Content

Chapter 1 Precautions

1.1 Safety notes

This chapter contains the safety precautions you must follow.

Warning symbols

	Danger: Serious physical injury or even death may occur if not follow the relative requirements
	Warning: Physical injury or damage to the devices may occur if not follow the relative requirements

Safety precautions and warning symbols are marked on the cabinets and power units.

 High voltage!	Do not open the doors after power on, and wait for 15 minutes after all power supplies are disconnected.
 Electrical danger!	Only qualified technicians are allowed to operate the inverters.
 Warning!	There are more than two power supplies for the equipment. To avoid electric shock, all power supplies must be disconnected before maintenance.

Disconnect the main breaker before maintenance and ensure the DC circuit has been discharged (all LEDs of each unit off). Grounding connection and other measures are also required.

About usage

- ✧ Before installation, wiring, operation and maintenance inspection, read the manual carefully for proper use. Ensure to be familiar with the machinery situation and all relevant safety precautions.

- ✧ The series medium voltage variable frequency speed control systems are only applicable to 3-phase high voltage synchronous and asynchronous motors, and cannot be put into other applications; otherwise, danger may occur.
- ✧ Under the circumstances of application where the fault of this product may cause accidents or loss, corresponding safety measures must be provided for emergencies.
- ✧ Do not touch after power on; otherwise, electric shock may occur.

About delivery

- ✧ When moving, transporting and placing the equipment, keep it level and flat.
- ✧ When lifting the equipment, ensure the force is enough and the process is gentle.

- ✧ Don't leave foreign objects such as wire ends, paper, metal debris and tools in the variable frequency speed control system.

About installation

- ✧ Configure the grounding lines strictly in accordance with the national standards and the technical requirements as required by the manual.
- ✧ The wiring operation must be carried out by professional electrical technicians.
- ✧ The operation can only be carried out under the circumstance of confirming that both control circuit and main circuit have no voltage input.
- ✧ The I/O cables must be connected properly according to the instructions; otherwise, the equipment may be damaged.
- ✧ Confirm that input power supply complies with the requirement of product technical specifications.
- ✧ The variable frequency speed control system shall be installed on fire-retardant materials, such as metal support.
- ✧ Do not place flammable objects including drawings and manual in or near the cabinet of the variable frequency speed control system.
- ✧ Do not put into installation or operation when the system components are damaged.

About wiring

- ✧ The power side of the variable frequency speed control system shall be fitted with high voltage circuit breaker for circuit protection.
- ✧ It is required to connect the grounding lines reliably.
- ✧ The wiring must be implemented under the guidance of the professionals of our company according to the relevant electrical safety standards.
- ✧ It is required to carry out wiring after the main body of the equipment is installed in place.
- ✧ It is required to confirm that the phase number of the input power and the rated input voltage are consistent with the ratings of the system.
- ✧ The output terminals (U, V and W) must not be connected to AC power supply.
- ✧ The I/O cables shall meet the requirements of insulation and capacity in national or industrial standards.

About operation

- ✧ Only after the electrical cabinet doors are all closed can the system be connected to power supply. After the power supply is connected, the doors cannot be opened.
- ✧ Do not use wet hands to operate the switch.

- ✧ When trip and reboot occurs, the peripheral system shall guarantee personal and equipment safety.
- ✧ When the variable frequency speed control system is connected to power supply, even in stop state, the terminal may still be charged, please do not touch.
- ✧ The start-stop of the variable frequency speed control system cannot be controlled by connecting or disconnecting the main circuit.
- ✧ Control cabinet and other cabinets use optical fiber isolation technology without high voltage, but it is required to operate by trained and authorized personnel.
- ✧ Do not disconnect the power supply of the fan during operation; otherwise, it will cause overheating and damage the equipment.
- ✧ Confirm that there is good ventilation indoors where the system is installed, maintain the ambient temperature at -5~+40°C.
- ✧ The operation of transformer cabinet, power unit cabinet or bypass cabinet must comply with high-voltage operation procedures.
- ✧ The transformer cabinet, power unit cabinet and bypass cabinet are dangerous zones in high voltage, so do not open the cabinet door to operate after power on (the system has the lock device).
- ✧ It is required to install protective guards (with the symbol of high voltage) for some necessary places and do not move them when the system is running.

About maintenance and replacement

- ✧ Maintenance repair and replacement must be carried out by qualified personnel in accordance with relevant operation procedures.
- ✧ In case of voltage and high temperature, do not touch any part inside the cabinet.
- ✧ It is required to check whether the grounding resistor meets the requirements of operation and national standards usually. If not, it may be dangerous.

About disposal

- ✧ Deal with the scrapping parts and components as industrial effluent.

Chapter 2 Product overview

2.1 Product introduction

The Galt G5000 product adopts advanced high performance vector control mode and simultaneously it is compatible with vectorization V/F control. The product features high-quality input, high power factor and excellent power output, and it also has the advantages of high control precision, quick dynamic torque response and large low-frequency output torque.

2.1.1 High-quality input

G5000 series medium voltage variable frequency speed control systems are designed in compliance with the strictest requirements of IEEE 519 1992 voltage and current harmonic distortion standards. By secondary winding phase shifting of isolation transformer, the input side adopts multi-pulse diode rectifier input (30 pulses for 6kV, 48 pulses for 10kV) to provide isolated power supply for the power units, eliminating most of harmonic current caused by a single power unit.

As shown in Fig2.1, when G5000 series medium voltage variable frequency speed control systems are under 30 pulses rated load supply impedance, the total current harmonic distortion and corresponding voltage distortion are below 2.00%.

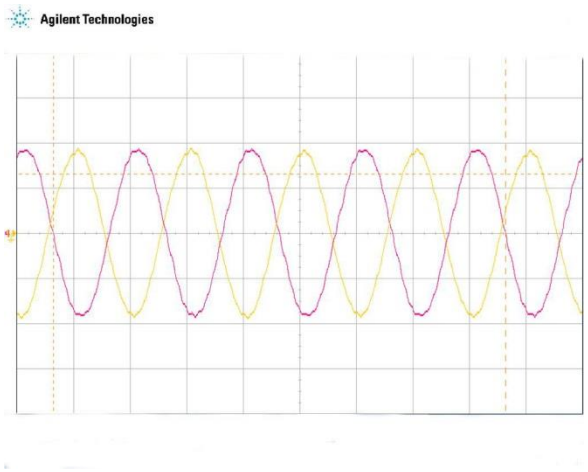


Fig 2.1 30 pulses input voltage and current waveform (100:1)

2.1.2 High power factor

Due to high-quality input, G5000 medium voltage variable frequency speed control systems acquire excellent sine-wave input current (see Fig2.1), and thus, without using external power factor to compensate capacitance, the power factor will exceed 0.97 in the whole range of speed control. However, low power factor usually generates rectangular wave current, which will cause harmonic and other relevant resonance problems. Meanwhile, the distribution cabinets, circuit breakers and transformers will not cause overload because of reactive power.

2.1.3 Excellent power output

The systems adopt the technology of multi-unit series PWM wave superposition, greatly reducing output harmonic and outputting excellent sine waves (see Fig2.2 and 2.3) without the necessity of output filter equipment, which means the systems will generate little distortion and low motor noise, and

the motor will not need to derate. Actually, the excellent systems eliminate the harmonic caused by motor heat as well as eliminate the torque ripple (even in the condition of low speed range), reducing the stress of the device, and minimizing the stress between common-mode voltage and dv/dt to protect the main circuit motor and cable insulation from damage. Within derating range, the motor cable has no length limit.

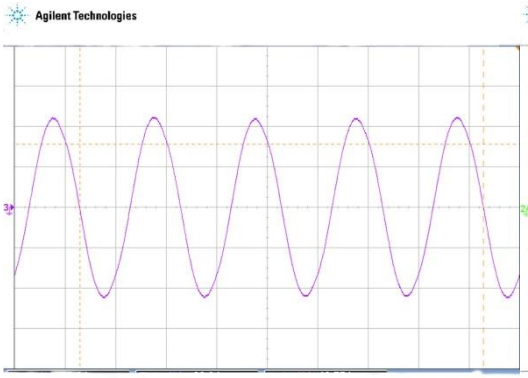


Fig 2.2 Output current waveform

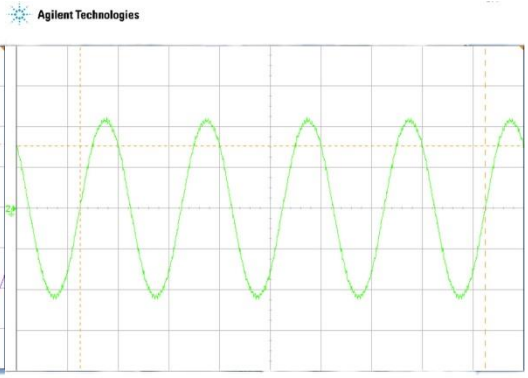


Fig 2.3 Output voltage waveform

2.2 Product features

G5000 series medium voltage variable frequency speed control systems, the new generation of high voltage (SM/AM) three-phase AC speed control device manufactured by our company, have following features:

- High performance vector control technology (SM/AM) of high precision and quick dynamic torque response
- Built-in PID regulator: Close loop running
- Compatible with vectorization V/F control, that is optimize V/F control and make the dynamic response approach the vector control level; gain better torque feature by low frequency automatic torque boost
- Excellent low frequency compensation: By the advanced algorithm of dead area compensation and low frequency oscillation suppression, low frequency output performance will be better under vector and V/F control modes
- No stop after instantaneous power off and main circuit power off (1-5s) ensures the device is not affected by sudden power off
- Optimized overvoltage speed loss: Bus voltage close loop facilitates quick deceleration without overvoltage alarm
- Master-slave control: Multi-motor control of the belt conveyor
- Power consumption statistics of variable frequency
- V/F separation (suitable for power industry)
- One-drive-more control of bypass cabinet
- Braking energy balance: By software optimization on braking energy distribution, balance the braking energy on each power unit and lower overvoltage point
- AVR function for output voltage (Automatic Voltage Regulation): Control the output voltage accurately and improve the control performance of the motor
- Strong voltage adaptability, with a wide range of input voltage, applicable at home and abroad
- All-around rotating speed tracking makes the motor restart in rotating to guarantee continuity
- Synchronous switching (optional): Smoothly switch between the grid and variable frequency, decreasing impact on the grid and motor

- Multiple communication methods: MODBUS-RTU, PROFIBUS-DP (optional), Ethernet UDP (optional)
- Modularized design, convenient and simple maintenance
- The ventilating window mounted externally is convenient for dedusting and maintenance
- LCD display in Chinese, touch buttons on the panel
- Double-loop redundancy of control power, cascading fault protection

Besides, the systems also have:

- Realtime parameters monitoring, realtime data recording, alarm and fault protection, fault find and waveform displaying
- Overload and overcurrent protection
- Phase loss protection
- Overvoltage, undervoltage, overtemperature and overspeed protection
- Optical fiber isolating communication with high reliability

2.3 Technical parameters

See technical parameters of G5000 series medium voltage variable frequency speed control systems in Table 2-1:

Table 2-1 Technical parameters

Item		3kV	3.3kV	4.16kV	6kV	6.6kV	10kV	11kV
Input	Rated input voltage	AC 3PH 3kV	AC 3PH 3.3kV	AC 3PH 4.16kV	AC 3PH 6kV	AC 3PH 6.6kV	AC 3PH 10kV	AC 3PH 11kV
	Voltage fluctuation range	-15%~+10%						
	Input frequency	50/60Hz; ±5%						
	Input power factor	≥ 0.97 (full load)						
	System efficiency	≥ 96% (full load)						
	Input current harmonic	≤ 4%				≤ 2%		
Output	Output voltage	0~3kV	0~3.3kV	0~4.16kV	0~6kV	0~6.6kV	0~10kV	0~11kV
	Output current	0~539 A	0~551A	0~555A	0~539A	0~551A	0~577A	0~525A
	Output capacity	0~2800 kVA	0~3150kVA	0~4000kVA	0~5600kVA	0~6300kVA	0~10000 kVA	0~10000 kVA
	Output power	0~2240 kW	0~2500kW	0~3150kW	0~4500kW	0~5000kW	0~8000kW	0~8000kW
	Output frequency	0~120Hz						
	Output current	≤ 4%				≤ 2%		

Item		3kV	3.3kV	4.16kV	6kV	6.6kV	10kV	11kV
	harmonic							
Control performance	Control mode	V/F control, open loop vector control, close loop vector control						
	Control system	DSP, FPGA, ARM						
	HMI	10 inch touch screen						
	Speed ratio	1:50 (V/F) ; 1:100 (open loop vector), 1:200 (close loop vector)						
	Speed control precision	±1% the maximum speed (V/F) ; ±0.4% the maximum speed (open loop vector), ±0.2% the maximum speed (close loop vector)						
	Torque response time	< 200ms (open loop vector), < 100ms (close loop vector)						
	Overload protection	120%: 120s, 150%: 5s, 200% protect immediately						
	ACC/DEC time	0-3600s, customized						
	Feedback control mode	Synchronous rectification control technology (4-quadrant)						
	Feedback capability	100%, the maximum feedback power is the same as the maximum output power (4-quadrant)						
Signal I/O	Digital input	8 digital inputs						
	Digital output	8 relay outputs						
	Analog input	3 channels: AI1, AI2: 0~10V/0~20mA; AI3: -10V~10V						
	Analog output	4 channels: AO1, AO2, AO3, AO4: 0~10V/0~20mA						
	High-speed pulse input	1 input, range: 0~50kHz						
	High-speed pulse output	1 output, range: 0~50kHz						
Communication method		Modbus (RS485 interface), Profibus, Ethernet						
Protection function	System	Overcurrent, overvoltage, undervoltage, motor overload, inverter overload, phase loss						
		Overheating, temperature controller fault, communication fault, access fault						
	Unit	Communication fault, undervoltage, overvoltage, power supply overheating, input phase loss, VCE fault, bypass failure, hardware overcurrent						
Others	Installation manner	Cabinet mounting						
	IP grade	IP30						
	Noise degree	≤75dB						
	Feed in and	Bottom in and bottom out; other methods are optional						

Item		3kV	3.3kV	4.16kV	6kV	6.6kV	10kV	11kV
	out method							
	Cooling	Forced-air cooling						
	Control source	AC 380V±10%						
	MTBF	50000h						
	Temperature	-5°C~+40°C, derate 1.5% for every additional 1°C if the temperature is above 40°C and the maximum temperature is 50°C; run with no load if the temperature reaches 60°C						
	Altitude	Below 1000m; derate 1% for every additional 100m if the sea level is above 1000m						
	Storage	Keep away from dust, direct sunlight, flammable or corrosive gas, oil, steam and vibration						
	Vibration	0.59g						

2.4 Models and selection guide

When selecting the models, refer to the rated voltage, current and power of the motors to make sure the system capacity is not smaller than the motor capacity.

2.4.1 Type designation key

The product model definitions of G5000 series products are shown as Fig 2.4.

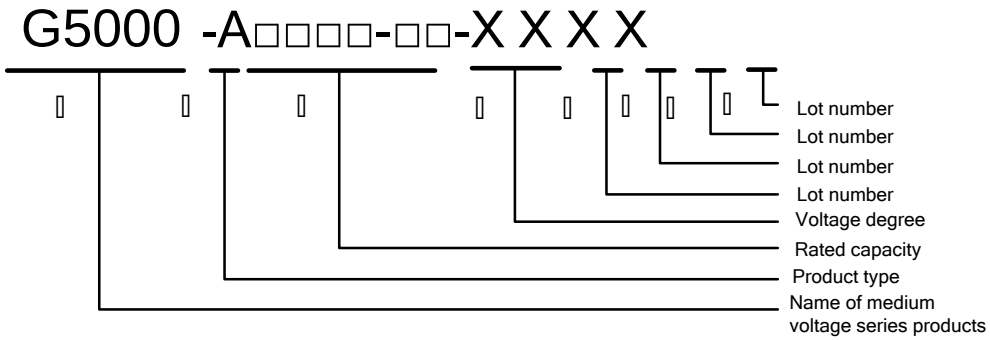


Fig 2.4 Product model definitions of G5000 series products

Table 2-2 Instruction of product model definitions

Label	Definition	Instruction
①	Name of medium voltage series products	G5000: series medium voltage variable frequency speed control systems
②	Product type	A: asynchronous vector product (AM) B: synchronous vector product (SM)
③	Rated capacity	0500: 500kVA 10000: 10000kVA
④	Voltage degree	03: voltage degree 3kV 3.3: voltage degree 3.3kV 4.16: voltage degree 4.16kV 06: voltage degree 6kV 6.6: voltage degree 6.6kV

Label	Definition	Instruction
		10: voltage degree 10kV 11: voltage degree 11kV
⑤	Lot number	1) S: front maintenance 2) D: dual-side maintenance 3) L: integrated machine
⑥	Lot number	1) R: energy feedback system 2) If no, default
⑦	Lot number	1) C: bypass system with unit contactor 2) If no, default
⑧	Lot number	1) Important non-standard product 2) P: belt conveyor 3) Lot number special for other industries decided by product line 4) If no, default

2.4.2 Name plate

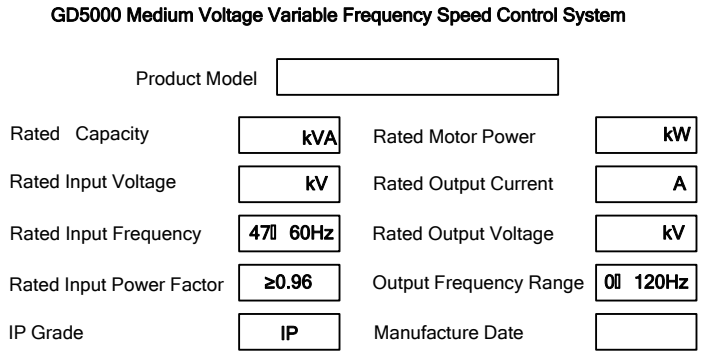


Fig 2.5 Name plate of G5000 series products

2.4.3 Product specifications and dimensions

Table 2-3 Parameters of G5000 series products (3kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0280-03	220	54	3200X1200X2720	2416
G5000-A0315-03	250	61	3200X1200X2720	2466
G5000-A0355-03	280	68	3200X1200X2720	2506
G5000-A0400-03	315	77	3800X1200X2720	2731
G5000-A0450-03	355	87	3800X1200X2720	2881
G5000-A0500-03	400	96	3800X1200X2720	2961
G5000-A0560-03	450	108	4000X1200X2720	3149
G5000-A0630-03	500	121	4000X1200X2720	3299
G5000-A0710-03	560	137	4000X1200X2720	3349
G5000-A0800-03	630	154	4000X1200X2720	3549
G5000-A0900-03	710	173	4000X1200X2720	3790
G5000-A1000-03	800	192	4000X1200X2720	3890
G5000-A1120-03	900	216	4000X1200X2720	4030

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A1250-03	1000	241	4000X1200X2720	4380
G5000-A1400-03	1120	269	5000X1500X2820	5560
G5000-A1600-03	1250	308	5000X1500X2820	5810
G5000-A1800-03	1400	346	5400X1500X2820	6710
G5000-A2000-03	1600	385	5400X1500)X2820	7010
G5000-A2240-03	1800	431	5800X1500X2820	7760
G5000-A2500-03	2000	481	5800X1500X2820	8160
G5000-A2800-03	2240	539	5800X1500X2820	8860

Table 2-4 Parameters of G5000 series products (3.3kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0280-3.3	220	49	3200X1200X2660	2283
G5000-A0315-3.3	250	55	3200X1200X2720	2416
G5000-A0355-3.3	280	62	3200X1200X2720	2466
G5000-A0400-3.3	315	70	3200X1200X2720	2506
G5000-A0450-3.3	355	79	3800X1200X2720	2731
G5000-A0500-3.3	400	87	3800X1200X2720	2881
G5000-A0560-3.3	450	98	3800X1200X2720	2961
G5000-A0630-3.3	500	110	4000X1200X2720	3149
G5000-A0710-3.3	560	124	4000X1200X2720	3299
G5000-A0800-3.3	630	140	4000X1200X2720	3349
G5000-A0900-3.3	710	157	4000X1200X2720	3549
G5000-A1000-3.3	800	175	4000X1200X2720	3790
G5000-A1120-3.3	900	196	4000X1200X2720	3890
G5000-A1250-3.3	1000	219	4000X1200X2720	4030
G5000-A1400-3.3	1120	245	4000X1200X2720	4380
G5000-A1600-3.3	1250	280	5000X1500X2820	5560
G5000-A1800-3.3	1400	315	5000X1500X2820	5810
G5000-A2000-3.3	1600	350	5400X1500X2820	6710
G5000-A2240-3.3	1800	392	5400X1500X2820	7010
G5000-A2500-3.3	2000	437	5800X1500X2820	7760
G5000-A2800-3.3	2240	490	5800X1500X2820	8160
G5000-A3150-3.3	2500	551	5800X1500X2820	8860

Table 2-5 Parameters of G5000 series products (4.16kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0315-4.16	250	44	3600X1200X2720	3405
G5000-A0355-4.16	280	49	3600X1200X2720	3455

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0400-4.16	315	56	3600X1200X2720	3638
G5000-A0450-4.16	355	62	3600X1200X2720	3718
G5000-A0500-4.16	400	69	3600X1200X2720	3798
G5000-A0560-4.16	450	78	4200X1200X2720	4053
G5000-A0630-4.16	500	87	4200X1200X2720	4353
G5000-A0710-4.16	560	99	4200X1200X2720	4483
G5000-A0800-4.16	630	111	4600X1200X2720	4743
G5000-A0900-4.16	710	125	4600X1200X2720	5093
G5000-A1000-4.16	800	139	4600X1200X2720	5243
G5000-A1120-4.16	900	155	4600X1200X2720	5593
G5000-A1250-4.16	1000	173	4600X1200X2720	5975
G5000-A1400-4.16	1120	194	4600X1200X2720	6425
G5000-A1600-4.16	1250	222	4600X1200X2720	6865
G5000-A1800-4.16	1400	250	4600X1200X2720	7515
G5000-A2000-4.16	1600	278	5000X1500X2820	8910
G5000-A2240-4.16	1800	311	5000X1500X2820	9410
G5000-A2500-4.16	2000	347	5400X1500X2820	10860
G5000-A2800-4.16	2240	389	5400X1500X2820	11510
G5000-A3150-4.16	2500	437	5800X1500X2820	13210
G5000-A3550-4.16	2800	493	5800X1500X2820	14110
G5000-A4000-4.16	3150	555	5800X1500X2820	15010

Table 2-6 Parameters of G5000 series products (6kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0400-06	315	38	2600X1500X2720	2643
G5000-A0500-06	400	48	2600X1500X2720	2808
G5000-A0560-06	450	54	2600X1500X2720	2885
G5000-A0630-06	500	61	2600X1500X2720	2962
G5000-A0710-06	560	68	2600X1500X2720	3177
G5000-A0800-06	630	77	2600X1500X2720	3221
G5000-A0900-06	710	87	2600X1500X2720	3342
G5000-A1000-06	800	96	2600X1500X2720	3452
G5000-A0400-06	315	38	3800X1200X2660	2965
G5000-A0500-06	400	48	3800X1200X2660	3035
G5000-A0560-06	450	54	3800X1200X2660	3170
G5000-A0630-06	500	61	3800X1200X2660	3320
G5000-A0710-06	560	68	3800X1200X2660	3370
G5000-A0800-06	630	77	4400X1200X2660	3635
G5000-A0900-06	710	87	4400X1200X2660	3785
G5000-A1000-06	800	96	4400X1200X2660	3885
G5000-A1120-06	900	108	4800X1200X2720	4268

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A1250-06	1000	120	4800X1200X2660	4408
G5000-A1400-06	1120	135	4800X1200X2660	4758
G5000-A1600-06	1250	154	4800X1200X2660	5058
G5000-A1800-06	1400	173	4800X1200X2720	5610
G5000-A2000-06	1600	192	4800X1200X2720	5810
G5000-A2240-06	1800	216	4800X1200X2720	6060
G5000-A2500-06	2000	241	4800X1200X2720	6560
G5000-A2800-06	2240	269	5800X1500X2820	7550
G5000-A3150-06	2500	303	5800X1500X2820	8350
G5000-A3550-06	2800	342	6400X1500X2820	9750
G5000-A4000-06	3150	385	6800X1500X2820	10000
G5000-A4500-06	3550	433	7400X1500X2820	11600
G5000-A5000-06	4000	481	7400X1500X2820	12000
G5000-A5600-06	4500	539	7600X1500X2820	13180

Table 2-7 Parameters of G5000 series products (6.6kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0400-6.6	315	35	4000X1200X2720	3026
G5000-A0450-6.6	355	39	4000X1200X2720	3056
G5000-A0500-6.6	400	44	4000X1200X2720	3096
G5000-A0560-6.6	450	49	4000X1200X2720	3126
G5000-A0630-6.6	500	55	4000X1200X2720	3402
G5000-A0710-6.6	560	62	4000X1200X2720	3482
G5000-A0800-6.6	630	70	4000X1200X2720	3552
G5000-A0900-6.6	710	79	4600X1200X2720	3917
G5000-A1000-6.6	800	87	4600X1200X2720	4017
G5000-A1120-6.6	900	98	4600X1200X2720	4117
G5000-A1250-6.6	1000	109	5000X1200X2660	4522
G5000-A1400-6.6	1120	122	5000X1200X2660	4872
G5000-A1600-6.6	1250	140	5000X1200X2660	5172
G5000-A1800-6.6	1400	157	5000X1200X2660	5472
G5000-A2000-6.6	1600	175	5000X1200X2720	5965
G5000-A2240-6.6	1800	196	5000X1200X2720	6215
G5000-A2500-6.6	2000	219	5000X1200X2720	6765
G5000-A2800-6.6	2240	245	5000X1200X2720	7065
G5000-A3150-6.6	2500	276	5800X1500X2820	8425
G5000-A3550-6.6	2800	311	5800X1500X2820	8725
G5000-A4000-6.6	3150	350	6800X1500X2820	9625
G5000-A4500-6.6	3550	394	6800X1500X2820	10825
G5000-A5000-6.6	4000	437	7400X1500X2820	12975
G5000-A5600-6.6	4500	490	7600X1500X2820	13755

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A6300-6.6	5000	551	7600X1500X2820	14555

Table 2-8 Parameters of G5000 series products (10kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0500-10	400	29	2600X1500X2720	3194
G5000-A0560-10	450	32	2600X1500X2720	3359
G5000-A0710-10	560	41	2600X1500X2720	3513
G5000-A0800-10	630	46	2600X1500X2720	3755
G5000-A0900-10	710	52	2600X1500X2720	3876
G5000-A1000-10	800	58	2600X1500X2720	4008
G5000-A1120-10	900	65	2600X1500X2720	4283
G5000-A1250-10	1000	72	2600X1500X2720	4360
G5000-A1400-10	1120	81	2600X1500X2720	4525
G5000-A1600-10	1250	92	2600X1500X2720	4723
G5000-A1700-10	1400	98	2600X1500X2720	4855
G5000-A0500-10	400	29	4600X1200X2660	3550
G5000-A0560-10	450	32	4600X1200X2660	3550
G5000-A0710-10	560	41	4800X1200X2660	3960
G5000-A0800-10	630	46	4800X1200X2720	4070
G5000-A0900-10	710	52	4800X1200X2720	4366
G5000-A1000-10	800	58	4800X1200X2660	4426
G5000-A1120-10	900	65	4800X1200X2660	4776
G5000-A1250-10	1000	72	4800X1200X2660	4976
G5000-A1400-10	1120	81	5200X1200X2720	5271
G5000-A1600-10	1250	92	5200X1200X2720	5421
G5000-A1700-10	1400	98	5200X1200X2720	5621
G5000-A2000-10	1600	115	5800X1200X2720	6481
G5000-A2240-10	1800	129	6200X1500X2720	6876
G5000-A2500-10	2000	144	6200X1500X2720	7276
G5000-A2800-10	2240	162	6200X1500X2720	7576
G5000-A3150-10	2500	182	6200X1500X2720	8210
G5000-A3550-10	2800	205	6200X1500X2720	9310
G5000-A4000-10	3150	231	6200X1500X2720	10030
G5000-A4500-10	3550	260	7000X1500X2820	10960
G5000-A5000-10	4000	289	7000X1500X2820	11260
G5000-A5600-10	4500	323	7200X1500X2820	11940
G5000-A6300-10	5000	364	8000X1500X2820	14340
G5000-A7100-10	5600	410	8800X1500X2820	15990
G5000-A7500-10	6000	433	11200X1500X2820	19880
G5000-A8000-10	6300	462	11200X1500X2820	21080
G5000-A9000-10	7100	520	11200X1500X2820	22280

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A10000-10	8000	577	11200X1500X2820	23080

Table 2-9 Parameters of G5000 series products (11kV)

Model	Rated power (kW)	Rated output current (A)	Overall dimension W*D*H (mm)	Standard weight (kg)
G5000-A0500-11	400	26	4800X1200X2720	3699
G5000-A0560-11	450	29	4800X1200X2720	3749
G5000-A0630-11	500	33	4800X1200X2720	3849
G5000-A0710-11	560	37	5000X1200X2720	4129
G5000-A0800-11	630	42	5000X1200X2720	4179
G5000-A0900-11	710	47	5000X1200X2720	4279
G5000-A1000-11	800	52	5000X1200X2660	4608
G5000-A1120-11	900	59	5000X1200X2660	4918
G5000-A1250-11	1000	66	5000X1200X2660	5118
G5000-A1400-11	1120	73	5000X1200X2660	5368
G5000-A1600-11	1250	84	5400X1200X2720	5503
G5000-A1800-11	1400	94	5400X1200X2720	5843
G5000-A2000-11	1600	105	6000X1200X2720	6376
G5000-A2240-11	1800	118	6000X1200X2720	6826
G5000-A2500-11	2000	131	6400X1200X2720	7421
G5000-A2800-11	2240	147	6400X1200X2720	7671
G5000-A3150-11	2500	165	6400X1200X2720	7871
G5000-A3550-11	2800	186	6400X1200X2720	9395
G5000-A4000-11	3150	210	6400X1200X2720	10295
G5000-A4500-11	3550	236	6400X1200X2720	10595
G5000-A5000-11	4000	262	7800X1500X2820	12005
G5000-A5600-11	4500	294	8000X1500X2820	14385
G5000-A6300-11	5000	331	9000X1500X2820	16885
G5000-A7000-11	5600	367	9000X1500X2820	17585
G5000-A8000-11	6300	420	12600X1500X2820	21765
G5000-A9000-11	7100	472	12600X1500X2820	23265
G5000-A10000-11	8000	525	12600X1500X2820	25665

Note:

1. The overall dimensions of medium voltage variable frequency speed control systems listed in the tables above are standard. They may differ from the actual dimensions required by users.

2. If the value exceeds the rated data, please contact Galt Electric.

3. The dimensions may be subject to the technical agreement without notice during improving.

2.4.4 External dimension

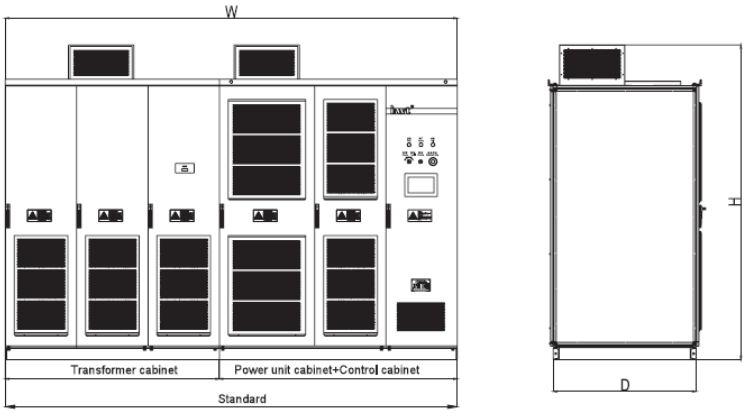


Fig 2.6 External dimension of G5000 series products

2.5 Product application

Widely used in various industries, G5000 series products provide perfect high voltage AC motor (AM/SM) soft-start, speed regulation, energy saving and smart control solutions. The detailed applications are as follows:

Steel/Metallurgy: air blowers, dusting blowers, ID (induced draft) fans, descaling pumps, mud pumps, feed pumps, slag washing pumps, phosphorus removal pumps, rolling mills, etc.

Cement/Building material: high temperature fans, furnace head fans, furnace end fans, dusting blowers, raw meal rolling machine, ore rolling machine, etc.

Thermal power/Hydropower/Garbage power: ID (induced draft) fans, FD (forced draught) fans, primary air fans, secondary air fans, air compressors, sweetening fans, feed pumps, condensate pumps, circulating pumps, ash pumps, etc.

Oil/Chemical industry/Natural gas: injection pumps, circulating pumps, oil pipe pumps, submersible pumps, electric submersible pumps, brine pumps, descaling pumps, mud pumps, compressors, etc.

Paper making/Pharmacy: beating pumps, cleaning pumps, etc.

Mining: belt conveyors, air exhausters, dusting blower, gas pumps, medium pumps, etc.

Municipal engineering: domestic water pumps, industrial water pumps, sewage pumps, clean water pumps, purifying pumps, etc.

Others: power station pumps, wind tunnel test fans, etc.

2.6 Design standards

G5000 series medium voltage variable frequency speed control systems are designed and manufactured according to latest national standards (GB or GB/T) and the standards of International Electricotechnical Commission (IEC), and International System of Units (SI). As the lowest technical specifications, the related technical parameters meet the requirements of GB or GB/T and IEC.

Part of the technical standards referenced by the design:

IEC 60071-1-2011	Insulation coordination Part 1: definitions，principles and rules
IEC 61800-5-1-2007	Adjustable speed electrical power drive systems-Part 5-1: Safety requirements-Electrical, thermal and energy
IEC 60529-2001	Degrees of protection provided by enclosure (IP code)
IEC 61000-4	EMC testing and measurement techniques (series standards)
IEC 61800-3-2004	Adjustable speed electrical power drive systems-Part 3: EMC requirements

	and specific test methods
IEC 61800-4-2002	Adjustable speed electrical power drive systems-Part 4: General requirements-Rating specifications for AC power drive systems above 1000V AC not exceeding 35kV
IEC 60038-2009	IEC standard voltage
IEC 60196-2009	IEC standard frequency
IEC 60076-1-2000	Power transformers-Part 1: General
IEC 60068-2	Series standards of environmental testing
IEC 60204-11-2000	Safety of machinery-Electrical equipment of machines-Part 11: Requirements for HV equipment for voltages above 1000V AC or 1500V DC and not exceeding 36kV
IEEE 519-1992	Recommended practices and requirements for harmonic control in electrical power systems
GB/T 3859.1-1993	Basic requirements for semiconductor converters
GB/T 14549-1993	Power quality-Utility grid harmonics
GB 19212.1-2008	Safety of power transformers, power supplies, reactors and similar products-Part 1: General requirements and tests
GB 12668-1990	General specification for speed control assembly with semiconductor adjustable frequency for AC motor
DL-T 994-2006	Application of high voltage inverter to fan and pump in thermal power plant
JB 3975-1985	Basic standards for circular copper conductor connectors
JB 2438-78	Standards for general wiring ducts

Chapter 3 Product principle and composition

3.1 Product principle

G5000 series medium voltage variable frequency speed control systems adopt the technology of multi-unit series PWM wave superposition. By power units in series, the input voltage of the grid runs through phase-shifting transformer, becomes 3*N channels 3-phase 690V voltage (N: the number of power units in each phase), and then supplies power to each power unit. Each unit uses H-bridge whose PWM output is controlled by the main control system; connect the unit outputs of the same phase in series, connect the first unit of each phase in “Y”, and combine the last units of three phases into high voltage output. The system consists of the main circuit, power units and control system, as shown in Fig 3.1.

3.1.1 Main circuit

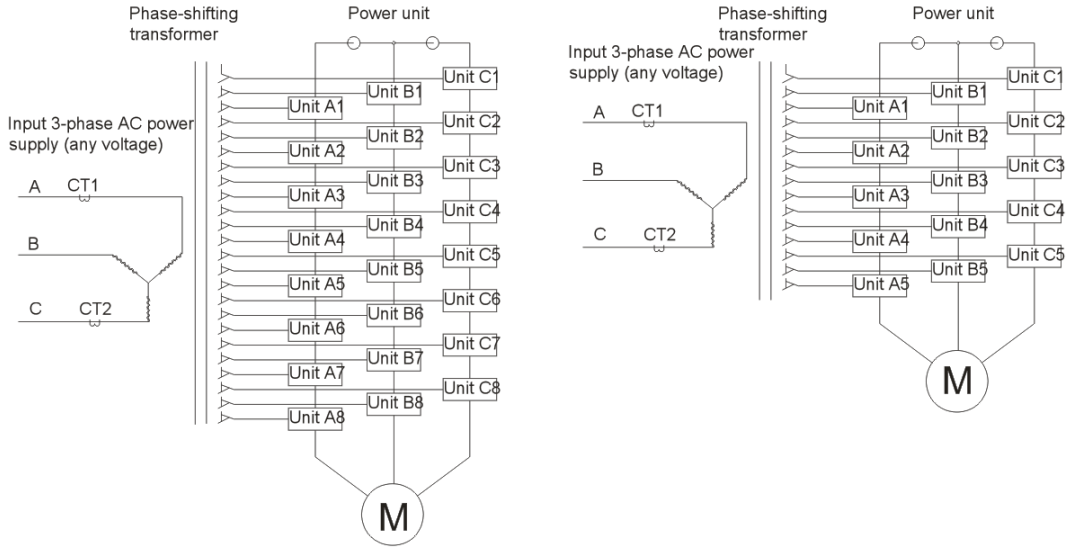


Fig 3.1 Topological diagram of G5000 series products

The isolation transformer is dry-type phase shifting transformer using forced air cooling, the original side is in “Y” connection directly connected to high voltage incoming line, and the secondary side winding is in prolonged delta connection with a certain phase difference.

Phase-shifting angle=60°/the number of power units in each phase

The secondary side winding supplies power to the power units and the phase difference is determined by the number of power units and the voltage degree of the variable frequency speed control system.

3.1.2 Power unit

The power units mainly consist of main circuit and control circuit. The main circuit includes protection, rectification, filtering, converting and bypass (optional).

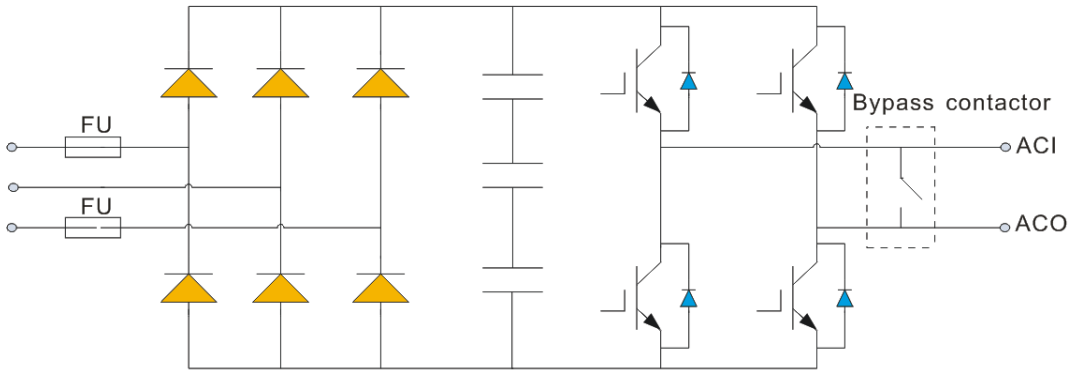


Fig 3.2 Schematic diagram of power units

The input terminals R/S/T are connected to 3-phase low voltage output of the secondary coil of the transformer, electrify DC bus after 3-phase full-bridge rectification, and then convert into AC output by H-bridge converting. The output terminal of power units in single phase is ACI/ACO.

The control circuit controls the power units by receiving the signals from the main control system, and simultaneously it monitors the power units by sending its own information including voltage, faults and states back to the main control system via optical fiber.

The power units have the function of unit bypasses, one is IGBT bypass and the other is contactor bypass (optional). When a unit has a fault, the unit will achieve automatic bypass to ensure the system continues working normally.

3.1.3 Control system

The main control system of G5000 series medium voltage variable frequency speed control systems adopts modular structure. Each single board of the main control system is connected to the main control board via connecting slots. In this way, each single board has clear functions for the convenience of signals distinguishing and maintenance.

With interfaces of multi-functional I/O terminals, all user I/O terminals are located in the user I/O board, including 16-channel digital input, 3-channel analog input, 1-channel high-speed pulse input, 4-channel analog output, 1-channel high-speed pulse output and 20-channel relay output.

3.1.4 Board jumper and selector switch

Voltage and current switch jumper on user I/O board:

The analog I/O signals can be current or voltage signals which are switched by jumper, J1 corresponding to AI1, J2 corresponding to AI2, J3 corresponding to AO1, J4 corresponding to AO2, J5 corresponding to AO3, J6 corresponding to AO4. According to instructions on I/O board, connect the mini jumper to select the corresponding voltage or current signal.

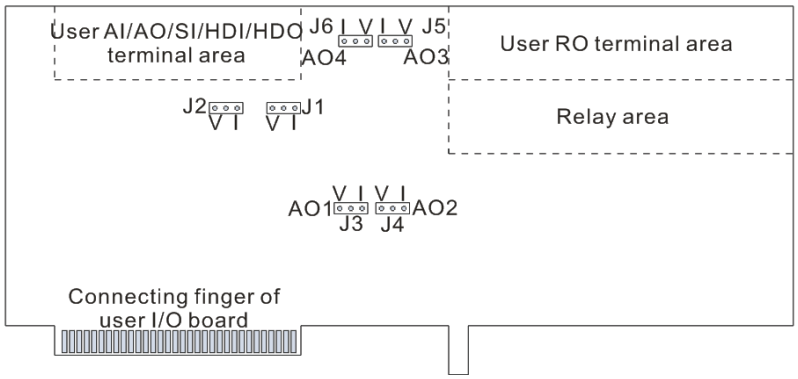


Fig 3.3 Switch jumper of analog voltage and current on the user I/O board

RS232/485 jumper:

Select RS232/485 interface to support MODBUS communication protocol.

Function of DIP switches on the main control board:

SW1, SW2, SW3 function and position

		ON	OFF
SW1	DIP switch 1	Configuration mode	Normal mode
	DIP switch 2	DSP flash loading mode	DSP serial programming mode enable
SW2	DIP switch 1	FPGA normal mode	FPGA flash loading mode
	DIP switch 2		
SW3	DIP switch 1	485 interface connected to termination resistor	Not connected to termination resistor
	DIP switch 2		

Configuration mode: Users can modify IP of the variable frequency speed control system. Refer to the configuration mode and P17.00~P17.08 parameters of HMI. The modify steps are: (1) switch the switch in configuration mode to ON; (2) power on the main control system, press and hold at the blank of log-in interface for 3 seconds, the additional menu options will pop up; (3) select configuration mode; after the interface of modify IP address pops up, modify the relevant information according to P17 group; (4) power off the main control cabinet and switch the switch in configuration mode to OFF (normal mode); (5) power on the main control cabinet and the modified IP address is valid.

Switch of the switch cabinet:

G5000 series products support one-drive-four switch cabinet control, that is to say, 4 switch cabinets are controlled by corresponding 4 control boards. The address codes are selected by the DIP switches on the boards.

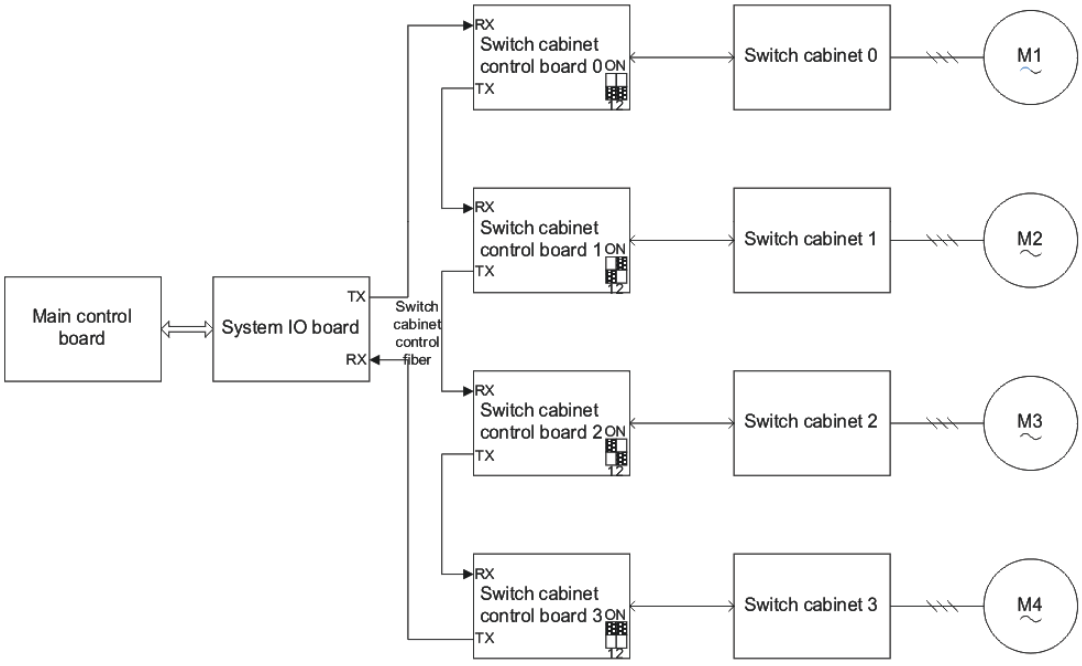


Fig 3.4 Configuration of switch cabinets

The DIP switch 1 and 2 on the control board can combine into 4 states corresponding to 4 addresses of switch cabinets. As shown in below table, the main control board will send command to the switch cabinet along with corresponding address, only when the address is the same as the command address, the switch cabinet will act.

Combination address		DIP 1	
		ON	OFF
DIP switch 2	ON	Switch cabinet 3	Switch cabinet 2
	OFF	Switch cabinet 1	Switch cabinet 0

The switches and jumpers in the control system shall be set well in factory. It is not recommended to modify; otherwise, damage may occur. If necessary, please read the instructions carefully before proper operating.

3.2 Product composition

G5000 series medium voltage speed control systems are mainly composed of the transformer cabinet, power unit cabinet, control cabinet, power units and HMI; in actual use, bypass cabinet (or switch cabinet) can be fitted as optional according to requirements of users.

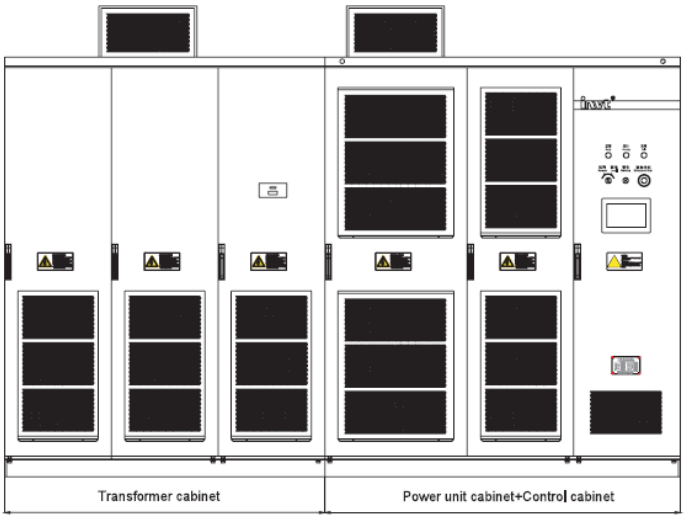


Fig 3.5 Appearance of G5000 series products

3.2.1 Transformer cabinet

The transformer cabinet is used to install phase shifting isolation transformer and accessories.

Fig 3.6 Layout in the transformer cabinet

The phase shifting isolation transformer installed in the transformer cabinet provides 3-phase power supply for power units to achieve high/low voltage shifting and isolation. The phase shifting transformer adopts dry-type structure, isolation degree at H and secondary side in prolonged delta connection, reducing harmonics at the grid side.

The temperature controller installed on the door of the cabinet monitors the temperature of each phase, and provides temperature protection and alarm. The default setting is: when the temperature of the phase shifting transformer exceeds 130°C, the system will alarm but not stop; when the temperature exceeds 150°C, the system will conduct temperature protection and stop. At the bottom of the transformer, special grounding copper bar is used for reliable high voltage grounding. The system shall be grounded together with the high voltage grounding during construction.

3.2.2 Power unit cabinet

The power unit cabinet is the converter of the system and the actuator for AC-DC-AC conversion. It is used to install power units and accessories.

Fig 3.7 Layout in the power unit cabinet

The power unit cabinet is used for placing power units; by the connection of high-voltage cable and secondary side winding of phase-shifting isolation transformer, the transformer can supply power to power units. The power units are placed in three lines in the cabinet, with the units of the same line in series connection forming A/B/C 3-phase. The last unit 3-phase close to the control cabinet is in “Y” connection. Being the output terminal of the system, the first unit 3-phase is in connection via the high-voltage cable and the copper bar of output terminals. By the connection of the optical fiber and main control system, the main control system realizes control and protection on power units.

3.2.3 Control cabinet

As the brain of the system, the control cabinet has the functions of command, control and self-protection. It is used to install the main control system, secondary control circuit system and UPS power supply, and so on.

Fig 3.8 Layout in the control cabinet

G5000 series variable frequency speed control systems use independent control cabinets which are isolated from the high-voltage section of transformer cabinet, power unit cabinet by optical fiber or isolation transformer and special grounding.

There are 3 power supplies for the control system: main power supply, backup power supply and UPS power supply. When the main supply fails, the system will switch into backup power supply automatically; when both the main and backup power supplies fail, UPS will supply power. When a power supply has a fault, the system will alarm. Therefore, the system can be used in bad power conditions.

3.2.4 Bypass cabinet (optional)

To meet the requirements of users, G5000 series medium voltage variable frequency speed control systems provide different combinations between standard manual bypass cabinet and automatic bypass cabinet.

The bypass cabinets are used to make the motor run at power frequency if the system has a fault, in order to guarantee continuity of the production and improve reliability of the system. According to production process, the dimension of the manual bypass cabinet and automatic bypass cabinet is 1000×1200×2690. It is recommended to install the bypass cabinets on the left of the transformer cabinet. Due to limited space, the arrangement is different from that recommended, which shall be stated in the technical agreement.

As shown in Fig 3.9, when the system stops for a short time, operators can switch variable frequency to power frequency by using the manual bypass cabinet.

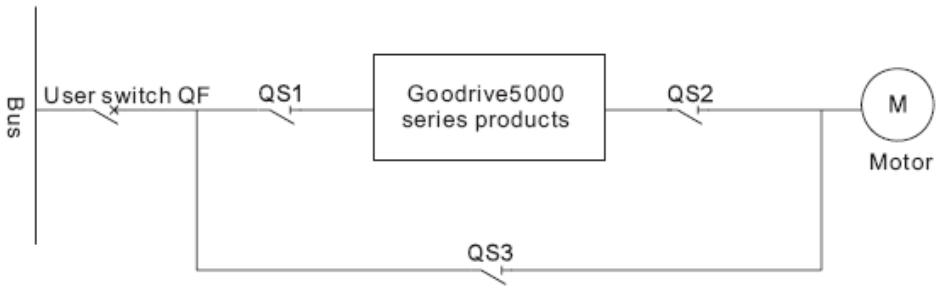


Fig 3.9 Diagram of the main circuit of manual bypass cabinet

When the system is not allowed to stop, the automatic bypass cabinet will switch automatically. The cabinet has three high-voltage vacuum contactors KM1, KM2 and KM3, among which KM2 and KM3 realize electric interlock to ensure the power frequency supply will not be directly sent to the output terminal of the variable frequency speed control system. The cabinet also has two isolation knife switches QS1 and QS2 to isolate the variable frequency speed control system from high-voltage power supply when the motor runs at power frequency, convenient for maintenance and inspection.

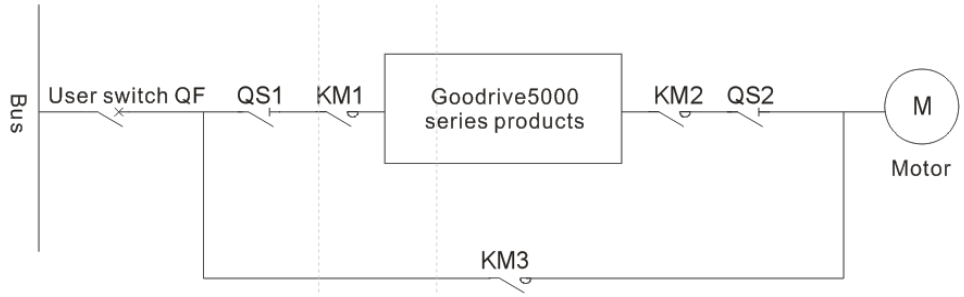


Fig 3.10 Diagram of the main circuit of automatic bypass cabinet

With bypass cabinets, users' power cables (power incoming cable and motor outgoing cable) usually feed in at the bottom or top of the cabinets; while the power cable, between the bypass cabinet and the variable frequency speed control system, adopts flexible wire and lays out in the cabinet.

3.2.5 Power unit

The power units, the converting part of the variable frequency speed control system, achieve high-low-high voltage shifting of the system by connection in series. The main control system controls H-bridge PWM output of each power unit, achieving perfect sine waves and control on motor rotation.

When installing the power units, put them on the brackets, next push the units inside till close to the air duct baffle, then fix them with screws, connect corresponding input cables and series copper bars, and finally plug corresponding optical fiber cables in.

When removing the power units, unplug the optical fiber cables, input cables and series copper bars, twist off the screws on the units, and finally remove the power units from the brackets.

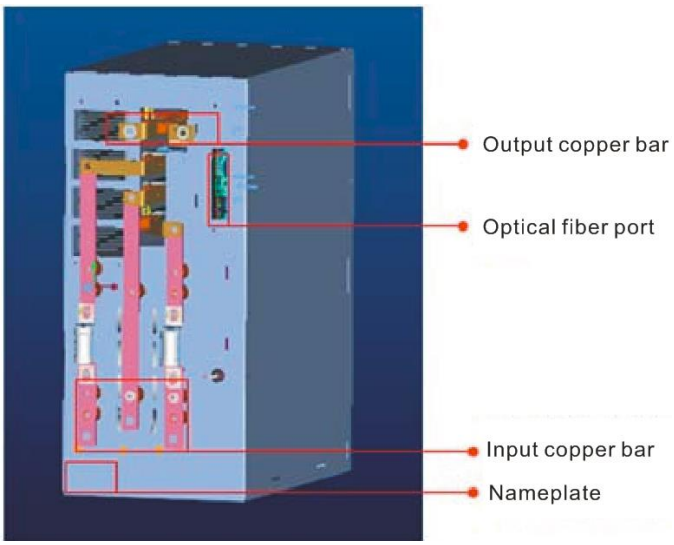


Fig 3.11 Appearance of the power unit

3.2.6 HMI

G5000 series medium voltage variable frequency speed control systems provide HMI with touch screen/indicator light/button/alarm apparatus installed on the door of the control cabinet.

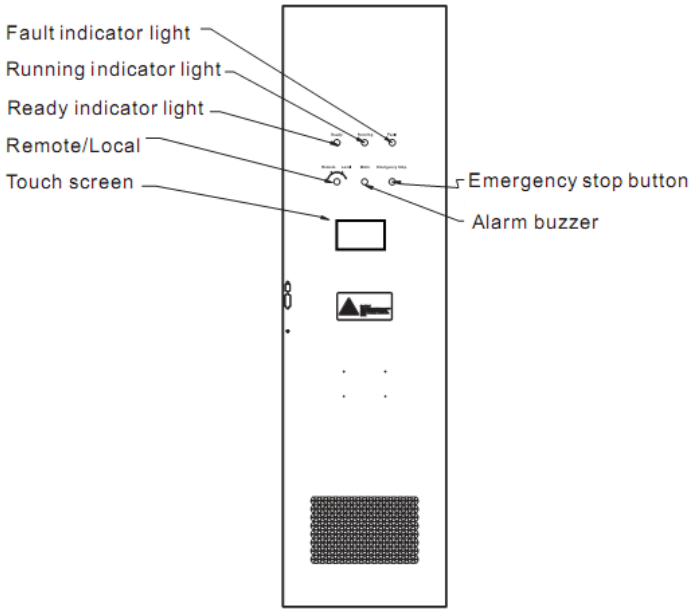


Fig 3.12 Layout of control cabinet door

Fault indicator light: means whether the system is in fault or alarm state, if so, the indicator light on;

Running indicator light: means whether the system is in running state, if so, the indicator light on;

Ready indicator light: means whether the system is in standby or ready state. If the system does not run and no fault is in detection after power on, the indicator light on;

Emergency stop button: if the main control board is damaged or cannot be controlled normally, users can push the emergency stop button; by the physical circuit disconnection, damage will be minimized.

Danger

- ✧ **Power on only after disconnecting high voltage by loosening the emergency stop button with rotation;**

- ✧ **When the switching cabinet under power frequency, the emergency stop button is invalid. Disconnect high voltage by directly powering off the higher level or sending the command of disconnecting high voltage to the system;**
- ✧ **When under manual switching, the emergency stop button can only control higher level high-voltage breaker or contactor. Connect the knife switch in series in the switching cabinet to high level control circuit.**

3.3 Setting and definition of touch screen

After the touch screen is power-on, the login interface will pop up for users to select username and input password. The main interface appears after login. Then users can operate on the interface by clicking the buttons.

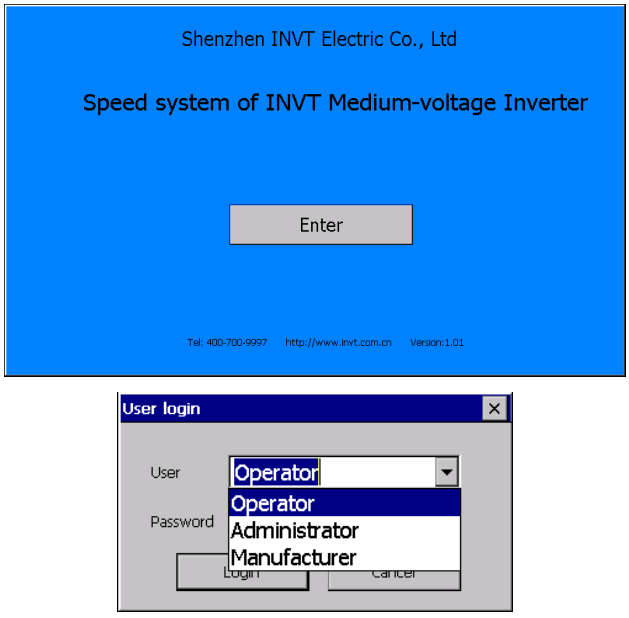


Fig 3.13 Login interface

Click the buttons on the main interface to enter into corresponding special interface called sub-interface. Because special interface appears after clicking corresponding buttons, the sub-interface has hierarchy. Therefore, the main interface is the first level interface, the sub-interface which appears after clicking the main interface is the second level interface, and so on.

Click the region for setting values and then enter into the interfaces for users to input values. The interfaces called general interfaces are not sub-interfaces.

3.3.1 Main interface

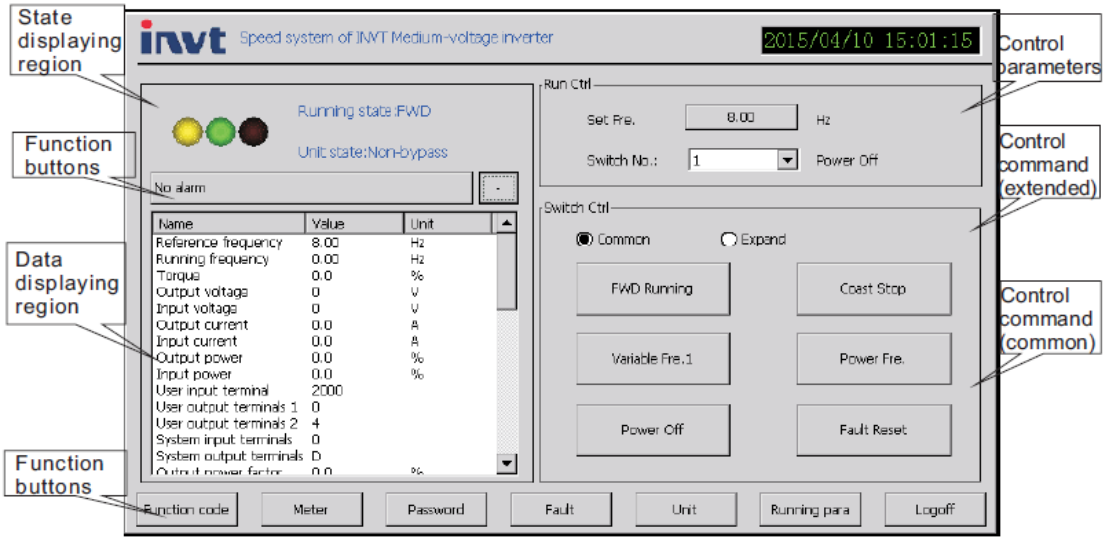


Fig 3.14 Main interface of the touch screen

The figure above is the main interface of the touch screen and it is divided into following regions:

No.	Region	Buttons	Instruction
1	State displaying	Running state	In forward running/reverse running/stand-by/fault/POFF state
		Unit state	Bypass/non-bypass
		Icon state	yellow on, in stand-by; green on, in running; red on, in fault; not connected to Internet
2	Data displaying	Set frequency	Set frequency of variable frequency speed control system
		Running frequency	Running frequency of variable frequency speed control system
		Rotating speed	Current rotating speed of the motor
		Output voltage	Output voltage of variable frequency speed control system
		Input voltage	Input voltage of variable frequency speed control system
		Output current	Output current of variable frequency speed control system
		Input current	Input current of variable frequency speed control system
		Output power	The percentage of motor rated power current output power accounts for
		Input power	The percentage of motor rated power current input power accounts for
		Torque	The percentage of system rated torque current output torque accounts for
		User input terminal	The binary digit 0/1 corresponding to open/close state of user input terminal
		User output terminal 1	The binary digit 0/1 corresponding to open/close state of user output terminal 1
		User output terminal 2	The binary digit 0/1 corresponding to open/close state of user output terminal 2
		System input terminal	The binary digit 0/1 corresponding to open/close state of system input terminal
		System output	The binary digit 0/1 corresponding to open/close state of

No.	Region	Buttons	Instruction
		terminal	system output terminal
		Output power factor	Output power factor
		Input power factor	Input power factor
		Active component of input current	Active component of input current
		Reactive component of input current	Reactive component of input current
		Active component of output current	Active component of output current
		Reactive component of output current	Reactive component of output current
		U-phase bus voltage	U-phase DC bus voltage
		V-phase bus voltage	V-phase DC bus voltage
		W-phase bus voltage	W-phase DC bus voltage
		Temperature of the motor	Current temperature of the motor
		Corresponding value of AI1	Corresponding input voltage or current percentage of AI1
		Corresponding value of AI2	Corresponding input voltage or current percentage of AI2
		Corresponding value of AI3	Corresponding input voltage or current percentage of AI3
		Value of HDI	Frequency of multi-functional HDI
		Corresponding value of AO1	Corresponding output function percentage of AO1
		Corresponding value of AO2	Corresponding output function percentage of AO2
		Corresponding value of AO3	Corresponding output function percentage of AO3
		Corresponding value of AO4	Corresponding output function percentage of AO4
		Value of HDO	Frequency of multi-functional HDO
		PID reference	Percentage of PID reference
		PID feedback	Percentage of PID feedback
3	Control parameters	Set frequency	Set frequency of function code
		Switch cabinet No.	0~8
4	Control	Forward	Under communication command channel, push the button to

No.	Region	Buttons	Instruction
	command (common)	running	send forward running command to the system.
		Coast to stop	Under any command channel, push the button to send coast to stop command to the system.
		Variable frequency 1	One drives more and other motors are in variable frequency. When specified motor receives variable frequency 1, other motors in variable frequency will coast to stop and the motor will run in variable frequency.
		Power frequency	The motor runs in power frequency.
		Power off	Disconnect the input power of specified motor and other motors are not affected.
		Fault reset	Fault reset by manual
5	Control command (extended)	Reverse running	Under communication command channel, push the button to send reverse running command to the system.
		Decelerate to stop	If the running command channel is communication command channel and the system is in running state, push the button to send decelerate to stop command to the system.
		Power frequency into variable frequency 1	One drives more and other motors are in variable frequency. When specified motor receives power frequency into variable frequency 1, other motors in variable frequency will coast to stop and the motor will switch power frequency into variable frequency.
		Variable frequency into power frequency	The motor switches variable frequency running into power frequency bypass.
		Variable frequency 2	One drives more and other motors are in variable frequency. When specified motor receives variable frequency 2, other motors in variable frequency will run in power frequency and the motor in variable frequency.
		Power frequency into variable frequency 2	One drives more and other motors are in variable frequency. When specified motor receives power frequency into variable frequency 2, other motors will switch variable frequency into power frequency and the motor will switch power frequency into variable frequency.
6	Function buttons	Alarm information	Click the button and the second level interface of fault information will pop up.
		Function codes	Click the button and the second level interface of function groups will pop up.
		Virtual instrument	Click the button and the interface of instrument data will pop up.
		Change password	Change login password of variable frequency speed control system.
		Fault records	Click the button and the second level interface of fault information will pop up.
		Units	Click the button and the second level interface of unit information will pop up.
		Running	Click the button and the second level interface of running

No.	Region	Buttons	Instruction
		parameters	parameters will pop up.
		User logout	Back to login interface

3.3.2 Login interface

After the control system powers on or users exit the main interface, the login interface will be displayed on the touch screen. There are three types of operators:

Operator: for who will not configure the system and only start or stop the variable frequency speed control system.

Administrator: for technical leaders who can configure and operate the system.

Manufacturer: only for who manufacture the system

Limited rights in different regions for different operators

Region	Operator	Administrator
State displaying	Allow view	Allow view
Data displaying	Allow view	Allow view
Start-stop control	Prohibit changing control channels	Allow operation
Frequency switching control	Allow operation	Allow operation
Function button	Prohibit viewing function codes	Allow operation

3.3.3 Second level interface

1) Each function button corresponds to a second level interface

Fig 3.15 Function buttons

2) Introduction to the second level interface of function groups

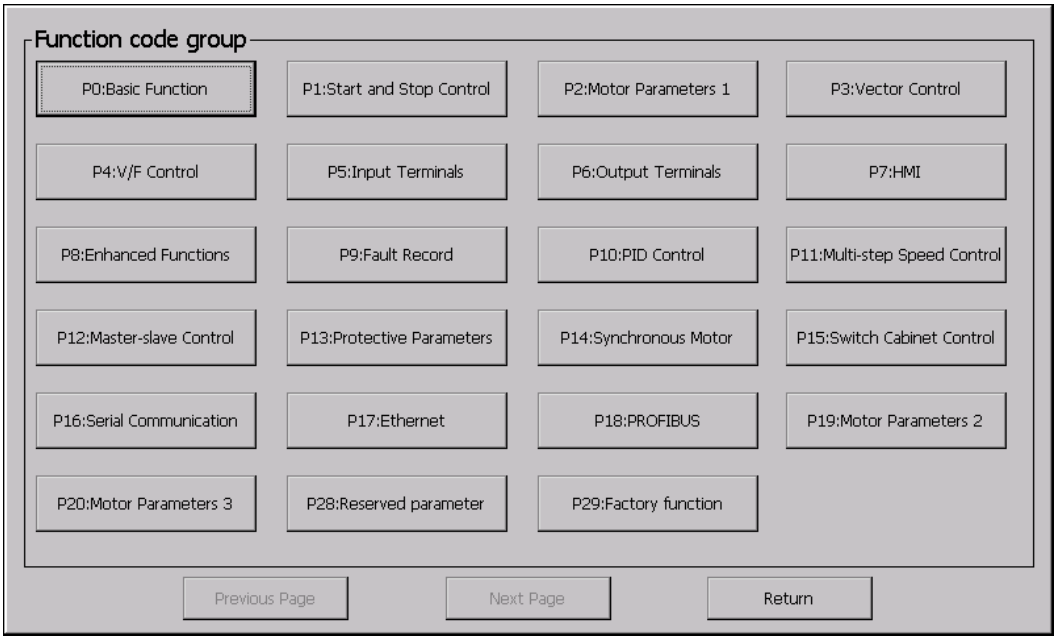


Fig 3.16 Second level interface of function groups

Setting is a necessity for above groups. Click the button of each group and the corresponding setting interface will pop up. Return to the top level by clicking back button.

3) Introduction to the second level interface of virtual instrument

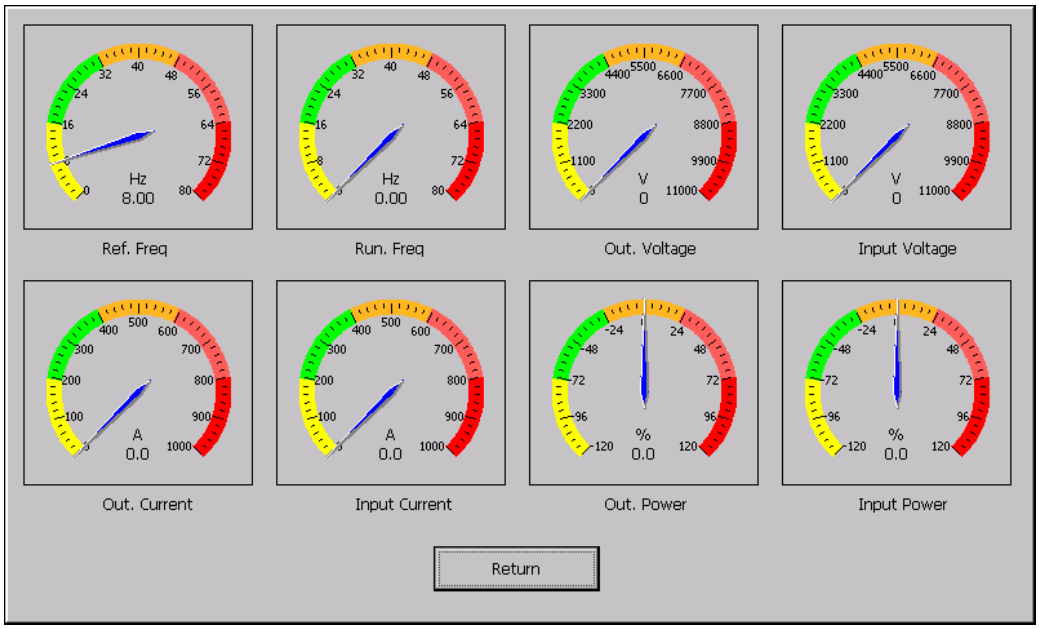


Fig 3.17 Second level interface of virtual instrument

The virtual instrument is used to display the variables in common use.

4) Introduction to the second level interface of change password

Fig 3.18 Second level interface of change password

5) Introduction to the second level interface of fault records

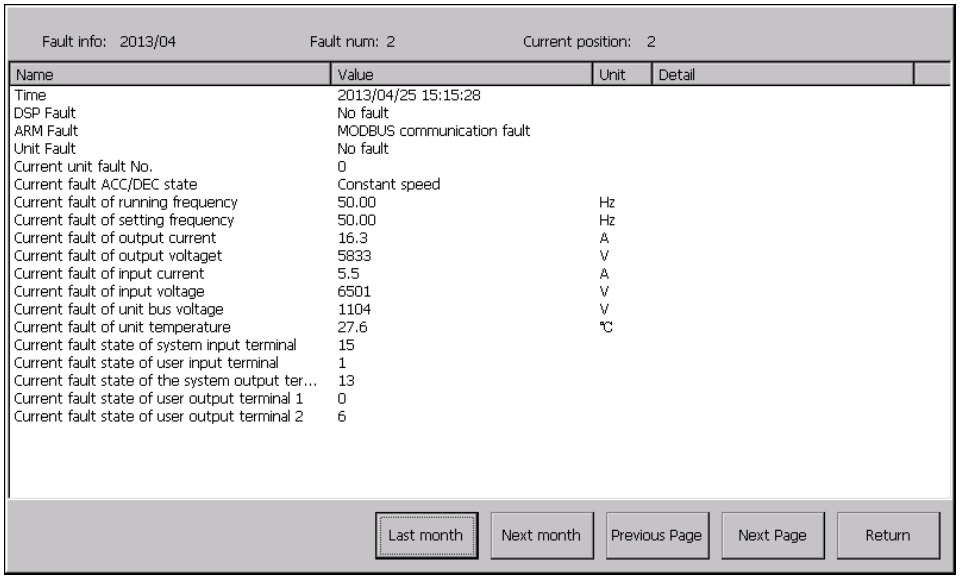


Fig 3.19 Second level interface of fault record

6) Introduction to the second level interface of units

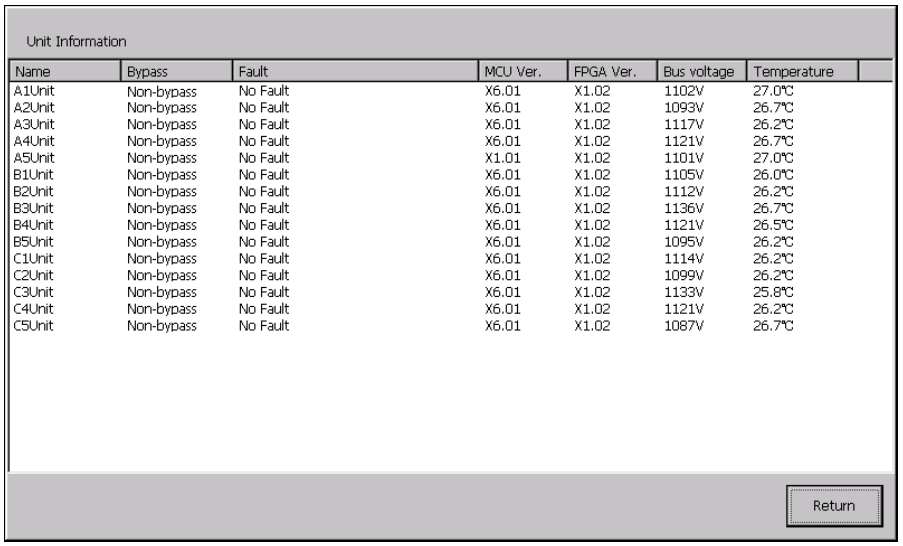


Fig 3.20 Second level interface of unit

7) Introduction to the second level interface of running parameters

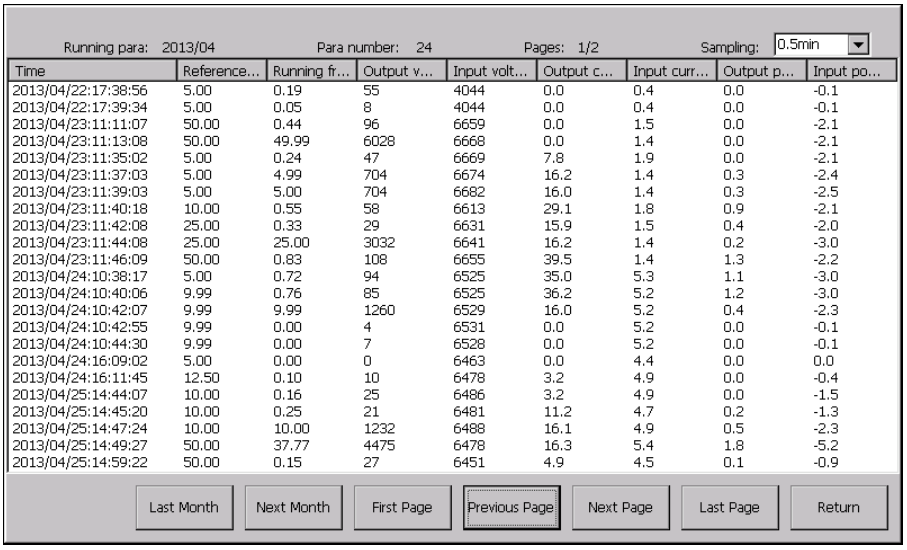


Fig 3.21 Second level interface of running parameters

The interface displays running records of the system and the period for the records can be modified.

3.3.4 Third level interface

1) Second level interface generating the third level

The second level interface of function groups can generate third level interface.

2) Introduction to the third level interface of function groups

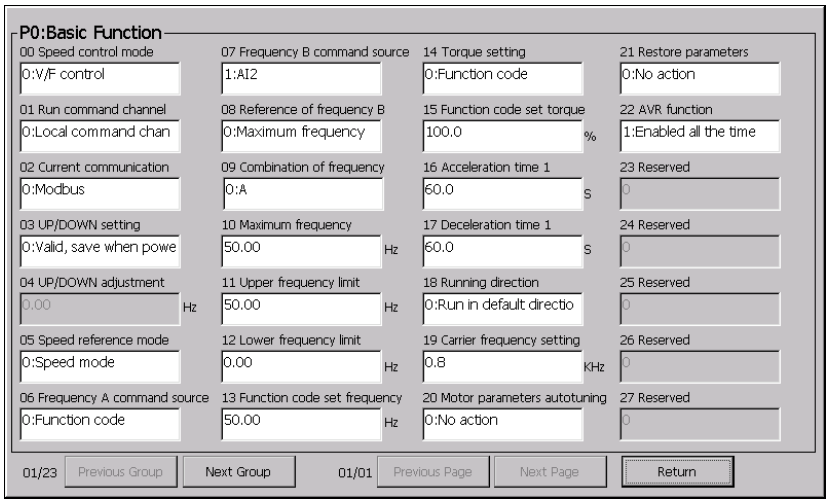


Fig 3.22 Third level interface for setting parameters

The interface displays the value and state of each function code which can be modified or set by users. The white edit box is modifiable while the grey box is read-only.

3) Click the edit box and then the third level sub-interface will pop up.

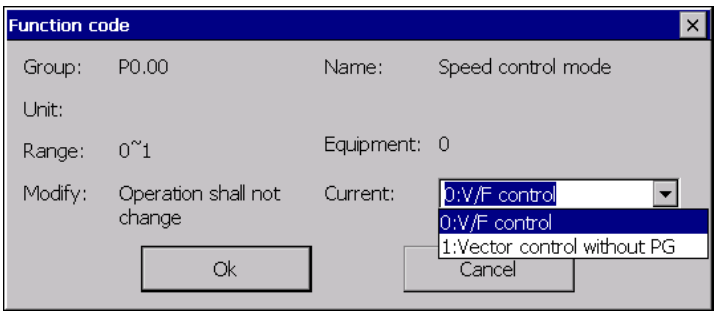


Fig 3.23 Interface for modifying the edit box

3.3.5 Other interfaces

1) Soft keyboard

Fig 3.24 Soft keyboard

The software input of touch screen depends on the soft keyboard. After users click the keyboard, above interface will pop up.

2) Additional options on login interface

Note: On login interface, press and hold the touch board for seconds and additional options will pop up.

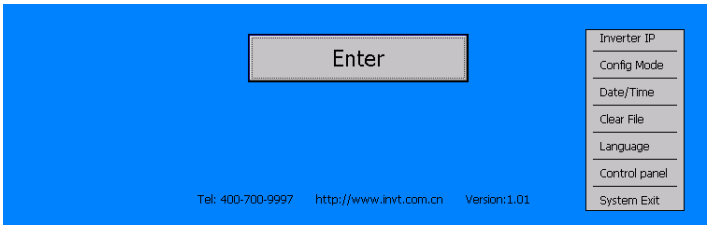


Fig 3.25 Additional options on login interface

1) Inverter IP

Click the option to display the inverter IP which can be changed via soft keyboard by users.

2) Configuration mode

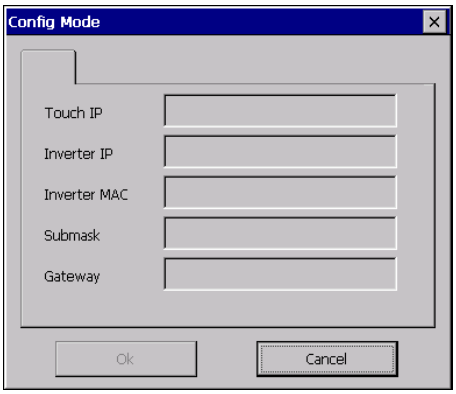


Fig 3.26 Interface of configuration mode

Refer to 3.1.4.

3) Date/Time

Users can change current date and time of variable frequency speed control system.

4) Clear file

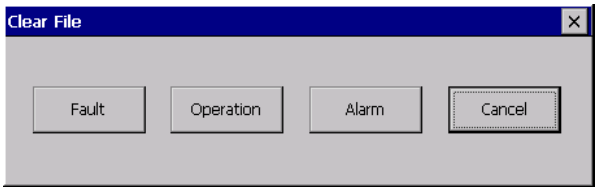


Fig 3.27 Interface of clear file

5) Language

Users can select the language as required. After selection, restart the touch screen. The system will change the language into the set one.

6) Control panel

Click the button and enter into the control panel of Win CE control system.

7) System exit

Click the button and return to the desktop of Win CE control system.

Chapter 4 Wiring and terminals

4.1 Wiring of main circuit

As shown in Fig 4.1, due to interlocking between the switch cabinet and the variable frequency speed control system, the closing of QF of the switch cabinet will be invalid when the system in fault state, QF will open automatically when the system in fault state after closing.

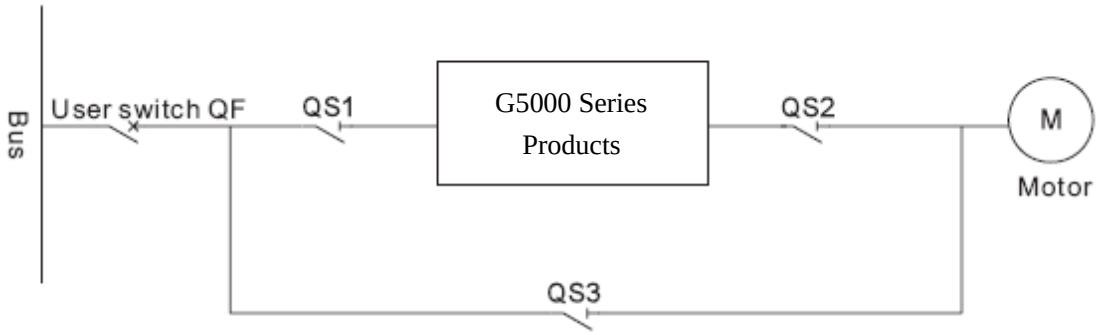


Fig 4.1 Wiring diagram of main circuit

When there is no bypass cabinet, the wiring of main circuit feeds in R, S, T terminals and feeds out U, V, W terminals in transformer cabinet. The copper bar at the bottom of the transformer cabinet will be connected to the grounding of transformer, unit cabinet and control cabinet, and user grounding grid after the system is installed. The terminals of control circuit in control cabinet shall be grounded independently.

When there is bypass cabinet, I/O terminals in the switching cabinet are top in or bottom out. The copper bar at the bottom of the bypass cabinet will be connected to the grounding of transformer, unit cabinet and control cabinet, and user grounding grid after the system is installed. The terminals of control circuit in control cabinet shall be grounded independently.

Warning	✧ Do not exchange the wiring of I/O terminals; otherwise, the system and other devices may be damaged.

1. Standard requirements of power distribution

Before the power is connected to G5000 series variable frequency speed control system, it needs to pass through the main circuit breaker which is allowed to close only after receiving the switching signal from the system.

The power of main circuit breaker is directly connected to the input terminals of switch cabinets in no need of passing through the input reactor.

The output of the system is connected to the motor by the output terminals of switch cabinets.

Danger	✧ Collect I/O terminals properly; otherwise, the system may be damaged.

2. Wiring of switch cabinets

Terminals		Name	Instruction
Input	R	Power input of main circuit, the 1st phase sequence	Connect to 3-phase AC power, the 1st phase sequence
	S	Power input of main circuit, the 2nd	Connect to 3-phase AC power, the 2nd

		phase sequence	phase sequence
	T	Power input of main circuit, the 3rd phase sequence	Connect to 3-phase AC power, the 3rd phase sequence
Output	**U**	Output of medium voltage variable frequency speed control system, the 1st phase sequence	Connect to 3-phase AC motor, the 1st phase sequence
	V	Output of medium voltage variable frequency speed control system, the 2nd phase sequence	Connect to 3-phase AC motor, the 2nd phase sequence
	W	Output of medium voltage variable frequency speed control system, the 3rd phase sequence	Connect to 3-phase AC motor, the 3rd phase sequence

Note: Phase sequence of U, V and W terminals may be different from that of R, S and T. When power frequency bypass is a necessity, make sure input phase sequence is consistent with output phase sequence; otherwise, the system cannot work properly.

3. Requirements of devices and cables

◆ Main circuit breaker

The main circuit breaker can be vacuum or air isolation circuit breaker which will meet not only the requirements of voltage and current of power supply, but also the requirements of primary side voltage and current of phase shifting transformer. Furthermore, it shall be capable of bearing current surge caused by switching on the transformer, and it will not trip after fault current caused by secondary side short circuit in 100ms.

◆ Input cables

There are no special requirements for the cables from the circuit breaker to the primary side of transformer. The rated voltage of the cables shall keep consistent with the voltage of the primary side circuit. The rated current shall satisfy the transformer and the set value for protection. On basis of the maximum ambient temperature, set the decreased capacity of the cables according to the cooling factors and local electrical regulations.

◆ Output cables

There are no special requirements for the cables from G5000 series medium voltage variable frequency speed control system to the motor. It is recommended that the length to be no longer than 1 kilometer, the case that the field cable length is longer than 1 kilometer shall be proposed in the order.

The rated voltage of the cables shall keep consistent with the motor model, and the rated current of the cables shall comply with the motor model as well as allowable overload current for motor protection. The decreased capacity of the cables shall refer to the maximum ambient temperature, cooling factors, and other factors required by national electrical standards.

4. Layout of high voltage cables

The layout of main power supply and motor cables must comply with national standards. Please refer to the instructions and suggestions of the manufacturer.

- It is recommended to use 3-phase armoring steel cables shielded individually. If single phase cable is used, 3-phase cables shall be combined with each other to ensure EMC.
- According to requirements of the manufacturer, install collectors at the cable terminations.
- Corresponding ground wire shall be grounded in compliance with national electrical standards.

5. Grounding

Ensure the ground wire with less than 4Ω ground resistance, use wires between the cabinet and door of the system, channel in base among cabinets, copper conductor cable with no less than 50mm^2 sectional area for the ground connection between the whole-set equipment and the grid. To guarantee equipment and personal safety, check the grounding before using.

Danger

- ✧ Before cabling, please confirm that the input power supply has been cut off. There is the risk of electric shock and fire.
- ✧ Electric engineering professionals are allowed to perform the cabling. There is the risk of electric shock and fire.
- ✧ Be sure to make reliable grounding of the cabinet bodies. There is the risk of electric shock and fire.
- ✧ Please check whether the AC main circuit power supply is consistent with the rated voltage of the variable frequency speed control system; otherwise, there will be risk of injury and fire hazard.
- ✧ Please use the screwdriver of designated torque to tighten the terminals; otherwise, there will be the risk of fire.
- ✧ Do not connect the input power supply to the output terminals U, V and W; otherwise, internal damage may occur to the variable frequency speed control system.

Danger

- ✧ All connectors must receive insulation treatment to ensure good insulation. The connecting positions must be kept clean and meet the requirement of corresponding cleanliness.
- ✧ Medium voltage electrical insulation distance must meet the requirements of electrical safety distance in order to avoid short circuit.

4.2 Wiring of control circuit

Recommended cross section and specification of control, signal and communication cables:

◆Analog I/O cables: Whole shielded twisted pair, cross section 0.5~1.5 mm^2;

◆Digital I/O cables: Whole shielded twisted pair, cross section 0.5~1.5 mm^2;

◆Communication cables: Select specialized communication according to relevant requirements, or whole shielded twisted pair, cross section 0.5~1.5 mm^2;

4.2.1 General introduction to user terminals

G5000 series medium voltage variable frequency speed control systems provide standard 16-channel digital inputs, 20-channel relay outputs, 3-channel analog inputs, 4-channel analog outputs, 1-channel HDI and 1-channel HDO. All user terminals are programmable and they can be set by function codes. Simultaneously, the control terminals can be extended as required.

All user terminals are connected to the terminal blocks, so pay attention to connecting from the terminal blocks before using. The wiring of control circuit for users shall be conducted in the control cabinet.

4.2.2 User terminals and functions

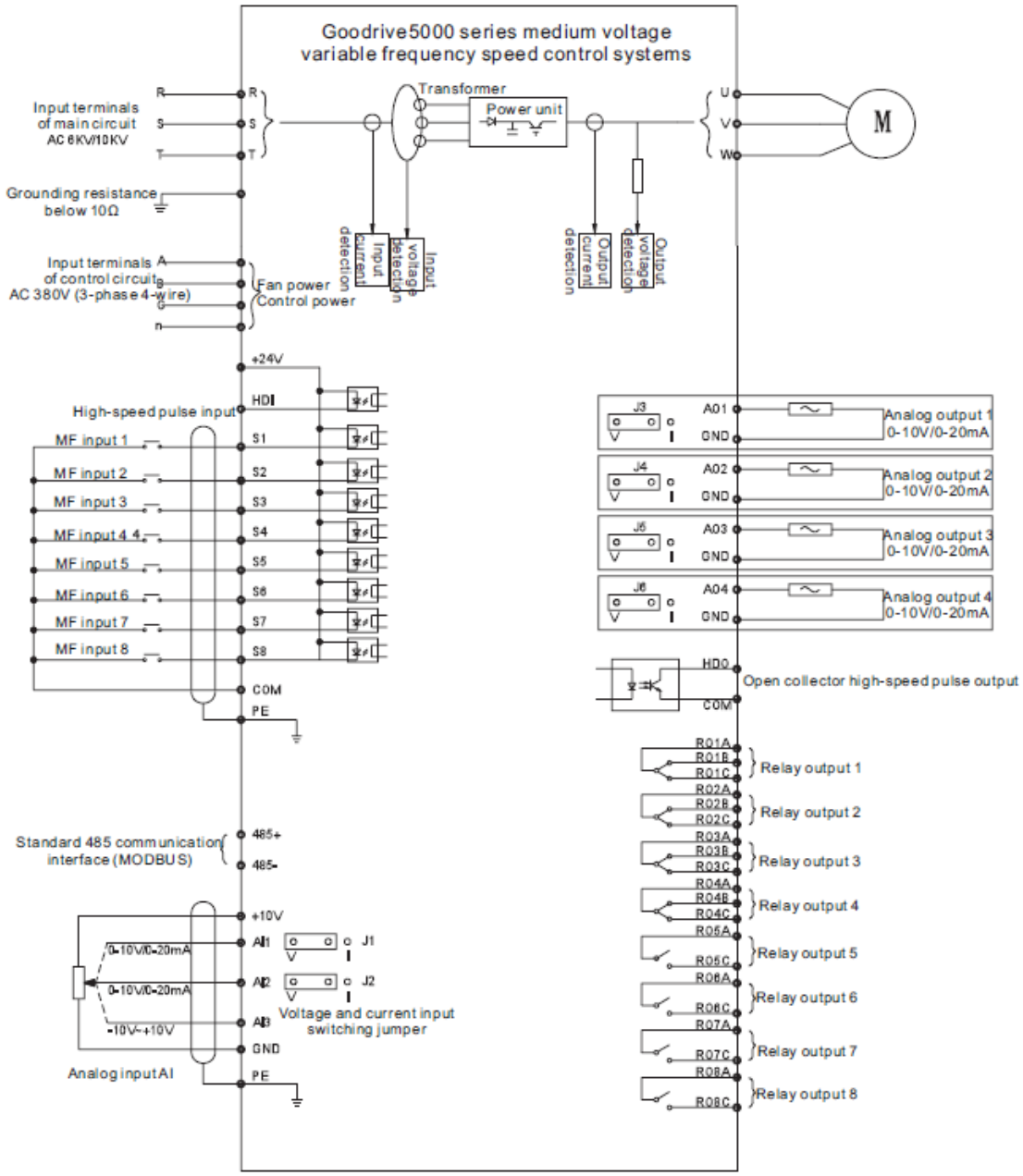


Fig 4.2 Wiring diagram of user terminals

Classification	Terminal	Terminal function	Technical specifications
Digital input	S1	Multi-functional input 1	1. Forming the optical coupler isolation input with COM 2. The input voltage can only be 24V provided by the system 3. The suspension of terminals will be regarded as disconnected 4. Input impedance: 3.3kΩ
	S2	Multi-functional input 2	
	S3	Multi-functional input 3	
	S4	Multi-functional input 4	
	S5	Multi-functional input 5	
	S6	Multi-functional input 6	
	S7	Multi-functional input 7	
	S8	Multi-functional input 8	
High-speed pulse input	HDI	High-speed pulse input terminal	1. Forming the optical coupler isolation input with COM

Classification	Terminal	Terminal function	Technical specifications
			2. The input voltage can only be the 24V provided by the system 3. The suspension of terminals will be regarded as disconnected 4. Input impedance: 1.1kΩ
24V power supply	+24V	+24V power supply provided by the system, for the digital input and high-speed pulse input	
	COM	+24V power supply grounding	
10V power supply	+10V	+10V power supply provided by the system, for the analog input	
	GND	+10V power supply grounding	
Analog input	AI1	Analog input terminal1	1. Forming a loop connection with GND 2. It is recommended to use the +10V provided by the system as the input voltage. 3. For voltage input, voltage range 0~+10V; for current input, current range 0~20mA, 20mA current corresponding to +10V 4. Input impedance: 20kΩ (voltage) /250Ω (current)
	AI2	Analog input terminal 2	
	AI3	Analog input terminal 3	1. Forming a loop connection with GND 2. It is recommended to use the +10V provided by the system as the input voltage. 3. For voltage input, voltage range -10V ~+10V 4. Input impedance: 20kΩ (voltage)
Analog output	AO1	Analog output terminal 1	1. Outputting the voltage and current corresponding to the GND terminals. 2. Output voltage range 0~+10V, output current range 0~20mA 3. While voltage output, allowable output impedance ≥5kΩ; while current output, allowable output impedance 100~5000Ω
	AO2	Analog output terminal 2	
	AO3	Analog output terminal 3	
	AO4	Analog output terminal 4	
Relay output	RO01	Relay output terminal 1	1. Each relay has normally open/closed output. 2. Current withstand capacity: 3A
	RO02	Relay output terminal 2	
	RO03	Relay output terminal 3	
	RO04	Relay output terminal 4	

Classification	Terminal	Terminal function	Technical specifications
	RO05	Relay output terminal 5	
	RO06	Relay output terminal 6	
	RO07	Relay output terminal 7	
	RO08	Relay output terminal 8	
High-speed pulse output	HDO	Programmable high-speed pulse output terminal	1. Optical coupler isolation 2. Maximum output frequency: 50.000kHz

Note:

1. Do not route the analog cables and input power cables in parallel;

2. Do not use the same line for the signal cables and input power cables.

Danger

- ✧ Installation of large current positions: to enable the variable frequency speed control system to meet the technical properties, pay close attention to large current installation (All I/O terminals with more than 10A current flow shall be considered large current terminals). The key points are:
  - ◆ Terminals shall use the materials with excellent conductive property, such as oxygen-free copper terminals, silver-plating or tin-plating fasteners and other connecting materials.
  - ◆ All terminals shall be carefully cleaned with ethanol before connecting.
  - ◆ Connections of all connectors shall be very reliable, the fasteners shall be tightened with wrenches, the important connectors shall be wrenched tight reliably with torque wrenches to ensure the contact resistance is less than 2mΩ.
  - ◆ The fasteners of all large current connecting positions shall include spring washers which will be pressed flat after fastening.
  - ◆ The current density of large current wires shall be appropriate to avoid heating and thus influence the device.

Chapter 5 Detailed function description

P00 Group Basic function

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.00	Control mode selection	0: V/F control 1: Sensorless vector control 0 2: Sensorless vector control 1 3: Vector control	0~3	0

Select speed control mode of the variable frequency speed control system.

0: V/F control

V/F is applicable to cases where speed control precision is not required high for general load, such as fans, pumps and synchronous motors, and where a variable frequency speed control system drives multi-motors.

1: Sensorless vector control 0

Sensorless vector control 0 also called open loop vector supports asynchronous motors and applies to the cases requiring high performance without pulse encoders, low-frequency large-torque and high speed control precision. One variable frequency speed control system drives only one motor such as conveyors and large-power drive equipment.

2: Sensorless vector control 1

Sensorless vector control 1 only supports synchronous motors and the inverter should carry out high precision adjustment on output current by close loop control algorithm to make torque and speed output more stable and accurate.

3: Vector control

Vector control supports asynchronous motors, uses encoders as speed detection sensor for higher precision and wider range, and applies to the cases requiring high rotating speed control precision and low-frequency large-torque.

Note: Precise motor parameters are the necessity for vector control with high performance. Therefore, input the name plate parameters of the motor correctly before running and finish motor parameters autotuning. Adjusting P3 vector control group can optimize vector control performance.

Note: At present, only V/F control mode is available for synchronous motors.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.01	Run command channel	0: Local command channel 1: Terminal command channel 2: Communication command channel 3: Master command channel	0~3	0

When the function code is invalid to the terminal R_N of the control cabinet, it is used to select the command channel of the system in remote-local state; when the function code is valid to the terminal R_N, it has nothing to do with P0.01 in local state and the operation is only controlled by the touch screen.

The control commands include: start, stop, forward running, reverse running, jogging, and fault reset and so on.

0: Local command channel

Some functions are available by setting the function codes.

1: Terminal command channel

The control commands including forward running, reverse running, forward jogging, reverse jogging, stop, and fault reset are controlled by multifunctional input terminals. Please refer to detailed settings in P5.

2: Communication command channel

The run command is controlled by P0.02 to select communication methods. Please refer to communication methods in Appendix.

3: Master command channel

The channel is mainly used to set the run command of the slave under master-slave control. If the function code is set to 3, the slave is controlled by the start/stop command of the master.

Note: The touch screen of the system applies Ethernet channel.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.02	Current communication command channel	0: MODBUS 1: Profibus 2: Ethernet	0~2	0

When P0.01=2, the function code is used to select the communication method of frequency setting command channel.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.03	UP/DOWN setting	0: Valid, save when power off 1: Valid, do not save when power off 2: Invalid 3: Valid during running, clear at stop	0~3	0
P0.04	UP/DOWN adjustment	-120.00~120.00Hz	-120.00~120.00	0.00Hz

The function code of UP/DOWN setting (frequency setting increasing/decreasing) can modify the set frequency of the system, adjust any frequency setting except multi-step speed setting and achieve fine adjustment on the set frequency of the system. Actual set frequency of the system=set frequency of channels + adjusted frequency, as shown in Fig5.1.

0: Valid, save UP/DOWN value when power off

Users can adjust the reference frequency by UP/DOWN. The value of UP/DOWN can be saved when power off.

1: Valid, do not save UP/DOWN value when power off

Users can adjust the reference frequency by UP/DOWN, but the value of UP/DOWN will not be saved when power off.

2: Invalid

Users can not adjust the reference frequency by UP/DOWN. The value of UP/DOWN will be cleared.

3: Valid during running, clear at stop

Users can adjust the reference frequency by UP/DOWN during running. When the system stops, the value of UP/DOWN will be cleared

Note: When the parameters of the system restore to default values, the value of UP/DOWN will be cleared automatically.

After the UP/DOWN setting is valid, P0.03 will display the UP/DOWN adjusted value with the range of -120.00~120.00Hz.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.05	Speed reference mode	0: Speed mode 1: Torque mode 2: Slave speed mode 3: Slave torque mode	0~3	0

0: Speed mode. The system will output frequency at the set speed command and the motor will automatically adjust the output torque to keep the speed. But the output torque is limited by P3.12. If the load torque is above the upper limit, the output torque of the system is limited and the motor speed will change.

1: Torque mode. The system will output torque at the set torque command and the output frequency is limited by the upper and lower limit. When the set torque is above the load torque, the output frequency will increase to the upper limit and when the set torque is below the load torque, the output frequency will decrease to the lower limit. If the output frequency of the system is limited, the output torque is different from the set torque.

2~3: Slave speed and torque mode. The two modes have no difference and they are mainly used in the master-slave mode.

Note: During decelerating to stop, the system will switch from torque control mode to speed control mode.

Note: When P12.29=3 (slave) and P0.01=3, the local is the slave.

Note: The torque control mode and speed control mode can also be switched via MF terminals. The torque control mode is only for vector control.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.06	Frequency A command source	0: Function code 1: AI1 2: AI2 3. AI3 4: HDI 5: Multi-step speed 6: PID control 7: MODBUS setting 8: Profibus setting	0~8	0

G5000 series variable frequency speed control systems have two command sources A and B, A command source is the general channel, B command source is the assistant channel. The combination of P0.06 and P0.07 determines the value of frequency setting. Refer to P0.09 for the way of combination.

0: Function code, frequency A setting is the value of P0.13.

1~3: AI setting, AI1, AI2 and AI3 are programmable analog input terminals. Refer to P5 group for the functions. Whether AI1 and AI2 are current or voltage inputs can be selected by the jumpers.

4: HDI, set frequency=maximum output frequency (P0.10) * percentage. The percentage is determined by input HDI frequency. Refer to P5 group for the function.

5: Multi-step speed, the system runs at multi-step speed and P11.00 will select multi-step speed. P11.00=0, the multi-step speed terminal in P5 will select current step; P11.00=1, P11.18~P11.33 is the current step and P11.01~P11.16 is current frequency (multi-step n frequency=maximum frequency

P0.10 * speed n percentage)

6: PID control, the result of built-in PID module adjustment is the set frequency of the system. See PID source, setting, feedback and parameters in P10.

7: MODBUS setting, set the frequency of frequency A source

8: Profibus setting, set the frequency of frequency A source

Note: The fieldbus card of the system is optional.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.07	Frequency B command source	0: AI1 1: AI2 2: AI3 3: HDI	0~3	0
P0.08	Reference of frequency B	0: Maximum frequency 1: Frequency A command	0~1	0

P0.07 and P0.08 determine the value of B frequency setting. B frequency=Reference of frequency B (P0.08)* Frequency B command source (P0.07).

If P0.07=0, P0.08=0, AI1 input percentage is 50%, max frequency setting is 50Hz, then B frequency= 50Hz×50%=25Hz; P0.07=0, P0.08=1, AI1 input percentage is 50%, frequency A command source is 40Hz, then B frequency=40Hz×50%=20Hz.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.09	Combination of frequency source	0: A 1: B 2: A+B 3: Max(A, B)	0~3	0

P0.09 is used to set the combination of frequency source, and it can be also switched by P5 group, as shown in Fig5.1.

P0.09=0: current frequency is frequency A command;

P0.09=1: current frequency is frequency B command;

P0.09=2: current frequency is frequency A command+B command;

P0.09=3: current frequency is the maximum value between frequency A and B command;

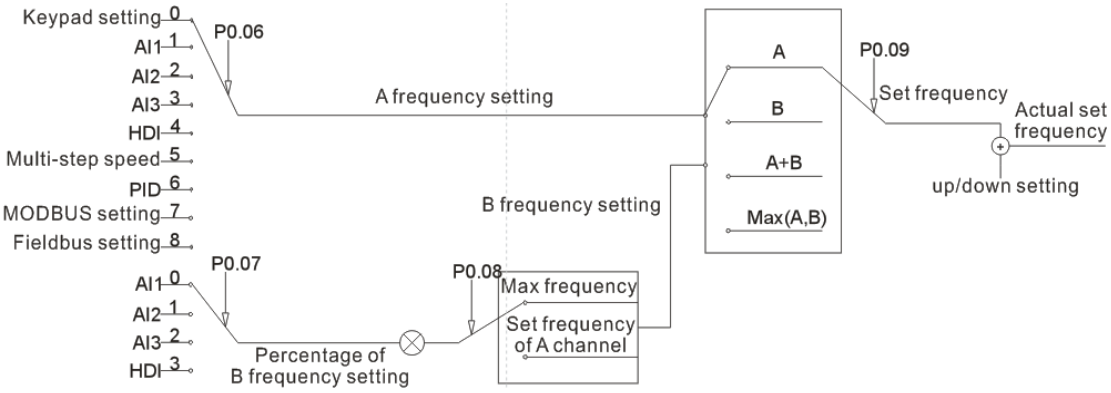


Fig 5.1 Combination of frequency source

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.10	Maximum	P0.11~120.00Hz	P0.11~120.00	50.00Hz

	frequency			

Set the maximum frequency of the system.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.11	Upper frequency limit	P0.12~P0.10 (Max. frequency)	P0.12~P0.10	50.00Hz
P0.12	Lower frequency limit	0.00Hz~P0.11 (upper frequency limit)	0.00~P0.11	0.00Hz

P0.11 and 0.12 are used to set upper and lower frequency limit of the variable frequency speed control system. Pay attention to distinguish upper limit of running frequency from maximum frequency, the former for actual maximum frequency and the latter for set maximum frequency.

Restrictions on the relationship between frequencies: Maximum frequency ≥ upper frequency ≥ set frequency ≥ lower frequency.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.13	Function code set frequency	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	50.00Hz

P0.06=0, the function code is the initial value of frequency setting.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.14	Torque setting	0: Function code 1: AI1 2: AI2 3: AI3 4: HDI 5: Multi-step speed 6: MODBUS setting 7: Profibus setting	0~7	0

In the vector control mode, P0.05=1, torque reference channel can be selected by P0.14. If the torque is set as negative, the torque output direction is reverse to the set running direction.

Note: The set running direction is determined by the reference direction and P0.18.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.15	Function code set torque	-100.0%~100.0%	-100.0~100.0%	100.0%

P0.14=0, P0.15 is used to set the set torque of the system, among which 100.0% corresponds to the rated output current.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.16	Acceleration time 1	0.1~3600.0s	0.1~3600.0	Depend on model
P0.17	Deceleration time 1	0.1~3600.0s	0.1~3600.0	Depend on model

Acceleration time is the time of accelerating from 0Hz to maximum frequency (P0.10). Deceleration time is the time of decelerating from maximum frequency (P0.10) to 0Hz.

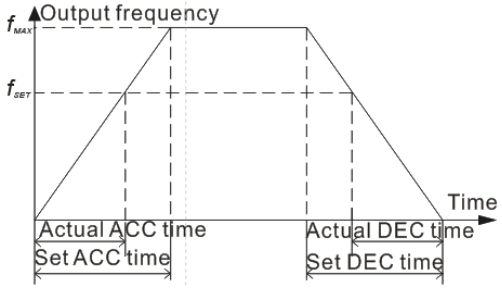


Fig 5.2 Acceleration and deceleration time

When the set frequency (f_{SET}) equals to the maximum frequency (f_{MAX}), the actual acceleration and deceleration time will be in accordance with the set time.

When the set frequency is less than the maximum frequency, the actual acceleration and deceleration time will be less than the set time.

Actual acceleration and deceleration time = set time * (set frequency ÷ maximum frequency)

G5000 has 4 groups of acceleration and deceleration time.

1st: P0.15, P0.16;

2nd: P8.00, P8.01;

3rd: P8.02, P8.03;

4th: P8.04, P8.05.

The acceleration and deceleration time can be selected by combination of multifunctional ON-OFF input terminals. The default is the first group.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.18	Running direction	0: Run in default direction 1: Run in opposite direction 2: Forbid reverse running	0~2	0

0: Run in default direction, the motor runs in accordance with the actual direction.

1: Run in opposite direction, the motor runs in opposite direction, which is equivalent to changing the direction of motor by changing any two-phase sequence.

Note: After initialization of parameters, the direction of the motor will restore to the original state. Be cautious to use when the motor direction is forbidden to change after commissioning.

2: Forbid reverse running, applicable when reverse running is forbidden, such as in situations which need to switch between power frequency and variable frequency. During forbidding reverse running, the system will enter into standby after receiving reverse running command.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.19	Carrier frequency setting	0.5~2.0kHz	0.5~2.0	0.8kHz

The factory setting is optimal in most cases, so modification of this parameter is not recommended. If the carrier frequency exceeds the factory setting, the system must be derated.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.20	Motor parameters autotuning	0: No action 1: Autotuning	0~1	0

In vector control, to obtain more accurate motor parameters, choose to perform parameters autotuning based on applications.

0: No action, do not perform parameters autotuing

1: Autotuning, release load and then carry out overall parameters autotuing

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.21	Restore parameters	0: No action 1: Restore factory setting 2: Clear fault records 3: Clear ammeter records	0~3	0

The function code can restore the parameters to default values, clear all fault records and ammeter records of the system.

Note: After P0.21 function operation is completed, this function code will restore to 0 automatically. The parameters of P2 group will not restore.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.22	AVR function	0: Disabled 1: Enabled all the time 2: Disabled during deceleration	0~2	1

Note: When AVR (Auto Voltage Regulation) function is disabled, the output voltage of the system will change along with the input voltage; when the function is enabled, the output voltage will keep stable in a certain range; when deceleration time is too long to meet field requirements, cancel AVR function to shorten the time.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P0.23	Reserved	0~65536	0~65536	0
P0.24	Reserved	0~65536	0~65536	0
P0.25	Reserved	0~65536	0~65536	0
P0.26	Reserved	0~65536	0~65536	0
P0.27	Reserved	0~65536	0~65536	0

P01 Group Start and stop control

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.00	Braking mode	0: DC braking 1: Dual-frequency braking (reserved)	0~1	0

The function code is used to set braking modes.

0: DC braking

When the output frequency of the system reaches the starting frequency of DC braking, DC current will run through the stator winding, and the braking torque will generate because the rotor cuts the static magnetic field.

1: Dual-frequency braking (reserved)

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.01	Start mode	0: Start directly	0~2	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
		1: Start after DC braking 2: Start after rotating speed tracking		

0: Start directly: Start the motor from the starting frequency.

1: Start after DC braking: The system outputs DC current firstly and then starts the motor at the starting frequency. Please refer to description of P1.04 and P1.05. It is suitable for the motor which have small inertia load and may reverse rotate when start.

2: Start after rotating speed tracking: The system detects the rotation speed and direction of motor, then start running from current speed. This can realize smooth start of rotating motor.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.02	Starting frequency	0.00~10.00Hz	0.00~10.00	0.10Hz
P1.03	Hold time of starting frequency	0.0~50.0s	0.0~50.0	0.0s

The system will start from the starting frequency (P1.02), and then accelerate to the reference frequency on basis of the set acceleration time after hold time of starting frequency (P1.03). The starting frequency could not be limited by the lower frequency.

Increasing the starting torque will avoid the motor cannot start up at 0 frequency.

Note:

1. When the reference frequency is less than starting frequency, the system will have no output.

2. Starting frequency shall not be larger than upper frequency limit; otherwise, the system will have no output to respond to commands. When starting frequency is higher than DC braking frequency, the system will stop and DC braking is invalid; when running frequency is less than starting frequency, the system will coast to stop.

3. No output: during PID hibernation and forbidding reverse running, reference frequency less than starting frequency and lower frequency limit, the system has no frequency and voltage output. When the system satisfies the conditions for restore, it will output.

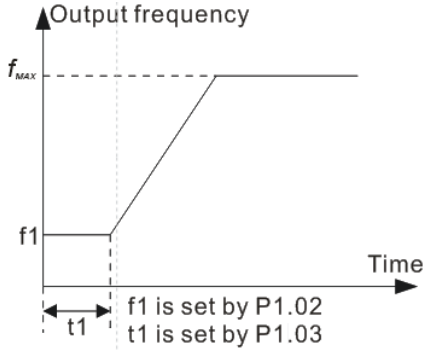


Fig 5.3 Direct start

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.04	DC braking current before start	0.0~120.0% (rated current of the system)	0.0~120.0	0.0%
P1.05	DC braking time	0.0~50.0s	0.0~50.0	0.0s

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	before start			

P1.04: Before start, the value of DC braking current is the percentage of rated current of the variable frequency speed control system.

P1.05: It is duration of DC braking before start. DC braking is invalid when P1.05 is set to be 0.

Note: 1. Only on condition that both P1.04 and P1.05 are non-zero is DC braking current before start valid.

2. The bigger the DC braking current, the greater the braking torque. However, the motor will also produce great heat, so set the function code properly according to actual conditions.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.06	ACC/DEC mode	0: Linear type 1: S curve	0~1	0

0: Linear type, output speed increases or decreases as a straight line, acceleration=maximum frequency ÷ ACC (DEC) time

1: S curve, output speed changes as S curve. S curve is applicable when smooth start and stop are required, such as hoisters and belt conveyors.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.07	S curve starting-segment proportion	1.0~40.0% (ACC/DEC time)	1.0~40.0	30.0%
P1.08	S curve ending-segment proportion	1.0~40.0% (ACC/DEC time)	1.0~40.0	30.0%

S curve can directly influence whether the system starts and stops at load smoothly. The parameters of S curve are ACC and DEC parameters, as shown in Fig 5.4. In the figure, t1 (t1=t*P1.07) is the DEC/ACC time defined by P1.07, the rate of output frequency variation increases progressively; t2 (t2=t*P1.08) is the DEC/ACC time defined by P1.08, the rate of output frequency variation decreases progressively. During t1 and t2, the rate of output frequency variation is constant. The shape of S curve is determined by ACC/DEC frequency range, ACC/DEC time, starting-segment time and ending-segment time.

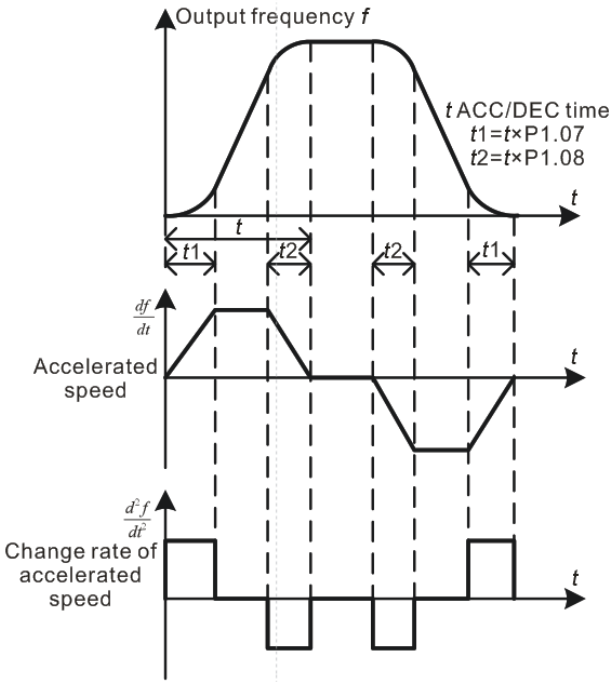


Fig 5.4 ACC/DEC of S curve

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.09	Stop mode	0:Decelerate to stop 1:Coast to stop	0~1	0

0: Decelerate to stop

When the stop command becomes valid, the system decreases the output frequency according to defined DEC curve. If there is no DC braking at stop, the system will coast to stop when running frequency reaches starting frequency; otherwise, it will coast to stop after DC braking.

1: Coast to stop

When the stop command becomes valid, the system will block output immediately and the motor will coast to stop by mechanical inertia.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.10	Starting frequency of stop braking	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz
P1.11	Waiting time before stop braking	0.0~50.0s	0.0~50.0	0.0s
P1.12	Stop DC braking current	0.0~120.0% (rated current of the system)	0.0~120.0	0.0%
P1.13	Stop DC braking time	0.0~50.0s	0.0~50.0	0.0s

Starting frequency of stop braking: During deceleration, start the DC braking when running frequency reaches the starting frequency. If the value of stop braking starting frequency is 0 or lower than starting frequency (P1.02), DC braking is invalid; the variable frequency speed control system will coast to stop when running frequency reaches starting frequency.

Waiting time before DC braking: The system will block output before reaching starting frequency of stop

braking during DEC and the DC braking will start after the waiting time, which prevents over-current fault caused by DC braking at high speed.

Stop DC braking current: The added DC braking current. The bigger the DC braking current, the greater the braking torque.

Stop DC braking time: The time for DC braking

Note: Only on condition that both P1.12 and P1.13 are non-zero is stop DC braking valid.

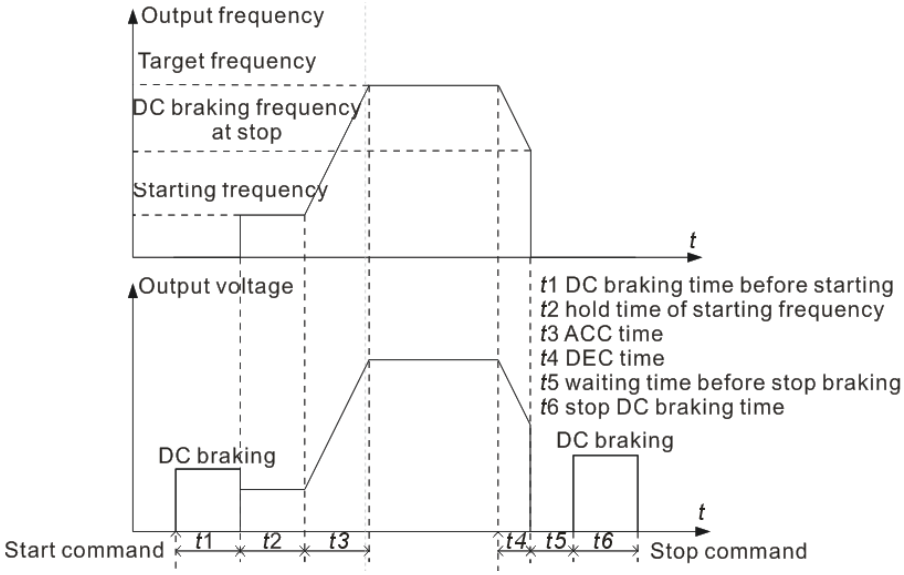


Fig 5.5 Stop DC braking

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.14	Torque of dual-frequency braking	0.0%~50.0%	0.0~50.0	30.0%
P1.15	Enabling voltage of dual-frequency braking	1000~1500V	1000~1500	1130V
P1.16	Dual-frequency frequency of dual-frequency braking	200.0~500.0Hz	200.0~500.0	300.0Hz
P1.17	Reserved	0~65536	0~65536	0
P1.18	Dual-frequency voltage limit of dual-frequency braking	50.0%~100.0%	50.0~100.0	80.0%
P1.19	Proportional coefficient of dual-frequency braking	0~65536	0~65536	5
P1.20	Integral coefficient of dual-frequency	0~65536	0~65536	2

	braking			
P1.21	Adjusting multiple of dual-frequency braking	0~65536	0~65536	2
P1.22	Reserved	0~65536	0~65536	0
P1.23	Reserved	0~65536	0~65536	0

When the dual-frequency braking is valid and the bus voltage exceeds P1.15, the inverter starts outputting dual-frequency frequency to reduce bus voltage. At the time, dual-frequency voltage amplitude output should not exceed P1.18 (relative to motor rated voltage) and dual-frequency frequency output is P1.16. In vector mode, when P1.14 is large, dual-frequency braking deceleration will be faster; in V/F mode, the function code is invalid.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.24	Dead time of FWD/REV	0.0~3600.0s	0.0~3600.0	1.0s

Set the hold time at zero frequency in the transition between forward and reverse running. It is shown as following figure:

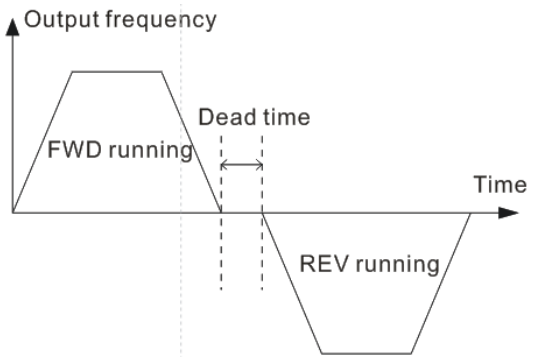


Fig 5.6 FWD/REV dead time

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.25	Action when running frequency is less than lower frequency limit (valid when lower frequency limit＞0)	0: Run at the lower frequency limit 1: Stop 2: Stand-by	0~2	0

This function code determines the running state of the variable frequency speed control system.

0: Run at the lower frequency limit. The reference frequency is equal to lower frequency limit;

1: Stop. The system will coast to stop when it decelerates to lower frequency limit;

2: Stand-by. The system will stand by when the reference frequency is less than lower frequency limit (refer to Note 3 in P1.03). When the reference frequency is higher than or equal to lower frequency limit again, the system will start to run automatically.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.26	Restart after power off	0: Disabled 1: Enabled	0~1	0
P1.27	Instantaneous power off time	0.00~5.00s	0.00~5.00	1.00s
P1.28	Delay time for restart	0.0~3600.0s (valid when P1.26=1)	0.0~3600.0	1.0s

Note: If the main circuit of the system powers off, the steps for processing are as follows:

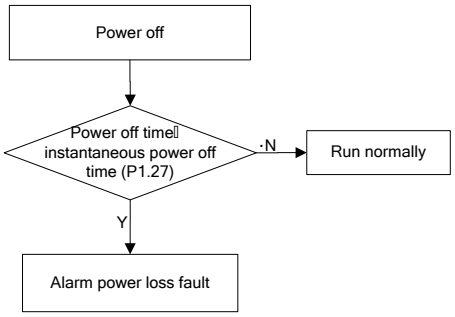


Fig 5.7 Processing after power off

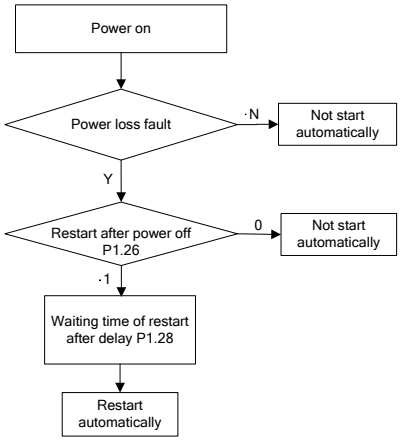


Fig 5.8 Restart after power off

P1.26 is the action when the system powers off and on again during running.

0: Disabled: The system will not automatically restart when power on again.

1: Enabled: When the system is running, after power off and power on again, the system will automatically restart after delay time for restart (P1.28) (If the system is terminal control, must ensure that the running terminals are still in closed state), otherwise the system will not automatically restart.

Note: This function may cause serious consequences, please use it with cautions.

P1.27 is the instantaneous power off time. If the power off time is no more than the set time, the system can work normally and it will not alarm power off.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.29	High voltage switching action at stop	0: Cut off high voltage supply 1: Not cut off high voltage supply	0~1	0

P1.29 decides whether to cut off high voltage at stop.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.30	Waiting time of switching on	0.0~3600.0s	0.0~3600.0s	10.0s

P1.30 refers to the waiting time from responding to power frequency into variable frequency properly to sending out switching on signals. It is used to protect the units from impact caused by a short time in switching on twice continuously.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.31	Waiting time of running readiness	0.0~3600.0s	0.0~3600.0s	10.0s

The waiting time of running readiness is the time from finishing charging of the bus to sending signals of running readiness to upgrade DCS after vacuum contactor high voltage switching on.

The time is used to make sure DC bus charging completely so as to reduce voltage surge of the grid.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P1.32	Reserved	0~65536	0~65536	0
P1.33	Reserved	0~65536	0~65536	0
P1.34	Reserved	0~65536	0~65536	0
P1.35	Command source of coast to stop	0: No 1: UDP 2: Internal command 3: Terminal 4: Modbus 5: Profibus	0~5	0
P1.36	Command source of decelerate to stop	0: No 1: UDP 2: Terminal 3: Modbus 4: Profibus	0~4	0

P1.35 and P1.36 are used to check the current command source of coast to stop and decelerate to stop and cleared in next start.

P02 Group Motor parameters 1

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P2.00	Motor 1 type	0: Asynchronous motor 1: Synchronous motor	0~1	0

Note: The motor parameters are particularly important in motor protection and the voltage output, so be sure to set the parameters in accordance with the set parameters. When P2.00 is asynchronous motors, the parameters of synchronous motors are unmodifiable; when P2.00 is synchronous motors, the parameters of asynchronous motors are unmodifiable.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P2.01	Rated power of	4~50000kW	4~50000	Depend

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	asynchronous motor 1			on model
P2.02	Rated frequency of asynchronous motor 1	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P2.03	Rated speed of asynchronous motor 1	1~36000rpm	1~36000	Depend on model
P2.04	Rated voltage of asynchronous motor 1	0~20000V	0~20000	Depend on model
P2.05	Rated current of asynchronous motor 1	0.1~1000.0A	0.1~1000.0	Depend on model

In order to achieve control performance, the system needs to match with the motor at power. If the bias is too big, the control performance of the system will decrease distinctly.

Note: Resetting motor rated power (P2.01) can initialize P2.06~P2.10 automatically.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P2.06	Stator resistance of asynchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model
P2.07	Rotor resistance of asynchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model
P2.08	Inductance of asynchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model
P2.09	Mutual inductance of asynchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model
P2.10	Non-load current of asynchronous motor 1	0.01~655.35A	0.01~655.35	Depend on model

The parameters from P2.06~P2.10 have a great impact on control performance in vector control. During initialization, the system will confirm a group of initial parameters. After motor autotuning, the parameters will be updated and saved automatically and users should not modify them. Be sure not to change P2.06~P2.10 in V/F control.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P2.11	Rated power of synchronous motor	4~50000kW	4~50000	Depend on

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	1			model
P2.12	Rated frequency of synchronous motor 1	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P2.13	Rated speed of synchronous motor 1	0~36000rpm	0~36000	1500rpm
P2.14	Number of pole pairs for synchronous motor 1	1~50	1~50	2
P2.15	Rated voltage of synchronous motor 1	0~20000V	0~20000	Depend on model
P2.16	Rated current of synchronous motor 1	0.1~1000.0A	0.1~1000.0	Depend on model

Note: The motor parameters are particularly important in motor protection and the voltage output, so be sure to set the parameters in accordance with the set parameters.

In order to achieve control performance, the system needs to match with the motor at power. If the bias is too big, the control performance of the system will decrease distinctly.

Note: Resetting motor rated power (P2.11) can initialize P2.17~P2.20 automatically.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P2.17	Stator resistance of synchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model
P2.18	Direct axis inductance of synchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model
P2.19	Quadrature axis inductance of synchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model
P2.20	Back emf constant of synchronous motor 1	0~20000V/1000rpm	0~20000	15000 V/1000rpm

The parameters from P2.17~P2.20 are reserved in V/F control.

P03 Group Vector control

Only in V/F control are the parameters of P03 valid. (P0.00＝1)

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P3.00	Speed loop proportional gain 1	0~100	0~100	25
P3.01	Speed loop integral time 1	0.01~10.00s	0.01~10.00	1.00s
P3.02	Low switching frequency	0.00Hz~P3.05	0.00~P3.05	5.00Hz
P3.03	Speed loop proportional gain 2	0~100	0~100	30
P3.04	Speed loop integral time 2	0.01~10.00s	0.01~10.00	1.00s
P3.05	High switching frequency	P3.02~P0.10 (Max. frequency)	P3.02~P0.10	10.00Hz

Under P3.02, PI is P3.00 and P3.01. Above P3.05, PI is P3.03 and P3.04. Between P3.02 and P3.05, PI changes according to the 2 groups of parameters:

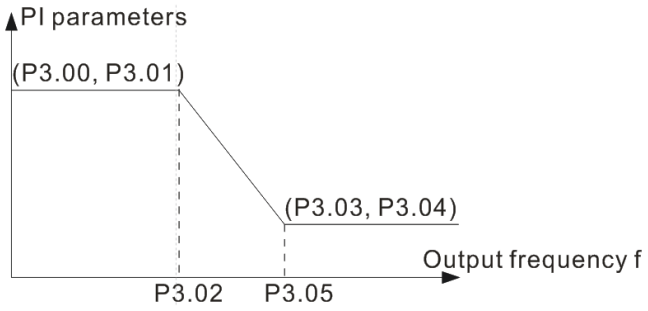


Fig 5.9 PI parameters

Dynamic response of speed loop in vector control is adjustable by setting the proportional coefficient and integral time in speed regulator. Either increasing proportional gain or decreasing integral time can accelerate dynamic response, but too large proportional gain or too low integral time will cause oscillation easily and speed offset may occur.

PI parameters have a close relationship with the inertia of the system. Adjust them on basis of different loads to meet all requirements.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P3.06	Current loop proportional gain P	0~65535	0~65535	500
P3.07	Current loop integral time I	0~65535	0~65535	500

Above two function codes are parameters of current loop PI. They directly influence dynamic response speed and control precision. Generally, it is unnecessary for users to modify default values.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P3.08	Speed loop filter time	0.000~1.000s	0.000~1.000	0.000s

The function code is the filter time of speed detection for suppressing interference from encoders. If the interference is great, set the time appropriately.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P3.09	VC slip compensation factor	50.0%~200.0%	50.0~200.0	100.0%

The slip compensation factor is used to adjust the slip frequency in vector control and improve speed control precision. Adjusting the parameter appropriately can suppress speed offset.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P3.10	Reserved	0~65535	0~65535	0
P3.11	Reserved	0~65535	0~65535	0
P3.12	Upper torque limit	0.0~200.0% (rated current of the system)	0.0~200.0%	150.0%

P3.12 is used to set the upper torque limit, 100% corresponding to rated output current of the system.

Note: The larger P3.12, the better the speed tracking performance. But too large upper torque limit will easily cause overcurrent.

Note: P3.12 is valid in the speed control mode. In the torque mode, actual output torque=set torque percentage*P3.12.

P04 Group V/F control

Only in V/F control are the parameters of P04 valid. (P0.00＝0)

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.00	V/F curve	0: Straight line V/F curve 1: Multi-dots V/F curve 2:1.3th power low torque V/F curve 3:1.7th power low torque V/F curve 4:2.0th power low torque V/F curve 5: Customized (V/F separation)	0~5	0

0: Straight line V/F curve. It is applicable for constant torque load.

1: Multi-dots V/F curve. It can be defined by setting P4.05~P4.10.

2~4: Multi-power V/F curve. It is applicable for variable torque load, such as fans, pumps and so on. Please refer to following figure.

5: Customized (V/F separation)

Note: The V_b corresponds to motor rated voltage; f_b corresponds to motor rated frequency in the figure below.

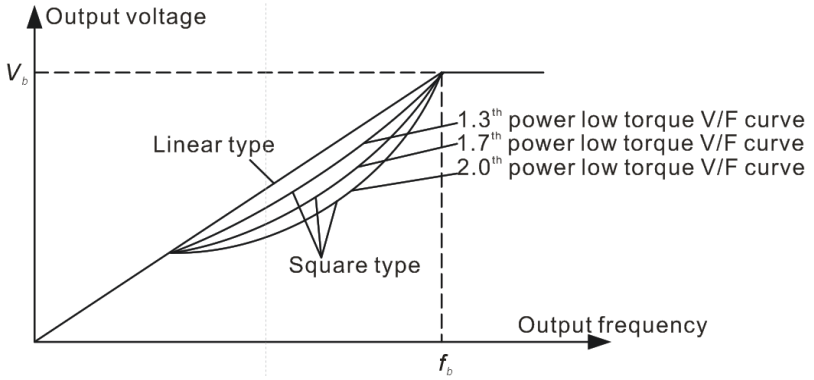


Fig 5.10 V/F curves

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.01	Torque boost	0.0%: (automatic) 0.1%~10.0%	0.0~10.0	0.5%
P4.02	Torque boost cut-off	0.0%~50.0% (relative to motor rated frequency)	0.0~50.0	20.0%

To compensate the torque performance at low frequency, boost compensation is the necessity to output voltage.

When P4.01 is non-zero, the system is manual torque boost. The V/F curve after boost is shown as follows (less than P4.02, the value of torque boost is determined by P4.01 and current frequency.). Torque boost can improve the low-frequency torque V/F performance.

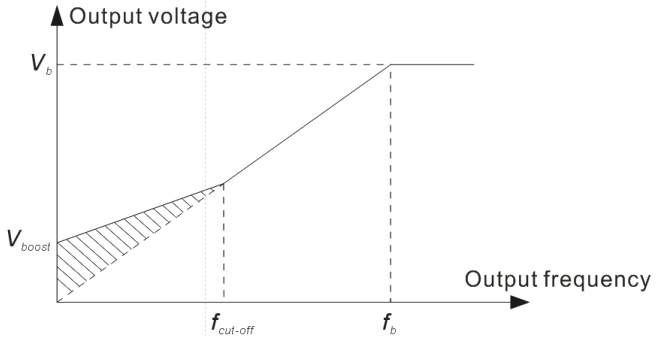


Fig 5.11 Manual torque boost

Set the value of torque boost according to loads. The heavier the load, the larger the value needs to be set. But too large torque boost will cause over excitation and overheat of the motor or the inverter would be tripped by over-current.

Note: When torque boost=0.0%, the system is automatic torque boost and it is valid in the whole frequency range.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.03	V/F slip compensation	0.0~200.0%	0.0~200.0	0.0%

The parameter can compensate motor speed changes which results in the variation of loads to improve the mechanical rigidity of the motor. The value is set to motor rated slip, which can be calculated as below:

P4.03= (fb-n*p/60)/ fb*100%

Among which fb is motor rated frequency (P2.02), n is motor rated speed (P2.03), and p is pole pairs.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.04	Energy saving operation	0: Energy saving invalid 1: Energy saving valid	0~1	0

Energy saving operation: When the motor is running with light load or without load, output voltage will be reduced appropriately to save energy.

Note: The function has a particular effect to fans, pumps etc.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.05	V/F frequency 1	0.00Hz~P4.07	0.00~P4.07	0.00Hz
P4.06	V/F voltage 1	0.0%~P4.08	0.0~P4.08	0.0%
P4.07	V/F frequency 2	P4.05~P4.09	P4.05~P4.09	0.00Hz
P4.08	V/F voltage 2	P4.06~ P4.10	P4.06~P4.10	0.0%
P4.09	V/F frequency 3	P4.07~P2.02 (motor rated frequency)	P4.07~P2.02	0.00Hz
P4.10	V/F voltage 3	P4.08~100.0% (motor rated voltage)	P4.08~100.0	0.0%

P4.05~P4.10 are used to set the user-defined V/F curve. The value needs to be set according to the load characteristic of the motor.

Note: V1＜V2＜V3, f1＜f2＜f3. The voltage corresponding to low frequency shall not be set too high; otherwise, it may cause motor overheat or burnout, or the system overcurrent protection.

Note: Set (P4.09, P4.10) at first, then (P4.07, P4.08), and finally (P4.05, P4.06)

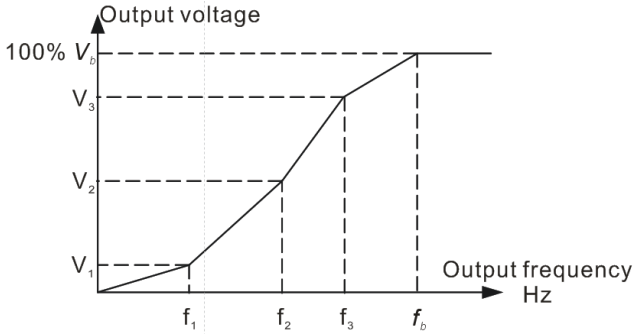


Fig 5.12 V/F curve setting

Note: V/F voltage is relative to the percentage of motor rated voltage (P2.04).

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.11	PWM mode	0: PWM 1 1: PWM 2	0~1	0

P4.11 is used to select the mode of modulating waves.

0: SPWM 1, sine waves with triple-harmonics

1: SPWM 2, standard sine waves

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.12	Voltage setting channel	0: Keypad 1: AI1 2: AI2 3: AI3 4: HDI1	0~8	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
		5: Multi-step speed 6: PID 7: MODBUS communication 8: PROFIBUS communication		

When V/F curve separates (P4.00=5), select the voltage setting channel.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.13	Voltage setting by keypad	0.0%~100.0% (motor rated voltage)	0.0~100.0	20.0%

When P4.12=0, the voltage is set by keypad (touch screen).

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.14	Voltage increasing time	0.0s~3600.0s	0.0~3600.0	100.0s
P4.15	Voltage decreasing time	0.0s~3600.0s	0.0~3600.0	100.0s

Voltage increasing time refers to the time the system needs to accelerate from 0V to motor rated voltage while voltage decreasing time refers to the time the system needs to decelerate from motor rated voltage to 0V.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P4.16	Minimum output voltage	0.0%~P4.17	0.0~P4.17	5.0%
P4.17	Maximum output voltage	P4.16~100.0%	P4.16~100.0	100.0%

The function codes are used to set the upper and lower voltage limit.

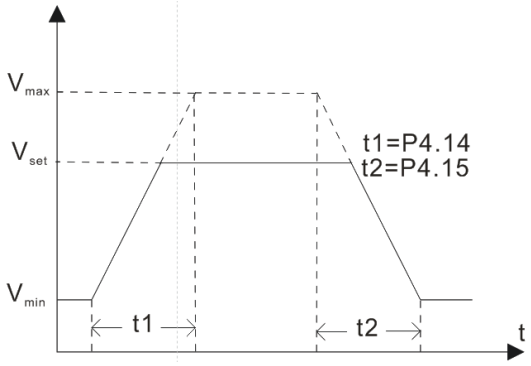


Fig 5.13 Setting diagram of upper and lower voltage limit

P05 Group Input terminals

G5000 series variable frequency speed control systems provide 16 MF digital input terminals, 3 AI terminals and 1 HDI terminal for users.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.00	S1 terminal	0: Invalid	0~63	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	function	1: Forward running		
P5.01	S2 terminal function	2: Reverse running 3: 3-wire control	0~63	0
P5.02	S3 terminal function	4: Forward jogging 5: Reverse jogging	0~63	0
P5.03	S4 terminal function	6: Coast to stop (emergency stop) 7: Fault reset	0~63	0
P5.04	S5 terminal function	8: External fault NO input 9: External fault NC input	0~63	0
P5.05	S6 terminal function	10: Frequency increase (UP) 11: Frequency decrease (DOWN)	0~63	0
P5.06	S7 terminal function	12: Clear UP/DOWN 13: Clear UP/DOWN (temporary)	0~63	0
P5.07	S8 terminal function	14: ACC/DEC time selection 1 15: ACC/DEC time selection 2	0~63	0
P5.08	S9 terminal function	16: Multi-step speed terminal 1 17: Multi-step speed terminal 2	0~63	0
P5.09	S10 terminal function	18: Multi-step speed terminal 3 19: Multi-step speed terminal 4	0~63	0
P5.10	S11 terminal function	20: Multi-step speed pause 21: Switch between A and B	0~63	0
P5.11	S12 terminal function	22: Switch between (A+B) and A 23: Switch between (A+B) and B	0~63	0
P5.12	S13 terminal function	24: Variable frequency running (pulse signal ↑)	0~63	0
P5.13	S14 terminal function	25: Power frequency running (pulse signal ↑)	0~63	0
P5.14	S15 terminal function	26: Switching from variable frequency to power frequency (pulse signal ↑)	0~63	0
P5.15	S16 terminal function	27: Switching from power frequency to variable frequency (pulse signal ↑) 28: High voltage breaking input (pulse signal) 29: PID pause 30: Reserved 31: Reserved 32: Switch cabinet address 0 33: Switch cabinet address 1 34: Switch cabinet address 2 35: Running command switching to the local 36: Running command switching to terminals 37: Running command switching to	0~63	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
		communication 38: Reserved 39: Reserved 40: Torque control disabled 41: Master-slave control enabled (reserved) 42: Master-slave speed synchronous counter reset terminal (reserved) 43: ACC/DEC disabled 44: Vacuum contactor KM2 feedback 45: Commissioning signal input 46: Reserved 47: Reserved 48: QF1M1 feedback 49: QF1M2 feedback 50: QF1M3 feedback 51: QF1M4 feedback 52: QF1M5 feedback 53: QF1M6 feedback 54: QF1M7 feedback 55: QF1M8 feedback 56: QF2M1 feedback 57: QF2M2 feedback 58: QF2M3 feedback 59: QF2M4 feedback 60: QF2M5 feedback 61: QF2M6 feedback 62: QF2M7 feedback 63: QF2M8 feedback		

The parameters are used to set the functions of MF input terminals.

0: Invalid

1: Forward running (FWD)

2: Reverse running (REV)

3: 3-wire control

1~3 are valid when running command channel is set to terminals. Please refer to description of P5.18.

4: Forward jogging

5: Reverse jogging

The terminals are used to select the states of jogging. Please refer to description of P8.06~P8.08.

6: Coast to stop (emergency stop)

When the command takes effect, the system will block output immediately. For large inertia loads and without limit to stop time, it is advised to apply the method. It has the same meaning as P1.09. If the terminal command is not cancelled, the system cannot start.

7: Fault reset

It is used for long distance fault reset. If the terminal acts, the system will perform fault reset. The function

is pulse triggering, a pulse rising time for reset once.

8: External fault NO input

9: External fault NC input

Above two functions are for receiving external faults. If the external alarms fault, the system will generate external fault signals and act according to P9.02. As for external fault NO input, the terminal on indicates no fault while the terminal off indicates external faults. External fault NC input is opposite.

10: Frequency increase (UP)

11: Frequency decrease (DOWN)

12: Clear UP/DOWN

13: Clear UP/DOWN (temporary)

Above four are used to adjust the frequency by external terminals. (Refer to description of P0.02 and P0.03) Up is frequency increase and DOWN is frequency decrease. (Refer to description of P5.19 and P5.20)

Clear UP/DOWN: The terminal is used to clear the value of setting by UP / DOWN.

Clear UP/DOWN (temporary): The terminal is used to clear the value of setting by UP/DOWN temporarily when it is valid. The frequency value goes back to normal when the terminal is invalid

14, 15: ACC/DEC time selection 1 and 2

Four groups of ACC/DEC time can be selected by the combination of these two terminals.

Terminal 2	Terminal 1	ACC/DEC time selection	Corresponding parameters
OFF	OFF	ACC/DEC time 1	P0.16, P0.17
OFF	ON	ACC/DEC time 2	P8.00, P8.01
ON	OFF	ACC/DEC time 3	P8.02, P8.03
ON	ON	ACC/DEC time 4	P8.04, P8.05

16~19: Multi-step speed terminal 1~4

16-step speed can be set by the combination of these four terminals. See detailed instructions of multi-step speed parameters in P0 and P11.

Note: Multi-step speed 1 is low bit, and multi-step speed 4 is high bit.

Multi-step speed terminal 4	Multi-step speed terminal 3	Multi-step speed terminal 2	Multi-step speed terminal 1
BIT3	BIT2	BIT1	BIT0

20: Multi-step speed pause

Once the terminal is enabled, whatever multi-step speed terminals or analog terminals change, the set frequency keeps in current step.

21: Switch between A and B

22: Switch between (A+B) and A

23: Switch between (A+B) and B

Switching the channel of frequency can be realized by three terminals.

When the system frequency is given by A-channel and the terminal 21 acts, the channel of frequency setting will switch to B-channel; after the terminal 21 returns, the channel of frequency setting will switch to A-channel. The terminals 22 and 23 are invalid.

When the system frequency is given by B-channel and the terminal 21 acts, the channel of frequency setting will switch to A-channel; after the terminal 21 returns, the channel of frequency setting will switch to B-channel.

The functions of terminals 22 and 23 are similar to the function of 21.

24: Variable frequency running

The system changes from switch off state to variable frequency state by pulse signal of the terminal, that is to say, KM1, KM2, KM3 and KM4 off at first, then KM1, KM2 and KM3 on (KM4 still off). If system is under other states, the terminals are invalid.

25: Power frequency running

The system changes from switch off state to power frequency state by pulse signal of the terminal, that is to say, KM1, KM2, KM3 and KM4 off at first, then KM4 on. If system is under other states, the terminals are invalid.

26: Switching from variable frequency to power frequency

The system switches from variable frequency to power frequency by pulse signal of the terminal, that is to say, KM1, KM2, KM3 on and KM4 off at first, then KM4 on and KM1, KM2 and KM3 off. If system is under other states, the terminals are invalid.

27: Switching from power frequency to variable frequency

The system switches from power frequency to variable frequency by pulse signal of the terminal, that is to say, KM1, KM2, KM3 off and KM4 on at first, then KM4 off and KM1, KM2 and KM3 on. If system is under other states, the terminals are invalid.

Note: 24~27 are valid only for the system with isolated automatic switch cabinet. If no, they are invalid.

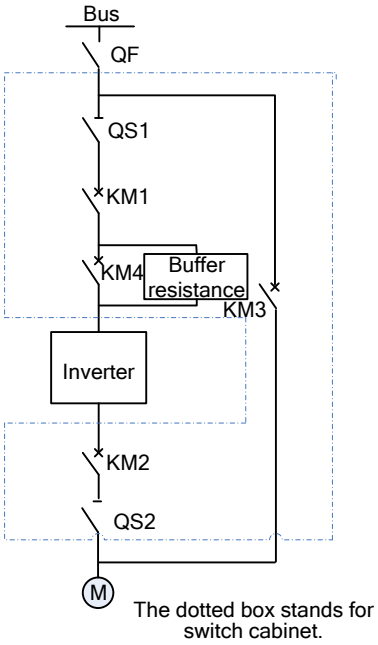


Fig 5.14 Switch cabinet

28: High voltage breaking input (pulse signal)

If the terminal is valid, the system will automatically cut off the power.

29: PID pause

PID invalid, the system will keep the current output frequency.

30~31: Reserved

32: Switch cabinet address 0

33: Switch cabinet address 1

34: Switch cabinet address 2

Take the combinations of 0 and 1 of 3 switch cabinet addresses (000~111, 8 combinations in total) as the number of 1~8 switch cabinets.

35: Running command switching to the local

If the terminal is valid, the running command channel of the system will be forced to switch into UDP.

36: Running command switching to terminals

If the terminal is valid, the running command channel will be forced to switch into terminals.

37: Running command switching to communication

If the terminal is valid, the running command channel will be forced to switch into communication command channel specified in P0.22.

Note: Above channel switching is valid only when the remote-local switch is at remote.

38~39: Reserved

40: Torque control disabled

The control mode will switch from torque control to speed control if the terminal is valid. In actual application, the terminal can be used to switch between speed control and torque control.

41: Master-slave control enabled (reserved)

42: Master-slave speed synchronous counter reset terminal (reserved)

43: ACC/DEC disabled

The system will not be affected by external frequency source if the function is valid.

44: Vacuum contactor KM2 feedback

The system will be installed with buffer cabinet if the function is valid.

Note: If the system is installed with buffer cabinet, confirm which MF input terminal the buffer cabinet feedback is connected to according to on-site wiring and set corresponding terminal to 44; otherwise, buffer resistance may emit heat or even burn out after working too long.

45: Commissioning signal input

46~47: Reserved

48: QF1M1 feedback

49: QF1M2 feedback

50: QF1M3 feedback

51: QF1M4 feedback

52: QF1M5 feedback

53: QF1M6 feedback

54: QF1M7 feedback

55: QF1M8 feedback

56: QF2M1 feedback

57: QF2M2 feedback

58: QF2M3 feedback

59: QF2M4 feedback

60: QF2M5 feedback

61: QF2M6 feedback

62: QF2M7 feedback

63: QF2M8 feedback

48 and 56 are vacuum breaker feedback of QF1M1 at variable frequency side and QF2M1 at power frequency side of switch cabinet 1 (main switch cabinet). When P15.01=1, variable frequency and power frequency share the power. As long as either QF1M1 or QF2M1 feedback switches on, the common vacuum breaker will switch off. As long as both QF1M1 and QF2M1 feedback switch off, the common vacuum breaker will switch off. When P15.01=0, variable frequency and power frequency do not share the power. QF1M1 and QF2M1 feedback indicates the states of vacuum breakers respectively, high electrical level standing for switching on and low electrical level for switching off.

49~55: QF1M2~ QF1M8 feedback

States of vacuum breaker feedback at variable frequency sides of switch cabinets 2~8

57~63: QF2M2~ QF2M8 feedback

States of vacuum breaker feedback at power frequency sides of switch cabinets 2~8

Note: If the system is installed with vacuum breakers, set vacuum contactor feedback to corresponding vacuum breaker feedback according to on-site wiring.

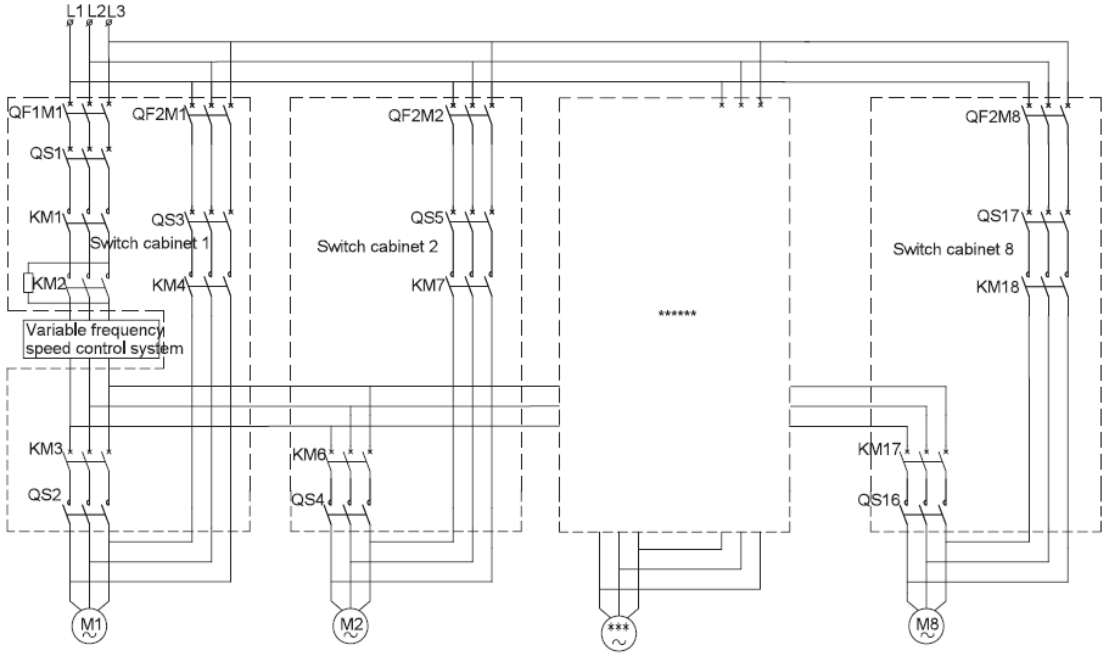


Fig 5.15 One-drive-more control

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.16	Polarity of input terminal	0x0000~0xFFFF	0000~FFFF	0000

The function code is used to set polarity of ON/OFF input terminals, each terminal takes up one bit, 0: NO contact, 1: NC contact.

S16	S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1
BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.17	Filter time of digital signal	1~500	1~500	20

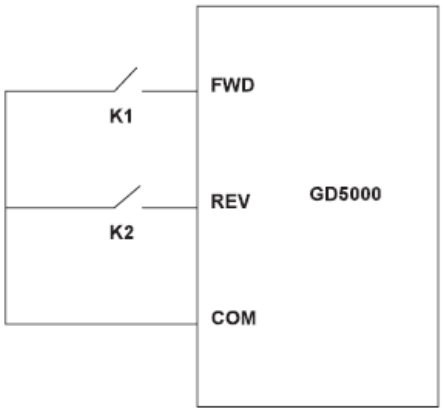
The function code is used to set filter time of S1~S16 terminals sampling. In the case of strong interference, increasing the parameter can prevent incorrect operation.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.18	Terminal control run mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0~3	0

This parameter defines four different control modes that control the system through external terminals.

0: Two-wire control mode 1

Enabling and direction are combined together. This is the most frequently used two-wire mode. Whether the motor is forward or reverse running is determined by FWD and REV terminal commands.

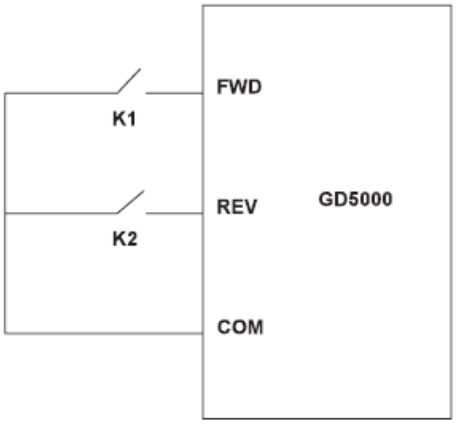


K1	K2	Running command
OFF	OFF	Stop
OFF	ON	REV running
ON	OFF	FWD running
ON	ON	Stop

Fig 5.16 Two-wire control (enabling and direction combined)

1: Two-wire control mode 2

Enabling is separated from direction. START/STOP command is determined by FWD terminal. Direction is determined by REV terminal.



K1	K2	Running command
OFF	OFF	Stop
OFF	ON	Stop
ON	OFF	FWD running
ON	ON	REV running

Fig 5.17 Two-wire control (enabling and direction separated)

2: Three-wire control mode 1

SIn (In=1-16) =3 (three-wire control enabled), when SIn switches on, the running command will be generated by FWD (terminal rising edge valid) and the direction will be controlled by REV (REV off indicates forward running; REV on indicates reverse running.). When SIn switches off, the system will stop.

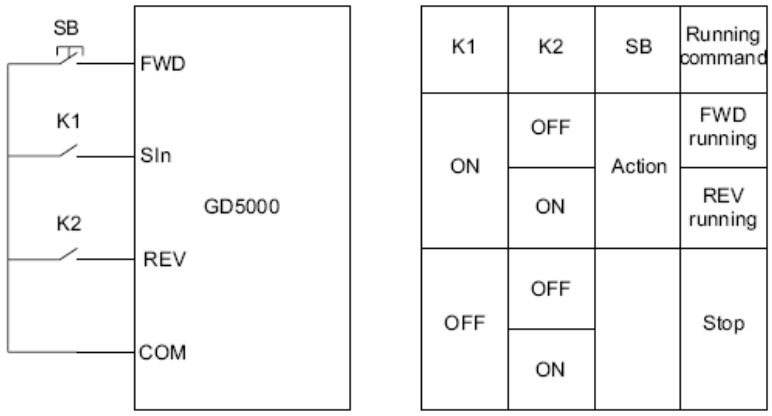


Fig 5.18 Three-wire control mode 1

K1: Enabling switch SB1: Run button K2: REV/FWD running switch

3: Three-wire control mode 2

SIn (In=1-16) =3 (three-wire control enabled), when SIn switches on, the running command will be generated by FWD or REV and the direction will be controlled by both of them. When SIn switches off, FWD and REV are invalid. FWD and REV (both rising edges valid) refer to inputs of forward and reverse running commands respectively.

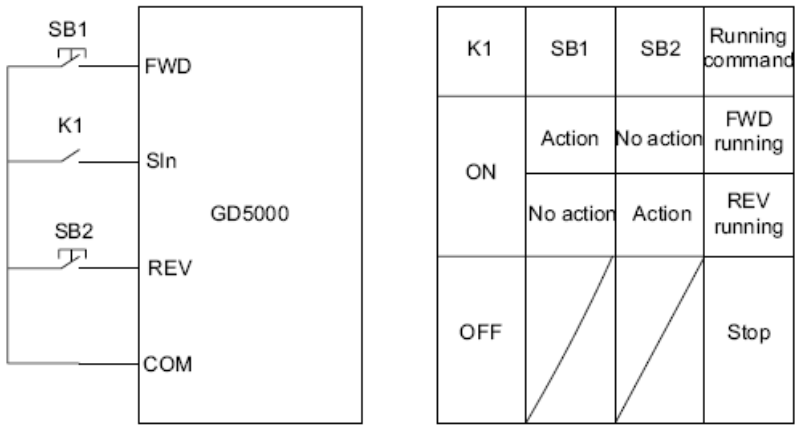


Fig 5.19 Three-wire control mode 2

SB1: Forward running button K1: Enabling switch SB2: Reverse running button

Note: The system will not respond to the running commands given before two-wire control is ready. Only after readiness of two-wire control will the system respond to re-given running commands.

Note: During 2-wire control mode, when the FWD/REV terminal is valid, the stop command generated by other sources cannot make the system stop, the system will not run after the stop command disappears even if FWD/REV terminal is still valid. In order to make the inverter run again, you must retrigger FWD/REV.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.19	UP setting change rate	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s
P5.20	DOWN setting change rate	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s

When UP/DOWN terminal functions are used to adjust set frequency, P5.19 and P5.20 are for setting

UP/DOWN setting change rate.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.21	AI1 lower limit	0.00V~ P5.23	0.00~P5.23	0.00V
P5.22	AI1 lower limit corresponding setting	-100.0%~ P5.24	-100.0~P5.24	0.0%
P5.23	AI1 upper limit	P5.21~10.00V	P5.21~10.00	10.00V
P5.24	AI1 upper limit corresponding setting	P5.22~100.0%	P5.22~100.0	100.0%
P5.25	AI1 input filter time	0.00s~10.00s	0.00~10.00	2.00s

The parameters determine the relationship between AI1 input voltage or current and the corresponding setting value. When the analog input voltage or current exceeds the range between lower limit and upper limit, it will be regarded as the upper limit or lower limit.

If the signal of analog input is current signal, 0mA~20mA current corresponds to 0V~5V voltage.

For different applications, the corresponding value of 100.0% analog setting is different. For details, please refer to description of each application.

The following figure is about the relationship between AI1/AI2 and corresponding setting.

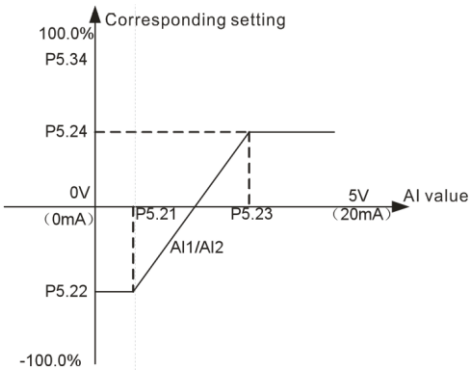


Fig 5.20 Relationship between AI1/AI2 and corresponding setting

AI1 input filter time: Adjust the analog input sensitivity. Increasing the value appropriately can enhance anti-interference capability but will weaken the sensitivity.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.26	AI2 lower limit	0.00V~ P5.28	0.00~ P5.28	0.00V
P5.27	AI2 lower limit corresponding setting	-100.0%~ P5.29	-100.0~ P5.29	0.0%
P5.28	AI2 upper limit	P5.26~10.00V	P5.26~10.00	10.00V
P5.29	AI2 upper limit corresponding setting	P5.27~100.0%	P5.27~100.0	100.0%
P5.30	AI2 input filter time	0.00s~10.00s	0.00~10.00	2.00s
P5.31	AI3 lower limit	-10.00V~ P5.33	-10.00~P5.33	0.00V
P5.32	AI3 lower limit	-100.0%~ P5.34	-100.0~P5.34	0.0%

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	corresponding setting			
P5.33	AI3 upper limit	P5.31~10.00V	P5.31~10.00	10.00V
P5.34	AI3 upper limit corresponding setting	P5.32~100.0%	P5.32~100.0	100.0%
P5.35	AI3 input filter time	0.00s~10.00s	0.00~10.00	2.00s

The setting of AI2 and AI3 is the same as that of AI1.

Note: AI2 supports 0~10V voltage or 0~20mA current input (the same as AI1) and AI3 only supports voltage input in the range of -10V~10V.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P5.36	HDI lower limit	0.000 kHz~P5.38	0.000~P5.38	0.000kHz
P5.37	HDI lower limit corresponding setting	-100.0%~P5.39	-100.0~P5.39	0.0%
P5.38	HDI upper limit	P5.36~50.000kHz	P5.36~50.000	50.000kHz
P5.39	HDI upper limit corresponding setting	P5.38~100.0%	P5.38~100.0	100.0%
P5.40	HDI input filter time	0.00s~10.00s	0.00~10.00	0.10s

The function codes define the corresponding relationships between the pulse frequency at high-speed pulse input port and the corresponding input value. The description of P5.21~P5.25 is similar to AI1.

P06 Group Output terminals

G5000 series variable frequency speed control systems are fitted with 20 MF relay output terminals (RO1~RO20), 1 HDO terminal (only as high-speed pulse output) and 4 MF analog output terminals (AO1~AO4) as standard.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P6.00	RO1 output	0: No output 1: In running 2: Fault output 3: FDT output 4: Frequency arrival 5: Zero speed running 6: Variable frequency state 7: Power frequency state 8: Running time arrival 9: Upper frequency limit arrival 10: Lower frequency limit arrival 11: Ready for running (run request)	0~70	0
P6.01	RO2 output		0~70	0
P6.02	RO3 output		0~70	0
P6.03	RO4 output		0~70	0
P6.04	RO5 output		0~70	0
P6.05	RO6 output		0~70	0
P6.06	RO7 output		0~70	0
P6.07	RO8 output		0~70	0
P6.08	RO9 output		0~70	0
P6.09	RO10 output		0~70	0
P6.10	RO11 output		0~70	0
P6.11	RO12 output		0~70	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P6.12	RO13 output	12: Alarm output	0~70	0
P6.13	RO14 output	13: Permission of QF1M1 switching on	0~70	0
P6.14	RO15 output	14: Permission of QF1M2 switching on	0~70	0
P6.15	RO16 output	15: Permission of QF1M3 switching on	0~70	0
P6.16	RO17 output	16: Permission of QF1M4 switching on	0~70	0
P6.17	RO18 output	17: Permission of QF1M5 switching on	0~70	0
P6.18	RO19 output	18: Permission of QF1M6 switching on	0~70	0
P6.19	RO20 output	19: Permission of QF1M7 switching on 20: Permission of QF1M8 switching on 21: Permission of QF2M1 switching on 22: Permission of QF2M2 switching on 23: Permission of QF2M3 switching on 24: Permission of QF2M4 switching on 25: Permission of QF2M5 switching on 26: Permission of QF2M6 switching on 27: Permission of QF2M7 switching on 28: Permission of QF2M8 switching on 29: Permission of QF1M1 switching off 30: Permission of QF1M2 switching off 31: Permission of QF1M3 switching off 32: Permission of QF1M4 switching off 33: Permission of QF1M5 switching off 34: Permission of QF1M6 switching off 35: Permission of QF1M7 switching off 36: Permission of QF1M8 switching off 37: Permission of QF2M1 switching off 38: Permission of QF2M2 switching off 39: Permission of QF2M3 switching off 40: Permission of QF2M4 switching off 41: Permission of QF2M5 switching off 42: Permission of QF2M6 switching off 43: Permission of QF2M7 switching off 44: Permission of QF2M8 switching off 45: Variable frequency state of switch cabinet 1 46: Power frequency state of switch cabinet 1 47: Variable frequency state of switch cabinet 2 48: Power frequency state of switch cabinet 2 49: Variable frequency state of switch cabinet 3 50: Power frequency state of switch	0~70	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
		cabinet 3 51: Variable frequency state of switch cabinet 4 52: Power frequency state of switch cabinet 4 53: Variable frequency state of switch cabinet 5 54: Power frequency state of switch cabinet 5 55: Variable frequency state of switch cabinet 6 56: Power frequency state of switch cabinet 6 57: Variable frequency state of switch cabinet 7 58: Power frequency state of switch cabinet 7 59: Variable frequency state of switch cabinet 8 60: Power frequency state of switch cabinet 8 (Both power frequency and variable frequency valid at the same time indicates fault.) 61: Unit bypass state 62: Remote-local state 63: Vacuum contactor control 64: Vacuum contactor power control 65: Low-voltage commissioning vacuum contactor KM1 control 66: Low-voltage commissioning vacuum contactor KM2 control 67~70: Reserved, no output		

0: No output

1: In running: When the system is running, ON signal will be output.

2: Fault output: When any fault occurs to the system, ON signal will be output.

3: FDT output: Please refer to P8.15~P8.16.

4: Frequency arrival: Please refer to P8.17.

5: Zero speed running: When the system is running and the output frequency is zero, ON signal will be output.

6: Variable frequency state: When the system is running at variable frequency, ON signal will be output.

7: Power frequency state: When the system is running at power frequency, ON signal will be output.

8: Running time arrival: When cumulative running time reaches the set time in P7.11, ON signal will be output.

9: Upper frequency limit arrival: When the running frequency reaches upper frequency limit, ON signal will be output.

10: Lower frequency limit arrival: When the running frequency reaches lower frequency limit, ON signal will be output.

11: Ready for running (run request): When the power supply of main circuit and control circuit is established, and the system is capable to run without protective function action, ON signal will be output.

12: Alarm output: When the system alarms (not to cause fault abnormality), ON signal will be output.

13: Permission of QF1M1 switching on

14: Permission of QF1M2 switching on

15: Permission of QF1M3 switching on

16: Permission of QF1M4 switching on

17: Permission of QF1M5 switching on

18: Permission of QF1M6 switching on

19: Permission of QF1M7 switching on

20: Permission of QF1M8 switching on

21: Permission of QF2M1 switching on

22: Permission of QF2M2 switching on

23: Permission of QF2M3 switching on

24: Permission of QF2M4 switching on

25: Permission of QF2M5 switching on

26: Permission of QF2M6 switching on

27: Permission of QF2M7 switching on

28: Permission of QF2M8 switching on

13~28: After the system receives variable frequency signals, it needs to pass self-testing and waiting time of switching on (P1.30), and then send signals to up level (operation platform or switch). The up level will switch on up switch after the receiving the signal.

29: Permission of QF1M1 switching off

30: Permission of QF1M2 switching off

31: Permission of QF1M3 switching off

32: Permission of QF1M4 switching off

33: Permission of QF1M5 switching off

34: Permission of QF1M6 switching off

35: Permission of QF1M7 switching off

36: Permission of QF1M8 switching off

37: Permission of QF2M1 switching off

38: Permission of QF2M2 switching off

39: Permission of QF2M3 switching off

40: Permission of QF2M4 switching off

41: Permission of QF2M5 switching off

42: Permission of QF2M6 switching off

43: Permission of QF2M7 switching off

44: Permission of QF2M8 switching off

29~44: When the system needs to switch off up switch, it is necessary to send signals to up level (operation platform or vacuum breaker) which will have to switch off up switch to protect the system.

45: Variable frequency state of switch cabinet 1

46: Power frequency state of switch cabinet 1

47: Variable frequency state of switch cabinet 2
48: Power frequency state of switch cabinet 2
49: Variable frequency state of switch cabinet 3
50: Power frequency state of switch cabinet 3
51: Variable frequency state of switch cabinet 4
52: Power frequency state of switch cabinet 4
53: Variable frequency state of switch cabinet 5
54: Power frequency state of switch cabinet 5
55: Variable frequency state of switch cabinet 6
56: Power frequency state of switch cabinet 6
57: Variable frequency state of switch cabinet 7
58: Power frequency state of switch cabinet 7
59: Variable frequency state of switch cabinet 8
60: Power frequency state of switch cabinet 8
(Both power frequency and variable frequency valid at the same time indicate fault.)
45~60: The states of switch cabinets 1~8
ON signals will be output when the switch cabinets correspond to the motors in variable frequency state or power frequency state.
61: Unit bypass state: When the system has unit bypass, ON signal will be output.
62: Remote-local state: When the switch is at the local state, the system can only control through the local command channel and output ON signal; and at the remote state, the system can control through terminals, MODBUS and Profibus and output OFF signal.
63: Vacuum contactor control
When the system powers on at variable frequency, the vacuum contactor control of buffer cabinet will output ON signal after unit bus voltage beyond undervoltage point. The contactor switches on to disconnect buffer resistance and the signal remains ON. When the system powers off, the vacuum contactor control will output OFF signal. The contactor switches off to connect buffer resistance and the signal remains OFF.
64: Vacuum contactor power control
When the vacuum contactor control of buffer cabinet switches on or off, ON signal will be output for just 2 seconds to supply power.
Note:

1. **If the system is installed with buffer cabinet, functions of MF terminals in P5 must be buffer cabinet vacuum contactor feedback.**
2. **The vacuum contactor control terminals shall be connected properly according to the electrical drawings of the factory. Output terminals (buffer cabinet vacuum contactor control and buffer cabinet vacuum contactor power control) have been set by the factory, so there is no need for users to set them.**

65: Low-voltage commissioning vacuum contactor KM1 control
66: Low-voltage commissioning vacuum contactor KM2 control
65, 66: Mainly used for low-voltage power on commissioning of the factory
67~70: Reserved
Note: ON signals refer to the signals of the contactor NO contact on and the contactor NC contact off.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P6.20	HDO output	0: Running frequency (100%: Max. frequency) 1: Set frequency (100%: Max. frequency) 2: Inverter current RMS (100%: 2 times of system rated current) 3: Motor current RMS (100%: twice of motor rated current) 4: Output voltage (100%: 1.2 times of system rated voltage) 5: Output power (100%: twice of motor rated power) 6: Output torque (100%: twice of motor rated torque) 7: AI1 voltage 8: AI2 voltage 9: AI3 voltage (100%: 10V)	0~9	0
P6.21	AO1 output		0~9	0
P6.22	AO2 output		0~9	0
P6.23	AO3 output		0~9	0
P6.24	AO4 output		0~9	0

AO1, AO2, AO3 and AO4 provide 0~10V voltage output or 0~20mA current output which can be selected by the jumpers J3 (AO1), J4 (AO2), J5 (AO3) and J6 (AO4) on the I/O board. The range of HDO open collector high-speed pulse output is 0~50.000 kHz.

The corresponding ranges are shown in the following table:

Setting value	Function	Range
0	Running frequency	100%: Max. frequency
1	Set frequency	100%: Max. frequency
2	Inverter current RMS	100%: 2 times of system rated current
3	Motor current RMS	100%: twice of motor rated current
4	Output voltage	100%: 1.2 times of system rated voltage
5	Output power	100%: twice of motor rated power
6	Output torque	100%: twice of motor rated torque
7	AI1 voltage	100%: 10V
8	AI2 voltage	100%: 10V
9	AI3 voltage	100%: 10V

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P6.25	HDO lower limit	0.00%~ P6.27	0.00~ P6.27	0.00%
P6.26	HDO lower limit corresponding output	0.000kHz~ P6.28	0.000~ P6.28	0.000kHz
P6.27	HDO upper limit	P6.25~100.00%	P6.25~100.00	100.00%
P6.28	HDO upper limit corresponding output	P6.26~50.000kHz	P6.26~50.000	50.000kHz

Above function codes define the relationship between high-speed pulse output frequency and the corresponding output value. When the output value exceeds the range between lower limit and upper limit, it will be calculated as the upper limit or lower limit.

For different applications, the corresponding value of 100.0% high speed pulse output is different. For details, please refer to description of each application.

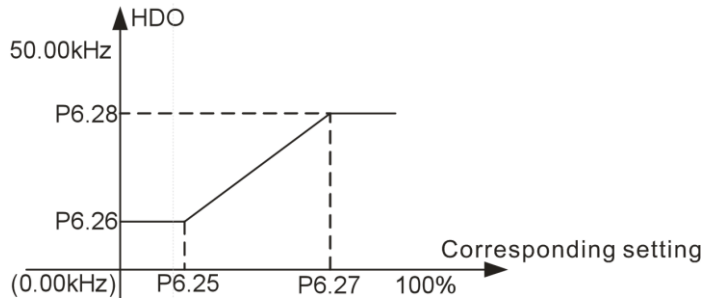


Fig 5.21 Relationship between HDO and corresponding setting

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P6.29	AO1 lower limit	0.00%~P6.31	0.00~P6.31	0.0%
P6.30	AO1 lower limit corresponding output	0.00V~P6.32	0.00~P6.32	0.00V
P6.31	AO1 upper limit	P6.29~100.0%	P6.29~100.0	100.0%
P6.32	AO1 upper limit corresponding output	P6.30~10.00V	P6.30~10.00	10.00V
P6.33	AO2 lower limit	0.00%~P6.35	0.00~P6.35	0.0%
P6.34	AO2 lower limit corresponding output	0.00V~P6.36	0.00~P6.36	0.00V
P6.35	AO2 upper limit	P6.33~100.0%	P6.33~100.0	100.0%
P6.36	AO2 upper limit corresponding output	P6.34~10.00V	P6.34~10.00	10.00V
P6.37	AO3 lower limit	0.00%~P6.39	0.00~P6.39	0.0%
P6.38	AO3 lower limit corresponding output	0.00V~P6.40	0.00~P6.40	0.00V
P6.39	AO3 upper limit	P6.37~100.0%	P6.37~100.0	100.0%
P6.40	AO3 upper limit corresponding output	P6.38~10.00V	P6.38~10.00	10.00V
P6.41	AO4 lower limit	0.00%~P6.43	0.00~P6.43	0.0%
P6.42	AO4 lower limit corresponding output	0.00V~P6.44	0.00~P6.44	0.00V

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P6.43	AO4 upper limit	P6.41~100.0%	P6.41~100.0	100.0%
P6.44	AO4	P6.43~10.00V	P6.43~10.00	10.00V

The functions are similar to HDO terminals. The analog output is shown as follows.

Note: When current output is selected for AO1, AO2, AO3 and AO4, 1mA corresponds to 0.5V.

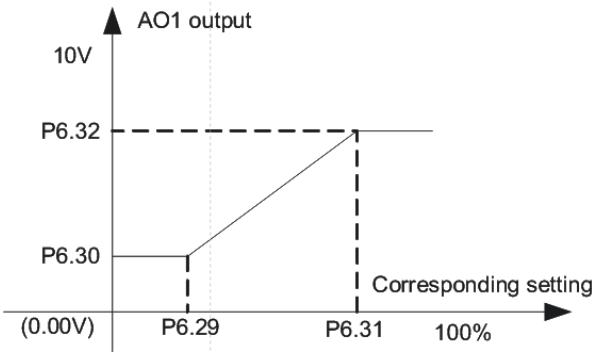


Fig 5.22 Relationship between AO and corresponding setting

P07 Group HMI

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.00	Reserved	0~65536	0~65536	0
P7.01	Reserved	0~65536	0~65536	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.02	FPGA software version	0~655.35	0~655.35	Factory setting
P7.03	DSP software version	0~655.35	0~655.35	Factory setting
P7.04	ARM software version	0~655.35	0~655.35	Factory setting

The software versions are read-only and unmodifiable.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.05	Valid control mode	0: V/F control 1: Sensorless vector control 0 2: Sensorless vector control 1 3: Vector control	0~3	Factory setting

According to the purchasing needs of customers, set the authority before leaving the factory. 0 means only V/F control, 1 means both V/F control and sensorless vector control 0 are available, 2 means the first three control modes are available and 3 means all control modes are available.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.06	Max. available	1~12	1~12	Factory

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	unit			setting

Each phase of the system supports 12 units in series at most.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.07	Motor type	0: Asynchronous motor 1: Synchronous motor 2: Asynchronous and synchronous motors	0~2	Factory setting

0: Asynchronous motor only

1: Synchronous motor only

2: Both asynchronous and synchronous motors are available

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.08	I/O extension card	0: Not support 1: Support	0~1	Factory setting
P7.09	Profibus card	0: Not support 1: Support	0~1	Factory setting

The system supports 20 relay outputs as the standard part. That is to say, the factory setting supports extension. It is necessary to set P7.08=1 when using extension function.

0: Not support I/O extension card: The extension of 12 relay outputs cannot be available.

1: Support I/O extension card: When equipped with PG card, the option must be 1, if not, invalid.

The system supports Profibus as the optional part. The Profibus card supports PROFIBUS protocol. It is necessary to set P7.09=1 when applying Profibus card.

0: Not support Profibus

1: Support Profibus

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.10	Max. switch cabinet	0~8	0~8	Factory setting

The function code is applicable to one-drive-more control, 8 switch cabinets at most.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.11	Local accumulative running time	0~65535h	0~65535	0

The function code is used to record the accumulative running time of the system by hours. It is read-only and unmodifiable.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P7.12	Local running time	0~65535min	0~65535	0

The function code is used to set the current running time of the system by minutes. If the running time arrives, users can operate after the system outputs the signal of running time arrival.

P08 Group Enhanced functions

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.00	ACC time 2	0.1~3600.0s	0.1~3600.0	Depend on model
P8.01	DEC time 2	0.1~3600.0s	0.1~3600.0	Depend on model
P8.02	ACC time 3	0.1~3600.0s	0.1~3600.0	Depend on model
P8.03	DEC time 3	0.1~3600.0s	0.1~3600.0	Depend on model
P8.04	ACC time 4	0.1~3600.0s	0.1~3600.0	Depend on model
P8.05	DEC time 4	0.1~3600.0s	0.1~3600.0	Depend on model

The function codes P8.00~P8.05 can be switched by of MF input terminal combinations (see the description of P5). The definitions of different ACC/DEC time are the same, as described in P0.16 and P0.17.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.06	Jogging frequency	0.00 Hz~P0.10 (Max. frequency)	0.00~P0.10	5.00Hz
P8.07	Jogging ACC time	0.1~3600.0s	0.1~3600.0	Depend on model
P8.08	Jogging DEC time	0.1~3600.0s	0.1~3600.0	Depend on model

Jogging start/stop mode: Direct start and decelerate to stop

Jogging ACC time is the time the system needs to accelerate from 0Hz to the maximum frequency (P0.10).

Jogging DEC time is the time the system needs to decelerate from the maximum frequency (P0.10) to 0Hz.

Note: Jogging enjoys the top priority. Under torque mode, if the jogging command is valid, it is necessary to switch into speed mode to respond to the command.

Note: When the jogging command is valid, run in linear ACC/DEC according to jogging ACC/DEC time; otherwise, switch into common ACC/DEC curve.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.09	Jumping frequency 1	0.00 Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz
P8.10	Jumping frequency range 1	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz
P8.11	Jumping frequency 2	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz
P8.12	Jumping frequency range 2	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz

Setting the jumping frequency can keep the system from the mechanical resonance point. The system can set two jumping frequency points. But this function will be unavailable if both of the jumping points are set to 0.

Note: The jumping frequency limits the set frequency. For example, f_0 =initial set frequency, f_j =jumping frequency, Δ_f =jumping range, f =actual set frequency

If $(f_j - \Delta_f/2) \le f_0 < f_j$, thus $f = f_j - \Delta_f/2$;

If $f_j \le f_0 \le (f_j + \Delta_f/2)$, thus $f = f_j + \Delta_f/2$

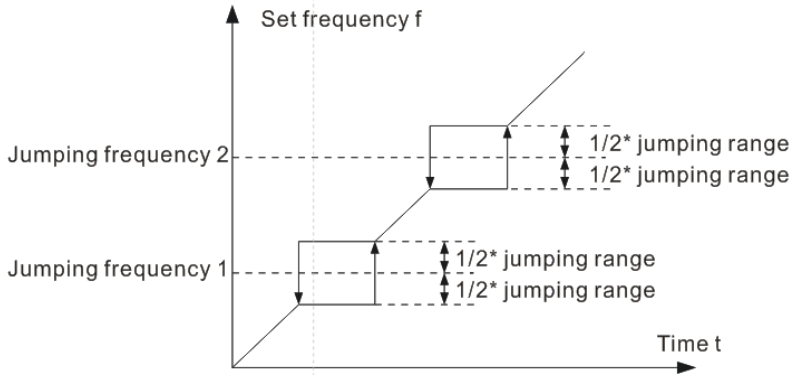


Fig 5.23 Jumping frequency

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.13	Automatic fault reset times	0~3	0~3	0
P8.14	Interval of automatic fault reset	0.1~100.0s	0.1~100.0	1.0s

Automatic fault reset times: Users can set automatic fault reset times when the function code is selected. The system will automatically reset and start rotating speed tracking when minor faults occur to it. If the continuous reset times exceed this set value, the system will stop and need repairing.

Interval of automatic fault reset: Select the interval from fault occurrence to its auto-reset.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.15	FDT electrical level detection value	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	50.00Hz
P8.16	FDT retention detection value	0.0~100.0% (FDT electrical level)	0.0~100.0	5.0%

When the output frequency exceeds the corresponding frequency FDT electrical level, output the signal until the output frequency decreases to a value lower than the corresponding frequency (FDT retention detection value). Below is the diagram:

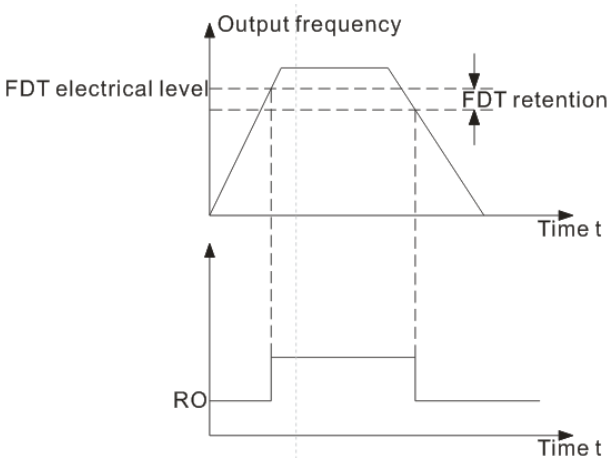


Fig 5.24 FDT electrical level

Note: FDT retention detection value is the percentage corresponding to FDT electrical level.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.17	Frequency arrival detection range	0.0~100.0% (Max. frequency)	0.0~100.0	0.0%

When the output frequency is among the below or above range of the set frequency, the pulse signal will be output. See the diagram below for detailed information:

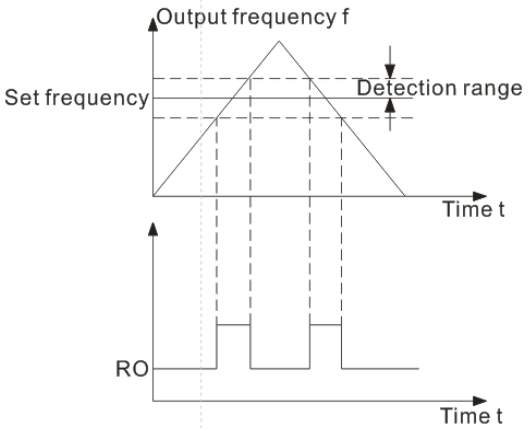


Fig 5.25 Frequency arrival detection range

Note: Frequency arrival detection range is the percentage corresponding to the maximum frequency (P0.10).

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.18	Overmodulation	0: Invalid 1: Valid	0~1	0

Under the conditions of low voltage (below 85% of rated voltage) or heavy loads for a long time, the system can improve utilization of bus voltage and thus raise output voltage by overmodulation.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.19	Running mode of cooling fan	0: Rated running mode 1: The fan keeps running after powering on	0~1	0

0: Rated running mode: The cooling fan keeps running when the system in running state. When the

system stops after 30s, the fan will stop.

1: The fan keeps running after powering on

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.20	Alarm reset interval	0.0s (invalid) 0.1~3600.0s	0.0~3600.0	0.0

Note: Alarm means when the system works abnormally, if users do not pay attention, the abnormity will cause faults. Users can choose whether it is necessary for the system to alarm and set alarm reset interval via the function code.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.21	Frequency reference offline threshold	0.0~100.0%	0.0~100.0	0.0
P8.22	Frequency reference offline time	0.0~360.0s	0.0~360.0	0.0s

100% of frequency reference offline threshold corresponding to upper frequency limit (P0.11), when the system detects the set frequency less than or equal to the set frequency threshold, it will start timing. If the timing exceeds offline time, the system will alarm frequency reference offline fault.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.23	Frequency change rate of dropping control	0.00~10.00Hz	0.00~10.00	0.00Hz

When several variable frequency speed control systems drive one load, due to different speeds, unbalanced load distribution will make the system at the highest speed bear heavy load. The dropping control is featuring speed changing along with loads and balanced distribution. Adjust the parameter from the smallest one to the largest one. The relationship between load and output frequency is shown as follows:

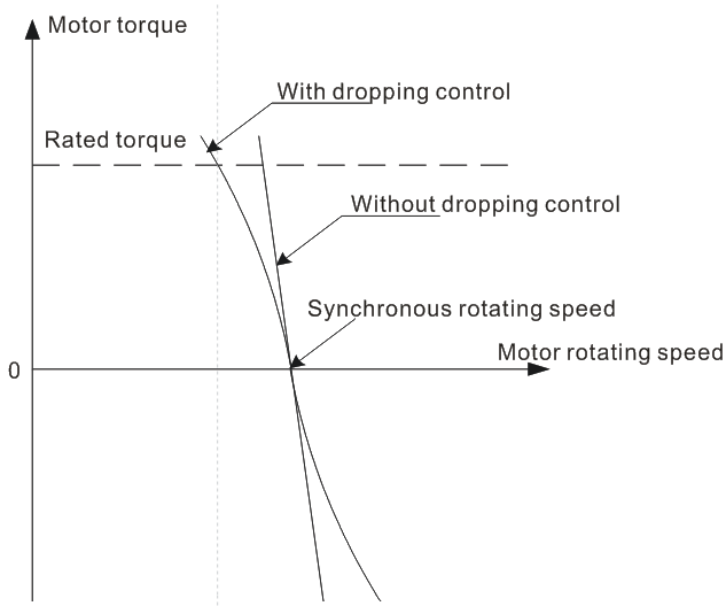


Fig 5.26 Dropping control

The parameter is used to adjust the frequency change rate of dropping control for the system.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.24	Ambient overtemperature threshold	0~100.0%	0.0~100.0	100.0

When ambient temperature exceeds P8.24, the system will alarm overtemperature, 0.0% and 100% corresponds to -100°C and 200°C respectively, corresponding value of ambient overtemperature threshold = P8.24*300-100.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P8.25	Motor temperature zero-calibration factor	-100.00%~100.00%	-100.00~100.00	0.00
P8.26	Motor temperature proportional calibration factor	0~200.00%	0~200.00	100.00
P8.27	Motor temperature sensor selection	0: Not installed 1: Installed	0~1	0

When P8.27=1, correct the temperature by P8.25 and P8.26.

P09 Group Fault record

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.00	DSP fault action 1	0xEABA~0xFFFF Two bits stand for a fault. 00: No solution 01: Alarm 10: Fault, stop but not cut off high voltage power 11: Serious fault, stop and cut off high voltage power	0xEABA~0xFFFF	0xEABA
P9.01	DSP fault action 2	0x3EAA~0xFFFF	0x3EAA~0xFFFF	0xBEAA
P9.02	ARM fault action 1	0x830A~0xFFFF	0x830A~0xFFFF	0xABAE
P9.03	ARM fault action 2	0xB28A~0xFFFF	0xB28A~0xFFFF	0xBAAA
P9.04	ARM fault action 3	0xAA00~0xFFFF	0xAA00~0xFFFF	0xAAAA
P9.05	ARM fault action 4	0x009A~0xFFFF	0x000A~0xFFFF	0x009A
P9.06	Unit fault action 1	0x2AEA~0xFFFF	0x2AEA~0xFFFF	0xAAEA
P9.07	Unit fault action 2	0xAE8~0xFFFF	0xAE8~0xFFFF	0x0AEA

The fault action includes 4 types: no solution; alarm; fault, stop but not cut off high voltage power; serious fault, stop and cut off high voltage power.

00: No solution

01: Alarm

10: Fault, stop but not cut off high voltage power, can carry out fault auto reset

11: Serious fault, stop and cut off high voltage power, cannot carry out fault auto reset

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.08	Previous 2 DSP fault type	Each bit stands for 1 fault type. 0: No fault 1: Fault bit0: Software overcurrent bit1: Hardware overcurrent bit2: Grid overvoltage bit3: Grid undervoltage bit4: Motor overload bit5: Inverter overload bit6: Output phase loss bit7: Current detection fault bit8: Motor autotuning fault bit9: Encoder offline fault bit10: Encoder REV fault bit11: Input phase loss bit12: Handshake fault bit13: Input overcurrent bit14: Transmission board fault	0~FFFF	0

P9.08 includes 15 DSP fault types, each bit stands for 1 fault type, bitn=1 means some fault occur, bitn=0 means the fault does not occur. P9.09 and P9.10 includes 28 ARM fault types, P9.11 includes 14 fault types.

For example, the relationship between fault word and fault type:

If there is DSP hardware overcurrent in P9.08, bit1=1 (P9.08). If P9.00 is set to 0XEABA, bit3~bit2 =10 (P9.00). The system will stop but not cut off high voltage because of the fault.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.09	Previous 2 ARM fault 1	Each bit stands for 1 fault type. 0: No fault 1: Fault bit0: Transformer temperature controller fault bit1: Transformer overheat bit2: External fault bit3: MODBUS communication fault bit4: Buffer cabinet fault bit5: PID feedback disconnection fault bit6: Access fault bit7: Synchronous switching timeout bit8: Reserved bit9: Factory time arrival	0~FFFF	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
		bit10: The motor temperature is too high bit11: Switch cabinet uplink communication fault bit12: Switch cabinet downlink communication fault bit13: QF feedback fault bit14: DSP and ARM handshake fault bit15: Power off in operation		

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.10	Previous 2 ARM fault 2	bit16: PROFIBUS communication fault bit17: Frequency reference disconnection bit18: Switch cabinet 1 action fault bit19: Switch cabinet 2 action fault bit20: Switch cabinet 3 action fault bit21: Switch cabinet 4 action fault bit22: Switch cabinet 5 action fault bit23: Switch cabinet 6 action fault bit24: Switch cabinet 7 action fault bit25: Switch cabinet 8 action fault bit26: Fan overheat bit27: Master-slave optical fiber communication fault	0~FFFF	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.11	Previous 2 unit fault type	Each bit stands for 1 fault type. 0: No fault 1: Fault bit0: Unit fiber uplink communication fault bit1: Unit fiber downlink communication fault bit2: Unit not ready bit3: Unit overvoltage bit4: Unit undervoltage bit5: Unit power fault bit6: Unit overheat bit7: Unit input phase loss protection bit8: Unit input power off protection bit9: Up bridge VCE fault	0~FFFF	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
		bit10: Down bridge VCE fault bit11: Hardware overvoltage bit12: The unit does not match bit13: Unit bypass failure		

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.12	Previous 2 fault No.	If the number is 0, there is no unit fault. If it is not 0, then A1~A12: 1~12 B1~B12: 13~24 C1~C12: 14~36	0~36	0

Display the previous 2 fault number. 1~12 stand for the unit fault of A phase A1~A12; 13~24 stand for the unit fault of B phase B1~B12; 25~36 stands for the unit fault of C phase C1~C12.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.13	ACC/DEC state at previous 2 fault	0:Constant speed 1: ACC 2: DEC	0~2	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.14	Running frequency at previous 2 fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz
P9.15	Set frequency at previous 2 fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz
P9.16	Output current at previous 2 fault	0.0~6553.5A	0.0~6553.5	0.0A
P9.17	Output voltage at previous 2 fault	0~65535V	0~65535	0V
P9.18	Input current at previous 2 fault	0.0~6553.5A	0.0~6553.5	0.0A
P9.19	Input voltaga at previous 2 fault	0~65535V	0~65535	0V
P9.20	Bus voltage at previous 2 fault	0~65535V	0~65535	0V
P9.21	Unit temperature at previous 2 fault	0.0~6553.5°C	0.0~6553.5	0.0°C

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.22	System input terminal state at	0~65535	0~65535	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	previous 2 fault			
P9.23	User input terminal state at previous 2 fault	0~65535	0~65535	0

The input terminals at previous 2 fault are decimal to display the states of all digital input terminals. If the input terminal is ON, then the corresponding bit is 1; if it is OFF, the corresponding bit is 0.

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
S16	S15	S14	S13	S12	S11	S10	S9
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
S8	S7	S6	S5	S4	S3	S2	S1

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.24	System output terminal state at previous 2 fault	0~65535	0~65535	0
P9.25	User output terminal state at previous 2 fault 1	0~65535	0~65535	0
P9.26	User output terminal state at previous 2 fault 2	0~65535	0~65535	0

The output terminals at previous 2 fault are decimal to display the states of all digital output terminals. If the output terminal is ON, then the corresponding bit is 1; if it is OFF, the corresponding bit is 0.

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
RO8	RO7	RO6	RO5	RO4	RO3	RO2	RO1

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.27	Previous DSP fault type	Same as P9.08		0
P9.28	Previous ARM fault 1	Same as P9.09		0
P9.29	Previous ARM fault 2	Same as P9.10		0
P9.30	Previous unit fault	Same as P9.11		0
P9.31	Previous fault No.	Same as P9.12		0
P9.32	ACC/DEC state at previous fault	0:Constant speed 1: ACC 2: DEC	0~2	0
P9.33	Running frequency	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	at previous fault			
P9.34	Set frequency at previous fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz
P9.35	Output current at previous fault	0.0~6553.5A	0.0~6553.5	0.0A
P9.36	Output voltage at previous fault	0~65535V	0~65535	0V
P9.37	Input current at previous fault	0.0~6553.5A	0.0~6553.5	0.0A
P9.38	Input voltage at previous fault	0~65535V	0~65535	0V
P9.39	Bus voltage at previous fault	0~65535V	0~65535	0V
P9.40	Unit temperature at previous fault	0.0~6553.5°C	0.0~6553.5	0.0°C
P9.41	System input terminal state at previous fault	0~65535	0~65535	0
P9.42	User input terminal state at previous fault	0~65535	0~65535	0
P9.43	System output terminal state at previous fault	0~65535	0~65535	0
P9.44	User output terminal state at previous fault 1	0~65535	0~65535	0
P9.45	User output terminal state at previous fault 2	0~65535	0~65535	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.46	Current DSP fault	Same as P9.08		0
P9.47	Current ARM fault 1	Same as P9.09		0
P9.48	Current ARM fault 2	Same as P9.10		0
P9.49	Current unit fault	Same as P9.11		0
P9.50	Current fault No.	Same as P9.12		0
P9.51	ACC/DEC state at current fault	0:Constant speed 1: ACC 2: DEC	0~2	0
P9.52	Running frequency at current fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P9.53	Set frequency at current fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz
P9.54	Output current at current fault	0.0~6553.5A	0~6553.5	0.0A
P9.55	Output voltage at current fault	0~65535V	0~65535	0V
P9.56	Input current at current fault	0.0~6553.5A	0.0~6553.5	0.0A
P9.57	Input voltage at current fault	0~65535V	0~65535	0V
P9.58	Bus voltage at current fault	0~65535V	0~65535	0V
P9.59	Unit temperature at current fault	0.0~6553.5°C	0~6553.5	0.0°C
P9.60	System input terminal state at current fault	0~65535	0~65535	0
P9.61	User input terminal state at current fault	0~65535	0~65535	0
P9.62	System output terminal state at current fault	0~65535	0~65535	0
P9.63	User output terminal state at current fault 1	0~65535	0~65535	0
P9.64	User output terminal state at current fault 2	0~65535	0~65535	0
P9.65	Reserved	0~65535	0~65535	0

P10 Group PID control

PID control is a common method used in process control, such as flow, pressure and temperature control. The principle will firstly detect the bias between preset value and feedback value, then calculate output frequency of the system according to proportional gain, integral and differential time. Please refer to following figure:

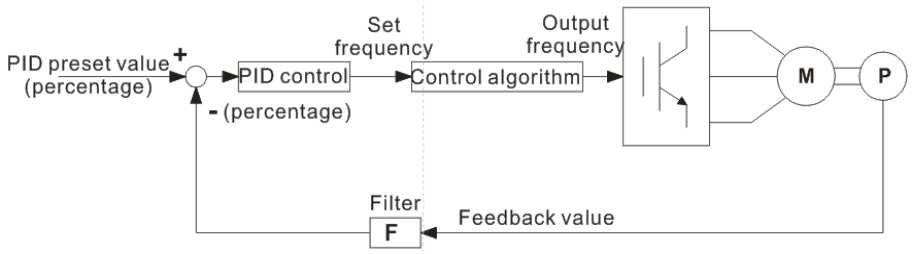


Fig 5.27 PID control

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.00	PID preset source	0: Function code (P10.01) 1: AI1 2: AI2 3: AI3 4: AI1+AI2 5: AI2+AI3 6: AI3+AI1 7: HDI 8: Multi-step 9: MODBUS 10: PROFIBUS	0~10	0

When the frequency source selects PID, that is, P0.06=6, the group function decides the target volume channels of this PID parameter. Reference target of the process PID is a relative value, 100% of preset value corresponds to 100% of feedback value. The system operates in relative value (0~100%), by default, 100% of the values of PID reference and feedback correspond to 10V.

Note: After setting the parameters in P11, multi-step reference can be achieved by current step selection via terminals.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.01	Local preset PID	0.0%~100.0%	0.0~100.0	0.0%

P10.00=0, set the function code. The value of this parameter is the system feedback value.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1+AI2 4: AI2+AI3 5: AI3+AI1 6: HDI 7: MODBUS 8: PROFIBUS	0~8	0

Please select the PID feedback channel through this parameter.

Note: Preset channel and feedback channel shall not be the same; otherwise, PID cannot be effectively controlled.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.03	PID output characteristic	0: Positive 1: Negative	0~1	0

0: Positive. When the feedback value is greater than the preset value, output frequency has to decrease to get the actual value reach the preset value.

1: Negative. When the feedback value is greater than the preset value, output frequency has to increase to get the actual value reach the preset value.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.04	Proportional gain (Kp)	0.00~100.00	0.00~100.00	1.00
P10.05	Integral time (Ti)	0.01~10.00s	0.01~10.00	0. 50s
P10.06	Differential time (Td)	0.00~10.00s	0.00~10.00	0.00s

Proportional gain (P): When the feedback and preset have offset, the adjustment is proportional to the offset. The offset is constant, so is the adjustment. Proportional gain can respond to feedback changes but only proportional gain cannot achieve floating control. The larger the proportional gain, the higher the adjusting speed. Too large P may cause oscillation. Set the integral time quite long and differential time to zero, make the system run through proportional gain, change the preset value and check the offset of the feedback and the preset. If the offset is in the direction of the preset variation, continue to increase proportional gain; otherwise, decrease it. Repeat the operation till the offset is much smaller.

Integral time (I): When the feedback and preset have offset, the adjustment is accumulated continuously. If the offset remains, increase the adjustment till no offset. Integral controller can effectively eliminate offset, the smaller the integral time, the stronger the effect. However, too strong integral effect may cause repeated over adjustment and even oscillation. Adjust the integral time from large to small gradually and check the effect till the speed of the system becomes stable.

Differential time (D): When the feedback and preset have offset, the adjustment is proportional to the offset. The adjustment is only related to the direction and size of offset variation and it has nothing to do with offset. When the feedback signal changes, differential time is used to perform adjustment based on variations and thus suppress feedback signal change, the larger the differential time, the stronger the effect. Please use differential controller with cautions, because the adjustment can easily enlarge system interference, especially interference with frequent change.

PID parameters setting

(1) Proportional gain Kp setting

Ti=0 and Td=0, set input to 60%~70% of the maximum value allowed by the system, increase Kp from 0 gradually till system oscillation appears; decrease Kp till the oscillation disappears, record Kp at this time. The set proportional gain is 60%~70% of current proportional gain. Proportional gain setting finishes.

(2) Integral time Ti setting

After above setting, set Td to 0, proportional gain to the value in first step and integral time Ti to a larger value, then decrease Ti till system oscillation appears, increase Ti till the oscillation disappears, and finally record Ti at this time. The set integral coefficient is 150%~180% of current integral coefficient. Integral time setting finishes.

(3) Differential time Td setting

Generally, Td=0, if differential effect necessary, the setting is the same as Kp and Ti setting, 30% of critical oscillation.

(4) Adjustment

After all settings, the system runs with load. Adjust the values under different conditions to achieve satisfying control effects. As for experienced engineers, they can skip over above three steps and adjust PID factors directly.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.07	Sampling cycle (T)	0.01~100.00s	0.01~100.00	0.10s
P10.08	PID control deviation limit	0.0~100.0% (reference source)	0.0~100.0	0.0%

The sampling cycle means the sampling cycle of the feedback. The controller calculates once in each sampling cycle. The longer the sampling cycle is, the slower the response will be.

The output of PID system is relative to the maximum deviation of the close loop reference. As shown in the diagram below, PID controller stops adjusting in the range of deviation limit and works out the range of deviation limit. Set the function code properly to adjust the accuracy and stability of PID system.

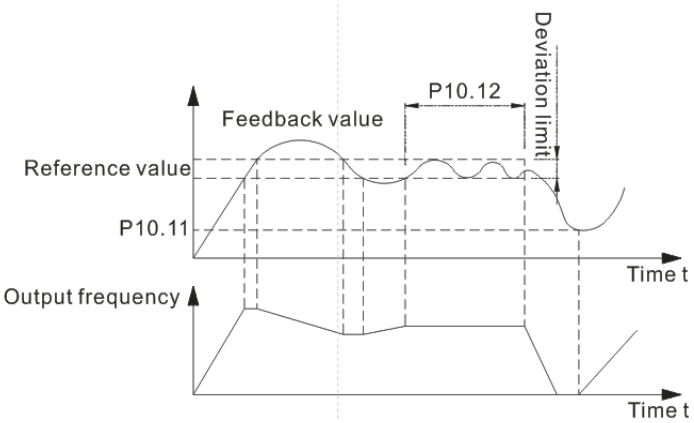


Fig 5.28 The relationship between PID deviation limit and system output frequency

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.09	Feedback offline detection value	0.0~100.0% (reference source)	0.0~100.0%	0.0%
P10.10	Feedback offline detection time	0.0~3600.0s (reference source)	0.0~3600.0	1.0s

The feedback offline detection value is corresponding value of PID feedback 100%. The system will be detecting PID feedback when PID reference is valid. When feedback value is less than or equal to feedback offline detection value, the system begins timing for detection. If the detection time exceeds feedback offline detection time, the system will alarm PID feedback offline.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P10.11	PID dormancy wake up value	0.0~100.0% (reference source)	0.0~100.0%	0.0
P10.12	PID dormancy delay time	0.0~360.0s	0.0~360.0	1.0s

PID dormancy awakening value: If the system is in dormancy, PID feedback higher than dormancy value (negative) or lower than dormancy value (positive), PID will be waked up. Then system output frequency increases from 0 until PID feedback reaches PID preset again.

PID dormancy delay time: If the time is not 0, PID dormancy will be valid. After PID feedback reaches PID preset and work steadily, the system will keep current output frequency for PID dormancy delay time, then reduce frequency to 0 and enter dormancy state until PID is waked up again.

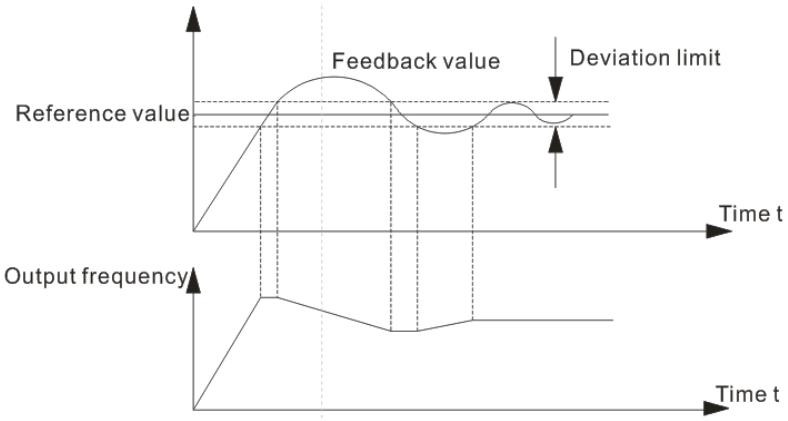


Fig 5.29 PID dormancy and PID dormancy wake up

As shown above, after the system starts running, output frequency increases, so does PID feedback. When the feedback reaches preset value within bias limit, the system remains current state for PID dormancy delay time P10.12, and then the frequency reduces to 0. Because of system inertia, PID feedback reduces slowly. When feedback value reaches the wake up value P10.11, the system will be waked up from dormancy, and then frequency increases, so does PID feedback.

P11 Group Multi-step speed control

In non-jogging mode, multi-step speed control has the highest priority. If the speed step is not 0, that is to say, the frequency setting or PID setting source is other modes, the system will run at multi-step speed mode.

Note: Only when the frequency setting or PID setting source is multi-step speed mode is step 0 valid.

When PID setting source is multi-step speed, the setting of multi-step speed is the percentage of PID reference rather than frequency.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P11.00	Multi-step speed reference	0: Terminal 1: Analog	0~1	0

0: Terminal: Refer to the description of P5

1: Analog: Refer to the description of P11.17

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P11.01	Multi-step speed 0	-100.0~100.0%	-100.0~100.0	0.0%
P11.02	Multi-step speed 1	-100.0~100.0%	-100.0~100.0	0.0%
P11.03	Multi-step speed 2	-100.0~100.0%	-100.0~100.0	0.0%
P11.04	Multi-step speed 3	-100.0~100.0%	-100.0~100.0	0.0%
P11.05	Multi-step speed 4	-100.0~100.0%	-100.0~100.0	0.0%
P11.06	Multi-step speed 5	-100.0~100.0%	-100.0~100.0	0.0%
P11.07	Multi-step speed 6	-100.0~100.0%	-100.0~100.0	0.0%
P11.08	Multi-step speed 7	-100.0~100.0%	-100.0~100.0	0.0%
P11.09	Multi-step speed 8	-100.0~100.0%	-100.0~100.0	0.0%
P11.10	Multi-step speed 9	-100.0~100.0%	-100.0~100.0	0.0%
P11.11	Multi-step speed 10	-100.0~100.0%	-100.0~100.0	0.0%

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P11.12	Multi-step speed 11	-100.0~100.0%	-100.0~100.0	0.0%
P11.13	Multi-step speed 12	-100.0~100.0%	-100.0~100.0	0.0%
P11.14	Multi-step speed 13	-100.0~100.0%	-100.0~100.0	0.0%
P11.15	Multi-step speed 14	-100.0~100.0%	-100.0~100.0	0.0%
P11.16	Multi-step speed 15	-100.0~100.0%	-100.0~100.0	0.0%

P11.01~ P11.16 are used to set the value of each step speed.

If the frequency setting source is multi-step speed, 100.0% corresponds to the maximum frequency P0.10. The sign of multi-step speed determines the running direction. Negative means reverse running. Multi-step speed range can be set continuously within -fmax~fmax. G5000 series variable frequency speed control systems can set 16-step speed.

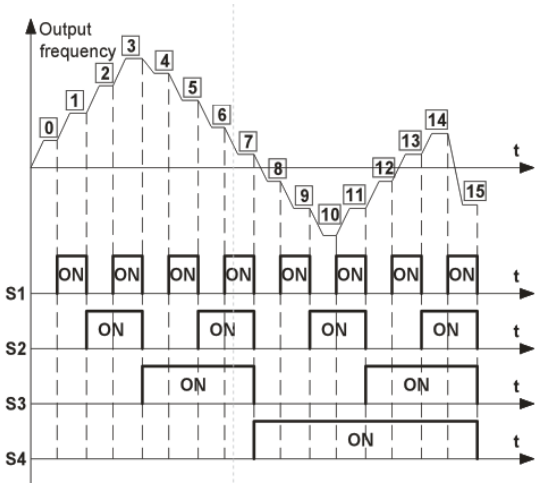


Fig 5.30 Multi-step speed operation

As for terminals mode, the step speed can be set by the combination of input terminals.

Set S1~S4 to multi-step speed input terminals. The following table shows the relationship between the terminals and steps.

S1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
S2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
S3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
S4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
Step	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

As for analog mode (P11.17), select analog input source at first and then set the step speed (P11.18~P11.33).

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P11.17	Analog input source	0: AI1 1: AI2 2: AI3	0~2	0

When P11.00=1, P11.17 is used to set the analog input source, AI1~AI3.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P11.18	Corresponding	-100.0~100.0%	-100.0~100.0	0.0%

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	analog of step 0			
P11.19	Corresponding analog of step 1	-100.0~100.0%	-100.0~100.0	0.0%
P11.20	Corresponding analog of step 2	-100.0~100.0%	-100.0~100.0	0.0%
P11.21	Corresponding analog of step 3	-100.0~100.0%	-100.0~100.0	0.0%
P11.22	Corresponding analog of step 4	-100.0~100.0%	-100.0~100.0	0.0%
P11.23	Corresponding analog of step 5	-100.0~100.0%	-100.0~100.0	0.0%
P11.24	Corresponding analog of step 6	-100.0~100.0%	-100.0~100.0	0.0%
P11.25	Corresponding analog of step7	-100.0~100.0%	-100.0~100.0	0.0%
P11.26	Corresponding analog of step 8	-100.0~100.0%	-100.0~100.0	0.0%
P11.27	Corresponding analog of step 9	-100.0~100.0%	-100.0~100.0	0.0%
P11.28	Corresponding analog of step 10	-100.0~100.0%	-100.0~100.0	0.0%
P11.29	Corresponding analog of step 11	-100.0~100.0%	-100.0~100.0	0.0%
P11.30	Corresponding analog of step 12	-100.0~100.0%	-100.0~100.0	0.0%
P11.31	Corresponding analog of step 13	-100.0~100.0%	-100.0~100.0	0.0%
P11.32	Corresponding analog of step 14	-100.0~100.0%	-100.0~100.0	0.0%
P11.33	Corresponding analog of step 15	-100.0~100.0%	-100.0~100.0	0.0%

P11.18~P11.33 are used to set corresponding steps of analog. Take AIn for example, P11.29<AIn≤P11.30, corresponding step 12, corresponding frequency P11.13*P0.10.

During step setting by analog, the step will be 15 if not satisfying the conditions of 0~14 step.

P12 Group Master-slave control

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.00	Master-slave mode selection	0: Power-balancing mode 1: Speed synchronous mode (reserved)	0~1	0

Power-balancing mode is the main mode of master-slave control that the motors are connected to work together in way of gearboxes, guide rails or shafts coupling and the powers among the motors are

distributed properly to reach corresponding control precision. The slaves are controlled by master communication.

Speed synchronous mode is used for multiple drives in synchronous running. It requires the system shall have pulse encoder feedback and communication connection.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.01	Master output signal source	0: Master output torque signal 1: Master output current signal 2: Master output PG signal (reserved)	0~2	0

The signals sent by the master to the slave are command signals, master running frequency signals and P12.01.

0: Master output torque signal: The master will send output torque to the slave.

1: Master output current signal: The master will send output current to the slave.

2: Master output PG signal: The function is reserved.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.02	Filter time of slave reference signal	0.00s~655.35s	0.00~655.35	0.00s

The function code is used to set the filter time of slave reference signal to eliminate influence caused by interference.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.03	PID adjustment amplitude limit	0.0~100.0%	0~100	100.0%

-P12.03≤PID output≤P12.03, when PID output is smaller than -P12.03, PID output=-P12.03; when PID output is larger than P12.03, PID output=P12.03.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.04	PID mode	0: Proportion plus integration as synchronous coefficient 1: Proportion plus integration as error correction	0~1	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.05	Slave reference frequency source gain	0.01~100.00	0.01~100.00	1.00
P12.06	Slave reference signal source gain	0.01~100.00	0.01~100.00	1.00

In master-slave control, the product of slave reference frequency source (reference signal 1) and P12.05 are internal operational frequency data. It is more convenient to adjust master and slave speed relationship flexibly.

As the same, in master-slave control, the product of slave reference signal source (reference signal 2) and P12.06 are internal operational signal data. It is more convenient to adjust master and slave speed

relationship flexibly.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.07	Master-slave proportional coefficient P1	0.000~6.5535	0.000~6.5535	0.100
P12.08	Master-slave integral coefficient I1	0.00s~655.35s	0.00~655.35	1.00s
P12.09	Low switching frequency of master-slave PI	0.00Hz~P12.12	0.00~P12.12	5.00Hz
P12.10	Master-slave proportional coefficient P2	0.000~6.5535	0.000~6.5535	10.0000
P12.11	Master-slave integral coefficient I2	0.00s~655.35s	0.00~655.35	6.00s
P12.12	High switching frequency of master-slave PI	P12.09~P0.10	P12.09~P0.10	10.00Hz

P12.07~P12.12 are used to set proportional coefficient and integral coefficient of slave PI adjustment.

The control diagram of master-slave power-balancing mode is shown as follows:

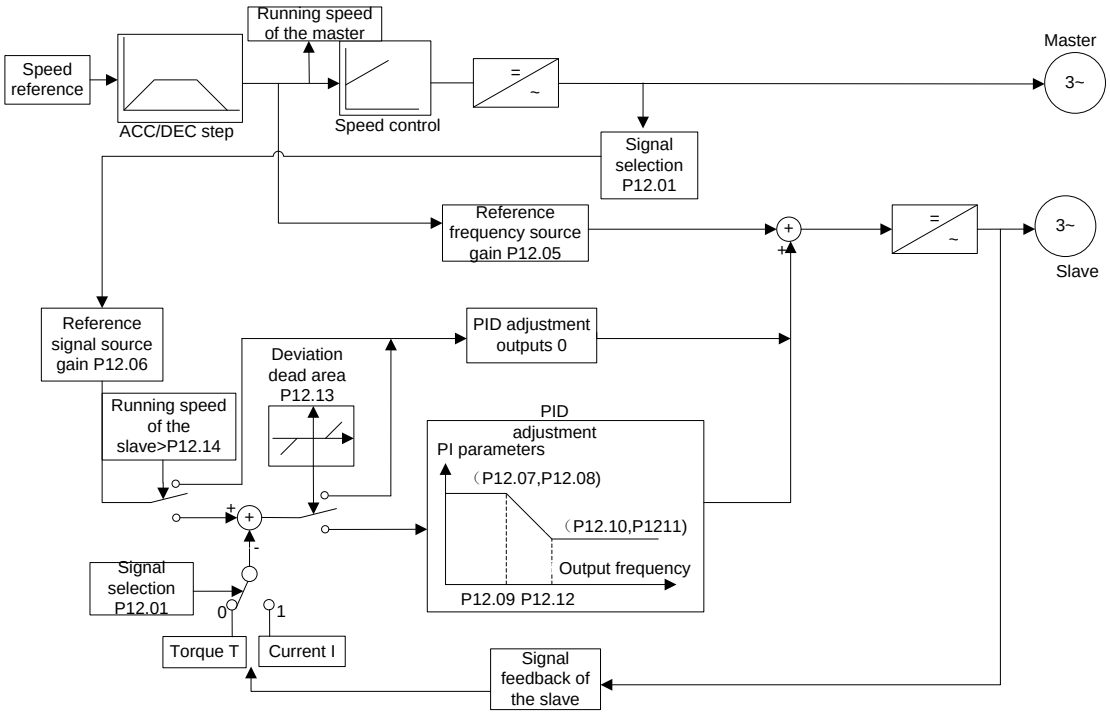


Fig 5.31 Master-slave flexible connection, the slave adopts speed control mode

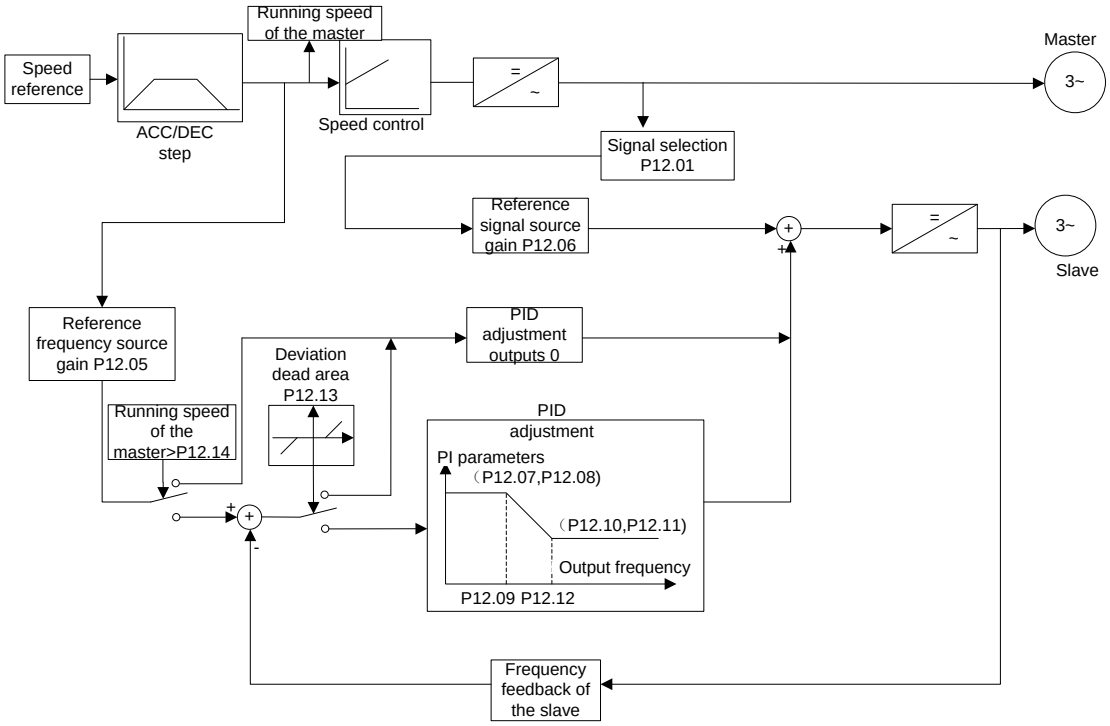


Fig 5.32 Master-slave rigid connection, the slave adopts torque control mode

High and low switching frequency of PI and corresponding PI coefficients are in the same switching way as speed loop PI parameters in P3. Please refer to the description of speed loop parameters in P3. Because PID adjustment is only fine adjustment on slave control signals, proportional and integral adjusting effect cannot be too strong. That is to say, set smaller proportional coefficient and larger integral coefficient.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.13	PI control deviation limit	0.0~80.0%	0.0~80.0	0.0%

PI output values correspond to the maximum deviation allowed by close loop reference, as shown below, PI adjuster stops adjusting in deviation limit. Setting the function code properly can control the precision and stability of PI system.

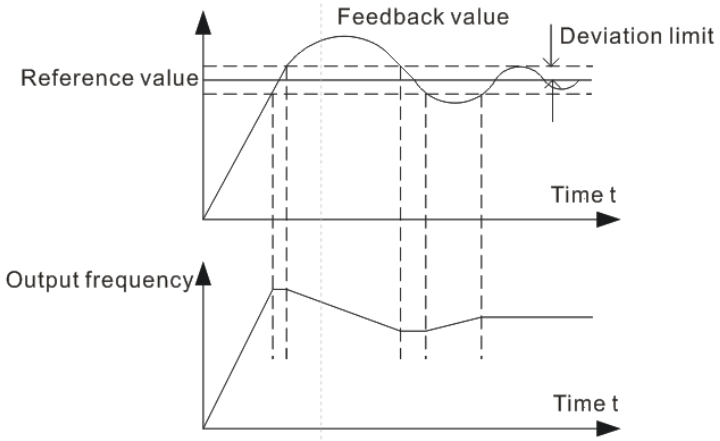


Fig 5.33 Deviation limit and corresponding output frequency

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.14	Lower limit of PI integral enabling deviation	0.0~100.0%	0.0~100.0	0.0%
P12.15	Master-slave control differential coefficient	0.00s~655.35s	0.00~655.35	0.00

P12.14 is defined when slave PI operation begins running under master-slave control. Only when the master speed exceeds lower limit of synchronous speed will the slave begin PI operation. The function code can perform PI adjustment after the slave starts running.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.16	Reserved	0~65536	0~65536	0
P12.17	Reserved	0~65536	0~65536	0
P12.18	Reserved	0~65536	0~65536	0
P12.19	Reserved	0~65536	0~65536	0
P12.20	Reserved	0~65536	0~65536	0
P12.21	Reserved	0~65536	0~65536	0
P12.22	Reserved	0~65536	0~65536	0
P12.23	Reserved	0~65536	0~65536	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.24	Master-slave control ID code	0~15	0~15	0
P12.25	Master-slave character	0~1	0~1	0
P12.26	Master-slave node state 1	0~0xFFFF	0~0xFFFF	0
P12.27	Master-slave node state 2	0~0xFFFF	0~0xFFFF	0

P12.24~P12.27 are mainly used for inquiry under master-slave control.

P12.24 is the code of the local, up to 16 in a master-slave control system and code 0~15, among which 0 represents the master and following codes represent the slaves in sequence.

P12.25 is the symbol of substituted master. If any fault occurs to the master, a substituted master will be selected from the slaves to control other slaves. At this time, P12.25=1.

P12.26 and P12.27 are the states of the master and the slaves. Two bits of the parameter mean a state for 16 machines at most.

00: Power off

01: Ready

10: Running

11: Fault

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.28	Master-slave optical fiber communication fault	0: Shield 1: Not shield	0~1	0

P12.28 is used to select whether to shield master-slave optical fiber communication fault. For one machine, set P12.28 to 0 to shield master-slave optical fiber communication fault.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P12.29	Master-slave type	0: Single master 1: Spare machine 2: Master 3: Slave	0~3	0
P12.30	KM1	0: Disabled 1: Enabled	0~1	0
P12.31	Reserved	0~65536	0~65536	0
P12.32	Reserved	0~65536	0~65536	0

P12.29 is used to set the master-slave type. When P12.29=0, the inverter will run independently; when P12.29=1, multiple for operation and one for spare, the inverter will be the spare machine; when P12.29=2, the inverter will be the master; when P12.29=3 (P0.01=3), the inverter will be the slave.

P12.30 is used in the application of multiple for operation and one for spare. When P12.30=1, by clicking the variable frequency 1 on the touch screen, the contactor KM1 closes; when P12.30=0, cope it with normal mode.

P13 Group Protective parameters

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.00	Output phase loss protection	0: Disabled 1: Enabled	0~1	1

The function code is used to select whether the system performs output phase loss protection.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.01	Motor overload protection	0: No protection 1: Common motor (with low speed compensation) 2: Variable frequency motor (without low speed compensation)	0~2	2

0: No protection

The system has no motor overload protection. Please use with cautions.

1: Common motor (with low speed compensation)

For common motors, their heat emission will be bad at low speed, so corresponding heat protection value shall be adjusted properly. Low speed compensation is to decrease overload protection threshold when the running frequency of the motor is below 30Hz.

2: Variable frequency motor (without low speed compensation)

Because heat emission of converter inverters is not affected by their speed, there is no need to adjust protection value at low speed.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.02	Motor overload protective coefficient	20.0%~120.0% (motor rated current)	20.0~120.0	100.0%

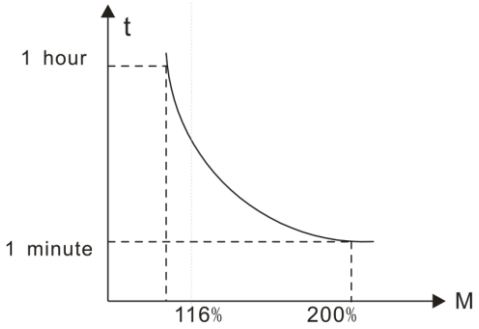


Fig 5.34 Motor overload protective coefficient setting

Times of motor overload M=Iout/(In*K)

In is the rated current of the motor, Iout is the output current of the inverter and K is the motor overload protective coefficient. So, the bigger the value of K is, the smaller the value of M is. When M=116%, protect after the motor overloads 1 hour; when M=200%, protect after the motor overloads 1 minute; when M>=400%, protect immediately.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.03	Frequency decreasing point at sudden power loss	200~900V	200~900	650V
P13.04	Frequency decreasing ratio at sudden power loss	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	3.00Hz

When the frequency decreasing ratio at instantaneous power off is set to 0, decreasing frequency at instantaneous power off is invalid.

After the grid powers off, bus voltage decreases to frequency decreasing point at sudden power loss. Then the system begins decreasing running frequency according to P13.04 to keep the motor in power generation and make the feedback energy maintain the bus voltage. The system will work properly until power on again.

Note: Adjusting above two parameters properly can avoid stop caused by grid voltage drop at the start of heavy load.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.05	Overvoltage speed loss protection	0: Disabled 1: Enabled	0~1	1
P13.06	Overvoltage speed loss voltage protection	950~1280V	950~1280	1150V

During DEC running of the system, due to load inertia, the actual decreasing ratio of the motor speed is

lower than the decreasing ratio of output frequency. At this time, the motor will feedback energy to the system, which will make the bus voltage increase. The trips of the system will be caused by overvoltage fault if there are not any measures.

During the running of the system, overvoltage speed loss protection will detect unit bus voltage and compare it with overvoltage speed loss point defined in P13.06. If more than overvoltage speed loss point, the output frequency of the system will stop decreasing. If unit bus voltage is lower than overvoltage speed loss point, the system will continue DEC running.

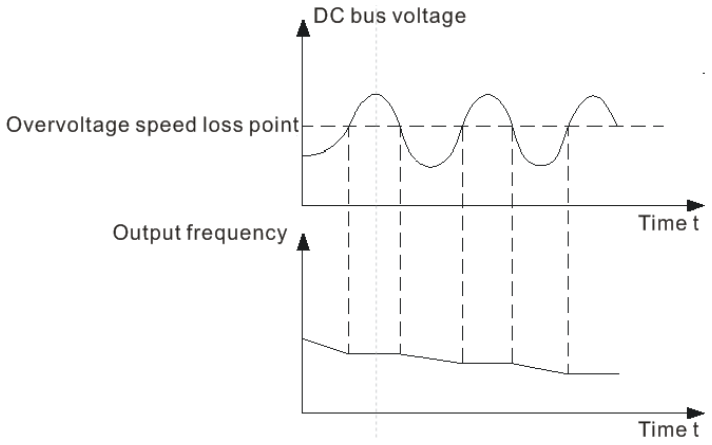


Fig 5.35 Overvoltage speed loss

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.07	Automatic current limit level	50~200%	50~200	140%
P13.08	Frequency decreasing ratio during current limit	0.00~10.00Hz (0.00 means overcurrent speed loss is invalid.)	0.00~10.00	10.00Hz

During ACC running of the system, due to heavy load, the actual increasing ratio of the motor speed is lower than the increasing ratio of output frequency. The trips of the system will be caused by the ACC overcurrent fault if there are not any measures.

During the running of the system, this function will detect the output current and compare it with the limit level defined in P13.07. If it exceeds the level, the system will run at stable frequency during ACC running, while the system will derate to run during the constant running. If it exceeds the level continuously, the output frequency will keep decreasing to 0. If the detected output current is lower than the limit level, the system will continue ACC running.

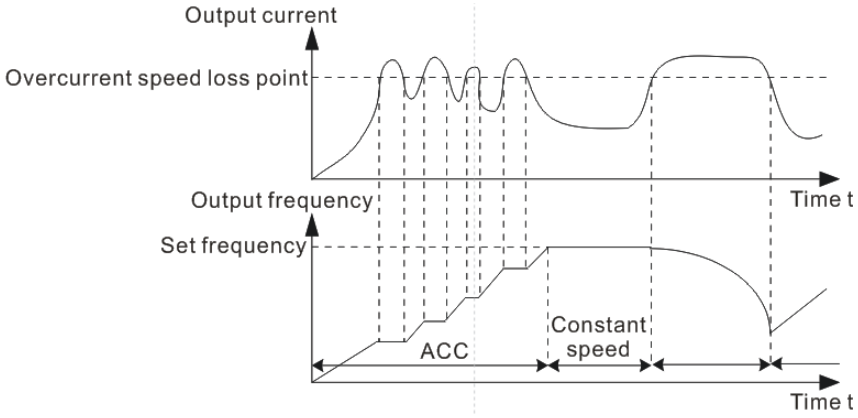


Fig 5.36 Automatic current limit level

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.09	Input overvoltage pre-alarm point	105~120%	105~120	110%

P13.09 is set to pre-alarm point of input voltage detection. When the actual input voltage exceeds pre-alarm point, the system will alarm. The value corresponds to the percentage of rated input voltage.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.10	Unit bypass function	0: Manual bypass 1: Common automatic bypass 2: Neutral point drifting bypass	0~2	0
P13.11	Unit manual bypass setting	0x000~0x1FF	0x000~0x1FF	Depend on inverter voltage

P13.10 is used to set bypasses of the system.

0: Manual bypass

When the unit has some faults, it will not be bypassed automatically. If users want to bypass the unit, set P13.11. Bypassing a unit in a phase will bypass the units of other two phases in corresponding places.

1: Common automatic bypass

When the unit has some faults, the system will not alarm and automatically bypass the unit in fault. At this time, P13.11 is invalid. Bypassing a unit in a phase will bypass the units of other two phases in corresponding places.

2: Neutral point drifting bypass

When the unit has some faults, the system will not alarm and automatically bypass the unit in fault. It only bypasses the unit in fault.

G5000 series variable frequency speed control systems support 12 units in series at most. P13.11 adopts hex, one bit corresponding to one unit. When corresponding bit is 1, do not bypass the unit; when corresponding bit is 0, bypass the unit.

Note: Bypass 2 units in each phase at most and ensure effective units are no less than 2. The output capacity of the system will reduce after bypassing and derating will be necessary.

Note: Because asymmetric bypasses cannot use PWM modulation, neutral point drifting bypass is suggested to be used in bad conditions or in cases where faults easily occur to units. Common automatic bypass is suggested in good conditions.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.12	Hardware overcurrent point	50~200% (inverter rated current)	50~200	195%
P13.13	Hardware current limit point	50~200% (inverter rated current)	50~200	195%

P13.12 is used to set hardware overcurrent point. When output current of the system exceeds hardware overcurrent point, the system will alarm overcurrent.

P13.13 is used to set hardware current limit point. When output current of the system exceeds hardware current limit point, the system will begin hardware current limit.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.14	Power frequency bypass action at fault	0: Manual power frequency bypass 1: Automatic power frequency bypass	0~1	0

The function code is used to set whether the system will automatically switch from variable frequency into power frequency bypass at fault.

0: Manual power frequency bypass

When the system has some faults, it will coast to stop, or cut off input power supply when it coasts to stop according to how bad the faults are.

1: Automatic power frequency bypass

After the system has some faults, it will coast to stop and simultaneous make the motor switch from variable frequency into power frequency bypass. The motor continue running.

Note: When switching from variable frequency into power frequency, the motor will run from current frequency to power frequency. Sudden load change and current surge may easily occur, so use with cautions.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P13.15	Low frequency surge suppression factor	0~100	0~100	10
P13.16	High frequency surge suppression factor	0~100	0~100	0
P13.17	Frequency threshold of surge suppression	0.00~120.00Hz	0.00~120.00	15.00Hz

Current surge may easily occur to some motors in V/F control, especially large power motors. It will cause instability of the motors or even overcurrent of the system. Based on different conditions, it is necessary to adjust surge suppression factor by P13.15 and P13.16.

Frequency threshold of surge suppression refers to the coverage of low and high frequency surge suppression factors. If the running frequency is below P13.17, use suppression strength specified by P13.15. If the running frequency is above P13.17, use suppression strength specified by P13.16.

Note: It is not definitely better when low and high frequency surge suppression factors are high. If the factors do not match with the features of the motor, current surge will increase.

P14 Group Control parameters of synchronous motor

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P14.00	Excitation mode	0: Manual 1: Automatic	0~1	1

When the system controls synchronous motors, P14.00 is used to set the excitation mode of synchronous motors.

0: Manual: The system will not adjust exciting current.

1: Automatic: The system will automatically adjust exciting current according to power factors.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P14.01	Initial percentage of automatic excitation	0.0%~100.0%	0.0~100.0%	0.0
P14.02	Starting frequency of automatic excitation	0.00Hz~50.00Hz	0.00~50.00	0.00

When P14.00=1, P14.01 is used to set the initial percentage of automatic excitation corresponding to the percentage of rated exciting current. When the output frequency of the system reaches P14.02, the power factor will close loop and automatic excitation will start.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P14.03	Output power factor setting	0.0%~200.0%	0.0~200.0	0.0

P14.03 is used to set the output power factor. 0.0%~100.0% means the load characteristic of the motor is inductive, 0.0% corresponds to power factor 0 and 100.0% corresponds to power factor 1. 100.0%~200.0% means the load characteristic of the motor is capacitive, 200% corresponds to power factor 0 and 100.0% corresponds to power factor 1.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P14.04	Corresponding voltage of exciting analog 0%	0.00V~P14.05	0.00~P14.05	0.00
P14.05	Corresponding voltage of exciting analog 100%	P14.04~10.0V	P14.04~10.00	10.00

P14.04 and P14.05 correspond to the maximum and minimum voltage of exciting analog respectively, 100% corresponding to the maximum value and 0% to the minimum value.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P14.06	Low frequency surge suppression factor of synchronous motor	0~100	0~100	10
P14.07	High frequency surge suppression factor of synchronous motor	0~100	0~100	0
P14.08	Frequency threshold of surge suppression of synchronous motor	0.00~120.00Hz	0.00~120.00	15.00Hz
P14.09	Frequency switch of surge	0.00~120.00Hz	0.00~120.00	0.00Hz

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	suppression of synchronous motor			

P14.06-P14.09 are used for synchronous motors in V/F control, for example, compressors. When the output frequency of the system reaches P14.09, surge suppression is valid. At this time, use P14.07 if the frequency above P14.08 and use P14.06 if the frequency below P14.08.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P14.10	Exciting current reference at power frequency	0.0%~100.0%	0.0~100.0	0

P15 Group Switch cabinet control

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.00	Variable frequency switching to power frequency delay	0.0~60.0s	0.0~60.0	2.0s

When the motor switches from variable frequency to power frequency, the switch will act after delay time set by P15.00.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.01	QF configuration mode	0: Independent 1: Two into one	0~1	0

P15.01 is used to set QF configuration modes at power frequency and variable frequency.

0: Power frequency and variable frequency has independent QF

1: Power frequency and variable frequency share one QF

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.02	Command channel	0: Local control 1: Master control	0~1	0

P 15.02 is used to set the command channel of the slave.

0: The commands are given by the local. That is to say, the switching of power frequency and variable frequency is controlled by the local.

1: The commands are given by the master. That is to say, the switching of power frequency and variable frequency is controlled by the master.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.03	Synchronous switching enabling	0: Invalid 1: Valid	0~1	0

The function code can achieve the switching of power frequency and variable frequency. P15.03=1, synchronous switching is enabled.

0: Invalid: Large current surge during switching

1: Valid: Switch into power frequency after phase locking, with small current surge

Note: When the system alarms synchronous switching fault, it indicates failure of KM4 switching off or incorrect switching off feedback. It is necessary to check whether the contact of KM4 is damaged or feedback is incorrect. After KM4 acts and feedbacks properly, restart the system to continue synchronous switching.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.04	QF1 configuration information 1	Set configuration information of switch cabinet 1~4, QF1 configuration information set independently by 4 bits, 0000~0100 valid: 0000: No common use 0001: The 1st group of QF1 in common use 0010: The 2nd group of QF1 in common use 0011: The 3rd group of QF1 in common use 0100: The 4th group of QF1 in common use	0~FFFF	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.05	QF1 configuration information 2	Set configuration information of switch cabinet 5~8, QF1 configuration information set independently by 4 bits, 0000~0100 valid: 0000: No common use 0001: The 1st group of QF1 in common use 0010: The 2nd group of QF1 in common use 0011: The 3rd group of QF1 in common use 0100: The 4th group of QF1 in common use	0~FFFF	0

P15.04 and P15.05 are used for configuration information of switch cabinets in common use when two or above inputs share one group of QF1. For example, when P15.04=0x0011, switch cabinet 1 and 2 share the 1st group of QF1. When P15.05=0x3033, switch cabinet 5, 6 and 8 share the 3rd group of QF1.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.06	Synchronous switching reactor	0~1000V	0~1000	50

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	voltage			

The function is used to compensate voltage drop of the reactor and the parameter is set according to reactance and current.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P15.07	KM1 configuration information 1	Set configuration information of switch cabinet 1~4, QS1/KM1 configuration information set independently by 4 bits, 0000~0100 valid: 0000: No common use 0001: The 1st group of QS1/KM1 in common use 0010: The 2nd group of QS1/KM1 in common use 0011: The 3rd group of QS1/KM1 in common use 0100: The 4th group of QS1/KM1 in common use	0~FFFF	0
P15.08	KM1 configuration information 2	Set configuration information of switch cabinet 5~8, QS1/KM1 configuration information set independently by 4 bits, 0000~0100 valid: 0000: No common use 0001: The 1st group of QS1/KM1 in common use 0010: The 2nd group of QS1/KM1 in common use 0011: The 3rd group of QS1/KM1 in common use 0100: The 4th group of QS1/KM1 in common use	0~FFFF	0

P15.07 and P15.08 are used for configuration information of switch cabinets in common use when two or above inputs share one group of QS1/KM1. For example, when P15.07=0x0011, switch cabinet 1 and 2 share the 1st group of QS1/KM1. When P15.08=0x3033, switch cabinet 5, 6 and 8 share the 3rd group of QS1/KM1.

For each switch of the switch cabinets in P15.04, P15.05, P15.07 and P15.08, refer to Fig 5.15 One-drive-more control in P5 group.

P16 Group Serial communication

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P16.00	Local MODBUS address	1~247 (0: broadcast address)	1~247	1

The function code is used to set MODBUS communication address. When slave communication address is set to 0 (broadcast address), all the slaves will accept the frame without response. In the same MODBUS network, local communication address is unique and slave address cannot be repeated. It is the foundation to achieve point-to-point communication between the upper computer and the system.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P16.01	MODBUS baud rate	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	0~5	4

The function code is used to set the baud rate of the system. If the baud rate is different from the primary node, communication will fail. (Note: BPS, abbreviation of bit per second, means how many bits in every second.)

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P16.02	MODBUS data check	0: No check (N, 8, 2) for RTU 1: Even check (E, 8, 1) for RTU 2: Odd check (O, 8, 1) for RTU	0~2	1

The parameter sets MODBUS communication format:

0: Communication mode (RTU), 8bit, no check, 2bit end of the bit number

1: Communication mode (RTU), 8bit, 1bit even check, 1bit end of the bit number

2: Communication mode (RTU), 8bit, 1bit odd check, 1bit end of the bit number

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P16.03	Communication response delay time	0~200ms	0~200	5

P16.03 is used to set the interval time between data receiving from upper computer and response sending to upper computer. If response delay is smaller than system processing time, the parameter may be subject to system processing time; if response delay is larger than system processing time, the system needs to delay after data processing and sends data to upper computer after delay time arrival.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P16.04	Communication timeout fault time	0.0 (invalid), 0.1~100.0s	0.0~100.0	0.0s

When the function code is set to 0.0s, it is invalid.

When the function code is valid, the system will alarm MODBUS communication fault if the interval

between current and next communication exceeds communication response delay time.
Generally, the parameter is invalid. In continuous communication, set the parameter to monitor the communication state.

P17 Group Ethernet

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P17.00	High bit of local IP address	0~0XFFFF (high bit)	0~0XFFFF	0XC0A8
P17.01	Low bit of local IP address	0~0XFFFF (low bit)	0~0XFFFF	0X102
P17.02	High bit of local subnet mask	0~0XFFFF (high bit)	0~0XFFFF	0XFFFF
P17.03	Low bit of local subnet mask	0~0XFFFF (low bit)	0~0XFFFF	0XFF00
P17.04	High bit of local gateway	0~0XFFFF (high bit)	0~0XFFFF	0XC0A8
P17.05	Low bit of local gateway	0~0XFFFF (low bit)	0~0XFFFF	0X101
P17.06	High bit of local MAC	0~0XFFFF (high bit)	0~0XFFFF	0X5254
P17.07	Medium bit of local MAC	0~0XFFFF (medium bit)	0~0XFFFF	0X4C19
P17.08	Low bit of local MAC	0~0XFFFF (low bit)	0~0XFFFF	0XF742

P17.00~P17.08 are used to set the IP addresses, subnet masks and MAC addresses for Ethernet communication. The parameters can be modified in setting mode; it will be read-only but unmodifiable in common mode.

IP address format: P17.00-P17.01

Example: IP address is C0.A8.01.02 (hex), that is to say, 192.168.1.2 (decimal)

IP subnet mask format: P17.02-P17.03

Example: Subnet mask is FF.FF.FF.00 (hex), that is to say, 255.255.255.0 (decimal)

Gateway format: P17.04.P17.05

Example: Gateway is C0.A8.01.01 (hex), that is to say, 192.168.1.1 (decimal)

MAC address format: P17.06.P17.07. P17.08

Example: MAC address is 52.54.4C.19.F7.42 (hex)

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P17.09	Log level of DSP command and control	0: No log 1: Fatal 2: Error 4: Key information 8: Prompt message Combination of above levels	0~15	0
P17.10	Log level of DSP speed control		0~15	0
P17.11	Log level of DSP torque calculation		0~15	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P17.12	Log level of DSP current loop		0~15	0
P17.13	Log level of DSP oscillograph calculation		0~15	0
P17.14	Log level of DSP fault management		0~15	0
P17.15	Log level of DSP parameters inquiry		0~15	0

G5000 series variable frequency speed control systems have the function of log history. P17.09~P17.15 are used to set the log levels of each functional module, which have 4 levels (bit3~bit0) marking the log level of current module. When the log level is 1, the log of current module is recorded.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P17.16	Log level of ARM start-stop control	0: No log 1: Fatal 2: Error 4: Key information 8: Prompt message Combination of above levels	0~15	0
P17.17	Log level of ARM frequency reference		0~15	0
P17.18	Log level of ARM faults diagnosis		0~15	0
P17.19	Log level of ARM frequency calculation		0~15	0
P17.20	Log level of ARM switch cabinets		0~15	0
P17.21	Log level of ARM function codes		0~15	0
P17.22	Log level of ARM terminal functions		0~15	0
P17.23	Log level of ARM UDP/IP		0~15	0
P17.24	Log level of ARM MODBUS		0~15	0
P17.25	Log level of ARM PROFIBUS		0~15	0
P17.26	Log level of ARM master-slave		0~15	0

Log levels of P17.16~P17.26 ARM are the same as those of P17.09~P17.15 DSP.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P17.27	Log receiving IP high bit	0~0XFFFF (high bit)	0~0XFFFF	0

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P17.28	Log receiving IP low bit	0~0XFFFF (low bit)	0~0XFFFF	0

The function codes are used for log receiving IP address of the upper computer.

P18 Group PROFIBUS

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P18.00	Module type	0: Not connected 1: PROFIBUS	0~1	0

P18.00 sets the types of PROFIBUS communication and users cannot adjust the parameter.

0: PROFIBUS communication card is not connected.

1: PROFIBUS

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P18.01	Module address	0~99	0~99	2

In PROFIBUS, each device corresponds to a unique node address. If the selective switch of the node address (on DP extension card) is at 0, the parameter can be used to define the node address.

If the selective switch of the node address (on DP extension card) is used to define the node address when the switch is not at 0, the parameter will be only used to display the node address.

After resetting the node address, restart the system to initialize PROFIBUS communication module.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P18.02	PZD2 receiving	0: Invalid 1: Frequency reference 2: Torque reference 3: Reserved 4: PID reference 5: PID feedback 6: V/F separation voltage reference 7~20: Reserved	0~20	1
P18.03	PZD3 receiving		0~20	2
P18.04	PZD4 receiving		0~20	3
P18.05	PZD5 receiving		0~20	0
P18.06	PZD6 receiving		0~20	0
P18.07	PZD7 receiving		0~20	0
P18.08	PZD8 receiving		0~20	0
P18.09	PZD9 receiving		0~20	0
P18.10	PZD10 receiving		0~20	0
P18.11	PZD11 receiving		0~20	0
P18.12	PZD12 receiving		0~20	0

The master and the system exchange data quickly by PROFIBUS-DP protocol and the data frame is 16 bits, as shown below:

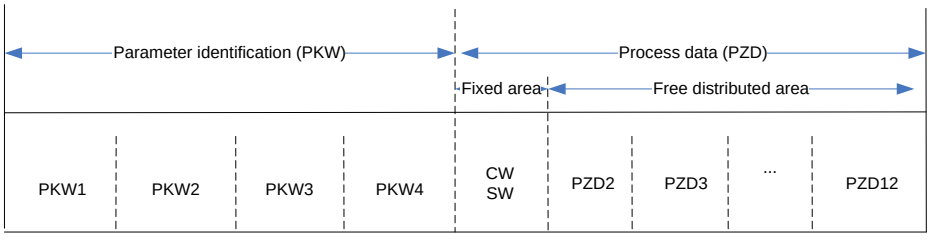


Fig 5.37 Structure of PROFIBUS-DP data frame

P18.02~P18.12 are used to set PZD2~PZD12 receiving data of master communication in

PROFIBUS-DP, as described below:

Value	Function	Illustration
0	Invalid	No meaning
1	Frequency reference	The master sends frequency reference to the inverter; data form: percentage, integer, -10000~+10000, with 2 digits after the decimal point; unit: %; for example, 5000 is 50.00%
2	Torque reference	The master sends torque reference to the inverter; data form: percentage, integer, -1000~+1000, with 2 digits after the decimal point; unit: %; for example, 500 is 50.0%
3	Reserved	
4	PID reference	Under PID mode, the master can set PID reference; data form: percentage, integer, -10000~+10000, with 2 digits after the decimal point; unit: %; for example, 5000 is 50.00%
5	PID feedback	Under PID mode, the master can set PID feedback; data form: percentage, integer, -10000~+10000, with 2 digits after the decimal point; unit: %; for example, 5000 is 50.00%
6	V/F separation voltage reference	When V/F separation is valid, set voltage reference via the master with 1 digit after the decimal point; for example, 100 is 10.0%, range 0%~100.0%
7~20	Reserved	

P18.02~P18.12 function codes can be modified at any state.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P18.13	PZD2 sending	0: Invalid	0~30	9
P18.14	PZD3 sending	1: Running frequency	0~30	2
P18.15	PZD4 sending	2: Reserved	0~30	11
P18.16	PZD5 sending	3: Input voltage	0~30	6
P18.17	PZD6 sending	4: Output voltage	0~30	1
P18.18	PZD7 sending	5: Output current	0~30	5
P18.19	PZD8 sending	6: Output torque actual value	0~30	4
P18.20	PZD9 sending	7: Output power percentage	0~30	0
P18.21	PZD10 sending	8: Set frequency absolute value	0~30	0
P18.22	PZD11 sending	9: Current DSP fault	0~30	0
P18.23	PZD12 sending	10: Current ARM fault 1 11: Current ARM fault 2 12: Current unit fault 13: Current unit number at fault 14: User input terminal 15: System input terminal 16: User output terminal 1 17: User output terminal 2 18~30: Reserved	0~30	0

P18.13~P18.23 are used to set PZD2~PZD12 sending data of master communication in PROFIBUS-DP, as described below:

Value	Function	Illustration
0	Invalid	No meaning
1	Running frequency	PZD sends data (running frequency, actual value, integer, with 2 digits after the decimal point, unit: Hz) to the upper master
2	Reserved	
3	Input voltage	PZD sends data (input voltage, actual value, integer, with one decimal place, unit: V) to the upper master
4	Output voltage	PZD sends data (output voltage, actual value, integer, unit: V) to the upper master
5	Output current	PZD sends data (output current, actual value, integer, with one decimal place, unit: A) to the upper master
6	Output torque actual value	PZD sends data (output torque, percentage, integer, with one decimal place, unit: %) to the upper master
7	Output power percentage	PZD sends data (output power, corresponding percentage of motor rated power, integer, with one decimal place, unit: %) to the upper master
8	Set frequency absolute value	PZD sends data (set frequency, actual value, integer, with 2 digits after the decimal point, unit: Hz) to the upper master
9	Current DSP fault	The same as P9.46
10	Current ARM fault 1	The same as P9.47
11	Current ARM fault 2	The same as P9.48
12	Current unit fault	The same as P9.49
13	Current unit number at fault	The same as P9.50
14	User input terminal	The same as P6.61
15	System input terminal	The same as P6.60
16	User output terminal 1	The same as P6.63
17	User output terminal 2	The same as P6.64
18-30	Reserved	

P18.13~P18.23 can be modified at any state.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P18.24	Temporary variable	0~65535	0~65535	0

The parameter is used to be temporary variable for PZD sending data and it can be modified at any state.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P18.25	DP communication timeout fault time	0.0 (invalid), 0.1~100.0s	0.0~100.0	0.0s

When P18.25=0.0s, PROFIBUS-DP timeout fault is invalid. When P18.25 is set to non-zero (actual value, unit: second) and the interval between the present and next communication exceeds the communication timeout time, the system will alarm DP communication fault (PCF).

P18.25 can be modified at any state.

P19 Group Motor parameters 2

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P19.00	Motor 2 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P19.01	Rated power of asynchronous motor 2	4~50000kW	4~50000	Depend on model
P19.02	Rated frequency of asynchronous motor 2	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.03	Rated speed of asynchronous motor 2	1~36000rpm	1~36000	Depend on model
P19.04	Rated voltage of asynchronous motor 2	0~20000V	0~20000	Depend on model
P19.05	Rated current of asynchronous motor 2	0.1~1000.0A	0.1~1000.0	Depend on model
P19.06	Stator resistance of asynchronous motor 2	0.001~65.535Ω	0.001~65.535	Depend on model
P19.07	Rotor resistance of asynchronous motor 2	0.001~65.535Ω	0.001~65.535	Depend on model
P19.08	Inductance of asynchronous motor 2	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.09	Mutual inductance of asynchronous motor 2	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.10	Non-load current of asynchronous motor 2	0.01~655.35A	0.01~655.35	Depend on model
P19.11	Rated power of synchronous motor 2	4~50000kW	4~50000	Depend on model
P19.12	Rated frequency of synchronous motor 2	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.13	Rated speed of synchronous motor	0~36000rpm	0~36000	1500rpm

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	2			
P19.14	Number of pole pairs for synchronous motor 2	1~50	1~50	2
P19.15	Rated voltage of synchronous motor 2	0~20000V	0~20000	Depend on model
P19.16	Rated current of synchronous motor 2	0.1~1000.0A	0.1~1000.0	Depend on model
P19.17	Stator resistance of synchronous motor 2	0.001~65.535Ω	0.001~65.535	Depend on model
P19.18	Direct axis inductance of synchronous motor 2	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.19	Quadrature axis inductance of synchronous motor 2	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.20	Back emf constant of synchronous motor 2	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P19.21	Motor 3 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P19.22	Rated power of asynchronous motor 3	4~50000kW	4~50000	Depend on model
P19.23	Rated frequency of asynchronous motor 3	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.24	Rated speed of asynchronous motor 3	1~36000rpm	1~36000	Depend on model
P19.25	Rated voltage of asynchronous motor 3	0~20000V	0~20000	Depend on model

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P19.26	Rated current of asynchronous motor 3	0.1~1000.0A	0.1~1000.0	Depend on model
P19.27	Stator resistance of asynchronous motor 3	0.001~65.535Ω	0.001~65.535	Depend on model
P19.28	Rotor resistance of asynchronous motor 3	0.001~65.535Ω	0.001~65.535	Depend on model
P19.29	Inductance of asynchronous motor 3	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.30	Mutual inductance of asynchronous motor 3	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.31	Non-load current of asynchronous motor 3	0.01~655.35A	0.01~655.35	Depend on model
P19.32	Rated power of synchronous motor 3	4~50000kW	4~50000	Depend on model
P19.33	Rated frequency of synchronous motor 3	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.34	Rated speed of synchronous motor 3	0~36000rpm	0~36000	1500rpm
P19.35	Number of pole pairs for synchronous motor 3	1~50	1~50	2
P19.36	Rated voltage of synchronous motor 3	0~20000V	0~20000	Depend on model
P19.37	Rated current of synchronous motor 3	0.1~1000.0A	0.1~1000.0	Depend on model
P19.38	Stator resistance of synchronous motor 3	0.001~65.535Ω	0.001~65.535	Depend on model
P19.39	Direct axis inductance of	0.1~6553.5mH	0.1~6553.5	Depend on model

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	synchronous motor 3			
P19.40	Quadrature axis inductance of synchronous motor 3	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.41	Back emf constant of synchronous motor 3	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P19.42	Motor 4 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P19.43	Rated power of asynchronous motor 4	4~50000kW	4~50000	Depend on model
P19.44	Rated frequency of asynchronous motor 4	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.45	Rated speed of asynchronous motor 4	1~36000rpm	1~36000	Depend on model
P19.46	Rated voltage of asynchronous motor 4	0~20000V	0~20000	Depend on model
P18.47	Rated current of asynchronous motor 4	0.1~1000.0A	0.1~1000.0	Depend on model
P19.48	Stator resistance of asynchronous motor 4	0.001~65.535Ω	0.001~65.535	Depend on model
P19.49	Rotor resistance of asynchronous motor 4	0.001~65.535Ω	0.001~65.535	Depend on model
P19.50	Inductance of asynchronous motor 4	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.51	Mutual inductance of asynchronous motor 4	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.52	Non-load current of	0.01~655.35A	0.01~655.35	Depend

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	asynchronous motor 4			on model
P19.53	Rated power of synchronous motor 4	4~50000kW	4~50000	Depend on model
P19.54	Rated frequency of synchronous motor 4	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.55	Rated speed of synchronous motor 4	0~36000rpm	0~36000	1500rpm
P19.56	Number of pole pairs for synchronous motor 4	1~50	1~50	2
P19.57	Rated voltage of synchronous motor 4	0~20000V	0~20000	Depend on model
P19.58	Rated current of synchronous motor 4	0.1~1000.0A	0.1~1000.0	Depend on model
P19.59	Stator resistance of synchronous motor 4	0.001~65.535Ω	0.001~65.535	Depend on model
P19.60	Direct axis inductance of synchronous motor 4	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.61	Quadrature axis inductance of synchronous motor 4	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.62	Back emf constant of synchronous motor 4	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P19.63	Motor 5 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P19.64	Rated power of asynchronous	4~50000kW	4~50000	Depend on model

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	motor 5			
P19.65	Rated frequency of asynchronous motor 5	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.66	Rated speed of asynchronous motor 5	1~36000rpm	1~36000	Depend on model
P19.67	Rated voltage of asynchronous motor 5	0~20000V	0~20000	Depend on model
P19.68	Rated current of asynchronous motor 5	0.1~1000.0A	0.1~1000.0	Depend on model
P19.69	Stator resistance of asynchronous motor 5	0.001~65.535Ω	0.001~65.535	Depend on model
P19.70	Rotor resistance of asynchronous motor 5	0.001~65.535Ω	0.001~65.535	Depend on model
P19.71	Inductance of asynchronous motor 5	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.72	Mutual inductance of asynchronous motor 5	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.73	Non-load current of asynchronous motor 5	0.01~655.35A	0.01~655.35	Depend on model
P19.74	Rated power of synchronous motor 5	4~50000kW	4~50000	Depend on model
P19.75	Rated frequency of synchronous motor 5	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P19.76	Rated speed of synchronous motor 5	0~36000rpm	0~36000	1500rpm
P19.77	Number of pole pairs for synchronous motor 5	1~50	1~50	2
P19.78	Rated voltage of	0~20000V	0~20000	Depend

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	synchronous motor 5			on model
P19.79	Rated current of synchronous motor 5	0.1~1000.0A	0.1~1000.0	Depend on model
P19.80	Stator resistance of synchronous motor 5	0.001~65.535Ω	0.001~65.535	Depend on model
P19.81	Direct axis inductance of synchronous motor 5	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.82	Quadrature axis inductance of synchronous motor 5	0.1~6553.5mH	0.1~6553.5	Depend on model
P19.83	Back emf constant of synchronous motor 5	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

P20 Group Motor parameters 3

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P20.00	Motor 6 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P20.01	Rated power of asynchronous motor 6	4~50000kW	4~50000	Depend on model
P20.02	Rated frequency of asynchronous motor 6	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P20.03	Rated speed of asynchronous motor 6	1~36000rpm	1~36000	Depend on model
P20.04	Rated voltage of asynchronous motor 6	0~20000V	0~20000	Depend on model
P20.05	Rated current of asynchronous motor 6	0.1~1000.0A	0.1~1000.0	Depend on model
P20.06	Stator resistance of	0.001~65.535Ω	0.001~65.535	Depend

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	asynchronous motor 6			on model
P20.07	Rotor resistance of asynchronous motor 6	0.001~65.535Ω	0.001~65.535	Depend on model
P20.08	Inductance of asynchronous motor 6	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.09	Mutual inductance of asynchronous motor 6	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.10	Non-load current of asynchronous motor 6	0.01~655.35A	0.01~655.35	Depend on model
P20.11	Rated power of synchronous motor 6	4~50000kW	4~50000	Depend on model
P20.12	Rated frequency of synchronous motor 6	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P20.13	Rated speed of synchronous motor 6	0~36000rpm	0~36000	1500rpm
P20.14	Number of pole pairs for synchronous motor 6	1~50	1~50	2
P20.15	Rated voltage of synchronous motor 6	0~20000V	0~20000	Depend on model
P20.16	Rated current of synchronous motor 6	0.1~1000.0A	0.1~1000.0	Depend on model
P20.17	Stator resistance of synchronous motor 6	0.001~65.535Ω	0.001~65.535	Depend on model
P20.18	Direct axis inductance of synchronous motor 6	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.19	Quadrature axis inductance of	0.1~6553.5mH	0.1~6553.5	Depend on model

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	synchronous motor 6			
P20.20	Back emf constant of synchronous motor 6	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P20.21	Motor 7 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P20.22	Rated power of asynchronous motor 7	4~50000kW	4~50000	Depend on model
P20.23	Rated frequency of asynchronous motor 7	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P20.24	Rated speed of asynchronous motor 7	1~36000rpm	1~36000	Depend on model
P20.25	Rated voltage of asynchronous motor 7	0~20000V	0~20000	Depend on model
P20.26	Rated current of asynchronous motor 7	0.1~1000.0A	0.1~1000.0	Depend on model
P20.27	Stator resistance of asynchronous motor 7	0.001~65.535Ω	0.001~65.535	Depend on model
P20.28	Rotor resistance of asynchronous motor 7	0.001~65.535Ω	0.001~65.535	Depend on model
P20.29	Inductance of asynchronous motor 7	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.30	Mutual inductance of asynchronous motor 7	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.31	Non-load current of asynchronous motor 7	0.01~655.35A	0.01~655.35	Depend on model
P20.32	Rated power of synchronous motor	4~50000kW	4~50000	Depend on model

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	7			
P20.33	Rated frequency of synchronous motor 7	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P20.34	Rated speed of synchronous motor 7	0~36000rpm	0~36000	1500rpm
P20.35	Number of pole pairs for synchronous motor 7	1~50	1~50	2
P20.36	Rated voltage of synchronous motor 7	0~20000V	0~20000	Depend on model
P20.37	Rated current of synchronous motor 7	0.1~1000.0A	0.1~1000.0	Depend on model
P20.38	Stator resistance of synchronous motor 7	0.001~65.535Ω	0.001~65.535	Depend on model
P20.39	Direct axis inductance of synchronous motor 7	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.40	Quadrature axis inductance of synchronous motor 7	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.41	Back emf constant of synchronous motor 7	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P20.42	Motor 8 type	0:Asynchronous motor 1:Synchronous motor	0~1	0
P20.43	Rated power of asynchronous motor 8	4~50000kW	4~50000	Depend on model
P20.44	Rated frequency of asynchronous motor 8	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P20.45	Rated speed of asynchronous motor 8	1~36000rpm	1~36000	Depend on model
P20.46	Rated voltage of asynchronous motor 8	0~20000V	0~20000	Depend on model
P20.47	Rated current of asynchronous motor 8	0.1~1000.0A	0.1~1000.0	Depend on model
P20.48	Stator resistance of asynchronous motor 8	0.001~65.535Ω	0.001~65.535	Depend on model
P20.49	Rotor resistance of asynchronous motor 8	0.001~65.535Ω	0.001~65.535	Depend on model
P20.50	Inductance of asynchronous motor 8	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.51	Mutual inductance of asynchronous motor 8	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.52	Non-load current of asynchronous motor 8	0.01~655.35A	0.01~655.35	Depend on model
P20.53	Rated power of synchronous motor 8	4~50000kW	4~50000	Depend on model
P20.54	Rated frequency of synchronous motor 8	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz
P20.55	Rated speed of synchronous motor 8	0~36000rpm	0~36000	1500rpm
P20.56	Number of pole pairs for synchronous motor 8	1~50	1~50	2
P20.57	Rated voltage of synchronous motor 8	0~20000V	0~20000	Depend on model
P20.58	Rated current of synchronous motor	0.1~1000.0A	0.1~1000.0	Depend on model

Function code	Name	Detailed instruction of parameters	Setting range	Default value
	8			
P20.59	Stator resistance of synchronous motor 8	0.001~65.535Ω	0.001~65.535	Depend on model
P20.60	Direct axis inductance of synchronous motor 8	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.61	Quadrature axis inductance of synchronous motor 8	0.1~6553.5mH	0.1~6553.5	Depend on model
P20.62	Back emf constant of synchronous motor 8	0~20000V/1000rpm	0~20000	15000

Refer to the description of parameters in P2.

When configuring multiple bypasses in bypass one-drive-more control, set the motor parameters corresponding to the motor numbers in P2 and P19.

P21 Group Encoder status

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P21.00	Encoder actual efficiency	-327.68~327.67Hz	-327.68~327.67	0.00Hz
P21.01	High bit of PG1 pulse count	0~65535	0~65535	0
P21.02	Low bit of PG1 pulse count	0~65535	0~65535	0
P21.03	Rotary count	0~65535	0~65535	0
P21.04	Rotary angle	0.00~359.99	0.00~359.99	0.00
P21.05	Pole angle	0.00~359.99	0.00~359.99	0.00
P21.06	High bit of PG2 pulse count	0~65535	0~65535	0
P21.07	Low bit of PG2 pulse count	0~65535	0~65535	0
P21.08	Reserved	0~65535	0~65535	0
P21.09	Reserved	0~65535	0~65535	0
P21.10	Reserved	0~65535	0~65535	0
P21.11	Reserved	0~65535	0~65535	0
P21.12	Reserved	0~65535	0~65535	0

P22 Group Encoder

Function code	Name	Detailed instruction of parameters	Setting range	Default value
P22.00	Encoder type selection	0: Incremental encoder 1: UVW encoder (reserved) 2: Rotary encoder (reserved)	0~2	0
P22.01	Pulse number	0~65535	0~65535	1024
P22.02	Encoder direction	0: Forward input 1: Reverse input	0~1	0
P22.03	Disconnection fault detection time	0.0~10.0s	0.0~10.0	1.0s
P22.04	Reverse fault detection time	0.0~10.0s	0.0~10.0	1.0s
P22.05	Detection filter times	0~10	0~10	0
P22.06	Rotating speed ratio of motor and encoder	0.001~65.535	0.001~65.535	1.000
P22.07	Control parameters of synchronous motors	0x0000~0xFFFF Bit0: Z pulse correction enabling Bit1: Encoder angle correction enabling Bit2: SVC speed test enabling Bit3: Rotary speed test mode Bit4: Z pulse capture mode	0x0000~0xFFFF	0x3
P22.08	Z pulse disconnection detection enabling	0: Z pulse disconnection detection invalid 1: Enabling detection	0~1	0
P22.09	Z pulse initial angle	0.00~359.99°	0.00~359.99	0.00°
P22.10	Pole initial angle	0.00~359.99°	0.00~359.99	0.00°
P22.11	Frequency deviation in vector control	0.0%~100.0% (Max. frequency)	0.0~100.0%	1.0%
P22.12	Deviation count time	0.0~6553.5s	0.0~6553.5	1.0s
P22.13	Reserved	0~65535	0~65535	0
P22.14	Reserved	0~65535	0~65535	0
P22.15	Reserved	0~65535	0~65535	0
P22.16	Reserved	0~65535	0~65535	0
P22.17	Reserved	0~65535	0~65535	0

Chapter 6 Function introduction and operation

6.1 Parameters autotuning after power on

After installing the variable frequency speed control system on site, confirm the wiring, carry out commissioning in operation procedure after power on according to the manual and then select the motor type (P2.00). On basis of motor type selection and nameplate parameters setting (P2.01~P2.05 or P2.11~P2.16), press and hold forward jogging button on the touch screen, check the rotating direction of the motor, if reverse, power off and change the wiring in any two phases of the motor, or change the running direction in P0.18 and power on again.

Motor parameters autotuning (P0.20=1), press forward running button on the touch screen to start parameters autotuning. The motor will automatically stop after autotuning. Then set the control mode, run command channel (P0.00 and P0.01), running frequency, start-stop control (P1 group) and ACC/DEC time. After that, send running command and stop command to the system and it will run and stop based on corresponding command. As a result, the system works normally.

6.2 Frequency setting

G5000 variable frequency speed control systems have two frequency command channels followed by multiple choices for users to set the frequency. A channel and B channel can perform simple mathematical operation and they can switch into each other via multi-functional input terminals. The final set frequency is calculated by the set values of A and B frequency sources according to P0.09.

Function code	Name	Content	Setting range
P0.06	Frequency A command source	0: Function code 1: AI1 2: AI2 3: AI3 4: HDI 5: Multi-step speed 6: PID control 7: MODBUS setting 8: Profibus setting	0~8
P0.07	Frequency B command source	0: AI1 1: AI2 2: AI3 3: HDI	0~3
P0.08	Reference of frequency B	0: Maximum frequency 1: Frequency A command	0~1

P0.09	Combination of frequency source	0: A 1: B 2: A+B 3: Max(A, B)	0~3

6.3 Start/Stop control

Start commands of the variable frequency speed control system include power-on start, power-off restart and start after fault reset; the ways of start are start at starting frequency, start after DC braking, and start after rotating speed tracking. Users can select a proper way of start under actual conditions. The ways of stop are decelerate to stop and coast to stop. When the output of the system is blocked, load will stop according to its mechanical inertia; when the system decelerates to stop, DEC time and DC braking parameters can be set.

Start after rotating speed tracking is applicable to situations under frequent start. Synchronous motors are recommended to start directly.

Function code	Name	Content	Setting range
P1.00	Braking mode	0: DC braking 1: Dual-frequency braking (reserved)	0~1
P1.01	Start mode	0: Start directly 1: Start after DC braking 2: Start after rotating speed tracking	0~2
P1.02	Starting frequency	0.00~10.00Hz	0.00~10.00
P1.03	Hold time of starting frequency	0.0~50.0s	0.0~50.0
P1.04	DC braking current before start	0.0~120.0% (rated current of the system)	0.0~120.0
P1.05	DC braking time before start	0.0~50.0s	0.0~50.0
P1.06	ACC/DEC mode	0: Linear type 1: S curve	0~1
P1.07	S curve starting-segment proportion	1.0~40.0% (ACC/DEC time)	1.0~40.0
P1.08	S curve ending-segment proportion	1.0~40.0% (ACC/DEC time)	1.0~40.0
P1.09	Stop mode	0: Decelerate to stop 1: Coast to stop	0~1
P1.10	Starting frequency of stop braking	0.00 Hz~P0.10 (Max. frequency)	0.00~P0.10
P1.11	Waiting time before stop braking	0.0~50.0s	0.0~50.0
P1.26	Restart after power off	0: Disabled 1: Enabled	0~1

P1.27	Instantaneous power off time	0.00~5.00s	0.00~5.00
P1.28	Delay time for restart	0.0~3600.0s (valid when P1.26=1)	0.0~3600.0
P1.29	High voltage switching action at stop	0: Cut off high voltage supply 1: Not cut off high voltage supply	0~1

6.4 Analog input/output

G5000 series variable frequency speed control systems have 3 analog inputs and 4 analog outputs, AI1 (4~20mA/0~10V), AI2 (4~20mA/0~10V), AI3 (-10~10V), AO1 (4~20mA/0~10V), AO2 (4~20mA/0~10V), AO3 (4~20mA/0~10V) and AO4 (4~20mA/0~10V). Input voltage or current signals are selected by jumpers. Each analog input or output has upper and lower limits, corresponding maximum and minimum parameters which can be modified by users to adjust corresponding curves.

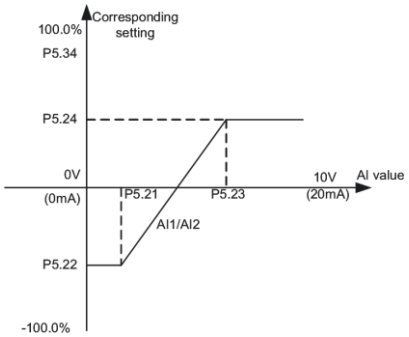


Fig 6.1 AI1 corresponding setting

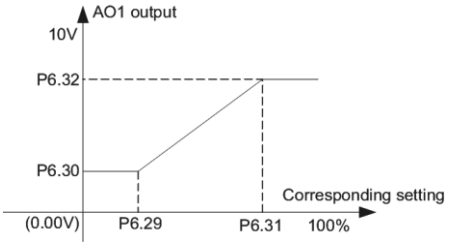


Fig 6.2 AO1 corresponding setting

6.5 Digital input/output

G5000 series variable frequency speed control systems provide various standard I/O terminals which are programmable and thus guarantee the flexibility and extendibility of the systems. The systems also provide standard 16 user input terminals and 20 user output terminals. With various functions, the user input terminal is convenient enough to connect with its corresponding signal after users finish its function setting. In the same way, a high level signal can be output after users set the function and the condition is met.

6.6 AVR function

G5000 series variable frequency speed control systems can automatically adjust and output the duty ratio of PWM signals according to bus voltage fluctuation, thus mitigating impact from grid voltage surge to output voltage. Users can decide whether to use AVR function in P0.22. When AVR function is enabled, the impact from grid voltage surge to output voltage can be nearly ignored; when the function is disabled, grid voltage surge will cause instability of bus voltage and thus instability of output voltage.

6.7 Auxiliary functions

The systems support jogging functions and jump frequency setting, as described below:

Jogging function: Mainly for commissioning; it can set jogging frequency and jogging ACC/DEC time independently

Jump frequency: Up to 2 jump frequency points are available mainly to keep away from resonance point and thus protect the equipment from damage.

Please refer to the description of P08.

6.8 V/F control

G5000 series variable frequency speed control systems have built-in V/F control, which can be applied to situations with low requirements in precision and will also be recommended to one-drives-more. V/F control provides multiple V/F curves users can select and set according to actual requirements.

To meet the requirement of constant torque, linear V/F curves can be selected for constant torque loads, such as conveyors; because the actual torque and rotating speed have a functional relationship of second or third power, corresponding power 1.3, 1.7 or 2 V/F curve can be selected for decreasing torque loads, such as fans and pumps. The systems also provide multi-point V/F curve of 5 datum points made up of three customized frequency and voltage points, zero point, and rated frequency and voltage points.

Low frequency torque boost (P4.01) can effectively compensate low frequency torque performance under V/F control. When the set value is 0, the system will automatically adjust the boost value according to loads. However, the boost value shall not be too large; otherwise, low frequency oscillation or over current may occur. It is appropriate to decrease the boost value once it is too large.

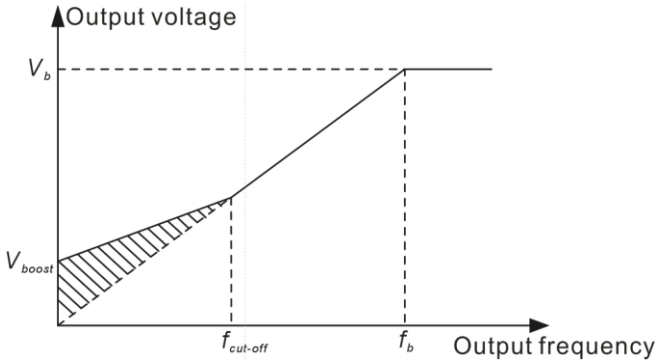


Fig 6.3 Torque boost

V/F control mode adopted for large-power drive usually causes motor oscillation. To solve the problem, G5000 series variable frequency speed control systems increase two function codes P13.15 and P13.16 to suppress oscillation. Generally, they are set to default values. Users can adjust the parameters according to the frequency point at oscillation. Use low-frequency oscillation suppression factor below P13.17 and high-frequency oscillation suppression factor above P13.17. Larger the factor is, more effective the oscillation suppression will be, but too large factor will easily cause large output current, so users cannot set too large factor.

Customized V/F function, V/F separation, means voltage and frequency without corresponding relationship change separately according to their own settings and ACC/DEC time.

6.9 Vector control

Due to characteristics of asynchronous motor model such as higher order, non-linear, strong coupling and multi-variable, thus precise control over the motor is more difficult. Vector control is a better mode for precise control over the motor, by measuring the stator current of the motor, in accordance with the principle of magnetic field orientation, the stator current is decomposed into exciting current and torque current which respectively control the range and phase of the other current component to achieve decoupling control of exciting current and torque current and finally high-performance speed control over the motor.

G5000 series variable frequency speed control systems are configured with built-in speed sensorless

vector control algorithm, which is based on accurate motor parameters, so the accuracy of the motor parameters directly affects vector control performance. Before using the vector control, users are suggested to input the parameters of motor name plate and carry out motor parameters autotuning.

Function code	Name	Content	Setting range
P0.00	Speed control mode	0: V/F control 1: Sensorless vector control 0 2: Sensorless vector control 1 3: Vector control	1
P0.20	Motor parameters autotuning	0: No action 1: Autotuning	1
P2.00	Motor 1 type	0: Asynchronous motor 1: Synchronous motor	0
P2.01	Rated power of asynchronous motor 1	4~50000kW	Name plate parameter
P2.02	Rated frequency of asynchronous motor 1	0.01Hz~P0.10 (Max. frequency)	Name plate parameter
P2.03	Rated speed of asynchronous motor 1	1~36000rpm	Name plate parameter
P2.04	Rated voltage of asynchronous motor 1	0~20000V	Name plate parameter
P2.05	Rated current of asynchronous motor 1	0.1~1000.0A	Name plate parameter
P3.00	Speed loop proportional gain 1	0~100	25
P3.01	Speed loop integral time 1	0.01~10.00s	1.00s
P3.02	Low switching frequency	0.00Hz~P3.05	5.00Hz
P3.03	Speed loop proportional gain 2	0~100	30
P3.04	Speed loop integral time 2	0.01~10.00s	1.00s
P3.05	High switching frequency	P3.02~P0.10 (Max. frequency)	10.00Hz
P3.06	Current loop proportional gain P	0~65535	500
P3.07	Current loop integral time I	0~65535	500
P3.08	Speed loop filter time	0.000~1.000s	0.000s
P3.09	VC slip compensation factor	50.0%~200.0%	100.0%
P3.10	Encoder pulse	1~65535	1000
P3.12	Upper torque limit	0.0~200.0% (rated current of the system)	150.0%

Vector control consists of speed mode and torque mode: Speed mode takes stable speed as the core. The output torque of the system automatically will change according to different loads, to ensure that the running speed is consistent with the set speed. If the output torque is larger than upper torque limit, the motor will no longer run at a set speed and its speed will automatically change. The system outputs torque in accordance with the set torque command under torque mode, the output frequency will be

limited by upper and lower frequency. When the set torque is larger than the load torque, the output frequency of the system will increase up to upper frequency limit; when the set torque is less than the load torque, the output frequency of the system will drop to lower frequency limit. When the output frequency is limited, the output torque is no longer the same as the set torque.

During the adjustment of P3, users need to have a better understanding about vector control algorithm, so set parameters in P3 to default values and change them with cautions.

6.10 PID control

PID control can be used in the close loop application of constant voltage water supply and its flexible parameters setting can meet the requirements under different conditions.

Function code	Name	Content	Setting range
P10.00	PID reference source	0: Function code (P10.01) 1: AI1 2: AI2 3: AI3 4: AI1+AI2 5: AI2+AI3 6: AI3+AI1 7: HDI 8: Multi-step 9: MODBUS 10: PROFIBUS	0~10
P10.01	Local preset PID reference	0.0%~100.0%	0.0~100.0
P10.02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1+AI2 4: AI2+AI3 5: AI3+AI1 6: HDI 7: MODBUS 8: PROFIBUS	0~8
P10.03	PID output characteristic	0: Positive 1: Negative	0~1
P10.04	Proportional gain (Kp)	0.00~100.00	0.00~100.00
P10.05	Integral time (Ti)	0.01~10.00s	0.01~10.00
P10.06	Differential time (Td)	0.00~10.00s	0.00~10.00
P10.07	Sampling cycle (T)	0.01~100.00s	0.01~100.00
P10.08	PID control deviation limit	0.0~100.0%	0.0~100.0
P10.09	Feedback offline detection value	0.0~100.0%	0.0~100.0%

Function code	Name	Content	Setting range
P10.10	Feedback offline detection time	0.0~3600.0s	0.0~3600.0
P10.11	PID dormancy wake up value	0.0~100.0%	0.0~100.0%
P10.12	PID dormancy delay time	0.0~360.0s	0.0~360.0

In PID close loop application, at first set PID reference and PID feedback source, next adjust proportional, integral, differential initial parameters of PID control, and then run the system. Adjust PID parameters again according to the commissioning method provided by the P10 until satisfactory control effect is achieved.

6.11 Master-slave control (optional)

Master-slave control is that two or above motors work in cooperation to drive load, including master-slave power-balancing mode and master-slave speed synchronous mode. The first mode is the control mode that the motors are connected to work together in way of gearboxes, guide rails or shafts coupling and the powers among the motors are distributed properly to reach corresponding control precision. External control signals are connected to the master and the slaves are controlled by the master via communication. Master-slave power-balancing mode is the main mode of master-slave control.

As for rigid connection via gearboxes or shafts coupling, the master runs under speed mode while the slaves under torque mode; as for flexible connection via belts, both the master and the slaves are under speed mode.

Function code	Name	Content	Setting range
P0.00	Speed control mode	0: V/F control 1: Sensorless vector control 0 2: Sensorless vector control 1 3: Vector control	1
P0.01	Run command channel	0: Local command channel 1: Terminal command channel 2: Communication command channel 3: Master command channel	Set the master according to actual mode and the slaves to 3
P0.05	Speed reference mode	0: Speed mode 1: Torque mode 2: Slave speed mode 3: Slave torque mode	Set speed reference mode according to connection mode
P12.00	Master-slave mode selection	0: Power-balancing mode 1: Speed synchronous mode (reserved)	0
P12.01	Master output signal source	0: Master output torque signal 1: Master output current signal 2: Master output PG signal (reserved)	Set the master in consistent with the slaves
P12.02	Filter time of slave reference signal	0.00s~655.35s	0.00~655.35

Function code	Name	Content	Setting range
P12.03	PID adjustment amplitude limit	0.0~100.0%	0~100
P12.04	PID mode	0: Proportion plus integration as synchronous coefficient 1: Proportion plus integration as error correction	0~1
P12.05	Slave reference frequency source gain	0.01~100.00	0.01~100.00
P12.06	Slave reference signal source gain	0.01~100.00	0.01~100.00
P12.07	Master-slave proportional coefficient P1	0.000~6.5535	0.000~6.5535
P12.08	Master-slave integral coefficient I1	0.00s~655.35s	0.00~655.35
P12.09	Low switching frequency of master-slave PI	0.00Hz~P12.12	0.00~P12.12
P12.10	Master-slave proportional coefficient P2	0.000~6.5535	0.000~6.5535
P12.11	Master-slave integral coefficient I2	0.00s~655.35s	0.00~655.35
P12.12	High switching frequency of master-slave PI	P12.09~P0.10	P12.09~P0.10
P12.13	PI control deviation limit	0.0~80.0%	0.0~80.0
P12.14	Lower limit of PI integral enabling deviation	0.0~100.0%	0.0~100.0
P12.15	Master-slave control differential coefficient	0.00s~655.35s	0.00~655.35
P12.24	Master-slave control ID code	0~15	0~15
P12.25	Master-slave character	0~1	0~1
P12.26	Master-slave node state 1	0~0xFFFF	0~0xFFFF
P12.27	Master-slave node state 2	0~0xFFFF	0~0xFFFF
P15.02	Command channel	0: Local control 1: Master control	0~1

As for a master-slave control system, carry out parameters autotuning respectively at first, then select the speed mode for the master, next set the command channel and reference of the master and finally set master output signal source (P12.01); as for the slaves, set run command channel (P0.01) to master command channel, then select the speed mode or torque mode for the slaves, next set master output signal source in consistent with the master and finally adjust PID control parameters of the slaves.

No matter speed mode or torque mode for the slaves, the effect of PID adjusting is fine adjustment, so the effect should not be too strong; otherwise, the slaves may run unstably. Set the command channel of slave switch cabinet to master control (P15.02=1) in the cases where the master and slaves need to

power on and off at the same time and switch cabinets are installed.

6.12 Synchronous switching (optional)

G5000 series variable frequency speed control system can achieve bumpless synchronous switching between power frequency and variable frequency. When variable frequency switches into power frequency, the system will adjust the phase, frequency and range of output voltage, and then switch into variable frequency when in consistent with power supply at power frequency, with small surge. When power frequency switches into variable frequency, the system will automatically track current motor speed, and then switch into variable frequency. Achieved by switch cabinet, synchronous switching makes the system run reliably with small surge to the motor and it is applicable in one-drive-more control such as constant pressure water supply.

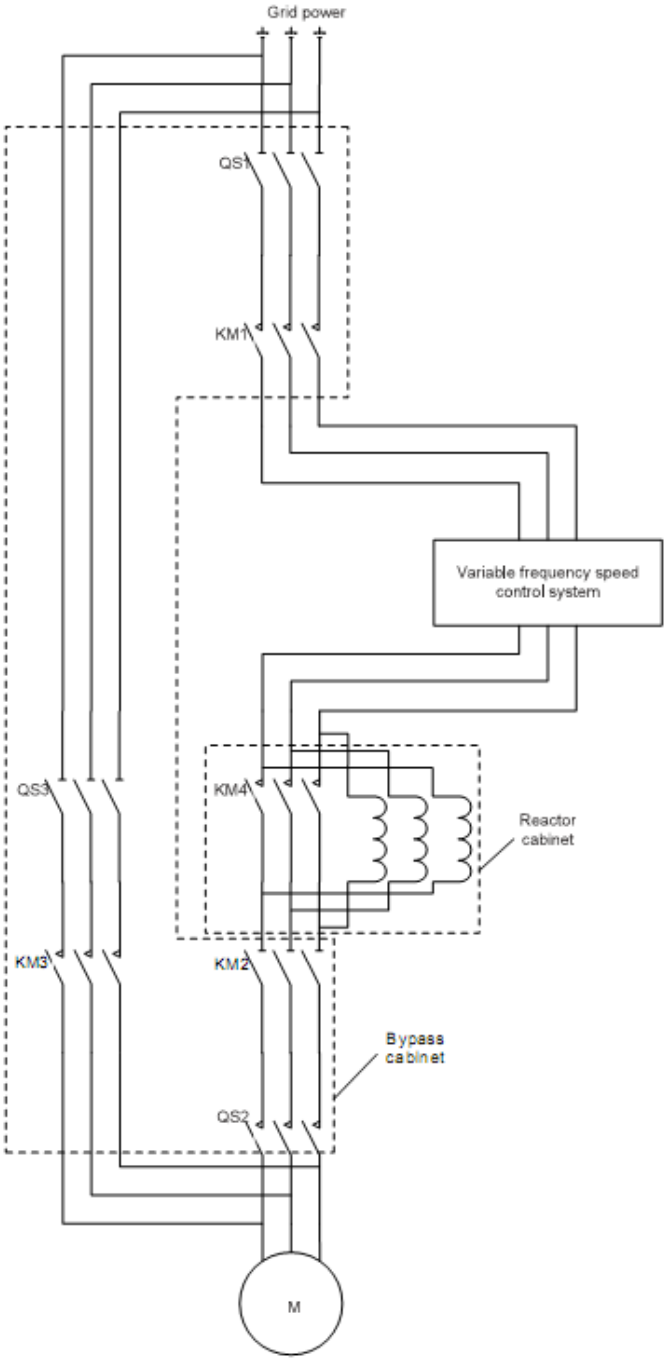


Fig 6.4 Wiring diagram of synchronous switching

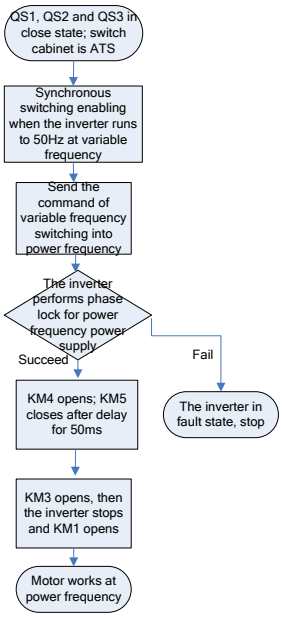


Fig 6.5 Flow chart of variable frequency switching into power frequency

Variable frequency switching into power frequency: When the system runs at variable frequency and reaches 50Hz, set P15.03 to 1, after receiving the command of variable frequency switching into power frequency, the system will begin phase lock. If phase lock succeeds, the switch will act and the system will enter into power frequency.

Power frequency switching into variable frequency: When the system runs at power frequency, after receiving the command of power frequency switching into variable frequency, the motor will break away from power frequency grid. The system will track current motor speed and running direction, and then accelerate to frequency reference and run at variable frequency.

6.13 Multi-step speed control

To meet requirements of frequent speed change, G5000 series variable frequency speed control systems provide multi-step speed control mode. Users can select current step flexibly via terminals or analog values. In the application of multi-step speed control, set frequency reference source to multi-step speed at first, then set terminal step speed or define analog 16-step speed, and finally set the values at 16-step speed.

6.14 Realtime parameters monitoring

G5000 series variable frequency speed control systems have various functions of realtime parameters monitoring, including running frequency, frequency reference, bus voltage, output voltage, output current, output power, output torque, PID reference, PID feedback, terminals states, analog inputs and time. Users can read on the interface of touch screen directly.

6.15 Fault protection

G5000 series variable frequency speed control systems provide a variety of protection functions, which can be flexibly configured by function codes, such as overvoltage speed loss, overcurrent speed loss, phase loss detection, and so on. Please refer to the detailed description of P09, the last three times of running information at fault, including system ARM and DSP faults and unit faults, visual and convenient.

The systems also support alarm functions. When the systems alarm, they will prompt without stop and reset the alarm regularly. Users can select whether to disable alarm functions and set the fault reset interval via the function codes.

6.16 Remote communication

G5000 series variable frequency speed control system supports MODBUS, PROFIBUS-DP (optional) and Ethernet communication protocols. Users can use their own systems to control and set the system via MODBUS, PROFIBUS-DP (optional) and Ethernet protocols. For specific information, please refer to P16, P17, P18 and appendixes.

Chapter 7 Alarm and fault solution

G5000 series variable frequency speed control systems provide various functions of fault protection and alarm. If any fault occurs to the system, it can indicate fault state and implement stop protection, power unit bypass, alarm, cutting off high voltage input automatically according to alarm levels. Due to fault instructions on the touch screen and general fault solutions, in the guidance of alarm interface, users can make a quick judgment and work out appropriate solutions.

G5000 series variable frequency speed control systems have two types of faults, unit fault and system fault. The system faults are ARM fault and DSP fault. Users can view fault type and fault location on fault history sub-interface of the main interface on the touch screen. Xn, X (A/B/C) means the phase of fault unit and n (1~12) means the location of fault unit.

G5000 series variable frequency speed control systems also provide alarm functions. If the fault is not serious enough to cause destructive damage, the system will alarm without stop. During alarm, the system will reset automatically or manually.

Two types of alarms: System alarm and unit alarm. Users can view the types on alarm information menu of the main interface on the touch screen.

Three types of faults:

Serious fault: The fault causes alarm, stop and high-voltage power supply disconnection. The system cannot reset automatically and manual intervention is necessary.

Light fault: The fault causes alarm and stop, but no high-voltage power supply disconnection. Refer to other faults except serious fault.

Warning: Only alarm without stop. Refer to system alarm and unit alarm.

7.1 System fault

Fault type	Name	Reason	Solution
DSP fault	Software overcurrent	1. ACC time is too short 2. The grid voltage is too low 3. The system power is too small 4. Load sudden change or abnormal	1. Increase ACC time 2. Check input power supply 3. Select the system of larger power 4. Check load or decrease load sudden change
	Hardware overcurrent	1. ACC time is too short 2. The grid voltage is too low 3. The system power is too small 4. Load sudden change or abnormal	1. Increase ACC time 2. Check input power supply 3. Select the system of larger power 4. Check load or decrease load sudden change
	Grid overvoltage	1. DEC time is too short 2. Load inertia torque is too large 3. The system power is too small 4. Input voltage abnormal	1. Increase DEC time 2. Select the system of larger power 3. Check input power supply

Fault type	Name	Reason	Solution
		5. After instantaneous power off, restart the rotating motor	4. Adjust input voltage or input interface of the transformer
	Grid undervoltage	1. The grid voltage is too low	1. Check input power supply
	Motor overload	1. The grid voltage is too low 2. Motor rated current setting is incorrect. 3. Motor blockage or too big load sudden change 4. Motor power is much larger than load power	1. Check the grid voltage 2. Set motor rated current again 3. Check load and adjust torque boost 4. Select proper motor
	System overload	1. ACC time is too short 2. Restart the rotating motor 3. The grid voltage is too low 4. Load is too large 5. Motor power is much smaller than load power	1. Increase ACC time 2. Avoid stop and restart 3. Check the grid voltage 4. Select the system of larger power
	Output phase loss	1. U, V, W output phase loss (or load 3-phase is severe asymmetry)	1. Check output wiring 2. Check the motor and cables
	Input phase loss	1. R, S, T input phase loss 2. Input power supply fluctuation is too large	1. Check input power supply and wiring
	Current detection fault	1. Connectors of control board are loose 2. Auxiliary power supply damage 3. Hall device damage 4. Amplifying circuit abnormal	1. Check the connectors and connect again 2. Ask for support 3. Ask for support 4. Ask for support
	Motor autotuning fault	1. Motor capacity and system capacity do not match 2. Motor parameters setting is incorrect 3. Autotuning timeout 4. Deviation between parameters after autotuning and standard parameters are too large	1. Select the system matching with the motor 2. Set motor parameters correctly according to the name plate 3. Redo autotuning at non-load
	Handshake fault	ARM does not work in a short time	Replace the control board
	Input overcurrent	1. System capacity is too small 2. There is interference to input current detection circuit 3. High voltage winding of the system is short circuited	1. Replace with the system of larger capacity 2. Update input current detection circuit and ground shielded layer 3. Ask for support
	Transmission board	1. Transmission board for voltage	1. Re-connect input power

Fault type	Name	Reason	Solution
	fault	detection is not connected well 2. Uplink and downlink optical fiber of transmission board are not connected well 3. Optical fiber bending angle of transmission board is too large 4. Transmission board fault	supply of transmission board 2. Replace and re-connect voltage detection 3. As for uplink and downlink optical fiber, ask for support
ARM fault	Transformer temperature controller fault	1. Overload 2. Environmental temperature is too high 3. Temperature controller fault 4. Transformer cooling circuit fault 5. There is interference to protective circuit 6. Control cable shield is grounded improperly	1. Check external signal circuit and proper grounding of cable shield 2. Check the load of transformer and environmental temperature,compare with ratings (make records) 3. Check whether installation conditions meet requirements (whether exposed to sunlight, and good ventilation) 4. Check proper grounding of control cable shield 5. Check temperature controller and other circuits
	Transformer overheat		
	External fault	1. SI external fault terminals act	1. Check input signals of external devices 2. Check the setting of P5
	MODBUS communication fault	1. The setting of baud rate is improper 2. Serial communication error 3. Communication interrupt for a long time	1. Set proper baud rate 2. Reset and ask for support 3. Check wiring of communication interface
	Buffer cabinet fault	1. Contactor feedback is incorrect 2. Vacuum contactor damage or contact damage	1. Check contactor feedback 2. Ask for support
	PID feedback disconnection fault	1. PID feedback disconnection 2. PID feedback source disappears	1. Check PID feedback signal line 2. Check PID feedback source
	Access fault	1. The cabinet door is not properly closed 2. Cabinet door travel switch fault 3. Control cable shield is	Check whether the cabinet door is closed properly and check cabinet door travel switch and its contact

Fault type	Name	Reason	Solution
		grounded improperly	
	Synchronous switching timeout	1. During synchronous switching, the system and the grid is not synchronous at running frequency, or the system and the grid have a great deviation at output voltage 2. Unsuccessful phase locking for the inverter	1. Ensure synchronous switching after the system reaches synchronous frequency of the grid 2. Ask for support
	Factory time arrival	Reach running time set by the factory	Ask for support
	The motor temperature is too high	1. Environmental temperature is too high 2. Long time overload	1. Decrease environmental temperature 2. Check load or replace with the motor of larger power
	Switch cabinet uplink communication fault	1. Optical fiber connector is loose 2. Optical fiber damage 3. Control board fault	1. Connect again 2. Replace optical fiber 3. Ask for support
	Switch cabinet downlink communication fault	1. Optical fiber connector is loose 2. Optical fiber damage 3. Control board fault	1. Connect again 2. Replace optical fiber 3. Ask for support
	QF feedback fault	1. QF feedback disconnection	1. Check QF feedback
	DSP and ARM handshake fault	DSP does not work in a short time	1. Replace control board 2. Ask for support
	Power off in operation	1. The time for instantaneous power off is too long 2. The set time for instantaneous power off is too short	1. Check grid power 2. Increase the time for instantaneous power off
	PROFIBUS communication fault	1. PROFIBUS communication card is not connected well 2. PROFIBUS communication card damage 3. Communication address setting error 4. Too strong interference	1. Connect PROFIBUS communication card again 2. Ask for support 3. Check related setting 4. Eliminate interference
	Frequency reference disconnection	1. Connection of frequency reference source is loose 2. Frequency reference source disappears	1.Check wiring 2.Check frequency reference source
	Synchronous switching serious fault	1. Contactor feedback is incorrect 2. Vacuum contactor damage or contact damage	1. Check contactor feedback 2. Ask for support
	Switch cabinet 1 action fault	1. Vacuum contactor or disconnector feedback is	1. Check whether the wiring of the switch feedback is

Fault type	Name	Reason	Solution
	Switch cabinet 2 action fault Switch cabinet 3 action fault Switch cabinet 4 action fault Switch cabinet 5 action fault Switch cabinet 6 action fault Switch cabinet 7 action fault Switch cabinet 8 action fault	incorrect 2. Vacuum contactor or disconnector is not contacted properly or damaged 3. Vacuum contactor or disconnector damage	correct, and the contact in good contact 2. Change connection onto spare contact without damage, or replace the contactor or disconnector 3. Ask for support
	Fan overheat	1. Environmental temperature is too high 2. Temperature sensor of the fan is damaged	1. Decrease environmental temperature 2. Check whether the temperature sensor of the fan is damaged
	Master-slave optical fiber communication fault	1. Optical fiber connector is loose 2. Optical fiber damage	1. Connect again 2. Replace optical fiber 3. For one machine, shield the fault by P12.28 4. Ask for support

7.2 Unit fault

Fault type	Name	Reason	Solution
Unit fault	Unit fiber uplink communication fault	1. Optical fiber connector is loose 2. Optical fiber damage 3. Unit fault	1. Connect again 2. Replace optical fiber 3. Ask for support
	Unit fiber downlink communication fault	1. Optical fiber connector is loose 2. Optical fiber damage	1. Connect again 2. Replace optical fiber 3. Ask for support
	Unit not ready	1. Unit control board fault	1. Replace fault unit 2. Ask for support
	Unit overvoltage	1. Large load inertia torque and short DEC time 2. Current surge 3. The grid voltage is too high 4. Unit fault	1. Increase DEC time 2. Decrease input voltage 3. Ask for support
	Unit undervoltage	1. The grid voltage is too low	1. Check the grid voltage
	Unit power fault	1. Unit drive board fault 2. Unit power board fault	1. Ask for support

Fault type	Name	Reason	Solution
	Unit overheat	1. Environmental temperature is too high 2. Cooling is not smooth 3. Poor cabinet tightness and cooling condition	1. Decrease environmental temperature 2. Ask for support 3. Clean dust filter
	Unit input phase loss protection	1. Input terminals wiring error 2. Transformer has problems 3. Unit fuse broken	1. Check and re-connect input wiring correctly 2. Ask for support
	Unit input power off protection	1. Input terminals wiring error 2. Unit fault	1. Check and re-connect input wiring correctly 2. Ask for support
	Up bridge VCE fault	1. Output short circuit 2. H bridge direct connection 3. Unit drive error	1. Ask for support
	Down bridge VCE fault	1. Output short circuit 2. H bridge direct connection 3. Unit drive error	1. Ask for support
	Hardware overvoltage	1. Large load inertia torque and short DEC time 2. Current surge 3. The grid voltage is too high 4. Unit fault	1. Increase DEC time 2. Decrease input voltage 3. Ask for support
	The unit does not match	1. The effective unit set by factory is not consistent with actual effective unit	1. Ask for support
	Unit bypass failure	1. Bypass relay fault 2. Bypass relay wiring error	1. Replace bypass relay 2. Check bypass relay wiring

7.3 Action after fault

After a fault occurs to the system, it will latch and display fault information. At the same time, alarm begins.

For system fault, the system will coast to stop immediately. For serious system fault, such as the temperature of phase-shifting transformer over 150°C, the system will cut off high voltage along with coast to stop.

For unit fault, use bypass fault unit according to requirements for derating run without processing unit fault. If you check fault unit, stop the system and cut off high voltage. Bypass fault unit is only used to deal with one fault unit. If the number of fault units is more than one and fault unit is not in bypass, the system will alarm fault and cut off high voltage.

The system will latch fault all the time and it will not restore to the normal state until users removes the fault and push the fault reset button.

The keypad of the system can latch last three times of fault information and environmental information. The touch screen can latch last several hundreds of fault information and environmental information.

Warning

- ✧ Please do not reset and re-run the system if the fault reason is uncertain. Deal with the fault after confirming its level and reason.
- ✧ The system is complicated electronics converter equipment. Inspection or repair must be carried out under the instruction of manufacture engineers.
- ✧ Please make sure the power supply is disconnected and filter capacitor discharges completely.

7.4 Action after alarm

1. Introduction of system alarm

Serial No.	Name	Reason	Solution
1	Input overvoltage	1. The grid voltage is too high	1. Make sure the grid voltage within +/-15% of rated voltage
2	Phase-shifting transformer overheat	1. Overload 2. Environmental temperature is too high 3. Temperature controller fault 4. Cooling circuit fault 5. There is interference to protective circuit line 6. Control cable shield is grounded improperly	1. Check external signal circuit and proper grounding of cable shield 2. Check the load of transformer and environmental temperature, compare with ratings (make records) 3. Check whether installation conditions meet requirements (whether exposed to sunlight, and good ventilation) 4. Check proper grounding of control cable shield 5. Check temperature controller and other circuits
3	Main control power supply off	1. Main control power supply off or not connected well 2. Control cabinet main control power supply switch (Q1) open 3. Control cabinet main control power supply feedback relay (K4) fault	1. Check main control power supply system and make sure connector plug-in 2. Check and make sure Q1 is closed 3. Check K4 works properly, if not, replace it 4. Ask for support
4	Alternative control power supply off	1. Alternative control power supply off or not connected well 2. Control cabinet alternative control power supply switch (Q2) open 3. Control cabinet alternative control power supply feedback relay (K5) fault	1. Check alternative control power supply system and make sure connector plug-in 2. Check and make sure Q2 is closed 3. Check K5 works properly, if not, replace it 4. Ask for support
5	Fan power	1. The power supply for fan	1. Check auxiliary winding circuit of

Serial No.	Name	Reason	Solution
	supply fault	from phase-shifting transformer is off 2. Control cabinet fan power supply switch (Q3) open 3. Control cabinet fan power supply feedback relay (K7) fault	phase-shifting transformer is OK 2. Check and make sure Q3 is closed 3. Check K7 works properly, if not, replace it 4. Ask for support
6	UPS power supply fault	1. UPS is not connected or not plugged at the bottom 2. UPS fault 3. UPS feedback relay (K6) fault	1. Check and make sure UPS is connected and operated properly 2. Check K6 works properly, if not, replace it 3. Ask for support
7	Fan overheat	1. Cooling fan blockage 2. Temperature in the cabinet is too high	1. Check cooling fan 2. Ask for support

2. Introduction of unit alarm

Unit	Name	Reason	Solution
1~36	Unit overtemperature	1. Fan fault 2. Poor cabinet tightness and cooling condition 3. Heavy load and large current	1. Ask for support 2. Clean dust filter 3. Select larger system

1~36, 1~12 is the number of A-phase units, 13~24 is the number of B-phase units and 25~36 is the number of C-phase units. After the system alarms, it will prompt and not affect working. However, users should pay attention to the alarm; otherwise, long time warm may change into fault and cause stop.

7.5 Common faults and solutions

The system may have following faults during running. Please refer to following solutions:

Ready indicator light is not on:

1) Use touch screen to check input voltage. Only when there is high voltage is ready indicator light on.

2) Check corresponding unit has voltage. If not, cut off power supply and check the wiring between phase-shifting transformer and unit.

3) If the unit has voltage but ready indicator light is not on, please check virtual effective unit is consistent with the unit which has voltage.

Overvoltage during decelerating:

1) Check whether the input voltage is too high.

2) Increase DEC time.

Chapter 8 Transportation, storage and installation

The functional unit electrical cabinets of G5000 series variable frequency speed control systems are assembled, tested and packaged as a whole in factory. During the transportation, the cabinet bodies must be transported as a whole. To improve the reliability of the system and avoid damage in transportation, this chapter identifies the basic requirements of transportation and storage, which users must strictly comply with. Any violation of the relevant requirements in this chapter will influence the service life of the system.

8.1 Transportation and moving

The outer packaging of G5000 series variable frequency speed control systems can endure the external impact from the sea, land or air transportation, but appropriate protection measures must be taken to avoid the pollution of water immersion and dust. Besides, during the process of transportation, it is necessary to avoid the impact of damage caused by mechanical external shocks and rough handling. To move, disassemble and store properly, please pay attention to all relevant precautions and indication and instruction tags on the packaging boxes. We recommend entrusting logistic companies with a good reputation and credit to lift and transport the variable frequency speed control systems.

Transportation: G5000 series variable frequency speed control systems can be transported by any vehicles such as trucks, trains, airplanes and ships. During transportation, the products must be handled with care. Exposure to rain and sunlight are both strictly forbidden. No severe vibration, impact or upend is allowed.

Moving: The power unit cabinets, phase-shifting transformer cabinets and switch cabinets can be packaged separately for moving. There are two moving methods:

- Forklifts
- Cranes

① Ensure the maximum bearing weight of the forklift. The relieved tooth (600mm~1200mm) shall be at least 1.5m long and its thickness shall not be larger than 90mm. Use two forklifts when the device is too long or too wide.

② During hoisting, it is required to rope the device at the designated hoisting marks on the package. Generally, the geometric center of four hoisting marks is the center of gravity, as shown below:

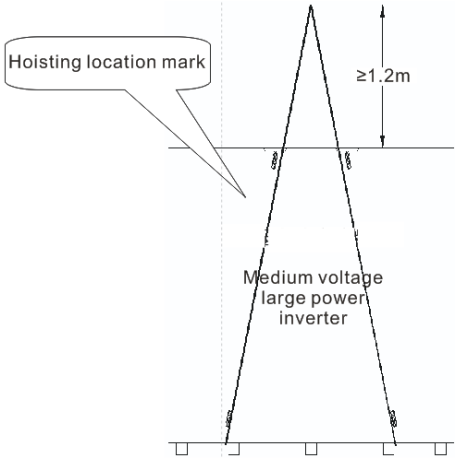


Fig 8.1 Hoisting with package

In the chassis of the system, there are forklift holes. After unpacking, there are three moving methods:

- Cranes or chain hoisting
- Forklifts
- Rolling bars

① Cranes or chain hoisting—hoist via the ropes through the forklift holes and ensure the rope does not impact on the cabinet body directly.

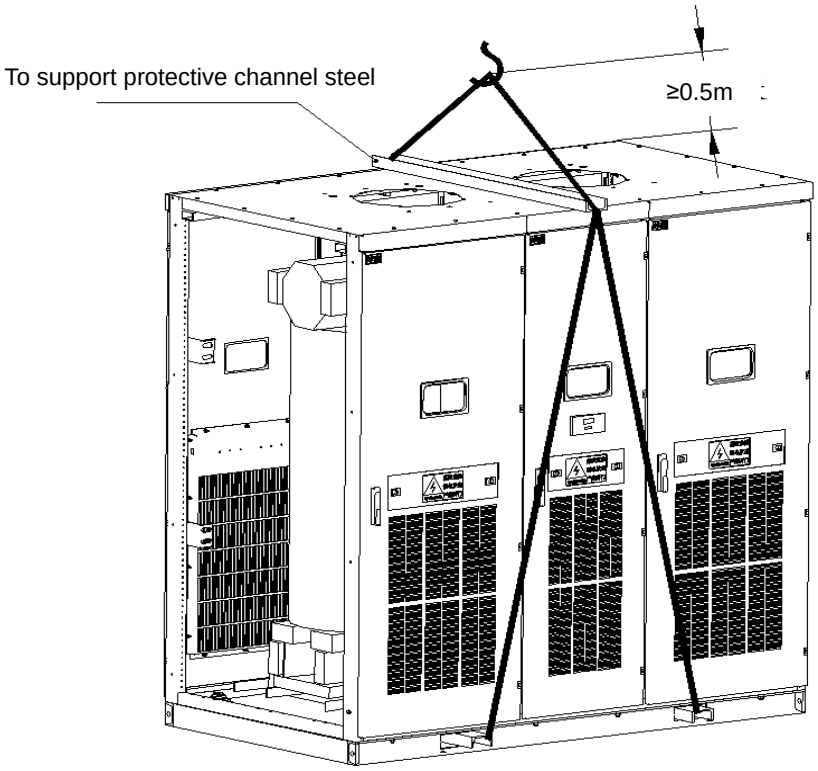


Fig 8.2 Cabinet body hoisting

② Forklifts—ensure the maximum bearing weight of the forklift. The relieved tooth (600mm~1200mm) shall be at least 1.2m long, the thickness shall not be larger than 50mm and the width shall not be larger than 150mm. While moving, a piece of wood is needed at the corner of the relieved tooth in order to prevent the cabinet body from damage.

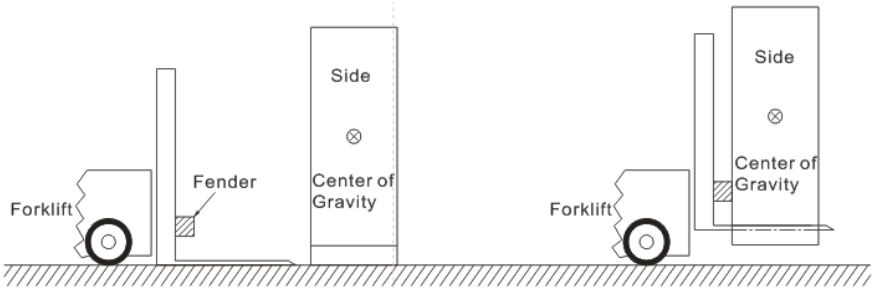


Fig 8.3 Moving with forklifts

③ Rolling bars—the simplest method, put parallel rolling bars on the floor to move the cabinet body and move the rolling bars in cycle. (The length of the rolling bar shall exceed the thickness of the cabinet body, the diameter shall not be smaller than 50mm and the space between the rolling bars shall not be larger than 500mm.)

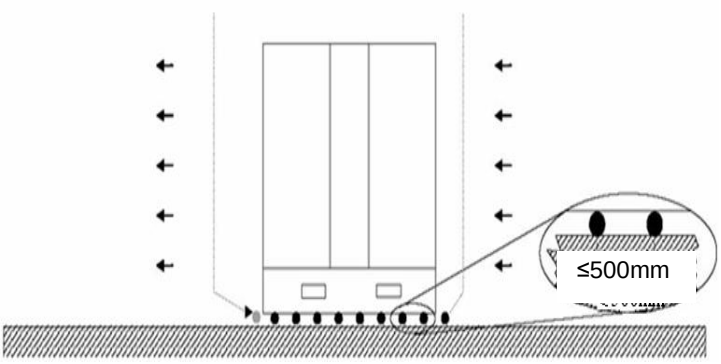


Fig 8.4 Moving with rolling bars

8.2 Unpacking inspection

After receiving the variable frequency speed control system that you ordered, if there is anything wrong with the products you ordered or they do not comply with the specifications that you ordered, please contact the agent from whom you order the equipment or contact the nearest office of our company.

① Check the name plates of the variable frequency speed control systems and confirm the models and specifications of the equipment you ordered.

② Check whether any damage has occurred on the appearance during handling and transportation, such as damage to the cabinet body appearance, any distortion to the door and sideboards and inner devices falling off, etc.

③ Open the cabinet door and check whether the control cables are loose and there is water immersion, missing or damaged parts.

④ By contrast of the supply list, check whether the equipment that you ordered is complete.

8.3 Storage

Inappropriate methods of storage for power electronic equipment will affect the service lives of the equipment, or even result in the failure of the equipment.

Environment conditions for storage

Item	Specification	
Storage temperature	-40~+70°C, air temperature change is less than 1°C/Min	Do not put it in the place with condensation or freeze caused by rapid changes of temperature.
Relative humidity	<95%	
Environment	Keep away from direct sunlight, dust, corrosive gas, flammable gas, oil mist, vapor or water drop.	

General requirements:

① Do not place it directly on the ground; place it on appropriate supporting objects.

② If there is any impact of humidity, appropriate desiccating agent shall be provided: each unit of desiccating agent (30g) absorbs 6g water content. According to the packaging materials in use, you will need the desiccating agent of the following amounts: Polyethylene metal film: 10 units per square meter; aluminum metal film: 8 units per square meter.

③ Taking polyethylene materials or aluminum metal film as the protective packaging can prevent the water content from infiltrating.

④ Regular inspection: During the whole storage period, inspect the storage state and packaging state of the equipment every month. If the equipment has been damaged, you need to check the damage

immediately and find out the reason. After repairing the damaged equipment, store the system according to the requirements mentioned above.

8.4 Storage of spare parts

After receiving G5000 series variable frequency speed control systems, check immediately whether there is any damage to the spare parts, and if any damage to the spare parts is found, please report it to our company. Our company will not undertake any product quality guarantee responsibility for the damage caused by external shock or external environment within the product quality guarantee period. Within the quality guarantee period, to prevent the equipment spare parts from damage, please pay attention to following items: there must be no vibration or impact at the storage place, and it is necessary to avoid damage caused by moisture, frost, temperature, dust and gravels. The environment conditions should meet the requirements of temperature and humidity: The spare parts must be stored in a dry original packaging box without flying insects, and kept away from corrosive gas. The relative humidity shall be less than 95%, and the storage temperature for the spare parts shall be -5°C ~+55°C. The circuit boards must be stored in anti-static packing bags without leakage of desiccant agent, and kept away from corrosive gas that may cause damage to the circuit boards or gases containing alkali-saline or other impurities, and they must not be frozen. If you find that the humidity has surpassed the maximum allowable extent in the air, environmental protection measures such as cooling, heating, dehumidifying and other myethods shall be taken to guarantee the environment conditions for storing the spare parts.

The power unit is equipped with electrolytic capacitors inside, long-term power off of electrolytic capacitors will lead to the deterioration of their electrical characteristics; therefore, store them in the method of electrifying once every year.

8.5 What to do after scrapping

- ✧ When the package or product is scrapped, deal with it as industrial effluent; otherwise, injuries or environment pollution may occur.

The package of G5000 series variable frequency speed control systems shall be designed with the minimum usage of the packing materials that have adverse effects on the environment; some of the packing materials can be recycled and reused. The handling of the packing materials shall comply with the national standards related to environment protection.

While scrapping the devices inside the variable frequency speed control systems, the electrolytic capacitors, PCBs, electronic components and other parts need to be dealt with correct methods so that any part may not cause harm to the surroundings. These handling methods can refer to the national laws and regulations on environment protection.

8.6 Installation of cabinets

The main bodies of G5000 series variable frequency speed control systems include phase-shifting transformers cabinets, power unit cabinets, control cabinets, and even switch cabinets based on the requirements of users.

1. Requirements of running environment

The efficiency of G5000 series variable frequency speed control systems is over 96% and 4% of the loss will be basically converted into heat. Therefore, the cooling problem of the variable frequency

speed control systems needs to be taken into consideration. If the installation environment is narrow and the ambient temperature is high, it is necessary to install additional forced-air cooling unit or air conditioning cooling devices.

2. Requirements of space for cabinet placement

For the drawings of the cabinet dimension, outline dimension and the bottom plate installation of the variable frequency speed control system, please refer to the related drawings of engineering technical information. All cabinet bodies shall be installed according to the drawings, and sufficient space shall be provided in the periphery to guarantee the air flow, the maximum door swinging and the space required for maintenance. Provide the channel for entering the installation basis (aisle space, etc.) and ensure the space for the auxiliary devices used for transportation.

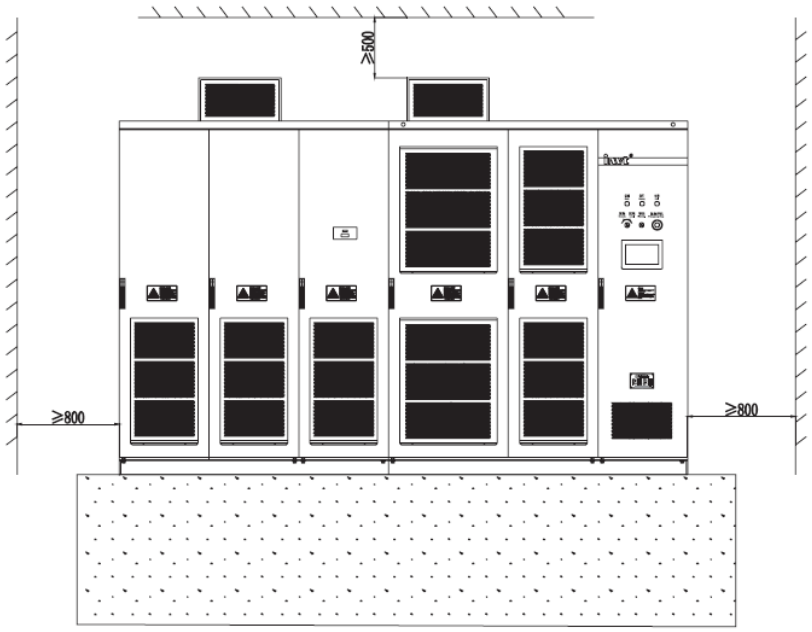


Fig 8.5 Schematic diagram 1 of installation requirements (front view, unit: mm)

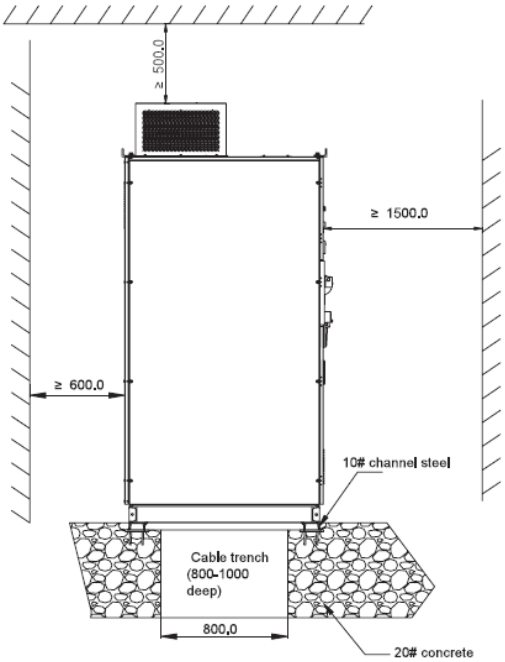


Fig 8.6 Schematic diagram 2 of installation requirements (side view, unit: mm)

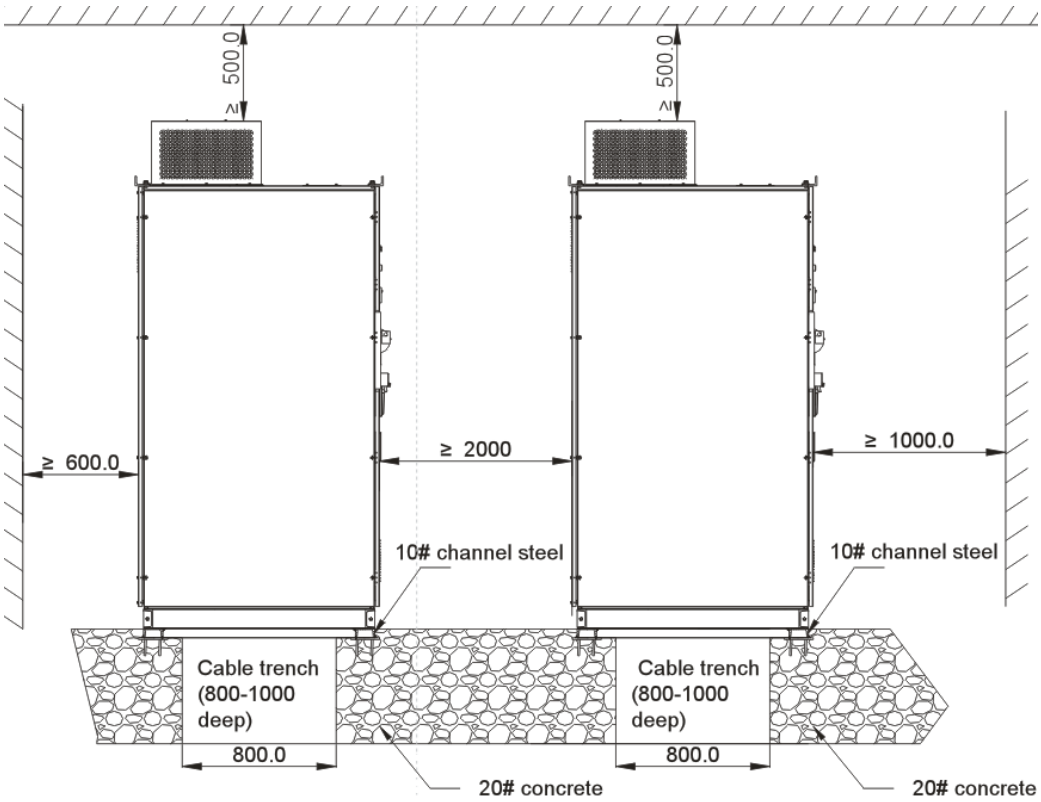


Fig 8.7 Schematic diagram 3 of double-row installation requirements (side view, unit: mm)

As shown above, the following table is the basic requirements for the widths of surrounding channels of the cabinets.

Minimum width of the surrounding channels of variable frequency speed control systems		
Layout mode	Maintenance channel	Running channel
Double-row	0.6m	2.0m/1.0m
Single-row	0.6m	1.0m

The cooling air duct of the variable frequency speed control system is shown in Fig 8.8. To guarantee sufficient cooling, the distance between the top of the system and the roof must comply with the requirements of relevant national regulations. To reduce ambient temperature further, users can install centralized ventilation air ducts for transmitting the hot air through centrifugal blower and directly to the outside by the air ducts.

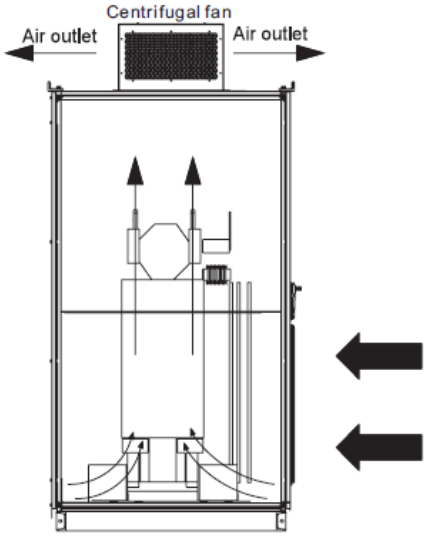


Fig 8.8 Schematic diagram of cooling path-transformer cabinet

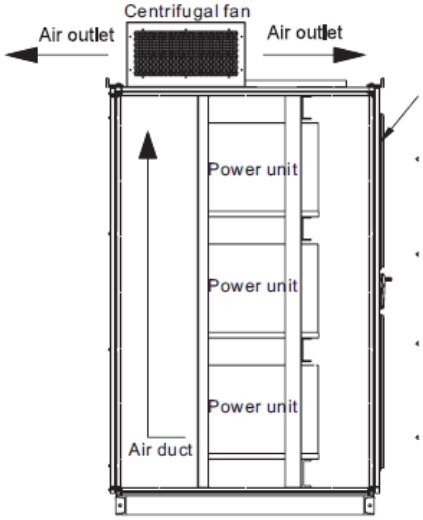


Fig 8.9 Schematic diagram of cooling path-power unit cabinet

3. Requirements of foundation installation

The cabinet bodies of G5000 series variable frequency speed control systems must be vertically installed onto the concrete casting foundation framework made of flat steel channels, with the overall roughness of the surface below 5mm. The foundation must be made of non-combustible materials and have smooth and abrasion-free surface, and shall be moisture-proof and able to bear the weight of the system. The cable ducts must be made of non-combustible materials and have smooth and abrasion-free surface, and shall be moisture-proof and dust-proof, with measures preventing animals from entering.

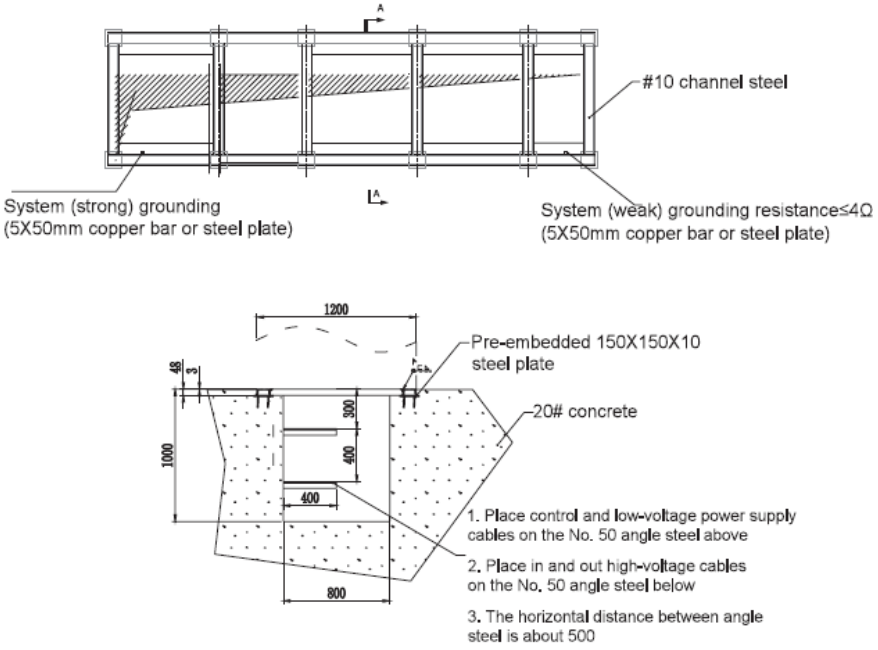


Fig 8.9 Schematic diagram of foundation installation

4. Installation of cabinet bodies

The variable frequency speed control system is composed of more than 3 cabinet bodies (depending on power size and layout mode). According to the requirements, a single cabinet body or multiple cabinet bodies can be placed upon the foundation steel channels vertically using traveling crane or forklift. The phase-shifting transformer cabinet must be installed separately.

The cabinet bodies shall be assembled, connected, positioned and aligned, then shall be directly welded onto foundation steel channels, the wiring inside the cabinets and between the cabinets shall be installed under the guidance of the professionals from our company.

In some cases, the power units shall be separately packaged for transportation, and they are installed into the power unit cabinets under the guidance of the professionals from our company after arriving.

Warning

- ✧ Ensure that various kinds of fibers, paper scraps, sawdust, metal fragments and other foreign materials do not enter into the cabinets or adhere to the radiators; otherwise, it may cause accidents or fire.
- ✧ Install onto the non-combustible structure made of basic steel channels; otherwise, it may cause fire.

The following installation guidelines are applicable to the general installation in industrial environment. In special environment, please make inquiry to our company for detailed installation procedures.

1. Before machinery installation, please be sure to meet all environment conditions described above.
2. Examine the basic level with level instruments. The allowable maximum overall roughness is less than 5mm. If the ground surface is not flat, it may cause cabinet distortion and cabinet doors cannot be opened or closed smoothly.
3. Move to the installation position. Please refer to the requirements of moving.
4. Open all cabinet doors, and carefully inspect possible transportation damage to the system and the attached devices. If any part is damaged or missing, please immediately contact the technical service department of our company and the logistics company. Please note the opening methods of cabinet doors.

5. Check whether the cabinet doors can be fully opened or closed; if not, the cabinet bodies need to be adjusted. Examine the position-restraint locks on the doors: after power on, aside from the doors of the main control cabinets, no other front doors and back doors can be opened. The illegal opening of cabinet doors will trigger the alarm.
6. Perform the fine adjustment of the cabinet bodies, and fix the adjacent cabinet bodies tightly with binding bolts.
7. Connect the wiring inside the cabinet bodies, install and fix the power units under the guidance of the professionals of our company.

Note: Please pay attention to the opening methods of cabinet doors. Forced opening of cabinet doors is forbidden; otherwise, the equipment will be damaged.

Chapter 9 Maintenance guidelines

In order to prevent the faults of the system and make it run smoothly in high-performance for a long time, users must inspect the system periodically. This chapter introduces maintenance on G5000 series variable frequency speed control systems.

9.1 Daily inspection

1. Make sure indoor temperature no more than 40°C and check ventilation
2. Keep the system inside clean
3. Check whether the cooling fan runs normally (Place a piece of A4 paper at air inlet and it will be firmly sucked by filter.)
4. Check whether the system has abnormal sound or smell, the cabinet body is heating, and 3-phase temperature of dry-type transformer is normal.
5. Check whether switches of control power supply and fan power supply are closed, and bottom UPS power supply switch is under use.
6. Record running information of the system usually (including running mode, voltage, current, speed, power, etc.) and record fault information after trip. Find out the reason of the fault before power on again.
7. Check whether the temperature and bus voltage displayed in unit state are normal.
8. Check the state of knife switch for bypass cabinet and make sure no abnormal vibration or sound on high-voltage contactor.

9.2 Maintenance steps

(1) After the system stops, cut off the main power supply of high voltage switch cabinet and switch on grounding knife switch
(2) Cut off the control power supply and UPS of the system
(3) Open the cabinet door after waiting for 15 minutes and confirm power unit discharge before operation; otherwise, electric shock may occur.
(4) Clean the dust filter once a week if there is much dust and dust cabinet inside with vacuum cleaner
(5) After the system comes into use for a month, tighten all in and out cables and the terminal block which is used to connect cables to control section, and tighten again every 6 months (including control lines).
(6) Check whether the optical fiber connector of power units is loose
(7) Confirm there are no tools or foreign materials left in the cabinets and close each cabinet door
(8) Power on spare units periodically (6 months in general), and make sure the optical fiber connector of spare units in connection to avoid pollution
(9) Power on again and record maintenance and inspection

Check items for daily maintenance

Check item	Check content	Check method/Criterion
Environment	1. The environmental temperature, humidity, vibration, dust, oil and water drop 2. Foreign materials such as tools and dangerous objects	**Observation or instrument measurement, observe the interface** **Complying with technical specifications**

		No placement
Touch screen	1. Touch screen display	**Observation** **Display clearly**
Frame structure	1. Abnormal vibration and sound 2. Loose bolts (fasteners) 3. Distortion, damage and crackles 4. Dust, dirtiness and rust	**Observation** **Not abnormal**
Cooling fan	1. Abnormal vibration and sound	**Observation and hearing** **Not abnormal**
Ventilating duct	1. Blockage or adhered substance 2. Great differences between temperatures showed by units before and after	**Observation** **Not abnormal**
Phase-shifting transformer	1. Abnormal temperature rise 2. Abnormal sound	**Observation and hearing, observe the interface**
High voltage contactor	1. Abnormal vibration and sound	**Observation and hearing** **Not abnormal**

Maintenance list of G5000 series variable frequency speed control systems

No	Check location	Check item	Check content	Cycle				Check method	Criterion	Instrument	Remarks
				Daily	Year						
					1	2	3				
1	All	Environment	Ambient temperature, humidity, dust, etc.	●				Observation	-5~40°C, unfrozen; humidity below 90%, no condensation	Thermo-meter, hygrometer	
2		Entire system	Abnormal vibration and sound	●				Observation and hearing	Not abnormal		
3		Voltage of main power supply	Normal voltage	●				Observe the input voltage showed on the interface	-15%, +10% of rated voltage		
4		Voltage of control power supply	Normal voltage	●				Measure the input voltage of control part	AC380V±10%	Multi-meter	
5		HMI	Normal information and accurate operation	●				Observation	Displayed data in the normal range and operation normal		
6		Dust filter	Blockage, too much dust	●				Observation	Use a piece of A4 paper to check air inlet flow, filter can firmly suck the paper, no obvious dust outside		
7	Main circuit	All	(1) Insulation resistance (phase-shifting transformer insulation)		●			(1) insulation resistance needs to be within the normal range (2) Check and tighten (3) Observation	(1) Above 20MΩ (2)~(3) Not abnormal	Insulation ohmmeter DC 2500V	
			(2) Loose fasteners		●	●	●				
			(3) Abnormal heating of parts		●	●	●				
			(4) Cleaning				●				
8		Connecting conductor and wires	(1) Conductor is tilted		●	●	●	Observation	Not abnormal		
			(2) Wire insulation is damaged, aging		●	●	●				

No	Check location	Check item	Check content	Cycle				Check method	Criterion	Instrument	Remarks
				Daily	Year						
					1	2	3				
9		Terminal	Broken		●	●	●	Observation	Not abnormal		
10		Filter capacitor	(1) Fluid leakage	●	●	●	●	(1)~(2) Observation (3) Measure with capacitance meter	(1)~(2) Not abnormal (3) Above 85% of rated capacity	Capacitance meter	
			(2) Expansion	●	●	●	●				
			(3) Electrostatic capacity				●				
11		Relay	(1) Abnormal noise		●	●	●	(1) Hearing (2) Observation	Not abnormal		
			(2) Contact is rough or broken		●	●	●				
12	Control and protection circuit	Action check	(1) The balance of the output voltage		●			(1) Measuring the phase-to-phase voltage of output terminals U, V and W (2) Carry out related test at simulation run position	(1) Measure the output voltage on the control cabinet, voltage deviation among phases below 10V (2) The high voltage switch will switch on after "switch allow" is given; it will immediately break when emergency stop button is pressed	Multimeter	
			(2) Interlock switch and protection circuit are normal		●						
13	Cooling system	Cooling fans	(1) Abnormal vibration and sound	●				(1) Rotate by hand without power (2) Check and tighten	(1) Smooth rotation (2) Not abnormal		
			(2) Loose connection parts		●	●	●				
14	Display	Display	(1) HMI display is normal	●				(1) Observation (2) Clean with cotton yarn rather than organic solvent			Confirm normal
			(2) Cleaning		●						
15		Indicator	on and correct	●				Be consistent with the requirements	Meet the design requirements		
16		Instrument	Normal	●				Confirm the values	Meet ratings		
17	Motor	All	(1) Abnormal vibration and sound	●				(1)Hearing, feeling, observation (2) Abnormal odor caused by overheat or damage	Not abnormal		
			(2) Abnormal odor	●							
18		Insulation resistance	Insulation resistance test (all terminals and grounding terminals)		●			Remove the wiring of U, V and W, including the wiring of the motor	Above 5MΩ	Insulation ohmmeter DC 2500V	

Appendix 1

General knowledge of EMC

EMC is the abbreviation of electromagnetic compatibility, which means the device or system has the ability to work normally in the electromagnetic environment and will not generate any electromagnetic interference to other equipment. EMC includes two subjects: electromagnetic interference and electromagnetic anti-jamming.

According to the transmission mode, Electromagnetic interference can be divided into two categories: conducted interference and radiated interference.

Conducted interference is the interference transmitted by conductor. Therefore, any conductors such as wire, transmission line, inductor and capacitor are the transmission channels of interference.

Radiated interference is the interference transmitted in electromagnetic waves, and the energy is inversely proportional to the square of distance.

Three necessary conditions or essentials of electromagnetic interference are: interference source, transmission channel and sensitive receiver. For customers, the solution of EMC problem is mainly in transmission channels because the device as interference source or receiver cannot be changed.

Different electric and electronic devices, because of its various EMC standards or degrees, have different EMC capacities.

EMC features of medium voltage variable frequency speed control system

Like other electric or electronic devices, the system is not only an electromagnetic interference source but also an electromagnetic receiver. The operating principle of the system determines that it can produce certain electromagnetic interference noise. And the same time the system needs to be designed with certain anti-jamming ability to ensure the smooth working in certain electromagnetic environment. The following is its EMC features:

① Input current is non-sine wave. The input current includes large amount of high-harmonic waves that can cause electromagnetic interference, decrease the grid power factor and increase the line loss.

② Output voltage is high frequency PWM wave, which can increase the temperature rise and shorten the life of motor. And the leakage current will also increase, which can lead to the leakage protection device malfunction and generate strong electromagnetic interference to influence the reliability of other electric devices.

③ As the electromagnetic receiver, too strong interference will damage the system and influence the normal using.

④ In the system, EMS and EMI of the system coexist. Decrease the EMI of the system can increase its EMS ability.

General EMC principles of medium voltage variable frequency speed control system

In order to ensure all electric devices in the same system to work smoothly, this section, based on EMC features of the system, introduces general EMC principles in several aspects including noise control, site wiring and grounding for reference in site installation.

1. Noise control

All the connections to the control terminals must use shielded wire. And the shield layer of the wire must ground near the wire entrance of the system. The ground mode is 360 degree annular connection formed

by cable clips. It is strictly prohibitive to connect the twisted shielding layer to the ground of the system, which greatly decreases or loses the shielding effect.

2. Site wiring

Power supply wiring: The shielding layer of power supply incoming cables of the system shall be grounded reliably. It is strictly prohibitive to route the power cables and control cables in parallel.

Device categorization: There are different electric devices in the same distribution system, which have different ability of emitting and withstanding electromagnetic noise. Therefore, it needs to categorize these devices into strong noise device and noise sensitive device. The same kind of devices needs to be placed in the same area, and the distance between devices in different categories needs to be more than 20cm.

Wiring in the control cabinet: During wiring, signal cables and power cables need to be arranged in different areas. It is strictly prohibitive to arrange them in parallel or interlacement at a close distance (less than 20cm) or tie them together. If the signal cables have to cross the power cables, they need to be arranged in 90 degree angle.

3. Grounding

The system must be grounded safely and reliably in operation. Grounding has the priority in all EMC methods because it does not only ensure the safety of equipment and persons, but also it is the simplest, most effective and lowest-cost solution for EMC problems.

Three categories of grounding: special pole grounding, common pole grounding and series-wound grounding. Different control system needs to use special pole grounding, different devices in the same control system needs to use common pole grounding, and different devices connected by the same power cables needs to use series-wound grounding.

Appendix 2

The function parameters have been divided into three levels. For example, “P08.08” means the eighth function code in the P8 function group. PE group is factory group, and users are forbidden to access these parameters.

For the convenience of function codes setting, the function group number corresponds to the first level menu, the function code corresponds to the second level menu and the function code parameter corresponds to the third level menu.

1. Below are the instructions of the tables for function codes:

The first line “Function code”: codes of function parameter group and parameters

The second line “Name”: full name of function parameters

The third line “Detailed instruction of parameters”: Detailed illustration of the function parameters

The forth line “Setting range”: valid setting range of the function parameters

The fifth line “Default value”: the original factory set value of the function parameters

The sixth line “Modify”: the modifying character of function codes (the parameters can be modified or not and the modifying conditions), below are the instructions:

“○”: means the set value of the parameter can be modified in stop and running state；

“◎”: means the set value of the parameter cannot be modified in running state；

“●”: means the value of the parameter is the real detection value which cannot be modified.

(The system has limited the automatic inspection of the modifying character of the parameters to help users avoid modifying by mistake)

2. “Parameter radix” is decimal (DEC), if the parameter is expressed by hex, then the parameter is separated from each other when editing. The setting range of certain bits are hex (0~F).

3. “Default value” means the function parameter will restore to the default value during default parameters restoring. But the detected parameter or recorded value will not be restored.

4. For a better parameter protection, the system provides password protection to the parameters and only factory and administrator can modify the function codes. For the factory setting parameter zone, only factory can enter. (Remind that the users cannot modify the factory parameters by themselves; otherwise, if the parameter setting is incorrect, damage to the system may occur). If the password protection is unlocked, the user can modify the password freely and the user password will be subject to the last one.

List of function parameters of G5000 variable frequency speed control systems

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P00 Group Basic function						
P0.00	Speed control mode	0: V/F control 1: Sensorless vector control 0 2: Sensorless vector control 1 3: Vector control	0~3	0	◎	1.
P0.01	Run command channel	0: Local command channel 1: Terminal command channel 2: Communication command channel 3: Master command channel	0~3	0	○	2.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P0.02	Current communication command channel	0: MODBUS 1: Profibus 2: Ethernet	0~2	0	○	3.
P0.03	UP/DOWN setting	0: Valid, save when power off 1: Valid, do not save when power off 2: Invalid 3: Valid during running, clear at stop	0~3	0	○	4.
P0.04	UP/DOWN adjustment	-120.00~120.00Hz	-120.00~120.00	0.00Hz	●	5.
P0.05	Speed reference mode	0: Speed mode 1: Torque mode 2: Slave speed mode 3: Slave torque mode	0~3	0	◎	6.
P0.06	Frequency A command source	0: Function code 1: AI1 2: AI2 3. AI3 4: HDI 5: Multi-step speed 6: PID control 7: MODBUS setting 8: Profibus setting	0~8	0	○	7.
P0.07	Frequency B command source	0: AI1 1: AI2 2: AI3 3: HDI	0~3	0	○	8.
P0.08	Reference of frequency B	0: Maximum frequency 1: Frequency A command	0~1	0	○	9.
P0.09	Combination of frequency source	0: A 1: B 2: A+B 3: Max(A, B)	0~3	0	○	10.
P0.10	Maximum frequency	P0.11~120.00Hz	P0.11~120.00	50.00Hz	◎	11.
P0.11	Upper frequency limit	P0.12~P0.10 (Max. frequency)	P0.12~P0.10	50.00Hz	◎	12.
P0.12	Lower frequency limit	0.00Hz~P0.11 (upper frequency limit)	0.00~P0.11	0.00Hz	◎	13.
P0.13	Function code set frequency	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	50.00Hz	○	14.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P0.14	Torque setting	0: Function code 1: AI1 2: AI2 3: AI3 4: HDI 5: Multi-step speed 6: MODBUS setting 7: Profibus setting	0~7	0	○	15.
P0.15	Function code set torque	-100.0%~100.0%	-100.0~100.0%	100.0%	○	16.
P0.16	Acceleration time 1	0.1~3600.0s	0.1~3600.0	Depend on model	○	17.
P0.17	Deceleration time 1	0.1~3600.0s	0.1~3600.0	Depend on model	○	18.
P0.18	Running direction	0: Run in default direction 1: Run in opposite direction 2: Forbid reverse running	0~2	0	○	19.
P0.19	Carrier frequency setting	0.5~2.0kHz	0.5~2.0	0.8kHz	◎	20.
P0.20	Motor parameters autotuning	0: No action 1: Autotuning	0~1	0	◎	21.
P0.21	Restore parameters	0: No action 1: Restore factory setting 2: Clear fault records 3: Clear ammeter records	0~3	0	◎	22.
P0.22	AVR function	0: Disabled 1: Enabled all the time 2: Disabled during deceleration	0~2	1	◎	23.
P0.23	Reserved	0~65535	0~65535	0	●	24.
P0.24	Reserved	0~65535	0~65535	0	●	25.
P0.25	Reserved	0~65535	0~65535	0	●	26.
P0.26	Reserved	0~65535	0~65535	0	●	27.
P0.27	Reserved	0~65535	0~65535	0	●	28.
P01 Group Start and stop control						
P1.00	Braking mode	0: DC braking 1: Dual-frequency braking (reserved)	0~1	0	◎	100.
P1.01	Start mode	0: Start directly 1: Start after DC braking 2: Start after rotating speed tracking	0~2	0	◎	101.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P1.02	Starting frequency	0.00~10.00Hz	0.00~10.00	0.10Hz	◎	102.
P1.03	Hold time of starting frequency	0.0~50.0s	0.0~50.0	0.0s	◎	103.
P1.04	DC braking current before start	0.0~120.0% (rated current of the system)	0.0~120.0	0.0%	◎	104.
P1.05	DC braking time before start	0.0~50.0s	0.0~50.0	0.0s	◎	105.
P1.06	ACC/DEC mode	0: Linear type 1: S curve	0~1	0	◎	106.
P1.07	S curve starting-segment proportion	1.0~40.0% (ACC/DEC time)	1.0~40.0	30.0%	◎	107.
P1.08	S curve ending-segment proportion	1.0~40.0% (ACC/DEC time)	1.0~40.0	30.0%	◎	108.
P1.09	Stop mode	0:Decelerate to stop 1:Coast to stop	0~1	0	○	109.
P1.10	Starting frequency of stop braking	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz	○	110.
P1.11	Waiting time before stop braking	0.0~50.0s	0.0~50.0	0.0s	○	111.
P1.12	Stop DC braking current	0.0~120.0% (rated current of the system)	0.0~120.0	0.0%	○	112.
P1.13	Stop DC braking time	0.0~50.0s	0.0~50.0	0.0s	○	113.
P1.14	Torque of dual-frequency braking	0.0%~50.0%	0.0~50.0	30.0%	○	114.
P1.15	Enabling voltage of dual-frequency braking	1000~1500V	1000~1500	1130V	○	115.
P1.16	Dual-frequency frequency of dual-frequency braking	200.0~500.0Hz	200.0~500.0	300.0Hz	○	116.
P1.17	Reserved	0~65536	0~65536	0	○	117.
P1.18	Dual-frequency	50.0%~100.0%	50.0~100.0	80.0%	○	118.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	voltage limit of dual-frequency braking					
P1.19	Proportional coefficient of dual-frequency braking	0~65536	0~65536	5	◎	119.
P1.20	Integral coefficient of dual-frequency braking	0~65536	0~65536	2	◎	120.
P1.21	Adjusting multiple of dual-frequency braking	0~65536	0~65536	2	◎	121.
P1.22	Reserved	0~65536	0~65536	0	●	122.
P1.23	Reserved	0~65536	0~65536	0	●	123.
P1.24	Dead time of FWD/REV	0.0~3600.0s	0.0~3600.0	1.0s	○	124.
P1.25	Action when running frequency is less than lower frequency limit (valid when lower frequency limit＞0)	0: Run at the lower frequency limit 1: Stop 2: Stand-by	0~2	0	◎	125.
P1.26	Restart after power off	0: Disabled 1: Enabled	0~1	0	○	126.
P1.27	Instantaneous power off time	0.00~5.00s	0.00~5.00	1.00s	◎	127.
P1.28	Delay time for restart	0.0~3600.0s (valid when P1.26=1)	0.0~3600.0	1.0s	○	128.
P1.29	High voltage switching action at stop	0: Cut off high voltage supply 1: Not cut off high voltage supply	0~1	0	○	129.
P1.30	Waiting time of switching on	0.0~3600.0s	0.0~3600.0s	10.0 s	○	130.
P1.31	Waiting time of running readiness	0.0~3600.0s	0.0~3600.0s	10.0 s	○	131.
P1.32	Reserved	0~65535	0~65535	0	●	132.
P1.33	Reserved	0~65535	0~65535	0	●	133.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P1.34	Reserved	0~65535	0~65535	0	●	134.
P1.35	Command source of coast to stop	0: No 1: UDP 2: Internal command 3: Terminal 4: Modbus 5: Profibus	0~5	0	●	135.
P1.36	Command source of decelerate to stop	0: No 1: UDP 2: Terminal 3: Modbus 4: Profibus	0~4	0	●	136.
P02 Group Motor parameters 1						
P2.00	Motor 1 type	0: Asynchronous motor 1: Synchronous motor	0~1	0	○	200.
P2.01	Rated power of asynchronous motor 1	4~50000kW	4~50000	Depend on model	◎	201.
P2.02	Rated frequency of asynchronous motor 1	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	202.
P2.03	Rated speed of asynchronous motor 1	1~36000rpm	1~36000	Depend on model	◎	203.
P2.04	Rated voltage of asynchronous motor 1	0~20000V	0~20000	Depend on model	◎	204.
P2.05	Rated current of asynchronous motor 1	0.1~1000.0A	0.1~1000.0	Depend on model	◎	205.
P2.06	Stator resistance of asynchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model	○	206.
P2.07	Rotor resistance of asynchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model	○	207.
P2.08	Inductance of asynchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model	○	208.
P2.09	Mutual inductance of	0.1~6553.5mH	0.1~6553.5	Depend on model	○	209.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	asynchronous motor 1					
P2.10	Non-load current of asynchronous motor 1	0.01~655.35A	0.01~655.35	Depend on model	○	210.
P2.11	Rated power of synchronous motor 1	4~50000kW	4~50000	Depend on model	◎	211.
P2.12	Rated frequency of synchronous motor 1	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	212.
P2.13	Rated speed of synchronous motor 1	0~36000rpm	0~36000	1500rpm	◎	213.
P2.14	Number of pole pairs for synchronous motor 1	1~50	1~50	2	◎	214.
P2.15	Rated voltage of synchronous motor 1	0~20000V	0~20000	Depend on model	◎	215.
P2.16	Rated current of synchronous motor 1	0.1~1000.0A	0.1~1000.0	Depend on model	◎	216.
P2.17	Stator resistance of synchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model	○	217.
P2.18	Direct axis inductance of synchronous motor 1	0.01~655.35mH	0.01~655.35	Depend on model	○	218.
P2.19	Quadrature axis inductance of synchronous motor 1	0.01~655.35mH	0.01~655.35	Depend on model	○	219.
P2.20	Back emf constant of synchronous motor 1	0~20000V/1000rpm	0~20000	15000 V/ 1000rpm	○	220.
P03 Group Vector control						
P3.00	Speed loop	0~100	0~100	25	○	300.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	proportional gain 1					
P3.01	Speed loop integral time 1	0.01~10.00s	0.01~10.00	1.00s	○	301.
P3.02	Low switching frequency	0.00Hz~P3.05	0.00~P3.05	5.00Hz	○	302.
P3.03	Speed loop proportional gain 2	0~100	0~100	30	○	303.
P3.04	Speed loop integral time 2	0.01~10.00s	0.01~10.00	1.00s	○	304.
P3.05	High switching frequency	P3.02~P0.10 (Max. frequency)	P3.02~P0.10	10.00Hz	○	305.
P3.06	Current loop proportional gainP	0~65535	0~65535	500	○	306.
P3.07	Current loop integral time I	0~65535	0~65535	500	○	307.
P3.08	Speed loop filter time	0.000~1.000s	0.000~1.000	0.000s	○	308.
P3.09	VC slip compensation factor	50.0%~200.0%	50.0~200.0	100.0%	○	309.
P3.10	Encoder pulse	1~65535	1~65535	1000	○	310.
P3.11	Encoder direction	0: Forward input 1: Reverse input	0~1	0	○	311.
P3.12	Upper torque limit	0.0~200.0% (rated current of the system)	0.0~200.0%	150.0%	○	312.
P04 Group V/F control						
P4.00	V/F curve	0: Straight line V/F curve 1: Multi-dots V/F curve 2:1.3th power low torque V/F curve 3:1.7th power low torque V/F curve 4:2.0th power low torque V/F curve 5: Customized (V/F separation)	0~5	0	◎	400.
P4.01	Torque boost	0.0%: (automatic) 0.1%~10.0%	0.0~10.0	0.5%	○	401.
P4.02	Torque boost cut-off	0.0%~50.0% (relative to motor rated frequency)	0.0~50.0	20.0%	◎	402.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P4.03	V/F slip compensation	0.0~200.0%	0.0~200.0	0.0%	○	403.
P4.04	Energy saving operation	0: Energy saving invalid 1: Energy saving valid	0~1	0	◎	404.
P4.05	V/F frequency 1	0.00Hz~P4.07	0.00~P4.07	0.00Hz	○	405.
P4.06	V/F voltage 1	0.0%~P4.08	0.0~P4.08	0.0%	○	406.
P4.07	V/F frequency 2	P4.05~P4.09	P4.05~P4.09	0.00Hz	○	407.
P4.08	V/F voltage 2	P4.06~ P4.10	P4.06~P4.10	0.0%	○	408.
P4.09	V/F frequency 3	P4.07~P2.02 (motor rated frequency)	P4.07~P2.02	0.00Hz	○	409.
P4.10	V/F voltage 3	P4.08~100.0% (motor rated voltage)	P4.08~100.0	0.0%	○	410.
P4.11	PWM mode	0: PWM 1 1: PWM 2	0~1	0	◎	411.
P4.12	Voltage setting channel	0: Keypad 1: AI1 2: AI2 3: AI3 4: HDI1 5: Multi-step speed 6: PID 7: MODBUS communication 8: PROFIBUS communication	0~8	0	○	412.
P4.13	Voltage setting by keypad	0.0%~100.0% (motor rated voltage)	0.0~100.0	20.0%	○	413.
P4.14	Voltage increasing time	0.0s~3600.0s	0.0~3600.0	100.0s	○	414.
P4.15	Voltage decreasing time	0.0s~3600.0s	0.0~3600.0	100.0s	○	415.
P4.16	Minimum output voltage	0.0%~P4.17	0.0~P4.17	5.0%	○	416.
P4.17	Maximum output voltage	P4.16~100.0%	P4.16~100.0	100.0%	○	417.
P05 Group Input terminals						
P5.00	S1 terminal function	0: Invalid 1: Forward running 2: Reverse running 3: 3-wire control 4: Forward jogging 5: Reverse jogging 6: Coast to stop (emergency stop) 7: Fault reset	0~63	0	◎	500.
P5.01	S2 terminal function		0~63	0	◎	501.
P5.02	S3 terminal function		0~63	0	◎	502.
P5.03	S4 terminal function		0~63	0	◎	503.
P5.04	S5 terminal		0~63	0	◎	504.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	function	8: External fault NO input 9: External fault NC input 10: Frequency increase (UP) 11: Frequency decrease (DOWN) 12: Clear UP/DOWN 13: Clear UP/DOWN (temporary) 14: ACC/DEC time selection 1 15: ACC/DEC time selection 2 16: Multi-step speed terminal 1 17: Multi-step speed terminal 2 18: Multi-step speed terminal 3 19: Multi-step speed terminal 4 20: Multi-step speed pause 21: Switch between A and B 22: Switch between (A+B) and A 23: Switch between (A+B) and B 24: Variable frequency running (pulse signal ↑) 25: Power frequency running (pulse signal ↑) 26: Switching from variable frequency to power frequency (pulse signal ↑) 27: Switching from power frequency to variable frequency (pulse signal ↑) 28: High voltage breaking input (pulse signal) 29: PID pause 30: Reserved 31: Reserved 32: Switch cabinet address 0 33: Switch cabinet address 1 34: Switch cabinet address 2 35: Running command switching to the local 36: Running command switching to terminals 37: Running command switching to communication				
P5.05	S6 terminal function		0~63	0	◎	505.
P5.06	S7 terminal function		0~63	0	◎	506.
P5.07	S8 terminal function		0~63	0	◎	507.
P5.08	S9 terminal function		0~63	0	◎	508.
P5.09	S10 terminal function		0~63	0	◎	509.
P5.10	S11 terminal function		0~63	0	◎	510.
P5.11	S12 terminal function		0~63	0	◎	511.
P5.12	S13 terminal function		0~63	0	◎	512.
P5.13	S14 terminal function		0~63	0	◎	513.
P5.14	S15 terminal function		0~63	0	◎	514.
P5.15	S16 terminal function		0~63	0	◎	515.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		38: Reserved 39: Reserved 40: Torque control disabled 41: Master-slave control enabled (reserved) 42: Master-slave speed synchronous counter reset terminal (reserved) 43: ACC/DEC disabled 44: Vacuum contactor KM2 feedback 45: Commissioning signal input 46: Reserved 47: Reserved 48: QF1M1 feedback 49: QF1M2 feedback 50: QF1M3 feedback 51: QF1M4 feedback 52: QF1M5 feedback 53: QF1M6 feedback 54: QF1M7 feedback 55: QF1M8 feedback 56: QF2M1 feedback 57: QF2M2 feedback 58: QF2M3 feedback 59: QF2M4 feedback 60: QF2M5 feedback 61: QF2M6 feedback 62: QF2M7 feedback 63: QF2M8 feedback				
P5.16	Polarity of input terminal	0x0000~0xFFFF	0000~FFFF	0000	○	516.
P5.17	Filter time of digital signal	1~500	1~500	20	○	517.
P5.18	Terminal control run mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	0~3	0	◎	518.
P5.19	UP setting change rate	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s	○	519.
P5.20	DOWN setting change rate	0.01~50.00Hz/s	0.01~50.00	0.50Hz/s	○	520.
P5.21	AI1 lower limit	0.00V~ P5.23	0.00~P5.23	0.00V	○	521.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P5.22	AI1 lower limit corresponding setting	-100.0%~ P5.24	-100.0~P5.24	0.0%	○	522.
P5.23	AI1 upper limit	P5.21 ~10.00V	P5.21~10.00	10.00V	○	523.
P5.24	AI1 upper limit corresponding setting	P5.22~100.0%	P5.22~100.0	100.0%	○	524.
P5.25	AI1 input filter time	0.00s~10.00s	0.00~10.00	2.00s	○	525.
P5.26	AI2 lower limit	0.00V~ P5.28	0.00~ P5.28	0.00V	○	526.
P5.27	AI2 lower limit corresponding setting	-100.0%~ P5.29	-100.0~ P5.29	0.0%	○	527.
P5.28	AI2 upper limit	P5.26~10.00V	P5.26~10.00	10.00V	○	528.
P5.29	AI2 upper limit corresponding setting	P5.27~100.0%	P5.27~100.0	100.0%	○	529.
P5.30	AI2 input filter time	0.00s~10.00s	0.00~10.00	2.00s	○	530.
P5.31	AI3 lower limit	-10.00V~ P5.33	-10.00~P5.33	0.00V	○	531.
P5.32	AI3 lower limit corresponding setting	-100.0%~ P5.34	-100.0~P5.34	0.0%	○	532.
P5.33	AI3 upper limit	P5.31~10.00V	P5.31~10.00	10.00V	○	533.
P5.34	AI3 upper limit corresponding setting	P5.32~100.0%	P5.32~100.0	100.0%	○	534.
P5.35	AI3 input filter time	0.00s~10.00s	0.00~10.00	2.00s	○	535.
P5.36	HDI lower limit	0.000 kHz~P5.38	0.000~P5.38	0.000kHz	○	536.
P5.37	HDI lower limit corresponding setting	-100.0%~ P5.39	-100.0~P5.39	0.0%	○	537.
P5.38	HDI upper limit	P5.36~50.000kHz	P5.36~50.000	50.000kHz	○	538.
P5.39	HDI upper limit corresponding setting	P5.38~100.0%	P5.38~100.0	100.0%	○	539.
P5.40	HDI input filter time	0.00s~10.00s	0.00~10.00	0.10s	○	540.
P06 Group Output terminals						
P6.00	RO1 output	0: No output	0~70	0	○	600.
P6.01	RO2 output	1: In running	0~70	0	○	601.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P6.02	RO3 output	2: Fault output 3: FDT output 4: Frequency arrival 5: Zero speed running 6: Variable frequency state 7: Power frequency state 8: Running time arrival 9: Upper frequency limit arrival 10: Lower frequency limit arrival 11: Ready for running (run request) 12: Alarm output 13: Permission of QF1M1 switching on 14: Permission of QF1M2 switching on 15: Permission of QF1M3 switching on 16: Permission of QF1M4 switching on 17: Permission of QF1M5 switching on 18: Permission of QF1M6 switching on 19: Permission of QF1M7 switching on 20: Permission of QF1M8 switching on 21: Permission of QF2M1 switching on 22: Permission of QF2M2 switching on 23: Permission of QF2M3 switching on 24: Permission of QF2M4 switching on 25: Permission of QF2M5 switching on 26: Permission of QF2M6 switching on 27: Permission of QF2M7 switching on 28: Permission of QF2M8	0~70	0	○	602.
P6.03	RO4 output		0~70	0	○	603.
P6.04	RO5 output		0~70	0	○	604.
P6.05	RO6 output		0~70	0	○	605.
P6.06	RO7 output		0~70	0	○	606.
P6.07	RO8 output		0~70	0	○	607.
P6.08	RO9 output		0~70	0	○	608.
P6.09	RO10 output		0~70	0	○	609.
P6.10	RO11 output		0~70	0	○	610.
P6.11	RO12 output		0~70	0	○	611.
P6.12	RO13 output		0~70	0	○	612.
P6.13	RO14 output		0~70	0	○	613.
P6.14	RO15 output		0~70	0	○	614.
P6.15	RO16 output		0~70	0	○	615.
P6.16	RO17 output		0~70	0	○	616.
P6.17	RO18 output		0~70	0	○	617.
P6.18	RO19 output		0~70	0	○	618.
P6.19	RO20 output		0~70	0	○	619.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		switching on 29: Permission of QF1M1 switching off 30: Permission of QF1M2 switching off 31: Permission of QF1M3 switching off 32: Permission of QF1M4 switching off 33: Permission of QF1M5 switching off 34: Permission of QF1M6 switching off 35: Permission of QF1M7 switching off 36: Permission of QF1M8 switching off 37: Permission of QF2M1 switching off 38: Permission of QF2M2 switching off 39: Permission of QF2M3 switching off 40: Permission of QF2M4 switching off 41: Permission of QF2M5 switching off 42: Permission of QF2M6 switching off 43: Permission of QF2M7 switching off 44: Permission of QF2M8 switching off 45: Variable frequency state of switch cabinet 1 46: Power frequency state of switch cabinet 1 47: Variable frequency state of switch cabinet 2 48: Power frequency state of switch cabinet 2 49: Variable frequency state of switch cabinet 3 50: Power frequency state of				

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		switch cabinet 3 51: Variable frequency state of switch cabinet 4 52: Power frequency state of switch cabinet 4 53: Variable frequency state of switch cabinet 5 54: Power frequency state of switch cabinet 5 55: Variable frequency state of switch cabinet 6 56: Power frequency state of switch cabinet 6 57: Variable frequency state of switch cabinet 7 58: Power frequency state of switch cabinet 7 59: Variable frequency state of switch cabinet 8 60: Power frequency state of switch cabinet 8 (Both power frequency and variable frequency valid at the same time indicates fault.) 61: Unit bypass state 62: Remote-local state 63: Vacuum contactor control 64: Vacuum contactor power control 65: Low-voltage commissioning vacuum contactor KM1 control 66: Low-voltage commissioning vacuum contactor KM2 control 67~70: Reserved, no output				
P6.20	HDO output	0: Running frequency (100%: Max. frequency) 1: Set frequency (100%: Max. frequency) 2: Inverter current RMS (100%: 2 times of system rated current) 3: Motor current RMS (100%:	0~9	0	○	620.
P6.21	AO1 output		0~9	0	○	621.
P6.22	AO2 output		0~9	0	○	622.
P6.23	AO3 output		0~9	0	○	623.
P6.24	AO4 output		0~9	0	○	624.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		twice of motor rated current) 4: Output voltage (100%: 1.2 times of system rated voltage) 5: Output power (100%: twice of motor rated power) 6: Output torque (100%: twice of motor rated torque) 7: AI1 voltage 8: AI2 voltage 9: AI3 voltage (100%: 10V)				
P6.25	HDO lower limit	0.00%~P6.27	0.00~P6.27	0.00%	○	625.
P6.26	HDO lower limit corresponding output	0.000kHz~P6.28	0.000~P6.28	0.000kHz	○	626.
P6.27	HDO upper limit	P6.25~100.00%	P6.25~100.00	100.00%	○	627.
P6.28	HDO upper limit corresponding output	P6.26~50.000kHz	P6.26~50.000	50.000kHz	○	628.
P6.29	AO1 lower limit	0.00%~ P6.31	0.00~ P6.31	0.0%	○	629.
P6.30	AO1 lower limit corresponding output	0.00V~ P6.32	0.00~ P6.32	0.00V	○	630.
P6.31	AO1 upper limit	P6.29~100.0%	P6.29~100.0	100.0%	○	631.
P6.32	AO1 upper limit corresponding output	P6.30~10.00V	P6.30~10.00	10.00V	○	632.
P6.33	AO2 lower limit	0.00%~ P6.35	0.00~ P6.35	0.0%	○	633.
P6.34	AO2 lower limit corresponding output	0.00V~ P6.36	0.00~ P6.36	0.00V	○	634.
P6.35	AO2 upper limit	P6.33~100.0%	P6.33~100.0	100.0%	○	635.
P6.36	AO2 upper limit corresponding output	P6.34~10.00V	P6.34~10.00	10.00V	○	636.
P6.37	AO3 lower limit	0.00%~ P6.39	0.00~ P6.39	0.0%	○	637.
P6.38	AO3 lower limit corresponding output	0.00V~ P6.40	0.00~ P6.40	0.00V	○	638.
P6.39	AO3 upper limit	P6.37~100.0%	P6.37~100.0	100.0%	○	639.
P6.40	AO3 upper limit corresponding output	P6.38~10.00V	P6.38~10.00	10.00V	○	640.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P6.41	AO4 lower limit	0.00%~ P6.43	0.00~ P6.43	0.0%	○	641.
P6.42	AO4 lower limit corresponding output	0.00V~ P6.44	0.00~ P6.44	0.00V	○	642.
P6.43	AO4 upper limit	P6.41~100.0%	P6.41~100.0	100.0%	○	643.
P6.44	AO4	P6.43~10.00V	P6.43~10.00	10.00V	○	644.
P07 Group HMI						
P7.00	Rotating speed display factor	0.1~999.9%	0.1~999.9%	100.0%	○	700.
P7.01	Linear velocity display factor	0.1~999.9%	0.1~999.9%	100.0%	○	701.
P7.02	FPGA software version	0~655.35	0~655.35	Factory setting	●	702.
P7.03	DSP software version	0~655.35	0~655.35	Factory setting	●	703.
P7.04	ARM software version	0~655.35	0~655.35	Factory setting	●	704.
P7.05	Valid control mode	0: V/F control 1: Sensorless vector control 0 2: Sensorless vector control 1 3: Vector control	0~3	Factory setting	●	705.
P7.06	Max. available unit	1~12	1~12	Factory setting	●	706.
P7.07	Motor type	0: Asynchronous motor 1: Synchronous motor 2: Asynchronous and synchronous motors	0~2	Factory setting	●	707.
P7.08	I/O extension card	0: Not support 1: Support	0~1	Factory setting	●	708.
P7.09	Profibus card	0: Not support 1: Support	0~1	Factory setting	●	709.
P7.10	Max. switch cabinet	0~8	0~8	Factory setting	●	710.
P7.11	Local accumulative running time	0~65535h	0~65535	0	●	711.
P7.12	Local running time	0~65535min	0~65535	0	○	712.
P7.13	Reserved	0~65535	0~65535	0	●	713.
P7.14	Reserved	0~65535	0~65535	0	●	714.
P7.15	Reserved	0~65535	0~65535	0	●	715.
P7.16	Reserved	0~65535	0~65535	0	●	716.
P7.17	Reserved	0~65535	0~65535	0	●	717.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P08 Group Enhanced functions						
P8.00	ACC time 2	0.1~3600.0s	0.1~3600.0	Depend on model	○	800.
P8.01	DEC time 2	0.1~3600.0s	0.1~3600.0	Depend on model	○	801.
P8.02	ACC time 3	0.1~3600.0s	0.1~3600.0	Depend on model	○	802.
P8.03	DEC time 3	0.1~3600.0s	0.1~3600.0	Depend on model	○	803.
P8.04	ACC time 4	0.1~3600.0s	0.1~3600.0	Depend on model	○	804.
P8.05	DEC time 4	0.1~3600.0s	0.1~3600.0	Depend on model	○	805.
P8.06	Jogging frequency	0.00 Hz~P0.10 (Max. frequency)	0.00~P0.10	5.00Hz	○	806.
P8.07	Jogging ACC time	0.1~3600.0s	0.1~3600.0	Depend on model	○	807.
P8.08	Jogging DEC time	0.1~3600.0s	0.1~3600.0	Depend on model	○	808.
P8.09	Jumping frequency 1	0.00 Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz	○	809.
P8.10	Jumping frequency range 1	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz	○	810.
P8.11	Jumping frequency 2	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz	○	811.
P8.12	Jumping frequency range 2	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	0.00Hz	○	812.
P8.13	Automatic fault reset times	0~3	0~3	0	○	813.
P8.14	Interval of automatic fault reset	0.1~100.0s	0.1~100.0	1.0s	○	814.
P8.15	FDT electrical level detection value	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	50.00Hz	○	815.
P8.16	FDT retention detection value	0.0~100.0% (FDT electrical level)	0.0~100.0	5.0%	○	816.
P8.17	Frequency arrival detection range	0.0~100.0% (Max. frequency)	0.0~100.0	0.0%	○	817.
P8.18	Overmodulation	0: Invalid	0~1	0	◎	818.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		1: Valid				
P8.19	Running mode of cooling fan	0: Rated running mode 1: The fan keeps running after powering on	0~1	0	○	819.
P8.20	Alarm reset interval	0.0s (invalid) 0.1~3600.0s	0.0~3600.0	0.0	○	820.
P8.21	Frequency reference offline threshold	0.0~100.0%	0.0~100.0	0.0	◎	821.
P8.22	Frequency reference offline time	0.0~360.0s	0.0~360.0	0.0s	◎	822.
P8.23	Frequency change rate of dropping control	0.00~10.00Hz	0.00~10.00	0.00Hz	○	823.
P8.24	Ambient overtemperature threshold	0~100.0%	0.0~100.0	100.0	○	824.
P8.25	Motor temperature zero-calibration factor	-100.00%~100.00%	-100.00~100.00	0.00	○	825.
P8.26	Motor temperature proportional calibration factor	0~200.00%	0~200.00	100.00	○	826.
P8.27	Motor temperature sensor selection	0: Not installed 1: Installed	0~1	0	●	827.
P8.28	Reserved	0~65535	0~65535	0	●	828.
P8.29	Reserved	0~65535	0~65535	0	●	829.
P8.30	Reserved	0~65535	0~65535	0	●	830.
P8.31	Reserved	0~65535	0~65535	0	●	831.
P09 Group Fault record						
P9.00	DSP fault action 1	0xEABA~0xFFFF Two bits stand for a fault. 00: No solution 01: Alarm 10: Fault, stop but not cut off high voltage power 11: Serious fault, stop and cut off high voltage power	0xEABA~0xFFFF	0xEABA	○	900.
P9.01	DSP fault action	0x3EAA~0xFFFF	0xBEAA~0xFFFF	0xBEAA	○	901.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	2					
P9.02	ARM fault action 1	0x830A~0xFFFF	0x830A~0xFFFF	0xABAE	○	902.
P9.03	ARM fault action 2	0xB28A~0xFFFF	0xB28A~0xFFFF	0xBAAA	○	903.
P9.04	ARM fault action 3	0xAA00~0xFFFF	0xAA00~0xFFFF	0xAAAA	○	904.
P9.05	ARM fault action 4	0x009A~0xFFFF	0x000A~0xFFFF	0x009A	○	905.
P9.06	Unit fault action 1	0x2AEA~0xFFFF	0x2AEA~0xFFFF	0xAAEA	○	906.
P9.07	Unit fault action 2	0xAE8~0xFFFF	0xAE8~0xFFFF	0x0AEA	○	907.
P9.08	Previous 2 DSP fault type	0: No fault 1: Fault bit0: Software overcurrent bit1: Hardware overcurrent bit2: Grid overvoltage bit3: Grid undervoltage bit4: Motor overload bit5: Inverter overload bit6: Output phase loss bit7: Current detection fault bit8: Motor autotuning fault bit9: Encoder offline fault bit10: Encoder REV fault bit11: Input phase loss bit12: Handshake fault bit13: Input overcurrent bit14: Transmission board fault	0~FFFF	0	●	908.
P9.09	Previous 2 ARM fault 1	0: No fault 1: Fault bit0: Transformer temperature controller fault bit1: Transformer overheat bit2: External fault bit3: MODBUS communication fault bit4: Buffer cabinet fault bit5: PID feedback disconnection fault bit6: Access fault bit7: Synchronous switching timeout bit8: Reserved	0~FFFF	0	●	909.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		bit9: Factory time arrival bit10: The motor temperature is too high bit11: Switch cabinet uplink communication fault bit12: Switch cabinet downlink communication fault bit13: QF feedback fault bit14: DSP and ARM handshake fault bit15: Power off in operation				
P9.10	Previous 2 ARM fault 2	bit16: PROFIBUS communication fault bit17: Frequency reference disconnection bit18: Switch cabinet 1 action fault bit19: Switch cabinet 2 action fault bit20: Switch cabinet 3 action fault bit21: Switch cabinet 4 action fault bit22: Switch cabinet 5 action fault bit23: Switch cabinet 6 action fault bit24: Switch cabinet 7 action fault bit25: Switch cabinet 8 action fault bit26: Fan overheat bit27: Master-slave optical fiber communication fault	0~FFFF	0	●	910.
P9.11	Previous 2 unit fault type	0: No fault 1: Fault bit0: Unit fiber uplink communication fault bit1: Unit fiber downlink communication fault bit2: Unit not ready bit3: Unit overvoltage bit4: Unit undervoltage bit5: Unit power fault bit6: Unit overheat	0~FFFF	0	●	911.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		bit7: Unit input phase loss protection bit8: Unit input power off protection bit9: Up bridge VCE fault bit10: Down bridge VCE fault bit11: Hardware overvoltage bit12: The unit does not match bit13: Unit bypass failure				
P9.12	Previous 2 fault No.	If the number is 0, there is no unit fault. If it is not 0, then A1~A12: 1~12 B1~B12: 13~24 C1~C12: 14~36	0~36	0	●	912.
P9.13	ACC/DEC state at previous 2 fault	0:Constant speed 1: ACC 2: DEC	0~2	0	●	913.
P9.14	Running frequency at previous 2 fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz	●	914.
P9.15	Set frequency at previous 2 fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz	●	915.
P9.16	Output current at previous 2 fault	0.0~6553.5A	0.0~6553.5	0.0A	●	916.
P9.17	Output voltage at previous 2 fault	0~65535V	0~65535	0V	●	917.
P9.18	Input current at previous 2 fault	0.0~6553.5A	0.0~6553.5	0.0A	●	918.
P9.19	Input voltaga at previous 2 fault	0~65535V	0~65535	0V	●	919.
P9.20	Bus voltage at previous 2 fault	0~65535V	0~65535	0V	●	920.
P9.21	Unit temperature at previous 2 fault	0.0~6553.5°C	0.0~6553.5	0.0°C	●	921.
P9.22	System input terminal state at previous 2 fault	0~65535	0~65535	0	●	922.
P9.23	User input terminal state at previous 2 fault	0~65535	0~65535	0	●	923.
P9.24	System output	0~65535	0~65535	0	●	924.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	terminal state at previous 2 fault					
P9.25	User output terminal state at previous 2 fault 1	0~65535	0~65535	0	●	925.
P9.26	User output terminal state at previous 2 fault 2	0~65535	0~65535	0	●	926.
P9.27	Previous DSP fault type	Same as P9.08			●	927.
P9.28	Previous ARM fault 1	Same as P9.09			●	928.
P9.29	Previous ARM fault 2	Same as P9.10			●	929.
P9.30	Previous unit fault	Same as P9.11			●	930.
P9.31	Previous fault No.	Same as P9.12			●	931.
P9.32	ACC/DEC state at previous fault	0:Constant speed 1: ACC 2: DEC	0~2	0	●	932.
P9.33	Running frequency at previous fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz	●	933.
P9.34	Set frequency at previous fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz	●	934.
P9.35	Output current at previous fault	0.0~6553.5A	0.0~6553.5	0.0A	●	935.
P9.36	Output voltage at previous fault	0~65535V	0~65535	0V	●	936.
P9.37	Input current at previous fault	0.0~6553.5A	0.0~6553.5	0.0A	●	937.
P9.38	Input voltage at previous fault	0~65535V	0~65535	0V	●	938.
P9.39	Bus voltage at previous fault	0~65535V	0~65535	0V	●	939.
P9.40	Unit temperature at previous fault	0.0~6553.5°C	0.0~6553.5	0.0°C	●	940.
P9.41	System input terminal state at previous fault	0~65535	0~65535	0	●	941.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P9.42	User input terminal state at previous fault	0~65535	0~65535	0	●	942.
P9.43	System output terminal state at previous fault	0~65535	0~65535	0	●	943.
P9.44	User output terminal state at previous fault 1	0~65535	0~65535	0	●	944.
P9.45	User output terminal state at previous fault 2	0~65535	0~65535	0	●	945.
P9.46	Current DSP fault	Same as P9.08			●	946.
P9.47	Current ARM fault 1	Same as P9.09			●	947.
P9.48	Current ARM fault 2	Same as P9.10			●	948.
P9.49	Current unit fault	Same as P9.11			●	949.
P9.50	Current fault No.	Same as P9.12			●	950.
P9.51	ACC/DEC state at current fault	0:Constant speed 1: ACC 2: DEC	0~2	0	●	951.
P9.52	Running frequency at current fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz	●	952.
P9.53	Set frequency at current fault	0.00Hz~P0.10	0.00Hz~P0.10	0.00Hz	●	953.
P9.54	Output current at current fault	0.0~6553.5A	0~6553.5	0.0A	●	954.
P9.55	Output voltage at current fault	0~65535V	0~65535	0V	●	955.
P9.56	Input current at current fault	0.0~6553.5A	0.0~6553.5	0.0A	●	956.
P9.57	Input voltage at current fault	0~65535V	0~65535	0V	●	957.
P9.58	Bus voltage at current fault	0~65535V	0~65535	0V	●	958.
P9.59	Unit temperature at current fault	0.0~6553.5°C	0~6553.5	0.0°C	●	959.
P9.60	System input terminal state at current fault	0~65535	0~65535	0	●	960.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P9.61	User input terminal state at current fault	0~65535	0~65535	0	●	961.
P9.62	System output terminal state at current fault	0~65535	0~65535	0	●	962.
P9.63	User output terminal state at current fault 1	0~65535	0~65535	0	●	963.
P9.64	User output terminal state at current fault 2	0~65535	0~65535	0	●	964.
P9.65	Current fault time	0~65535	0~65535	0	●	965.
P10 Group PID control						
P10.00	PID preset source	0: Function code (P10.01) 1: AI1 2: AI2 3: AI3 4: AI1+AI2 5: AI2+AI3 6: AI3+AI1 7: HDI 8: Multi-step 9: MODBUS 10: PROFIBUS	0~10	0	○	1000.
P10.01	Local preset PID	0.0%~100.0%	0.0~100.0	0.0%	○	1001.
P10.02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1+AI2 4: AI2+AI3 5: AI3+AI1 6: HDI 7: MODBUS 8: PROFIBUS	0~8	0	○	1002.
P10.03	PID output characteristic	0: Positive 1: Negative	0~1	0	○	1003.
P10.04	Proportional gain (Kp)	0.00~100.00	0.00~100.00	1.00	○	1004.
P10.05	Integral time (Ti)	0.01~10.00s	0.01~10.00	0. 50s	○	1005.
P10.06	Differential time (Td)	0.00~10.00s	0.00~10.00	0.00s	○	1006.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P10.07	Sampling cycle (T)	0.01~100.00s	0.01~100.00	0.10s	○	1007.
P10.08	PID control deviation limit	0.0~100.0%	0.0~100.0	0.0%	○	1008.
P10.09	Feedback offline detection value	0.0~100.0%	0.0~100.0%	0.0%	○	1009.
P10.10	Feedback offline detection time	0.0~3600.0s	0.0~3600.0	1.0s	○	1010.
P10.11	PID dormancy wake up value	0.0~100.0%	0.0~100.0%	0.0	○	1011.
P10.12	PID dormancy delay time	0.0~360.0s	0.0~360.0	1.0s	○	1012.
P11 Group Multi-step speed						
P11.00	Multi-step speed reference	0: Terminal 1: Analog	0~1	0	○	1100.
P11.01	Multi-step speed 0	-100.0~100.0%	-100.0~100.0	0.0%	○	1101.
P11.02	Multi-step speed 1	-100.0~100.0%	-100.0~100.0	0.0%	○	1102.
P11.03	Multi-step speed 2	-100.0~100.0%	-100.0~100.0	0.0%	○	1103.
P11.04	Multi-step speed 3	-100.0~100.0%	-100.0~100.0	0.0%	○	1104.
P11.05	Multi-step speed 4	-100.0~100.0%	-100.0~100.0	0.0%	○	1105.
P11.06	Multi-step speed 5	-100.0~100.0%	-100.0~100.0	0.0%	○	1106.
P11.07	Multi-step speed 6	-100.0~100.0%	-100.0~100.0	0.0%	○	1107.
P11.08	Multi-step speed 7	-100.0~100.0%	-100.0~100.0	0.0%	○	1108.
P11.09	Multi-step speed 8	-100.0~100.0%	-100.0~100.0	0.0%	○	1109.
P11.10	Multi-step speed 9	-100.0~100.0%	-100.0~100.0	0.0%	○	1110.
P11.11	Multi-step speed 10	-100.0~100.0%	-100.0~100.0	0.0%	○	1111.
P11.12	Multi-step speed 11	-100.0~100.0%	-100.0~100.0	0.0%	○	1112.
P11.13	Multi-step speed 12	-100.0~100.0%	-100.0~100.0	0.0%	○	1113.
P11.14	Multi-step speed 13	-100.0~100.0%	-100.0~100.0	0.0%	○	1114.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P11.15	Multi-step speed 14	-100.0~100.0%	-100.0~100.0	0.0%	○	1115.
P11.16	Multi-step speed 15	-100.0~100.0%	-100.0~100.0	0.0%	○	1116.
P11.17	Analog input source	0: AI1 1: AI2 2: AI3	0~2	0	○	1117.
P11.18	Corresponding analog of step 0	-100.0~100.0%	-100.0~100.0	0.0%	○	1118.
P11.19	Corresponding analog of step 1	-100.0~100.0%	-100.0~100.0	0.0%	○	1119.
P11.20	Corresponding analog of step 2	-100.0~100.0%	-100.0~100.0	0.0%	○	1120.
P11.21	Corresponding analog of step 3	-100.0~100.0%	-100.0~100.0	0.0%	○	1121.
P11.22	Corresponding analog of step 4	-100.0~100.0%	-100.0~100.0	0.0%	○	1122.
P11.23	Corresponding analog of step 5	-100.0~100.0%	-100.0~100.0	0.0%	○	1123.
P11.24	Corresponding analog of step 6	-100.0~100.0%	-100.0~100.0	0.0%	○	1124.
P11.25	Corresponding analog of step7	-100.0~100.0%	-100.0~100.0	0.0%	○	1125.
P11.26	Corresponding analog of step 8	-100.0~100.0%	-100.0~100.0	0.0%	○	1126.
P11.27	Corresponding analog of step 9	-100.0~100.0%	-100.0~100.0	0.0%	○	1127.
P11.28	Corresponding analog of step 10	-100.0~100.0%	-100.0~100.0	0.0%	○	1128.
P11.29	Corresponding analog of step 11	-100.0~100.0%	-100.0~100.0	0.0%	○	1129.
P11.30	Corresponding analog of step 12	-100.0~100.0%	-100.0~100.0	0.0%	○	1130.
P11.31	Corresponding analog of step 13	-100.0~100.0%	-100.0~100.0	0.0%	○	1131.
P11.32	Corresponding analog of step 14	-100.0~100.0%	-100.0~100.0	0.0%	○	1132.
P11.33	Corresponding	-100.0~100.0%	-100.0~100.0	0.0%	○	1133.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	analog of step 15					
P12 Group Master-slave control						
P12.00	Master-slave mode selection	0: Power-balancing mode 1: Speed synchronous mode (reserved)	0~1	0	◎	1200.
P12.01	Master output signal source	0: Master output torque signal 1: Master output current signal 2: Master output PG signal (reserved)	0~2	0	○	1201.
P12.02	Filter time of slave reference signal	0.00s~655.35s	0.00~655.35	0.00s	○	1202.
P12.03	PID adjustment amplitude limit	0.0~100.0%	0~100	100.0%	○	1203.
P12.04	PID mode	0: Proportion plus integration as synchronous coefficient 1: Proportion plus integration as error correction	0~1	0	○	1204.
P12.05	Slave reference frequency source gain	0.01~100.00	0.01~100.00	1.00	○	1205.
P12.06	Slave reference signal source gain	0.01~100.00	0.01~100.00	1.00	○	1206.
P12.07	Master-slave proportional coefficient P1	0.000~6.5535	0.000~6.5535	0.100	○	1207.
P12.08	Master-slave integral coefficient I1	0.00s~655.35s	0.00~655.35	1.00s	○	1208.
P12.09	Low switching frequency of master-slave PI	0.00Hz~P12.12	0.00~P12.12	5.00Hz	○	1209.
P12.10	Master-slave proportional coefficient P2	0.000~6.5535	0.000~6.5535	10.0000	○	1210.
P12.11	Master-slave integral coefficient I2	0.00s~655.35s	0.00~655.35	6.00s	○	1211.
P12.12	High switching frequency of master-slave PI	P12.09~P0.10	P12.09~P0.10	10.00Hz	○	1212.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P12.13	PI control deviation limit	0.0~80.0%	0.0~80.0	0.0%	○	1213.
P12.14	Lower limit of PI integral enabling deviation	0.0~100.0%	0.0~100.0	0.0%	○	1214.
P12.15	Master-slave control differential coefficient	0.00s~655.35s	0.00~655.35	0.00	○	1215.
P12.16	Reserved	0~65535	0~65535	0	●	1216.
P12.17	Reserved	0~65535	0~65535	0	●	1217.
P12.18	Reserved	0~65535	0~65535	0	●	1218.
P12.19	Reserved	0~65535	0~65535	0	●	1219.
P12.20	Reserved	0~65535	0~65535	0	●	1220.
P12.21	Reserved	0~65535	0~65535	0	●	1221.
P12.22	Reserved	0~65535	0~65535	0	●	1222.
P12.23	Reserved	0~65535	0~65535	0	●	1223.
P12.24	Master-slave control ID code	0~15	0~15	0	●	1224.
P12.25	Master-slave character	0~1	0~1	0	●	1225.
P12.26	Master-slave node state 1	0~0xFFFF	0~0xFFFF	0	●	1226.
P12.27	Master-slave node state 2	0~0xFFFF	0~0xFFFF	0	●	1227.
P12.28	Master-slave optical fiber communication fault	0: Shield 1: Not shield	0~1	0	●	1228.
P12.29	Master-slave type	0: Single master 1: Spare machine 2: Master 3: Slave	0~3	0	●	1229.
P12.30	KM1	0: Disabled 1: Enabled	0~1	0	●	1230.
P12.31	Reserved	0~65535	0~65535	0	●	1231.
P12.32	Reserved	0~65535	0~65535	0	●	1232.
P13 Group Protective parameters						
P13.00	Output phase loss protection	0: Disabled 1: Enabled	0~1	1	○	1300.
P13.01	Motor overload protection	0: No protection 1: Common motor (with low speed compensation)	0~2	2	◎	1301.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		2: Variable frequency motor (without low speed compensation)				
P13.02	Motor overload protective coefficient	20.0%~120.0% (motor rated current)	20.0~120.0	100.0%	○	1302.
P13.03	Frequency decreasing point at sudden power loss	200~900V	200~900	650V	○	1303.
P13.04	Frequency decreasing ratio at sudden power loss	0.00Hz~P0.10 (Max. frequency)	0.00~P0.10	3.00Hz	○	1304.
P13.05	Overvoltage speed loss protection	0: Disabled 1: Enabled	0~1	1	○	1305.
P13.06	Overvoltage speed loss voltage protection	950~1280V	950~1280	1150V	○	1306.
P13.07	Automatic current limit level	50~200%	50~200	140%	○	1307.
P13.08	Frequency decreasing ratio during current limit	0.00~10.00Hz (0.00 means overcurrent speed loss is invalid.)	0.00~10.00	10.00Hz	○	1308.
P13.09	Input overvoltage pre-alarm point	105~120%	105~120	110%	○	1309.
P13.10	Unit bypass function	0: Manual bypass 1: Common automatic bypass 2: Neutral point drifting bypass	0~2	0	○	1310.
P13.11	Unit manual bypass setting	0x000~0x1FF	0x000~0x1FF	Depend on inverter voltage	○	1311.
P13.12	Hardware overcurrent point	50~200% (inverter rated current)	50~200	195%	◎	1312.
P13.13	Hardware current limit point	50~200% (inverter rated current)	50~200	195%	◎	1313.
P13.14	Power	0: Manual power frequency	0~1	0	○	1314.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	frequency bypass action at fault	bypass 1: Automatic power frequency bypass				
P13.15	Low frequency surge suppression factor	0~100	0~100	10	○	1315.
P13.16	High frequency surge suppression factor	0~100	0~100	0	○	1316.
P13.17	Frequency threshold of surge suppression	0.00~120.00Hz	0.00~120.00	15.00Hz	○	1317.
P14 Group Control parameters of synchronous motor						
P14.00	Excitation mode	0: Manual 1: Automatic	0~1	1	◎	1400.
P14.01	Initial percentage of automatic excitation	0.0%~100.0%	0.0~100.0%	0.0	◎	1401.
P14.02	Starting frequency of automatic excitation	0.00Hz~50.00Hz	0.00~50.00	0.00	◎	1402.
P14.03	Output power factor setting	0.0%~200.0%	0.0~200.0	0.0	○	1403.
P14.04	Corresponding voltage of exciting analog 0%	0.00V~P14.05	0.00~P14.05	0.00	◎	1404.
P14.05	Corresponding voltage of exciting analog 100%	P14.04~10.00V	P14.04~10.00	10.00	◎	1405.
P14.06	Low frequency surge suppression factor	0~100	0~100	10	○	1406.
P14.07	High frequency surge suppression	0~100	0~100	0	○	1407.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	factor					
P14.08	Frequency threshold of surge suppression	0.00~120.00Hz	0.00~120.00	15.00Hz	○	1408.
P14.09	Frequency switch of surge suppression	0.00~120.00Hz	0.00~120.00	0.00Hz	○	1409.
P14.10	Exciting current reference at power frequency	0.0%~100.0%	0.0~100.0	0	○	1410.
P14.11	Reserved	0~65535	0~65535	0	○	1411.
P14.12	Reserved	0~65535	0~65535	0	◎	1412.
P14.13	Reserved	0~65535	0~65535	0	◎	1413.
P14.14	Reserved	0~65535	0~65535	0	◎	1414.
P14.15	Reserved	0~65535	0~65535	0	●	1415.
P15 Group Switch cabinet control						
P15.00	Variable frequency switching to power frequency delay	0.0~60.0s	0.0~60.0	2.0s	○	1500.
P15.01	QF configuration mode	0: Independent 1: Two into one	0~1	0	○	1501.
P15.02	Command channel	0: Local control 1: Master control	0~1	0	○	1502.
P15.03	Synchronous switching enabling	0: Invalid 1: Valid	0~1	0	○	1503.
P15.04	QF1 configuration information 1	0000: No common use 0001: The 1st group in common use 0010: The 2nd group in common use 0011: The 3rd group in common use 0100: The 4th group in common use	0~FFFF	0	○	1504.
P15.05	QF1 configuration information 2	0000: No common use 0001: The 1st group in common use 0010: The 2nd group in common use	0~FFFF	0	○	1505.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		0011: The 3rd group in common use 0100: The 4th group in common use				
P15.06	Synchronous switching reactor voltage	0~1000V	0~1000	50	○	1506.
P15.07	KM1 configuration information 1	0000: No common use 0001: The 1st group in common use 0010: The 2nd group in common use 0011: The 3rd group in common use 0100: The 4th group in common use	0~FFFF	0	●	1507.
P15.08	KM1 configuration information 2	0000: No common use 0001: The 1st group in common use 0010: The 2nd group in common use 0011: The 3rd group in common use 0100: The 4th group in common use	0~FFFF	0	●	1508.
P16 Group Serial communication						
P16.00	Local MODBUS address	1~247 (0: broadcast address)	1~247	1	○	1600.
P16.01	MODBUS baud rate	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	0~5	4	○	1601.
P16.02	MODBUS data check	0: No check (N, 8, 2) for RTU 1: Even check (E, 8, 1) for RTU 2: Odd check (O, 8, 1) for RTU	0~2	1	○	1602.
P16.03	Communication response delay time	0~200ms	0~200	5	○	1603.
P16.04	Communication timeout fault time	0.0 (invalid), 0.1~100.0s	0.0~100.0	0.0s	○	1604.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P16.05	Reserved	0~65535	0~65535	0	●	1605.
P17 Group Ethernet						
P17.00	High bit of local IP address	0~0XFFFF (high bit)	0~0XFFFF	0XC0A8	●	1700.
P17.01	Low bit of local IP address	0~0XFFFF (low bit)	0~0XFFFF	0X102	●	1701.
P17.02	High bit of local subnet mask	0~0XFFFF (high bit)	0~0XFFFF	0XFFFF	●	1702.
P17.03	Low bit of local subnet mask	0~0XFFFF (low bit)	0~0XFFFF	0XFF00	●	1703.
P17.04	High bit of local gateway	0~0XFFFF (high bit)	0~0XFFFF	0XC0A8	●	1704.
P17.05	Low bit of local gateway	0~0XFFFF (low bit)	0~0XFFFF	0X101	●	1705.
P17.06	High bit of local MAC	0~0XFFFF (high bit)	0~0XFFFF	0X5254	●	1706.
P17.07	Medium bit of local MAC	0~0XFFFF (medium bit)	0~0XFFFF	0X4C19	●	1707.
P17.08	Low bit of local MAC	0~0XFFFF (low bit)	0~0XFFFF	0XF742	●	1708.
P17.09	Log level of DSP command and control	0: No log 1: Fatal 2: Error 4: Key information 8: Prompt message Combination of above levels	0~15	0	○	1709.
P17.10	Log level of DSP speed control		0~15	0	○	1710.
P17.11	Log level of DSP torque calculation		0~15	0	○	1711.
P17.12	Log level of DSP current loop		0~15	0	○	1712.
P17.13	Log level of DSP oscillograph calculation		0~15	0	○	1713.
P17.14	Log level of DSP fault management		0~15	0	○	1714.
P17.15	Log level of DSP parameters inquiry		0~15	0	○	1715.
P17.16	Log level of ARM start-stop control	0: No log 1: Fatal 2: Error	0~15	0	○	1716.
P17.17	Log level of	4: Key information	0~15	0	○	1717.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	ARM frequency reference	8: Prompt message Combination of above levels				
P17.18	Log level of ARM faults diagnosis		0~15	0	○	1718.
P17.19	Log level of ARM frequency calculation		0~15	0	○	1719.
P17.20	Log level of ARM switch cabinets		0~15	0	○	1720.
P17.21	Log level of ARM function codes		0~15	0	○	1721.
P17.22	Log level of ARM terminal functions		0~15	0	○	1722.
P17.23	Log level of ARM UDP/IP		0~15	0	○	1723.
P17.24	Log level of ARM MODBUS		0~15	0	○	1724.
P17.25	Log level of ARM PROFIBUS		0~15	0	○	1725.
P17.26	Log level of ARM master-slave		0~15	0	○	1726.
P17.27	Log receiving IP high bit	0~0XFFFF (high bit)	0~0XFFFF	0	○	1727.
P17.28	Log receiving IP low bit	0~0XFFFF (low bit)	0~0XFFFF	0	○	1728.
P18 Group PROFIBUS						
P18.00	Module type	0: Not connected 1: PROFIBUS	0~1	0	●	1800.
P18.01	Module address	0~99	0~99	2	◎	1801.
P18.02	PZD2 receiving	0: Invalid 1: Frequency reference 2: Torque reference 3: Reserved 4: PID reference 5: PID feedback 6: V/F separation voltage reference	0~20	1	○	1802.
P18.03	PZD3 receiving		0~20	2	○	1803.
P18.04	PZD4 receiving		0~20	3	○	1804.
P18.05	PZD5 receiving		0~20	0	○	1805.
P18.06	PZD6 receiving		0~20	0	○	1806.
P18.07	PZD7 receiving		0~20	0	○	1807.
P18.08	PZD8 receiving		0~20	0	○	1808.
P18.09	PZD9 receiving		0~20	0	○	1809.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P18.10	PZD10 receiving	7~20: Reserved	0~20	0	○	1810.
P18.11	PZD11 receiving		0~20	0	○	1811.
P18.12	PZD12 receiving		0~20	0	○	1812.
P18.13	PZD2 sending	0: Invalid 1: Running frequency 2: Reserved 3: Input voltage 4: Output voltage 5: Output current 6: Output torque actual value 7: Output power percentage 8: Set frequency absolute value 9: Current DSP fault 10: Current ARM fault 1 11: Current ARM fault 2 12: Current unit fault 13: Current unit number at fault 14: User input terminal 15: System input terminal 16: User output terminal 1 17: User output terminal 2 18~30: Reserved	0~30	9	○	1813.
P18.14	PZD3 sending		0~30	2	○	1814.
P18.15	PZD4 sending		0~30	11	○	1815.
P18.16	PZD5 sending		0~30	6	○	1816.
P18.17	PZD6 sending		0~30	1	○	1817.
P18.18	PZD7 sending		0~30	5	○	1818.
P18.19	PZD8 sending		0~30	4	○	1819.
P18.20	PZD9 sending		0~30	0	○	1820.
P18.21	PZD10 sending		0~30	0	○	1821.
P18.22	PZD11 sending		0~30	0	○	1822.
P18.23	PZD12 sending		0~30	0	○	1823.
P18.24	Temporary variable	0~65535	0~65535	0	○	1824.
P18.25	DP communication timeout fault time	0.0 (invalid), 0.1~100.0s	0.0~100.0	0.0s	○	1825.
P19 Group Motor parameters 2						
P19.00	Motor 2 type	0:Asynchronous motor 1:Synchronous motor	0~1	0	○	1900.
P19.01	Rated power of asynchronous motor 2	4~50000kW	4~50000	Depend on model	◎	1901.
P19.02	Rated frequency of asynchronous motor 2	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1902.
P19.03	Rated speed of asynchronous motor 2	1~36000rpm	1~36000	Depend on model	◎	1903.
P19.04	Rated voltage of asynchronous	0~20000V	0~20000	Depend on model	◎	1904.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	motor 2					
P19.05	Rated current of asynchronous motor 2	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1905.
P19.06	Stator resistance of asynchronous motor 2	0.001~65.535Ω	0.001~65.535	Depend on model	○	1906.
P19.07	Rotor resistance of asynchronous motor 2	0.001~65.535Ω	0.001~65.535	Depend on model	○	1907.
P19.08	Inductance of asynchronous motor 2	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1908.
P19.09	Mutual inductance of asynchronous motor 2	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1909.
P19.10	Non-load current of asynchronous motor 2	0.01~655.35A	0.01~655.35	Depend on model	○	1910.
P19.11	Rated power of synchronous motor 2	4~50000kW	4~50000	Depend on model	◎	1911.
P19.12	Rated frequency of synchronous motor 2	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1912.
P19.13	Rated speed of synchronous motor 2	0~36000rpm	0~36000	1500rpm	◎	1913.
P19.14	Number of pole pairs for synchronous motor 2	1~50	1~50	2	◎	1914.
P19.15	Rated voltage of synchronous motor 2	0~20000V	0~20000	Depend on model	◎	1915.
P19.16	Rated current of synchronous motor 2	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1916.
P19.17	Stator resistance of	0.001~65.535Ω	0.001~65.535	Depend on model	○	1917.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	synchronous motor 2					
P19.18	Direct axis inductance of synchronous motor 2	0.1~6553.5mH	0.01~655.35	Depend on model	○	1918.
P19.19	Quadrature axis inductance of synchronous motor 2	0.1~6553.5mH	0.01~655.35	Depend on model	○	1919.
P19.20	Back emf constant of synchronous motor 2	0~20000V/1000rpm	0~20000	15000	○	1920.
P19.21	Motor 3 type	0:Asynchronous motor 1:Synchronous motor	0~1	0	○	1921.
P19.22	Rated power of asynchronous motor 3	4~50000kW	4~50000	Depend on model	◎	1922.
P19.23	Rated frequency of asynchronous motor 3	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1923.
P19.24	Rated speed of asynchronous motor 3	1~36000rpm	1~36000	Depend on model	◎	1924.
P19.25	Rated voltage of asynchronous motor 3	0~20000V	0~20000	Depend on model	◎	1925.
P19.26	Rated current of asynchronous motor 3	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1926.
P19.27	Stator resistance of asynchronous motor 3	0.001~65.535Ω	0.001~65.535	Depend on model	○	1927.
P19.28	Rotor resistance of asynchronous motor 3	0.001~65.535Ω	0.001~65.535	Depend on model	○	1928.
P19.29	Inductance of asynchronous motor 3	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1929.
P19.30	Mutual	0.1~6553.5mH	0.1~6553.5	Depend	○	1930.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	inductance of asynchronous motor 3			on model		
P19.31	Non-load current of asynchronous motor 3	0.01~655.35A	0.01~655.35	Depend on model	○	1931.
P19.32	Rated power of synchronous motor 3	4~50000kW	4~50000	Depend on model	◎	1932.
P19.33	Rated frequency of synchronous motor 3	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1933.
P19.34	Rated speed of synchronous motor 3	0~36000rpm	0~36000	1500rpm	◎	1934.
P19.35	Number of pole pairs for synchronous motor 3	1~50	1~50	2	◎	1935.
P19.36	Rated voltage of synchronous motor 3	0~20000V	0~20000	Depend on model	◎	1936.
P19.37	Rated current of synchronous motor 3	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1937.
P19.38	Stator resistance of synchronous motor 3	0.001~65.535Ω	0.001~65.535	Depend on model	○	1938.
P19.39	Direct axis inductance of synchronous motor 3	0.1~6553.5mH	0.01~655.35	Depend on model	○	1939.
P19.40	Quadrature axis inductance of synchronous motor 3	0.1~6553.5mH	0.01~655.35	Depend on model	○	1940.
P19.41	Back emf constant of synchronous motor 3	0~20000V/1000rpm	0~20000	15000	○	1941.
P19.42	Motor 4 type	0:Asynchronous motor	0~1	0	○	1942.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
		1:Synchronous motor				
P19.43	Rated power of asynchronous motor 4	4~50000kW	4~50000	Depend on model	◎	1943.
P19.44	Rated frequency of asynchronous motor 4	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1944.
P19.45	Rated speed of asynchronous motor 4	1~36000rpm	1~36000	Depend on model	◎	1945.
P19.46	Rated voltage of asynchronous motor 4	0~20000V	0~20000	Depend on model	◎	1946.
P18.47	Rated current of asynchronous motor 4	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1947.
P19.48	Stator resistance of asynchronous motor 4	0.001~65.535Ω	0.001~65.535	Depend on model	○	1948.
P19.49	Rotor resistance of asynchronous motor 4	0.001~65.535Ω	0.001~65.535	Depend on model	○	1949.
P19.50	Inductance of asynchronous motor 4	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1950.
P19.51	Mutual inductance of asynchronous motor 4	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1951.
P19.52	Non-load current of asynchronous motor 4	0.01~655.35A	0.01~655.35	Depend on model	○	1952.
P19.53	Rated power of synchronous motor 4	4~50000kW	4~50000	Depend on model	◎	1953.
P19.54	Rated frequency of synchronous motor 4	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1954.
P19.55	Rated speed of synchronous motor 4	0~36000rpm	0~36000	1500rpm	◎	1955.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
P19.56	Number of pole pairs for synchronous motor 4	1~50	1~50	2	◎	1956.
P19.57	Rated voltage of synchronous motor 4	0~20000V	0~20000	Depend on model	◎	1957.
P19.58	Rated current of synchronous motor 4	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1958.
P19.59	Stator resistance of synchronous motor 4	0.001~65.535Ω	0.001~65.535	Depend on model	○	1959.
P19.60	Direct axis inductance of synchronous motor 4	0.1~6553.5mH	0.01~655.35	Depend on model	○	1960.
P19.61	Quadrature axis inductance of synchronous motor 4	0.1~6553.5mH	0.01~655.35	Depend on model	○	1961.
P19.62	Back emf constant of synchronous motor 4	0~20000V/1000rpm	0~20000	15000	○	1962.
P19.63	Motor 5 type	0:Asynchronous motor 1:Synchronous motor	0~1	0	○	1963.
P19.64	Rated power of asynchronous motor 5	4~50000kW	4~50000	Depend on model	◎	1964.
P19.65	Rated frequency of asynchronous motor 5	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1965.
P19.66	Rated speed of asynchronous motor 5	1~36000rpm	1~36000	Depend on model	◎	1966.
P19.67	Rated voltage of asynchronous motor 5	0~20000V	0~20000	Depend on model	◎	1967.
P19.68	Rated current of asynchronous	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1968.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	motor 5					
P19.69	Stator resistance of asynchronous motor 5	0.001~65.535Ω	0.001~65.535	Depend on model	○	1969.
P19.70	Rotor resistance of asynchronous motor 5	0.001~65.535Ω	0.001~65.535	Depend on model	○	1970.
P19.71	Inductance of asynchronous motor 5	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1971.
P19.72	Mutual inductance of asynchronous motor 5	0.1~6553.5mH	0.1~6553.5	Depend on model	○	1972.
P19.73	Non-load current of asynchronous motor 5	0.01~655.35A	0.01~655.35	Depend on model	○	1973.
P19.74	Rated power of synchronous motor 5	4~50000kW	4~50000	Depend on model	◎	1974.
P19.75	Rated frequency of synchronous motor 5	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	1975.
P19.76	Rated speed of synchronous motor 5	0~36000rpm	0~36000	1500rpm	◎	1976.
P19.77	Number of pole pairs for synchronous motor 5	1~50	1~50	2	◎	1977.
P19.78	Rated voltage of synchronous motor 5	0~20000V	0~20000	Depend on model	◎	1978.
P19.79	Rated current of synchronous motor 5	0.1~1000.0A	0.1~1000.0	Depend on model	◎	1979.
P19.80	Stator resistance of synchronous motor 5	0.001~65.535Ω	0.001~65.535	Depend on model	○	1980.
P19.81	Direct axis	0.1~6553.5mH	0.01~655.35	Depend	○	1981.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	inductance of synchronous motor 5			on model		
P19.82	Quadrature axis inductance of synchronous motor 5	0.1~6553.5mH	0.01~655.35	Depend on model	○	1982.
P19.83	Back emf constant of synchronous motor 5	0~20000V/1000rpm	0~20000	15000	○	1983.
P20 Group Motor parameters 3						
P20.00	Motor 6 type	0:Asynchronous motor 1:Synchronous motor	0~1	0	○	2000.
P20.01	Rated power of asynchronous motor 6	4~50000kW	4~50000	Depend on model	◎	2001.
P20.02	Rated frequency of asynchronous motor 6	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	2002.
P20.03	Rated speed of asynchronous motor 6	1~36000rpm	1~36000	Depend on model	◎	2003.
P20.04	Rated voltage of asynchronous motor 6	0~20000V	0~20000	Depend on model	◎	2004.
P20.05	Rated current of asynchronous motor 6	0.1~1000.0A	0.1~1000.0	Depend on model	◎	2005.
P20.06	Stator resistance of asynchronous motor 6	0.001~65.535Ω	0.001~65.535	Depend on model	○	2006.
P20.07	Rotor resistance of asynchronous motor 6	0.001~65.535Ω	0.001~65.535	Depend on model	○	2007.
P20.08	Inductance of asynchronous motor 6	0.1~6553.5mH	0.1~6553.5	Depend on model	○	2008.
P20.09	Mutual inductance of asynchronous	0.1~6553.5mH	0.1~6553.5	Depend on model	○	2009.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	motor 6					
P20.10	Non-load current of asynchronous motor 6	0.01~655.35A	0.01~655.35	Depend on model	○	2010.
P20.11	Rated power of synchronous motor 6	4~50000kW	4~50000	Depend on model	◎	2011.
P20.12	Rated frequency of synchronous motor 6	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	2012.
P20.13	Rated speed of synchronous motor 6	0~36000rpm	0~36000	1500rpm	◎	2013.
P20.14	Number of pole pairs for synchronous motor 6	1~50	1~50	2	◎	2014.
P20.15	Rated voltage of synchronous motor 6	0~20000V	0~20000	Depend on model	◎	2015.
P20.16	Rated current of synchronous motor 6	0.1~1000.0A	0.1~1000.0	Depend on model	◎	2016.
P20.17	Stator resistance of synchronous motor 6	0.001~65.535Ω	0.001~65.535	Depend on model	○	2017.
P20.18	Direct axis inductance of synchronous motor 6	0.1~6553.5mH	0.01~655.35	Depend on model	○	2018.
P20.19	Quadrature axis inductance of synchronous motor 6	0.1~6553.5mH	0.01~655.35	Depend on model	○	2019.
P20.20	Back emf constant of synchronous motor 6	0~20000V/1000rpm	0~20000	15000	○	2020.
P20.21	Motor 7 type	0:Asynchronous motor 1:Synchronous motor	0~1	0	○	2021.
P20.22	Rated power of	4~50000kW	4~50000	Depend	◎	2022.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	asynchronous motor 7			on model		
P20.23	Rated frequency of asynchronous motor 7	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	2023.
P20.24	Rated speed of asynchronous motor 7	1~36000rpm	1~36000	Depend on model	◎	2024.
P20.25	Rated voltage of asynchronous motor 7	0~20000V	0~20000	Depend on model	◎	2025.
P20.26	Rated current of asynchronous motor 7	0.1~1000.0A	0.1~1000.0	Depend on model	◎	2026.
P20.27	Stator resistance of asynchronous motor 7	0.001~65.535Ω	0.001~65.535	Depend on model	○	2027.
P20.28	Rotor resistance of asynchronous motor 7	0.001~65.535Ω	0.001~65.535	Depend on model	○	2028.
P20.29	Inductance of asynchronous motor 7	0.1~6553.5mH	0.1~6553.5	Depend on model	○	2029.
P20.30	Mutual inductance of asynchronous motor 7	0.1~6553.5mH	0.1~6553.5	Depend on model	○	2030.
P20.31	Non-load current of asynchronous motor 7	0.01~655.35A	0.01~655.35	Depend on model	○	2031.
P20.32	Rated power of synchronous motor 7	4~50000kW	4~50000	Depend on model	◎	2032.
P20.33	Rated frequency of synchronous motor 7	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	2033.
P20.34	Rated speed of synchronous motor 7	0~36000rpm	0~36000	1500rpm	◎	2034.
P20.35	Number of pole pairs for	1~50	1~50	2	◎	2035.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	synchronous motor 7					
P20.36	Rated voltage of synchronous motor 7	0~20000V	0~20000	Depend on model	◎	2036.
P20.37	Rated current of synchronous motor 7	0.1~1000.0A	0.1~1000.0	Depend on model	◎	2037.
P20.38	Stator resistance of synchronous motor 7	0.001~65.535Ω	0.001~65.535	Depend on model	○	2038.
P20.39	Direct axis inductance of synchronous motor 7	0.1~6553.5mH	0.01~655.35	Depend on model	○	2039.
P20.40	Quadrature axis inductance of synchronous motor 7	0.1~6553.5mH	0.01~655.35	Depend on model	○	2040.
P20.41	Back emf constant of synchronous motor 7	0~20000V/1000rpm	0~20000	15000	○	2041.
P20.42	Motor 8 type	0:Asynchronous motor 1:Synchronous motor	0~1	0	○	2042.
P20.43	Rated power of asynchronous motor 8	4~50000kW	4~50000	Depend on model	◎	2043.
P20.44	Rated frequency of asynchronous motor 8	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	2044.
P20.45	Rated speed of asynchronous motor 8	1~36000rpm	1~36000	Depend on model	◎	2045.
P20.46	Rated voltage of asynchronous motor 8	0~20000V	0~20000	Depend on model	◎	2046.
P20.47	Rated current of asynchronous motor 8	0.1~1000.0A	0.1~1000.0	Depend on model	◎	2047.
P20.48	Stator	0.001~65.535Ω	0.001~65.535	Depend	○	2048.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	resistance of asynchronous motor 8			on model		
P20.49	Rotor resistance of asynchronous motor 8	0.001~65.535Ω	0.001~65.535	Depend on model	○	2049.
P20.50	Inductance of asynchronous motor 8	0.1~6553.5mH	0.1~6553.5	Depend on model	○	2050.
P20.51	Mutual inductance of asynchronous motor 8	0.1~6553.5mH	0.1~6553.5	Depend on model	○	2051.
P20.52	Non-load current of asynchronous motor 8	0.01~655.35A	0.01~655.35	Depend on model	○	2052.
P20.53	Rated power of synchronous motor 8	4~50000kW	4~50000	Depend on model	◎	2053.
P20.54	Rated frequency of synchronous motor 8	0.01Hz~P0.10 (Max. frequency)	0.01~P0.10	50.00Hz	◎	2054.
P20.55	Rated speed of synchronous motor 8	0~36000rpm	0~36000	1500rpm	◎	2055.
P20.56	Number of pole pairs for synchronous motor 8	1~50	1~50	2	◎	2056.
P20.57	Rated voltage of synchronous motor 8	0~20000V	0~20000	Depend on model	◎	2057.
P20.58	Rated current of synchronous motor 8	0.1~1000.0A	0.1~1000.0	Depend on model	◎	2058.
P20.59	Stator resistance of synchronous motor 8	0.001~65.535Ω	0.001~65.535	Depend on model	○	2059.
P20.60	Direct axis inductance of synchronous	0.1~6553.5mH	0.01~655.35	Depend on model	○	2060.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	motor 8					
P20.61	Quadrature axis inductance of synchronous motor 8	0.1~6553.5mH	0.01~655.35	Depend on model	○	2061.
P20.62	Back emf constant of synchronous motor 8	0~20000V/1000rpm	0~20000	15000	○	2062.
P21 Group Encoder status						
P21.00	Encoder actual efficiency	-327.68~327.67Hz	-327.68~327.67	0.00Hz	●	2100.
P21.01	High bit of PG1 pulse count	0~65535	0~65535	0	●	2101.
P21.02	Low bit of PG1 pulse count	0~65535	0~65535	0	●	2102.
P21.03	Rotary count	0~65535	0~65535	0	●	2103.
P21.04	Rotary angle	0.00~359.99	0.00~359.99	0.00	●	2104.
P21.05	Pole angle	0.00~359.99	0.00~359.99	0.00	●	2105.
P21.06	High bit of PG2 pulse count	0~65535	0~65535	0	●	2106.
P21.07	Low bit of PG2 pulse count	0~65535	0~65535	0	●	2107.
P21.08	Reserved	0~65535	0~65535	0	●	2108.
P21.09	Reserved	0~65535	0~65535	0	●	2109.
P21.10	Reserved	0~65535	0~65535	0	●	2110.
P21.11	Reserved	0~65535	0~65535	0	●	2111.
P21.12	Reserved	0~65535	0~65535	0	●	2112.
P22 Group Encoder						
P22.00	Encoder type selection	0: Incremental encoder 1: UVW encoder (reserved) 2: Rotary encoder (reserved)	0~2	0	◎	2200.
P22.01	Pulse number	0~65535	0~65535	1024	◎	2201.
P22.02	Encoder direction	0: Forward input 1: Reverse input	0~1	0	◎	2202.
P22.03	Disconnection fault detection time	0.0~10.0s	0.0~10.0	1.0s	◎	2203.
P22.04	Reverse fault detection time	0.0~10.0s	0.0~10.0	1.0s	◎	2204.
P22.05	Detection filter	0~10	0~10	0	◎	2205.

Function code	Name	Detailed instruction of parameters	Setting range	Default value	Modify	No.
	times					
P22.06	Rotating speed ratio of motor and encoder	0.001~65.535	0.001~65.535	1.000	◎	2206.
P22.07	Control parameters of synchronous motors	0x0000~0xFFFF Bit0: Z pulse correction enabling Bit1: Encoder angle correction enabling Bit2: SVC speed test enabling Bit3: Rotary speed test mode Bit4: Z pulse capture mode	0x0000~0xFFFF	0x3	◎	2207.
P22.08	Z pulse disconnection detection enabling	0: Z pulse disconnection detection invalid 1: Enabling detection	0~1	0	◎	2208.
P22.09	Z pulse initial angle	0.00~359.99°	0.00~359.99	0.00°	◎	2209.
P22.10	Pole initial angle	0.00~359.99°	0.00~359.99	0.00°	◎	2210.
P22.11	Frequency deviation in vector control	0.0%~100.0% (Max. frequency)	0.0~100.0%	1.0%	◎	2211.
P22.12	Deviation count time	0.0~6553.5s	0.0~6553.5	1.0s	○	2212.
P22.13	Reserved	0~65535	0~65535	0	●	2213.
P22.14	Reserved	0~65535	0~65535	0	●	2214.
P22.15	Reserved	0~65535	0~65535	0	●	2215.
P22.16	Reserved	0~65535	0~65535	0	●	2216.
P22.17	Reserved	0~65535	0~65535	0	●	2217.