14	State type	Possible cause	Solution
BIT0=1	Part 1 needs maintenance	The running time of part 1 exceeds the time set by P19.00.	Carry out maintenance after stop
BIT1=1	Part 2 needs maintenance	The running time of part 2 exceeds the time set by P19.01.	Carry out maintenance after stop
BIT2=1	Part 3 needs maintenance	The running time of part 3 exceeds the time set by P19.02.	Carry out maintenance after stop
BIT3=1	Part 4 needs maintenance	The running time of part 4 exceeds the time set by P19.03.	Carry out maintenance after stop
BIT4=1	Part 5 needs maintenance	The running time of part 5 exceeds the time set by P19.04.	Carry out maintenance after stop
BIT5=1	Auxiliary pressure signal fault	The actual voltage detected by P2 is less than 1V.	• Pressure detection sensor is abnormal. • Pressure detection input P2 signal wire is disconnected.
BIT6=1	Auxiliary temperature signal fault	PT100 sensor is disconnected.	• Check whether the wiring of PT100 is normal. • Temperature detection sensor is abnormal. • Temperature detection input circuit is abnormal.
BIT7=1	Auxiliary pressure pre-alarm	The actual voltage detected by P2 is larger than the pre-alarm pressure set by P18.17	• Pressure detection sensor is abnormal. • The pressure is set to a too large value. • 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, if not calibrated. • The starting temperature of the fan is set to a too high value. • The temperature of the fan is set to a too high value. • Fan power is too small to

P19.14	State type	Possible cause	Solution
			dissipate heat effectively.
BIT9=1	Auxiliary pressure alarm	The actual voltage detected by P2 is larger than the alarm pressure set by P18.18.	• Pressure detection sensor is abnormal. • The voltage is set to a too high value. • Adjust pressure PID regulator.
BIT10=1	Auxiliary temperature alarm	The actual temperature detected by PT2 is higher than the alarm temperature set by P18.20.	• Temperature detection sensor is abnormal. • Temperature detection input circuit is abnormal, if not calibrated. • The starting temperature of the fan is set to a too high value. • The temperature of the fan is set to a too high value. • The fan power is too small to dissipate heat effectively.
BIT11=1	Maintenance timeout alarm	Any part whose running time exceeds the set value will enter overtime maintenance stage, and hereafter, if the running time exceeds the time set by P18.45 again, maintenance timeout alarm will be reported.	Carry out maintenance on the timeout parts after stop.

Appendix A Product dimension

A.1 Keypad diagram

A.2 External keypad installation dimensions



Simple keypad bracket (61006-00911)

Customer installation dimensions

A.3 Wall installation dimension

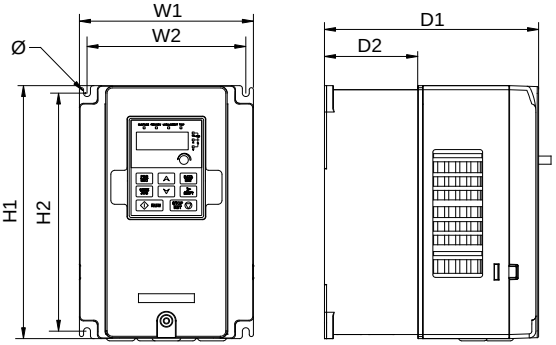


Figure A-1 7.5kW–37kW wall installation diagram

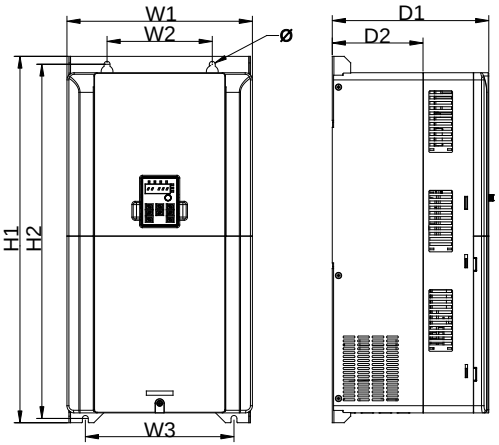


Figure A-2 45kW–55kW wall installation diagram

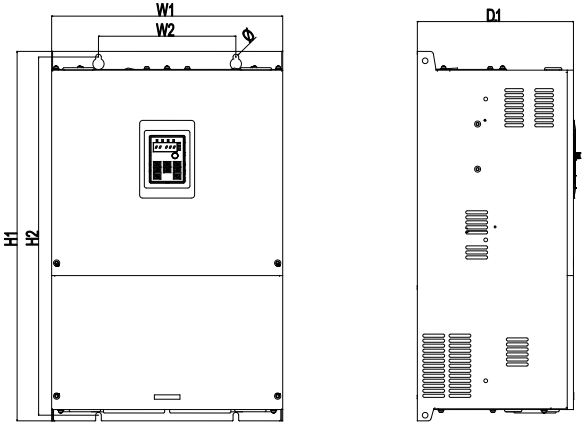


Figure A-3 75kW wall installation diagram

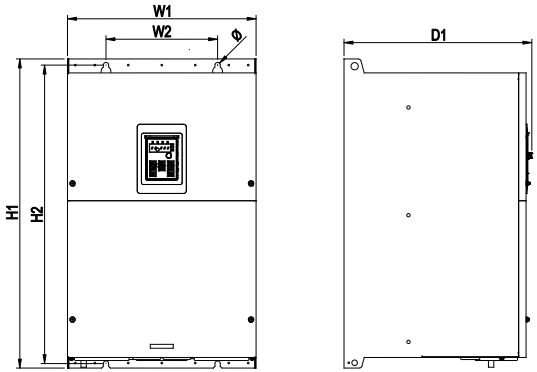


Figure A-4 90–110kW wall installation diagram

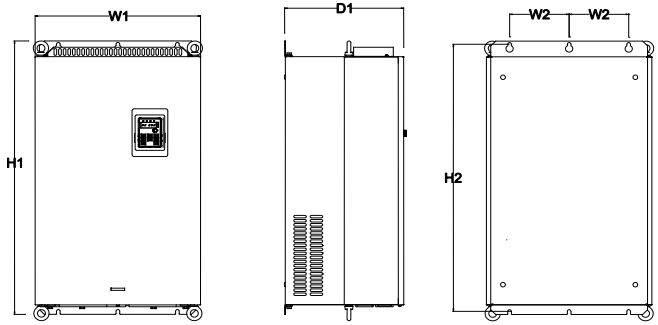


Figure A-5 132kW–200kW wall installation diagram

Table A-1 Wall installation dimension of 7.5kW–200kW single VFD (unit: mm)

Power	W1	W2	W3	H1	H2	D1	D2	Diameter of mounting hole
7.5kW	170	151	—	320	303.5	196.5	113	6
11kW–22kW	200	185	—	340.5	328.5	184.5	104.5	6
30kW–37kW	250	230	—	400	380	202	123.5	6
45kW–55kW	282	160	226.0	560	542	238	138	9
75KW	370	220	—	590	572	250	---	9
90－110KW	338	200	—	554	535	337	—	9.5
132kW–200kW	500	180	—	870	850	360	—	11

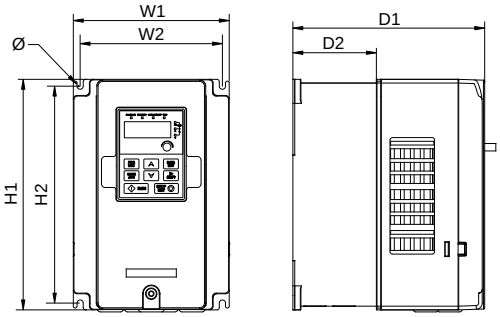


Figure A-6 Wall installation diagram of 7.5kW–15kW single VFD integrated machine

Table A-2 Wall installation dimension of 7.5kW–15kW single-VFD integrated machine (unit: mm)

Power	W1	W2	H1	H2	D1	D2	Diameter of mounting hole
7.5kW–15kW	200	185	340.5	328.5	184.5	104.5	6

A.4 Flange installation dimension

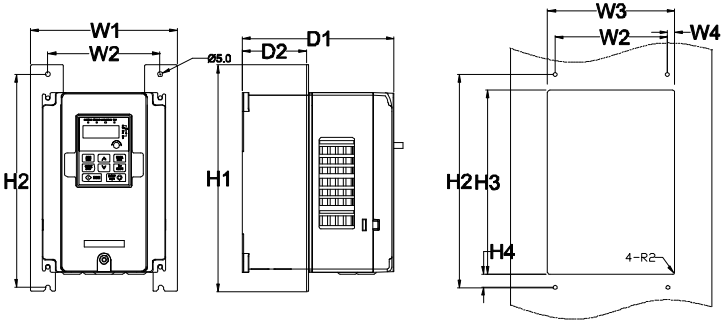


Figure A-7 7.5kW–55kW flange installation diagram

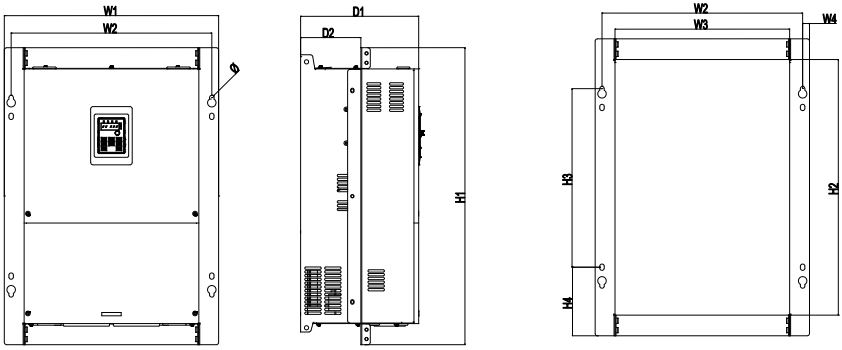


Figure A-8 75kW flange installation diagram

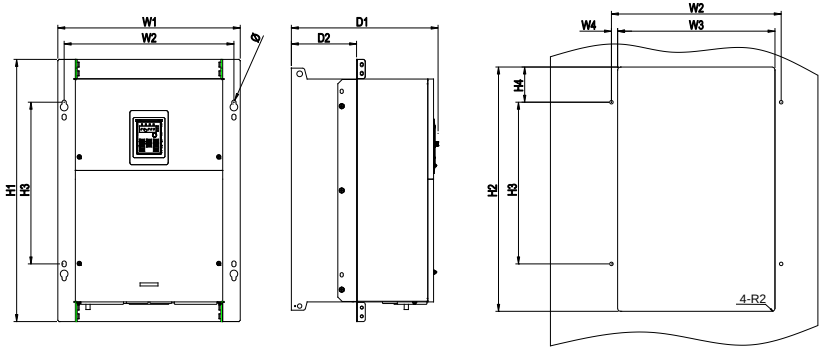


Figure A-9 90kW–110kW flange installation diagram

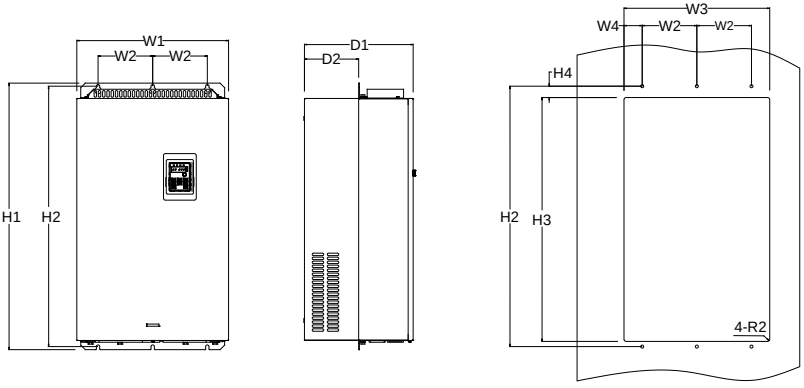


Figure A-10 132kW–200kW flange installation diagram

Table A-3 7.5kW–200kW flange installation dimension (unit: mm)

Power	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Diameter of mounting hole	Nut specification
7.5kW	191	151	174	11.5	370	351	324	12	196.5	113	6	M5
11kW–22kW	266	250	224	13	371	250	350.5	20.5	184.5	104	6	M5
30kW–37kW	316	300	274	13	430	300	410	55	202	118.5	6	M5
45kW–55kW	352	332	306	13	580	400	570	80	238	134	9	M8
75KW	454	425	370	14.5	632	544	380	146	250	127.5	9.5	M8
90–110KW	418	389	361	14	600	559	370	80	337	150	9.5	M8
132kW–200kW	500	180	480	60	870	850	796	37	358	178.5	11	M12

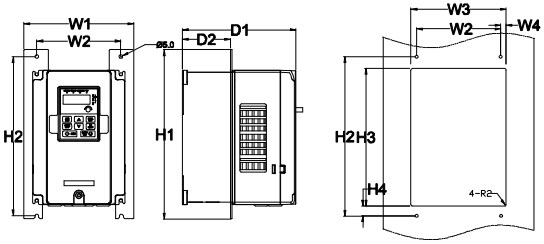


Figure A-11 Flange installation diagram of 7.5kW–15kW single-VFD integrated machine

Table A-4 Flange installation dimension of 7.5kW–15kW single-VFD integrated machine (mm)

Power	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Diameter of mounting hole	Nut specification
7.5kW–15kW	266	250	224	13	371	250	350.5	20.5	184.5	104	6	M5

Note: Flange installation board is required for flange installation. 132-200kW models needs no flange installation board, users just need to move the upper and lower installation beam to the middle position.

A.5 Product weight and package dimension

A.5.1 Weight and package dimension of single-VFD product

Product model	N/W (kg)	G/W (kg)	Package dimension (mm)
GD300-01A-7R5G-4	5.6	6.6	428x270x328
GD300-01A-011G-4	6.6	8.2	485x325x320
GD300-01A-015G-4	8.7	10.3	485x325x320
GD300-01A-018G-4	10.4	12.0	485x325x320
GD300-01A-022G-4	10.4	12.0	485x325x320
GD300-01A-030G-4	16.0	18.5	580x395x360
GD300-01A-037G-4	16.0	18.5	580x395x360
GD300-01A-045G-4	37.0	48.0	710x510x495
GD300-01A-055G-4	37.0	48.0	710x510x495

Product model	N/W (kg)	G/W (kg)	Package dimension (mm)
GD300-01A-075G-4	37.0	48.0	710x510x495
GD300-01A-090G-4	45.5	56.5	675x470x575
GD300-01A-110G-4	46.5	57.5	675x470x575
GD300-01A-132G-4	76.0	97.0	971x631x565
GD300-01A-160G-4	76.0	97.0	971x631x565
GD300-01A-185G-4	76.0	97.0	971x631x565
GD300-01A-200G-4	76.0	97.0	971x631x565

A.5.2 Weight and package dimension of single-VFD integrated machine

Product model	N/W (kg)	G/W (kg)	Package dimension (mm)
GD300-01A-7R5G-4-CT	6.6	8.2	485x325x320
GD300-01A-011G-4-CT	6.6	8.2	485x325x320
GD300-01A-015G-4-CT	8.7	10.3	485x325x320

Appendix B Optional accessories

B.1 Touch screen

In order to drive and manage the air compressor in an optimized manner, users can choose our VT6070E touch screen to be used in conjunction with Goodrive300-01A product. The touch screen comes with 2.5m RS485 communication cable (24V power cable included) and emergency-stop signal wire, as shown below.

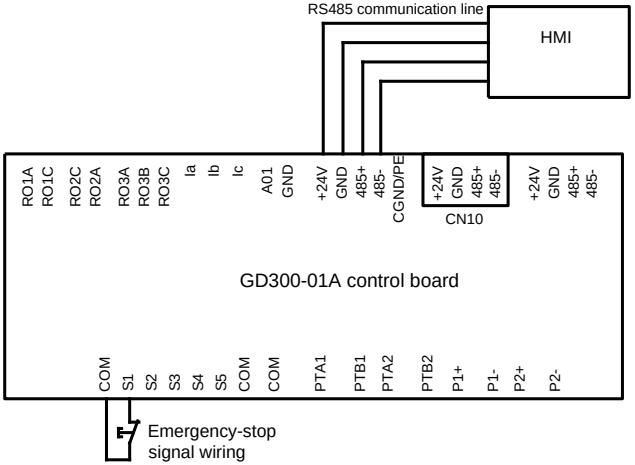


Figure B-1 Wiring of touch screen cables

Note:

1. The RS485 communication cable included in the standard configuration of the touch screen is non-shielded cable; shielded cables should be purchased separately.
2. See *User Manual for VT6070E series HMI* for details on how to use the touch screen.

B.2 Filter

Filter model selections for GD300-01A are shown below.

VFD model	Input filter	Output filter
GD300-01A-7R5G-4	FLT-P04032L-B	FLT-L04032L-B
GD300-01A-7R5G-4-CT		
GD300-01A-011G-4		
GD300-01A-011G-4-CT		
GD300-01A-015G-4	FLT-P04045L-B	FLT-L04045L-B
GD300-01A-015G-4-CT		
GD300-01A-018G-4		
GD300-01A-022G-4	FLT-P04065L-B	FLT-L04065L-B
GD300-01A-030G-4		
GD300-01A-037G-4	FLT-P04100L-B	FLT-L04100L-B
GD300-01A-045G-4		

VFD model	Input filter	Output filter
GD300-01A-055G-4	FLT-P04150L-B	FLT-L04150L-B
GD300-01A-075G-4		
GD300-01A-090G-4	FLT-P04240L-B	FLT-L04240L-B
GD300-01A-110G-4		
GD300-01A-132G-4		
GD300-01A-160G-4	FLT-P04400L-B	FLT-L04400L-B
GD300-01A-185G-4		
GD300-01A-200G-4		

B.3 Reactor

Reactor model selections for GD300-01A are shown below.

VFD power	Input reactor	DC reactor	Output reactor
GD300-01A-132G-4	ACL2-160-4	DCL2-132-4	OCL2-160-4
GD300-01A-160G-4	ACL2-160-4	DCL2-160-4	OCL2-200-4
GD300-01A-185G-4	ACL2-200-4	DCL2-220-4	OCL2-200-4
GD300-01A-200G-4	ACL2-200-4	DCL2-220-4	OCL2-200-4

Appendix C Current transformer of the fan

C.1 Current transformer model selections

Power of the cooling fan (kW)	Rated current A of cooling fan	Recommended transformation ratio of the transformer
0.75	2	40A/40mA
1.1	2.7	
1.5	3.7	
2.2	5	
3	6.8	
4	8.8	
5.5	11.6	

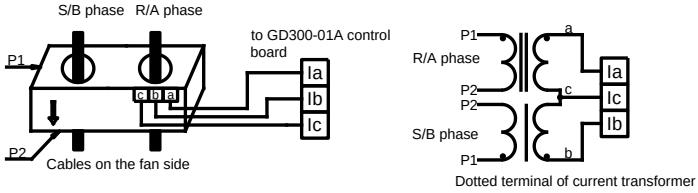
Note:

1. The fan can sustain tripled overload at a short-time. In order to ensure the fan can be protected by the VFD properly, the current on input side of the current transformer should be more than three times of the rated current of the fan.
2. The transformation ratio of the current transformer must be 1000.

C.2 Wiring of current transformer of the fan

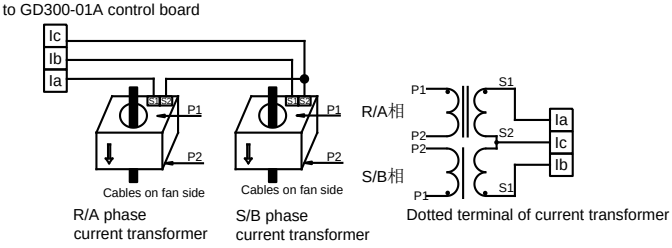
The transformer should be purchased by the user. The figure below illustrates the wiring precautions for transformer. If the transformer actually used differs from the one shown in the figure below, please consult with the transformer manufacturers.

1. If users adopt 2-phase combined current transformer, please refer to the wiring diagram below.



The main circuit cable must go in from P1 and out from P2. The coil a, b and c on output side of the transformer must be connected to Ia, Ib and Ic respectively. A and B must correspond to a and b respectively.

3. If users chose single current transformer, refer to the wiring diagram below.



Pay attention to the current direction during wiring. P1 and S1 are dotted terminals, so does P2 and S2, namely the main circuit cable goes in from P1 and out from P2, and the S1 on output side of R/A phase must be connected to la, and S2 to lc. The S1 on output side of S/B phase must be connected to lb, and S2 to lc.

Note:

1. Open circuit is not allowed on output side;
2. Avoid large power and interference during transformer wiring;
3. Wiring of the transformer and control board can be carried out only after power off.

C.3 Parameter setup of current transformer of the fan

1. The transformation ratio of the current transformer used by the user must be 1000. For instance, if the current on input side is 40A, current on output side must be 40mA;
2. After confirming transformer model, input the rated current value of the cooling fan;
3. See Figure 4-17 for the transformation ratio of the current transformer and rated current of the cooling fan.

Appendix D Communication protocol

D.1 Application mode

The Modbus protocol of this VFD is RTU mode and the network line is RS485.

D.1.1 RS485

The interface of RS485 works on semiduplex and its data signal adopts differential transmission mode which is also called balance transmission, too. It uses twisted pairs, one of which is defined as A (+) and the other is defined as B (-). Generally, if the positive electrical level sending between drive A and B is among +2 to +6V, it is logic“1”, if the electrical level is among -2V to -6V; it is logic“0”.

485+ on the VFD terminal board corresponds to A and 485- to B.

Communication baud rate (P14.01) means the binary bit number transmitted in one second. The unit is bit/s (bps). The higher the baud rate is, the quicker the transmission speed is and the weaker the anti-interference is. If the twisted pairs of 0.56mm (24AWG) is used as the communication cables, the max. Transmission distance is as below.

Baud rate (bps)	Max. transmission distance	Baud rate (bps)	Max. transmission distance
2400	1800 m	9600	800 m
4800	1200 m	19200	600 m

It is recommended to use shield cables and make the shield layer as the grounding lines during RS485 remote communication.

In the cases with less devices and shorter distance, it is recommended to use 120Ω terminal resistor as the performance will be weakened if the distance increases even though the network can perform well without load resistor.

D.2 RTU command code and communication data

D.2.1 Command code: 03H, read N words (N≤16)

Command code 03H means that if the master read data from the VFD, the data number depends on the “data number” in the command code. The max number is 16 and the parameter address to be read must be continuous. The length of every data is 2 bytes (one word). The following command format is illustrated in hex (a number with “H” means hex) and one hex number occupies one byte.

This command code is used to read the working state of the VFD.

D.2.2 Command code: 06H, write one word

This command means the master writes data to the VFD and one command can write one data only. It is used to change the parameter and working mode of the VFD.

D.2.3 Command code: 08H, diagnosis function

Meaning of sub-function codes

Sub-function Code	Description
0000	Return to inquire information data

D.2.4 Definition of data address

The address definition of communication data is used to control VFD operations, obtain VFD state information and set function parameters.

D.2.4.1 Rules for presentation of function code address

The parameter address occupies 2 bytes with the most significant byte (MSB) in the front and the least significant byte (LSB) in the behind. The ranges of the MSB and LSB are: MSB—00 – ffH; LSB—00 – ffH. The MSB is the group number before the radix point of the function code and the LSB is the number after the radix point, but both the MSB and the LSB should be converted into hex. For example P05.06, the group number before the radix point of the function code is 05, then the MSB of the parameter is 05, the number after the radix point is 06, then the LSB of the parameter is 06, and the function code address is 0506H in hex. Similarly, the parameter address of P10.01 is 0A01H.

D.2.4.2 Address description of other Modbus functions

The address definition of communication data is used to control VFD operations, obtain VFD state information and set function parameters.

Table C-1: Other function parameters

Function description	Address definition	Data meaning	R/W attribute
Communication control command	2000H	0001H: forward running	W/R
		0002H: reverse running	
		0003H: forward jogging	
		0004H: reverse jogging	
		0005H: stop	
		0006H: coast to stop (emergency stop)	
		0007H: fault reset	
		0008H: jogging stop	
Address of the set value of communication	2001H	The set communication frequency (0–Fmax (unit: 0.01Hz))	W/R
	2002H	PID reference, range (0–1000, 1000 corresponds to 100.0%)	
	2003H	PID feedback, range (0–1000, 1000 corresponds to 100.0%)	W/R
	2004H	The set torque value (-3000–3000, 1000 corresponds to 100.0% rated motor current)	W/R
	2005H	The set value of upper limit frequency of forward rotating (0–Fmax (unit: 0.01Hz))	W/R
	2006H	The set value of upper limit frequency of reverse rotating (0–Fmax (unit: 0.01Hz))	W/R
	2007H	Upper limit torque of electromotion torque (0–3000, 1000 corresponds to 100.0% motor current of the VFD)	W/R

Function description	Address definition	Data meaning	R/W attribute
	2008H	Upper limit torque of brake torque (0–3000, 1000 corresponds to 100.0% rated motor current)	W/R
	2009H	Special control command word: Bit0–1: =00: Motor 1 =01: Motor 2 =10: Motor 3 =11: Motor 4 Bit2: =1 Torque control =0: Speed control Bit3: =1 Power consumption cleared to zero =0: Power consumption not cleared to zero Bit4: =1 Pre-excitation =0: Pre-excitation forbidden Bit5: =1 DC brake =0: DC brake forbidden	W/R
	200AH	Virtual input terminal command, range: 0x000–0x1FF	W/R
	200BH	Virtual output terminal command, range: 0x00–0x0F	W/R
	200CH	The set voltage value (used for V/F separation) (0–1000, 1000 corresponds to 100.0% rated motor voltage)	W/R
	200DH	The set value 1 of AO output (-1000–1000, 1000 corresponds to 100.0%)	W/R
	200EH	The set value 2 of AO output (-1000–1000, 1000 corresponds to 100.0%)	W/R
	200FH	BIT0: =1 running time of part 1 cleared to zero; =0: invalid BIT1: =1 running time of part 2 cleared to zero =0: invalid BIT2: =1 running time of part 3 cleared to zero =0: invalid BIT3: =1 running time of part 4 cleared to zero =0: invalid BIT4: =1 running time of part 5 cleared to zero =0: invalid BIT5: =1 device running time cleared to zero =0: invalid BIT6: =1 solenoid valve loading =0: solenoid valve unloading	W/R
	2010H	The set maintenance time of part 1; Range: 0–65535	W

Function description	Address definition	Data meaning	R/W attribute
	2011H	The set maintenance time of part 2; Range: 0–65535	W
	2012H	The set maintenance time of part 3; Range: 0–65535	W
	2013H	The set maintenance time of part 4; Range: 0–65535	W
	2014H	The set maintenance time of part 5; Range: 0–65535	W
	2015H	Running time of part 1, 0–65535	W
	2016H	Running time of part 2, 0–65535	W
	2017H	Running time of part 3, 0–65535	W
	2018H	Running time of part 4, 0–65535	W
	2019H	Running time of part 5, 0–65535	W
	201AH	Running time of the device: 0–65535	W
	201BH	Start/stop command of power-frequency fan, 0–3	W
VFD state word 1	2100H	0001H: In forward running	R
		0002H: In reverse running	
		0003H: In stopping	
		0004H: In fault	
		0005H: VFD Poff state	
		0006H: VFD pre-exciting state	
VFD state word 2	2101H	Bit0: =0: Not ready to run =1: Ready to run Bi1–2: =00: Motor 1 =01: Motor 2 =10: Motor 3 =11: Motor 4 Bit3: =0: Asynchronous motor =1: Synchronous motor Bit4: =0: Non-overload pre-alarm =1: Overload pre-alarm Bit5– Bit6: =00: Keypad control =01: Terminal control =10: communication control	R
VFD fault code	2102H	See fault type	R
VFD identification code	2103H	GD300-01A-----0x012F	R
Running frequency	3000H	Compatible with CHF100A, CHV100 communication address	R
The set frequency	3001H		R

Function description	Address definition	Data meaning	R/W attribute
Bus voltage	3002H		R
Output voltage	3003H		R
Output current	3004H		R
Running speed	3005H		R
Output power	3006H		R
Output torque	3007H		R
Closed- loop setting	3008H		R
Closed- loop feedback	3009H		R
Input IO state	300AH		R
Output IO state	300BH		R
Analog input 1	300CH		R
Analog input 2	300DH		R
Analog input 3	300EH		R
Analog input 4	300FH		R
Read high speed pulse 1 input	3010H		R
Read high speed pulse 2 input	3011H		R
Read current step number of multi-step speed	3012H		R
External length value	3013H		R
External counting value	3014H		R
The set torque value	3015H		R
VFD identification code	3016H		R
Fault code	5000H		R

D.2.5 Error message response

Table C-2: Error message response and meaning

Code	Name	Meaning
01H	Illegal command	The command from master cannot be executed. The reason maybe: 1. This command is only for new version and this version cannot realize.

Code	Name	Meaning
		2. Slave is in fault state and cannot execute it.
02H	Illegal data address.	Some of the operation addresses are invalid or not allowed to access. Especially the combination of the register and the transmitting bytes are invalid.
03H	Illegal data value	When there are invalid data in the message framed received by slave. **Note:** This error code does not indicate the data value to write exceed the range, but indicate the message frame is an illegal frame.
04H	Operation failed	The parameter setting in parameter writing is invalid. For example, the function input terminal cannot be set repeatedly.
05H	Password error	The password written to the password check address is not same as the password set by P7.00.
06H	Data frame error	In the frame message sent by the upper computer, the length of the digital frame is incorrect or the counting of CRC check bit in RTU is different from the lower computer.
07H	Written not allowed.	It only happen in write command, the reason maybe: 1. The written data exceeds the parameter range. 2. The parameter should not be modified now. 3. The terminal has already been used.
08H	Parameter cannot be modified during running	The modified parameter in the writing of the upper computer cannot be modified during running.
09H	Password protection	When the upper computer is writing or reading and the user password is set without password unlocking, it will report that the system is locked.

The slave uses function code fields and fault addresses to indicate it is a normal response or some error occurs (named as objection response). For normal responses, the slave shows corresponding function codes, digital address or sub-function codes as the response. For objection responses, the slave returns a code which equals the normal code, but the first byte is logic 1.

For example: when the master sends a message to the slave, requiring it to read a group of address data of the VFD function codes, there will be following function codes:

0 0 0 0 0 0 1 1 (Hex 03H)

For normal responses, the slave responds the same codes, while for objection responses, it will return:

1 0 0 0 0 0 1 1 (Hex 83H)

Besides the function codes modification for the objection fault, the slave will respond a byte of abnormal code which defines the error reason.

When the master receives the response for the objection, in a typical processing, it will send the message again or modify the corresponding command.

Appendix E Common EMC problems and troubleshooting

E.1 Interference problems of meter switches and sensors

The sensor signal (pressure, temperature, displacement, etc) is collected and displayed via HMI device, the sensor value displayed after VFD starts is wrong, the common **phenomena** are listed below:

- Incorrect display of upper limit or lower limit value, such as 999 or -999;
- The displayed value changes randomly (often occurred to pressure transmitter);
- The displayed value is stable but huge deviation exists eg the displayed temperature value is dozens of centigrades higher than the normal value (often occurred to thermocouple);
- The signal collected by the sensor does not display directly but acts as feedback signal for drive system operation eg the VFD is supposed to decelerate when the air compressor has reached the upper limit pressure, however, the VFD starts to decelerate before upper limit pressure is reached;
- Various meters connected by VFD analog output (AO) (such as frequency meter, current meter, etc), the value displayed by these meters after VFD starts is inaccurate;
- The system adopts proximity switch. The indicator of proximity switch flickers after VFD starts, overturn occurred to output level by mistake.

Solution

- Check and confirm the sensor feedback line is routed with motor cable at a distance of at least 20cm;
- Check and ensure motor ground line has been connected to PE terminal of the VFD (if motor ground line has been connected to the grounding bar of VFD cabinet, measure with multimeter to confirm that the resistance between grounding bar and PE terminal is less than 1.5Ω);
- If there are too many interfered meters/sensors, it is recommended to install external C2 filter at the input power side of the VFD.

E.2 485 communication interferences

The 485 communication interference mainly lies in communication delay, out-of-synchronization, disconnection or occasional normal after VFD starts.

Abnormal communication is not always caused by interference, which can be ruled out by below means.

- Check if circuit break or poor contact occurred to 485 communication bus;
- Check if both ends of A, B cable of the 485 communication bus are connected reversely.
- Check if the communication protocol (eg baud rate, data bit check, etc) of the VFD is in consistent with that of the upper PC;

If it is confirmed that the abnormality is caused by interference, rule out the problem cause by below means.

- The communication cable cannot be routed with motor cable in the same cable tray;
- In multi-machine application, the connection of communication cables between VFDs should adopt chrysanthemum mode to improve anti-interference ability;
- In multi-machine application, it is necessary to confirm that the drive capacity of the master is strong enough;

- For multi-machine connection, both ends should be connected to 120Ω terminal resistors.

Solution:

- Check and confirm the motor ground line is connected to PE terminal of the VFD (if motor ground line has been connected to the grounding bar of VFD cabinet, measure with multimeter to confirm that the resistance between grounding bar and PE terminal is less than 1.5Ω);
- The VFD and motor cannot be common grounded along with the communication upper PC (PLC, HMI, touch screen, etc). It is recommended to connect the VFD and motor to the power GND, and connect the communication upper PC to the ground pile separately;
- Try to short connect reference GND terminal of VFD signal to the reference GND terminal of upper PC controller signal to ensure the ground potential of their communication chips is the same;
- Try to short connect reference GND terminal of VFD signal to the grounding terminal (PE) of the VFD.

E.3 Unstoppable or shimmering indicator caused by coupling of motor cable

Interference phenomena:

- Unable to stop

For VFD system whose start/stop is controlled by S terminal, the motor cable and control cable are routed in the same cable tray. After system starts, it cannot stop by S terminal.

- Shimmering indicator

After VFD starts to run, shimmering, flickering or abnormal noise occurred to below equipment:

a) Relay indicator
b) Indicator of distribution box
c) PLC indicator
d) Indicating buzzer

Solution:

- Check and confirm the abnormal signal cable is routed with motor cable motor cable at a distance of at least 20cm;
- Connect in parallel the digital input terminal (S) used for start/stop control with other idle digital input terminals. For instance, S1 terminal is used for start/stop control, S4 terminal is idled, then try to short connect S1 terminal with S4 terminal.

E.4 Leakage current and residual current device (RCD)

As the VFD outputs high frequency PWM voltage to drive the motor, the distributed capacitance against the radiator from internal IGBT and between rotor and stator of the motor may cause the VFD to generate high frequency leakage current against the ground. While the RCD is used to detect the power frequency leakage current when grounding fault occurred to electrical circuit, the application of VFD may cause mal-operation of RCD.

How to select RCD:

Due to the specialty of VFD system, it is required that the rated residual operating current should be above 200mA for regular RCDs at all levels, and the VFD must be grounded with proper technics.

As for the setting time of RCD, the time limit of preceding action should be longer than the secondary

action and time gap between them should be set to a value larger than 20ms eg 1s, 0.5s and 0.2s.

It is recommended to use electromagnetic RCD for the electrical circuit of VFD system. Such RCD carries strong anti-interference capacity to prevent the RCD from being affected by high frequency leakage current.

Electronic RCD	Electromagnetic RCD
Low cost, high sensitivity, small size, vulnerable to voltage fluctuation of the grid and ambient temperature, weak anti-interference capacity	Require the zero sequence current transformer to be quite sensitive, precise and stable, made from permalloy material with high permeability, complicated process and high cost, immune to voltage fluctuation of the grid and ambient temperature., strong anti-interference capacity

Solution to mal-operation of RCD (on the part of VFD)

a) Try to disassemble the jumper cap in “EMC/J10” (refer to chapter 3.1.3 and 3.1.4 for the position of J10)
b) Try to decrease the carrier frequency to 1.5kHz (P00.14=1.5);
c) Try to change the modulation mode to “3PH modulation and 2PH modulation” (P8.40=00)

Solution to mal-operation of RCD (on the part of system distribution)

a) Check and confirm the power cable is not immersed in water
b) Check and confirm the cable is not broken or switched over;
c) Check and confirm if secondary grounding occurred to the null line;
d) Check and confirm if power cable terminal is in the air switch or the contactor is poorly contacted (loose screws);
e) Check the single-phase electric equipment and confirm if the ground line is misused as null line;
f) VFD power cable and motor cable should not be shielded ones.

Leakage protection of motor autotuning

During motor autotuning, the measurement on differing motor parameters is conducted step by step, in which the first two steps is to measure the resistance of motor stator/rotor while the VFD will output square wave to motor stator winding at 4kHz (default carrier frequency), as leakage current generated by 4kHz carrier frequency against distributed capacitance between motor rotor and stator during charging/discharging is quite obvious, which may cause mal-operation of RCD. If such problem occurred, bypass RCD first and restore after parameter autotuning is completed.

E.5 Problem of charged device shell

The problem mainly lies in that the device shell carries detectable voltage which gives anyone who touches it a feeling of electrical shock, however, when the VFD is powered up without running, the shell will be uncharged (or the voltage it carries is far lower than human body safety voltage).

Solution:

a) If there is distribution grounding or ground pile on users’ site, ground the shell of VFD cabinet by power GND or ground pile;
b) If there is no grounding connection on site, it is necessary to electrically connect the motor shell to grounding terminal PE of the VFD and confirm that the jumper in “EMC/J10” of the VFD is short connected (refer to chapter 3.1.3 and 3.1.4 for the position of EMC/J10).

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