Foreword

The V5−H−5T series inverter is a kind of high-performance vector control inverter produced by V&T Technologies Co., Ltd. The inverter adopts speed sensorless vector control technology technology, the world-leading technology, to offer excellent control performance and combine the application characteristics in China market to further enhance the inverter reliability, environment adaptability and customized and industrialized design. It can better meet the demands of the various drive applications.

High Reliability Design

■ Meeting the Relevant International Product Standards

IEC61800-2	General requirements–Rating specifications for low voltage adjustable frequency a.c. power drive systems
IEC61800-3	EMC product standard including specific test methods
IEC61000-6	Electromagnetic compatibility (EMC) –Part6: Generic standards
IEC61800-5-1	Safety requirements –Electrical, thermal and energy
UL508C	UL Standard for Safety for Power Conversion Equipment

■ Integrated Design

- Unified design of hardware interfaces: Unified design of control board, button/shuttle type operation panel facilitates the operation and maintenance.
- Unified design of software protocol: The inverter series have unified terminal/operation panel RS485, and universal expansion port SPI protocols(Modbus protocol).
- Integrated design of main circuit terminals: 525V：15G to 75G integrated, 90G and above integrated, to facilitate the operation and maintenance.
- Built−in braking unit design: 525V:15G to 75G, Built-in as option.
- Unified design of built−in expansion cards: including injection molding machine interface card/PG feedback card/communication adapter card, meeting the industry application requirement.
- Full series standard shared DC bus design: Realizing standard shared DC bus schemeshared DC bus without modifying the inverter or adding peripheral circuit. It is applicable to such industry applications as paper making, chemical fiber, metallurgy and EPS.

■ Adaptability Design

- Independent duct design: The full series supports the application demand of mounting heatsink out of the cabinet, and is applicable to the applications of spinning machine, wire-drawing machine where there is too much cotton batting or dust.
- Compact structure design: With complete thermal simulation and unique cold plate process, the inverter has compact structure, meeting the demands of OEM customers.
- Complete system protection design: The advanced system designs, e.g., adopting protective coating on PCB, galvanizing the copper buses, and adopting sealed key in full series of product components, and the button and shuttle type operation panels meeting with the IP54 requirement, greatly improve the protection capacity of the system. It is applicable to the applications with dusty and corrosive environment, such as wire-drawing machine, printing and dyeing and ceramics.
- Wide voltage range design: 525V Voltage class the DC operating voltage range is

DC594V～875V。

- Precise current detection and protection: The full series of inverters adopt precise Hall sensor to detect the output current, meeting the quick real time control and protection requirement of software and hardware, ensuring the performance and reliability of the system.
- Independent power supply for control: The inverter provides an independent DC input interface. External UPS power supply can be connected to the inverter through an option card. It is applicable to the applications of oilfield, chemical industry and printing and dyeing industry.
- Power-up self-detection function: It realizes the power-up detection on the peripheral circuit, such as motor grounding, disconnection, greatly improving the system reliability.
- Comprehensive system protection function: software/hardware current limiting protection, overcurrent and overvoltage protection, grounding short circuit protection, overload protection, IGBT short circuit protection, abnormal current detection protection, relay suction pull-on anomaly protection.
- Perfect terminal protection function: short circuit and overload protection for the +24V and +10V power supply of the control terminal, operation panel cable reverse connection protection, input signal cable disconnection and abnormal analog input protection.
- Over-temperature prealarm protection function: Automatic adjustment will be made according to the temperature to ensure the reliable operation of the product, and maximum operating temperature will be recorded.
- Comprehensive switching power protection function: including switching power output short circuit protection, overload protection, power-up walk-in function, open loop self-locking and voltage limiting protection function, ensuring the system reliability.

Rich and Flexible Functions

■ Multiple Frequency Reference Modes, Flexible and Convenient for Operation

- ◆ Operation panel reference (digital reference). The operation panel can be used to adjust the frequency reference through the ∨/∧ keys.
- ◆ Terminal reference:
  1) Analog AI1/AI2: 0 to 10V or 0 to 20mA
  2) Analog AI3: -10V to 10V
  3) Pulse frequency X7/DI: 0.2Hz to 50kHz
  4) Xi terminal: UP/DN mode independent, able to superpose with any other frequency reference mode
- ◆ Communication mode reference: International standard Modbus protocol.
- ◆ The above reference modes can be switched online.

■ Multiple Channels for Reference and Feedback

- ◆ Under the open loop mode and analog feedback close loop mode, the reference value can define the main and auxiliary calculation relation:
  1) Main reference + auxiliary reference
  2) Main reference - auxiliary reference
  3) Main reference + auxiliary reference -50%
  4) Max (main reference, auxiliary reference)
  5) Min (main reference, auxiliary reference)
- ◆ The sign of the main and auxiliary reference calculation (positive or negative) can automatically determine the rotation direction of the motor.
- ◆ Under the analog feedback close loop mode, the feedback value can also be fed to the PID regulator for regulation control after the main and auxiliary calculation relationship is defined.

Especially applicable to:

Continuous and automatic production lines, such as paper making, printing and dyeing, packaging and printing;

Temperature difference and pressure difference applications, such as the chilled water control of the central air conditioner, the water supply system.

■ Digital Operation Panel

- ◆ Button type and shuttle type selectable, RS485 communication mode, standard network port connection.
- ◆ The button layout complies with the Ergonomics principle. One-button function code access and exit, making it easy for the operation.
- ◆ The standard configuration operation panel can realize parameter copy and remote control function (maximum length: 500m).

- With unique multifunctional button M, the following functions can be defined:
  1) JOG
  2) Emergent stop 1 (fastest shutdown)
  3) Emergent stop 2 (free shutdown)
  4) Reference mode switch through operating command (operation panel reference →terminal reference→host computer reference →operation panel reference)
  5) FASt/bASE menu switch
  6) Menu mode switching (bASE→FASt→ndFt→LASt→bASE)

■ Host Computer Communication

- The operation panel and terminals provide RS485 ports, the communication protocol is Modbus, and host computer monitoring software is provided.
- Master slave communication control among several inverters can be realized.
- Parameter upload and download can be realized.
- Cascade transmission of operating frequencies for several inverters can be realized to provide digital frequency divider functions.

Customized Functions

■ Multiple Function Code Display Modes

- ◆ bASE: Basic menu mode (refer to 5.1 basic menu function code parameter table), displays all the function codes.
- ◆ FASt: Fast menu mode, is especially suitable for the naive users.
- ◆ ndFt: Non-factory setting menu mode, it only displays the function codes different from the leave-factory values to facilitate the inquiry and commissioning.
- ◆ LASt: Last change menu mode, it displays the 10 functions codes that are recently changed and P0.02 to facilitate the inquiry and commissioning.
- ◆ User can define the function codes for inquiry and modification by themselves.

■ Multiple Function Code Encryption Modes (to Protect the Intellectual Property of the Customers)

- ◆ User can encrypt any group function codes by themselves.
- ◆ User can lock operation panel.
- ◆ User can set function parameter password protection.
- ◆ The technical secrets, such as system specific process parameters, cannot be copied.

■ User Self-defined Parameter Display Function

- ◆ User can choose the common parameters displayed by the operation panel and use to >> key switch such parameters.
- ◆ User can define the parameters displayed upon running and stopping respectively.
- ◆ User can define such parameters as pressure, temperature, flux and line speed.

■ User can Make Secondary Development

- ◆ Universal expansion port is provided as standard.
- ◆ Physical port SPI bus, software protocol Modbus.
- ◆ The ports provide +24V, ±15V and 5V power supply and two ways of A/D input.
- ◆ The CPU expansion scheme can realize PLC function.
- ◆ It supports the programming by user to realize process control.

■ Enhanced Function

- ◆ Settable software filtering time for the AI1, AI2 and AI3 analog input to enhance the anti-interference capacity.
- ◆ Independent multi-section modification can be made on the AI1, AI2, AI3 and DI analog input curve.
- ◆ Multi-section speed setting is provided, with 16 speeds as standard, and up to 23 speeds.
- ◆ Supporting the overload protection with motor temperature feedback.
- ◆ Customized timed shutdown, with the duration up to 100 hours.
- ◆ Independent high-speed pulse input and output ports are provided to realize high-speed pulse cascade function.

Typical industry applications

■ Digital Control Machine Tool

- ◆ Compact structure: The size is equal to 70% of the inverter of the same power.
- ◆ Low speed precise processing: The excellent low-frequency torque performance can meet the processing demand of the machine main shaft in low speed condition (when it is operating in motoring state, it can realize a frequency as low as 0.25Hz and output 180% rated torque).
- ◆ Torque and rotating speed index: It can meet the sudden loading and unloading requirement upon the cutting processing, with the dynamic torque response time <20ms and speed stabilization precision of ±0.2%.

■ Special Function for Wire-drawing Machine

- ◆ Operation without swing link: Using open loop tension control to realize operation without swing link under speed sensorless control mode.
- ◆ Operation with swing link: No need to adjust the position of the swing link manually. When the system starts up, the swing link will get to the proper position automatically.
- ◆ Powerful tensile capacity: Suitable for the applications of large and medium wire-drawing machine. It features large torque upon low frequency operation and high speed stabilization precision.
- ◆ Double conversion scheme: Realizing the inverter application of the same power class with precise current control and does not need to upgrade the level.
- ◆ Environment adaptability: Independent duct design, protective coating treatment, high-temperature operation, and digital protection function.

■ Special Function for Textile

- ◆ Traverse operation function: Effectively leading the yarn into the yarn carrier on the yarn and chemical fiber equipment to prevent the overlapping of the yarn and facilitate the unreeling.
- ◆ Constant line speed mode: Effectively preventing the uneven tightness of the yarns from the high speed cone winder to maintain the constant tension.
- ◆ Fixed length calculation: Convenient for the user to calculate the thread length. When the thread length reaches the preset value, the equipment will be shut down automatically.
- ◆ Fixed diameter shutdown: The spindle diameter can be detected by inputting analog signal. When the preset value is reached, the equipment will be shut down automatically.
- ◆ Crawling positioning: When the spinning is interrupted or ended, it can decelerate the equipment to designated frequency for low-speed operation and then shut down the equipment when receiving the positioning signal.

■ Extrusion Machine Energy Saving

- ◆ Extrusion machine interface board: Realizing optimized flow and pressure distribution relation in different processes by receiving the extrusion machine feedback signal to realize the optimized energy saving control of the motor.
- ◆ Customized process curve: No need to change the inverter parameter when replacing the moulds. The process curve memory can be easily realized.
- ◆ Wide range torque output: Within the set range of pressure and flow, the motor torque output is stable to ensure the quality of the workpiece.
- ◆ Tripless: With extremely powerful loading capacity, the inverter can realize stable tripless operation in any acceleration/deceleration time and under any impact load condition.
- ◆ Green output: Using advanced power module drive mode to reduce the interference to the extrusion machine control circuit and sensor.

■ Lifting Control

- ◆ Step torque response: Quickly following the equipment load change to prevent the runaway situation and ensure the safe production.
- ◆ Four quadrant operations: Smoothly and quickly switching the forward and reverse motoring and generating state of the equipment.
- ◆ Torque monitoring: Adjusting, limiting, displaying and switching the torque output, so as to monitor the operating state of the equipment.

Safety Precautions

Description of safety marks:

Danger: The misuse may cause fire, severe injury, even death.

Note: The misuse may cause medium or minor injury and equipment damage.

■ Use

Danger
● This series of inverter is used to control the variable speed operation of three-phase motor and cannot be used for single-phase motor or other applications. Otherwise, inverter failure or fire may happen. ● This series of inverter cannot be simply used in the applications directly related to the human safety, such as the medical equipment. ● This series of inverter is produced under strict quality management system. If the inverter failure may cause severe accident or loss, safety measures, such as redundancy or bypass, shall be taken.

■ Goods Arrival Inspection

Note
● If the inverter is found damaged or have missing parts, the inverter cannot be installed. Otherwise, accident may be caused.

■ Installation

Note
● When handling and installing the inverter, please hold the inverter bottom. Do not hold the enclosure only. Otherwise, your feet may be injured and the inverter may be damaged because of dropping. ● The inverter shall be mounted on the fire retardant surface, such as metal, and kept far away from the inflammables and heat source. ● Keep the drilling scraps from falling into the inverter during the installation; otherwise, inverter failure may be caused. ● When the inverter is installed inside the cabinet, the electricity control cabinet shall be equipped with fan and ventilation port. And ducts for heat dissipation shall be constructed in the cabinet.

■ Wiring

Danger

- The wiring must be conducted by qualified electricians. Otherwise, electric shock may happen or inverter damage.
- Before wiring, confirm that the power supply is disconnected. Otherwise, electric shock may happen or fire.
- The PE terminal must be reliably grounded, otherwise, the inverter enclosure may become live.
- Please do not touch the main circuit terminals. The wires of the main circuit terminals must not contact the inverter enclosure. Otherwise, electric shock may happen.
- The connecting terminals for the braking resistor are ⊕2/B1 and B2. Please do not connect terminals other than these two. Otherwise, fire may be caused.
- The leakage current of the inverter system is more than 3.5mA, and the specific value of the leakage current is determined by the operationapplication conditions. The inverter and the motor must be grounded to ensure the safety.

■ Wiring

Note

- The three-phase power supply cannot connect to output terminals U/T1, V/T2 and W/T3, otherwise, the inverter will be damaged.
- It is forbidden to connect the inverter output terminals to the capacitor or LC/RC noise filter with phase lead, otherwise, the internal components of the inverter may be damaged.
- Please confirm that the power supply phases, rated voltage are consistent with those indicated by the nameplate, otherwise, the inverter may be damaged.
- Do not perform dielectric strength test on the inverter, otherwise, the inverter may be damaged.
- The wires of the main circuit terminals and the wires of the control circuit terminals shall be laid separately or in a square-crossing mode, otherwise, the control signal may be interfered.
- The wires of the main circuit terminals shall adopt lugs with insulating sleeves.
- The sectional area of inverter input and output cables should be selected according to the inverter power.
- When the cables between the inverter and the motor are longer than 100m, it is suggested to use output reactor to avoid the inverter failure caused by the overcurrent of the distribution capacitor.
- The inverter equipped with a DC reactor must be connected with a DC reactor between the terminals of ⊕1 and ⊕2, otherwise the inverter will not display after power on.
- When the voltage level is 525V, the input and output reactors are optional parts; When the power is above 90kW, the input reactor is recommended; When the connection cable between the inverter and motor is longer than 50m, an output reactor is recommended to avoid over current generated by big distribution capacitors that may result in the inverter failure.
- For 525V, the grounding resistance is 5Ω or less.

■ Operation

Danger

- Power supply can only be connected after the wiring is completed and the cover is installed. It is forbidden to remove the cover in live condition; otherwise, electric shock may happen.
- When auto failure reset function or restart function is enabled, isolation measures shall be taken for the mechanical equipment, otherwise, personal injury may be caused.
- When the inverter is powered on, its terminals are still live even when it is in stop state. Do not touch the inverter terminals; otherwise electric shock may happen.
- The failure and alarm signal can only be reset after the running command has been cut off. Otherwise, personal injury may be caused.

Note

- Do not start or shut down the inverter by switching on or off the power supply, otherwise, the inverter may be damaged.
- Before operation, please confirm if the motor and equipment are in the normal use range, otherwise, the equipment may be damaged.
- The heatsink and the braking resistor have high temperature. Please do not touch such device; otherwise, you may be burnt.
- When the inverter is used by crane or lifting equipment, mechanical contracting brake shall also be equipped.
- Please do not change the inverter parameter randomly. Most of the factory settings of the inverter can meet the operating requirement, and the user only needs to set some necessary parameters. Any random change of the parameter may cause the damage of the mechanical equipment.
- In the applications with power frequency and variable frequency switching, the two contactors for controlling the industrial frequency and variable frequency switching shall be interlocked.

■ Maintenance, Inspection

Danger

- In the power-on state, please do not touch the inverter terminals; otherwise, electric shock may happen.
- If cover is to be removed, the power supply must be disconnected first.
- Wait for at least 10 minutes after power off or confirm that the CHARGE LED is off before maintenance and inspection to prevent the human injury caused by the residual voltage of the electrolytic capacitor in main circuit.
- The components shall be maintained, inspected or replaced by qualified electricians.

Note
● The circuit boards have large scale CMOS IC. Please do not touch the board to avoid the circuit board damage caused by ESD.

■ Others

Danger
● It is forbidden to modify the inverter unauthorizedly; otherwise, human injury may be caused.

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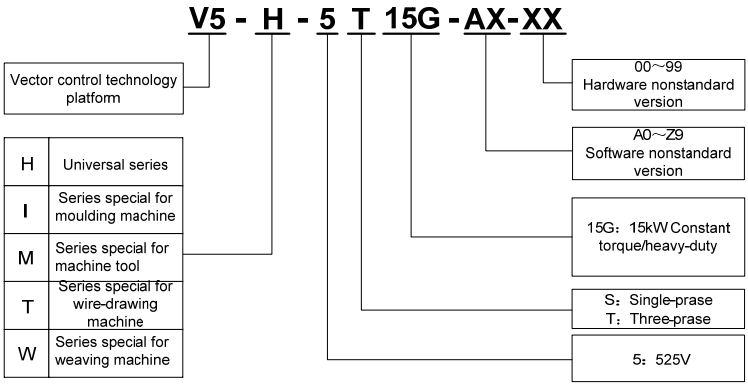
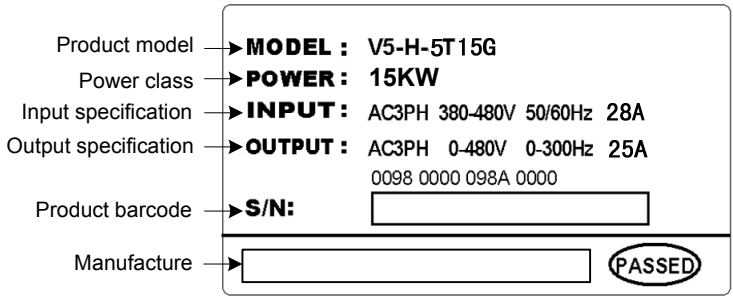
Chapter 1 Introduction to V5−H Medium Voltage Series Inverter

1.1 Product Model Description

The digits and letters in the inverter model field on the nameplate indicate such information as the inverter series, power supply class, power class and software/hardware versions.



1.2 Product Nameplate Description



1.3 Product Series

■ V5−H−4T□□□G Three-phase 400V Constant torque/heavy-duty application

Power (kW)		15	18.5	22	30	37	45	55	75	90	110	132	160
Motor power (kW)		15	18.5	22	30	37	45	55	75	90	110	132	160
Output	Voltage (V)	Three-phase 0 to rated input voltage											
	Rated current (A)	30	39	45	60	75	91	112	150	176	210	253	304
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)											
Input	Rated voltage/frequency	Three-phase 525V; 50Hz/60Hz											
	Allowable voltage range	323V ~ 528V; Voltage imbalance ≤3%; allowable frequency fluctuation: ±5%											
	Rated current (A)	33	43	50	66	83	100	123	165	160*	196*	232*	282*
Braking unit		Built-in as standard							Built-in as option				
Protection class		IP20											
Cooling mode		Natural−cooling			Forced air convection cooling								
Power (kW)		185	200	220	250	280	315	355	400	450	500	560	
Motor power (kW)		185	200	220	250	280	315	355	400	450	500	560	
Output	Voltage (V)	Three-phase 0 to rated input voltage											
	Rated current (A)	350	380	426	470	520	600	650	690	775	860	775	
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)											
Input	Rated voltage/frequency	Three-phase 525V; 50Hz/60Hz											
	Allowable voltage range	323V ~ 528V; Voltage imbalance ≤3%; allowable frequency fluctuation: ±5%											
	Rated current (A)	326*	352*	385*	437*	491*	580*	624*	670*	755*	840*	755	
Braking unit		External braking unit needed											
Protection class		IP20											
Cooling mode		Forced air convection cooling											

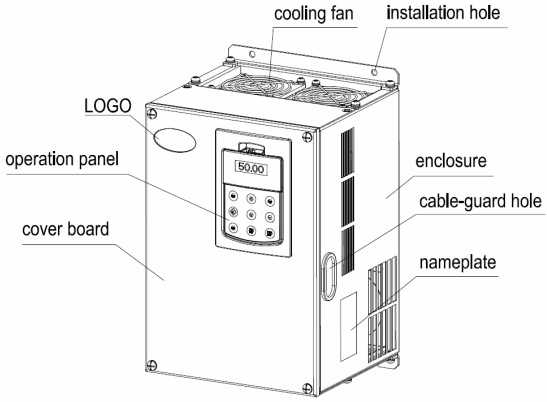
*V5−H−4T90G and above products are equipped with external DC reactor as standard.

1.4 Technical Specifications of Product

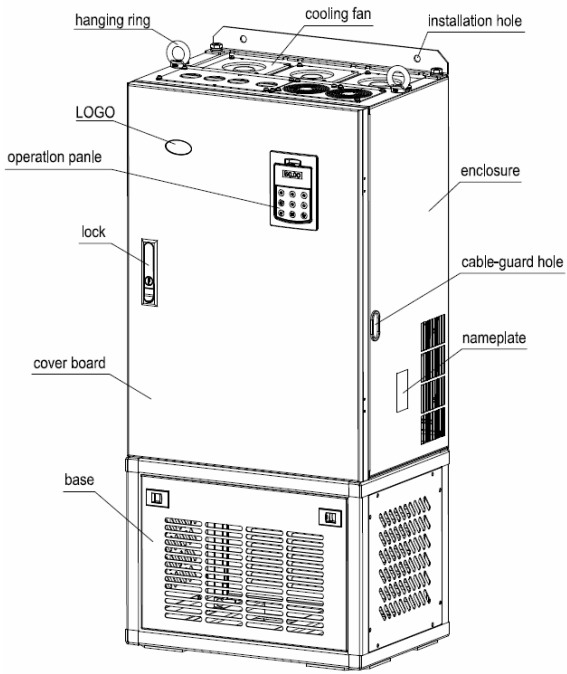
Control features	Control mode	Vector control 1
	Startup torque	0.50Hz 180%
	Speed adjustment range	1:100
	Speed stabilization precision	± 0.5%
Product functions	Key functions	Undervoltage adjustment, switching of AC operation grounding, protective grounding and DC operation grounding, rotation speed tracing, multi-speed operation (up to 23 speeds), S curve acceleration/deceleration, slip compensation, PID regulation, manual/auto torque increase, current limiting.
	Frequency setting mode	Frequency can be set via operation panel, UP/DN terminal, or analog inputs of AI1 / AI2/A3, or terminal pulse DI, and can also be set through communication with host computer,
	Frequency range	0.00 ~ 300.00Hz
	Startup frequency	0.00~60.00Hz
	Acceleration/deceleration time	0.1~36000s
	Powered braking capacity	Braking unit action voltage: AC525V：780～1000V
	DC braking capacity	DC braking initial frequency: 0.00 ~ 300.00Hz; DC braking current: Constant torque: 0.0 ~ 120.0%, Variable torque: 0. 0 ~ 90.0% DC braking time: 0.0 ~ 30.0s; there is no initial waiting time for the DC braking to realize quick braking
	Magnetic flux braking function	Ongoing action and no action upon deceleration as option, no action upon deceleration at default
Unique functions	Multifunctional M key	The unique multifunctional key is used to set the frequently used operations: JOG, emergent stop, Running command issuing mode switch , menu switching
	Multiple menu modes	Basic menu mode, fast menu mode. Menu mode of Non-factory setting function codes, Menu mode of last changed 10 function codes
	Parameter copy	The standard operation panel can realize the parameter upload, download and display the copy progress. User can select to forbid the overwriting of the uploaded parameters.
	Displayed/hidden function code	The customer can select to display or hide the function codes by themselves.
	Dual RS485 communication ports	Support Modbus protocol (RTU). The standard operation panel can realize the function of remote control box with a maximum distance of 500m.
	Operation panel	Button type or shuttle type operation panel optional, protection class: IP20 as standard, IP54 as option
	Shared DC bus	The full series can realize shared DC bus supply for several inverters.
	Independent duct	The full series adopts independent duct design and supports the installation of heatsink outside the cabinet
	Universal expansion interface	Universal expansion board equipped with CPU for supporting customers secondary development: physical interface SPI bus, software protocol Modbus
	Expansion card	User's secondary development card, injection molding machine interface card, PG feedback card, air compressor control card, communication adapter card, power monitoring card, phase sequence detection card, external power rectifying card

	Power-up auto-detection	Realizing the power-up auto-detection of internal and peripheral circuits, including motor grounding, abnormal +10V power supply output, abnormal analog input, and disconnection
Protection function	Power supply undervoltage, overcurrent protection, overvoltage protection, interference protection, abnormal comparison reference input, auto-tuning failure, module protection, heatsink overtemperature protection, inverter overload protection, motor overload protection, peripheral protection, abnormal current detection, output to ground short circuit, abnormal power failure during operation, abnormal input power, output phase failure, abnormal EEPROM, relay suction pull-on anomaly, temperature sensor taking sample anomaly, abnormal +10V power supply output, abnormal analog input, motor overtemperature (PTC), abnormal communication, abnormal version compatibility, abnormal copying,terminal mutual exclusion detection failure, hardware overload protection	
Environment	Operating site	The inverter shall be mounted vertically in the electric control cabinet with good ventilation. Horizontal or other installation modes are not allowed. The cooling medium is the air. The inverter shall be installed in the environment free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, steam and drip.
	Ambient temperature	-10 ~ +40ºC, derated at 40 ~ 50ºC, the rated output current shall be decreased by 1% for every temperature rise of 1ºC
	Humidity	5 ~ 95%, no condensing
	Altitude	0 ~ 2000m, derated above 1000m, the rated output current shall be decreased by 1% for every rise of 100m
	Vibration	3.5mm,2~9Hz; 10 m/s^2,9~200Hz; 15 m/s^2,200~500Hz
	Storage temperature	-40~+70ºC

1.5 Product Component Name



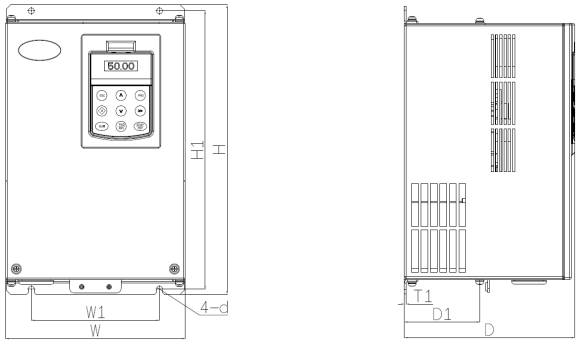
V5−H−5T75G and below



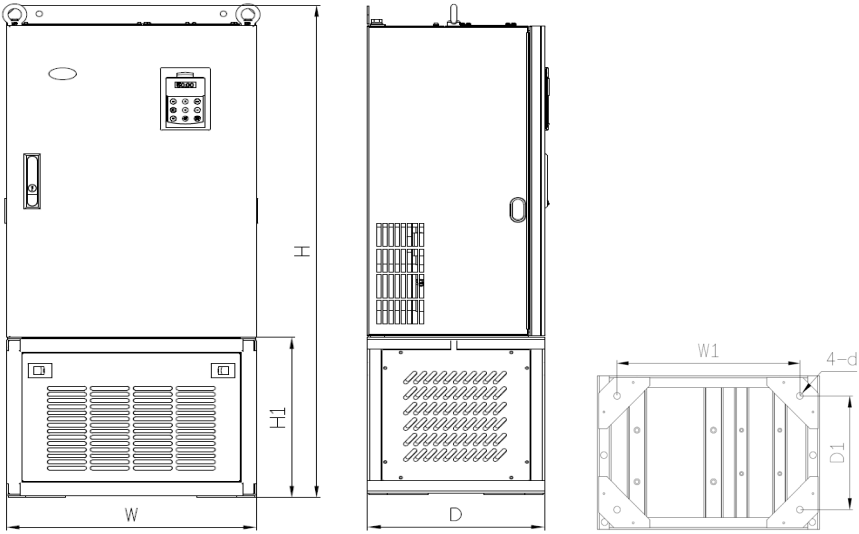
V5−H−5T90G and above

Figure 1−1 Product component name

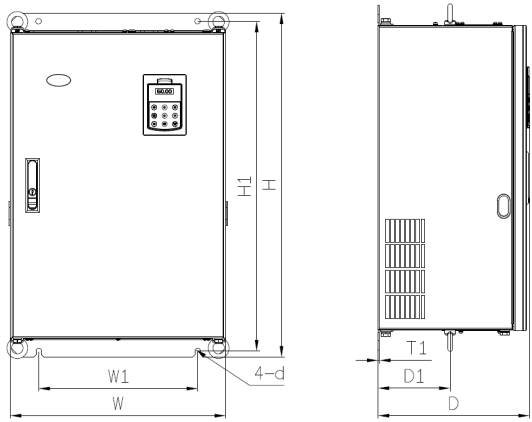
1.6 Product Outline, Mounting Dimension, and Weight



V5−H−5T75G and below



V5−H−5T15G and above (with base)



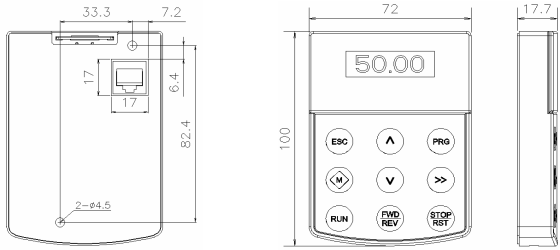
V5−H−5T90G and above (without base)

Figure 1−2 V5−H−5T outline and mounting dimension

Product outline, mounting dimension, and weight of standard V5−H−5T inverter

Voltage class	Inverter power (kW)	Base	Outline dimension (mm)			Mounting dimension (mm)					Gross weight (kg)
			W	H	D	W1	H1	D1	T1	Mounting hole	
525V	15～30	Y	285	679	220	200	219	107.5	—	7	30
		N	285	440	220	200	425	107.5	2.5	7	17
	37～45	Y	315	767	227	221	219	128	—	10	40
		N	315	575	227	220	553	123.5	2.5	10	25
	55～75	Y	400	800	265	306	219	166	—	10	55
		N	400	615	265	270	590	123.5	3.0	10	35
	90～110	Y	465	1042	325	382	339	238	—	14	75
		N	465	745	325	343	715	156	3.0	12	55
	132～220	Y	540	1206	385	459	365	300	—	14	120
		N	540	890	385	370	855	205.5	4.0	14	85
	250～315	Y	700	1380	385	614	412	294	—	15	155
		N	700	1010	385	520	977	210	4.0	14	125
	355～560	Y	810	1698	425	728	418	339	—	15	255
		N	810	1358	425	520	1300	210	4.0	14	215

1.7 Operation Panel Outline and Mounting Dimension



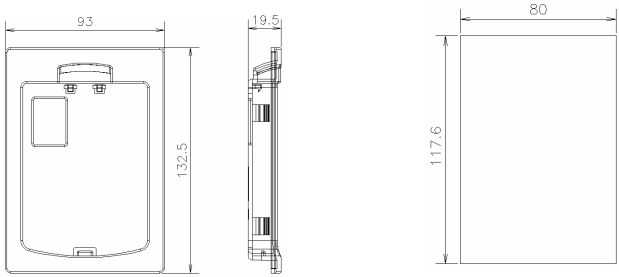
Button type operation panel (V6−DP02)

Rear view of operation panel

Figure 1-3 Operation panel outline and mounting dimension

1.8 Pallet Outline and Mounting Dimension

V6−DP05 is the mounting pallet when the operation panel is to install on the electric control cabinet. The outline and dimension are as follows:



Pallet (V6−DP05)

Open pore dimension of pallet

Figure 1−4 Pallet outline and mounting dimension

1.9 Models of Braking Resistor

When the load driven by the inverter brakes at a high speed, a braking unit is needed to consume the energy fed back to the DC bus during the braking process.

If braking is needed, a suitable braking resistor should be selected according to the inverter's capacity. For the application with 100% braking torque and 10% utility rate of braking unit, the configurations of the braking resistor and braking unit are as shown in the table below. For the load that needs to work in braking status for a long time, its braking power shall be re-adjusted according to the braking torque and utility rate of braking unit, and if calculated according to long term operation, the power of the braking resistor: PR=P motor *Kf, where, Kf is the utility rate of braking unit and R is the resistance of braking resistor.

Inverter model	Braking unit	Braking resistor unit				Braking torque%
		Power	Resistor	Minimum limit resistor	Qty.	
V5−H−5T15G	Built-in as an option	1500W	68Ω	20Ω	1	125
V5−H−5T18.5G		2000W	56Ω	20Ω	1	125
V5−H−5T22G		2200W	47Ω	20Ω	1	120
V5−H−5T30G		3000W	34Ω	20Ω	1	125
V5−H−5T37G		3700W	28Ω	15Ω	1	125
V5−H−5T45G		4500W	23Ω	15Ω	1	120
V5−H−5T55G		5500W	19Ω	9.5Ω	1	125
V5−H−5T75G		7500W	14Ω	7.5Ω	1	135

Note:

◆ The resistance of braking resistor shall be higher than the minimum limit of the resistance, otherwise the braking tube might be damaged;

◆ Avoid using wire-wound resistor as this resistor has a big parasite inductance that may damage the braking tube of the inverter;

◆ In the table, the power of the braking resistor shall be calculated based on the condition that the continuous braking time is within 30s. If the braking time is longer, the power of the braking resistor shall be bigger.

◆ The selection of braking resistor shall be determined according to actual application conditions. The selection of the braking resistor and braking unit is related to the system inertia, deceleration time, and distance (potential energy), and shall be made according to the actual condition. The bigger the system inertia, the shorter the deceleration time and the more frequent the braking, the higher the power of the braking resistor and the smaller the resistance of the braking resistor.

Chapter 2 Inverter Installation

2.1 Product Installation Environment

- Do not install the inverter in the sites with oil mist, metal powder and dust.
- Do not install the inverter in the sites with hazardous gas and liquid, and corrosive, combustible and explosive gas.
- Do not install the inverters in salty sites.
- Do not install the inverter in the sites with direct sunlight.
- Do not mount the inverter on the combustible materials, such as wood.
- Keep the drilling scraps from falling into the inverter during the installation.
- Mount the inverter vertically in the electric control cabinet, mount the cooling fan or air conditioner to prevent the ambient temperature from rising to above 45 ºC.
- For the sites with adverse environment, it is recommended to mount the inverter heatsink outside the cabinet.
- Elevation: The inverter runs at its rated power when it is installed below 1000m; When the elevation is higher than 1000m, the inverter power shall be derated and the derated amount is shown in the following Figure:

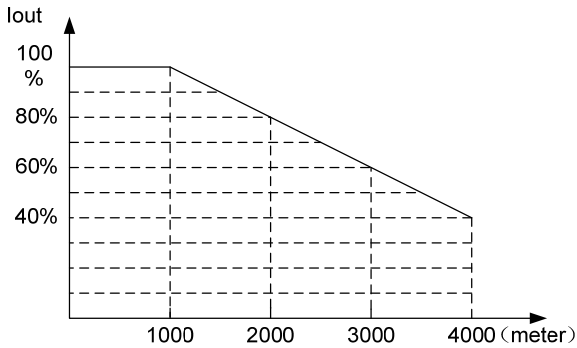


Figure 2−1 Elevation of installation site

2.2 Mounting Direction and Space

In order not to reduce the inverter cooling effect, the inverter must be mounted vertically, and certain clearance must be maintained, as shown in Figure 2−2 and Figure 2−3.

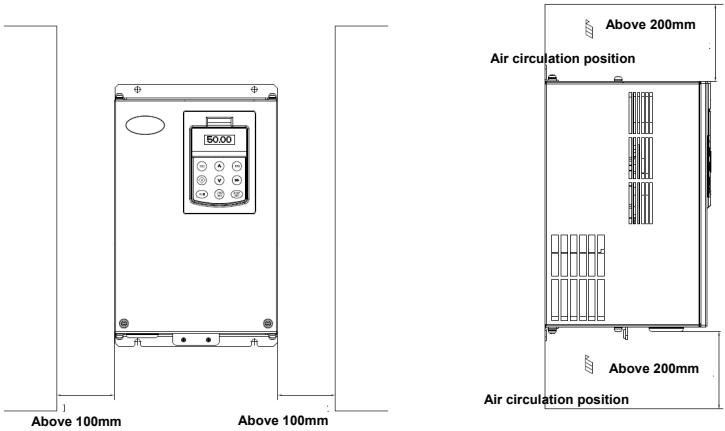


Figure 2−2 Mounting direction and space for V5−H−5T75G and below power class

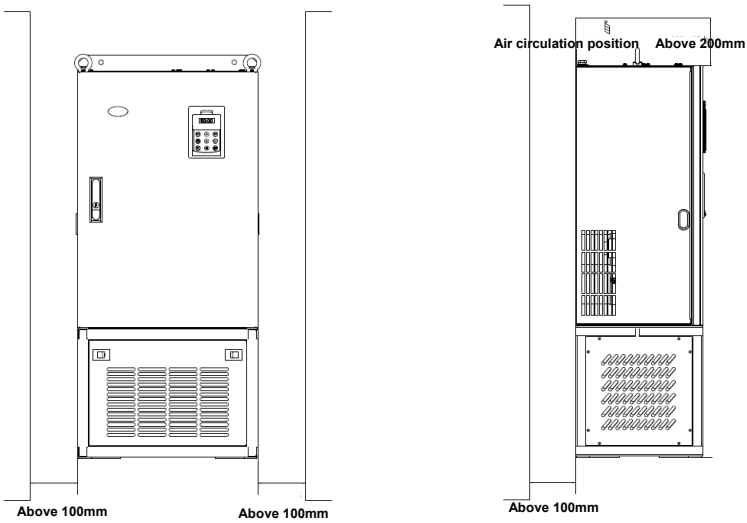


Figure 2−3 Mounting direction and clearance for V5−H−5T90G and above power class

2.3 Removal and Mounting of Operation Panel and Cover

2.3.1 Removal and Mounting of Operation Panel

- Removal of operation panel

  As shown in Figure 2−4, the grab the operation panel forcefully in direction 1, and then lift the panel body in direction 2.

- Mounting of operation panel

  As shown in Figure 2−4, align with the lower clamping position of the operation panel in direction 1, and then press down the operation panel in direction 2, until the “crack” sound is heard.

  Do not mount the operation panel in any other direction; otherwise, the operation panel will have poor contact.

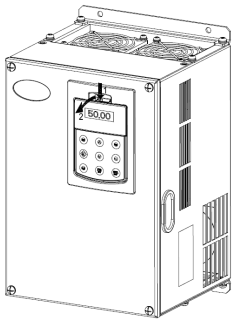


Figure 2−4 Removal of operation pan

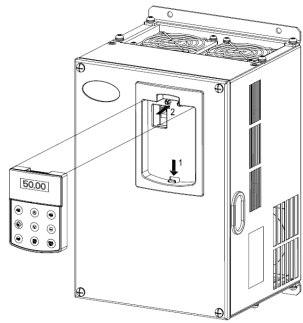


Figure2−5 Mounting of operation panel

2.3.2 Removal and Mounting of Covers of V5−H−5T15G~V5−H−5T90G Power Class

◆ Removal of operation panel

Please refer to 2.3.1 Removal and mounting of operation panel.

◆ Removal of cover

Remove the mounting screws on the lower part of the cover, lift the cover in direction 1 as shown in Figure 2−6, and then take out the cover in direction 2.

◆ Mounting of cover

After connecting the cables of main circuit terminals and control circuit terminals, cramp the cover in direction 1 as shown in Figure 2−7, press down the cover in direction 2 and then tighten the cover screws.

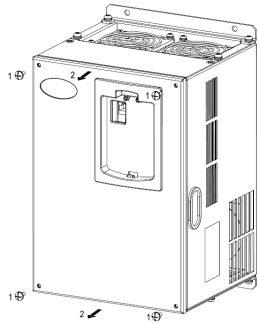


Figure 2−6 Removal of cover

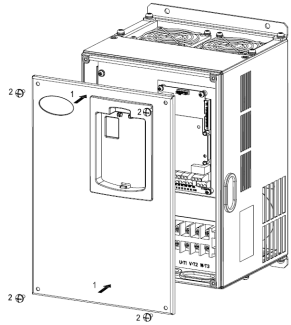


Figure 2−7 Mounting of cover

◆ Mounting of operation panel

Please refer to 2.3.1 Removal and mounting of operation panel.

☞ Note:

Do not directly mount the cover with operation panel on the inverter, otherwise, the operation panel will have poor contact.

2.3.3 Open and Close of Doors of V5−H−5T110G and Above Power Class Inverter with Sheet-metal Enclosure

◆ Opening of the door

Press the latch following direction 1 in Figure 2−8 and open the door following direction 2.

◆ Removal of operation panel

The operation panel is connected to the control board through the standard network cable and will not interfere with the open/close of the door. To remove the operation panel, refer to section 2.3.1 Removal and Mounting of Operation Panel

◆ Mounting of cover

After connecting the cables of main circuit terminals and control circuit terminals, close the door

following direction 1 in Figure 2−9, and then press down the latch following direction 2 to lock the door.

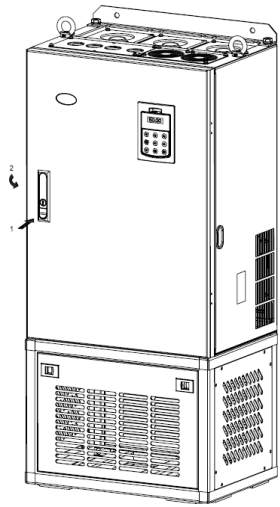


Figure 2−8 opening the door

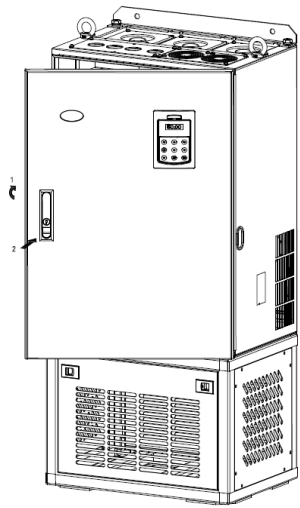
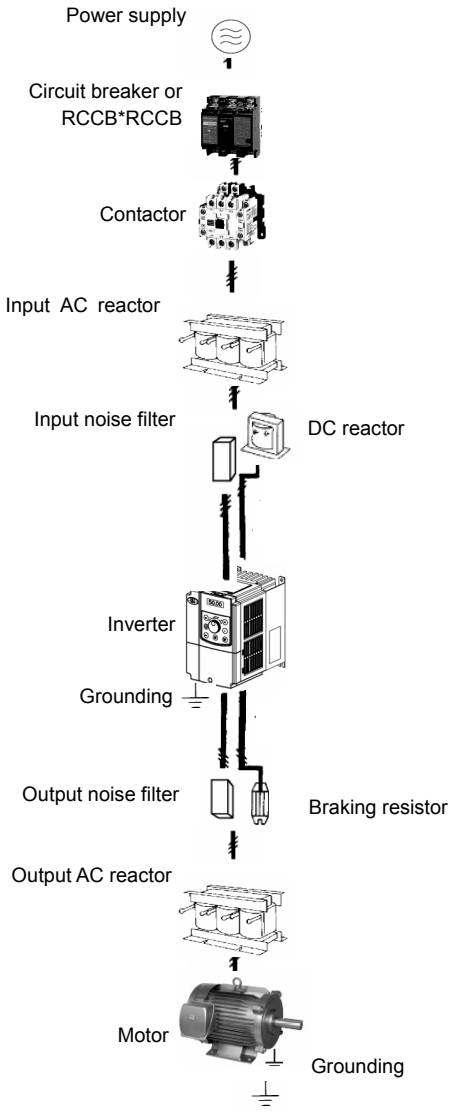


Figure 2−9 closing the door

Chapter 3 Wiring of Inverter

3.1 Connection of the inverter and Peripheral Devices



*RCCB: residual current circuit breaker

Figure 3−1 Connection diagram of the inverter and peripheral devices

3.2 Description of Peripheral Devices for Main Circuit

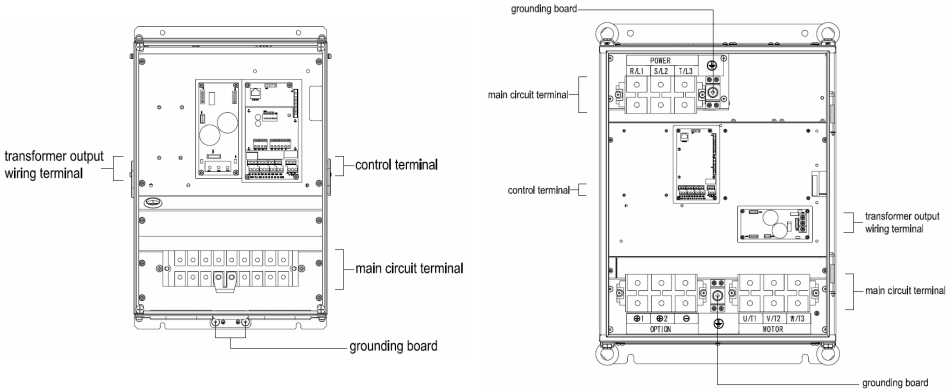
Circuit breaker	The circuit breaker capacity shall be 1.5 ~ 2 times of the inverter rated current. The time features of the circuit breaker shall fully consider the time features of the inverter overload protection.
RCCB	Because the inverter output is the high-frequency pulse, there will be high-frequency leakage current. Special RCCB shall be used when installing RCCB at the inverter input side. It is suggested that B type RCCB be used, and the leakage current value shall be set to 300mA.
Contactor	Frequent contactor tripping will cause inverter failure, so the highest frequency for contactor tripping shall not exceed 10 times/min. When a braking resistor is used, to avoid the overtemperature damage of the braking resistor, a thermal protection relay with braking resistor overtemperature detection shall be installed to disconnect the contactor at the contact control power side of the thermal protection relay.
Input AC reactor or DC reactor	1. The inverter power supply capacity is more than 600kVA or 10 times of the inverter capacity. 2. If there is switch type reactive-load compensation capacitor or load with silicon control at the same power node, there will be high peak current flowing into input power circuit, which damages the rectifier components. 3. When the voltage imbalance of the three-phase power supply of the inverter exceeds 3%, the rectifier component will be damaged. 4. It is required that the input power factor of the inverter shall be higher than 90%. When the above situations occur, install the AC reactor at the inverter input side or DC reactor to the DC reactor terminal.
Input noise filter	The noise input from the power end to the inverter and output from the inverter to the power end can be reduced.
Thermal protection relay	Although the inverter has motor overload protection function, when one inverter drives two or more motors or multi-pole motors, to prevent the motor overtemperature failure, a thermal protection relay shall be installed between the inverter and each motor, and the motor overload protection parameter P9.16 shall be set to “2” (motor protection disabled).
Output noise filter	When the output of the inverter is connected with noise filter, the conduction and radiation interference can be reduced.
Output AC reactor	When the voltage level is 525V, the input and output reactors are optional parts; When the power is above 90kW, the input reactor is recommended; When the connection cable between the inverter and motor is longer than 50m, an output reactor is recommended to avoid over current generated by big distribution capacitors that may result in the inverter failure.

3.3 Models of Main Circuit Peripheral Devices

Inverter model	Circuit Breaker (A)	Contactor (A)	R/L1, S/L2, T/L3, ⊕1, ⊕2/B1, B2, ⊖, U/T1, V/T2, W/T3			PE terminal ⏚		
			Terminal screw	Tightening torque (N·m)	Wire specification (mm^2)	Terminal screw	Tightening torque (N·m)	Wire specification (mm^2)
V5−H−5T15G	63	63	M5	2.5~3.0	6	M5	2.5~3.0	6
V5−H−5T18.5G	100	63	M6	4.0~5.0	10	M6	4.0~5.0	10
V5−H−5T22G	100	100	M6	4.0~5.0	16	M6	4.0~5.0	16
V5−H−5T30G	125	100	M6	4.0~5.0	25	M6	4.0~5.0	16
V5−H−5T37G	160	100	M8	9.0~10.0	25	M8	9.0~10.0	16
V5−H−5T45G	200	125	M8	9.0~10.0	35	M8	9.0~10.0	16
V5−H−5T55G	315	250	M10	17.6~22.5	50	M10	14.0~15.0	25
V5−H−5T75G	350	330	M10	17.6~22.5	60	M10	14.0~15.0	35
V5−H−5T90G	315	250	M10	17.6~22.5	70	M10	14.0~15.0	35

Inverter model	Circuit Breaker (A)	Contactor (A)	R/L1, S/L2, T/L3, ⊕1, ⊕2/B1, B2, ⊖, U/T1, V/T2, W/T3			PE terminal ⏚		
			Terminal screw	Tightening torque (N·m)	Wire specification (mm^2)	Terminal screw	Tightening torque (N·m)	Wire specification (mm^2)
V5-H-5T110G	350	330	M10	17.6~22.5	100	M10	14.0~15.0	50
V5-H-5T132G	400	330	M12	31.4~39.2	150	M12	17.6~22.5	75
V5-H-5T160G	500	400	M12	31.4~39.2	185	M12	17.6~22.5	50×2
V5-H-5T185G	630	500	M12	48.6~59.4	240	M12	31.4~39.2	60×2
V5-H-5T200G	630	500	M12	48.6~59.4	240	M12	31.4~39.2	60×2
V5-H-5T220G	800	630	M12	48.6~59.4	150×2	M12	31.4~39.2	75×2
V5-H-5T250G	1000	630	M12	48.6~59.4	185×2	M12	31.4~39.2	100×2
V5-H-5T280G	1000	630	M12	48.6~59.4	185×2	M12	31.4~39.2	100×2
V5-H-5T315G	1000	800	M14	48.6~59.4	250×2	M14	31.4~39.2	125×2
V5-H-5T355G	1200	800	M14	48.6~59.4	325×2	M14	31.4~39.2	150×2
V5-H-5T400G	1500	1000	M14	48.6~59.4	325×2	M14	31.4~39.2	150×2
V5-H-5T450G	2000	1500	M14	48.6~59.4	350×2	M14	31.4~39.2	175×2
V5-H-5T500G	2000	1500	M14	48.6~59.4	350×2	M14	31.4~39.2	175×2
V5-H-5T560G	1200	1000	M14	48.6～59.4	325×2	M14	31.4～39.2	150×2

3.4 Product Terminal Configuration



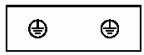
V5-H-5T75G and below V5-H-5T90G and above

Figure 3-2 Product terminal configuration

3.5 Functions of Main Circuit Terminal

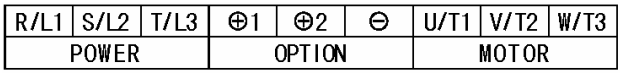
3.5.1 V5-H-2T0.4G~V5-H-2T2.2G and V5-H-5T0.75G~V5-H-5T15G

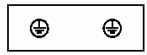
R/L1	S/L2	T/L3	⊕1	⊕2/B1	B2	⊖	U/T1	V/T2	W/T3
POWER			OPTION				MOTOR		



Terminal symbol	Terminal name and function description
R/L1, S/L2, T/L3	Three-phase AC input terminal
⊕1, ⊕2/B1	DC reactor connecting terminal, short circuited with copper bus upon delivery
⊕2/B1, B2	Connecting terminal of braking resistor
⊕2/B1, ⊖	DC power input terminal; DC input terminal of external braking unit
U/T1, V/T2, W/T3	Three-phase AC output terminal
⏚	PE terminal

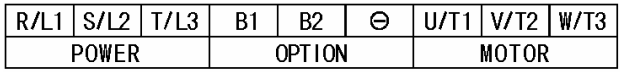
3.5.2 V5-H-5T18.5G~V5-H-5T75G

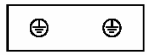




Terminal symbol	Terminal name and function description
R/L1, S/L2, T/L3	Three-phase AC input terminal
⊕1, ⊕2	DC reactor connecting terminal, short circuited with copper bus upon delivery
⊕2, ⊖	DC power input terminal; DC input terminal of external braking unit
U/T1, V/T2, W/T3	Three-phase AC output terminal
⏚	PE terminal

3.5.3 Internal Braking Unit Option for V5-H-5T18.5G/22L~V5-H-5T75G/90L



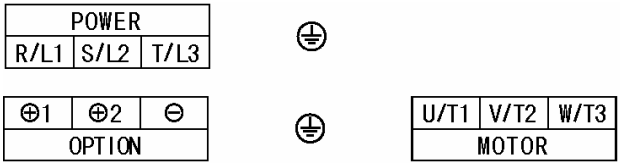


Terminal symbol	Terminal name and function description
R/L1, S/L2, T/L3	Three-phase AC input terminal
B1, ⊖ *	DC reactor connecting termina *
B1, B2 *	Connecting terminal of braking resistor *
U/T1, V/T2, W/T3	Three-phase AC output terminal
⏚	PE terminal

Note：*The inverter equipped with braking unit as standard can realized shared DC bus and braking function, if needed connect DC reactor and braking function should contact factory, and the teminal of main circuit B1、B2、⊖ should change to ⊕1、⊕2/B1、B2.

3.5.4 V5-H-5T90G~V5-H-5T500G and V5-H-5T110L~V5-H-5T560L

The inverters of V5-H-5T90G~V5-H-5T500G and V5-H-4T110L~V5-H-5T560L adopt the top cable-inlet bottom cable-outlet wiring mode.



Terminal symbol	Terminal name and function description
R/L1, S/L2, T/L3	Three-phase AC input terminal
⊕1, ⊕2	DC reactor connecting terminal, if don't connect DC reactor, the inverter will don't display after power on.
⊕2, ⊖	DC power input terminal; DC output terminal of external braking unit
U/T1, V/T2, W/T3	Three-phase AC output terminal
⏚	PE terminal

3.6 Attention for Main Circuit Wiring

3.6.1 Power Supply Wiring

- It is forbidden to connect the power cable to the inverter output terminal, otherwise, the internal components of the inverter will be damaged.
- The inverter shall connect to the power supply through a circuit breaker or RCCB and contactor to protect the inverter input against over current or disconnect the input power for maintenance.
- Please confirm that the power supply phases and rated voltage are consistent with that of the nameplate, otherwise, the inverter may be damaged.

3.6.2 Motor Wiring

- It is forbidden to short circuit or ground the inverter output terminal, otherwise the internal components of the inverter will be damaged.
- Avoid short circuit the output cable and the inverter enclosure, otherwise electric shock may happen.
- It is forbidden to connect the inverter output terminals to the capacitor or LC/RC noise filter with phase lead, otherwise, the internal components of the inverter may be damaged.
- When contactor is installed between the inverter and the motor, it is forbidden to switch on/off the contactor when the inverter is running, otherwise, large current will flow into the inverter, triggering the inverter protection action.
- cable between the inverter and motor

When the cable between the inverter and the motor is long, the high order harmonic leakage current at the output will affect the inverter and the devices connected to the inverter.

When the voltage level is 525V, the input and output reactors are optional parts; When the power is

above 90kW, the input reactor is recommended; When the connection cable between the inverter and motor is longer than 50m, an output reactor is recommended to avoid over current generated by big distribution capacitors that may result in the inverter failure.

Length of cable between the inverter and motor	Less than 50m	Less than 100 m	More than 100m
Carrier frequency (PA.00)	Less than 15kHz	Less than 10kHz	Less than 5kHz

3.6.3 Grounding Wiring

- The inverter will produce leakage current. The higher the carrier frequency is, the larger the leakage current will be. The leakage current of the inverter system is more than 3.5mA, and the specific value of the leakage current is determined by the application conditions. To ensure the safety, the inverter and the motor must be grounded.
- The grounding resistance shall be less than 10ohm. For the grounding wire diameter requirement, refer to 3.3 Models of main circuit peripheral devices.
- Do not share grounding wire with the welding machine and other power equipment.
- In the applications with more than 2 inverters, keep the grounding wire from forming a loop.

Correct **Wrong**

Figure 3−3 Grounding wiring

- The minimum cross sectional area of the grounding conductor is at least 10mm2，select the greater value among the data in the following table as the cross sectional area of the grounding conductor:

Cross sectional area of power cable S mm2	Cross sectional area of the grounding conductor
S≤16	S
16<S≤35	16
35<S	S/2

3.6.4 Countermeasures for Conduction and Radiation Interference

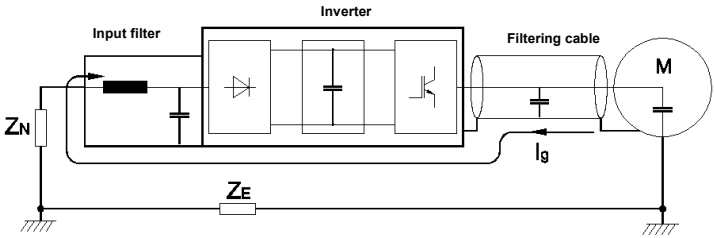


Figure 3−4 Noise current illustration

- When the input noise filter is installed, the wire connecting the filter to the inverter input power terminals shall be as short as possible.
- The filter enclosure and mounting cabinet shall be reliably connected in large area to reduce the back flow impedance of the noise current Ig.
- The wire connecting the inverter and the motor shall be as short as possible. The motor cable adopts 4-core cable, with the grounding end grounded at the inverter side, the other end connected to the motor enclosure. The motor cable shall be sleeved into the metal tube.
- The input power wire and output motor wire shall be kept away from each other as long as possible.
- The equipment and signal cables vulnerable to EMI shall be kept far away from the inverter.
- Key signal cables shall adopt shielded cable. It is suggested that the shielded layer shall be grounded with 360-degree grounding method and sleeved into the metal tube. The signal cable shall be kept far away from the inverter input wire and output motor wire. If the signal cable must cross the input wire and output motor wire, they shall be kept orthogonal.
- When analog voltage and current signals are adopted for remote frequency setting, shielded twisted pair cable shall be used. The shielded layer shall be connected to the PE terminal of the inverter, and the signal cable shall be no longer than 50m.
- The wires of the control circuit terminals RA/RB/RC and other control circuit terminals shall be separately routed.
- It is forbidden to short circuit the shielded layer and other signal cables or equipment.
- When the inverter is connected to the inductive load equipment (e.g. electromagnetic contactor, relay and solenoid valve), surge suppressor must be installed on the load equipment coil, as shown in Figure 3-5.

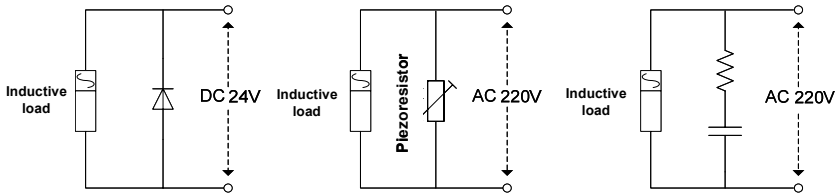


Figure 3−5 Application of inductive load surge suppressor

3.7 Terminal Wiring

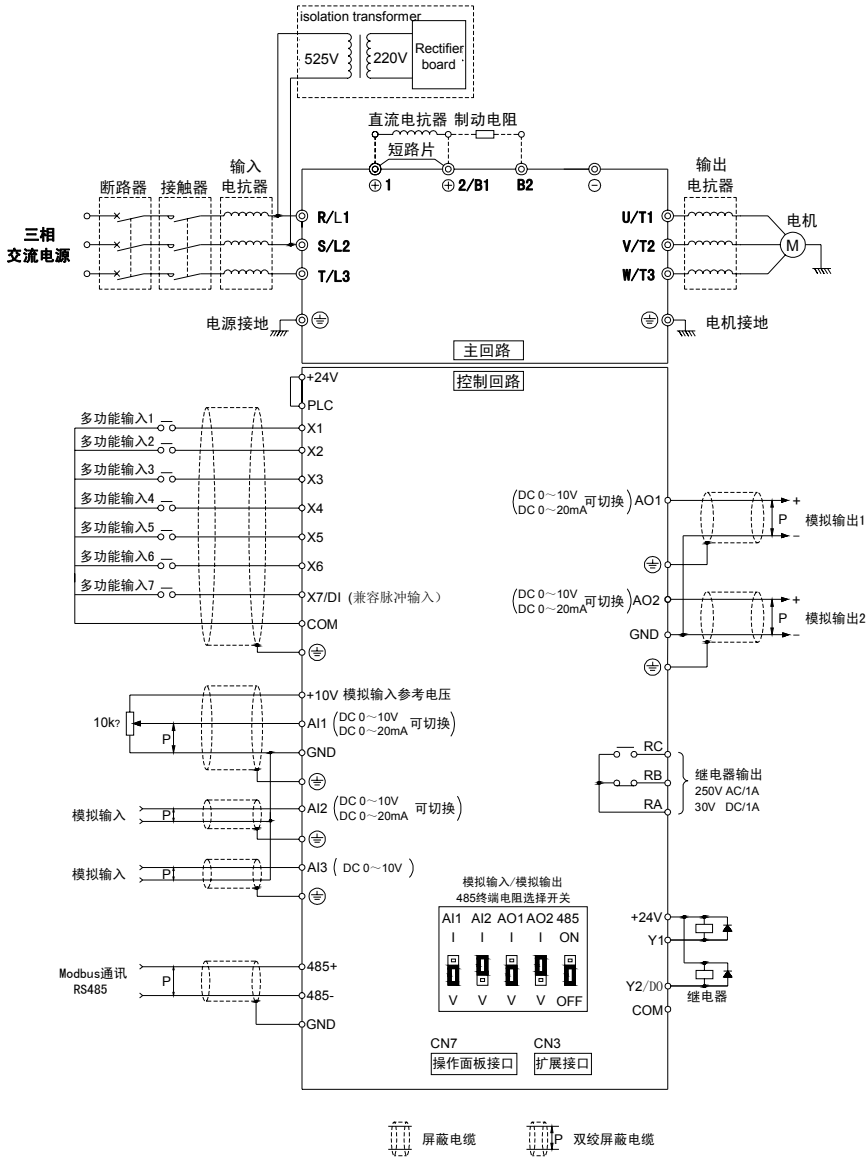


Figure 3-6 Terminal wiring diagram

3.8 Functions of Control Circuit Terminals

Type	Terminal symbol	Terminal function description	Technical specification
Terminal RS485	RS485+	Positive end of RS485 differential signal	Rate: 4800/9600/19200/38400/57600bps Up to 32 sets of equipment can be paralleled*. Relay shall be used if the number exceeds 32. Maximum distance: 500m (adopt standard twisted shielded cable)
	RS485−	Negative end of RS485 differential signal	
	GND	Shielding grounding of RS485 communication	Internal isolated with COM
Operation panel RS485	CN7	RS485 port of operation panel	When used for communication connection with host computer, it is the same as RS485 terminal.
			The maximum distance is 15m for the communication connection of operation panel (adopt standard twisted non-shielded network cable)
Digital input	+24V	+24V	24V±10%, internal isolated with GND, Maximum load: 200mA, with overload and short circuit protection
	PLC	Common end of multi-functional input terminal	Short circuited with +24V upon delivery
	X1~X6	Multi-functional input terminals 1 ~ 6	Input specification: 24VDC,5mA Frequency range: 0~200Hz Voltage range: 24V±20%
	X7/DI	Multi-functional input or pulse input	Multi-functional input: same as X1~X6 Pulse input: 0.1Hz~50kHz; voltage range: 24V±20%
	COM	+24V grounding	Internal isolated with GND
Digital output	Y1	Open collector output	Voltage range: 24V±20%, maximum input current: 50mA
	Y2/DO	Open collector or pulse output	Open collector: Same as Y1 Pulse output: 0~50kHz; voltage range: 24V±20%
	COM	Open collector output common end	Internal isolated with GND
Analog input	+10V	Analog input reference voltage	10V ±3%, internal isolated with COM, Maximum output current: 10mA, with short circuit and overload protection
	AI1	Analog input channel 1	0~20mA: Input impedance 500Ω, maximum input current: 30mA 0~10V: Input impedance 20kΩ, maximum input voltage : 15V Resolution: 12 bits (0.025%) 0~20mA or 0~10V analog input can be selected through jumper.
	AI2	Analog input channel 2	Same as AI1
	AI3	Analog input channel 3	-10V~10V: Input impedance 20kΩ Resolution: 12 bits (0.025%) Maximum input voltage: ±15V
	GND	Analog grounding	Internal isolated with COM
Analog output	AO1	Analog output 1	0~20mA: allowable output impedance 200~500Ω 0~10V: allowable output impedance ≥10kΩ Output precision: 2%, resolution: 10 bits (0.1%) with short circuit protection function, 0~20mA or 0~10V analog output can be selected through jumper.
	AO2	Analog output 2	Same as AO1
	GND	Analog grounding	Internal isolated with COM

Type	Terminal symbol	Terminal function description	Technical specification
Relay output	RA/RB/RC	Relay output	RA-RB: Normally closed RA-RC: Normally open Contact capacity: 250VAC/1A, 30VDC/1A

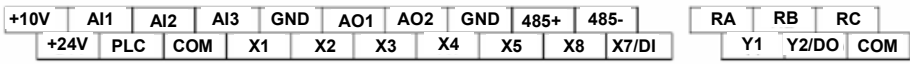
Note:

*: If you use computer to control the inverter, you can control 32 piece paralleled inverters, but you can't use one operation panel of the inverter to control 32 piece paralleled inverters.

＊ If the user connects adjustable potentiometer between ＋10V and GND, the resistance of the potentiometer shall be no less than 5kΩ,

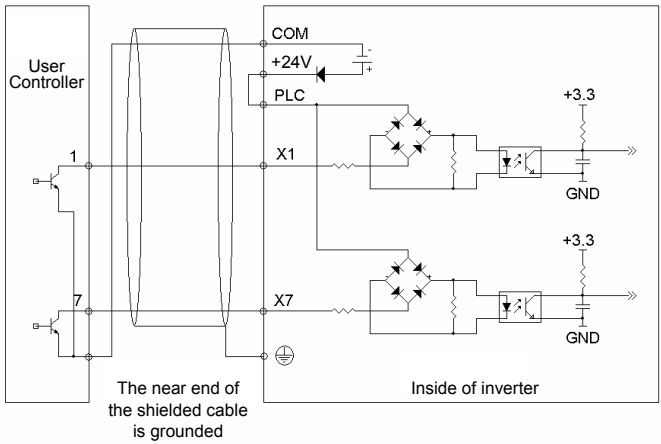
Note:

1. The arrangement sequence of the control circuit terminals is as follows:

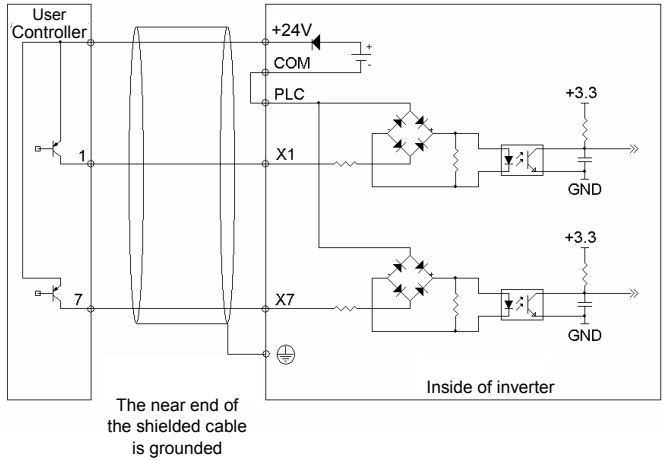


2. Wiring mode of the multi-functional input/output terminals

- When the internal +24V power supply of the inverter is used, the external controller adopts NPN sink current wiring mode.
-

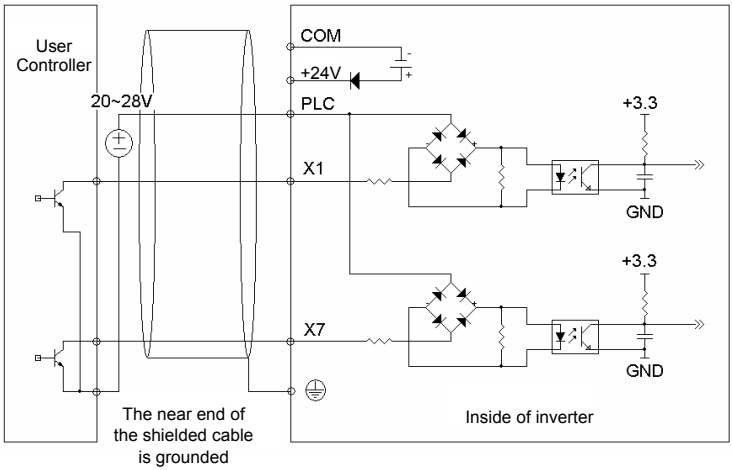


- When the internal +24V power supply of the inverter is used, the external controller adopts PNP draw-off current wiring mode.



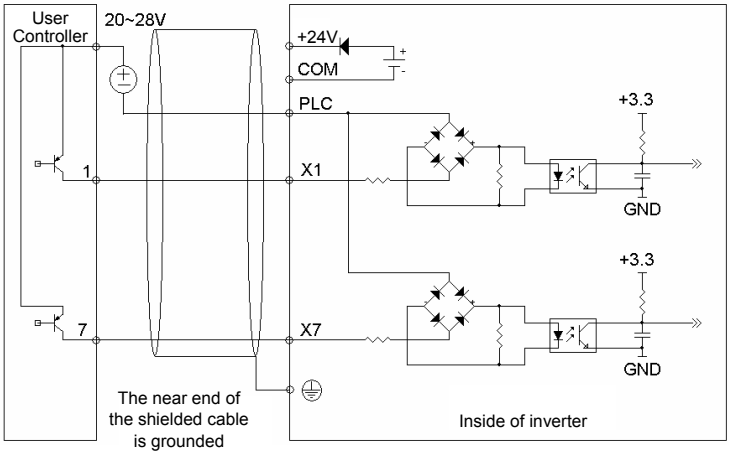
Note: The short circuit bar between terminal +24V and terminal PLC must be removed and short circuit bar shall be connected between PLC and COM terminals.

- When the external power supply is used, the external controller adopts NPN sink current wiring mode.



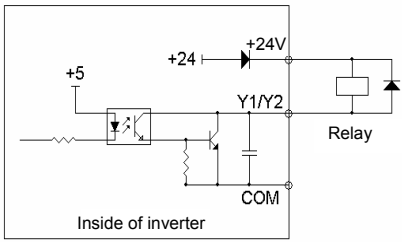
Note: The short circuit bar between terminal +24V and terminal PLC must be removed.

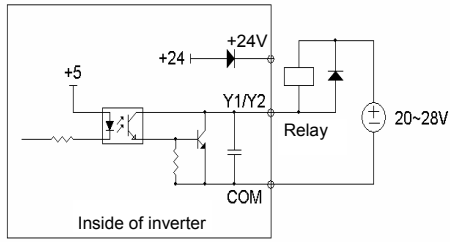
- When the external power supply is used, the external controller adopts PNP draw-off current wiring mode.



Note: The short circuit bar between terminal +24V and terminal PLC must be removed.

- The wiring modes of the multi-functional output terminals when the internal +24V power supply of the inverter and external power supply are used





Note: When this wiring mode is adopted, if Y1 or Y2 terminal is damaged, the polarity of the external diode must be checked to ensure the correctness.

3.9 Schematic Diagram of Control Board

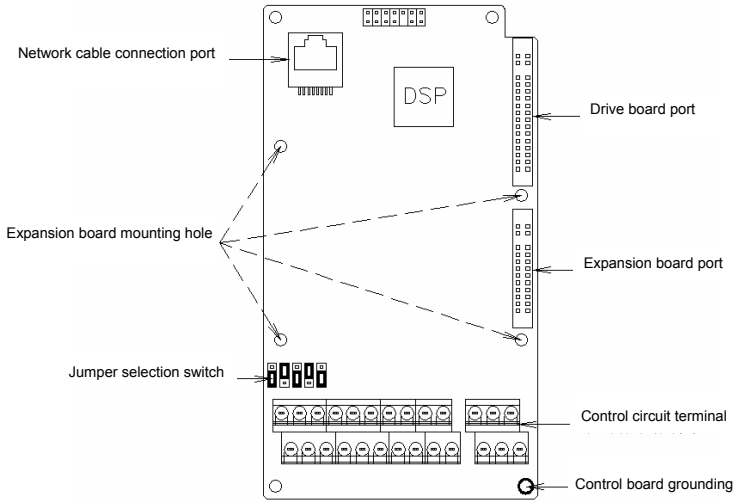


Figure 3-7 Schematic diagram of control board

3.10 Descriptions of Control Circuit Terminals

Terminal number	Terminal screw	Tightening torque (N·m)	Wire specification mm^2	Wire type
+10V, AI1, AI2, AI3, 485+, 485−, AO1, AO2, GND	M3	0.5~0.6	0.75	Shielded twisted pair cable
+24V, PLC, X1, X2, X3, X4, X5, X6, X7/DI, COM, Y1, Y2/DO, COM, RA, RB, RC	M3	0.5~0.6	0.75	Shielded cable

3.11 Description of Jumper Function

Jumper selecting switch in Figure 3-7:

Name	Function	Leave-factory setting
AI1	I is the current input (0~20mA), V is the voltage input (0~10V)	0~10V
AI2	I is the current input (0~20mA), V is the voltage input (0~10V)	0~20mA
AO1	I is the current output (0~20mA), V is the voltage output (0~10V)	0~10V
AO2	I is the current output (0~20mA), V is the voltage output (0~10V)	0~20mA
RS485	RS485 terminal resistor selection: ON: there is 100Ω terminal resistor, OFF: there is no terminal resistor	There is no terminal resistor

Chapter 4 Using Instructions of Operation Panel

4.1 Introduction to Operation Panel

Figure 4−1 Key-type operation panel (V6-DP02)

4.2 Descriptions of Indicators

Symbol of Indicator		Name	Meanings	Color
Unit indicator	Hz	Frequency indicator	On: Current displayed parameter is running frequency Flash: Current displayed parameter is setting frequency	Green
	A	Current indicator	On: Current displayed parameter is current	Green
	V	Voltage indicator	On: Current displayed parameter is voltage	Green
	Hz+A	Rotating speed indicator	On: Current displayed parameter is rotating speed Flash: Current displayed parameter is setting rotating speed	Green
	Hz+V	% indicator	On: Current displayed parameter is %	Green
	A+V	Self definable indicator	On/Flash: Current displayed parameter is self-defined, see description of P2 group.	Green
	Hz+A+V	Time indicator	On: Current displayed parameter is time	Green
		No unit indicator	Off: Current displayed parameter is no unit	−
Status indicator	MULTI	Multi-function key indicator	Refer to table 4-1 for using method of multi function keys and the meanings of MULTI indicator	Red
	MON	Running command issuing mode indicator	On: Running command is given via operation panel Off: Running command is given via terminals Flash: Running command is given via host computer	Red
	RUN	Running status indicator	On: Inverter is running Off: Inverter has stopped Flash: Inverter is stopping	Red
	FWD	Run forward indicator	On: In stop status, inverter has run forward command; In running status, inverter is running forward Flash: Changing from running forward to running reverse	Red
	REV	Run reverse indicator	On: In stop status, inverter has run reverse command; In running status, inverter is running reverse Flash: Changing from running reverse to running forward	Red

4.3 Description of Keys on Operation Panel

Symbol	Name	Function
	Programming key PRG	1、 Enter each level of menu 2、 Validate data change 3、 Check function code in sequence 4、 Confirm the Running command issuing mode with M key
	Escape Key ESC	1、 Back to first level menu from second level menu; Back from first level menu to standby status, running status, and fault status 2、 Give up data change after modifying data. 3、 Back to basic menu mode after pressing this key for more than 5s. Refer to 4.4.3. When LCD cannot display all the function codes, use this method to re-display all the function codes. 4、 After using >> key to switch from fault display to Stop / Run parameter display, press ESC to back to fault display status.
	Increase Key ∧	1、 In first level menu, increase function code according to edit bit. 2、 In second level menu, increase the function code data. 3、 In stop/run status, increase the input frequency or close loop input.
	Decrease Key ∨	1、 In first level menu, decrease function code according to edit bit. 2、 In second level menu, decrease the function code data. 3、 In stop/run status, decrease the input frequency or close loop input.
	Shift Key >>	1、 In first level menu, use >> key to move edit bit of PX.YZ menu 2、 In second level menu, use >> key to move the edit bit of data 3、 In stop/run status, switch the panel display parameters such as frequency, current and voltage. 4、 In fault status, change from fault display to stop/run display.
	Run Key RUN	1、 When running command is given via operation panel, press the key to start the inverter. 2、 After setting the parameter auto tuning,start parameter auto tuning for inverter startup
	Stop/Reset Key STOP/RST	1、 When running command is given via operation panel, press the key to stop the inverter. 2、 This key is used as a stop key when inverter only has fault alarm but does not stop. 3、 When the inverter has fault and has stopped, this key is used as RESET key to clear the fault alarm.
	Multi-function Key M	See table 4-1 for the using method of multi-function key and the meanings of MULTI indicator.
	Forward/reverse Key FWD/REV	When running command is given via operation panel, this key is used to confirm the output direction of inverter

Note: Using PRG key continuously can realize fast browse of all function codes.

Table 4-1 Method of using multi-function key and meanings of MULTI indicator

Definition of M key (P2.01)	Function	Meanings of function	Meanings of MULTI indicator
0	No function	Multi-function key is defined as no function.	Normally Off: No function
1	JOG	Used as JOG operation key and is only enabled when running command is given via operation panel. In stop status, press M key to enter jog operation status, and release this key to stop.	On: Press M Off: Release M to finish the jog operation
2	Emergent stop 1 (Stop in shortest time)	Press M key, inverter will stop in shortest time.	On: Press M Off: Release M
3	Emergent stop 2 (Coast to stop)	Press M key, inverter will coast to stop	On: Press M Off: Release M
4	Switch the reference method of running command	Press M key to switch the reference method of giving running command: Via operation panel→Via terminal→Via host computer→Via operation panel. During switching time, there is a 5-second response time limit and the change is cancelled automatically after 5-second time is exceeded. Press PRG key to confirm the change within 5s. MON indicator indicates the method of giving the running command.	On: Press M Off: M key has been released for more than 5s or PRG key has been used to confirm the changing of the method of giving running command
5	Switching between FASt/base menus	Press M key to switch between FASt and bASE menus, operation panel should prompt as FASt and bASE	On: FASt fast menu mode Off: bASE basic menu mode

4.4 Menu Style

The menu style is 2-level menu.

4.4.1 Format of First Level Menu

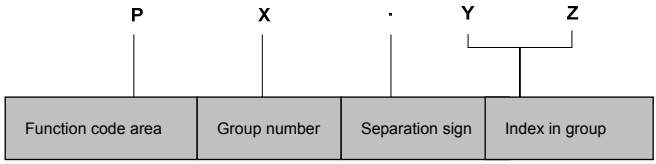


Figure 4−2 Format of first level menu

◆ Dividing the first level menu

Password action area	Function code area	Group number in area	Function code range
Protection area of user password P0.00	User operation area (P area)	P0 group	P0.00 ~ P0.16
		P1 group	P1.00 ~ P1.08
		P2 group	P2.00 ~ P2.07
		P3 group	P3.00 ~ P3.13
		P4 group	P4.00 ~ P4.36
		P5 group	P5.00 ~ P5.13
		P6 group	P6.00 ~ P6.24
		P7 group	P7.00 ~ P7.25
		P8 group	P8.00 ~ P8.10
		P9 group	P9.00 ~ P9.18
		PA group	PA.00 ~ PA.22
		Pb group	Pb.00 ~ Pb.23
		PC group	PC.00 ~ PC.06
		Pd group	Pd.00 ~ Pd.35
		PE group	Reserved
	Equipment status area (d area)	d0 group	d0.00 ~ d0.11
		d1 group	d1.00 ~ d1.11
		d2 group	d2.00 ~ d2.24
A0.00 protection area	Function code display/hidden area defined by user (A area)	A0 group	A0.00 ~ A0.02
C0.00 reserved area	Reserved (C area)	Reserved parameter area	Reserved
U0.00 reserved area	Reserved (U0 area)	Reserved parameter area	Reserved
U1.00 reserved area	Reserved (U1 area)	Reserved parameter area	Reserved

◆ Structure of first level menu

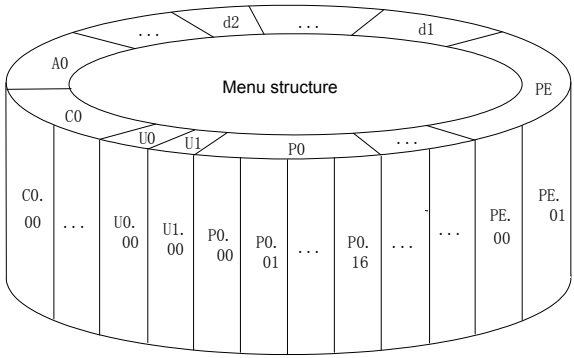


Figure 4-3 Structure of first level menu

4.4.2 Format of Second Level Menu

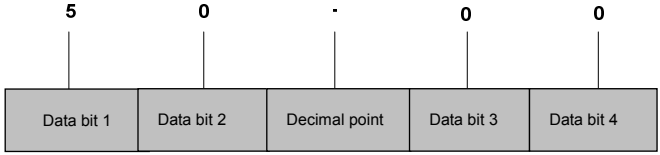


Figure 4−4 Format of second level menu

◆ Format of display/set for second level menu

Display/set decimal

From data bit 1 to 4, the characters of 0, 1……9 can be displayed or set.

When displayed data >9999, the last bit will be omitted:

For example: When data is 12345, operation panel displays “1234”.

When data is 1234.5, operation panel displays “1234”.

When data is 123.45, operation panel displays “123.4”.

When data is 12.345, operation panel displays “12.34”.

Display/set hex code:

From data bit 1 to 4, the characters of 0, 1……9, A, B, C, D, E and F can be displayed or set.

◆ Meanings of 0. 0. 0. 0. displayed in second level menu

After entering second level menu, besides the displayed data, there are also 4 dots, this means the password protection and you need to enter the password. The function codes that require password validation are P0.00, PE.00, A0.00, C0.00, U0.00 and U1.00. PE area, C area, U0 area and U1 area are factory reserved parameter area.

4.4.3 Menu Mode

Menu mode setting (P0.02)	Menu mode name	Visible function code range	Operation panel display
0	Basic menu	See 5.1 for the table of basic menu function code parameter	bASE
1	Fast menu	Quickly display the menu function codes in common use	FASt
2	Non-factory setting function code menu	Only display the function codes different from the leave-factory values	ndFt
3	Menu of last changed 10 function codes	Display the last changed 10 function codes and P0.02	LASt

◆ Basic menu bASE

Basic menu includes all the function codes mentioned in this user manual. Except for the special descriptions, all the descriptions of this manual are in this menu mode. See 5.1 for the table of basic menu function code parameter.

◆ Fast menu FASt

Fast menu includes some common function codes and you can start the inverter by setting only a few function codes so as to realize the fast application. See 5.2 for the table of fast menu function code parameter.

◆ Non-factory setting function code menu ndFt

This menu mode is used to search for the function codes different from the leave-factory values for the convenience of understanding the parameter setting.

◆ Menu of last changed 10 function codes LASt

If this menu mode is set, it enters password protection status. Only P0.00 and C0.00 can be viewed. The recently changed function codes, P0.00 and P0.02 can be viewed only when correct password is entered into P0.00.

◆ Method of back to basic menu

1. By editing the function code: Set P0.02=0, then the menu returns to basic menu mode after bASE is displayed.
2. By using M key: Define the function of multi-function key M as menu switching function, then press this key to switch the menu mode. Refer to table 4-1 for the using method of multi-function key and the meanings of MULTI indicator.
3. By pressing ESC for a long time: Press ESC and do not release it for more than 5s, then the menu returns to basic menu mode after bASE is displayed. If bASE is not displayed, this means the menu is already in basic menu mode.

4.4.4 Common Characters Displayed by LED

Except the function codes in first and second level menus, the operation panel will also display the following characters as shown in the following table:

Prompt symbol	Meaning	Prompt symbol	Meaning
8.8.8.8.	Instantaneous display of inverter when inverter is powered on	LoAd	Inverter parameters are being copied and this symbol will be displayed when parameters are uploaded to operation panel. For example, set Pb.23=1
-LU-	Inverter shutdown due to under voltage	Loc1	Operation panel is locked and the keys are disabled
-dc-	Inverter is in DC braking status	Loc2	Except M key, other keys are locked
-At-	Inverter is in auto tuning	Loc3	Except RUN and STOP/RST keys, other keys are locked
bASE	Basic menu (P0.02=0)	ndFt	Non factory setting of function code (P0.02=2)
CoPy	Inverter parameters are being downloaded and this symbol will be displayed when parameters are downloaded to inverter. For example, set Pb.23=2 or 3	P.CLr	Password is cleared, see 4.5 for password operation
dEFt	Restore to factory settings (P0.01=2 to 5)	P.SEt	Password is set successfully, see 4.5 for password operation
E.XXX	E. means fault or alarm happens. Analyze the fault or alarm according to the fault or alarm list in 7.1	Prot	Password protection is enabled, see 4.6 for key locking and unlocking
FASt	Fast menu (P0.02=1)	SLId	Operation panel is identified as shuttle type
HoLd	The parameter copy or upload function of operation panel is disabled	ULoc	Press ESC+>>+∨ together to unlock the panel
LASt	10 function codes modified recently (P0.02=3)	UpDn	Operation panel is identified as key type.
LInE	Communication of operation panel fails		

If the symbol is not listed in the table, please contact the local distributor or our company directly.

4.4.5 Identify Symbols Displayed Via LED

The relationship between characters displayed by LED and characters/numbers are as follows:

LED display	Meanings of characters	LED display	Meanings of characters	LED display	Meanings of characters	LED display	Meanings of characters
	0		A		I		S
	1		b		J		T
	2		C		L		t
	3		c		N		U
	4		d		n		V
	5		E		O		y
	6		F		o		-
	7		G		P		8.
	8		H		q		.
	9		h		r		

4.5 Password Operation

- **Set Password**

  Enter password function code and set to the identical parameters for two times continuously. After “P.Set” is displayed, the password setting is successful. See 4.8.3 for password setting.

- **Password Verification**

  Enter password function code, enter password correctly and you can see the parameters protected by password. See 4.8.4 descriptions of password verification.

- **Clear Password**

  After passing password verification, enter password function code, set 0000 continuously for two times, ”P. CLr” is displayed, this means the password is successfully cleared. From now on, you need not enter password for access the password protection area. See 4.8.5 descriptions of clearing password.

- **Method of Enabling Password**

  One of following three methods can be used to enable the password:

  1. Press ESC+PRG +∧ at the same time (for shuttle type, turning clock wise is equivalent to the ∧ key) to display “Prot”. If key locking function is enabled, “Loc1” (P2.00=1) or

"Loc2"(P2.00=2) or "Loc3"(P2.00=3) is displayed.

2. Do not press any key for continuous 5 minutes.
3. Restart the inverter

4.6 Lock/Unlock Keys

■ Lock Keys

◆ Set the function of locking keys

Select the P2.00 key locking functions:

0: Do not lock the keys on the operation panel and all the keys can be used;

1: Lock the keys on the operation panel and all the keys cannot be used;

2: Except multi-function key M, all the keys cannot be used;

3: Except RUN and STOP/RST keys, all the keys cannot be used.

◆ Key Locking Function is Enabled

One of following three methods can be used to enable the key locking function:

1. Press ESC+PRG +∧ at the same time (for shuttle type, turning clock wise is equivalent to the ∧ key) to display "Loc1" (P2.00=1) or "Loc2"(P2.00=2) or "Loc3"(P2.00=3), the operation panel is locked according to the setting method of P2.00. When P2.00=0, "Prot" is displayed and the operation panel is not locked and only the password protection is enabled.
2. Power on the inverter again to lock the operation panel.
3. If no key is pressed within 5 minutes after setting the function code, the operation panel is locked automatically.

■ Unlock Keys:

Press ESC+>>+∨ keys at the same time (for shuttle type, turning anti-clock wise is equivalent to ∨ key) to unlock.

4.7 Operation Panel Display and Key Operation

4.7.1 Classification of Display Status

There are 8 types of display status of operation panel:

SN	Status	Meaning
1	Display status of stopping parameters	Press >> key to switch the displayed parameters, P2.03 can be used to set the displayed parameters.
2	Display status of running parameters	Press >> key to switch the displayed parameters, P2.02 can be used to set the displayed parameters.
3	Display status of fault and alarm	In other 7 kinds of display status, if there is any fault happens, directly enter this status.
4	Display status of first level menu	When the keys are not locked, in status of SN1, SN2, SN3 and SN7, press PRG to enter.
5	Display status of second level menu	In the display status of first level menu, press PRG to enter.
6	Password verification status	If password protection is enabled, press PRG to enter in the display status of first level menu.
7	Password modification status	In the display status of stopping and running parameters, press /\ and \/ to enter.
8	Information prompt status	See 4.4.5 for identifying the LED display characters.

4.7.2 Display Status and Operation Process

◆>> key

In the display status of first level menu, press >> key to select the edit bit of function code PX.YZ.

In second level menu or password verification status, press >> key to select the data edit bit.

◆Auto switch between status

If no key is pressed for 30s, the screen automatically returns to the display status of stopping parameters, or the display status of running parameters.

If no key is pressed for 1 minute, clear menu edit status of PX.YZ to return to P0.00.

If there is password setting or key locking setting, and if no key is pressed for 5 minutes, the panel will enter password protection or locking status automatically.

◆Display Status and Operation Procedure

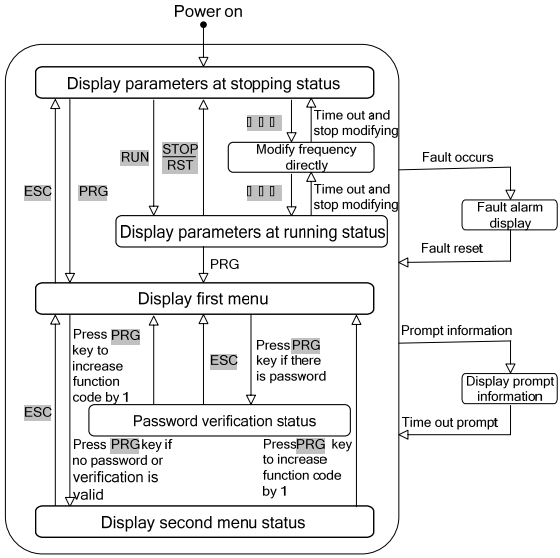


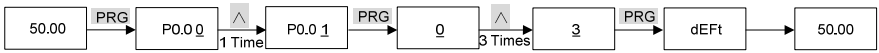
Figure 4−5 Display status and operation procedure

4.8 Operation Example

In following example, the displayed parameters at stopping status is reference frequency, the factory setting is 50.00Hz. The underscored line in the figure means the bit that is being edited.

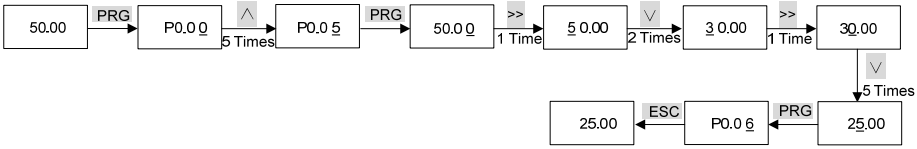
4.8.1 Restore Factory Setting

For example, setting P0.01=3: Restore all the parameters in P area to factory settings except the motor parameters (F9 group).



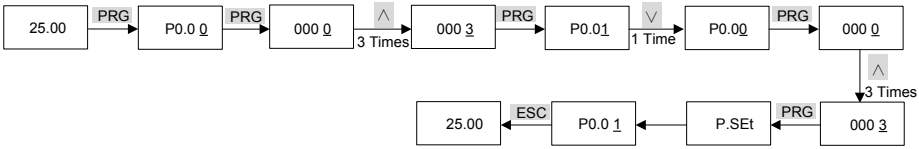
4.8.2 Setting Frequency

For example, setting P0.05=25.00Hz.



4.8.3 Setting Password

For example, setting user password P0.00 to 0003.



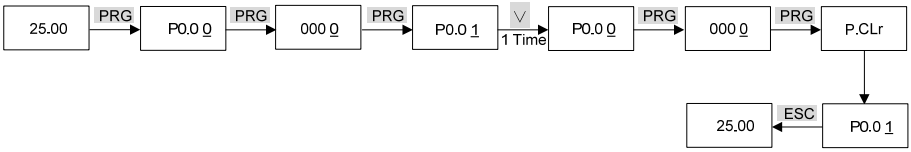
4.8.4 Password Verification

Assume that the function codes after P0.00 are protected by password and the password is 3. If the password protection is not enabled, you can press ESC+PRG+∧ to enable the password in last example of P0.00. You can verify the password according to the following process:

Note: If you use RS 485 communication mode to perform password verification, please refer to Appendix A. Description of register 0xF000 in Modbus communication protocol.

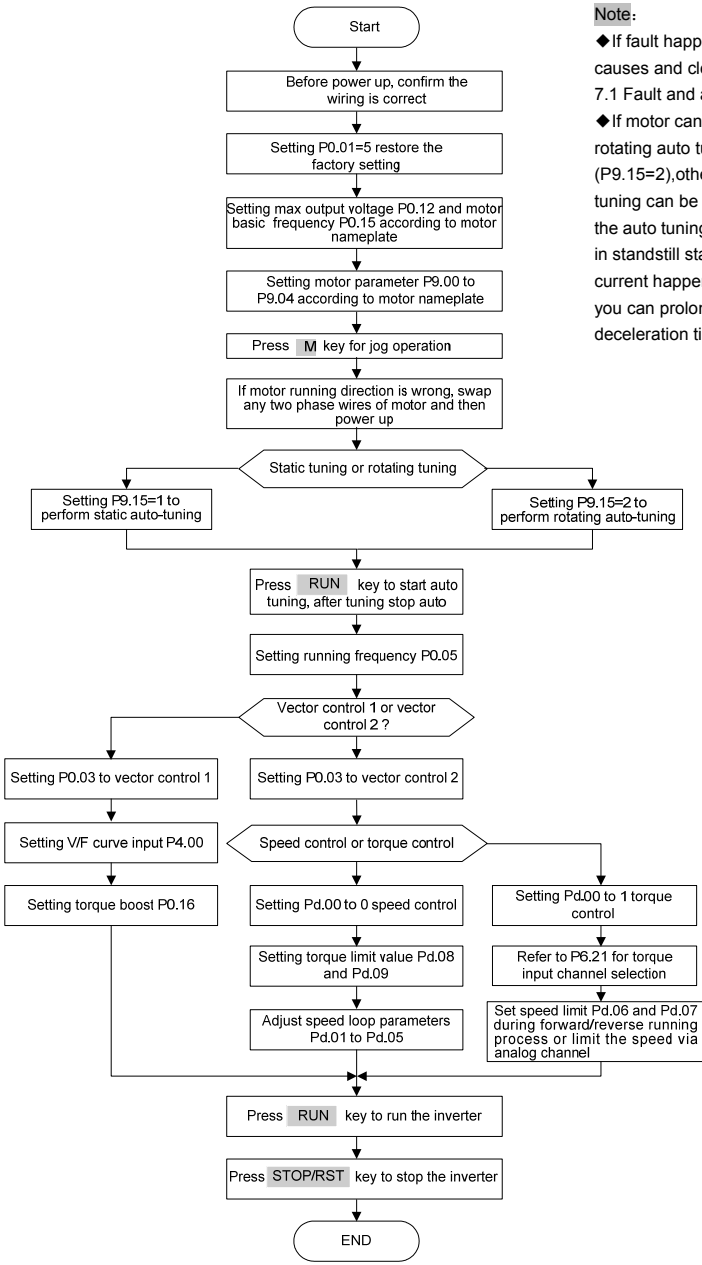
4.8.5 Clearing Password

For example, clear the user password P0.00.



4.9 Running for the First Time

Please follow the procedures to run the inverter for the first time:



Note:

◆If fault happens, please judge the fault causes and clear the fault according to 7.1 Fault and alarm information list.

◆If motor can without connecting the load rotating auto tuning can be selected (P9.15=2),otherwise only static auto tuning can be selected .When enabling the auto tuning please ensure the motor is in standstill status .If over voltage or over current happens in auto tuning process, you can prolong the acceleration and deceleration times of P0.08 and P0.09.

Chapter 5 List of Parameters

Meanings of Each Item in Function Code Parameter Table

Item	Meanings
Function code number	The number of function code, such as P0.00
Function code name	The name of function code, which explains the function code's meanings.
Factory setting	Restore the settings of the function code after the inverter is delivered (see P0.01).
Setting range	The value from minimum value to maximum value that can be set to this function code.
Unit	V: Voltage; A: Current; ºC: Celsius degree; Ω: Ohm; mH: Milli-henry; rpm: Rotating speed; %: Percentage; bps: baud rate; Hz, kHz: Frequency; ms, s, min, h, kh: Time; kW: Power; /: No unit
Property	○: This function code can be changed during operation; ×: This function code can only be changed during stopping process; *: The setting of this function code is read-only and cannot be changed.
Function code selection	Function code parameter setting list
User setting	Used for recording parameters by user

5.1 List of Basic Menu Function Codes

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
Group P0 Basic Function Parameter							
P0.00	User password	0000	0 ~FFFF	/	○	0000: No password; Other: Password protection	
P0.01	Function code protection	0	0 ~ 5	/	×	0: All the parameters can be modified; 1: All the parameters cannot be modified; 2: Restore parameters in zone P to factory settings; 3: Restore parameters in zone P to factory settings; (except for P9 group) 4: Recover the parameters in zone P and zone A to factory settings; 5: Recover all the parameters to factory settings. (except for d group)	
P0.02	Function code display	0	0 ~ 3	/	○	0: Basic menu mode 1: Fast menu mode 2: Menu mode of non-leave-factory setting value function codes; 3: Menu mode of last changed 10 function codes;	
P0.03	Control operation mode	0	0 ~ 7	/	×	**Vector control 1 without encoder speed feedback:** 0: Process open loop control; 1: Analog value feedback process close loop control; 2: Single phase pulse feedback process close loop control; 3: Composite control; **Vector control 2 without**	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
						encoder speed feedback: 4: Process open loop control 5: Analog value feedback process close loop control; 6: Single phase pulse feedback process close loop control; 7: Composite control;	
P0.04	Open loop main reference mode	0	0 ~ 4	/	×	0: Open loop digital frequency reference (P0.05); 1: AI1 analog value reference; 2: AI2 analog value reference; 3: AI3 analog value reference; 4: DI pulse reference	
P0.05	Open loop digital frequency reference	50.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P0.06	Running command issuing mode	0	0 ~ 2	/	○	0: Operation panel; 1: Terminal; 2: Host computer	
P0.07	Running direction command	0	0 ~ 1	/	○	0: Run forward; 1: Run reverse	
P0.08	Acceleration time 0	6.0	0.1 ~ 3600.0	s	○	15kW and below / 0.1 ~ 3600.0s	
P0.09	Deceleration time 0	20.0				18.5kW and above / 0.1 ~ 3600.0s	
P0.10	S-curve time	0.0	0.0 ~ 3600.0	s	○	0.0 ~ 3600.0s	
P0.11	Maximum output frequency	50.00	0.01 ~ 300.00	Hz	×	High frequency limit P0.13 ~ 300.00Hz	
P0.12	Maximum output voltage	380	1 ~ 480	V	×	1 ~ 480V	
P0.13	Frequency high limit	50.00	0.00 ~ 300.00	Hz	×	Low frequency limit P0.14 ~ Maximum output frequency P0.11	
P0.14	Frequency low limit	0.00	0.00 ~ 300.00	Hz	×	0.00Hz ~ High frequency limit P0.13	
P0.15	Basic operating frequency	50.00	0.00 ~ 300.00	Hz	×	0.00Hz ~ Maximum output frequency P0.11	
P0.16	Torque boost	0.0	0.0 ~ 30.0	%	×	0.0: Auto torque boost; 0.1% ~ 30.0%	
Group P1 Main and Auxiliary Reference Parameter							
P1.00	Open loop auxiliary reference mode	0	0 ~ 4	/	×	0: None 1: AI1; 2: AI2; 3: AI3; 4: DI	
P1.01	Open loop reference main and auxiliary relation calculation	0	0 ~ 5	/	×	0: Main + Auxiliary; 1: Main - Auxiliary; 2: Auxiliary-50%; 3: Main + Auxiliary-50%; 4: Take the maximum value; 5: Take the minimum value	
P1.02	Analog feedback close loop control main reference mode	0	0 ~ 4	/	×	0: Digital voltage reference P8.00; 1: AI1; 2: AI2; 3: AI3; 4: DI	
P1.03	Analog feedback close loop control auxiliary reference mode	0	0 ~ 4	/	×	0: None; 1: AI1; 2: AI2; 3: AI3; 4: DI	
P1.04	Analog feedback close loop control reference main and auxiliary calculation	0	0 ~ 5	/	×	0: Main + Auxiliary; 1: Main - Auxiliary; 2: Auxiliary-50%; 3: Main + Auxiliary-50%; 4: Take the maximum value; 5: Take the minimum value	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
P1.05	Analog feedback close loop control main feedback mode	1	1 ~ 4	/	×	1: AI1; 2: AI2; 3: AI3; 4: DI	
P1.06	Analog feedback close loop control auxiliary feedback mode	0	0 ~ 4	/	×	0: None; 1: AI1; 2: AI2; 3: AI3; 4: DI	
P1.07	Analog feedback close loop control feedback main and auxiliary calculation	0	0 ~ 5	/	×	0: Main + Auxiliary; 1: Main - Auxiliary; 2: Auxiliary-50%; 3: Main + Auxiliary-50%; 4: Take the maximum value; 5: Take the minimum value	
P1.08	Process open loop and close loop composite operation relationship calculation	0	0 ~ 1	/	×	0: Open loop frequency reference+ frequency after closed loop PDI adjustment; 1: Open loop frequency reference － frequency after closed loop PDI adjustment	
Group P2 Key and Display Parameters							
P2.00	Key-lock function selection	0	0 ~ 3	/	○	0: No locking; 1: Locking all keys; 2: Locking all keys except MULTI key; 3: Locking all keys except RUN and STOP/RST keys	
P2.01	Multi-function key definition	1	0 ~ 8	/	○	0: No function; 1: Jog function; 2: Emergent shutdown 1(Stop in shortest time); 3: Emergent shutdown 2 (Coast-to-stop); 4: Switch of input method of running command (Operation panel/Terminal/Host computer); 5: Function code display switch (fast/all); 6: Function code display switching (different from leave-factory/all); 7: Function code display switching (the last changed 10 function codes/all); 8: Function code display switching (P0.02 menu mode switching)	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
P2.02	Display parameter selection at running	1CB0	0 ~ FFFF	/	○	LED ones place: 0: Reference frequency (Hz); 1: Bus voltage (V); 2: AI1(V); 3: AI2(V); 4: AI3(V); 5: DI (%); 6: External counting; 7: Motor rotation speed (rpm); 8: Close loop reference (%); 9: Close loop feedback (%); A: Reference torque (%); B: Running frequency (Hz); C: Output current (A); D: Output torque (%); E: Output power (kW); F: Output voltage (V); LED tens, hundreds, thousands place: Same with above	
P2.03	Display parameter selection at stopping	3210	0 ~ FFFF	/	○	LED ones place: 0: Reference frequency (Hz); 1: Bus voltage (V); 2: AI1(V); 3: AI2(V); 4: AI3(V); 5: DI (%); 6: External counting; 7: Motor rotation speed (rpm); 8: Close loop reference (%); 9: Close loop feedback (%); A: Reference torque (%); B: Reserved; C: Reserved; D: Reserved; E: Reserved; F: Reserved; LED tens, hundreds, thousands place: Same with above	
P2.04	Running proportion display benckmark	0	0 ~ F	/	○	0 ~ F	
P2.05	Running proportion display coefficient	0.0	0.0 ~ 1000.0	%	○	0 ~ 1000.0%	
P2.06	Stopping proportion display benckmark	0	0 ~ F	/	○	0 ~ F	
P2.07	Stopping proportion display coefficient	0.0	0.0 ~ 1000.0	%	○	0 ~ 1000.0%	
Group P3 Start/stop Parameter							
P3.00	Startup mode	0	0 ~ 2	/	×	0: Normal startup; 1: Start after DC injection; 2: Catch a spinning motor	
P3.01	DC injection current	0.0	0.0 ~ 120.0	%	×	Constant torque: 0.0 ~ 120.0% inverter rated current Variable torque: 0.0 ~ 90.0% inverter rated current	
P3.02	DC injection time	0.00	0.00 ~ 30.00	s	×	0.00 ~ 30.00s	
P3.03	Startup frequency	0.0 or 0.50	0.00 ~ 60.00	Hz	×	0.00 ~frequency high limit the lower of P0.13 and 60.00Hz	
P3.04	Startup frequency retention time	0.0	0.0 ~ 3600.0	s	×	0.0 ~ 3600.0s	
P3.05	Stop mode	0	0 ~ 2	/	×	0: Deceleration to stop; 1: Coast to stop; 2: Deceleration to stop+DC braking	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
P3.06	DC braking initial frequency	0.00	0.00 ~ 300.00	Hz	×	0.00 ~ 300.00Hz	
P3.07	DC braking current	0.0	0.0 ~ 120.0	%	×	Constant torque: 0.0 ~ 120.0% inverter rated current Variable torque: 0.0 ~ 90.0% inverter rated current	
P3.08	DC braking time	0.00	0.0 0~ 30.00	s	×	0.00~ 30.00s	
P3.09	Anti-reverse selection	1	0 ~ 1	/	×	0: Run reverse enabled; 1: Run reverse disabled	
P3.10	Forward / reverse dead zone time	0.0	0.0 ~ 3600.0	s	×	0.0 ~ 3600.0s	
P3.11	Jog frequency	5.00	0.10 ~ 300.00	Hz	×	0.10 ~ 300.00Hz	
P3.12	Jog acceleration time	6.0	0.1 ~ 60.0	s	×	0.1 ~ 60.0s	
P3.13	Jog deceleration time	6.0	0.1 ~ 60.0	s	×	0.1 ~ 60.0s	
Group P4 Multi-section Parameter							
P4.00	V/F curve reference	0	0 ~ 6	/	×	0: Direct line; 1: Multi-section (P4.01 ~ P4.08); 2: Power of 1.2; 3: Power of 1.4; 4: Power of 1.6; 5: Power of 1.8; 6: Power of 2	
P4.01	V/F frequency value F0	0.00	0.00 ~ 300.00	Hz	×	F0<F1	
P4.02	V/F voltage value V0	0.0	0.0 ~ 100.0	%	×	0.0 ~ 100.0%	
P4.03	V/F frequency value F1	0.00	0.00 ~ 300.00	Hz	×	F1<F2	
P4.04	V/F voltage value V1	0.0	0.0 ~ 100.0	%	×	0.0 ~ 100.0%	
P4.05	V/F frequency value F2	0.00	0.00 ~ 300.00	Hz	×	F2<F3	
P4.06	V/F voltage value V2	0.0	0.0 ~ 100.0	%	×	0.0 ~ 100.0%	
P4.07	V/F frequency value F3	0.00	0.00 ~ 300.00	Hz	×	F3≤ Motor basic frequency P0.15	
P4.08	V/F voltage value V3	0.0	0.0 ~ 100.0	%	×	0.0 ~ 100.0%	
P4.09	Acceleration time 1	20.0	0.1 ~ 3600.0	s	×	0.1 ~ 3600.0s	
P4.10	Deceleration time 1	20.0	0.1 ~ 3600.0	s	×	0.1 ~ 3600.0s	
P4.11	Acceleration time 2	20.0	0.1 ~ 3600.0	s	×	0.1 ~ 3600.0s	
P4.12	Deceleration time 2	20.0	0.1 ~ 3600.0	s	×	0.1 ~ 3600.0s	
P4.13	Acceleration time 3	20.0	0.1 ~ 3600.0	s	×	0.1 ~ 3600.0s	
P4.14	Deceleration time 3	20.0	0.1 ~ 3600.0	s	×	0.1 ~ 3600.0s	
P4.15	Multi-section digital voltage reference 1	1.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.16	Multi-section digital voltage reference 2	2.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.17	Multi-section digital voltage reference 3	3.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.18	Multi-section digital voltage reference 4	5.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.19	Multi-section digital voltage reference 5	6.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.20	Multi-section digital voltage reference 6	8.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.21	Multi-section digital voltage reference 7	10.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P4.22	Multi-section	5.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
	frequency 1					~ P0.14)	
P4.23	Multi-section frequency 2	8.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.24	Multi-section frequency 3	10.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.25	Multi-section frequency 4	15.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.26	Multi-section frequency 5	18.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.27	Multi-section frequency 6	20.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.28	Multi-section frequency 7	25.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.29	Multi-section frequency 8	28.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.30	Multi-section frequency 9	30.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.31	Multi-section frequency 10	35.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.32	Multi-section frequency 11	38.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.33	Multi-section frequency 12	40.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.34	Multi-section frequency 13	45.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.35	Multi-section frequency 14	48.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
P4.36	Multi-section frequency 15	50.00	0.00 ~ 300.00	Hz	○	High / low frequency limit (P0.13 ~ P0.14)	
Group P5 Multi-functional Input Parameter							
P5.00	X1 terminal input function selection	99	0 ~ 99	/	×	Refer to Definition of multi function input terminals of P5 group in Chapter 6	
P5.01	X2 terminal input function selection	99	0 ~ 99	/	×		
P5.02	X3 terminal input function selection	99	0 ~ 99	/	×		
P5.03	X4 terminal input function selection	99	0 ~ 99	/	×		
P5.04	X5 terminal input function selection	99	0 ~ 99	/	×		
P5.05	X6 terminal input function selection	99	0 ~ 99	/	×		
P5.06	X7/DI terminal input function selection	99	0 ~ 99	/	×		
P5.07	X1 to X7 terminal filtering time	0.001	0.000 ~ 1.000	s	×	0.000 ~ 1.000s	
P5.10	Maximum input pulse frequency	10.0	0.1 ~ 50.0	kHz	×	0.1 ~ 50.0kHz	
P5.11	Startup/stop mode selection	0	0 ~ 3	/	×	0: 2-wire type 1;1: 2-wire type 2; 2: 3-wire type 1;3: 3-wire type 2;	
P5.12	Preset counting value reference	0	0 ~ 9999	/	×	0 ~ 9999	
P5.13	Reached counting value reference	0	0 ~ 9999	/	×	0 ~ 9999	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
Group P6 Analog Reference Parameter							
P6.00	AI1 to AI3 and DI analog value input curve selection	4444	0 ~ 4444	/	○	LED ones place: AI1 0: Determine the reference frequency according to curve 1(P6.01 ~ P6.04); 1: Determine the reference frequency according to curve 1(P6.05 ~ P6.08); 2: Determine the per unit value determined according to curve 3 (P6.09 to P6.12); 3: Determine the per unit value determined according to curve 4 (P6.13 to P6.20); 4: No need of curve correction LED tens place: AI2, same with above LED hundreds place: AI3, same with above LED thousands place: DI, same with above	
P6.01	Curve 1 input point A0	0.0	0.0 ~ 110.0	%	○	0.0 ~ 110.0%	
P6.02	Reference frequency f0 corresponding to curve1 input point A0	0.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P6.03	Curve 1 input point A1	100.0	0.0 ~ 110.0	%	○	0.0 ~ 110.0%	
P6.04	Reference frequency f1 corresponding to curve1 input point A1	50.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P6.05	Curve2 input point A0	0.0	0.0 ~ 110.0	%	○	0.0 ~ 110.0%	
P6.06	Reference frequency f0 corresponding to curve2 input point A0	0.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P6.07	Curve2 input point A1	100.0	0.0 ~ 110.0	%	○	0.0 ~ 110.0%	
P6.08	Reference frequency f1 corresponding to curve2 input point A1	50.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P6.09	Curve3 input point A0	0.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.10	Per-unit value B0 corresponding to curve3 input point A0	0.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.11	Curve3 input point A1	100.0	0.0 ~ 110.0	%	○	0.0~110.0%	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
P6.12	Per-unit value B1 corresponding to curve3 input point A1	100.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.13	Curve4 input point A0	0.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.14	Per-unit value B0 corresponding to curve4 input point A0	0.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.15	Curve4 input point A1	25.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.16	Per-unit value B1 corresponding to curve4 input point A1	25.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.17	Curve4 input point A2	50.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.18	Per-unit value B2 corresponding to curve4 input point A2	50.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.19	Curve4 input point A3	100.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.20	Per-unit value B3 corresponding to curve4 input point A3	100.0	0.0 ~ 110.0	%	○	0.0~110.0%	
P6.21	AI1～AI3、DI analog channel function selection	0000	0 ~ 6666	/	×	LED ones place: AI1 function selection 0: Open loop frequency or close loop analog input; 1: Reserved; 2: Reserved; 3: Reserved; 4: Reserved; 5: Motor temperature feedback (overload protective sensor); 6: Reserved; LED tens place: AI2 function selection, same with above LED hundreds place: AI3 function selection, same with above LED thousands place: DI function selection, same with above	
P6.22	AI1 filtering time	0.004	0.000 ~ 1.000	s	×	0.000 ~ 1.000s	
P6.23	AI2 filtering time	0.004	0.000 ~ 1.000	s	×	0.000 ~ 1.000s	
P6.24	AI3 filtering time	0.004	0.000 ~ 1.000	s	×	0.000 ~ 1.000s	
P6.25	AI1 used as digital terminal	99	6～99	/	×	Refer to the definition for Group P5 Multi Function Input Terminals	
P6.26	AI2 used as digital terminal	99	6～99	/	×		
P6.27	AI3 used as digital terminal	99	6～99	/	×		
Group P7 Multi-function Output Parameter							
P7.00	Y1 terminal output function selection	0	0 ~ 47	/	○	Refer to the definitions of multi function digital outputs of P7	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
P7.01	Y2/DO terminal output function selection	1	0 ~ 71	/	○	group, and the definitions of multi function analog values and pulse output in Chapter 6.	
P7.02	Relay terminal output function selection	14	0 ~ 47	/	○		
P7.03	AO1 terminal output function selection	48	48 ~ 71	/	○		
P7.04	AO2 terminal output function selection	49	48 ~ 71	/	○		
P7.05	AO1 gain	100.0	0.0 ~ 200.0	%	○	0.0 ~ 200.0%	
P7.06	AO1 bias	0.0	0.0 ~ 200.0	%	○	0.0 ~ 200.0%	
P7.07	AO2 gain	100.0	0.0 ~ 200.0	%	○	0.0 ~ 200.0%	
P7.08	AO2 bias	0.0	0.0 ~ 200.0	%	○	0.0 ~ 200.0%	
P7.09	Selection of positive and negative gain and bias	0000	0 ~ 1111	/	○	Ones place: AO1 gain: 0: Positive;1: Negative Tens place: AO1 bias: 0: Positive;1: Negative Hundreds place: AO2 gain: 0: Positive;1: Negative Thousands place: AO2 bias: 0: Positive;1: Negative	
P7.10	Y2/DO maximun output pulse frequency selection	10.0	0.1 ~ 50.0	kHz	○	0.1 ~ 50.0kHz	
P7.11	Status output signal type (Y1, Y2 and relay)	0	0～111	/	×	Ones place: Y1 terminal 0: Voltage level signal; 1: Pulse signal Tens place: 0: Voltage level signal; 1: Pulse signal Hundreds place: Relay terminal 0: Voltage level signal; 1: Pulse signal	
P7.12	Y1 terminal delay time	0.0	0.0～999.9	s	○	0.0～999.9s	
P7.13	Y1 terminal pulse width	0.0	0.0～999.9	s	○	0.0～999.9s	
P7.14	Y2 terminal delay time	0.0	0.0～999.9	s	○	0.0～999.9s	
P7.15	Y2 terminal pulse width	0.0	0.0～999.9	s	○	0.0～999.9s	
P7.16	Relay terminal delay time	0.0	0.0～999.9	s	○	0.0～999.9s	
P7.17	Relay terminal pulse width	0.0	0.0～999.9	s	○	0.0～999.9s	
P7.18	Zero current detection width	0.0	0.0 ~ 50.0	%	○	0.0 ~ 50.0%	
P7.19	Frequency arrival detection width	2.50	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P7.20	FDT1 level high limit	50.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P7.21	FDT1 level low limit	49.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P7.22	FDT2 level high limit	25.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P7.23	FDT2 level low limit	24.00	0.00 ~ 300.00	Hz	○	0.00 ~ 300.00Hz	
P7.24	Virtual terminal effective selection	000	000~ 111	/	○	LED ones place: Multi function input terminal Xi 0: Real terminal is enabled; 1: Virtual terminal is enabled LED tens place: Reserved LED hundreds place:	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
						Y1/Y2/Relay terminal 0: Real terminal is enabled; 1: Virtual terminal is enabled	
P7.25	Terminal effiective status selection	000	000 ~ 1111	/	○	Ones place: Multi function input terminal Xi 0: Enabled if there is current flowing through Xi; 1: Enabled if no current flowing through Xi Tens place: Multi function output terminal Yi 0: Enabled if there is current flowing through Yi; 1: Enabled if no current flowing through Yi Hundreds place: relay terminal 0: Enabled in magnetizing status; 1: Enabled if not in magnetizing status	
Group P8 Process PID Close Loop Control							
P8.00	Analog feedback process close loop control digital voltage reference	0.00	0.00 ~ 10.00	V	○	0.00 ~ 10.00V	
P8.01	Single phase pulse feedback process close loop control digital RPM reference	0	0 ~ 30000	rpm	○	0 ~ 30000rpm	
P8.02	Number of pulse per turn for single phase pulse	1000	1 ~ 9999	/	×	1 ~ 9999	
P8.03	Proportional gain KP	0.200	0.000 ~ 10.000	/	○	0.000 ~ 10.000	
P8.04	Integral gain Ki	0.500	0.000 ~ 10.000	/	○	0.000 ~ 10.000	
P8.05	Differential gain Kd	0.000	0.000 ~ 10.000	/	○	0.000 ~ 10.000	
P8.06	Sampling cycle	0.002	0.001 ~ 30.000	s	○	0.001 ~ 30.000s	
P8.07	Deviation limit	5.0	0.0 ~ 20.0	%	○	0.0 ~ 20.0%	
P8.08	PID regulation selection	10	0 ~ 11	/	○	Ones place: Integral mode 0: Frequency reaches high/low limit, stop integral regulation; 1: Frequency reaches high/low limit, continue integral regulation Tens place: output frequency 0: Be consistent with preset direction; 1: Reverse to preset direction	
P8.09	PID positive or negative function	0	0: Positive; 1: Negative	/	○	0 ~ 1	
P8.10	Reserved function code 2 of P8 group	0	0 ~ 65535	/	○	0 ~ 65535	
Group P9 Motor Parameter							
P9.00	Load type	0	0 ~ 1	/	×	0: G type constant torque/ heavy duty application; 1: L type variable torque/ light duty application	
P9.01	Number of motor poles	4	2 ~ 24	/	×	2 ~ 24	
P9.02	Rated rotating	1500	0 ~ 30000	rpm	×	0 ~ 30000rpm	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
	velocity of motor						
P9.03	Rated power of motor	Factory	0.4 ~ 999.9	kW	×	0.4 ~ 999.9kW	
P9.04	Rated current of motor	Factory	0.1 ~ 999.9	A	×	0.1 ~ 999.9A	
P9.05	Zero load current I0	Factory	0.1 ~ 999.9	A	×	0.1 ~ 999.9A	
P9.06	Stator resistance R1	0.407	0.000 ~ 65.000	Ω	×	0.000 ~ 65.000Ω	
P9.07	Stator leakage inductance L1	2.6	0.0 ~ 2000.0	mH	×	0.0 ~ 2000.0mH	
P9.08	Rotor resistance R2	0.219	0.000 ~ 65.000	Ω	×	0.000 ~ 65.000Ω	
P9.09	Mutual inductance L2	77.4	0.0 ~ 2000.0	mH	×	0.0 ~ 2000.0mH	
P9.10	Magnetic saturation coefficient 1	87.00	0.00 ~ 100.00	%	×	0.0 ~ 100.00%	
P9.11	Magnetic saturation coefficient 2	80.00	0.00 ~ 100.00	%	×	0.0 ~ 100.00%	
P9.12	Magnetic saturation coefficient 3	75.00	0.00 ~ 100.00	%	×	0.0 ~ 100.00%	
P9.13	Magnetic saturation coefficient 4	72.00	0.00 ~ 100.00	%	×	0.0 ~ 100.00%	
P9.14	Magnetic saturation coefficient 5	70.00	0.00 ~ 100.00	%	×	0.0 ~ 100.00%	
P9.15	Parameter auto tuning	0	0 ~ 2	/	×	0: No action; 1: Static auto tuning; 2: Rotating auto tuning	
P9.16	Motor overload protection	00	00 ~ 12	/	×	Ones place: Protection mode; 0: Motor current mode; 1: Sensor mode; 2: No action Tens place: Low speed derating 0: Action(suitable for common motor); 1: No action(suitable for variable frequency motor)	
P9.17	Sensor protection threshold of motor	10.00	0.00 ~ 10.00	V	×	0.00 ~ 10.00V	
P9.18	Motor overload protection time	10.0	0.5 ~ 30.0	min	×	0.5 ~ 30.0min	
Group PA Control Parameter							
PA.00	Carrier frequency	8.0 4.0 3.0 2.0	0.7 ~ 16.0	kHz	○	15kW or below : 0.7kHz ~ 16.0kHz; 18.5kW ~ 45kW: 0.7kHz ~ 10.0kHz; 55kW ~ 75kW: 0.7kHz ~ 8.0kHz; 90kW or above: 0.7kHz ~ 3.0kHz	
PA.01	Carrier frequency automatic adjustment selection	1	0 ~ 1	/	○	0: No auto adjustment; 1: Auto adjustment	
PA.02	Vector control 1 slip compensation gain	100.0	0.0 ~ 300.0	%	○	0.0 ~ 300.0%	
PA.03	Droop control	0.00	0.00 ~ 10.00	Hz	○	0.00 ~ 10.00Hz	
PA.04	Current limit action selection	1	0 ~ 1	/	×	0: Disabled; 1: Enabled	
PA.05	Current limit value	160.0	20.0 ~ 200.0	%	×	Constant torque: 20.0 ~ 200.0% rated current of inverter Variable torque: 20.0 ~ 150.0% rated current of inverter	
PA.06	Voltage adjustment function	101	000 ~ 111	/	×	Ones place: Over voltage regulation 0: Disabled; 1: Enabled	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
						Tens place: Under voltage regulation 0: Disabled; 1: Enabled Hundreds place: Over modulation 0: Disabled; 1: Enabled	
PA.07	Energy saving coefficient	0	0 ~ 50	%	○	0 ~ 50%	
PA.08	Magnetic flux braking selection	1	0 ~ 1	/	×	0: Disabled; 1: Enabled	
PA.09	Energy sonsumption braking selection	0	0 ~ 1	/	×	0: Disabled; 1: Enabled	
PA.10	Braking unit operating time	100.0	100.0	s	×	100.0s(Total cycle working time and interval is 100s)	
PA.11	Braking unit action voltage	720	650 ~ 750	V	×	650 ~ 750V	
PA.12	Relay action indication when the inverter is faulty	100	000 ~ 111	/	×	LED ones place: Under volt fault 0: Disabled; 1: Enabled LED tens place: Auto reset interval 0: Disabled; 1: Enabled LED hundreds place: Fault locking 0: Disabled; 1: Enabled	
PA.13	Inverter or motor overload prealarm	000	000 ~ 111	/	×	LED ones place: Selection of detected value 0: Motor overload pre-alarm, relative to motor rated current; 1: Inverter overload pre-alarm, relative to inverter rated current; LED tens place: Action selection after overload pre-alarm 0: Continue running; 1: Report overload fault and stop; LED hundreds place: Detecting condition selection 0: Detect all the time; 1: Only detect at constant speed	
PA.14	Overload pre-alarm detection level	130.0	20.0 ~ 200.0	%	×	20.0 ~ 200.0%	
PA.15	Overload pre-alarm detection time	5.0	0.1 ~ 60.0	s	×	0.1 ~ 60.0s	
PA.16	Fault shield and alarm attribute setting 1	0020	0000 ~ 2222	/	×	LED ones place: Output-ground short circuit LED tens place: Power failure during running process LED hundreds place: Input power error LED thousands place: Output phase failure 0: Fault is not shileded, stopped upon fault; 1: Fault is not shielded, non-stop upon fault; 2: Fault is shielded, no alarm and no stop	
PA.17	Fault shield and alarm attribute setting 2	0000	0000 ~ 2222	/	×	LED ones place: EEPROM error LED tens place: Relay contact open/close failure LED hundreds place: Temperature sensor taking	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
						sample anomaly LED thousands place: encoder disconnection 0: Fault is not shileded, stopped upon fault; 1: Fault is not shielded, non-stop upon fault; 2: Fault is shielded, no alarm and no stop	
PA.18	Fault shield and alarm attribute setting 3	2000	0000 ~ 2222	/	×	LED ones place: +10V output error LED tens place: Analog input error LED hundreds place: Motor over temperature (PTC) LED thousands place: Communication failure 1(operation panel 485) 0: Fault is not shileded, stopped upon fault; 1: Fault is not shielded, non-stop upon fault; 2: Fault is shielded, no alarm and no stop	
PA.19	Fault shield and alarm attribute setting 4	0002	0000 ~ 2222	/	×	LED ones place: Communication failure 2(RS485 terminal) LED tens place: Version incompatible LED hundreds place: Reserve; LED thousands place: Reserve; 0: Fault is not shileded, stopped upon fault; 1: Fault is not shielded, non-stop upon fault; 2: Fault is shielded, no alarm and no stop	
PA.20	Fault locking function selection	0	0 ~ 1	/	×	0: Fault is not locked; 1: Fault is locked	
PA.21	Automatic reset times	0	0 ~ 20	/	×	0 ~ 20	
PA.22	Automatic reset interval	2.0	2.0 ~20.0	s	×	2.0 ~ 20.0s	
Group Pb Enhanced Function Parameter							
Pb.00	Skip frequency 1 low limit	0.00	0.00 ~ 300.00	Hz	×	High / low frequency limit (P0.13 ~ P0.14)	
Pb.01	Skip frequency 1 high limit	0.00	0.00 ~ 300.00	Hz	×	High / low frequency limit (P0.13 ~ P0.14)	
Pb.02	Skip frequency 2 low limit	0.00	0.00 ~ 300.00	Hz	×	High / low frequency limit (P0.13 ~ P0.14)	
Pb.03	Skip frequency 2 high limit	0.00	0.00 ~ 300.00	Hz	×	High / low frequency limit (P0.13 ~ P0.14)	
Pb.04	Skip frequency 3 low limit	0.00	0.00 ~ 300.00	Hz	×	High / low frequency limit (P0.13 ~ P0.14)	
Pb.05	Skip frequency 3 high limit	0.00	0.00 ~ 300.00	Hz	×	High / low frequency limit (P0.13 ~ P0.14)	
Pb.06	Single step under without integral function	0.1	0.0~10.00	Hz	○	0.1~10.00 Hz	
Pb.07	Magnification selection	00	00 ~ 01	/	×	Ones place: Acceleration / deceleration time	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
						0: X1; 1: X10 Tens place: Reserved	
Pb.08	Operation panel ∧/∨ digital regulating frequency control	0001	0000 ~ 1221	/	○	Ones place: Action upon power off 0: Save upon power off; 1: Clear upon power off Tens place: Action upon stopping 0: Hold upon stopping; 1: Clear upon stop; 2: Clear upon standby Hundreds place: ∧/∨ setting via operation panel 0: Only enabled when main input is P0.05 open loop digital frequency input; 1: Adjustment is enabled; 2: Adjustment is disabled Thousands place: 0: With integral function; 1: Without integral function	
Pb.09	Operation panel ∧/∨ integral rate	2.0	0.1 ~ 50.0	s	○	0.1 ~ 50.0s	
Pb.10	Terminal UP/DN digital regulating frequency control	0001	0000 ~1221	/	○	Ones place: Action upon power off 0: Save upon power off; 1: Clear upon power off Tens place: Action upon stopping 0: Hold upon stopping; 1: Clear upon stop; 2: Clear upon standby Hundreds place: Terminal UP/DN adjustment setting 0: Only enabled when main input is P0.05 open loop digital frequency input; 1: Adjustment is enabled; 2: Adjustment is disabled Thousands place: 0: With integral function; 1: Without integral function	
Pb.11	Terminal UP/DN integral rate	2.0	0.1 ~ 50.0	s	○	0.1 ~ 50.0s	
Pb.12	Actions when preset running time out	0	0～11	/		Ones place: continuous running time out 0: Continue to run; 1: Stop and alarm Tens place: Total running time out 0: Continue to run; 1: Stop and alarm	
Pb.13	Preset continuous running time	0.0	0.0～6553.5	min	○	0～Max timing 6553.5min	
Pb.14	Preset total running time	0.0	0.0～6553.5	min	○	0～Max timing 6553.5min	
Pb.15	Restart automatically after power resumes narmal	0	0 ~ 1	/	×	0: No action; 1: Action	
Pb.16	Waiting time for restart	0.5	0.0 ~ 20.0	s	○	0.0 ~ 20.0s	
Pb.17	Preset frequency	0.00	0.00 ~ 300.00	Hz	×	0.00 ~ 300.00Hz	
Pb.18	Preset frequency operating time	0.0	0.0 ~ 3600.0	s	×	0.0 ~ 3600.0s	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
Pb.19	High limit of zero frequency operation	0.00	0.00 ~ 300.00	Hz	×	0.00 ~ 300.00Hz	
Pb.20	Low limit of zero frequency operation	0.00	0.00 ~ 300.00	Hz	×	0.00 ~ 300.00Hz	
Pb.21	Reserved	0	0 ~ 1	/	×	Reserved	
Pb.22	Reserved	380.0	0.0 ~ 380.0	V	×	Reserved	
Pb.23	Parameter copy	0	0 ~ 5	/	×	0: No function; 1: Parameter uploading; 2: Parameter downloading (without motor parameters); 3: Parameter downloading (with motor parameters); 4: Parameter storage enable (upload is prohibited); 5: Parameter storage disable (upload is allowed)	
Group PC Communication Parameters							
PC.00	Communication baud rate	6	4 ~ 8	bps	○	4: 4800 bps; 5: 9600 bps; 6: 19200 bps; 7: 38400 bps; 8: 57600 bps	
PC.01	Data format	0	0 ~ 2	/	○	0: 1-8-1 format, no parity; 1: 1-8-1 format, even parity; 2: 1-8-1 format, odd parity	
PC.02	Local address	1	1 ~ 247	/	○	1 ~ 247, 0 is broadcasting address	
PC.03	PC Reserved 1	0	0 ~ 65535	/	*	Reserved	
PC.04	Master-slave mode	0	0 ~ 2	/	○	0:SCIA slave, SCIB slave mode; 1:SCIA master,SCIB slave mode; 2:SCIA slave, SCIB master mode	
PC.05	Operation address from master to slave (set by master)	0	0 ~ 2	/	○	Master preset frequency written in function code of slave 0: P0.05; 1: P8.00; 2: P8.01	
PC.06	Slave setting frequency proportional coefficient(set by slave)	1.00	0.00 ~ 10.00	/	○	0.00 ~ 10.00	
Group Pd Vector Control 2 Parameters							
Pd.00	Speed/torque control	0	0 ~ 1	/	○	0: Reserved; 1: Reserved	
Pd.01	Speed loop proportional gain 1 (ASR_P1)	2.00	0.000 ~ 30.00	/	○	0.000~30.00	
Pd.02	Speed loop integral time 1 (ASR_I1)	0.200	0.000 ~ 6.000	s	○	0.000 ~ 6.000s	
Pd.03	Speed loop proportional gain 2 (ASR_P2)	2.000	0.000 ~30.00	/	○	0.000~30.00	
Pd.04	Speed loop integral time 2 (ASR_I2)	0.200	0.000 ~ 6.000	s	○	0.000 ~ 6.000s	
Pd.05	ASR switching frequency	5.00	0.00 ~ 300.00	Hz	○	0.00 ~ high frequency limit P0.13	
Pd.06	Maximum speed limit for forward running when torque control	50.00	0.00 ~ 300.00	Hz	○	0.00 ~ high frequency limit P0.13	
Pd.07	Maximum speed limit for reverse	50.00	0.00 ~ 300.00	Hz	○	0.00 ~ high frequency limit P0.13	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
	running when torque control						
Pd.08	Drive torque limit	180.0	0.0 ~ 200.0	%	○	Constant torque: 0.0 ~ 200.0% Variable torque: 0.0 ~ 150.0%	
Pd.09	Braking torque limit	180.0	0.0 ~ 200.0	%	○	Constant torque: 0.0 ~ 200.0% Variable torque: 0.0 ~ 150.0%	
Pd.10	Reserved	4	0 ~ 65535	/	○	Reserved	
Pd.11	Reserved	0.010	0.000 ~ 65.535	s	○	Reserved	
Pd.12	Torque acceleration time	0.10	0.00 ~ 120.00	s	○	0.00 ~ 120.00s	
Pd.13	Torque deceleration time	0.10	0.00 ~ 120.00	s	○	0.00~120.00s	
Pd.14	Pre-magnetizing time	0.300	0.000 ~ 8.000	s	○	0.000 ~ 8.000s	
Pd.15	Current loop scale coefficient (ACR_P)	1000	0 ~ 2000	/	○	0 ~ 2000	
Pd.16	Current loop integral coefficient (ACR_I)	1000	0 ~ 6000	/	○	0 ~ 6000	
Pd.17	Vector control 2 slip compensation gain (electric)	100.0	10.0 ~ 300.0	%	○	10.0 ~ 300.0%	
Pd.18	Vector control 2 slip compensation gain (power generation)	100.0	10.0~300.0	%	○	10.0 ~ 300.0%	
Pd.19	ASR input filtering time	0.5	0.0~500.0	ms	○	0.0~500.0	
Pd.20	ASR output filtering time	0.5	0.0~500.0	ms	○	0.0~500.0	
Pd.33	Torque limiting compensation coefficient in constant power zone	40.0	0.0~100.0	%	○	0.0~100.0%	
Pd.34	Reserved	28	0~65535	/	○	0~65535	
Pd.35	Reserved	1500	0~65535	/	○	0~65535	
Group d0 Fault Record Parameters							
d0.00	Fault type record 2	0	0~62	/	*	Refer to 7.1 fault and alarm information list	
d0.01	Fault type record 1	0	0~62	/	*		
d0.02	Latest fault type record 0	0	0~62	/	*		
d0.03	Bus voltage upon latest fault	0	0~999	V	*	0~999V	
d0.04	Actual current upon latest fault	0.0	0.0~999.9	A	*	0.0~999.9V	
d0.05	Operation frequency upon the latest fault	0.00	0.00~300.00	Hz	*	0.00~300.00Hz	
d0.06	Total power-up time on time	0.000	0.000~65.535	kh	*	0.000~65.535kh	
d0.07	Total operation time of the inverter	0.000	0.000~65.535	kh	*	0.000~65.535kh	
d0.08	Record of maximum temperature of heatsink	0.0	0.0~100.0	ºC	*	0.0~100.0ºC	
d0.09	Record of maximum bus voltage fluctuation	0	0~1000	V	*	0~1000V	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
d0.10	Reserved	0.00	0.00~300.00	Hz	*	0.00~300.00Hz	
d0.11	Reserved	0	0~5	/	*	0~5	
Group d1 Product Identity Parameters							
d1.00	Serial number	Factory	0.0~FFF.F	/	*	0 ~ FFF.F	
d1.01	Software version number of control board	Factory	0.00~99.99	/	*	0.0~99.99	
d1.02	Non-standard version number of software of control board	Factory	0.00~FF.FF	/	*	0.00~FF.FF	
d1.03	Software version number of operation panel	Factory	0.000~F.FFF	/	*	0.000~F.FFF	
d1.04	Software version number of extension board	Factory		/	*	0.000~F.FFF	
d1.05	Manufacture's bar code 1	Factory	0 ~ 9999	/	*	0 ~ 9999	
d1.06	Manufacture's bar code 2	Factory	0 ~ 9999	/	*	0 ~ 9999	
d1.07	Manufacture's bar code 3	Factory	0 ~ 9999	/	*	0 ~ 9999	
d1.08	Manufacture's bar code 4	Factory	0 ~ 9999	/	*	0 ~ 9999	
d1.09	Operation panel copy identification code	Factory	0.00 ~ 655.35	/	*	0.00 ~ 655.35	
d1.10	Control board software identification code	Factory	0~65535	/	*	0~65535	
d1.11	Reserved	Factory	0~65535	/	*	0~65535	
Group d2 Use of Display Parameters							
d2.00	Temperature of heatsink 1	0.0	0.0 ~ 100.0	ºC	*	0.0 ~ 100.0ºC	
d2.01	Terminal count value	0	0 ~ 65535	/	*	0~65535	
d2.02	AI1 percentage after curvilinear transformation	0.0	0.0 ~ 100.0	%	*	0.0~100.0%	
d2.03	AI2 percentage after curvilinear transformation	0.0	0.0 ~ 100.0	%	*	0.0~100.0%	
d2.04	AI3 percentage after curvilinear transformation	0.0	0.0 ~ 100.0	%	*	0.0~100.0%	
d2.05	DI percentage after curvilinear transformation	0.0	0.0 ~ 100.0	%	*	0.0~100.0%	
d2.06	Operation panel ∧/∨ digital adjustment value	0	0 ~ 65535	/	*	0~65535	
d2.07	Terminal UP/DN digital adjustment volume	0	0 ~ 65535	/	*	0~65535	
d2.08	Reserved	Factory	0 ~ 65535	/	*	0~65535	
d2.09	Input status display of X terminal	0000	0~FFFF	/	*	0~FFFF	

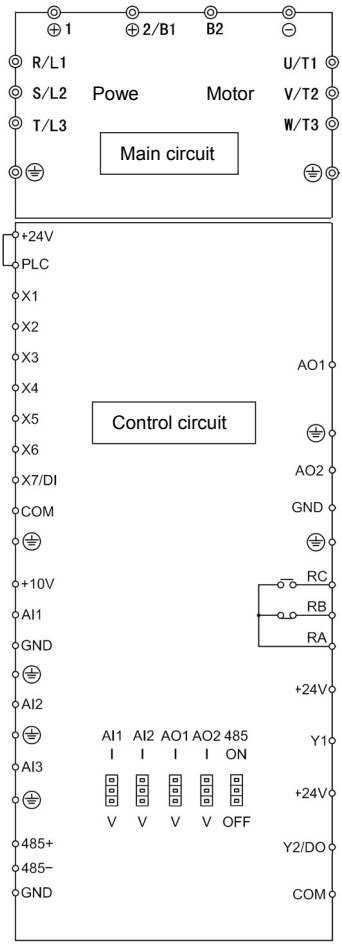
Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection	User setting
d2.10	Reference voltage 1 (percentage)	Factory	0.0~100.0	%	*	0.0~100.0%	
d2.11*	Reference voltage 2 (percentage)	Factory	0.0~100.0	%	*	0.0~100.0%	
d2.12	AI failure source display	Factory	0~5	/	*	1: AI1 exceeding limit; 2: AI2 exceeding limit; 3: AI3 exceeding limit; 4: AV4/AI4 exceeding limit; 5: AV5/AI5 exceeding limit	
d2.13	Current detection failure source display	Factory	0~6	/	*	2: Phase W abnormal; 4: Phase V abnormal; 6: Phase U abnorma	
d2.14 to d2.24	Reserved	Factory	0~65535`	/	*	0~65535	
Group A0 User-defined Function Code Displayed/hidden Zone Parameters							
A0.00	Password of displayed/hidden zone of user-defined function code	1	0 ~ FFFF	/	○	0 ~ FFFF	
A0.01	Displayed/hidden function 1 of the user-defined function code	FFFF	0 ~ FFFF	/	○	0 ~ FFFF	
A0.02	Displayed/hidden function 2 of the user-defined function code	FFFF	0 ~ FFFF	/	○	0 ~ FFFF	

*Note: The difference between d2.10 and d2.11 is that: d2.10 means 10V voltage percentage, d2.11 means voltage percentage of over current.

5.2 User's Parameter Record

Function code	Setting	Function code	Setting	Function code	Setting
d1.00		d1.01		d1.02	
d1.03		d1.04		d1.05	
d1.06		d1.07		d1.08	
d1.09		d1.10		Recorder:	

5.3 User's Connection Diagram



Chapter 6 Parameter Description

6.1 Basic Function Parameter (Group P0)

P0.00	User password	0~FFFF(0)

This function is used to prevent the irrelevant personnel from querying and changing the parameters, so as to protect the safety of the inverter parameters.

0000: No password protection: All the parameters in Zone P can be queried and changed (If P0.01=1, the change to parameters is disabled), and no password is set upon inverter delivery.

Set password:

Enter four digits as user password, and press PRG key for confirmation. Repeat this operation once.

Change password:

Press PRG key to enter the password verification status, and 0.0.0.0. is displayed. Enter correct password, and it enters parameter editing status. Select P0.00 (parameter P0.00 displayed as 0000). Input new password and press PRG key for confirmation. Set the same password for P0.00 twice.

When “P.Set” is displayed, the new password is successfully set.

Cancel password:

Press PRG key to enter the password verification status, and 0.0.0.0. is displayed. Enter correct user password to enter the parameter editing status, check if P0.00 is 0000. Press PRG key for confirmation, and set P0.00=0000 again, and then “P.Clr” is displayed and the password is cancelled.

Note: For the method for activating the password, refer to 4.5 password operation.

P0.01	Function code protection	0~5(0)

This function is used to set the modification authority and initialization level of the parameters.

0: All the parameters are allowed for modification.

1: All the parameters are disallowed for modification.

2: Restore all the parameters in zone P to leave-factory setting.

3. Restore all the parameters in zone P except for the motor parameters (group P9) to leave-factory setting.

4: Restore all the P zone parameters and A zone parameters (user’s customized function code display/hide zone) to leave-factory values.

5: Restore all the user parameters except for d group to leave-factory values.

Note: After the parameters are initialized, the password set by the user will be automatically reset.

P0.02	Function code display	0~3(0)

Set this function, and the operation panel will display the function code parameters according to the actual need of the user to improve the work efficiency.

0: Basic menu mode: The operation panel can display all the parameters.

1: Fast menu mode: The operation panel only displays the fast parameters defined by the manufacturer. When the basic functions of the inverter are used, this menu mode shall be set.

2: Menu mode of Non-factory setting function code: The operation panel only displays the parameters

different from the leave-factory values.

- When the technical personnel perform onsite maintenance, use this mode to conveniently record and query the modified parameters.
- After the inverter commissioning is completed, to conveniently record and query the modified parameters, this mode can be set.

3: Menu mode of last changed 10 function codes: When the inverter has abnormal operation or it is necessary to inquire the commissioning parameters, the last changed 10 parameters can be queried by setting this menu mode. When the leave-factory parameters are recovered, the record of the last changed 10 function codes will also be cleared.

Note:

- Both P0.00 and P0.02 are visible in all the menu display modes for the convenience of menu mode switching.
- Press ESC key and hold for over 5 seconds, it will restore to basic menu mode, and P0.02 is automatically restored to 0.
- In non-basic menu mode, the >> key cannot be used to switch the function zone code and group number. The current menu mode will be displayed after pressing the >> key slowly for several times.

P0.03	Control operation mode	0~7(0)

This function is used to set the control operation mode of the inverter. 0 ~ 3 indicates vector control 1, 4 ~ 7 indicates vector control 2.

Vector control 1 without encoder speed feedback:

0: Process open loop control: It is applicable to most applications, including the application of one inverter driving one motor and the application of one inverter driving multiple motors (the motors are in the same work conditions).

1: Analog value feedback process close loop control: It is applicable to applications with general requirement of speed control precision. The feedback analog can represent such parameters as temperature, pressure and humidity. For the reference and feedback setting of the analog feedback process close loop control, refer to P1.02~P1.07 function description. For the setting of the process PID close loop parameters, refer to Group P8 function code description.

AI1 and AI2 terminal input specification: 0~10V or 0~20mA.

AI3 terminal input specification: -10~10V;

X7/DI terminal input specification: 0~ maximum input pulse frequency P5.10.

2: Single-phase pulse feedback process close loop control: It is applicable to applications with higher speed control precision, and pulse encoder shall be installed at the motor end or mechanical equipment axle end. Single-phase pulse feedback channel: X7/DI terminal: The X7/DI terminal function must be set to process close loop control single-phase pulse input (P5.06=47) .

3: Composite control: The composite control of process open loop and analog feedback closed loop is suitable for special applications.

As for the set frequency of the inverter, if it is necessary to made fine tuning on another physical parameter in the system in addition to the open loop setting, closed loop adjustment can be made to this

physical parameter. The adjustment result will be added to the open loop frequency reference of the inverter, so as to ensure the constancy of the physical parameter through speed control. Refer to the description of the open loop and closed loop composite operation relation calculation parameter P1.08.

Vector control 2 without encoder speed feedback:

4: Process open loop control: Applicable to high performance applications and features high rotation speed precision, high torque precision and eliminates the need for pulse encoder.

5: Analog value feedback process close loop control: Refer to Parameter setting 1 of this function code.

6: Single-phase pulse process close loop control: Refer to Parameter setting 2 of this function code.

7: Composite control: For the composite control of process open loop and analog feedback closed loop, refer to parameter setting 3 of this function code

Note: V5-H series only support vector control 2 without encoder speed feedback, if vector control 2 with encoder speed feedback is needed, please select V6-H series product.

P0.04	Open loop main reference mode	0~4(0)
P0.05	Open loop digital frequency reference	0.00～300.00 Hz（50.00Hz）

This function is applicable to the frequency reference of open loop control mode, such as vector control 1, vector control 2. For the speed reference of process close loop control mode, refer to the descriptions of function code of Group P1.

0: Set frequency reference via P0.05.

Note: If multi-section digital voltage terminals 1 ~ 3 are enabled, the frequency is determined by the terminal combination. Refer to P4.15~P4.21. If multi-section frequency terminals 1 ~ 4 are enabled, the frequency is determined by the terminal combination. Refer to P4.22~P4.36.

1: Set frequency reference via AI1 port.

2: Set frequency reference via AI2 port.

Input specification of AI1 and AI2 terminals: 0~10V or 0~20mA. The correspondence relation between the analog and the reference frequency is defined by group P6.

Note: When adopting the current input of 0~20mA, refer to the description of P6.01~P6.08.

3: Set frequency reference via AI3 port.

Input specification of AI3 terminal: -10~10V. The correspondence relation between the analog absolute value and the reference frequency is defined by group P6. The operation direction is determined by the sign of the AI3 analog input.

4: Set frequency reference via X7/DI port.

X7/DI terminal input specification: 0~maximum pulse frequency P5.10. The correspondence relation between the pulse signal and the reference frequency is defined by group P6.

Note: When P0.04=4, the X7/DI terminal function must be set to pulse frequency DI input (P5.06=5) .

P0.06	Running command issuing mode	0~2(0)

There are 3 modes for issuing running commands for the inverter.

0: Operation panel mode: Perform the Run, Stop, Forward/reverse running of the inverter through the RUN, STOP/RST, FWD/REV buttons of the operation panel.

1: Terminal mode: Perform the Run, Stop, Forward/reverse running of the inverter by defining the

multi-functional terminals X1~X7. Refer to the description of P5.00~P5.06 and P5.11.

2: Host computer mode: Perform the Run, Stop, Forward/reverse running of the inverter through communication. Refer to the appendix A Modbus communication protocol.

P0.07	Running direction command	0~1(0)

This parameter is used to change the rotation direction of the motor when the running command is given through operation panel (P0.06=0).

0: Forward; 1: Reverse

Note: This function code is disabled when the running command is issued via terminal, and the running direction is controlled by terminal command.

P0.08	Acceleration time 0	0.1~3600.0 s(6.0s or 20.0s)
P0.09	Deceleration time 0	0.1~3600.0 s(6.0s or 20.0s)
P0.10	S curve time	0.0~3600.0 s(0.0s)

This function can set the speed and stability in the duration from acceleration to constant speed after the startup of the inverter, or from constant deceleration to stop.

Acceleration time 0: The time that the inverter accelerates from 0 frequency to maximum frequency.

Deceleration time 0: The time that the inverter accelerates from maximum frequency to 0 frequency.

S curve time: The time for adding curve segment to improve the smoothness of the start and ending section during the acceleration and deceleration, P0.10. S curve time is applicable to the belt conveyer that carries fragile materials or applications requiring smooth speed adjustment.

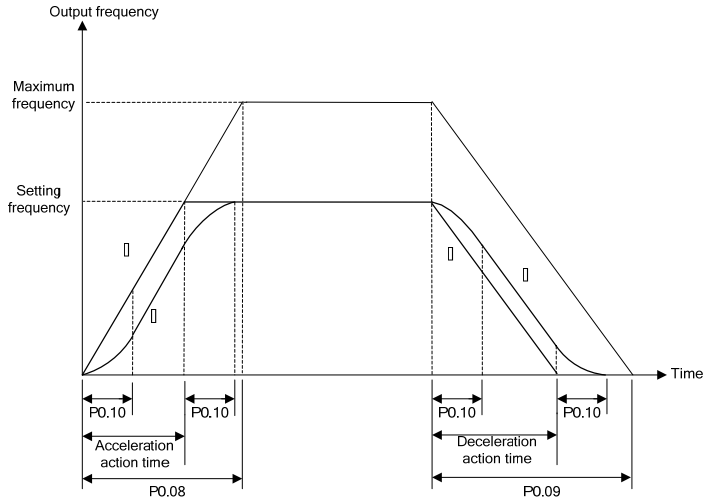


Figure 6−1 Acceleration/deceleration time and S curve

When P0.10 is set to 0, it indicates that there is no S curve time, and the acceleration and deceleration is in linear mode.

Acceleration time =P0.08×set frequency/P0.11; deceleration time =P0.09×set frequency/ P0.11.

When P0.10 is set to a non-zero value, it indicates that there is S curve time, and the acceleration and deceleration adopts S curve mode.

S curve acceleration/deceleration time = acceleration/deceleration time +S curve time.

As shown in Figure 6-1, curve 1 is the curve representing the acceleration/deceleration in linear mode, curve 2 is the curve representing the acceleration/deceleration in S curve mode.

Curves 1 and 2 corresponding to the same setting frequency. The actual acceleration/deceleration time of curve 2 is longer than that of curve 1 by the time set by P0.10.

Note:

- The S curve acceleration/deceleration setting is also available for acceleration times 1, 2 and 3 (P4.09~P4.14) , with the principle same as above.
- It is appropriate when the ratio between the S curve time and the acceleration/deceleration time is 1/5.

P0.11	Maximum output frequency	0.01~300.00 Hz(50.00Hz)
P0.12	Maximum output voltage	1~480 V(380V)
P0.13	Frequency high limit	0.00~300.00 Hz(50.00Hz)
P0.14	Frequency low limit	0.00~300.00 Hz(0.00Hz)
P0.15	Basic operating frequency	0.00~300.00 Hz(50.00Hz)

The maximum output frequency f_{max} is the allowable maximum output frequency of the inverter.

The maximum output voltage V_{max} is the output voltage when the inverter runs at basic operating frequency. When standard AC motor is used, it corresponds to the motor rated voltage. Refer to motor nameplate.

The frequency high limit f_H and frequency low limit f_L are the maximum and minimum operating frequency of the motor set according to the production process requirement by the user during the use.

The basic operating frequency f_b is the minimum frequency corresponding to the maximum output voltage of the inverter. When standard AC motor is used, it corresponds to the rated frequency of the motor. Refer to the motor nameplate.

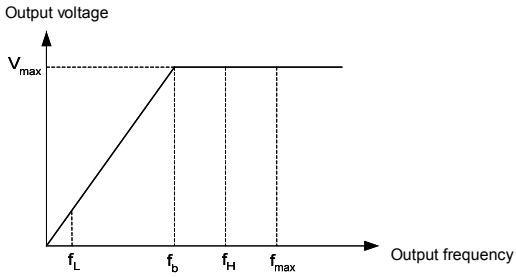


Figure 6−2 Characteristic parameter definition

P0.16	Torque boost	0.0~30.0 %(0.0%)

Effect of the torque boost function: Upon the vector control 1, when the inverter operation at low-frequency, increase the output voltage, and offset the stator voltage drop to product enough torque, so as to ensure the normal operation of the motor.

Note:

- The torque boost amplitude should be set according to the load situation. Excessive boost will cause large current impact during the startup process.
- When P0.16 is set to 0.0, and P4.00 is set to 0 (linear V/F curve), the automatic torque boost mode is enabled; when P4.00 is set to a non-zero value, the automatic torque increase mode is disabled.

6.2 Main and Auxiliary Reference Parameter (Group P1)

P1.00	Open loop auxiliary reference mode	0~4(0)
P1.01	Open loop reference main and auxiliary relation calculation	0~5(0)

In process open loop control mode (P0.03=0 or P0.03=4), the main reference value f_m will be added with an auxiliary reference value f_a, and it results in process open loop combination frequency reference f_{com}.

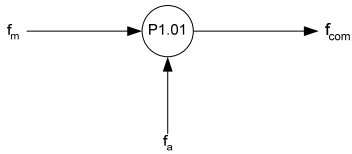


Figure 6−3 Open loop main and auxiliary reference combination

The process open loop auxiliary reference mode P1.00 is selected as follows:

0: none; 1: AI1; 2: AI2; 3: AI3; 4: DI

Such calculations as “add”, “subtract”, “bias”, “max” and “min” are available for main reference value f_m and auxiliary reference value f_a.

Through the parameter settings in group P6, the frequency change range of the auxiliary reference can be reduced to realize the fine tuning function.

The process open loop reference main and auxiliary relation calculation parameter P1.01 is defined as follows:

0: Main reference + auxiliary reference: The auxiliary frequency reference value is superimposed on the main reference, the function is “add”.

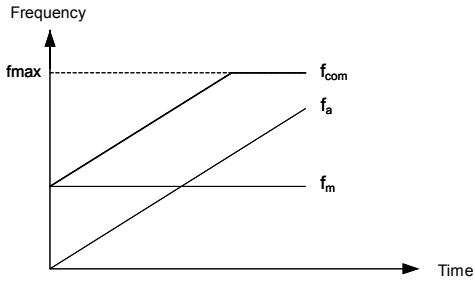


Figure 6-4 Process open loop main and auxiliary reference calculation 0

Open loop combination reference f_{com}=main reference f_m+auxiliary reference f_a

1: Main reference - auxiliary reference: The auxiliary frequency reference value is superimposed on the main reference, the function is “subtract”.

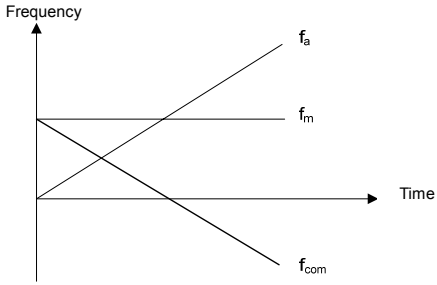


Figure 6-5 Process open loop main and auxiliary reference calculation 1

Open loop combination reference f_{com}=main reference f_m-auxiliary reference f_a

2: Auxiliary reference-50%: The auxiliary reference value subtracts the bias equal to 50% of the auxiliary reference full range value. The main reference value is disabled at this time.

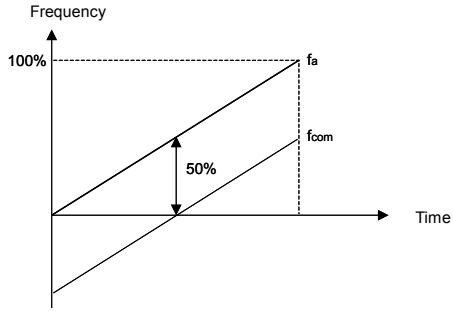


Figure 6-6 Process open loop main and auxiliary reference calculation 2

Open loop combination reference f_{com}=auxiliary reference f_a-50% bias

3: Main reference + auxiliary reference-50%: The auxiliary reference value subtracts the bias equal to 50% of the auxiliary reference full range value and then superimposes on the main reference.

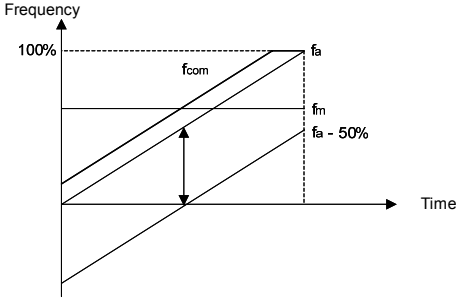


Figure 6-7 Process open loop main and auxiliary reference calculation 3

Open loop combination reference f_{com}=main reference f_m+auxiliary reference f_a-50% bias

4: Max: Get the maximum value of the main reference f_m and the auxiliary reference f_a.

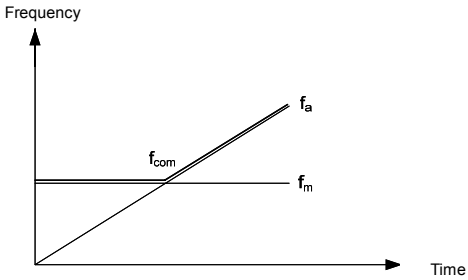


Figure 6-8 Process open loop main and auxiliary reference calculation 4

Open loop combination reference f_{com}=Max {main reference f_m, auxiliary reference f_a}

5: Min: Get the minimum value of the main reference f_m and the auxiliary reference f_a.

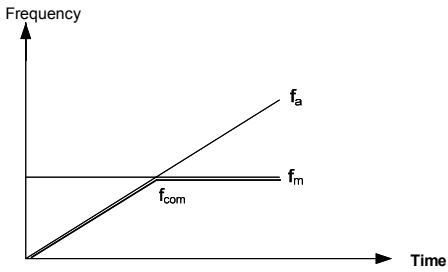


Figure 6-9 Process open loop main and auxiliary reference calculation 5

Open loop combination reference f_{com}=Min {main reference f_m, auxiliary reference f_a}

Note: When the corresponding frequency of the combination value f_{com} exceeds the high or low limit of the frequency, the output frequency will be restricted to the high or low limit.

P1.02	Analog feedback close loop control main reference mode	0~4(0)
P1.03	Analog feedback close loop control auxiliary reference mode	0~4(0)
P1.04	Analog feedback close loop control reference main and auxiliary calculation	0~5(0)

In the analog feedback close loop system, if there are main reference and auxiliary reference, the main reference value can be digital voltage, analog and pulse, the auxiliary reference value can be analog and pulse.

The analog feedback close loop control main reference mode P1.02 can be selected as follows:

0: Digital voltage reference (P8.00) ; 1: AI1; 2: AI2; 3: AI3; 4: DI

Digital voltage definition: 0~10V is indicated in digits in parameter P8.00.

The analog feedback close loop control auxiliary reference mode P1.03 can be selected as follows:

0: None; 1: AI1; 2: AI2; 3: AI3; 4: DI

The analog feedback close loop control main reference and auxiliary reference calculation P1.03 can be selected as follows:

0: Main + auxiliary; 1: Main - auxiliary; 2: Auxiliary -50%; 3: Main+ auxiliary-50%; 4: Max; 5: Min

The main reference and auxiliary reference calculation function for close loop reference is the same as the main reference and auxiliary reference calculation function for open loop reference. For details, refer to the description of P1.01.

Note: Under the analog feedback close loop control mode, the analog main reference, analog auxiliary reference, analog main feedback and analog auxiliary feedback cannot be set at the same channel.

P1.05	Analog feedback close loop control main feedback mode	1~4(1)
P1.06	Analog feedback close loop control auxiliary feedback mode	0~4(0)
P1.07	Analog feedback close loop control feedback main and auxiliary calculation	0~5(0)

In the analog feedback close loop system, the main feedback and auxiliary feedback can be analog or pulse.

The main feedback and auxiliary feedback calculation function for process close loop feedback is the same as the main reference and auxiliary reference calculation function for process close loop reference. For details, refer to the description of P1.01.

The analog feedback close loop control main feedback mode P1.05 can be selected as follows:

1: AI1; 2: AI2; 3: AI3; 4: DI

The analog feedback close loop control auxiliary feedback mode P1.06 can be selected as follows:

0: none; 1: AI1; 2: AI2; 3: AI3; 4: DI

The analog feedback close loop control main feedback and auxiliary feedback calculation P1.07 can be selected as follows:

0: Main + auxiliary; 1: Main - auxiliary; 2: Auxiliary -50%; 3: Main+ auxiliary-50%; 4: Max; 5: Min.

Note:

- Under the analog feedback close loop control mode, the analog main reference, analog auxiliary reference, analog main feedback and analog auxiliary feedback cannot be set at the same channel.
- When the process close loop analog feedback mode is DI, the pulse will be translated into analog (0~10V) as feedback:
  Analog = pulse/maximum pulse input frequency P5.10×10V.

P1.08	Process open loop and close loop composite operation relation calculation	0~1 (0)

This function definition is similar to that of P1.01. The process open loop composite reference f_{com} in this function definition can be treated as main reference, the frequency output of closed loop PID regulation f_{PID} can be treated as auxiliary reference, and f_{FIN} can be treated as composite reference.

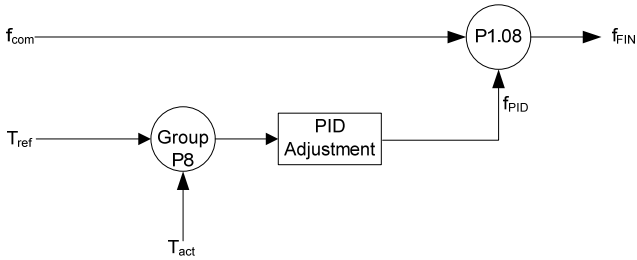


Figure 6-10 Open loop and closed loop composite operation reference

0: Add the process closed loop adjustment result f_{PID} to the process open loop reference f_{com}

1: Subtract the process closed loop adjustment result f_{PID} from the process open loop reference f_{com}

Note: In the case of analog feedback closed loop, refer to description of P1.02 to P1.04 for the reference mode T_{ref}, refer to the description of P1.05 to P1.07 for the feedback mode T_{act}.

6.3 Key and Display Parameters (Group P2)

P2.00	Key-lock function selection	0~3(0)

It is to realize the locking function of the keys on the operation panel, so as to avoid mis-operation.

0: The keys on the operation panel are not locked, and all the keys are enabled.

1: The keys on the operation panel are locked, and all the keys are disabled.

2: All the keys except for the multi-functional key are disabled.

3: All the keys except for the RUN AND STOP/RST keys are disabled.

Note: For the effective methods of key locking, refer to 4.6 description on key locking and unlocking.

P2.01	Multi-functional key definition	0~8(1)

To facilitate the operation, the frequent operation can be set on the multi-functional key of the operation

panel.

0: No function.

1: Jog function: For the jog frequency and jog acceleration/deceleration time, refer to P3.11~P3.13.

2: Emergent stop 1: Applicable to the situation that may cause human danger. The motor will be stopped with the shortest deceleration time.

3: Emergent stop 2: Applicable to the situation that may cause electric equipment damage. The motor will coast to stop.

4: Realize the circular switching of the operating command reference modes (operation panel reference →terminal reference→host computer reference). The MON status LED on the operation panel will indicate the corresponding status. It is effective only when the PRG key is pressed within 5 seconds, otherwise, the switching will be invalid, and the MON LED will restore to the former indication state.

5: Realize the circular switching of the display modes of fast function codes and all the function codes.

6: Realize the circular switching of the display modes of function codes different from leave-factory values and all the function codes.

7: Realize the circular switching of the display modes of last changed 10 function codes and all the function codes.

8: Realize the circular switching of different function code display modes (basic menu mode → fast menu mode → menu mode of Non-factory setting function code→Menu mode of last changed 0 function codes, refer to description of P0.02 for the menu modes.

P2.02	Display parameter selection at running	0~FFFF(1CB0)

Up to 4 parameters can be set and display at running status, and viewed circularly by pressing >>key.

Display of operation panel		
Unit place:	0: Reference frequency (Hz) ;	1: Bus voltage (V) ;
	2: AI1 (V) ;	3: AI2 (V) ;
	4: AI3 (V) ;	5: DI (%) ;
	6: External counts	7: Motor rotation speed (rpm);
	8: Close loop reference (%);	9: Close loop feedback (%);
	A: Reference torque (%);	B: Operating frequency (Hz);
	C: Output current (A);	D: Output torque (%);
	E: Output power (kW);	F: Output voltage (V)
Tens place	Same as above	
Hundreds place	Same as above	
Thousands place	Same as above	

P2.04	Running proportion display benchmark	0~F(0)
P2.05	Running proportion display coefficient	0.0~1000.0%(0.0%)

If the parameter to be displayed has proportion relation with a physical value in the operation display

parameter defined by P2.02, P2.04 can be used to designate the physical value as the display benchmark, and P2.05 can be used to set the coefficient of the display benchmark.

When the proportion display parameter is set (i.e. P2.05≠0), the physical value will be automatically added into the operation display parameter group and can be viewed by pressing >>key. At this time, there are 5 display parameters. The LEDs for the newly added parameter are LED A and LED V, both of which shall be on.

P2.03	Display parameter selection at stopping	0~FFFF(3210)

Up to 4 parameters can be set and display at stopping status, and viewed circularly by pressing >>key.

Display of operation panel		
Unit place:	0: Reference frequency (Hz) ;	1: Bus voltage (V) ;
	2: AI1 (V) ;	3: AI2 (V) ;
	4: AI3 (V) ;	5: DI (%) ;
	6: External counts	7: Motor rotation speed (rpm);
	8: Close loop reference (%);	9: Close loop feedback (%);
	A: Reference torque (%);	B: Reserved;
	C: Reserved;	D: Reserved;
	E: Reserved;	F: Reserved
Tens place	Same as above	
Hundreds place	Same as above	
Thousands place	Same as above	

P2.06	Stop proportion display benchmark	0~F(0)
P2.07	Stop proportion display coefficient	0.0~1000.0 %(0.0%)

If the parameter to be displayed has proportion relation with a physical value in the stopping display parameter defined by P2.03, P2.06 can be used to designate the physical value as the display benchmark, and P2.07 can be used to set the coefficient of the display benchmark.

When the proportion display parameter is set (i.e. P2.07≠0), the physical value will be automatically added into the stop display parameter group and can be viewed by pressing >>key. At this time, there are 5 display parameters. The LEDs for the newly added parameter are LED A and LED V, both of which shall be on.

6.4 Startup/stop Parameter (Group P3)

P3.00	Startup mode	0~2(0)

Different startup modes can be adopted for different applications.

0: The inverter begins to run from the startup frequency P3.03 and accelerates to the setting frequency after the startup frequency retention time P3.04. If the motor is still rotating upon the startup of the inverter, the motor will be automatically decelerated to low speed before the acceleration.

1: DC current is injected first to perform DC magnetizing and DC braking on the motor. The volume and time for the DC injection are set by P3.01 and P3.02. After the DC injection time expires, the inverter begins to run from the startup frequency P3.03 and accelerates to the setting frequency after the startup frequency retention time P3.04.

2: Catch a spinning motor.

The inverter will automatically identify the speed of the motor and directly start from the identified frequency. The current and voltage are smooth without any impact during the startup.

Note: During the DC current supply, the operation panel displays “-dc-”.

P3.01	DC injection current	0.0~120.0 %(0.0%)
P3.02	DC injection time	0.00~30.00 s (0.00s)

P3.01 sets the volume of the DC injection current, which is indicated in a percentage of the rated current of the inverter. Upon variable torque load: 0.0~90.0%.

P3.02 sets the action time of the DC injection.

P3.03	Startup frequency	0.00~60.00Hz(0.00or 0.50Hz)
P3.04	Startup frequency retention time	0.0~3600.0 s（0.0s）

The inverter begins to run from the startup frequency P3.03 and accelerates according to acceleration time after the startup frequency retention time P3.04.

Note: For the heavy-load startup applications, it will facilitate the startup if the startup frequency and retention time are properly set.

P3.05	Stop mode	0~2(0)

Different stop modes can be adopted for different applications.

0: Decelerate to stop according to the deceleration time.

1: The inverter locks the output and the motor coast to stop.

2: Decelerate to stop according to the deceleration time. When the frequency is lower than the DC braking initial frequency P3.06, inject the DC braking current P3.07, and the DC braking time is determined by P3.08.

Note: During the DC braking, the operation panel displays “-dc-”.

P3.06	DC braking initial frequency	0.00~300.00 Hz(0.00Hz)
P3.07	DC braking current	0.0~120.0 %(0.0%)

P3.08	DC braking time	0.00~30.00 s (0.00s)

P3.06 sets the initial frequency at the beginning of DC braking current injection during the shutdown
P3.07 sets the DC braking current value. This value is presented as the percentage of the rated current of the inverter. It ranges from 0.0 ~ 90.0% upon variable torque load.
P3.08 sets the action time of the DC braking current.

P3.09	Anti-reverse selection	0~1(1)
P3.10	Forward/reverse dead zone time	0.0~3600.0 s(0.0s)

For some production equipment, reverse running may cause equipment damage. This function can be used to prevent reverse running. P3.09 is set to forbid reverse running by default upon delivery.
When the motor rotation direction is opposite to the required direction of the equipment, the wire connection of any two terminals at the inverter output can be interchanged so that the run forward direction of the equipment is consistent with the run forward direction defined by the inverter.
Set P3.10 to realize the waiting time for the zero-crossing of rotation speed when the inverter switches from run forward to run reverse (or from run reverse to run forward).

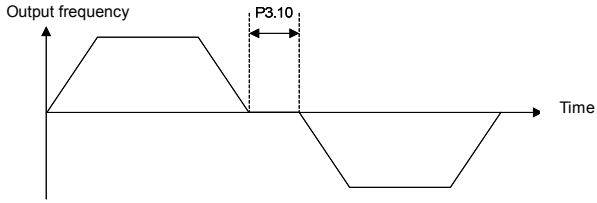


Figure 6−11 Forward/reverse dead zone time

P3.11	Jog frequency	0.10~300.00 Hz (5.00Hz)
P3.12	Jog acceleration time	0.1~60.0 s(6.0s)
P3.13	Jog deceleration time	0.1~60.0 s(6.0s)

P3.11 is the frequency set for jog operation.
Jog acceleration time P3.12: The time from zero to maximum frequency.
Jog deceleration time P3.13: The time from maximum frequency to zero.
When the inverter is in standby status, it can adopt jog operation. The jog operation command may come from the operation panel, multi-functional terminal or host computer.

6.5 Multi-section Parameter (Group P4)

P4.00	V/F curve reference	0~6(0)
P4.01	V/F frequency value F0	0.00~300.00 Hz(0.00Hz)
P4.02	V/F voltage value V0	0.0~100.0 %(0.0%)
P4.03	V/F frequency value F1	0.00~300.00 Hz(0.00Hz)
P4.04	V/F voltage value V1	0.0~100.0 %(0.0%)
P4.05	V/F frequency value F2	0.00~300.00 Hz(0.00Hz)
P4.06	V/F voltage value V2	0.0~100.0 %(0.0%)
P4.07	V/F frequency value F3	0.00~300.00 Hz(0.00Hz)
P4.08	V/F voltage value V3	0.0~100.0 %(0.0%)

It is to determine the different V/F curves under vector control 1 mode.

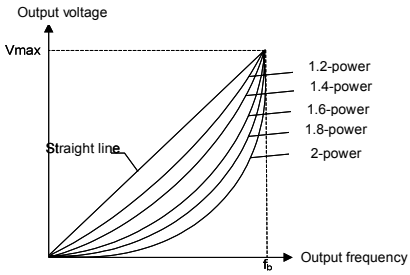


Figure 6−12 V/F curve

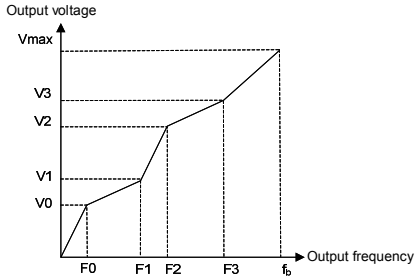


Figure 6-13 Multi-section V/F curve

P4.00=0: Applicable to the constant torque load situation, refer to the straight line in Figure 6-12.

P4.00=1: Self-defined curve of the user, applicable to sectional constant torque load, refer to Figure 6-13.

In Figure 6-13:F0<F1<F2<F3<f_b f_b is the motor basic operating frequency P0.15

V0≤V1≤V2≤V3≤100% V0, V1, V2, V3 are indicated in the percentage of the maximum output voltage P0.12.

P4.00=2~6: Applicable to the variable torque loads such as fan and pump. When P4.00 is set to 2~6, it corresponds to 1.2-power, 1.4-power, 1.6-power, 1.8-power and second power, as shown in Figure 6-12. The second power curve is for water supply, and the 1.2-power to 1.8-power curves are for the liquid loads of other media. Proper curve can be selected according to the actual situation.

P4.09	Acceleration time 1	0.1~3600.0 s(20.0s)
P4.10	Deceleration time 1	0.1~3600.0 s(20.0s)
P4.11	Acceleration time 2	0.1~3600.0 s(20.0s)
P4.12	Deceleration time 2	0.1~3600.0 s(20.0s)
P4.13	Acceleration time 3	0.1~3600.0 s(20.0s)
P4.14	Deceleration time 3	0.1~3600.0 s(20.0s)

In addition to the above acceleration time 0 (P0.08) and deceleration time 0 (P0.09) , three groups of acceleration/deceleration time (acceleration/deceleration time 1, acceleration/deceleration time 2, acceleration/deceleration time 3) can be defined. Different acceleration/deceleration time can be selected in different terminal status by defining the multi-functional terminal X (acceleration/deceleration time selection function: 13~14). The meaning of the three groups of acceleration/deceleration time is the same as P0.08 and P0.09.

P4.15	Multi-section digital voltage reference 1	0.00~10.00 V(1.00V)
P4.16	Multi-section digital voltage reference2	0.00~10.00 V(2.00V)
P4.17	Multi-section digital voltage reference3	0.00~10.00 V(3.00V)
P4.18	Multi-section digital voltage reference4	0.00~10.00 V(5.00V)
P4.19	Multi-section digital voltage reference5	0.00~10.00 V(6.00V)
P4.20	Multi-section digital voltage reference6	0.00~10.00 V(8.00V)
P4.21	Multi-section digital voltage reference7	0.00~10.00 V(10.00V)

It can be used as the process open loop frequency reference or analog feedback close loop digital reference. Different digital voltage reference is selected in different terminal status by defining the multi-functional terminal X (multi-section analog input terminals 1~3). ON means that the terminal is enabled, OFF means that the terminal is disabled.

Multi-stage digital voltage input terminal 3	Multi-stage digital voltage input terminal 2	Multi-stage digital voltage input terminal 1	Setting frequency	
			Process open loop control	Process PID close loop control
OFF	OFF	OFF	Open loop frequency P0.05	Close loop digital voltage reference
OFF	OFF	ON	Multi-section digital voltage reference 1	Multi-section digital voltage reference 1
OFF	ON	OFF	Multi-section digital voltage reference 2	Multi-section digital voltage reference 2
OFF	ON	ON	Multi-section digital voltage reference 3	Multi-section digital voltage reference 3
ON	OFF	OFF	Multi-section digital voltage reference 4	Multi-section digital voltage reference 4
ON	OFF	ON	Multi-section digital voltage reference 5	Multi-section digital voltage reference 5
ON	ON	OFF	Multi-section digital voltage reference 6	Multi-section digital voltage reference 6
ON	ON	ON	Multi-section digital voltage reference 7	Multi-section digital voltage reference 7

Note: During open loop operation process, if the input terminal function sets the multi-section digital voltage and multi-section frequency simultaneously, the multi-section frequency will have priority. During

analog feedback operation process, the multi-section digital voltage reference is in priority to other reference modes.

P4.22	Multi-section frequency 1	0.00~300.00 Hz(5.00Hz)
P4.23	Multi-section frequency 2	0.00~300.00 Hz(8.00Hz)
P4.24	Multi-section frequency 3	0.00~300.00 Hz(10.00Hz)
P4.25	Multi-section frequency 4	0.00~300.00 Hz(15.00Hz)
P4.26	Multi-section frequency 5	0.00~300.00 Hz(18.00Hz)
P4.27	Multi-section frequency 6	0.00~300.00 Hz(20.00Hz)
P4.28	Multi-section frequency 7	0.00~300.00 Hz(25.00Hz)
P4.29	Multi-section frequency 8	0.00~300.00 Hz(28.00Hz)
P4.30	Multi-section frequency 9	0.00~300.00 Hz(30.00Hz)
P4.31	Multi-section frequency 10	0.00~300.00 Hz(35.00Hz)
P4.32	Multi-section frequency 11	0.00~300.00 Hz(38.00Hz)
P4.33	Multi-section frequency 12	0.00~300.00 Hz(40.00Hz)
P4.34	Multi-section frequency 13	0.00~300.00 Hz(45.00Hz)
P4.35	Multi-section frequency 14	0.00~300.00 Hz(48.00Hz)
P4.36	Multi-section frequency 15	0.00~300.00 Hz(50.00Hz)

It can be used as process open loop frequency reference. Different multi-section frequency reference can be selected in different terminal status by defining the multi-functional terminal X (multi-section frequency terminals 1~4). ON means that the terminal is enabled, OFF means that the terminal is disabled.

Note: During open loop operation process, if the input terminal function sets the multi-section digital voltage and multi-section frequency simultaneously, the multi-section frequency has the highest priority.

Multi-section frequency terminal 1	Multi-section frequency terminal 3	Multi-section frequency terminal 2	Multi-section frequency terminal 1	Setting frequency
OFF	OFF	OFF	OFF	Open loop frequency P0.05
OFF	OFF	OFF	ON	Multi-section frequency 1
OFF	OFF	ON	OFF	Multi-section frequency 2
OFF	OFF	ON	ON	Multi-section frequency 3
OFF	ON	OFF	OFF	Multi-section frequency 4
OFF	ON	OFF	ON	Multi-section frequency 5
OFF	ON	ON	OFF	Multi-section frequency 6
OFF	ON	ON	ON	Multi-section frequency 7
ON	OFF	OFF	OFF	Multi-section frequency 8
ON	OFF	OFF	ON	Multi-section frequency 9
ON	OFF	ON	OFF	Multi-section frequency 10
ON	OFF	ON	ON	Multi-section frequency 11
ON	ON	OFF	OFF	Multi-section frequency 12
ON	ON	OFF	ON	Multi-section frequency 13
ON	ON	ON	OFF	Multi-section frequency 14
ON	ON	ON	ON	Multi-section frequency 15

6.6 Multi-functional Input Parameter (Group P5)

P5.00	X1 terminal input function selection	0~99(99)
P5.01	X2 terminal input function selection	0~99(99)
P5.02	X3 terminal input function selection	0~99(99)
P5.03	X4 terminal input function selection	0~99(99)
P5.04	X5 terminal input function selection	0~99(99)
P5.05	X6 terminal input function selection	0~99(99)
P5.06	X7 terminal input function selection	0~99(99)

Multi-functional input terminal definition table:

SN	Function definition	SN	Function definition
0	Jog forward	27	Shutdown via terminal with DC braking 2
1	Jog reverse	28	Counter trigger input
2	Forward (FWD)	29	Counter trigger reset
3	Reverse (REV)	30~46	Reserved
4	Three-wire operation control	47	PG feedback closed loop control single phase pulse input
5	Pulse frequency DI input (only available for X7/DI terminal)	48	Command switching to operation panel
6	Multi-section digital voltage terminal 1	49	Command switching to terminal
7	Multi-section digital voltage terminal 2	50	Command switching to host computer
8	Multi-section digital voltage terminal 3	51	Main frequency source close loop and open loop switching input
9	Multi-section frequency terminal 1	52	Main frequency source switching to digital
10	Multi-section frequency terminal 2	53	Reserved
11	Multi-section frequency terminal 3	54	Main frequency source switching to AI1
12	Multi-section frequency terminal 4	55	Main frequency source switching to AI2
13	Acceleration/deceleration terminal 1	56	Main frequency source switching to AI3
14	Acceleration/deceleration terminal 2	57	Main frequency source switching to DI
15	Digital regulating frequency reset	58	Auxiliary frequency source switching to disabled
16	Frequency increase instruction	59	Reserved
17	Frequency decrease instruction	60	Auxiliary frequency source switching to AI1
18	Acceleration/deceleration disable instruction	61	Auxiliary frequency source switching to AI2
19	External failure input	62	Auxiliary frequency source switching to AI3
20	Terminal failure reset input	63	Auxiliary frequency source switching to DI
21	External interrupt contact input	64	Speed control/torque control switching
22	Inverter running disabled	65	Speed limiting forced to be Pd.06 and Pd.07
23	Shutdown via terminal	66	Zero servo enable terminal
24	Free shutdown via terminal	67	Closed loop output forced to be 0
25	Shutdown via terminal with DC braking 1	68	PID positive or negative function
26	Emergent stop 1 (fastest shutdown)	69~98	Reserved

Relevant term explanation:

Terminal Xi: Refers to any of terminal X1, X2, X3, X4, X5, X6 or X7, also called terminal X.

Terminal Yi: Refers to terminal Y1, Y2 or relay also called terminal Y.

Terminal function enabled: Means that terminal Xi has set the function under description. And P7.25 adopts the leave-factory value, the terminal is closed; when the P7.25 adopts the Non-factory setting, the terminal is open.

Terminal function disabled: Means that terminal Xi has not set the function under description; or it has set the function, but when P7.25 adopts the leave-factory value, the terminal is open; or when the P7.25 adopts the Non-factory setting, the terminal is closed.

The leave-factory setting of terminal Xi (i=1~7) is no function (function code set to 99).

0: Terminal jog forward input

1: Terminal jog reverse input

2: Terminal forward run input (FWD)

3: Terminal reverse run input (REV)

The functions of above items 0 to 3 are only enabled when the running command is issued via terminal (P0.06=1). Interlocking of running command and jog command means that the jog command will not be executed in the running status and the running command will not be executed in the jog status.

4: Three-line running control

It is only enabled when the running command is issued via terminal ((P0.06=1). Refer to P5.11 for the instructions about its application.

5: Pulse frequency DI input (only available for X7/DI terminal)

When the pulse frequency DI input acts as the reference (e.g. P0.04=4 or P1.02=4), this function must be selected for the X7/DI terminal.

6: Multi-section digital voltage terminal 1

7: Multi-section digital voltage terminal 2

8: Multi-section digital voltage terminal 3

Refer to P4.15 ~ P4.21 for the instructions about its application.

9: Multi- section frequency terminal 1

10: Multi- section frequency terminal 2

11: Multi- section frequency terminal 3

12: Multi- section frequency terminal 4

Refer to P4.22 ~ P4.36 for the instructions about its application.

13: Acceleration/deceleration time terminal 1

14: Acceleration/deceleration time terminal 2

Refer to the table below for the instructions about its application.

Acceleration/deceleration terminal 2	Acceleration/deceleration terminal 1	Acceleration/deceleration time selection
OFF	OFF	Acceleration/deceleration time 0
OFF	ON	Acceleration/deceleration time 1
ON	OFF	Acceleration/deceleration time 2
ON	ON	Acceleration/deceleration time 3

15: Digital regulating frequency reset

It is used to reset the change values of the setup frequency regulated by the operation panel ∧/∨ and terminal UP/DN. When this terminal is enabled, the operation panel ∧/∨ and terminal UP/DN are disabled.

16: Frequency increase command

17: Frequency decrease command

The two terminals are used to modify the setup frequency with UP/DN key.

18: Acceleration/deceleration disable command

If this terminal is enabled, the running frequency will remain unchanged unless stop command is executed.

19: External failure input

When this terminal is enabled, inverter will stop running and display “E.oUt” failure.

20: Terminal failure reset input

This terminal is used to reset failure, which can also be done with the STOP/RST key on the operation panel and the host computer command.

21: External interrupt contact input

It is used to interrupt the inverter for a short while. At this time, the inverter output frequency will be zero but the inverter is still in the running status and the RUN indictor is ON. The inverter will continue running after cancelling interrupt signal.

22: Inverter running disabled

Once this terminal is enabled, the inverter will coast to stop immediately. Once this terminal is disabled, the inverter will start normally.

23: Shutdown via terminal

When the inverter is in the running status, the inverter will stop running once this terminal is enabled.

24: Coast to stop via terminal

When the inverter is in running status the inverter will coast to stop immediately once this terminal is enabled.

25: DC injection braking stop 1 via terminal

When the inverter is in the running status, this terminal can be used to stop the inverter. When the running frequency is lower than the DC braking frequency (P3.06), the inverter will start DC braking. The braking current is set by P3.07, and the braking time is the longer one between the function retention time of this terminal and the DC braking time(P3.08).

26: Emergent stop 1 (fastest stop)

When this terminal is enabled, the inverter will stop in the fastest way. The inverter will automatically determine the deceleration time according to the load torque and stop as fast as possible.

27: DC injection braking stop 2 via terminal

Once the stop command is executed on the inverter, when the running frequency is lower than the DC braking frequency (P3.06), the inverter will start DC braking. The braking current is set by P3.07, and the braking time is the longer one between the function retention time of this terminal.and the DC braking time at stop (P3.08).

28: Counter trigger input

It can input pulses with frequency of below 200Hz, such as work counting and other slow-speed pulse signals. For details, refer to P5.12 and P5.13.

29: Counter trigger reset

It is used to reset the counting value of the counter trigger input X terminal.

30 to 46: Reserved

47: Single-phase pulse input of single-phase pulse feedback process close loop control (only available for X7/DI terminal).

When the pulse frequency DI input acts as feedback (P0.03=2 or 6), it must set the X7/DI terminal function to single-phase pulse feedback process close loop control single-phase pulse input (P5.06=47).

Refer to P8.01 and P0.03 for description of single-phase pulse input feedback close loop.

48: Command switching to operation panel

49: Command switching to terminal

50: Command switching to host computer

The above three functions are set to facilitate the switching of Running command issuing mode. When the terminal is switched from disabled status to enabled status, the edge trigger is enabled.

51: Main frequency source close loop and open loop switching input

It is the process open loop operation and process close loop operation switching terminal. When this terminal is enabled, it means process close loop operation and when the terminal is disabled, it means process open loop operation.

52: Main frequency source switching to digital voltage reference

54: Main frequency source switching to AI1

55: Main frequency source switching to AI2

56: Main frequency source switching to AI3

57: Main frequency source switching to DI

The above five functions are set to facilitate the switching of main frequency source. When the terminal is switched from disabled status to enabled status, The edge trigger is enabled. When this terminal is enabled, it will switch from the current main frequency source mode to the main frequency source mode corresponding to this terminal function.

58: Auxiliary frequency source switching to disabled

59: Reserved

60: Auxiliary frequency source switching to AI1

61: Auxiliary frequency source switching to AI2

62: Auxiliary frequency source switching to AI3

63: Auxiliary frequency source switching to DI

The above five functions are set to facilitate the switching of auxiliary frequency source. When the terminal is switched from disabled status to enabled status, the edge trigger is enabled. When this terminal is enabled, it will switch from the current auxiliary frequency source mode to the auxiliary frequency source mode corresponding to this terminal function.

64~66: Reserved

67: Closed loop output forced to be 0

Under process closed loop control or composite control, when the terminal is enabled, the inverter output frequency process closed loop adjustment is forced to set to 0.

68: PID positive or negative function

PID is positeve function at default. It should enable negative function when feedback value is greater than reference value and the frequency needed increase. This function can realized through setting P8.09=1 or multi-function terminal function setting as 68.

P8.09=0, Terminal function is disabled: Positive;

P8.09=1, Terminal function is enabled: Positive;

P8.09=1, Terminal function is disabled: Negative;

P8.09=0，Terminal function is enabled: Negative.

69~98: Reserved.

P5.07	X1 to X7 terminal filtering time	0.000~1.000 s (0.001s)

It can properly amplify the setup value of P5.07 to improve the anti-interference capability of the terminal. The longer the terminal filter time is, the longer the delay time of the terminal action is.

P5.10	Maximum input pulse frequency	0.1~ 50.0 kHz (10.0 kHz)

When the pulse input of the multifunctional input terminal X7/DI acts as open loop frequency reference or analog feedback close loop reference (e.g. P0.04=4 or P1.02=4), the maximum input pulse frequency determined via this functional code.

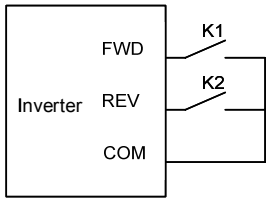
When the pulse input acts as open loop frequency reference, maximum input pulse frequency P5.10 corresponds to maximum output frequency P0.11, the current pulse input frequency f_P and open loop frequency reference f can be calculated as per the following formula: $f=f_P\times$ P0.11/ P5.10.

When the pulse input acts as close loop frequency reference, maximum input pulse frequency P5.10 corresponds to maximum digital voltage reference 10V, the current pulse input frequency f_P and analog feedback close loop reference V_P can be calculated as per the following formula: $v_P = f_P\times$ 10V/ P5.10.

P5.11	Startup/stop mode Selection	0 ~ 3(0)

P5.11 is used to set the mode of controlling the startup and stop of the inverter with FWD and REV terminals when the running command is issued via terminal.

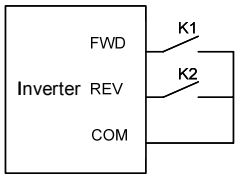
0: Two line 1;



FWD	REV	Start-up and stop command
0	0	Stop
0	1	Run reverse
1	0	Run forward
1	1	Stop

Figure 6-14 Two-line running mode 1

1: Two line 2;



FWD	REV	Start-up
0	0	Stop
0	1	Stop
1	0	Run
1	1	Run

Figure 6-15 Two-line running mode 2

2: Three line 1;

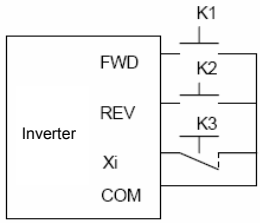


Figure 6-16 Three-line running mode 1

The terminal Xi(i=1~7) has set “4: Three-line mode rotation control” function.

Fig 6-16, when K3 is closed, FWD and REV controls are enabled; when K3 is disconnected, FWD and REV controls are disabled and the inverter stops.

The rising edge of FWD terminal means run forward command, while the rising edge of REV terminal means run reverse command.

3: Three line 2

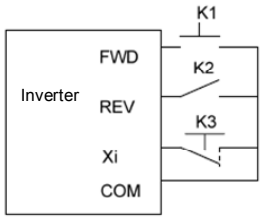


Figure 6-17 Three-line running mode 2

The terminal Xi (i=1~7) has set “4: Three-line mode rotation control” function.

Fig 6-17 when K3 is closed, FWD and REV controls are enabled; when K3 is disconnected, FWD and REV controls are disabled and the inverter stops.

The rising edge of FWD terminal means rotation command; the disconnection of REV terminal means run forward command, while the connection of REV terminal means run reverse command.

P5.12	Preset counting value reference	0 ~ 9999(0)
P5.13	Reached counting value reference	0 ~ 9999(0)

When the pulse signal counting of the terminal input complies with the preset condition, the terminal Yi will output corresponding instructions. The setting procedures are as follows:

1. Set Xi (i=1 to 7) terminal to “28: Counter trigger input”, and meanwhile set P5.12 and P5.13 .suck as P5.12=4 and P5.13=8 .

2. The terminal Yi is set to “10: Preset counting value action”, and the action sequence is shown as Out1 in Figure 6-18. Effective level will be output when the counting value is between the values of P5.12 and P5.13.

The terminal Yi is set to “11: Reaching counting value action”, and the action sequence is shown as Out2 in Figure 6-18. Effective level will be output and kept till the counting value changes when the counting

value reaches the value of P5.13.

Note:

- P5.12 cannot be set to a value of higher than P5.13, and the counter pulse signal frequency range is 0Hz to 200Hz. The voltage range is 24V±20%.
- Set Xi (ii=1 to 7) terminal to “29: Counter trigger reset”, and reset the counting value when the terminal Xi is enabled.

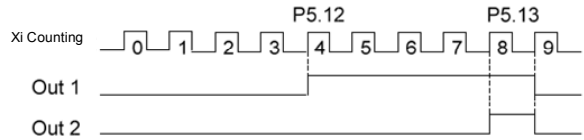


Figure 6-18 Schematic diagram for the preset and reaching counting value reference

6.7 Analog Reference Parameter (Group P6)

P6.00	AI1 to AI3 and DI analog value input curve selection	0~ 4444（4444）

This function is used to perform calibration on the signals that are input via different input channels with different analog input curves.

Display of operation panel	
Unit’s digit	AI1: 0: Determine the reference frequency (P6.01 ~ P6.04) by Curve 1 1: Determine the reference frequency (P6.05 ~ P6.08) by Curve 2 2: Per unit value determined by curve 3 (P6.09 to P6.12); 3: Per unit value determined by curve 4(P6.13 to P6.20); 4: Calibration by curve is not necessary
Tens place	AI2: Same as above
Hundreds place	AI3: Same as above
Thousands place	DI: Same as above

Curve 1 and curve 2 can be used to directly realize the corresponding relationship between analog value and setup frequency, while curve 3 and curve 4 can be used to convert the externally input analog value into analog values inside the inverter. The analog value selection is determined by P6.21.

Note:

- The running and stop display parameters AI1 ~ AI3 and DI determined by P2.02 and P2.03 all refer to the analog values inside the inverter, of which DI input is calculated on the basis of 10V corresponding to the maximum input pulse frequency P5.10.
- When current analog value input is selected, please refer to Figure 6-20.

- When “Calibration by curve is not necessary” is selected, the maximum analog input or maximum input pulse frequency corresponds to the maximum output frequency P0.11 or 100% per-unit value of the inverter.

P6.01	Curve 1 input point A0	0.0 ~110.0 %(0.0%)
P6.02	Reference frequency f0 corresponding to curve 1 input point A0	0.00~ 300.00 Hz(0.00Hz)
P6.03	Curve 1 input point A1	0.0 ~110.0 %(100.0%)
P6.04	Reference frequency f1 corresponding to curve 1 input point A1	0.00 ~ 300.00 Hz(50.00Hz)
P6.05	Curve 2 input point A0	0.0 ~110.0 %(0.0%)
P6.06	Reference frequency f0 corresponding to curve 2 input point A0	0.00 ~300.00 Hz(0.00%)
P6.07	Curve 2 input point A1	0.0 ~110.0 %(100.0%)
P6.08	Reference frequency f1 corresponding to curve 2 input point A1	0.00 ~ 300.00 Hz(50.00Hz)

Since the using methods of curve 1 and curve 2 are identical, Curve 1 is described as an example here. Both curve 1 and curve 2 can be used in process open loop analog frequency reference, and the running frequency of the inverter can be determined by the analog values AI1, AI2 and AI3 and DI pulse frequency reference. The conversion relationship between analog value and setup frequency is as shown in the figures below:

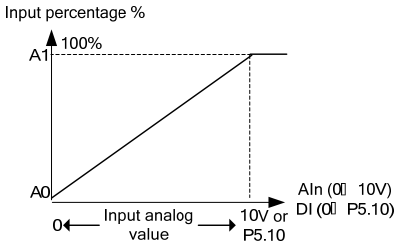


Figure 6−19 Corresponding percentage of input analog value (voltage/frequency)

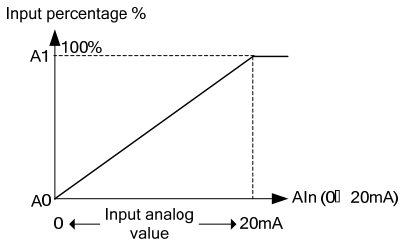


Figure 6−20 Corresponding percentage of input analog value (current)

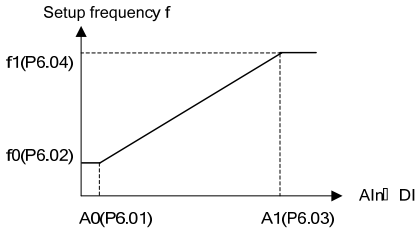


Figure 6−21 Setup frequency characteristics curve (positive effect)

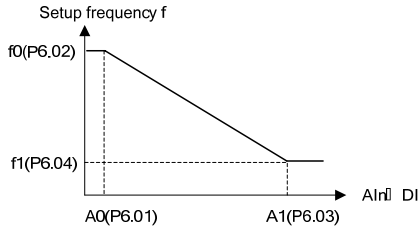


Figure 6−22 Setup frequency characteristics curve (negative effect)

P6.09	Curve 3 input point A0	0.0~110.0%(0.0%)
P6.10	Per-unit value B0 corresponding to curve 3 input point A0	0.0~110.0%(0.0%)
P6.11	Curve 3 input point A1	0.0~110.0%(100.0%)
P6.12	Per-unit value B1 corresponding to curve 3 input point A1	0.0~110.0%(100.0%)
P6.13	Curve 4 input point A0	0.0~110.0%(0.0%)
P6.14	Per-unit value B0 corresponding to curve 4 input point A0	0.0~110.0%(0.0%)
P6.15	Curve 4 input point A1	0.0~110.0%(25.0%)
P6.16	Per-unit value B1 corresponding to curve 4 input point A1	0.0~110.0%(25.0%)
P6.17	Curve 4 input point A2	0.0~110.0%(50.0%)
P6.18	Per-unit value B2 corresponding to curve 4 input point A2	0.0~110.0%(50.0%)
P6.19	Curve 4 input point A3	0.0~110.0%(100.0%)
P6.20	Per-unit I value B3 corresponding to curve 4 input point A3	0.0~110.0%(100.0%)

Curve 3 and curve 4 are basically the same, but that curve 4 has two more setting points than curve 3. The input analog characteristics curve as shown in Figure 6-23. Curve 4 is described as an example here.

Curves 3 and 4 convert the externally input analog into the equipment analog. All the AI and DI inputs will be reduced according to the relationship according to 10V correspondence to100% per unit value. The function of per-unit value is determined by the analog channel function selection P6.21.

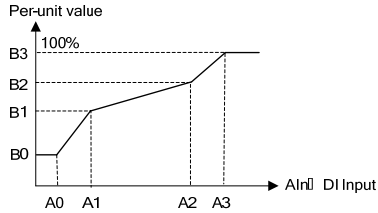


Fig 6−23 Input analog characteristics curve

P6.21	AI1～AI3、DI analog channel function selection	0~ 6666(0000)

Display of operation panel	
Unit's digit	AI1 function selection 0: Open loop frequency or close loop frequency reference; 1: Reserved; 2: Reserved; 3: Reserved; 4: Reserved; 5: Motor temperature feedback (overload protection sensor mode); 6: Reserved

Tens place	AI1 function selection, the same as above;
Hundreds place	AI3 function selection, the same as above;
Thousands place	DI function selection, the same as above

P6.21 is used to select functions of AI1, AI2, AI3 and DI terminals. Since the using methods of AI1, AI2, AI3 and DI are identical, AI1 is described as an example here:

0: Open loop frequency or analog close loop rotation velocity reference: AI1 analog input is converted into setup frequency via the analog curve.

1: Reserved

2: Reserved

3: Reserved

4: Reserved

5: Motor temperature feedback: It is used together with P9.17 sensor protection threshold to report motorthermal protection alarm.

6: Reserved

Note: If the analog channel function is set to a non-zero value, please make sure that different analog channels have different functions.

P6.22	AI1 filtering time	0.000~1.000 s(0.004s)
P6.23	AI2 filtering time	0.000~1.000 s(0.004s)
P6.24	AI3 filtering time	0.000~1.000 s(0.004s)

In field applications, the analog values input via AI1, AI2 and AI3 terminals usually have certain interference signals. It can amplify the setup value of AI filter time properly to improve the anti-interference capability of the terminal input. However, the longer the filtering time of the terminal is, the longer the delay for the response to the action of the terminal is.

P6.25	AI1 used as multi function input terminal	6~99(99)
P6.26	AI2 used as multi function input terminal	6~99(99)
P6.27	AI3 used as multi function input terminal	6~99(99)

When the parameter is set to 99, this means AI1, AI2 and AI3 are used as analog terminals. When the parameter setting is not 99, AI1, AI2 and AI3 can be used as multi function inputs, and the using method is same with Xi(i=1～7), see the descriptions for P5.00 - P5.07.

When AI1 - AI3 are used as multi function inputs, the default voltage detection threshold and hysteresis voltage are as follows: When AI1, AI2 and AI3 inputs ≥7V, it is high level; and when the inputs ≤3V, it is low level and the hysteresis voltage is 4V.

Note: When AI1 - AI3 are used as multi function input terminals, they are used in the same way as terminal Xi. The following example shows the wiring method of AI1 used as multi function input terminal.

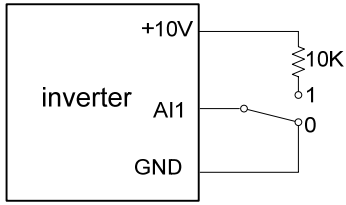


Figure 6−24 Wiring method of AI1 used as multi function input terminal

6.8 Multi-function Output Parameter (Group P7)

P7.00	Y1 terminal output function selection	0 ~ 47(0)
P7.01	Y2/DO terminal output function selection	0 ~ 71(1)
P7.02	Relay terminal output function selection	0 ~47(14)
P7.03	AO1 terminal output function selection	48~ 71(48)
P7.04	AO2 terminal output function selection	48 ~ 71(49)

Y1 and relay terminals can be defined as multifunctional digital signal output. AO1 and AO2 terminals can be defined as multifunctional analog value output, and the analog value type (0 ~ 10V/0 ~ 20mA) can be selected via the jumper.

The terminal Y2 can act as both multifunctional digital signal output and high-speed pulse output (0 ~ 50kHz).

The definition table of multifunctional digital signal output is as follows:

Function setup	Meaning	Function setup	Meaning
0	Signal indicating that the inverter is running (RUN)	1	Frequency arrival signal (FAR)
2	Frequency level detection signal 1(FDT1)	3	Frequency level detection signal 2(FDT2)
4	Pre-warning signal indicating inverter or motor overload (OL)	5	Stop and lock due to under voltage (LU)
6	Stop due to external failure (EXT)	7	Frequency high limit(FHL)
8	Frequency low limit(FLL)	9	Inverter is running at zero speed
10	Preset counting value action	11	Counting value arrival action
12	Reserved	13	Inverter ready for operation (RDY)
14	Inverter failure	15	Inverter reports alarm
16~18	Reserved	19	Output X1
20	Output X2	21	Reserved
22	Zero current detection arrival (relative to motor)	23	Stop command indication
24~47	Reserved		

0: Signal indicating that the inverter is running (RUN)

The signal is enabled when the inverter is running.

1: Frequency arrival signal (FAR)

When the deviation between the output frequency and the setup frequency of the inverter is in the setup

range of the frequency arrival detection width, the signal is enabled. Refer to P7.19 for details.

2: Frequency level detection signal (FDT1)

When the inverter output frequency is higher than FDT1 level high limit, the signal is enabled. When the output frequency is less than FDT1 level low limit, the signal is disabled. Refer to P7.20 ~ P7.21 for details.

3: Frequency level detection signal (FDT2)

When the inverter output frequency is higher than FDT2 level high limit, the signal is enabled. When the output frequency is less than FDT2 level low limit, the signal is disabled. Refer to P7.22 ~ P7.23 for details.

4: Pre-warning signal indicating inverter overload or motor overload (OL)

When the output current is higher than the overload pre-warning detection level and the retention time is higher than the overload pre-warning detection time, the signal is enabled. When the current is lower than the detection level, the signal is disabled. Refer to PA13 ~ PA.15 for details.

5: Stop and lock due to under voltage (LU)

When the inverter bus voltage is lower than the under voltage action value, the signal is enabled.

6: Stop due to external failure(EXT)

When the inverter is in the protection status due to failure of peripherals (“E.oUt” appears on the operation panel), the signal is enabled.

7: Frequency high limit (FHL)

When the inverter output frequency reaches setup frequency high limit, the signal is enabled.

8: Frequency low limit (FLL)

When the inverter output frequency reaches setup frequency low limit, the signal is enabled.

9: Inverter is running at zero speed.

When the inverter output frequency is 0, the single is enabled.

10: Preset counting value action

11: Counting value arrival action

When the counting value of inverter input terminal complies with action, the signal is enabled, Refer to P5.12 and P5.13 for details.

13: Inverter ready for operation (RDY)

When the auto-test of the inverter is normal after power on and the inverter operation disable function is disabled or disable, the signal is enabled.

14: Inverter fault

When the inverter is in the stop status due to failure, the signal is enabled.

15: Inverter reports alarm

When the inverter is in the alarm status due to fault but does not stop, the signal is enabled.

19: Output X1

When the status of multifunctional input X1 terminal is output via the terminal Y, when X1 is enabled, the signal is enabled.

20: Output X2

When the status of multifunctional input X2 terminal is output via the terminal Y, when X2 is enabled, the

signal is enabled.

22: Zero current detection arrival

When the output current of the inverter is lower than the zero current detection width during operation, the signal is enabled. Refer to P7.18 for details.

23: Stop command instruction

When the inverter is in the stop or standby status, the signal is enabled.

12, 16, 17, 18, 21and 24 ~ 47: Reserved

The definition table of multifunctional analog output and pulse output is as follows:

Function setup	Output signal selection	Definition of analog output range	Definition of pulse output range
48	Output frequency	Maximum frequency P0.11 corresponds to 10V/20mA.	Maximum frequency P0.11 corresponds to P7.10.
49	Setup frequency	Maximum frequency P0.11 corresponds to 10V/20mA.	Maximum frequency P0.11 corresponds to P7.10
50	Output current	Two times rated current of inverter corresponds to 10V/20mA.	Two times rated current of inverter corresponds to P7.10
51	Motor current	Two times rated current of motor corresponds to10V/20mA	Two times rated current of motor corresponds to P7.10.
52	Output torque	Two times rated torque of motor corresponds to 10V/20mA.	Two times rated torque of motor corresponds to P7.10
53	Output voltage	Two times maximum output voltage P0.12 corresponds to 10V/20mA.	Two times maximum output voltage P0.12 corresponds to P7.10
54	Bus voltage	1000V corresponds to 10V/20mA	1000V corresponds to P7.10.
55	AI1	10V corresponds to 10V/20mA; 20mA corresponds to 5V/10mA.	10V corresponds to P7.10; 20mA corresponds to 50% of P7.10.
56	AI2	Same as AI1	Same as AI1.
57	AI3	-10V ~ 10V corresponds to 0 ~ 10V/20mA.	-10V ~ 10V corresponds to 0 ~ P7.10.
58	DI	Maximum input pulse frequency P5.10 corresponds to 10V/20mA.	Maximum input pulse frequency P5.10 corresponds to P7.10
59	Output power	2 times rated output power of motor corresponds to 10V/20mA.	2 times rated output power of motor corresponds to P7.10.
60	Host computer percentage	10000 corresponds to10V/20mA.	10000 correspond to P7.10.
61	Heatsink temperature	0 to 100℃ corresponds to 0 to 10V/20mA	100℃ corresponds to P7.10
62	Output frequency 2	Maximum frequency P0.11 corresponds to 10V/20mA	Maximum frequency P0.11 corresponds to 10V/20mA
63~71	Reserved		

Note:

1. Output frequency indicate the output frequency of inverter, Output frequency 2 indicate the frequency calculate by motor rotate speed.
2. The "Host computer percentage" is the frequency or pressure reference.

P7.05	AO1 gain	0.0 ~ 200.0 %(100.0%)
P7.06	AO1 bias	0.0 ~ 200.0 %(0.0%)
P7.07	AO2 gain	0.0 ~ 200.0 %(100.0%)
P7.08	AO2 bias	0.0 ~ 200.0 %(0.0%)
P7.09	Selection of positive and negative gain and bias	0~1111(0000)

This function code can be used to adjust the analog outputs defined in the above table. The adjusted analog value is the actual output of AO terminal.

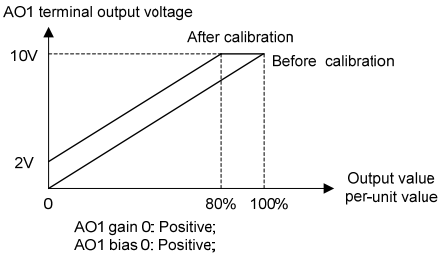
P7.09 is used to determine the positive and negative polarities of the gain or bias.

Display of operation panel	
Unit place	AO1 gain 0: Positive; 1: Negative
Tens place	AO1 bias 0: Positive; 1: Negative
Hundreds place	AO2 gain 0: Positive; 1: Negative
Thousands place	AO2 bias 0: Positive; 1: Negative

Since function codes P7.05 ~ P7.09 are different from other function codes, adjustment will affect the AO output timely, that is, by debugging the parameters P7.05-P7.09, you will get the analog output of A01 and A02.

Both AO1 and AO2 have the same calibration way. Take AO1 as an example:

Set P7.05 to 100.0% and P7.06 to 20.0%,namely, K=1 and b=2V, and the AO1 characteristics curve is as shown in Figure 6-24 and Figure 6-25.



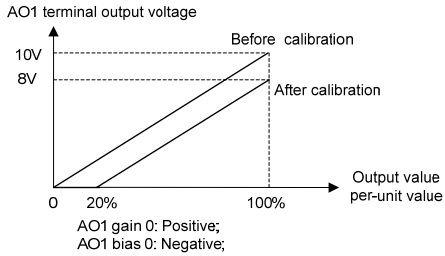


Figure 6−25AO1 Characteristics Curve Kx+b Figure 6−26 AO1 Characteristics Curve Kx−b

Set P7.05 to 100.0% and P7.06 to 120.0%, namely, K=1 and b=12V, and the AO1 characteristics curve is as shown in Figure 6-26.

Set P7.05 to 100.0% and P7.06 to 80.0%, namely, K=1 and b=8V, and the AO1 characteristics curve is as shown in Figure 6-27.

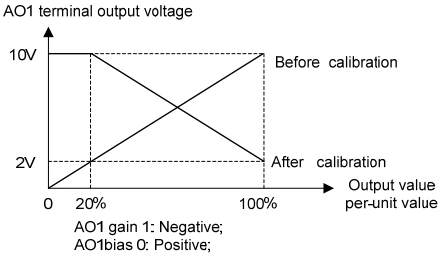


Figure 6−27 AO1 Characteristics Curve−Kx+b

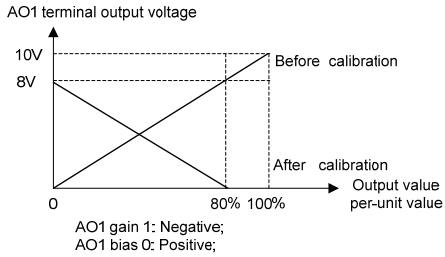


Figure 6−28 AO1 Characteristics Curve−Kx+b

Note: When the analog output gain is set to negative value and the bias is also negative, the AO output will be limited to 0V automatically.

P7.10	Y2/DO Maximum output pulse frequency	0.1~50.0 kHz(10.0kHz)

This function code determines the maximum frequency output by the terminal Y2/DO. Refer to P7.01 for details.

P7.11	Status output signal type (Y1, Y2 and relay)	000~111(000)

This function can realize the output signal (voltage level or pulse) selection among Y1, Y2 and relay terminals.

Note: The life of relay is about 100, 000 times, frequent on/off of the relay contacts will shorten the relay life.

P7.11 status output signal type	
Ones place	Y1 terminal 0: Voltage level signal; 1: Pulse signal
Tens place	Y2 terminal 0: Voltage level signal; 1: Pulse signal
Hundreds place	Relay terminal 0: Voltage level signal; 1: Pulse signal

P7.12	Y1 terminal delay time	0.0~999.9(0.0s)
P7.13	Y1 terminal pulse width	0.0~999.9(0.0s)
P7.14	Y2 terminal delay time	0.0~999.9(0.0s)
P7.15	Y2 terminal pulse width	0.0~999.9(0.0s)
P7.16	Relay terminal delay time	0.0~999.9(0.0s)
P7.17	Relay terminal pulse width	0.0~999.9(0.0s)

Terminal delay time is effective for both voltage level and pulse output signals. The terminal pulse width defines the effective pulse hold-up time of pulse signal. In the following Figure, Yi represents Y1, Y2 and relay terminals, if consistent waveform needs to be kept before and after signals, make sure that output signal width >Yi terminal delay setting, and the pulse when output signal width < Yi terminal delay setting can be neglected.

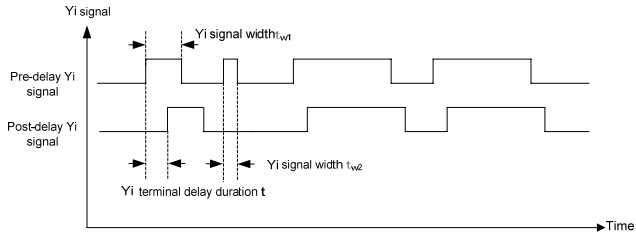


Figure 6−29 Delay of output terminal Yi

P7.18	Zero current detection width	0.0~ 50.0 %(0.0%)

This function can be used for load change detection. Once the output terminal is set to “22: Zero Current Detection Arrival”, indication signal will be output upon the inverter output current is lower than the zero current detection width P7.18.

Note: This function parameter is percentage of the inverter output current to rated current of the motor.

P7.19	Frequency arrival detection width	0.00 ~ 300.00 Hz(2.5Hz)

This function is used for detecting the deviation between output frequency and setup frequency. Once the output terminal function is set to “1: Frequency Arrival Signal”, the deviation between the output frequency and the setup frequency of the inverter is in the setup range of this function code and indication signal is output, as shown in Figure 6-28 Frequency Arrival Signal FAR.

Yi represents Y1 terminal, Y2 terminal or relay terminal.

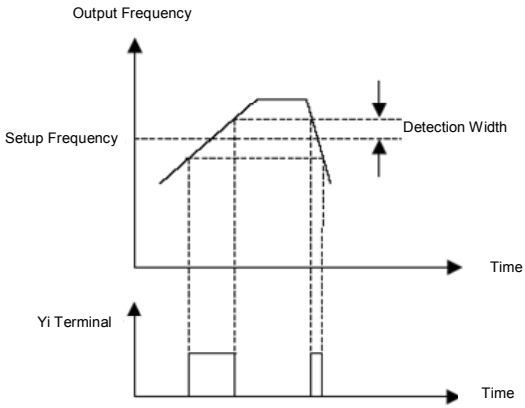


Figure 6-30: Frequency arrival signal (FAR)

P7.20	FDT1 level high limit	0.00 ~ 300.00 Hz(50.00Hz)
P7.21	FDT1 level low limit	0.00 ~300.00 Hz(49.00Hz)
P7.22	FDT2 level high limit	0.00 ~ 300.00 Hz(25.0Hz)
P7.23	FDT2 level low limit	0.00 ~ 300.00 Hz(24.00Hz)

This function is used for detecting whether the output frequency is within the setup FDT. The output terminal function is set to “2: Frequency level detection signal 1” or “3: Frequency level detection signal 2”, the output frequency is in the corresponding FDT setup range and indication signal is output.

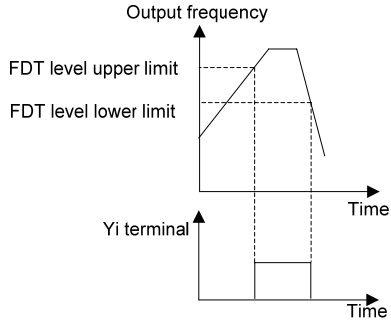


Figure 6-31: Frequency level detection signal (FDT)

P7.24	Virtual terminal effective selection	000 ~ 111(000)

It controls the action of the multifunctional input terminal or output terminal by the host computer.

Display of operation panel	
Unit place	Multifunctional input terminal Xi 0: The real terminal is enabled; 1: The virtual terminal is enabled
Tens place	reserved
Hundreds place	Y1, Y2 and relay terminals 0: The real terminal is enabled; 1: The virtual terminal is enabled

When Xi terminal signal source is input as virtual terminal, whether the corresponding function of this terminal is effective depends on the control of the host computer and has nothing to do with the real status of the current Xi terminal.

When Yi, Y2 and relay terminals are output as virtual terminals, the real outputs of these terminals depend on the control of the host computer and have nothing to do with whether the output terminal function is enabled.

P7.25	Terminal effective status selection	000 ~ 111(000)

It defines the validity of the input and output status of the multifunctional digital terminals.

Display of operation panel	
Unit place	Multifunctional input terminal Xi 0: Enabled if there is current flowing through Xi; 1: Enabled if no current flowing through Xi
Tens place	Multifunctional output terminal Yi 0: Enabled if there is current flowing through Yi; 1: Enabled if no current flowing through Yi
Hundreds place	Relay output terminal 0: Enable in magnetizing status;

	1: Enable in no magnetizing status

When the digital input Xi terminal and COM terminal are short circuited, it may judge whether the input status is enabled by whether there is current flowing in the terminals.

When the digital output Yi terminal acts as open collector output, it may judge whether the output status is enabled by whether there is current flowing in the terminal.

It may judge whether the output status is enabled by whether the relay terminal is in the magnetizing status.

6.9 Process PID Close Loop Parameters (Group P8)

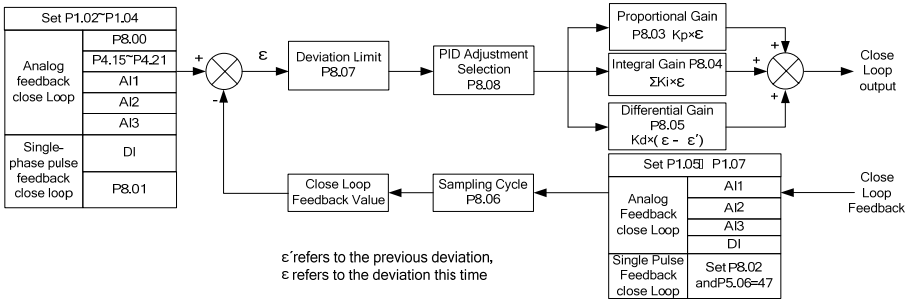


Figure 6-32 Schematic diagram for PID

P8.00	Analog feedback process close loop control digital voltage reference	0.00~10.00 V(0.00V)
P8.01	Single-phase pulse feedback process close loop control digital rotation velocity reference	0~30000 rpm(0rpm)
P8.02	Number of pulses per turn for single-phase pulse	1~9999(1000)

The current control operation mode P0.03 shall be determined before determining the process close loop reference value.

When the current control operation mode is analog feedback process close loop (P0.03=1, 3, 5 and 7), if P1.02 is set to “0”, it may determine the reference value of the close loop by P8.00. If P1.02 is non-zero value, it determines the reference value of the close loop by the analog value and pulse frequency selected in P1.02.

When the current control operation mode is single-phase pulse feedback process close loop (P0.03=2 and 6), it may determine the reference value of the close loop. In addition, when the single-phase pulse feedback process close loop is employed, it needs to use an pulse encoder and set the number of single-phase pulses per rotation for the encoder according to the encoder model (P8.02)so as to determine the close-loop feedback value indicated by the signal feedback by the single-phase pulse.

Note:

- The signal feedback by the single-phase pulse must be connected to X7/DI terminal and this terminal shall be set to “47: Single-Phase Pulse Input. of single-phase pulse feedback process

close loop control.

- In the analog value feedback close loop mode, if P1.02 is set to “0”, it can use multi-section digital voltage reference to implement the multi-section reference function of the close loop. Refer to P4.15 ~ P4.21 for details.

P8.03	Proportional gain Kp	0.000 ~ 10.000(0.200)
P8.04	Integral gain Ki	0.000 ~ 10.000(0.500)
P8.05	Differential gain Kd	0.000 ~ 10.000(0.000)

As shown in Figure 6-30 PID Schematic Diagram, the higher the Kp value is, the faster the response is, but if the Kp value is too big, it may easily generate oscillation and the deviation cannot be eliminated completely. It can use Ki to eliminate the residual deviation. The higher the Ki value is, the faster the response of the inverter to the deviation change, but it may easily generate oscillation if the Ki value is too big. If the system has frequent feedback to the jump, it needs to use Kd because Kd can respond to the deviation change between the system feedback and the reference quickly. The higher the Kd value is, the faster the response is, but it may easily generate oscillation if the value is too big.

P8.06	Sampling cycle	0.001 ~ 30.000 s(0.002s)

This function is used to set the sampling cycle of the feedback signal. The lower this parameter value is, the faster the system response to the deviation between the reference and the feedback, but if the sampling cycle is too fast, the associate requirement for the system PID gain adjustment will be higher, which may result in system oscillation.

P8.07	Deviation limit	0.0 ~ 20.0 %(5.0%)

When this function determines the certain level of the deviation between the feedback signal and the reference signal, it will stop the internal PID regulation and maintain stable output. Only when the deviation between the feedback value and the reference value of the close loop exceeds the deviation limit of P8.07 will the output be updated. Setting the deviation limit needs to take the system control precision and stability into consideration.

P8.08	PID adjustment selection	0 ~ 11(10)

This function determines the specific running mode during the process close loop adjustment.

Display of operation panel	
Unit place	Integration mode 0: Frequency reaches its high limit and low limit the integration adjustment is stopped; 1: Frequency reaches its high limit and low limit and the integration adjustment continues
Tens place	Output frequency 0: It must be consistent with the setup running direction. 1: It can be reverse to the setup running direction

If the output value of the close loop adjustment reaches frequency high limit or low limit (P0.13 or P0.14), there are two actions for selection in the integration section.

0: Stop integration adjustment: the integration value remains unchanged. When there is change

occurring to the deviation between the reference value and the feedback value, the integration value will follow that change trend.

1: Continue integration adjustment: The integration value will immediately respond to the change between the reference value and the feedback value unless this value reaches the internal integration limit. When there is change occurring to the deviation between the reference value and the feedback value changes, it needs to take longer time to offset the impact brought by the continuous integration so that the integration value can catch up that change trend.

If the output value of the close loop adjustment is inconsistent with the current setup running direction, the close loop output value has two actions for selection.

0: It must be consistent with the setup running direction: When the output value of the close loop adjustment is inconsistent with the current setup running direction, the current output value will be forced to be 0 internally.

1: It can be reverse to the setup running direction: When the output value of the close loop adjustment is inconsistent with the current setup running direction, the close loop adjustment opposite to the current setup running direction will be executed.

P8.09	PID positive or negative function	0 ~ 1 (0)

PID is positeve function at default. Negative function is needed if the frequency is required to be increased when feedback value is greater than reference value. This function can realized through setting P8.09=1 or multi-function terminal function setting as 68.

P8.09=0, Terminal function is disabled: Positive;

P8.09=1, Terminal function is enabled: Positive;

P8.09=1, Terminal function is disabled: Negative;

P8.09=0，Terminal function is enabled: Negative.

P8.10	Reserved	0 ~ 65535 (0)

6.10 Motor Parameter (Group P9)

P9.00	Load Type	0 ~ 1(0)

This function is used to determine the motor load type driven by the inverter.

0: G-type constant torque/heavy-duty application

1: L-type variable torque/light-duty application

Once the load type is changed, P9.03 ~ P9.14 will change to the factory default setting automatically, while P3.01 and P3.07 will change to 0 automatically. When the load type is selected as 1, the current limit value PA.05 will change to 120% automatically, while the drive and brake torque limit values Pd.08 and Pd.09 will change to 135% automatically. When the load type is selected as 0, the current limit value PA.05 will change to 160% automatically, while the drive and brake torque limit value Pd.08 and Pd.09 will change to 180% automatically.

P9.01	Number of motor poles	2~ 24(4)
P9.02	Rated rotation velocity of motor	0 ~ 30000 rpm(1500rpm)
P9.03	Rated power of motor	0.4 ~ 999.9 kW(Factory)
P9.04	Rated current of motor	0.1 ~ 999.9 A(Factory)

P9.01 ~ P9.04 are used to set the motor parameters driven by the setup inverter and shall be set properly in accordance with the motor nameplate prior to the use.

Note: The power level of the inverter shall match the motor.

P9.05	Motor no-load current I0	0.1 ~ 999.9 A (Factory)
P9.06	Stator resistance R1	0.000 ~ 65.000 Ω (Factory)
P9.07	Stator inductance leakage L1	0.0 ~ 2000.0 mH (Factory)
P9.08	Rotor resistance R2	0.000 ~ 65.000 Ω (Factory)
P9.09	Mutual inductance L2	0.0 ~ 2000.0 mH (Factory)
P9.10	Magnetic saturation coefficient 1	0.00 ~ 100.00 %(Factory)
P9.11	Magnetic saturation coefficient 2	0.00 ~ 100.00 %(Factory)
P9.12	Magnetic saturation coefficient 3	0.00~100.00 %(Factory)
P9.13	Magnetic saturation coefficient 4	0.00~100.00 %(Factory)
P9.14	Magnetic saturation coefficient 5	0.00~100.00 %(Factory)
P9.15	Parameter auto-tuning	0~2(0)

It determines the key motor parameters affecting the running control of the inverter through implementing the parameter auto-tuning. These motor parameters will be stored in the inverter automatically upon completion of parameter auto-tuning process till next parameter input or another parameter auto-tuning.

The process of parameter auto-tuning is described as follows:

- Input P9.00 to P9.04 properly in accordance with the motor nameplate; set the basic running frequency P0.15, maximum output frequency P0.11 and maximum output voltage P0.12; set the acceleration/deceleration time P0.08 and P0.09 properly.
- Select the implementation mode of parameter auto-tuning P9.15:

1: Static parameter auto-tuning. Press the run key to measure the motor parameters P9.06 ~ P9.08 automatically. and P9.15 will be restored to 0 automatically upon completion of auto-tuning process.

2: Rotating parameter auto-tuning. Press the run key to measure the motor parameters P9.06 ~ P9.14 automatically and P9.15 will be restored to 0 automatically upon completion of auto-tuning process.

Note:

- If the motor can be disconnected from the load, it can select rotation auto-tuning (P9.15=2), or it can select static auto-tuning only. Make sure that the motor is in the standstill status when starting the parameter auto-tuning. If there is over current or over voltage failure during the auto-tuning process, it can prolong the acceleration/deceleration time P0.08 and P0.09 properly.

- If the inverter power does not match the motor power, select static auto-tuning. After the tuning, manually change the no load current P9.05 to about 40% of the motor rated current P9.04.
- If the motor parameters are given, please enter the parameters to P9.05 ~ P9.09 directly. If the motor parameters are not given, please execute the parameter auto-tuning. The magnetic saturation and coefficient value in P9.10 ~ P.14 is automatically set during auto-tuning, eliminating the need of setting by the user.
- During the process of parameter auto-tuning, “-At-“will appear on the operation panel.

P9.16	Motor overload protection	00 ~ 12(00)
P9.17	Sensor protection threshold of motor	0.00 ~ 10.00 V (10.00V)
P9.18	Motor overload protection time	0.5 ~ 30.0 min (10.0min)

This function can be used to protect the motor.

Display of operation panel	
Unit place	Protection mode 0: Motor current mode; 1: Sensor mode; 2: No action
Tens place	Low speed derating 0. Action (applicable to common motor); 1. No action (applicable to variable frequency motor)

The unit’s place of P9.16 determines whether the motor overload protection is to be executed and whether the motor overload protection employs current mode or sensor mode.

0: Motor current mode: Overload is calculated in accordance with motor current, running frequency and running time and compared with the allowable motor overload time determined by P9.18. Once the accumulated overload time is reached, the inverter will report “E.oL2” motor overload failure.

When the load type is constant torque (P9.00=0), the motor overload protection time P9.18 corresponds to the overload protection time under 150% rated load current and is 10 minutes by factory default; when the load type is variable torque (P9.00=1), the motor overload protection time P9.18 corresponds to the overload protection time under 115% of rated load current and is 10 minutes by factory default.

Note: The calculation of motor overload protection continues during the inverter running and stopping process, while the accumulated overload value will be reset when the inverter is power-off.

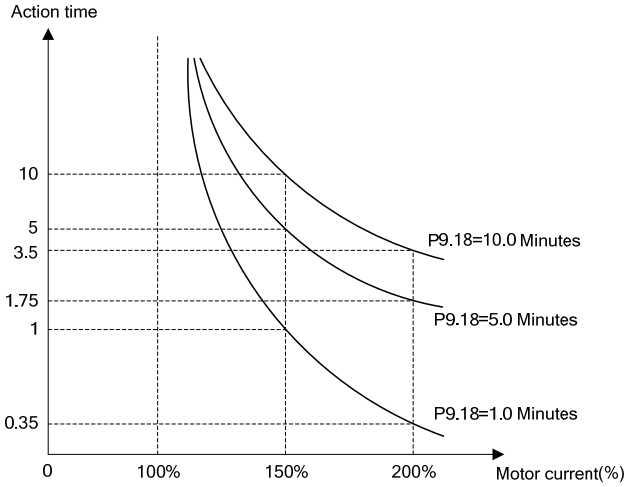


Figure 6-33 Motor Overload Protection Characteristics Curve (Constant Torque)

1: Sensor mode. Compare the analog feedback value of the thermal sensor installed on the motor with the present sensor protection threshold P9.17. If the feedback value is higher than that protection threshold, the inverter will report “E.Ptc” motor overheat failure immediately, without inverse time lag characteristics.

Note: When this protection mode is employed, it needs to select the input channel for the analog feedback value of the thermal sensor and confirm that the input function of this analog channel is selected as “5: Motor Temperature Feedback”.

2: No motor protection action, indicating that the inverter will not protect the overload status of the motor. It must be used with care.

Tens place of P9.16:

0: Action: The heat sink effect will become poorer when the motor is running at low speed and the motor is derated according to the motor overload protection time as determined in P9.18.

1: No action: For some special motors, such as variable frequency motor, “no action” can be selected when derating at low speed. It must be used with care.

6.11 Control Parameter (Group PA)

PA.00	Carrier frequency	0.7 ~ 16.0 kHz(Factory)
PA.01	Carrier frequency automatic adjustment selection	0 ~ 1(1)

Carrier frequency has an important impact on operations of inverter and motor. When carrier frequency increases, the loss, temperature rise and noise of motor will decrease. If carrier frequency decreases, the temperature rise of inverter itself as well as the leakage current of motor and its interference with external radiation will decrease.

PA.01 can determine automatically the most suitable carrier frequency according to the temperature of inverter.

0: Non-auto adjustment, carrier frequency will not be adjusted automatically according to the temperature of inverter. Under favorable circumstances as regards ventilation and heat sink, all loads shall operate with low noise. Set PA.00 with higher carrier frequency and set PA.01 to 0.

1: Auto-adjustment; inverter can adjust automatically carrier frequency through temperature check according to the weight of load. Maintain continuously reliable operation by keeping operating with low noise at low loads and controlling the temperature of inverter at heavy load.

PA.02	Vector control 1 slip compensation gain	0.0 ~ 300.0 %(100.0%)

The function will be enabled when operating under vector control 1 (when P0.03=0~3).The function will help the inverter to keep the motor rotational speed constant if loads vary or under heavy loads.

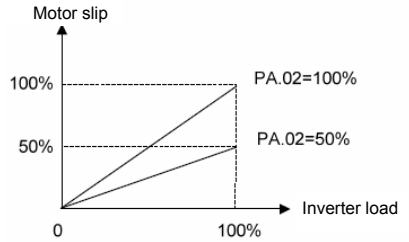


Figure 6-34 Vector control 1 slip compensation gain

PA.03	Droop control	0.00 ~ 10.00 Hz(0.00Hz)

When several inverters drive the same load, the function can distribute the load automatically between inverters and make them work cooperatively. For example, when some inverters run an assembly line, this function can be used to balance loads, allocate loads between inverters at different power levels in proportion to the power, and thus ensure the assembly line operate properly. Each inverter adjusts output frequency automatically according to its load condition and lifting ratio set by drooping control.

Note: This function is only applied to vector control 1.

PA.04	Current limit action selection	0~1(1)
PA.05	Current limit value	20.0~200.0 %(160.0%)

PA.04 current limit motion selection:

0: Disabled. Disabled for both processes of constant speed and acceleration/deceleration.

1: Enabled. Enabled for both processes of constant speed and acceleration/deceleration.

Generally, when setting speed or motor load varies sharply, output current of inverter may reach beyond over current protection value point, resulting over current error. Current limit function reduces effectively occurrences of over current errors as inverter controls instantaneous output current and keep the sharply changed output current below protective motion value, thus ensuring continuous and reliable operation of system. When current exceeds a certain value (PA.05), the inverter will turn into current limit status. When running at constant speed, maintain stable load capacity without producing over current error by current limit. When loads mitigate, exit the current limit status automatically, and return to work properly. The function is especially applied to applications of suddenly changed speed or load.

Note:

- Current limit current PA.05 is proportion of rated current of inverter. When torque load varies: 20.0~150.0%.
- This function is only applied to vector control 1.
- Under the current limit status, the speed of motor will decrease. The current limit function is not appropriate for systems that will not permit reduce speed, for example lifter, otherwise will loss of control.

PA.06	Voltage adjustment function	000 ~ 111(101)

Unit place: Over-voltage adjustment: When motor with large inertial load stops rapidly, or a short-time regenerative braking happens for load abrupt changes when the motor is running, DC bus voltage of inverter will rise, thus may result over-voltage protective motion. The voltage adjustment function in this case is to decrease the braking torque to control the DC bus voltage to prenvent over voltage alarm through adjusting output frequency and auto prolonging deceleration time.

Note: If energy-consumption braking is applied and braking unit (PA.09=1) has been set and applied, the function becomes disabled.

Tens place: Under-voltage adjustment: When power supply voltage decreases or instantaneous power-off; DC bus voltage will also decrease.The function of under-voltage adjustment is to decrease the motor rotating speed through decreasing the output frequency,and the load inertial energy is fed back to DC side to keep DC voltage higher than the under valtage value to avoid stopping caused by under voltage.Under voltage function is very effective in applications such as centrifugal pump and fan.

Note: This function is only applied to vector control 1.

Hundreds place: Overmodulation: This function is used to increase inverter output voltage and ensure the inverter output capacity under low grid voltage or heavy load.

Display of operation panel	
Unit place:	Over-voltage adjustment: 0: No action; 1: Action
Tens place	Under-voltage adjustment: 0: No action; 1: Action
Hundreds place	Overmodulation: 0: No action; 1: Action

PA.07	Energy-saving coefficient	0 ~ 50 %(0%)

By setting PA07, ensure that output voltage will decrease automatically as the loads decrease under proper operation. The inverter maximally decreases reactive power to save more energy. Adjust the parameter according to real load conditions. The greater the parameter setting is, more visible the energy saving effect achieves, and the longer the response time lasts for the inverter converting from energy saving condition to proper operation status.

Note:

- This function is only applied to Vector control 1.
- The function applies to valiable torque loads such as fan and pump. If used in applications of constant torque loads and rapidly changing loads, the function will result delayed control response.
- This function is disabled during acceleration/deceleration process.

PA.08	Magnetic flux braking selection	0 ~ 1(1)

0: Magnetic flux braking disabled

1: Magnetic flux braking enabled

When the motor decreases, the inverter can rapidly slow down if magnetic flux braking action is selected. Then the electric energy can be transformed to heat energy during the braking process.

Rapid deceleration can be realized by selecting magnetic flux braking action, but the output current will be bigger. Selecting no action, the deceleration will last longer, but the output current will be smaller.

PA.09	Energy consumption braking selection	0 ~ 1(0)

Determine whether to use energy consumption braking using braking unit selection PA.09.

0: Energy consumption braking disabled

1: Energy consumption braking enabled

For big rotating inertia applications and when rapid stop by braking is required, select matched braking unit and braking resistance and set braking parameter for the motor stop rapidly by braking.

PA.10	Braking unit operating time	100.0 s(100.0s)
PA.11	Braking unit action voltage	650 ~ 750 V(720V)

Braking unit operating time PA.10 and braking unit action voltage PA.11 are only applied to inverter with built-in braking unit.

Braking unit action cycle is fixed to be 100s. If PA.09 is set to 1, the use rate of the braking unit is fixed to 100%. That is, the use time of the braking unit is fixed to 100.0s

Action voltage of braking unit can be selected by adjusting PA.11. The motor can be stopped rapidly by energy braking with the appropriate action voltage.

Note: Set PA.09 to 1 when using braking unit. For model selection of braking unit parts and connection, refer to 1.9 braking unit model selection.

PA.12	Relay action indication when the inverter is faulty.	000 ~ 111(100)

Generally, when inverter produces a failure alarm, the relay will make corresponding indication action. With this function, the action of error relay terminal can be set under some special conditions.

Display of operation panel	
Unit place:	Under-voltage failure 0: Disable; 1: Enable
Tens place	Auto reset interval period 0: Disable; 1: Enable
Hundreds place	Failure locked 0: Disable; 1: Enable

Unit place: Under low-voltage status such as power-up or power failure, choose whether the failure indication to act or not.

Tens place: When the real failure is not displayed during auto reset period, choose whether the failure indication to act or not. Refer to PA.21 and PA.22 instructions.

Hundreds place: If failures lock function enabled, when locked failures during last power-failure are displayed after power-on again, choose whether the failure indication to act or not. Refer to PA.20 instruction.

PA.13	Inverter or motor overload prealarm	000 ~ 111(000)
PA.14	Overload prealarm detection level	20.0 ~ 200.0 %(130.0%)
PA.15	Overload prealarm detection time	0.1 ~ 60.0 s(5.0s)

Overload prealarm function can realize indication of pre-setting overload status or alarm stop.
PA.13 determines overload prealarm detection volume and conditions.

Display of operation panel	
Unit place:	Detection volume selection 0: Motor overload prealarm, relative motor rated current; 1: Inverter overload prealarm, relative inverter rated current
Tens place	Action selection after overload prealarm 0: Continue to run: 1: Report overload failure and stop
Hundreds place	Detection conditions selection 0: Detection all the time; 1: Detection only at constant speed

Unit place: Determine whether overload detection is motor overload prealarm or inverter overload prealarm.

Tens place: Determine whether inverter continues to run or alarms then stops when the output current exceeds continuously overload prealarm detection level PA.14 and the lasting time is longer than

overload prealarm detection time PA.15. If tens place is selected with overload failure display and stop, it will display “E.oL2” when the unit place is 0, it will display “E.oL1” when the unit place is 1.

Hundreds place: Determine under which run status the overload prealarm function will be enabled.

Note: Y terminal with multiple function can be set to “4: Overload detection signal (OL)” to display overload prealarm signal.

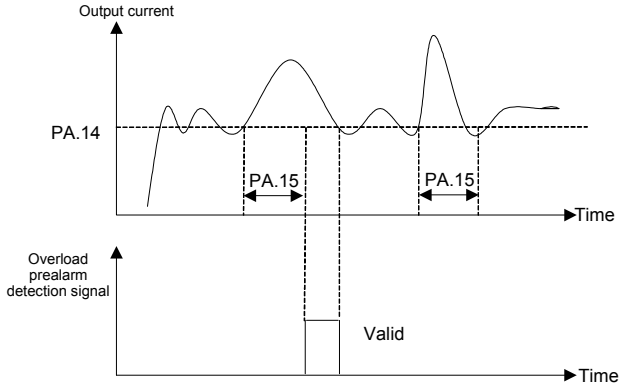


Figure 6−35 Overload prealarm detection signal

PA.16	Fault shielded and alarm attribute setup 1	0000 ~ 2222(0020)
PA.17	Fault shielded and alarm attribute setup 2	0000 ~ 2222(0000)
PA.18	Fault shielded and alarm attribute setup 3	0000 ~ 2222(2000)
PA.19	Fault shielded and alarm attribute setup 4	0000 ~ 2222(0002)

The function can be used to manage various actions when some failures occur. When these failures occur under some special circumstances, inverter shall alarm immediately but not stop. Alarm information is displayed on the operational panel and even the failure is to be shielded.

Unit place, tens place, hundreds place and thousands place displayed on operational panels from PA.16 to PA.19 can be set:

0: Failure not shielded and alarm and stop during failure.

1: Failure not shielded and alarm but not stop during failure.

2: Failure shielded, neither alarm nor stop.

Note: To change factory-setting, please contact with distributor or manufacturer.

PA.16 failure shield and alarm attribute setting 1

Display of operation panel	
Unit place:	Output short circuit to ground abnormality
Tens place	Power failure abnormality during running
Hundreds place	Input power abnormality
Thousands place	Output phase loss

PA.17 failure shield and alarm attribute setting 2

Display of operational panel	
Unit place	EEPROM abnormality
Tens place	Relay contact abnormality
Hundreds place	Temperature sensor taking sample anomaly
Thousands place	Encoder disconnection

PA.18 Failure shield and alarm attribute setting 3

Display of operational panel	
Unit place	Abnormal +10V power supply output
Tens place	Abnormal analog input
Hundreds place	Motor over-temperature (PTC)
Thousands place	Abnormal communication1(operational panel 485)

PA.19 Failure shield and alarm attribute setting 4

Display of operational panel	
Unit place	Abnormal communication2(RS485 terminal)
Tens place	Abnormal version compatibility
Hundreds place	Reserved
Thousands place	Reserved

PA.20	Fault locking function selection	0 ~ 1(0)

0: Failure lock disabled.

1: Failure lock enabled: Allowing re-display faults occurred upon last power failure after power-on properly run only after resetting failure.

Note:

- Whether to output failure indication at the same time is decided by action indication of fault relay of inverter. Refer to PA.12 instruction.
- LU under-voltage cannot be locked upon next time power-up of the inverter as failure.

PA.21	Automatic reset times	0 ~ 20(0)
PA.22	Automatic reset interval	2.0 ~ 20.0 s(2.0s)

The function can be used to auto reset from ordinary failures. The inverter will start to run automatically again after auto reset interval period PA.22. If the failure still exists as the inverter starts again after auto reset times PA.21, it will alarm then stop. For faults such as overcurrent or overvoltage occurred occasionally from beginning or during running, the function can be used if you want the equipment keep running without manual interfere.

Note: For fault E.PCU, E.rEF, E.AUt, E.FAL, E.oUt, E.ot1, E.ot2, E.Cur, E.GdF, E.LV1, E.CPy, E.dL4, E.IoF and E.oL3, there has no auto reset function. The inverter will not check fault.

6.12 Enhanced Function Parameter (Group Pb)

Pb.00	Skip frequency 1 low limit	0.00 ~ 300.00 Hz(0.00Hz)
Pb.01	Skip frequency 1 high limit	0.00 ~ 300.00 Hz(0.00Hz)
Pb.02	Skip frequency 2 low limit	0.00 ~ 300.00 Hz(0.00Hz)
Pb.03	Skip frequency 2 high limit	0.00 ~ 300.00 Hz(0.00Hz)
Pb.04	Skip frequency 3 low limit	0.00 ~ 300.00 Hz(0.00Hz)
Pb.05	Skip frequency 3 high limit	0.00 ~ 300.00 Hz(0.00Hz)

Set Skip frequency range of inverter to avoid mechanical resonance. When the setting frequency of inverter is less than the Skip frequency, the inverter will run automatically at the high limit or low limit of the Skip frequency (change to run at low limit of the Skip frequency when acceleration, for deceleration, change to run at high limit of the Skip frequency), as shown in Figure 6-34.

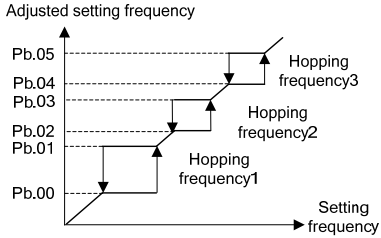


Figure 6-36 High and low limit of Skip frequency

Pb.06	Single step without integral function	0.00~10.00Hz(0.1Hz)

When Pb.08 and Pb.10 setting without integral function, UP/DN single step increase or decrease frequency define by Pb.06.

Pb.07	Magnification selection	00~01(00)

Display of operation panel	
Unit place	Acceleration/deceleration time 0:×1; 1:×10
Tens place	Reserved

For some special applications that longer acceleration/deceleration time is required, the function can be used to determine magnification of acceleration/deceleration time that has been set. For example, if the current acceleration/deceleration time 0(P0.08, P0.09) is enabled, the real applied acceleration/deceleration time is 10 times as long as acceleration/deceleration time 0 when ×10 is selected.

Pb.08	Operational panel ∧/∨ digital regulating frequency control	0000~1221(0001)
Pb.09	Operational panel ∧/∨ integral rate	0.1~50.0 s(2.0s)

Setting with operational panel ∧/∨ regulating frequency can be realized by the function. When the

operational panel is in the parameter display state of operation or stop,through operational panel ∧/∨ to regulate frequency is the most direct and covenient way. Frequency value will save in the inverter and superimposed on other frequency as final frequency.

Operational panel ∧/∨ digital regulating frequency control Pb.08 determines the function of operation panel ∧/∨ adjustment volume.

Operational panel ∧/∨ integral rate Pb.09 determines the time it will take to refresh increment/decrement for one time when adjusting with ∧/∨, that is, if you hold press the key for the time you have set for Pb.09, the frequency will be changed after the time you have set.

Display of operational panel	
Unit place	Action when power failure 0: mains loss save; 1: reset upon mains loss
Tens place	Action when stop 0: Maintain when stop; 1: Reset clear when deceleration or stop; 2: Reset during standby
Hundreds place	Operational panel ∧/∨ regulation setting 0: Only enabled when main reference is P0.05 open loop digital frequency setting 1: Enabled during adjustment; 2: Disabled during adjustment
Thousands place	0: With integral function; 1: Without integral function

Unit place: Action upon mains loss

0: After setting frequency by operational panel ∧/∨ adjustment, operational panel ∧/∨ adjustment volume will be recorded automatically after power to the inverter is cut off.

1: After setting frequency by operational panel ∧/∨ adjustment, operational panel ∧/∨ adjustment volume will be cleared automatically after power to the inverter is cut off.

Tens place: Action during stopping process

0: After the inverter stops, adjustment volume of ∧/∨ on operational panel keeps unchanged.

1: After the inverter stops, adjustment volume of ∧/∨ on operational panel will be cleared after carrying out stop command.

2: After the inverter stops, adjustment volume of ∧/∨ on operational panel is cleared under the stop status. Frequency cannot set by ∧/∨ under the stop status.

Hundreds place: Setting of ∧/∨ on operational panel

0: Only enabled when the main reference is P0.05 open loop digital frequency setting (P0.04=0).

1: Enabled under all frequency reference modes (P0.04 not specified).

2: Operational panel adjustment ∧/∨ disabled.

Thousands place: Setting of ∧/∨ on operational panel

0: With integral function. When the operation panel ∧/∨ adjustment is used to set the frequency, the consistent adjustment in one direction has integral effect. The step length of adjustment starts from 0.01Hz, after every 10 times of adjustment, the step length will be increased by 10 times, and the maximum step length of adjustment is 1.00Hz.

1: Without integral function. When the operation panel ∧/∨ adjustment is used to set the frequency, the step length of the adjustment is fixed to 0.1Hz.

Note: When operating under process closed loop PID, the closed loop reference also can be adjusted with operational panel ∧/∨. Then adjustment volume of ∧/∨ is regarded as analog superimposed upon closed loop reference. The minimum step size is 1mV.

Pb.10	Terminal UP/DN digital regulating frequency control	0000~1221(0001)
Pb.11	Terminal UP/DN integral rate	0.1~50.0 s(2.0s)

Display of operational panel	
Unit place	Action when power failure 0: Mains loss save; 1: Zero clearing upon mains loss
Tens place	Action upon stop 0: Maintained upon stop; 1: Reset when deceleration to stop; 2: Reset when standby
Hundreds place	Terminal UP/DN regulation setting 0: Only enabled when main reference is P0.05 open loop digital frequency setting; 1: Enabled during adjustment; 2: Disabled during adjustment
Thousands place	0: With integral function; 1: Without integral function

Pb.10 and Pb.11 are the same as the usage of operational panel ∧/∨. For functions of terminal UP/DN, refer to instructions of P5.00~P5.06.

Pb.12	Actions when preset operation time out	0.0~999.9(0.0s)
Pb.13	Preset continuous operation time	0.0~999.9(0.0s)
Pb.14	Preset total operation time	0.0~999.9(0.0s)

Pb.12 Actions when preset running time out	
Ones place	Ones place: continuous running time out 0: Continue to run; 1: Stop and alarm
Tens place	Tens place: Total running time out 0: Continue to run; 1: Stop and alarm

This function can determine if the inverter alarms automatically or stops after the inverter running time reaches the preset time. The default values of Pb.13 and Pb.14 are 0 without timing.

Starting from the time when the inverter responses to the running command, the inverter outputs indication signal after the continuous running time reaches the continuous running time Pb.13. You can realize the output of indication time by setting terminal Y to “18: Preset continuous running time out”.

Starting from the time when the inverter is powered on, the inverter outputs indication signal after the total running time reaches the preset total running time Pb.14. You can realize the output of indication time by setting terminal Y to “17: Preset continuous running time out”.

Note:

◆ Continuous running time and total running time will be cleared after power off.

◆ The continuous running time will be automatically cleared in stopping state, and after the indication signal of the continuous running time is enabled, the indication signal is disabled in stopping state.

◆ The total running time will not be cleared in stopping state. After indication signal for the total running time is enabled, the indication signal in stopping state becomes disabled and the timing will be automatically cleared.

◆ When restoring the function code operation (P0.01=4 or 5), this visible/hidden setting can be restored to factory setting.

Pb.15	Restart automatically after power resumes normal	0~1(0)
Pb.16	Waiting time for restart	0.0~20.0 s(0.5s)

0: No action after power resumes normal.

1: Action after power resumes normal.

The function supports automatic operation of the inverter when the power to the inverter resumes normal after power failure. Be careful in using this function.

When restart after power failure is selected, the inverter will operate automatically after power on under any operating command reference mode, such as operation panel operating command reference, terminal operating command reference or host computer operating command reference.

When restart after power failure is selected, if P0.06=1 and the running terninal is enabled when power on, the inverter will start running after the power resumes.

Note: To ensure this function is enabled under terminal operating command reference mode, please do not change the status of operating command terminal during shutdown.

Pb.17	Pre-set frequency	0.00~300.00 Hz(0.00Hz)
Pb.18	Pre-set frequency operating time	0.0~3600.0 s(0.0s)

When the inverter operates, the function can response the setting of reference channel for other frequencies after using the pre-set frequency as the setting frequency and keeping the time as pre-set frequency operating time Pb.18.

Pb.19	High limit of zero frequency operation	0.00~300.00 Hz(0.00Hz)
Pb.20	Low limit of zero frequency operation	0.00~300.00 Hz(0.00Hz)

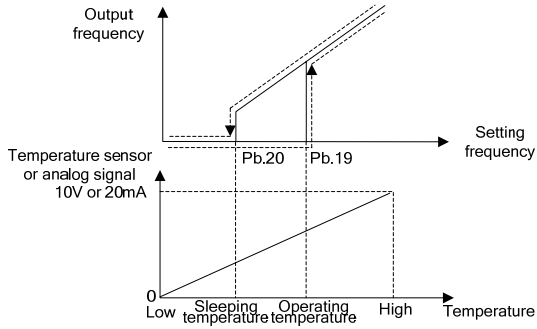


Figure 6-37 High and low limit of zero frequency operation

This function supports sleep function and energy saving operation. After running, the inverter will start when the setting frequency≥Pb.19. During operation, the inverter operates at zero frequency when the setting frequency≤Pb.20. Proper setting of limit value of zero operation can avoid the inverter starting and stopping frequently. If the inverter is often used for work situations such as air condition and fan, change the analog signal of temperature sensor to setting frequency to control automatic starting or stopping of inverter. See Figure 6-35.

Pb.21	Reserved	0~1(0)
Pb.22	Reserved	0.0~380.0(380.0)
Pb.23	Parameters copy	0~5(0)

Parameters copy function can be realized through operation panel.

0: No operation. When upload or download completed, the parameter restores automatically to 0.

1: Upload parameters. Press PRG button to upload parameters to the operation panel after setting, and will display percentage of copy process when indicating “CoPy”.

2: Download parameters (without motor’s parameters). Press PRG button to download parameters to the inverter after setting, and will display percentage of copy process when indicating “CoPy”. Parameters of motor (P9 Group) will not be downloaded to the inverter with this operation.

3: Download parameters (all users’ parameters). Press PRG button to download parameters to the inverter after setting, and will prompt percentage of copy process when indicating “CoPy”.

4: Parameters blocking enabled (upload not allowed). Avoiding deleting parameters that have been copied to the operation panel if you upload data unconsciously again. After setting this function, “HoLd” will be displayed on the operation panel when conducting parameters upload if you do not carry out unblocking parameters blocking function (upload allowed).

5: Unblocking parameters blocking (upload allowed), allowing uploading parameters to the operation panel after setting.

Note:

- After completing the above settings, Pb.23 will be automatically returned to “0: no action”.

‘’E.CPy” will display if error occurs during copying process.

- The parameters for V5 inverter and V6 inverter cannot be copied between each other.
- The copy operation can be performed only when the operation panel copy identification codes of the two inverters for upload and download (d1.09) are consistent.
- The copy function can be completed only when the inverter is completely powered off and then powered up after the download of the parameters for copy is completed.

6.13 Communication Parameters (Group PC)

PC.00	Communication baud rate	4~8(6)
PC.01	Data format	0~2(0)
PC.02	Local address	1~247(1)

The inverter supports international Modbus RTU protocol. Refer to the appendix.A.

PC.00 determines communication baud rate ranging from 4800~57600bps.

4: 4800bps

5: 9600bps

6: 19200bps

7: 38400bps

8: 57600bps

PC.01 sets communication format, odd-even check.

0: 1-8-1 format, without check.

1: 1-8-1 format, even check.

2: 1-8-1 format, odd check.

PC.02 sets the local address. 0 is the broadcast address, available address “1~247”, 248~255 for reservation.

PC.03	Reserved	0(0)
PC.04	Master-slave mode	0~2(0)
PC.05	Operation Address from master to slave (set by master)	0~2(0)
PC.06	Slave setting frequency proportional coefficient (set by slave)	0.00~10.00(1.00)

PC.04 master-slave mode:

0: SCIA is slave mode and SCIB is slave mode;

1: SCIA is master mode and SCIB is slave mode;

2: SCIA is slave mode and SCIB is master mode.

PC.05 master to slave operation address (set by master), position for writing slave function code to master setting frequency:

0: P0.05 1: P8.00 2: P8.01

The inverter provides two communication ports. SCIA is a port connecting with operation panel, and SCIB is used terminal for 485+ and 485-.

In common applications, the inverter operates under slave mode (PC.04=0) and responses to external instructions.

Master mode: Actively sending data to other devices, which is often applied when multi-machines operate synchronously. When selecting master mode, one unit in a group of units often is set to a master to transfer operating frequency instructions to other units. When the slave receives frequency instructions from the master, it will store these instructions at the position of function code specified by PC.05. For example, if open loop digital frequency is given, adopt P0.05 as frequency reference and set PC.05=0.

If inverter master mode is set for SCIA/SCIB and operation panel has been inserted, the operation panel will take priority of controlling, and the function of inverter as master mode will lose effect automatically. Pull out the operation panel, after 10 seconds the inverter will return back to master mode.

PC.06 slave setting frequency proportional coefficient (set by the slave):

The parameter is only enabled for the slave and is used to set the slave to receive correction coefficient specified by the master.

Slave setting=PC.06 × master reference.

6.14 Vector Control 2 Parameters (Group Pd)

This group of functions is only enabled for vector control 2. They are disabled for Vector control 1.

Pd.00	Speed/torque control	0~1(0)

Note: The series of V5-H is only support speed model upon vector control, if torque control model upon vector control is needed, please select the inverter series of V6-H.

Pd.01	Speed loop proportional gain 1 (ASR_P1)	0.000~6.000(2.00or3.00)
Pd.02	Speed loop integral time 1 (ASR_I1)	0.000~6.000 s(0.200)
Pd.03	Speed loop proportional gain 2 (ASR_P2)	0.000~6.000(2.00or3.00)
Pd.04	Speed loop integral time 2 (ASR_I2)	0.000~6.000 s(0.200s)
Pd.05	ASR switching frequency	0.00~300.00 Hz(5.00Hz)

Adjust proportional gain and integral time for the speed regulator.

Proportional gain P:

Adjust according to rotating inertia of machines connecting with motor. For machines with large rotating inertias, please increase P gain; for machines with small rotating inertias, please decrease P gain.

When P gain is greater than inertia, although the control response can be accelerated, the motor may shock or overshoot. Reversely, if P gain is smaller than inertia, the control response will get slower and the time taken to adjust the speed to the stable value will longer.

Integral time I:

The integral is disabled when setting the integral time I to 0 (controlled by P alone). To ensure the difference between the speed instructions and real speed is 0 under steady-state conditions, set the integral time I to non-0 values. When I value is smaller, the system responses quickly. But if the value is

very small, shock will occur. If I value is greater, the system responds slowly.

Adjust PI settings when operating quickly or slowly:

When the motor speed is greater than ASR switching frequency Pd.05, Pd.01 and Pd.02 will act to make the system obtain reasonable dynamic response when no shock occurs. If the motor speed is smaller than ASR switching frequency Pd.05, Pd.03 and Pd.04 will act. To obtain reasonable dynamic response when operating slowly, increase proportional gain Pd.03 and reduce integral time Pd.04 properly.

Pd.06	Maximum speed limit for forward running when torque control	0.00~300.00Hz(50.00Hz)
Pd.07	Maximum speed limit for reverse running when torque control	0.00~300.00Hz(50.00Hz)

Upon torque control, the speed cannot be controlled. When the set ztorque is greater than the load torque, the motor speed will keep rising to the speed limiting value. This function code sets the forward/reverse maximum speed limiting value.

Note:

- The analog channel input may be used to realize the maximum speed limiting upon torque control. Refer to the description of analog channel function selection P6.21.
- When analog channel input is used to realize speed limiting, terminals can be used to forcefully use Pd.06 and Pd.07 as the speed limiting value.

Pd.08	Drive torque limit	0.0~250.0 %(180.0%)
Pd.09	Braking torque limit	0.0~250.0 %(180.0%)

Pd.08 and Pd.09 are used to limit the maximum output torque of the inverter. The limit value is proportion of the rated output torque of motor. When large braking torque is required, please adopt additionally the energy braking method.

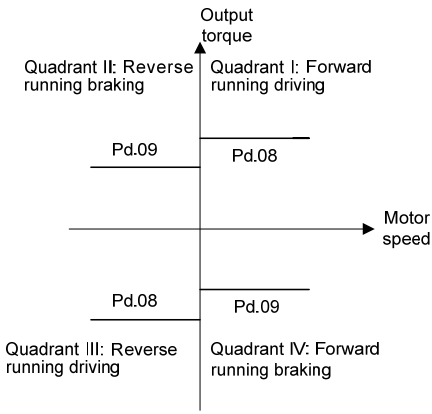


Figure 6-38 Torque limit

Note: When setting P9.00 to 1, i.e. operating with variable torque load, the setting range of Pd.08 and Pd.09 change to 0.0~150.0%. The leave-factory value is 135.0%

Pd.10	Reserved	0~65535(4)
Pd.11	Reserved	0.000~65.535(0.010)
Pd.12	Reserved	0~120.00s(0.10s)
Pd.13	Reserved	0~120.00s(0.10s)
Pd.14	Pre-magnetizing time	0.000~8.000 s(0.300s)

Pre-magnetizing is to create magnetize flux before the motor starts, aiming at fast response upon starting up of the motor. When operation instructions are available, bring the inverter into the pre-magnetizing status in the time set by this function code. After establishing the magnetize flux, try to accelerate normally. If the function code is set to 0, no pre-magnetizing process is applied.

Note: The motor may rotate during pre-magnetizing, and then adopt mechanical braking additionally.

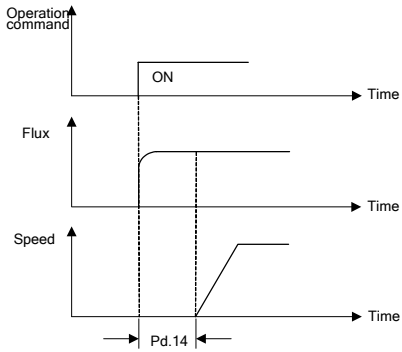


Figure 6-39 Pre-magnetizing

Pd.15	Current loop scale coefficient (ACR_P)	0~2000(1000)
Pd.16	Current loop integral coefficient (ACR_I)	0~6000(1000)

Vector control will control the output current of motor and keep track of current instruction value. Scale and integral gain of current control (ACR) shall be set here. Usually the factory default shall not be changed. Generally, increase P gain when coil inductance is high, decrease P gain when coil inductance is low. Current oscillation will be occurred as a result of setting I gain to extremely high.

Pd.17	Vector control slip compensation gain (electric)	10.0~300.0 %(100.0%)

When loads increase, motor slip will increase, but the rotating speed will decrease. The speed of motor can be controlled constantly by slip compensation. Please make adjustments according to below conditions:

When the motor speed is below the setting target value, increase vector control slip compensation gain.

When the motor speed is above the setting target value, decrease vector control slip compensation gain.

Note: When the temperature of motor increases, interior parameters of motor will change and the slip will

increase. Adjusting the function code can help to compensate the effects from temperature rise of motor.

Pd.18	Vector control slip compensation gain (power generation)	10.0～300.0 %（100.0%）

When loads increase, motor's slip will increase, and the rotating speed will also increase. The speed of motor can be controlled constantly by slip compensation. Please make adjustments according to below conditions:

When the motor speed is below the setting target value, decrease vector control slip compensation gain.

When the motor speed is above the setting target value, increase vector control slip compensation gain.

Note: When the temperature of motor increases, interior parameters of motor will change and the slip will increase. Adjusting the function code can help to compensate the effects from temperature rise of motor.

Pd.19	ASR input filtering time	0.0～500.0 ms（0.5ms）

This function defines the input filtering time of speed adjuster (ASR). In general, it needs no modification.

Pd.20	ASR output filtering time	0.0～500.0 ms（0.5ms）

This function defines the input filtering time of speed adjuster (ASR). In general, it needs no modification.

Pd.33	Torque limiting compensation coefficient of constant power zone	0.0～100.0 %（40.0%）

This parameter compensates the torque limiting of the constant power zone. The acceleration/deceleration time and output torque of the inverter when running in constant power zone can be optimized by changing this parameter.

Pd.34	Reserved	0～65535（28）
Pd.35	Reserved	0～65535（1500）
Pd.36	Reserved	0～65535（0）

6.15 Failure Record Parameters (Group d0)

d0.00	Fault type record 2	0~62(0)
d0.01	Fault type record 1	0~62(0)
d0.02	(Latest) Fault type record 0	0~62(0)
d0.03	Bus voltage of the latest failure	0~999 V(0V)
d0.04	Actual current of the latest failure	0.0~999.9 A(0.0A)
d0.05	Operation frequency of the latest failure	0.00~300.00 Hz (0.00Hz)

The inverter can record the latest three fault' code serial number (see 7.1 list of failure and alarm information) and bus voltage, output current and operation frequency during failures recently occurred for the ease of Trouble Shooting and repair.

Note: Upon the under-voltage display (LU), the parameters of fault type and failure time will not be saved.

d0.06	Total power-up time of inverter	0.000~65.535 kh(0.000kh)
d0.07	Total operation time of inverter	0.000~65.535 kh(0.000kh)

d0.08	Record of maximum temperature of heatsink	0.0~100.0 °C(0.0° C)
d0.09	Record of maximum bus voltage fluctuation	0~1000V(0V)
d0.10	Reserved	0.00~300.00Hz(0.00Hz)
d0.11	Reserved	0~5(0)

The inverter can record automatically the following information: Total power-up time of inverter, total operation time of inverter, record of maximum temperature of heat-sink, record of maximum bus voltage fluctuation,.

6.16 Product Identity Parameters (Group d1)

d1.00	Serial number	0.0~FFF.F(Factory)
d1.01	Software version number of control panel	0.00~99.99(Factory)
d1.02	Non-standard version number of software of control panel	0.00~FF.FF(Factory)
d1.03	Software version number of operating panel	0.000~F.FFF(Factory)
d1.04	Software version number of extended panel	0.000~F.FFF(Factory)
d1.05	Manufacturer’s bar code 1	0~9999(Factory)
d1.06	Manufacturer’s bar code 2	0~9999(Factory)
d1.07	Manufacturer’s bar code 3	0~9999(Factory)
d1.08	Manufacturer’s bar code 4	0~9999(Factory)
d1.09	Operation panel copy identification code	0.00~655.35(Factory)
d1.10	Control board software identification cod	0~65535(Factory)
d1.11	Reserved	0~65535(Factory)

Software version number and non-standard version number of product represent the software type. Each inverter has a unique bar code for identification of product and determining product information.

6.17 Use of Display Parameters (Group d2)

d2.00	Temperature of heatsink	0.0~100.0º C (0.0º C)
d2.01	Terminal count value	0~65535(0)
d2.02	AI1 percentage after curvilinear transformation	0.0~100.0%(0.0%)
d2.03	AI2 percentage after curvilinear transformation	0.0~100.0%(0.0%)
d2.04	AI3 percentage after curvilinear transformation	0.0~100.0%(0.0%)
d2.05	DI percentage after curvilinear transformation	0.0~100.0%(0.0%)
d2.06	Operation panel ∧/∨ digital adjustment volume	0~65535(0)
d2.07	Terminal UP/DN digital adjustment volume	0~65535(0)
d2.08	Reserved	0.00~65535(Factory)
d2.09	Input status display of X terminal	0~FFFF(0000)
d2.10	Reference voltage 1 (percentage)	0.0~100.0%(Factory)
d2.11	Reference voltage 2 (percentage)	0.0-100.0%(Factory)
d2.12	AI failure source display	0~5(Factory)
d2.13	Current detection failure source display	0~6(Factory)
d2.14	Frequency corresponding to the current rotation speed of the motor	0.00~655.35Hz(0.00Hz)

Parameters in d2 group are read only parameters.

d2.06 and d2.07 mean the adjustment of the digital range, not means the frequency and percentage, just refers to numbers

d2.09 indicates the input status of X terminal. 0 indicates Open, while 1 indicates Close. Hexadecimal combination is adopted, and the lowest bit indicates X1.

d2.10 means10V voltage percentage, while d2.11 means voltage percentage of over current.

d2.12 indicates the failure source of analog input. 1 indicates AI1 exceeding limit, 2 indicates AI2 exceeding limit, 3 indicates AI3 exceeding limit, 4 indicates AV4/AI4 exceeding limit, and 5 indicates AV5/AI5 exceeding limit.Among them 4 and 5 only enabled when use EX-PM01.

d2.13 indicates the current detection failure source display. 2 indicates phase W abnormal, 4 indicates phase V abnormal, and 6 indicates phase U abnormal.

d2.14 indicates the frequency corresponding to the actual motor rotation speed under vector control 2 with encoder speed feedback.

d2.15~d2.24	Reserved	0~65535(Factory)

6.18 User-defined Function Code Displayed/hidden Zone Parameters (Group A0)

A0.00	Password of displayed/hidden zone of user-defined function code	0~FFFF(1)
A0.01	Displayed/hidden function 1 of user-defined function code	0~FFFF(FFFF)
A0.02	Displayed/hidden function 2 of user-defined function code	0~FFFF(FFFF)

Customize function code menu by function code of group A0. Protect the customized menu with password A0.00.Only function code groups with corresponding Bit set to 1 by A0.01 or A0.02 can be shown.

Note:

- Factory default for password of displayed/hidden zone of user-defined function code is 1.
  LSB (the least significant bit) to MSB (the most significant bit) of A0.01 correspond to P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, Pb, PC, Pd, PE and d0 in turn.
  LSB to MSB of A0.02 correspond to d1, d2 and reserved 14 bits in total.
- Zones of PE, C, U0 and U1 are reserved for parameters by manufacturer.
- When recovery practices of function code P0.01=4 or 5, the displayed/hidden function will be reset back to factory default.

Chapter 7 Fault Diagnosis

7.1 List of Fault and Alarm Information

V5−H serial inverter is equipped with complete protection functions to provide efficient protection while utilizing its performance sufficiently. Some failure instructions may be displayed during operation. Compare the instructions with the following table and analyze, decide the causes and solve failures.
For damages on units or questions that can't be resolved, please contact with local distributors/agents, service centers or manufacturer for solutions.

Failure No.	Failure code	Failure description	Potential causes	Solutions
1	E.oc1	Over current protection when acceleration operation	Low grid voltage	Check input power supply
			Startup too fast during motor operation	Restart after the motor stops rotating
			Rotating inertial of load is very large and shock load is very heavy	Increase the acceleration time and reduce the occurrences of sudden change of load
			Improper setting of motor parameters	Set motor parameters properly
			Set start-up frequency too high	Decrease start-up frequency
			Acceleration time is too short	Prolong acceleration time
			Set V/F curve ratio too large	Adjust V/F curve setting and torque boost
			Power level of inverter is small	Replace with inverter with proper model
2	E.oc2	Over current protection when deceleration operation	Low grid voltage	Check input power supply
			Too big rotating inertial of load	Choose appropriate energy braking components
			Improper setting of motor parameters	Set motor parameters properly
			Deceleration time is too short	Prolong deceleration time
			Power level of inverter is small	Replace to inverter with proper model
3	E.oc3	Over current protection when operation with constant speed	Sudden change of load during operation	Decrease load's abrupt frequency change and amplitude
			Improper setting of motor parameters	Set motor parameters properly
			Power level of inverter is small	Replace to inverter with proper model
4	E.oV1	Over voltage protection when acceleration operation	Motor short to ground	Check motor wiring
			Abnormal input power supply voltage	Check input power supply
			Fast start-up again when motor operates with high speed	Start again after the motor stops rotating
5	E.oV2	Over voltage protection when deceleration operation	Motor short to ground	Check motor wiring
			Too big rotating inertial of load	Choose appropriate energy braking components
			Deceleration time is too short	Prolong deceleration time

Failure No.	Failure code	Failure description	Potential causes	Solutions
6	E.oV3	Over voltage protection when operation with constant speed	Motor short to ground	Check motor wiring
			Abnormal input power supply	Check input power supply
			Too big rotating inertial of load	Choose appropriate energy braking components
7	E.PCU	Interference protection	Severely Interfered by exterior signal	Ask professional technicians to maintain
8	E.rEF	Abnormal comparison benchmark	Loose connection of connectors inside the inverter	Ask professional technicians to maintain
			Abnormal internal switching power supply	Seek for technical support
			Abnormal signal sampling and comparison circuit	Seek for technical support
9	E.AUt	Auto-tuning failure	Enable auto-tuning function during motor spining	Perform auto-tuning after the motor stops to rotate
			Auto-tuning overtime	Check whether motor wirings are well connected Length of motor wiring within 100m
			Incorrect setting of motor parameters in group P9	Please reset the parameters according to the nameplate parameters on the motor.
10	E.FAL	Module protection	Output over current	Check whether the motor the output connection is short circuited, whether the ground is short circuited and whether the load is too heavy.
			DC terminal overvoltage	Check the mains power supply and whether the large inertia load has no function of quick stop at energy consumption brake.
			Loose connection of connectors inside the inverter	Ask professional technicians to maintain
11	E.oH1	Heatsink 1 over temperature protection	Ambient over-temperature	Lower the ambient temperature and strengthen ventilation and heat dissipation.
			Blockage of air duct	Clean the dusts, wools and other foreign objects in the air duct.
			Fan failure	Check whether fan wirings are well connected. Replace a new fan of the same model.
			Inverter module failure	Seek for technical support
			Temperature detection circuit failure	Seek for technical support
12	E.oH2	Heatsink 2 over temperature protection	Ambient over-temperature	Lower the ambient temperature and strengthen ventilation and heat dissipation
			Blockage of air duct	Clean the dusts, wools and other foreign objects in the air duct

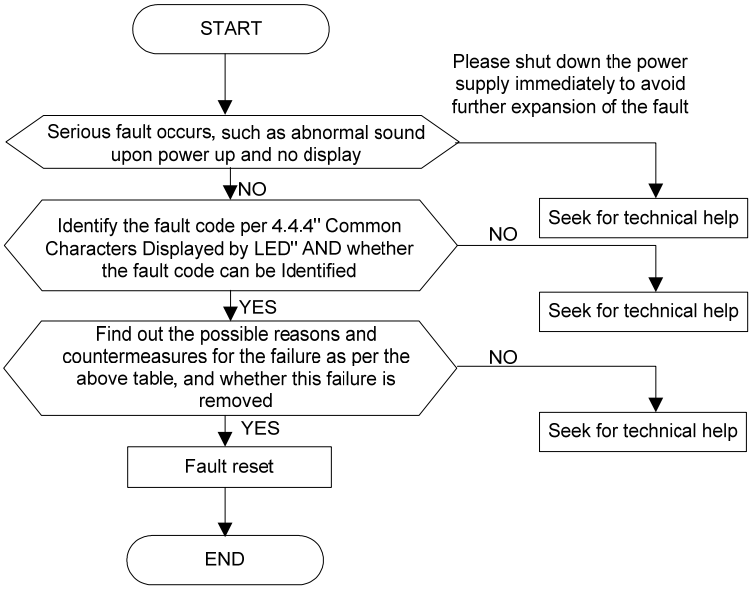
Failure No.	Failure code	Failure description	Potential causes	Solutions
			Fan failure	Check whether fan wirings are well connected. Replace a new fan of the same model
			Rectifier module failure	Seek for technical support
			Temperature detection circuit failure	Seek for technical support
13	E.oL1	Inverter overload protection	Input power under voltage	Check input power supply
			Fast start-up when motor operates with high speed	Start again after the motor stops rotating
			Keep overloading for a long period of time	Shorten the overloading time and reduce load
			Too short acceleration and deceleration time	Prolong the acceleration/deceleration time
			Too big V/F curve ratio	Adjust V/F curve setting and torque boost
			Power level of inverter is small	Replace to inverter with proper model
14	E.oL2	Motor overload protection	Input power under voltage	Check input power supply
			Motor rotation is blocked or load mutation occurs	Prevent the motor rotation from blocking and reduce the load mutation
			Common motor maintains running under heavy load for a long period of time	Replace the common motor with variable frequency motor or improve the running frequency
			Motor overload protection time is set too small	Increase the motor overload protection time
			Too big V/F curve ratio	Adjust V/F curve setting and torque increment
			DC braking current is set too high	Reduce the DC brake current
15	E.oUt	Peripheral protection	External failure terminal enable	Check the external failure terminal status
			Stall over voltage or over current and the time lasts for more than one minute	Check whether the external load is normal
19	E.CUr	Current detection fault	Current detection circuit failure	Seek for technical support
20	E.GdF	Output to ground short circuit	Wrong connection	Correct the connection error as per the user's manual
			Motor failure	Replace the motor after performing ground insulation test
			Invert module failure	Seek for technical support
			Too big ground-leakage current at the inverter output side	Seek for technical support
21	E.LV1	Abnormal power failure during running	Mains power fluctuation or momentary power failure	Check the local mains power
22	E.ILF	Input power failure	Abnormal connection, missing connection or disconnection at the power terminal of the inverter	Check the power connections as per the operational regulations and eliminate the errors of missing connection and disconnection

Failure No.	Failure code	Failure description	Potential causes	Solutions
			Serious imbalance of input power at three phases	Check whether the imbalance of input power at three phases comply with the requirements
			Burning of capacitor of the inverter	Seek for technical support
			The power-on buffer circuit of the inverter is faulty	Seek for technical support
23	E.oLF	Abnormal output phase loss	Abnormal connection, missing connection or disconnection at the output side of the inverter	Check the power connections at the output side of the inverter as per the operational regulations and eliminate the errors of missing connection and disconnection
			Imbalance of output three phases	Check whether motor is kept well Shut down the power supply to check whether the terminal characteristics both at the output side and DC side of the inverter are consistent
24	E.EEP	EEPROM failure	EEPROM reading and writing failure	Seek for technical support
25	E.dL3	Relay contact failure	Loose connection of connectors inside the inverter	Ask professional technicians to maintain
			The power-on buffer circuit is faulty	Seek for technical support
26	E.dL2	Temperature sensor taking sample anomaly	Ambient under temperature	Check whether the ambient temperature complies with the requirements
			The temperature sampling circuit inside the inverter is faulty	Seek for technical support
27	E.dL1	Encoder cable disconnection	Encoder connection is incorrect	Change the encoder cable connection
			Encoder has no signal output	Check whether the encoder and power supply are normal.
			Encoder cable disconnection	Reconnect
			Abnormal function code setting	Confirm that the relevant function codes of the encoder are set properly
28	E.P10	+10V power output abnormal	+10V power overload	Increase +10V power load impedance Utilize externally independent power supply
			+10V power supply and GND is short circuited	Eliminate the short circuit failure
			+10V power terminal circuit failure	Seek for technical support
29	E.AIF	Analog input abnormal	Too high analog input voltage	Check whether the analog input voltage complies with the requirements
			Analog input circuit failure	Seek for technical support
			Analog input circuit signal interfered	Increase the P6.22 and P6.24 AI filtering time

Failure No.	Failure code	Failure description	Potential causes	Solutions
30	E.Ptc	Motor over temperature(PTC)	The motor temperature signal reaches the alarm setting value	Strengthen ventilation and heat dissipation
			Thermistor resistance failure	Check the thermistor
			The sensor protection threshold of the motor is set improperly	Adjust the sensor protection threshold of the motor
31	E.SE1	Communication abnormal 1 (Operation panel 485)	The communication of operation panel RS485 is disconnected	Check the connection of the equipment communications
			Communication failure of operation panel RS485	Check whether the data receiving and transmission complies with the protocol, whether the check sum is correct and whether the receiving and transmission interval complies with the requirements
			The inverter is set to master mode	Set the inverter to slave mode
32	E.SE2	Communication abnormal 2 (RS485 terminal)	The communication of RS485 terminal is disconnected	Check the connection of the equipment communications
			The baud rate is set improperly	Set compatible baud rate
			The communication of RS485 terminal is faulty	Check whether the data receiving and transmission complies with the protocol, whether the check sum is correct and whether the receiving and transmission interval complies with the requirements
			The communication of RS485 terminal is time-out	Check whether the communication timeout is set properly and confirm the communication cycle of the application program
			Improper setting of failure alarm parameters	Adjust the failure alarm parameter
			The inverter is set to master mode	Set the inverter to slave mode
33	E.VEr	Version compatibility abnormal	Incompatible software version of the operation panel	Seek for technical support
34	E.CPy	Copy failure	The data error occurs when copying the inverter parameters to the operation panel	Check the connections of the operation panel
			The data error occurs when copying the parameters from the operation panel to the inverter	Check the connections of the operation panel

Failure No.	Failure code	Failure description	Potential causes	Solutions
			The parameters are directly downloaded without undergoing copy and upload operations.	Perform download before uploading the parameters
			Control board software version incompatible	Check if d1.09 is consistent
36	E.dL4	Expansion card connection abnormal	Expansion card connection is loosened	Ask professional technicians to maintain
			Expansion card failure	Seek for technical support
37	E.IoF	Terminal mutual exclusion check failed	The functions of X1 to X7, AI1, AI2 and DI terminals are set in a repeated manner	Modify the settings of X1 to X7, AI1, AI2 and DI terminals and ensure the setting functions are not repeated (excluding null function)
38	E.oL3	Hardware overload protection	Load failure	Check whether motor is blocked Replace inverter with proper model
			Input failure	Check whether there is phase loss
			Output failure	Check whether there are phase loss or short circuit
63	-LU-	Power under voltage	The power supply voltage is lower than the minimum operating voltage of the equipment	Check input power supply
			Abnormal internal switching power supply	Seek for technical support

7.2 Troubleshooting Procedures



Chapter 8 Routine Repair and Maintenance

The application environment (such as temperature, humidity, dust and powder, wool, smoke and oscillation), burning and wearing of internal devices and other factors may increase the possibilities of inverter failure. To reduce the failures and prolong the service life the inverter, it is necessary to conduct routine repair and periodic maintenance.

Note

1. Only the personnel receiving professional training can dismantle and replace the inverter components.
2. Prior to inspection and maintenance, please make sure that the power supply to the inverter has been disconnected for at least ten minutes or the CHARGER indictor is OFF, or there may be risks of electric shock (the inverter with power level of V5-H-4T11G/15L or above has CHARGER indicator).
3. Do not leave metal components and parts in the inverter, or it may damage the inverter.

8.1 Routine Maintenance

The inverter shall be used under the allowable conditions as recommended in this manual and its routine maintenance shall be conducted as per the table below.

Item	Inspection Contents	Inspection Means	Criteria
Operating Environment	Temperature	Thermometer	-10 ~ +40ºC Derated at 40 to 50ºC, and the rated output current shall be decreased by 1% for every temperature rise of 1ºC.
	Humidity	Humidiometer	5 ~ 95%, no condensing
	Dust, oil, water and drop	Visual check	There are no dust, oil, water and drop.
	Vibration	Special test instrument	3.5m/s^2, 2~ 9Hz; 10m/s^2,9~ 200Hz; 15m/s^2,200~ 500Hz
	Gas	Special test instrument, smell check and visual check	There are no abnormal smell and smoke.
Inverter	Overheat	Special test instrument	Exhaust normal
	Noise	Listen	There is no abnormal noise.
	Gas	Smell and visual check	There are no abnormal smell and smoke.
	Physical appearance	Visual check	The physical appearance is kept intact.
	Heatsink fan ventilation	Visual check	There are no fouling and wool that block the air duct.
	Input current	Amperemeter	In the allowable operating range. Refer to the nameplate.
	Input voltage	Voltmeter	In the allowable operating range. Refer to the nameplate.
	Output current	Amperemeter	In the rated value range. It can be overloaded for a short while.
	Output voltage	Voltmeter	In the rated value range.
Motor	Overheat	Special test instrument and smell.	There are no overheat fault and burning smell.
	Noise	Listen	There is no abnormal noise.
	Vibration	Special test instrument	There is no abnormal oscillation.

8.2 Periodic Maintenance

It needs to perform periodic inspection on the inverter once every three to six months according to the application environment and work conditions.

Item	Inspection Contents	Inspection Means	Criteria
Inverter	Main circuit terminal	Screwdriver/sleeve	The screws are tightened and the cables are intact.
	PE terminal	Screwdriver/sleeve	The screws are tightened and the cables are intact.
	Control circuit terminal	Screwdriver	The screws are tightened and the cables are intact.
	Reliability of internal connections and connectors	Screwdriver and hands	Connection is firm and reliable.
	Expansion card connector	Screwdriver and hands	Connection is firm and reliable.
	Mounting screws	Screwdriver/sleeve	The screws are tightened.
	Cleaning the dusts and powders	Cleaner	There are no dusts and wools.
	Internal foreign objects	Visual check	There are no foreign objects.
Motor	Insulation test	500VDC megameter	Normal

8.3 Component Replacement

Different types of components have different service lives. The service lives of the components are subject to the environment and application conditions. Better working environment may prolong the service lives of the components. The cooling fan and electrolytic capacitor are vulnerable components and shall be conducted routine inspection as per the table below. If any fault occurs, please conduct immediate replacement.

Vulnerable Components	Damage Causes	Solutions	Items for Routine Inspection
Fan	Bearing wear, blade aging	Change	The fan blade has no cracks and rotates normally. The screws are tightened.
Electrolytic capacitor	Ambient temperature is relatively high and electrolyte volatilizes.	Change	There are no electrolyte leakage, color change, crack and shell inflation. The safety valve is normal. Static capacity is equal to or higher than the initial value times 0.85.

Note

When the inverter is stored for a long period of time, power connection test shall be conducted once within two years and last at least five hours. It can use voltage regulator to gradually increase the value to the rated value when power connection is performed.

8.4 Insulation Test

Since the inverter has undergone insulation test upon its ex-factory, the user shall not perform such test

as much as possible under general condition. If the test is unavoidable, please perform the test strictly according to the following procedures, or it may damage the inverter.

It shall perform dielectric test strictly, or it may damage the inverter. If the dielectric test is unavoidable, please contact our company.

■ Main Circuit Insulation Test

- ◆ Utilize 500VDC megameter to perform test under condition of main power shutdown;
- ◆ Disconnect all the control board circuits to prevent the control circuits from connecting with the test voltage. For the inverter with power level of V5-H-4T11G/15L and V5−H−4T15G/18.5L, it must disconnect the terminal J1 on the drive board and the PE. For the inverter with power level of V5-H-4T18.5G/22L or above, it must disconnect three pieces of cables entry to the surge suppressing circuit. Pack the disconnected cable heads with insulating tapes properly;
- ◆ The main circuit terminal shall be connected with public conducting wires:

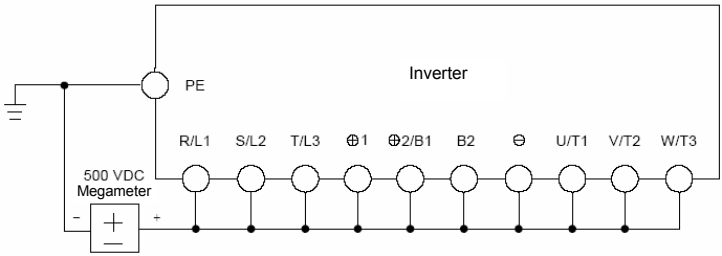


Figure 8−1 Main Circuit Insulation Test for V5−H−2T0.4G to V5−H−2T12.2G and V5−H−4T0.75G/1.5L to V5−H−4T15G/18.5L

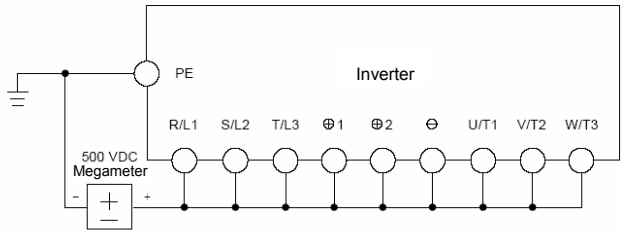


Figure 8−2 Main Circuit Insulation Test for V5−H−4T18.5G/22L to V5−H−4T500G/560L

- ◆ Megameter voltage can only be imposed between the public conducting wire of the main circuit and the PE terminal;
- ◆ The normal indication value of the megameter is 200MΩ or above.

Appendix A Modbus Communication Protocol

1. Support Protocol

Support Modbus protocol, RTU format, Broadcast address 0, slave address “1-247”, “248-255” for reservation.

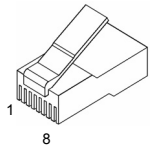
2. Interface mode

RS485: Asynchronous, half duplex, LSB sending priority. Low byte is after the high byte.

Inverter communication port A (RJ45) default data format: 8-N-1, 38400 bps

Inverter communication port B (terminal RS485+/-) default data format: 8-N-1,19200 bps, see PC function code specification.

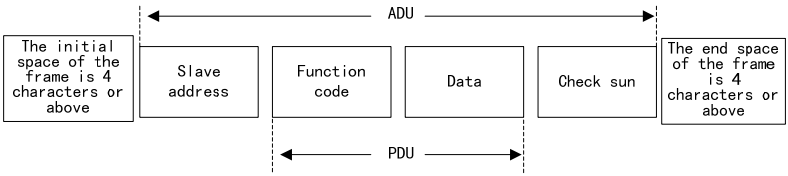
It is recommended to adopt EIA/TIA T568B, the lead of port A is defined as:



Attached Figure 1 RJ45 interface

Lead of communication port A	1	2	3	4	5	6	7	8
Signal of communication port A	+5V	GND	485+	485-	485+	485-	GND	+5V
EIA/TIA T568A	White green	Green	White orange	Blue	White blue	Orange	White brown	Brown
EIA/TIA T568B	White orange	Orange	White green	Blue	White blue	Green	White brown	Brown

3. Protocol Format



Attached Figure 2 Protocol Format

ADU (Application Data Unit) check is the CRC16 check of the first three parts of ADU and obtained through exchange of upper byte or lower byte.

If the operation request is rejected, the feedback of PDU(Protocol Data Unit) will be error code or abnormal code. Error code equals to function code +0x80, abnormal code shows the error cause in detail.

Examples for abnormal codes:

Abnormal code	Definition	Abnormal code	Definition
0x01	Illegal function code	0x20	Frame error: frame length error, check error
0x02	Illegal data address	0x21	Parameters are unchangeable.
0x03	Illegal data, data beyond high/low limits	0x22	Unchangeable upon operation of parameters
0x04	Slave operation failure, the data is within the range of high/low limits, but it is disabled.	0x23	Password protected for parameters
0x05	Order valid, in process, mainly occurs upon storing data into EEPROM	0x24	Non- host computer equipment control, invalid host computer command
0x06	Slave busy, mainly occurs upon storing data into EEPROM		

4. Function Interpretation

- Function 0x03 reads parameters and status words of multiple function code parameters of the inverter.

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x03
Initial address of register	2	0x0000 ~ 0xFFFF
Number of registers	2	0x0001 ~ 0x0010
Response:		
Function code	1	0x03
Read bytes	1	2*Number of registers
Read contents	2*Number of registers	

- Function 0x06(0x41) rewrites single function code or control parameter of the inverter and save it upon power failure (not save).

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x06(0x41)
Register address	2	0x0000 ~ 0xFFFF
Register data	2	0x0000 ~ 0xFFFF
Response:		
Function code	1	0x06(0x41)
Register address	2	0x0000~ 0xFFFF
Register data	2	0x0000 ~ 0xFFFF

Note: if change function code frequently, such as change setting frequency repeat, suggest use 0x41 command is better than 0x06, prevent from damage inner EEPROM.

- Function 0x10(0x42) rewrites multiple function codes or control parameters of the inverter and save them upon power failure (not save).

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x10(0x42)
Initial address of register	2	0x0000~0xFFFF
Number of register	2	0x0001~0x0010
Bytes of register contents	1	2*Number of operating registers
Register contents	2*Number of operating registers	
Response:		
Function code	1	0x10(0x42)
Initial address of register	2	0x0000~0xFFFF
Number of register	2	0x0001~0x00100

Note:

1、In case continuous storage is required, the inverter will store function codes in the register at the address from the lowest to highest, with maximum of 16 function codes being stored at the same time.

2、If change function code frequently, such as change setting frequency repeat, suggest use 0x42 command is better than 0x10, prevent from damage inner EEPROM.

3、The life of EEPROM is about 100000 times,if change setting frequency frequently, several days or several weeks may damage EEPROM, adopt write RAM, it can avoid damaging EEPROM.

- Function 0x17 reads and writes multiple function codes or control parameters of the inverter.

PDU Part Contents	Data Length (Byte)	Range
Request (Response):		
Function code	1	0x17
The initial address of reading register	2	0x0000~0xFFFF
The number of reading register	2	0x01~ 0x10
The initial address of writing register	2	0x0000~0xFFFF
The number of writing register	2	0x01~0x10
The number of bytes in the writing register	1	2*Number of operating registers
The writing register contents	2*Number of operating registers	
Response:		
Function code	1	0x17
Read the number of bytes in the register	1	0x02~0x20

PDU Part Contents	Data Length (Byte)	Range
Read data contents	2*Read bytes	0x0000~0xFFFF

Operating sequence: Read firstly and rewrite secondly, but the register 0xF080 is an exception, which shall be written firstly and read secondly so as to facilitate the management of the operation panel.

5. Inverter Register Address Distribution

Attached Table-1

Address Space	Meaning
0x0000 ~ 0x1A00	The corresponding relationship between the function codes of the inverter and the Modbus protocol register address. The bytes at higher orders refer to the descriptions of function code groupnumber. The bytes at lower orders refer to groupnumber, express with HEX adecimal. P0 to PE, d0, d1, d2, H0、H1、H2、A0、C0、U0、U1 corresponds to the bytes at higher orders such as 0x00 to 0x0E, 0x0F, 0x10, 0x11,0x12、0x13、0x14、0x15、0x16、0x17、0x18. for example,the Modbus address of function code Pb.23 is (0x0b<<8)+23=0x0b17
0x4000 ~ 0x5A00	The corresponding relationship between the function code attribute word (“attribute word” means use odd number to describe even number) of the inverter and the Modbus protocol register address. The bytes at higher orders refer to the function code group No. plus 0x40, while the bytes at lower orders refer to serial No. in the group, for example, 0x4b17 corresponds to the attribute word of the function code Pb.23. The attribute words are defined in the following order: Bit0 ~ Bit2 for unit, Bit3 ~ Bit4 for modifying attribute, Bit5 ~ Bit6 for precision and Bit7 ~ Bit15 for reserved purpose.
0x8000 ~ 0x800D	The register for control word of the inverter. Refer to Attached Table 2 for details.
0x810B ~ 0x8193	The register for status word of the inverter. Refer to Attached Table 3 for details.
0xF000 ~ 0xF002	Special register for input password authentication. Refer to Attached Table 4 for details.
0xF080~ 0xF084	Read the current value, high limit, low limit, and factory default value of the function code, and rewrite the function code. Refer to Attached Table 5for details.

- Register for control word of the inverter.

Attached Table-2

Register address	Name of Parameters	Register address	Name of Parameters
0x8000	Control command word	0x8007	AO2 output host computer percentage
0x8001	Open loop digital frequency reference	0x8008	Y2 output host computer percentage
0x8002	Running command issuing mode	0x8009	Slave setting frequency scale coefficient
0x8003	Open loop main reference mode	0x800A	Virtual terminal
0x8004	Close loop digital voltage reference	0x800B	Y1 terminal output function
0x8005	Close loop digital rotation velocity reference	0x800C	Acceleration time 0
0x8006	AO1 output host computer percentage	0x800D	Deceleration time 0
Note: The virtual terminals from LSB to MSB are X1, X2, X3, X4, X5, X6, X7, AI1, AI2, AI3, Y1, Y2 and relay, bit13 ~ bit15 are reserved.			

◆ Register for status word of the inverter.

Attached Table-3

Register	Name of Parameters	Precision	Register	Name of Parameters	Precision
0x810B	Equipment status word 1		0x8114	Display parameters of stopping status	According to currently stopping display
0x810E	Equipment status word 4		0x8116	Display parameters of running status	According to currently running display
0x8120	Reference frequency（Hz）	0.01Hz	0x8180	Reference frequency（Hz）	0.01Hz
0x8122	Bus voltage(V)	1V	0x8182	Bus voltage(V)	1V
0x8124	AI1（V）	0.01V	0x8184	AI1（V）	0.01V
0x8126	AI2（V）	0.01V	0x8186	AI2（V）	0.01V
0x8128	AI3（V）	0.01V	0x8188	AI3（V）	0.01V
0x812A	DI（%）	0.1%	0x818A	DI（%）	0.1%
0x812C	External counts	1	0x818C	External counts	1
0x812E	Rotate speed of motor	1	0x818E	Rotate speed of motor	1
0x8130	Close loop reference (%)	0.1%	0x8190	Close loop reference (%)	0.1%
0x8132	Close loop feedback (%)	0.1%	0x8192	Close loop feedback (%)	0.1%
0x8134	Reference torque(%)	0.1%	0x8194	Reference torque (%)	0.1%
0x8136	Operating frequency (Hz)	0.01Hz	0x8196	Reserved	
0x8138	Output current(A)	0.1A or 0.01A	0x8198	Reserved	
0x813A	Output torque(%)	0.1%	0x819A	Reserved	
0x813C	Output power (kW)	0.1kW	0x819C	Reserved	
0x813E	Output voltage(V)	1V	0x819E	Reserved	

Note：0x8121～0x819Fodd numbers are display attribute word，from LSB to MSB are Hex/Dec for 1bit, precision for 2bit, modification for 2bit and unit for 3Bit.

The register addresses 0x8120 ~0x813F refer to the display parameters corresponding to P2.02, while the register addresses 0x8180 ~0x8193 refer to the display parameters corresponding to P2.03.

The inverter of 3.7kw and below,the output current display precision is 0.01A, 5.5kw and above output current display precision is 0.1A,

The bits for the control command word (0x8000) of the inverter are defined as follows:

Bit	Meaning		Bit	Meaning	
0	0: Stop command enable	1: Running command enable	3	0: Jog command disable	1: Jog command enable
1	0: Run forward	1: Run reverse	14	0: Emergency stop disable	1: Emergency stop enable
2	0: Reset command disable	1: Reset command enable	15	0: Coast to stop disable	1: Coast to stop enable
Note: Bits 4 ~ 13 are reserved.					

The bits for the status word1 (0x810B) of the inverter are defined as follows:

Bit	Meaning		Bit	Meaning
0	0: Inverter stop	1: Inverter running	5~6	Running command issuing mode selection: 0: Operation panel reference, 1: Terminal reference, 2: host computer reference.
3	0: Run forward	1: Run reverse		
4	0: Button unlocked	1: Button locked	8 to 15	0: Normal; others: Failure code
Note: Bits 1, 2 and 7 are reserved.				

The bits for the status word 4(0x810E) of the inverter are defined as follows:

Bit	Meaning		Bit	Meaning	
0	0: Non-jog running	1: Jog running	5	0: Non-open loop multi-section voltage operation	1: Open loop multi-section voltage operation
1	0: Non-close loop operation	1: Close loop operation	6	0: Normal voltage	1: Under voltage
2	0: Non-open loop multi-section frequency operation 1: open loop multi-section frequency operation		7	0: Non-single phase pulse input close loop operation	1: Single phase pulse input close loop operation
3	0: Non-close loop multi-section frequency operation 1: Close loop multi-section frequency operation		14	0: Speed control	1: Reserved
4	0: Non-common operation	1: Common operation	15	0: Vector control 1	1: Vector control 2
Note: Bits 8 ~ 13 are reserved.					

◆ Special register for input password authentication

Attached Table-4

Sub function code of PDU	Meaning
0xF000	Inverter user password P0.00 authentication, and it will be closed automatically if no operation is performed within five minutes.
0xF001	PE.00 password authentication for the display and hidden areas of the specially authenticated function codes of the inverter, and it will be closed automatically if no operation is performed within five minutes.
0xF002	A0.00 password authentication for the display and hidden attributes customized areas of the function codes of the inverter, and it will be closed automatically if no operation is performed within five minutes.

◆ Register for function code characteristics of the inverter

Attached Table-5

Register address	Meaning	Range	Read (R) and Write (W)
0xF080	Relative address of the function code	See Attached Table-1	R/W
0xF081	Current value	0 ~ 65535	R/W
0xF082	High limit	0 ~ 65535	R
0xF083	Low limit	0 ~ 65535	R
0xF084	Factory default value of the function code	0 ~ 65535	R

It can write the function code No. into 0xF080 by reading and writing multiple register commands 0x17 firstly and then read several attributes of this function code.

6. CRC16 Function

```
unsigned int    crc16(unsigned char *data,unsigned char length)
{
    int i,crc_result=0xffff;
    while(length--)
    {
        crc_result^=*data++;
        for(i=0; i<8; i++)
        {
            if(crc_result&0x01)
                crc_result=(crc_result>>1) ^0xa001;
            else
                crc_result=crc_result>>1;
        }
    }
    return (crc_result=((crc_result&0xff) <<8) |(crc_result>>8) ) ; //Exchange CRC16 check sum and bytes at higher and lower orders
}
```

7. Case Study of Modbus Communication Control

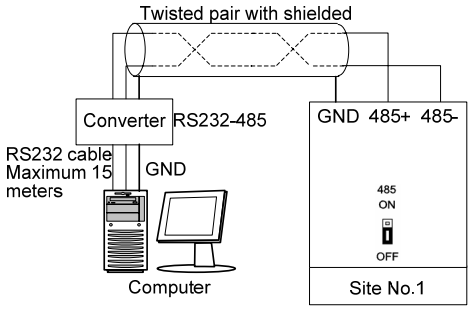
Start No.1 inverter to perform forward running, and set the rotation velocity to 50.00Hz (indicating 5,000 internally) as per the following commands:							
	Address	Function code	Register Address	Number	Bytes	Register Contents	Check Sum
Request	0x01	0x10	0x8000	0x0002	0x04	0x0001,0x1388	0xCEFF
Response	0x01	0x10	0x8000	0x0004	None	None	0xE80A
Read the operating frequency of No.1 inverter and the response operating frequency of the inverter is 50.00Hz:							
	Address	Function code	Register Address	Number		Bytes	Register Contents
Request	0x01	0x03	0x8136	0x0001		None	0x4C38
Response	0x01	0x03	None	0x02		0x1388	0xB512
No.1 inverter stops in the default mode:							
	Address	Function	Register	Register Contents			Check Sum

		code	Address		
Request	0x01	0x06	0x8000	0x0000	0xA00A
Response	0x01	0x06	0x8000	0x0000	0xA00A

☞ **Note:**
It needs to set P0.06 to 2 firstly.

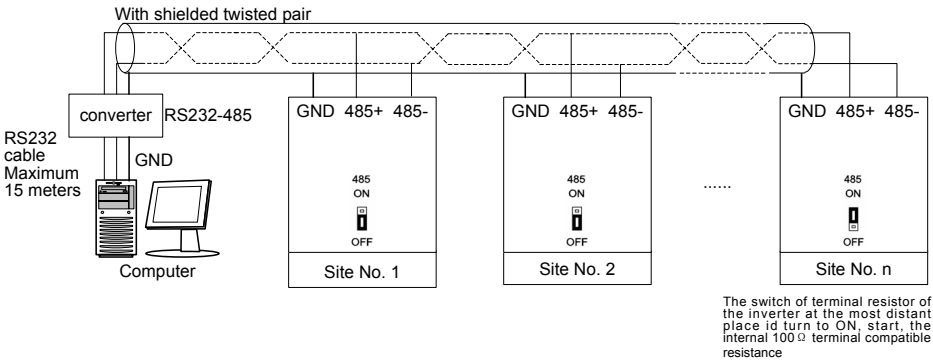
8. Communication Network Construction

◆ Connecting one inverter to the computer



Attached Figure 3 Connecting One Inverter to the Computer

◆ Connecting multiple inverters to the computer



Attached Figure 4 Connecting Multiple Inverters to the Computer

Appendix B Additional Descriptions for Inverter

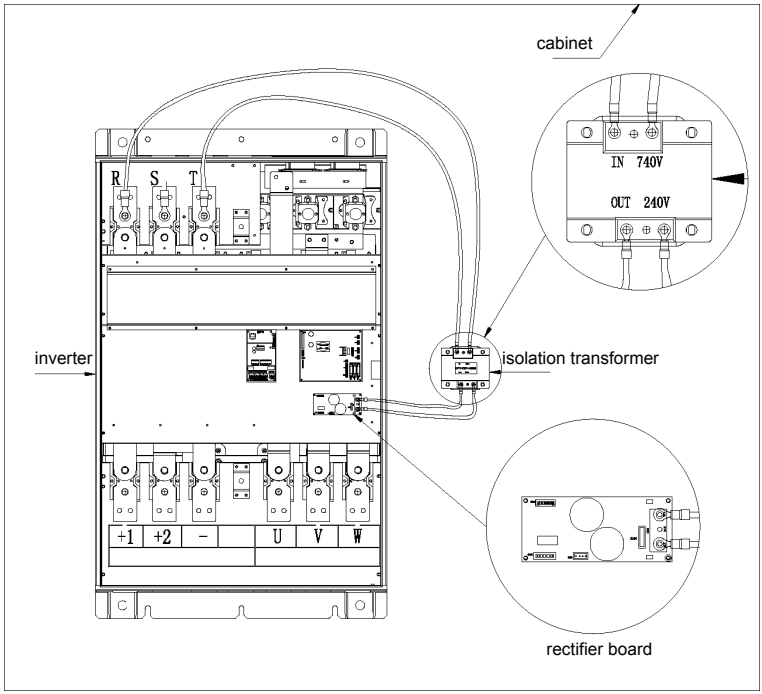
1 List of Accessories of Inverter and Shipment Packages

Power level	Isolation transformer	Installation location of isolation transformer	Packaging and shipping of isolation transformer
15kW～30kW	525V/220V 100W	Without base: Need additional installation position; With base: Installed in base;	Without base: Packaged and shipped independently; With base: Packaged and shipped with base;
37kW～110kW	525V/220V 200W	Without base: Need additional installation position; With base: Installed in base;	Without base: Packaged and shipped independently; With base: Packaged and shipped with base;
132kW～560kW	525V/220V 500W		

Note: 15kW power level corresponds to the inverter model of V5−H−5T15G, and so on for the relationship between power level and corresponding inverter model.

2 Wiring Diagram for Isolation Transformer Without Base

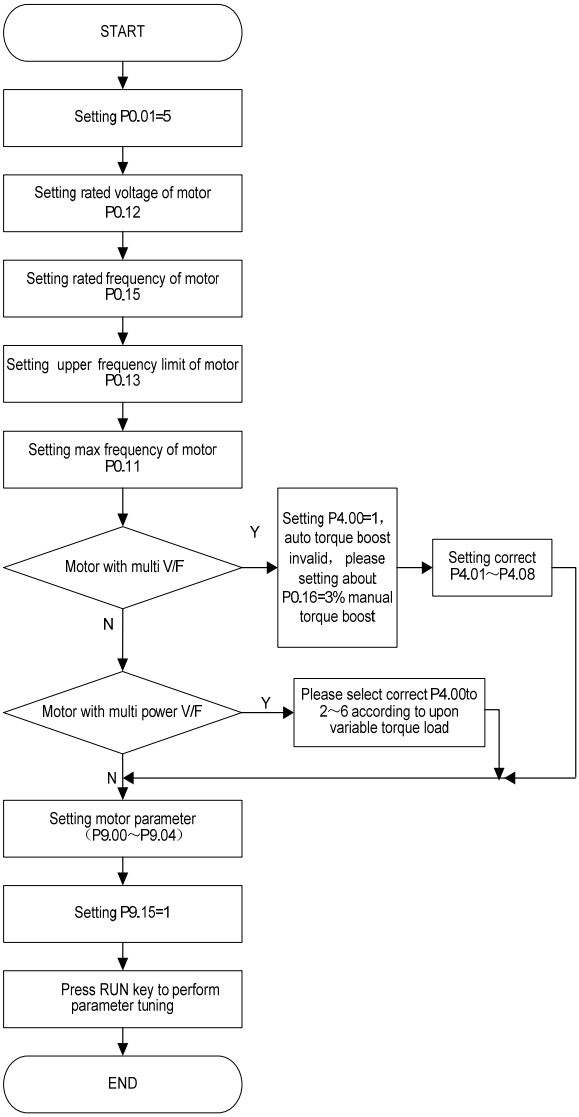
Wiring method of isolation transformer: Two primary side input terminals (IN 525V) are connected to the main circuit terminals R and T of the inverter respectively and the two secondary side wiring terminals(OUT 220V) are connected to the input terminals R and T on rectifier board of the inverter, as shown below:



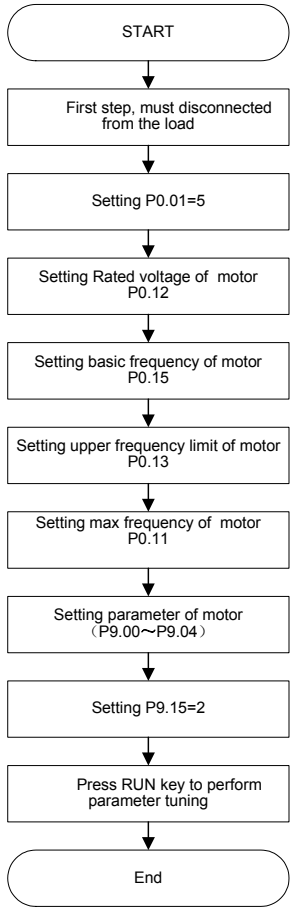
Appendix C Control Mode Setting Process

1. Setting Process for Auto-tuning

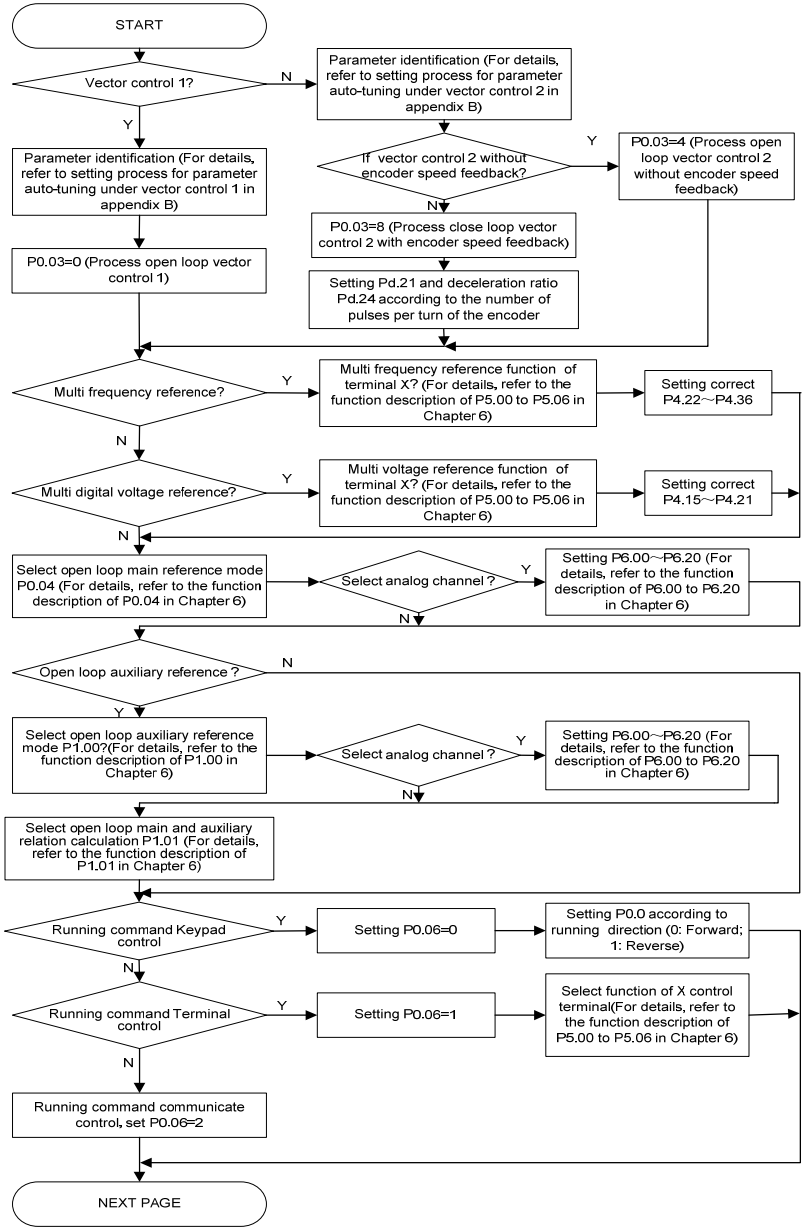
Parameter auto-tuning under Vector control 1



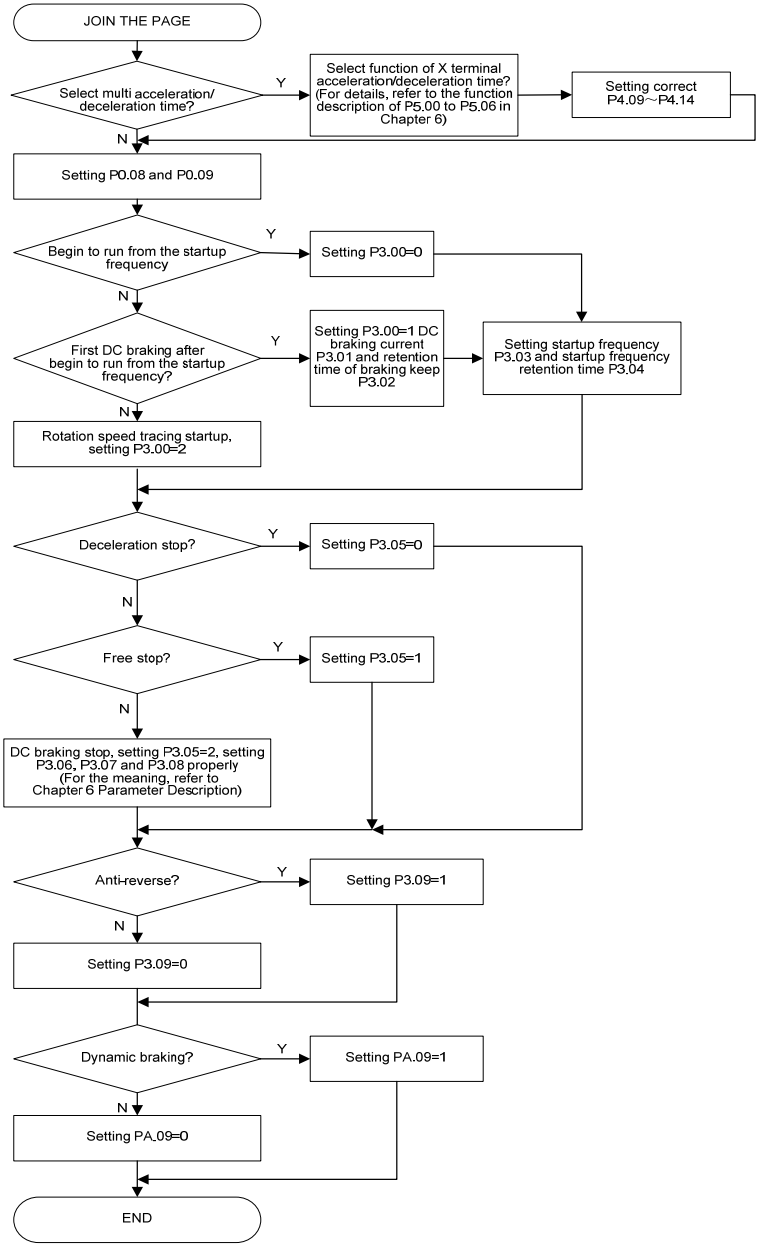
Parameter auto-tuning under vector control 2



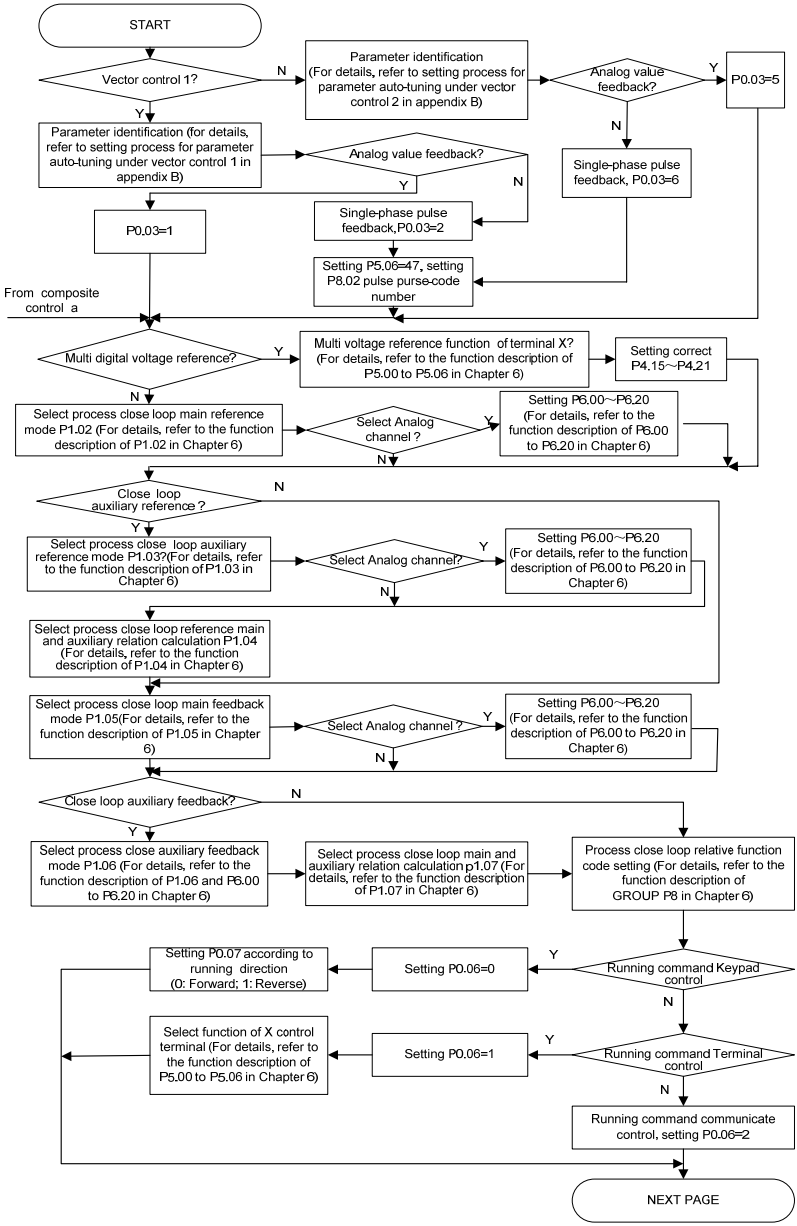
2. Setting Process for Open Loop



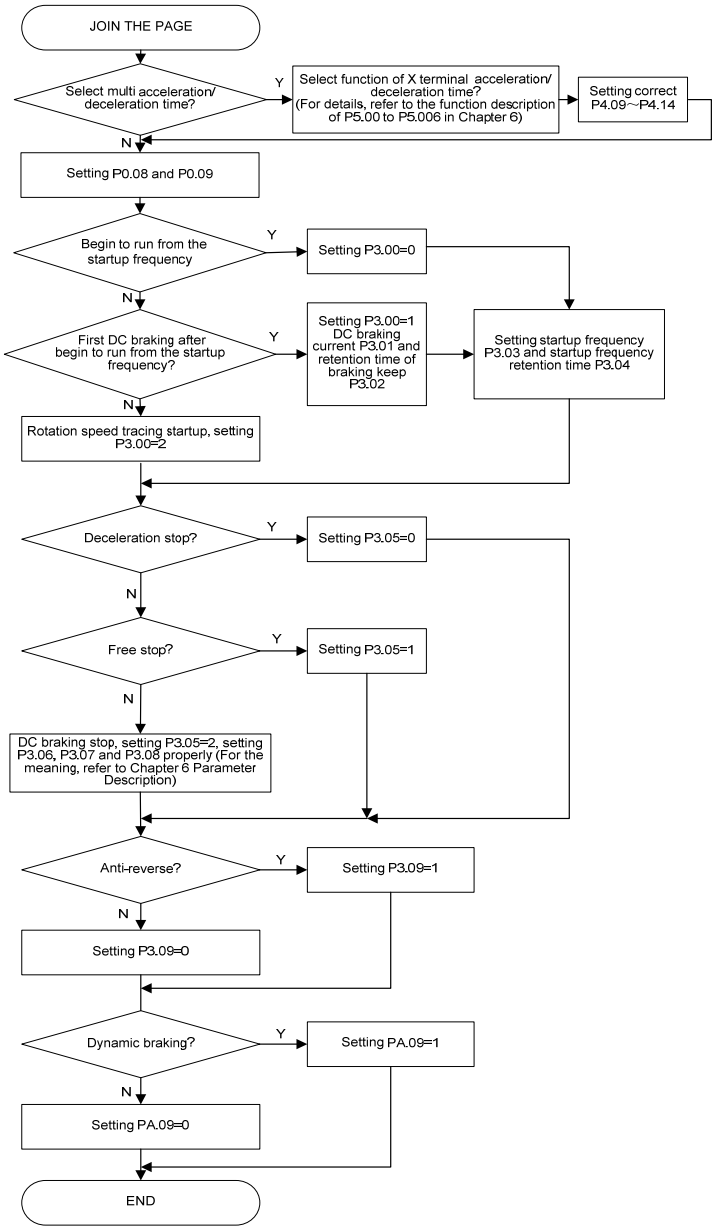
Open loop setting process (continued)



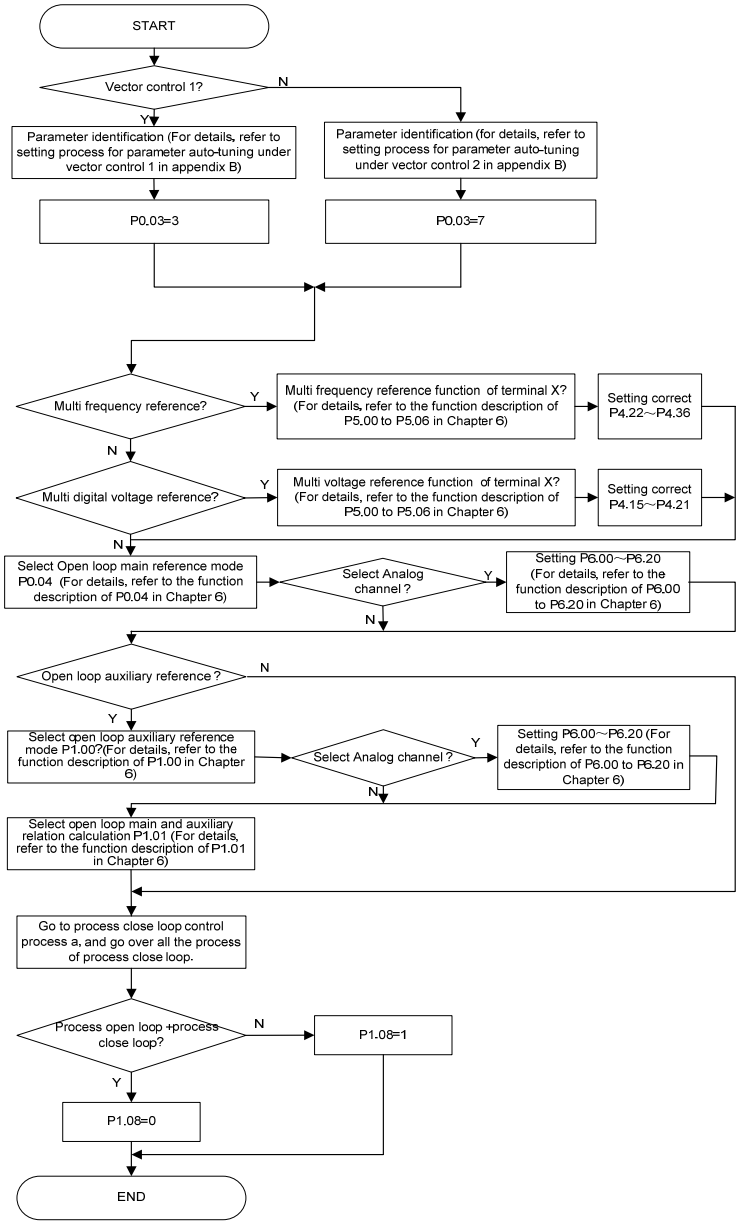
3. Setting Process for Closed Loop



Closed loop setting process (continued)



4. Setting Process for Composite Control



Appendix E FAQ

I. In the case of vector control 2, why did the inverter have abnormal operation?

A: (1) Check if there exists large difference between the power class of the motor and that of the inverter;

A; (2) Check if parameter auto-tuning has been performed under vector control 2. For details, refer to the setting process for parameter auto-tuning in Appendix B.

A: (3) Check if the control lines for the V5−H−4T18.5G/22L, and for inverter above 18.5kw, please check if the current sensor line is loosen or dislocated.

A

II. In the case of vector control 1, why did the inverter have abnormal operation?

A: (1) Check if parameter auto-tuning has been performed under vector control1, For details, refer to the setting process for parameter auto-tuning in Appendix B.

A: (2) Check if the control lines for the V5−H−4T18.5G/22L or current sensor of above power class are loose or dislocated.

III. Why was the operating frequency of the inverter kept at 0Hz upon reverse running?

A: (1) Check if the frequency is set to 0;

A: (2) Check if the inverter function code parameter P3.09 is set to 0. If not, change it to 0.

IV. The inverter had been connected with braking resistor featuring dynamic braking, why didn't it work?

A: (1) Check if the braking resistor is connected between the main circuit terminals B1 and B2;

A: (2) Check if the inverter function code parameter PA.09 is set to 1. If not, change it to 1.

V. Why was there large deviation on the correspondence relation between the analog input and the set frequency?

A: (1) Check if the jumpers of analog input type and control board are properly set. For the analog voltage input, toggle the corresponding channel to the "V" end of the jumper; for the analog current input, toggle the corresponding channel to the "I" end of the jumper.

A: (2) Calibrate the analog input curve according to function codes P6.00 to P6.2. For details, refer to the description of P6 group in Chapter 6 Parameter Description.

VI. Why was there large deviation on the correspondence relation between the analog output and output frequency, output current, etc.?

A: (1) Check if the jumpers of analog output type and control board are properly set. For the analog voltage output, toggle the corresponding channel to the "V" end of the jumper; for the analog current output, toggle the corresponding channel to the "I" end of the jumper.

A: (2) Calibrate the analog output curve according to function codes P7.05 to P7.09. For details, refer to the description of P7 group in Chapter 6 Parameter Description.

VII. Why did the inverter report E.AIF analog input abnormal error?

A: (1) Check if the jumpers of analog input type and control board are properly set. For the analog voltage input, toggle the corresponding channel to the “V” end of the jumper; for the analog current input, toggle the corresponding channel to the “I” end of the jumper.

A: (2) Check if the analog input exceeds 11V;

A: (3) When using the +10V power supply of the inverter control board, check if the voltage of +10V is lower than 9V or higher than 11V. If yes, check if the resistance value between the +10V and the GND is less than 1KΩ after the inverter is powered off completely.

VIII. Why did the inverter report E.P10 abnormal error?

A: Check if the voltage of +10V on the inverter control board is lower than 9V or higher than 11V. If yes, check if the resistance value between the +10V and the GND is less than 1KΩ after the inverter is powered off completely.

IX. Why did the PLC and inverter have abnormal 485-based communication?

A: (1) Check if the data format, address and baud rate of the inverter are consistent with that of the PLC;

A: (2) Check if the PLC address needs to be added by 1 (that is,”Address +1”);

A: (3) Check if the PLC adopts Modbus RTU format;

A: (4) Check if the register address of the PLC is converted to hexadecimal format;

(5) Check if the RS485 wires are properly connected.

X. Why did there exist abnormality upon parameter copying?

A: (1) The parameters for V5 inverter and V6 inverter cannot be copied between each other;

A: (2) The copy operation can be performed only when the upload and download function codes of the inverter d1.09 (operation panel copy identification code) are consistent;

A: (3) The copy function can be completed only when the inverter is completely powered down and then powered up after the download of the parameters for copy is completed.

XI. Why did the keyboard will have “8.8.8.8” display or have no display sometimes?

A: (1) Check if the connectors are properly connected when the operation panel is directly connected to the inverter control board;

A: (2) Check if the connection wire signals are in one to one correspondence when the keyboard is connected to the operation panel and inverter control board through customized extension wires;

A: (3) Check if the network cable connectors of the operation panel and inverter control board are properly connected when standard network cable is used to connect the operation panel and inverter control board.

XII. Why couldn’t display or modify the function codes of the operation panel?

A: (1) When the modification could not be performed, check if P0.01 is set to 1. If yes, change it to 0.

A: (2) When the modification could not be performed, check if the function code has been set to

modification disabled;
A: (3) When the modification could not be performed upon running, check if the function code could not modification upon running;
A: (4) When display is not available, check if the inverter function code has been encrypted;
A: (5) When display is not available, check if the inverter operation panel has been locked;

XIII. How to change the direction that the inverter drives the motor to rotate?

A: (1) In the case of operation panel control, the direction is determined by P0.07. However, the FWD/REV key on the operation panel can real time change the direction.
A: (2) In the case of operation panel control, the direction is determined by P0.07. However, the UP/DN key on the operation panel (or the FWD/REV knob of the shuttle operation panel) can real time change the direction, that is, it is possible to decelerate upon 0 speed from forward direction and then accelerate in reverse direction using DN key and vice versa to decelerate upon 0 speed from reverse direction and then accelerate in forward direction using UP key.
A: (3) In the case of operation panel control, the positive/negative frequency value resulting from the final frequency calculation for composite control can also change the direction in real time.
A: (4) In the case of terminal control, check if the forward/reverse terminal is in one to one correspondence with that of the control equipment (e.g. PLC).

XIV. Why did the fans of inverters of certain power classes will rotate upon power up, while others could not?

A: The fans of the 15KW inverters and inverters of lower power class are under no control, and they will run when powered up. The operation of the fans of 18.5KW inverters and inverters of higher power class is controlled by the heatsink temperature. When the inverter is powered up under low temperature condition, the fans will not run.

XV. What will happen if the CN1 busbar of the control board is loose or damaged?

A: If the CN1 busbar of the control board is loose or damaged, the inverter cannot run or will report several errors. For instance, the inverter may display “-LU- ” or “relay/contactor could not pull on “, or report such errors as E.oc1, E.FAL, E.oH1, E.oH2, E.Cur and E.dL3 ect