



向量變頻器

Vector control inverter

Operating manual



CA Series

www.tpg-tw.com

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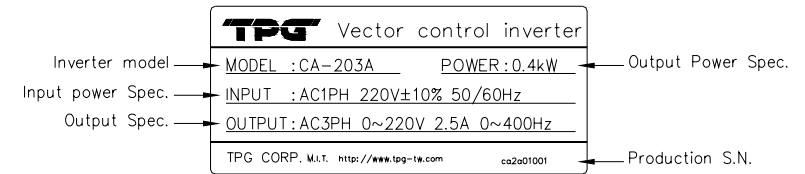
Chapter 1 Inspection and safety precautions

TPG frequency inverters have been tested and inspected before leaving factory. After purchasing, please check if its package is damaged due to careless transportation, and if the specifications and model of the product are consistent with your order requirements. For any problem, please contact your local authorized TPG dealer or directly contact this company.

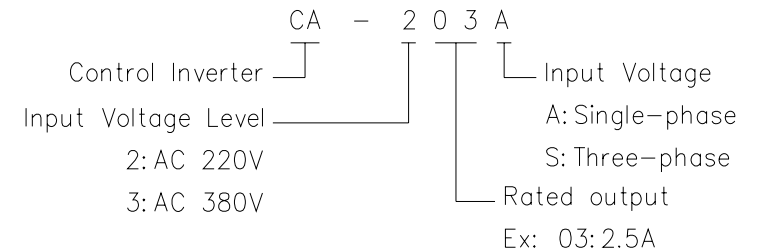
1-1. Inspection after unpacking

- ※ Check if that packing container contains this unit, one manual and one warranty card.
- ※ Check the nameplate on the side of the frequency inverter to ensure that the product you have received is the right one you ordered.

1-1-1. Instructions on nameplate





1-1-2. Model designation







1-2.Safety precautions



Safety precautions in this manual are divided into the following two categories:

 **Danger:** the dangers caused by failure to perform required operation, may result in serious body injury or even death;

 **Caution:**the dangers caused by failure to perform required operation,may result in moderate injury or minor injury, and equipment damage;

Process	Type	Explanation
Before installation	 Danger	<ul style="list-style-type: none"> ★ When unpacking, if control system with water, parts missed or component damaged are found, do not install! ★ If packing list does not match the real name, do not install! ★ Gently carry with care,otherwise there is the risk of damage to equipment! ★ Please do not use the damaged driver or the frequency inverter with missed pieces,otherwise there is the risk of injury! ★ Do not use your hand to touch the control system components, otherwise there is the risk of electrostatic damage!
		<ul style="list-style-type: none"> ★ Please install the unit on the metal or flame retardant objects; away from combustible material. Failure to do so may cause a fire! ★ Never twist the mounting bolts of the equipment components, especially the bolt with the red mark!
When installing	 Note	<ul style="list-style-type: none"> ★ Do not let the lead wires or screws fall into the driver. Otherwise which may cause damage to the driver! ★ Keep the driver installed in the place where less vibration, avoid direct sunlight. ★ When two or more converters are installed in a cabinet, please pay attention to the installation location, ensure the good heat dissipation effect.
		<ul style="list-style-type: none"> ★ Must comply with this manual's guidance,any construction shall be performed by a professional electrician, otherwise there would be the unexpected risk ! ★ A circuit breaker must be set between the inverter and the power supply to separate them, otherwise it may cause a fire! ★ Verify if power is a zero-energy status before wiring, otherwise there is a risk of electric shock! ★ The inverter shall be grounded correctly according to standard specifications, otherwise there is a danger of electrical shock! ★ Never connect the input power to the inverter output terminals (U, V, W) . Note that the mark of the terminals,

Process	Type	Explanation
		<p>do not incorrectly connect wires! Otherwise which may cause damage to the driver!</p> <ul style="list-style-type: none"> ★ Ensure that the distribution line meets the regional safety standards of EMC requirements. The diameter of used wire shall refer to the recommendations of this manual. Otherwise it may cause an accident! ★ When connecting to braking resistor,the braking resistor must be connected to position between terminals (P, RB) of the inverter
Before energizing	 Note	<ul style="list-style-type: none"> ★ Please confirm whether the input power voltage is same as the inverter rated voltage; wiring positions of power input terminals (R,S,T) and output terminals (U,V,W) are correct or not; and note that if there is a short circuit in the peripheral circuit connected to driver,if the connected lines are tight, otherwise it may cause damage to the driver! ★ Do not need to perform withstand voltage test for any part of the inverter,this product has been tested before leaving factory. Otherwise it may cause an accident!
		<ul style="list-style-type: none"> ★ The inverter's cover plate must close before power on. Otherwise it may cause an electric shock! ★ Wiring of all external accessories must comply with the guidance of this manual,please correctly wiring in accordance with the circuit connection methods described in this manual. Otherwise it may cause an accident!
After energizing	 Danger	<ul style="list-style-type: none"> ★ Do not open cover plate after energizing. Otherwise there is a risk of electric shock! ★ Do not touch the driver and peripheral circuits with wet hands. Otherwise there is a risk of electric shock! ★ Do not touch any input and output terminals of the inverter. Otherwise there is a risk of electric shock! ★ The inverter automatically perform the safety testing for the external strong electrical circuit in the early stages of energizing, therefore never touch the driver terminals (U, V, W) or motor terminals, otherwise there is a risk of electric shock! ★ If you need to identify the parameters, please pay attention to the danger of injury during motor rotation. Otherwise it may cause an accident! ★ Please do not change the inverter manufacturer parameters. Otherwise it may cause damage to this unit!
		<ul style="list-style-type: none"> ★ Do not touch the cooling fan and the discharge resistor to feel the temperature. Otherwise it may cause burns! ★ Non-professional personnel is not allowed to detect signal when operating. Doing so may cause personal injury or damage to this unit!

Process	Type	Explanation
	 Note	<ul style="list-style-type: none"> ★ When the inverter is operating, you should avoid that objects fall into this unit. Otherwise cause damage to this unit! ★ Do not start/stop the driver by switching on/off contactor. Otherwise cause damage to this unit!
When maintaining	 Danger	<ul style="list-style-type: none"> ★ Do not perform repairs and maintenance for the live electrical equipment. Otherwise there is a risk of electric shock! ★ The repairs and maintenance task can be performed only when the inverter voltage is lower than AC36V, generally that is two minutes after powering off. Otherwise, the residual charge from capacitor would cause personal injury! ★ Non-well-trained professional personnel is not allowed to perform repairs and maintenance of inverter. Doing so may cause personal injury or damage to this unit! ★ After replacing the inverter, parameter settings must be redone, all pluggable plugs can be operated only in the case of powering off!

1-3. Precautions

No.	Type	Explanation
1	Motor insulation inspection	Please perform motor insulation inspection for the first time use, re-use after leaving unused for a long time as well as regular check, in order to prevent damage to the inverter because of the motor's winding insulation failure. Wiring between motor and inverter shall be disconnected, it is recommended that the 500V voltage type megger should be adopted and insulation resistance shall be not less than 5MΩ.
2	Motor thermal protection	If the rated capacity of the selected motor does not match the inverter, especially when the inverter rated power is greater than the motor rated power, be sure to adjust the motor protection parameter values inside inverter or install thermal relay in the front of motor for motor protection.
3	Run over power frequency	This inverter can provide (0Hz to 400Hz) output frequency. If the user is required to run at 50Hz or more, please consider the endurance of your mechanical devices.
4	Vibrations of mechanical device	Inverter output frequency may be encountered mechanical resonance point of the load device, you can set jump frequency parameter inside inverter to avoid the case.
5	Motor heat and noise	The inverter output voltage is PWM wave that contains a certain amount of harmonics, so the temperature rise, noise and vibration of motor show a slight higher than frequency power frequency operation.

No.	Type	Explanation
6	Output side with piezoresistor or capacitor for improving power factor	The inverter output is PWM wave, if the piezoresistor for lightning protection or the capacitor for improving power factor is installed in the output side, which easily cause the inverter instantaneous overcurrent or even cause damage to the inverter. Please do not use.
7	Contactor or switch used in the inverter input/output terminals	If contactor is installed between power supply and inverter, the contactor is not allowed to start/stop the inverter. Necessarily need to use the contactor to control the inverter start/stop, the interval should not be less than one hour. Frequent charging and discharging may reduce the service life of the inverter capacitor. If the contactor or switch is equipped between output terminals and motor, the inverter should be turned on/off without output status, otherwise which easily lead to damage to the inverter module.
8	Use other than the rated voltage	CA Series inverter is not suitable for use beyond the allowable operating voltage described in this manual, which easily cause damage to the parts inside inverter. If necessary, please use the corresponding transformer to change voltage.
9	Never change 3-phase input to 2-phase input	Never change CA Series 3-phase inverter to 2-phase one for application. Otherwise it will lead to malfunction or damage to the inverter.
10	Lightning surge protection	The series inverter is equipped with lightning overcurrent protection device, so it has the ability of self-protection to lightning induction. For the area where lightning is frequent, user should also install the extra protection in the front of the inverter.
11	High altitude and derating application	When the inverter is used in areas over 1000m altitude, it is required to reduce frequency because the thin air will decrease the cooling effect of inverter. Please consult our technician for details on the application.
12	Special use	If the user need to use methods other than the suggested wiring diagram provided in this manual, such as common DC bus, please consult our technician.
13	Precautions for scrap disposal of the inverter	It may explode when electrolytic capacitors on the main circuit and printed circuit board are burned. When burning plastic parts, it may produce toxic gases. Please disposing as industrial waste.
14	About adaptive motor	<ol style="list-style-type: none"> 1) Standard adaptive motor shall be four-pole asynchronous squirrel-cage induction motor. Apart from the said motors, please select the inverter according to the motor rated current. 2) The cooling fan and the rotor shaft for non-inverter motor are coaxially connected, the fan cooling effect is reduced when the rotational speed is reduced, therefore,

No.	Type	Explanation
		<p>when the motor works in overheating occasions,a strong exhaust fan should be retrofitted or replace non-inverter motor with the inverter motor;</p> <p>3) The inverter has built-in the adaptive motor standard parameters, according to the actual situation, please identify motor parameters or accordingly modify the default values to try to meet the actual value,otherwise it will operation affect and protection performance;</p> <p>4) When short-circuit of cable or motor internal will activate the inverter alarm, even bombing. Therefore, firstly perform insulation short-circuit test for the initial installation of the motor and cable, routine maintenance often also need to perform such test. Note that the parts to be tested and the inverter shall be disconnected completely when testing.</p>
15	Others	<p>1) Never connect the AC power to the inverter output terminals (U, V, W) .</p> <p>2) Properly fix and lock the panel before powering on, so as to avoid hurting the personal safety due to internal poor capacitors.</p> <p>3) Never perform wiring, checking and other operations after power is turned on.</p> <p>4) Do not touch the internal circuit board and its components in order to avoid the risk of electric shock after this unit is powered,</p> <p>5) Do not touch internal circuit board and any parts after powering off and within five minutes after keyboard indicator lamp goes out,you must use the instrument to confirm that internal capacitor has been discharged fully,otherwise there is a danger of electric shock.</p> <p>6) Body static electricity will seriously damage the internal MOS field-effect transistors, etc.,if there are not anti-static measures, do not touch the printed circuit board and IGBT internal device with hand, otherwise it may cause a malfunction.</p> <p>7) The ground terminal of the inverter (E or \perp) shall be earthed firmly according to the provisions of the National Electrical Safety and other relevant standards. Do not shut down (power off) by pulling switch,and only cut off the power until the motor stopping operation.</p> <p>8) It is required to add the optional input filter attachment so as to meet CE standards</p>

1-4.Scope of applications

- ※ This inverter only applies to typical industrial three-phase AC asynchronous motor.
- ※ This inverter can only be used in those occasions recognized by this company, an unapproved use may result in fire, electric shock, explosion and other accidents.
- ※ If the inverter is used in such equipments (e.g: equipments for lifting persons,aviation systems, safety equipment, etc.) and its malfunction may result in personal injury or even death. In this case,please consult the manufacturer for your application.

Only the well-trained personnel can be allowed to operate this unit, please carefully read the instructions on safety, installation, operation and maintenance before use. The safe operation of this unit depends on proper transport, installation, operation and maintenance!

Chapter 2 Standard specifications

2-1. Technical specifications

Inverter model	Rated output Power KW)	Rated input Current(A)	Rated output current (A)	Adaptive motor Power (KW)
Single phase 220V ±10%				
CA-203A	0.4	5.4	2.5	0.4
CA-204A	0.75	8.2	4.0	0.75
CA-207A	1.5	14.0	7.0	1.5
CA-210A	2.2	23	10	2.2
Three-phase 220V ±10%				
CA-203S	0.4	4.1	2.5	0.4
CA-204S	0.75	5.3	4.0	0.75
CA-207S	1.5	8.0	7.0	1.5
Three-phase 380V ±10%				
CA-401S	0.4	2.0	1.2	0.4
CA-403S	0.75	4.3	2.5	0.75
CA-404S	1.5	5.0	3.8	1.5
CA-405S	2.2	5.8	5.1	2.2
CA-409S	3.7	10	8.5	3.7

Note: the 220V voltage level can be used as a brake unit selection; 380V voltage brake unit as the standard, can not do for selection.

2-2. Technical specifications

Items		Specifications
Power	Voltage and frequency levels	Single phase 220V, 50/60Hz Three-phase 220V, 50/60Hz Three-phase 380V,50/60Hz
	Allowable fluctuation	Voltage: ± 10% ;Frequency: ± 5% The voltage unbalance rate is less than 3% and the distortion rate meets the IEC61800-2 standard.
Control system	Control system	High performance vector control inverter based on DSP
	Output frequency	0.00 to 400.0Hz
	Control method	V/F control Open-loop flux vector control
	Automatic torque boost function	Realize low frequency (1Hz) and large output torque control under the V/F control mode.
	Frequency setting resolution	Digital: 0.01Hz Analog: highest frequency × 0.2%
	V/F curve mode	Linear, square root/m-th power, custom V/F curve
	Over load capability	Rated Current 150% - 60 seconds, Rated Current 200% - 1 seconds
	Slip compensation	Slip compensation available
	Carrier Frequency	1kHz to 15kHz
	Start torque	0.5Hz/150% (Open-loop flux vector control)
	Speed range	1:100 (Open-loop flux vector control)
	Steady-speed precision (Speed control accuracy)	Open-loop flux vector control: ≤ ± 0.5% (rated synchronous speed)
	Torque response	≤40ms (Open-loop flux vector control)
	Torque boost	Automatic torque boost; manual torque boost (0.1% to 30.0%)
	Linear ac/deceleration	Linear acceleration and deceleration mode; two kinds of acceleration and deceleration time; time range 0.1s to 3600.0s.
	DC braking	DC braking frequency: 0.00Hz to max.output frequency; Braking time: 0.0 to 50.0 seconds Braking current value: 0.0% to 150.0%
	Jogging control	Jog Frequency Range: 0.00Hz to max.output frequency; Jog Ac/deceleration time: 0.1s to 3600.0s
Multi-speed operation	Achieve up to 16-speed operation through the control terminal	
Built-in PID	Easy to realize closed-loop control system for the process control.	

Items		Specifications	
	Automatic voltage regulation (AVR)	Automatically maintain a constant output voltage when the voltage of electricity grid changes	
Running	Input signal	Running method	Keyboard/terminal/communication
		Frequency setting	Total 8 frequency setting modes: digital, analog voltage/current, multi-speed and serial port.
		Start signal	Forward run Reverse run
		Multi-speed	At most 16-speed can be set (run by using the multi-function terminals)
		Multi-stage acceleration	At most 2-stage acceleration can be set (run by using the multi-function terminals)
		Emergency stop	Interrupt controller output
		Wobble run	Process control run
		Jog running	Slow speed running
		Fault reset	When the protection function is active, you can automatically or manually reset the fault condition.
		PID feedback signal	Including DC 0 to 10V/0 to 20mA
	Output signal	Running status	Motor status display, forward, reverse, program running status.
		Fault output	Relay contact capacity AC 250V/7A
		Analog output	1-way analog output, 9 signals can be selected such as frequency, current, voltage and other, output signal range (DC 0 to 10V/0 to 20mA) .
		Output signal	2-way output, there are 8 signals each way
	Run function		Limit frequency, jump frequency, slip compensation, reversal protection, auto-tuning, PID control
	DC current braking		Built-in PID regulates braking current to ensure sufficient braking torque under no overcurrent condition.
	Running command channel		Three channels: operation panel, control terminals and serial communication port. They can be switched through a variety of ways.
	Frequency source		Total 8 frequency sources: digital, analog voltage, analog current, multi-speed and serial port. They can be switched through a variety of ways.
	Input terminals		5 digital input terminals, compatible with the active PNP or NPN input. 2 Analog input terminals
Output terminals		One digital output terminals (bipolar output) ; one relay output terminal; 2 analog output terminals respectively for optional range (0 to 20mA or 0 to 10V), they can be used to set frequency, output	

Items		Specifications	
		frequency, speed and other physical parameters. Support 0.1-10kHz square signal output.	
Protection function	Inverter protection		Overvoltage protection, undervoltage protection, overcurrent protection, overload protection, overheat protection, overcurrent stall protection, overvoltage stall protection, external fault, communication error, PID feedback signal abnormalities.
	IGBT temperature display		Displays current temperature IGBT
	Instantaneous power-down restart		Less than 15 milliseconds: continuous operation. More than 15 milliseconds: automatic detection of motor speed, instantaneous power-down restart.
	Speed start tracking method		The inverter automatically tracks motor speed after it starts
	Parameter protection function		Protect inverter parameters by setting administrator password and decoding
Display	LED Keyboard	Running message	Monitoring objects including: running frequency, set frequency, output current, DC bus voltage, output voltage, actual motor speed, PID setting value, PID feedback value, input terminal status, output terminal status, analog AI1 value, analog AI2 value, current stage of multi-speed, torque set value, etc.
		Error message	At most save 3 error messages, and the time, type, voltage, current, frequency and terminal status can be queried when the failure is occurred.
	LED display		Display parameters
	Key lock		It can lock all keys in order to prevent misuse.
	Communication	RS485	
Environment		Environment temperature	-10 °C to 40 °C (temperature at 40 °C to 50 °C, please derating for use)
	Storage temperature	-20 °C to 65 °C	
	Environment humidity	Less than 90% RH, non-condensing water droplets	
	Height and vibration	Below 1000m, below 5.9m/s ² (= 0.6g)	
Application sites		Indoor where no sunlight or corrosive, explosive gas and water vapor, dust, flammable gas, oil mist, water vapor, drip or salt, etc.	

Items		Specifications
	Altitude	Below 1000m
	Pollution degree	2
Product Standard	Product adopts safety standards.	IEC61800-5-1:2007
	Product adopts EMC standards.	IEC61800-3:2005
Cooling method		Forced air cooling

Chapter 3 Keyboard

3-1.Keyboard description

Keyboard is used to operate CA SERIES frequency inverters, read status data and adjust parameters.



Keyboard Schematic Diagram

3-2.Keyboard indicators

Indicator flag	Name	Meaning	
Status Indicator	FWD	Forward running lamp	ON means that the inverter is forward operating.
	REV	Reverse running lamp	ON means that the inverter is reverse operating.
	Hz	Frequency Indicator	Frequency unit of the inverter
	A	Current Indicator	Current unit of the inverter

Correspondence that LED displays symbols and characters/digits is as follows:

Digital display area	Display letters	Corresponding letters	Display letters	Corresponding letters	Display letters	Corresponding letters
	0	0	1	1	2	2
	3	3	4	4	5	5
	6	6	7	7	8	8
	9	9	A	A	b	B
	L	C	d	d	E	E

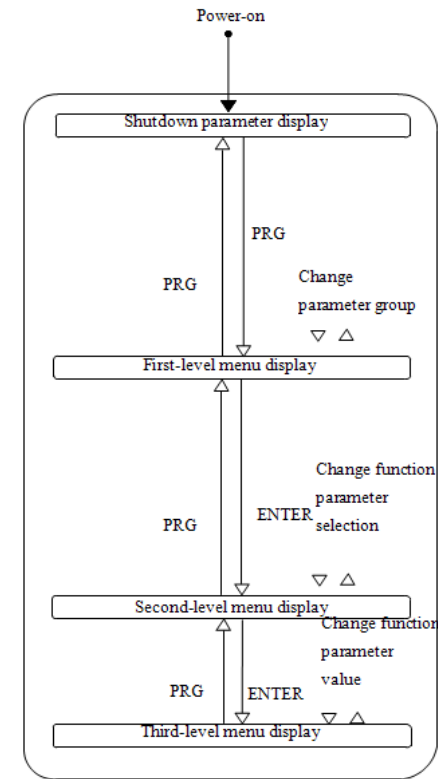
	F	F	H	H	I	I
	L	L	N	N	n	n
	O	o	P	P	r	r
	S	S	t	t	U	U
	T	T	.	.	-	-
	Y	y				

3-3. Description of operation panel keys

Sign	Name	Function
	Parameter Setting/Exit Key	* Enter top menu parameter change status * Exit from function option change * Return to status display menu from sub-menu or function option menu
	Shift Key	* Select circularly parameters under run or stop interface; select parameters when modifying the parameters.
	Ascending Key	* Data or function code ascending
	Decending Key	* Data or function code decending
	Run Key	Used for running operation in the keyboard mode.
	Stop/Reset Key	* Press the key to stop running in running status; press the key to reset in fault alarm status, can be used to reset the operation, the key is subject to function code F6.00.
	Enter Key	* Enter into levels of menu screen,confirm settings.
	Keyboard potentiometer	* F0.02 is set to 3,keyboard potentiometer is used to set the running frequency.
		Simultaneously press two keys to lock or unlock the keypad.

3-4. Examples of parameter settings

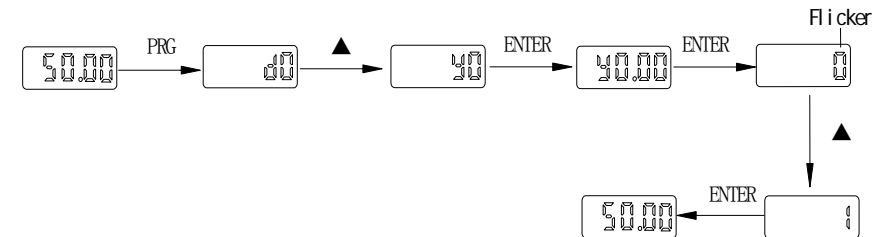
Instructions on viewing and modifying function code
 CA SERIES inverter operation panel has three levels of menu structure for parameter settings and other operations. Three levels of menu is as follows: function parameter group (first level menu) → function code (second level menu) → function code settings (third level menu) . The operation flow is shown in the figure.



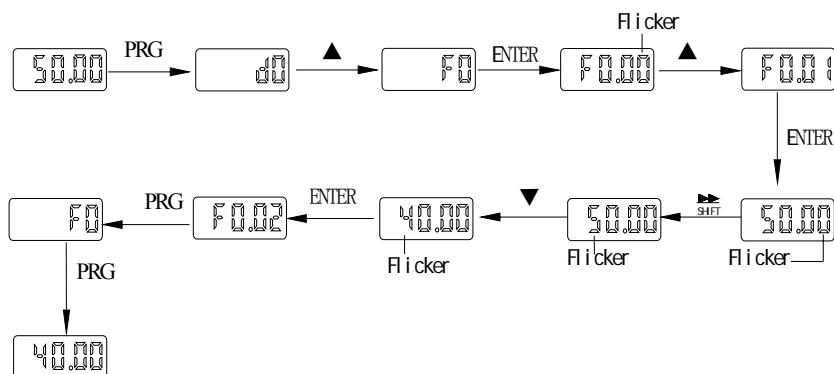
Display status and operation processes

Description: return to the second-level menu from the third-level menu by pressing PRG key or ENTER key. The difference between the two keys : press ENTER to return the second-level menu and save parameters setting before returning, and automatically transfer to the next function code; press PRG to return directly to the second-level menu, do not save parameters setting,and return to current function code .

Example 1 :restore factory default



Example 2 :change function code F0.01 from 50.00Hz to 40.00Hz



In the third-level menu status, if the parameter has not blinking bit, it means that the function code can not be modified, the possible causes include:

- 1) The function code can not be used to modify the parameters. Such as actual detection parameters, run record parameters.
- 2) The function code can not be modified in the running status, can be modified only after this unit is stopped.

How to view status parameters

In stop or run status, operate SHIFT key to display a variety of status parameters respectively. Parameter display selection depends on function code F6.01 (run parameter) and F6.02 (stop parameter) .

In stop status, there are 10 run status, you can set to display or not display them: set frequency, bus voltage, DI input status, DO output status, PID settings and PID feedback, analog input AI1 voltage, analog input AI2 voltage, and switch and display the selected parameter by pressing key orderly.

In run status, there are 16 run status, you can set to display or not display them: running frequency, set frequency, bus voltage, output voltage, output current, output power, output torque, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, linear speed, PID settings and PID feedback, etc, their display depends on function code F6.01, and switch and display the selected parameter by pressing key orderly.

Inverter powers off and then powers on again, the displayed parameters are the selected parameters before power-off.

3-4-1.Password settings

The inverter has password protection, when Y0.01 is non-zero value, that is user password, password protection will enter into force when you exit from function code editing status, press the PRG key again, it will display "----", you must enter correct user password before entering regular menus, otherwise inaccessible.

To cancel the password protection function, firstly enter correct password to access and then set Y0.01 to 0.

3-4-2.Motor parameter auto tuning

Select the operating mode of vector control, you must accurately input parameters

of the motor's nameplate before inverter operation, CA SERIES frequency inverter will match the standard motor parameters according to the nameplate parameters; the vector control method is highly dependent on motor parameters, in order to get good control performance, the accurate parameters of the controlled motor must be required

Motor parameter auto tuning steps are as follows (Take asynchronous motor as an example) :

Firstly select command source as keyboard control (F0.04=0) . then input the following parameters according to the actual motor parameters (selection is based on the current motor) :

Motor Selection	Parameters
Motor	b0.00: motor type selection b0.01: motor rated power b0.02: motor rated voltage b0.03: motor rated current b0.04: motor rated frequency b0.05: motor rated speed

If the motor can NOT completely disengage its load, please select 1 (asynchronous motor parameter static auto tuning) for b0.11, and then press the RUN key on the keyboard panel, the inverter will automatically calculate the motor's following parameters:

If the motor can completely disengage its load, please select 2 (asynchronous motor parameter comprehensive auto tuning) for b0.11, and then press the RUN key on the keyboard panel:

Motor Selection	Parameters
Motor	b0.06: Asynchronous motor stator resistance b0.07: Asynchronous motor rotor resistance b0.08: Asynchronous motor stator and rotor inductance b0.09: Asynchronous motor stator and rotor mutual inductance b0.10: Asynchronous motor no-load current

Complete motor parameter auto tuning

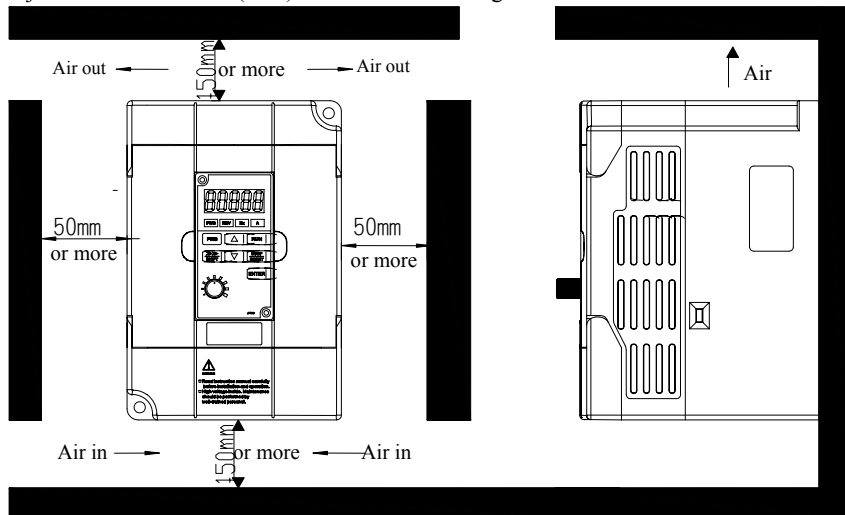
Chapter 4 Installation and commissioning

4-1. Operating environment

- (1) ambient temperature -10 ~ 50. After more than 40 degrees Celsius, in accordance with the proportion of 1 to 3% degrees down the amount of. Inverter is not recommended in the environment above 50.
- (2) to prevent electromagnetic interference, away from the source of interference.
- (3) to prevent the invasion of water, steam, dust, dust, cotton, metal powder.
- (4) to prevent oil, salt and corrosive gas intrusion.
- (5) avoid shaking. Maximum amplitude is not more than 5.9m/s (0.6g).
- (6) to avoid high temperature and humidity and no rain water poured, relative humidity is less than 90%RH, does not allow the dew. In the presence of corrosive gases in the space, the maximum relative humidity can not exceed 60%.
- (7) altitude.
- (8) the prohibition of the use of flammable, combustible, explosive gas, liquid or solid hazardous environment.

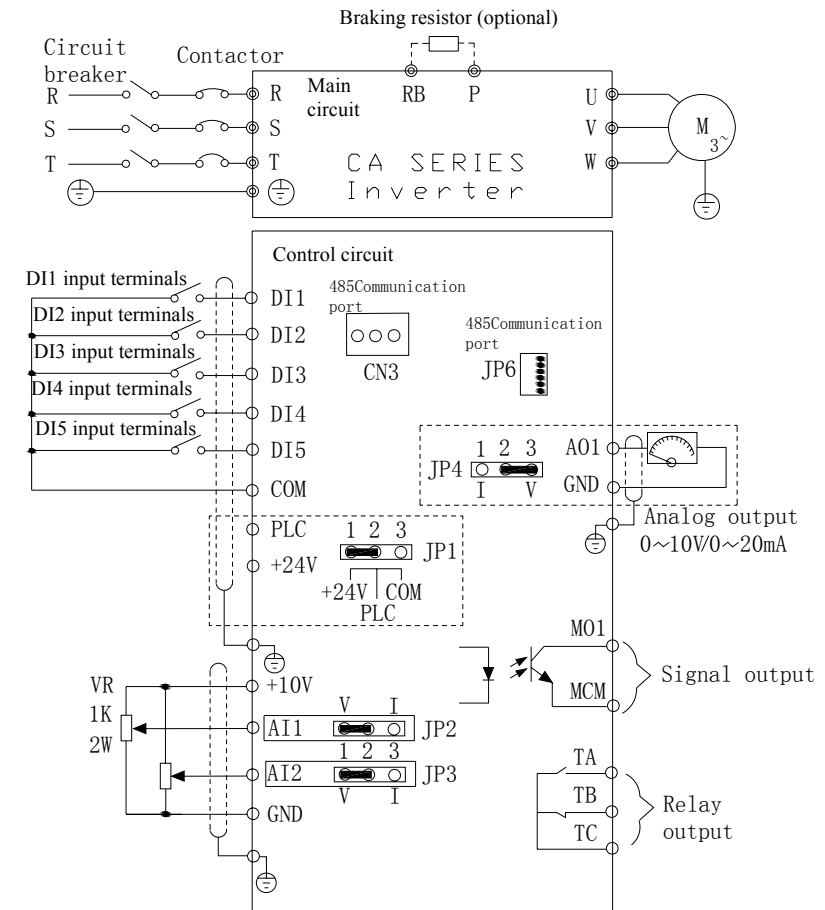
4-2. Installation direction and space

The inverter shall be installed in the room where it is well ventilated, the wall-mounted installation shall be adopted, and the inverter must keep enough space around adjacent items or baffle (wall) . As shown below figure:



4-3. Wiring diagram

The wiring of inverter is divided into two parts of main circuit and control circuit. User must correctly connect in accordance with the wiring circuit as shown in the following figure.



Note: the V6 version of the control board and the above 485 communication ports are CN3, V6 and JP6 port.

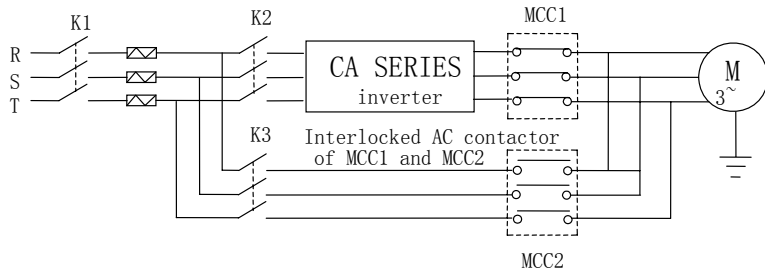
motor

- ※ Do not let metal chips or wire ends into inside the inverter when wiring, otherwise which may cause malfunction to the inverter.
- ※ Disconnect motor or switch power-frequency power supply only when the inverter stops output
- ※ In order to minimize the effects of electromagnetic interference, it is recommended that a surge absorption device shall be installed additionally when electromagnetic contactor and relay is closer from the inverter.
- ※ External control lines of inverter shall adopt isolation device or shielded wire.
- ※ In addition to shielding, the wiring of input command signal should also be aligned separately, it is best to stay away from the main circuit wiring.
- ※ If the carrier frequency is less than 3KHz, the maximum distance between the inverter and the motor should be within 50 meters; if the carrier frequency is greater than 4KHz, the distance should be reduced appropriately, it is best to lay the wiring inside metal tube.
- ※ When the inverter is additionally equipped with peripherals (filter, reactor, etc.), firstly measure its insulation resistance to ground by using 1000 volt megger, so as to ensure the measured value is no less than 4 megohms.
- ※ When the inverter need to be started frequently, do not directly turn power off, only the control terminal or keyboard or RS485 operation command can be used to control the start/stop operation, in order to avoid damage to the rectifier bridge.
- ※ Do not connect the AC input power to the inverter output terminals (U, V, W) .
- ※ To prevent the occurrence of an accident, the ground terminal (≡) must be earthed firmly (grounding impedance should be less than 10 ohms), otherwise the leakage current will occur.
- ※ The specifications on wires used by the main circuit wiring shall comply with the relevant provisions of the National Electrical Code.
- ※ The motor's capacity should be equal to or less than the inverter's capacity.

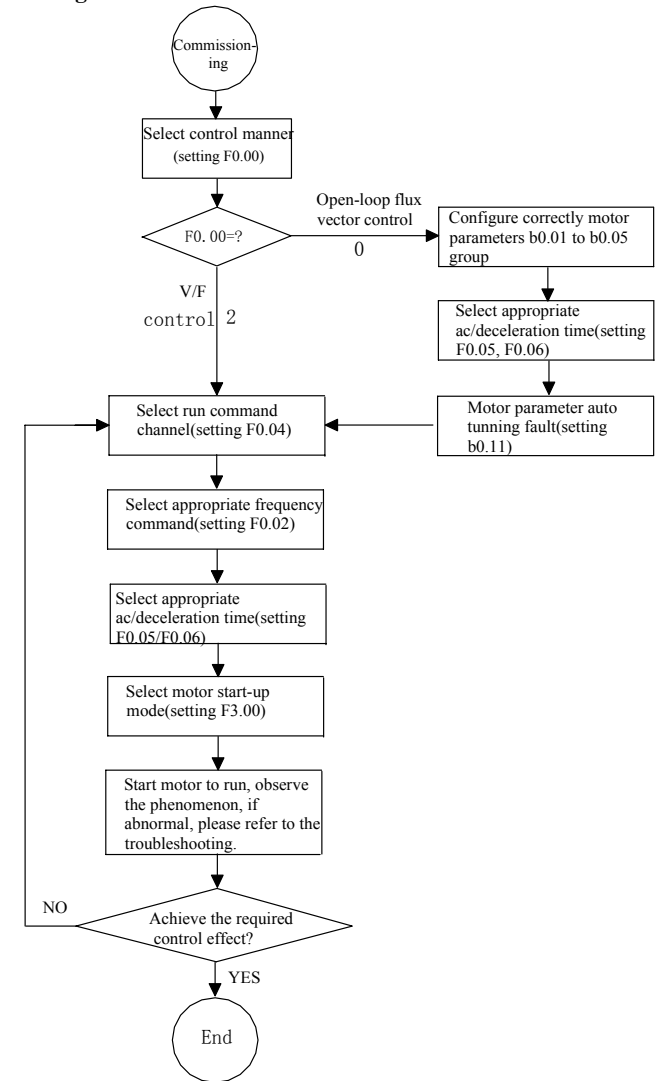
4-7.Spare circuit

When the inverter occurs the fault or trip, which will cause a larger loss of downtime or other unexpected faults. In order to avoid this case from happening, please additionally install spare circuit to ensure safety.

Note: the characteristics of spare circuit must be confirmed and tested beforehand, and its power-frequency shall be in accordance with the phase sequence of the inverter.



4-8.Commissioning



- Firstly confirm that AC input power supply voltage shall be within inverter rated input voltage range before connecting power supply to the inverter.
- Connect power supply to the R, S and T terminals of the inverter.
- Select the appropriate operation control method

Chapter 5 Function parameter

5-1.Menu grouping

CA SERIES inverter function parameters are grouped by function, there is d0 group, F0 group to Fb group, E0 group to E3 group, b0 group, y0 group to y1 group, L0 group, a total of 21 groups. Each functional group includes several functional code.

F group and E group are the basic function parameters, d group is monitoring function parameters and b group is motor parameters.

In order to more effectively carry out parameter protection, the inverter provides a password protection of function code. y0.01 is used to set parameters protection password, you can enter into parameter menu only after inputting correct password under function parameters mode. Password protection is canceled when y0.01 is set to 00000.

L0 group is factory function parameters, users do not have access to the group of parameters.

Function parameter table "Change", change properties (ie, whether to allow the change or not and change conditions) and symbol description is as follows:

"★": indicates that the parameter value can not be changed when the inverter is running;

"●": indicates that the parameter value is the actual measured value, can not be changed;

"☆": indicates that the parameter value can be changed when the inverter is running or stopped;

"▲": "Factory parameters", prohibit the user to operate;

"-": indicates that the parameter factory default is none or the value is undefined.

Code	Parameter Group Name	Functional Description
d0	Monitoring function group	Monitoring frequency, current, etc
F0	Basic function group	Frequency setting, control mode, acceleration and deceleration time
F1	Input terminals group	Analog and digital input functions
F2	Output terminals group	Analog and digital output functions
F3	Start and stop control group	Start and stop control parameters
F4	V/F control group	V/F control parameters
F5	Vector control group	Vector control parameters
F6	Keyboard and display group	To set key and display function parameters
F7	Auxiliary function group	To set Jog, jump frequency and other auxiliary function parameters

F8	Fault and protection group	To set fault and protection parameters
F9	Communication parameter group	To set MODBUS communication function
FA	Torque control group	To set parameters under torque control mode
Fb	Control optimization group	To set parameters of optimizing the control performance
E0	Wobble control group	Wobble function parameters setting
E1	Multi-speed control group	Multi-speed setting
E2	PID control group	To set Built-in PID parameters
E3	Virtual DI, virtual DO group	Virtual IO setting
b0	Motor parameters group	To set motor parameter
y0	Function code management group	User password, initialization parameter setting
y1	Fault history search group	Information on current, former or first two faults

5-1-1.d0 Group - Monitoring function

No.	Code	Parameter name	Functional Description	Smallest unit	Change
1.	d0.00	Running frequency	Inverter current actual output frequency	0.01Hz	●
2.	d0.01	Set frequency	Inverter current actual setting frequency	0.01Hz	●
3.	d0.02	DC bus voltage	Detected value for DC bus voltage	1V	●
4.	d0.03	Inverter output voltage	Inverter actual output voltage	1V	●
5.	d0.04	Inverter output current	Inverter actual output current	0.1A	●
6.	d0.05	Inverter output power	Inverter actual output power	0.1kW	●
7.	d0.06	Inverter output torque	Inverter actual output torque percentage	1%	●
8.	d0.07	Input terminal status	Input terminal status	-	●
9.	d0.08	Output terminal status	Output terminal status	-	●
10.	d0.09	Analog AI1 value	Analog AI1 input voltage value	0.01V	●
11.	d0.10	Analog AI2 value	Analog AI2 input voltage value	0.01V	●

12.	d0.11	Panel potentiometer voltage	Panel potentiometer setting voltage value	0.01V	●
13.	d0.12	Motor actual speed	Motor actual running speed	1rpm	●
14.	d0.13	PID setting value	Setting value percentage under PID adjustment mode	1%	●
15.	d0.14	PID feedback value	Feedback value percentage under PID adjustment mode	1%	●
16.	d0.15	Current stage of multi-speed	Current stage of multi-speed	-	●
17.	d0.16	Reserved			
18.	d0.17	Inverter module temperature	0 to 100.0°C	0.1°C	●
19.	d0.18	Software version	DSP software version number	-	●
20.	d0.19	Cumulative running time of this unit	0 to 65535h	1h	●
21.	d0.20	Torque setting value	Observe the set command torque under speed mode or torque control mode	0.1%	●

5-1-2.F0 Group - Basic function

No.	Code	Parameter name	Setting range	Factory default	Change
22.	F0.00	Control mode	0: Open-loop flux vector control 1: Reserved 2: V/F control 3: torque control	2	★
23.	F0.01	Keyboard set frequency	0.00Hz to F0.08 (maximum output frequency)	50.00Hz	☆
24.	F0.02	Frequency command selection	0: keyboard setting 1: Analog AI1 setting 2: Analog AI2 setting 3: Panel potentiometer setting 4: AI1+ AI2 setting 5: Multi-speed operation setting 6: PID control setting 7: Remote communications setting	0	★
25.	F0.03	Keyboard and terminal UP/DOWN setting	0: Valid, and the inverter power failure with data storage 1: Valid, and the inverter power failure without data storage	0	☆

			2: UP/DOWN setting is invalid 3: Valid when running, invalid when stop		
26.	F0.04	Command source channel	0: Keyboard command channel 1: Terminal command channel 2: Communication command channel	0	★
27.	F0.05	Acceleration time 1	0.1 to 3600.0s	Depends on models	☆
28.	F0.06	Deceleration time 1	0.1 to 3600.0s	Depends on models	☆
29.	F0.07	Carrier frequency setting	1.0 to 15.0kHz	Depends on models	☆
30.	F0.08	Maximum output frequency	10.00 to 400.00Hz	50.00Hz	★
31.	F0.09	Upper limit frequency setting source selection	0: Keyboard setting (F0.10) 1: Analog AI1 setting 2: Analog AI2 setting 3: Multi-speed setting 4: Remote communications setting Note: Option 1 to 4, the setting value 100% corresponds to the maximum output frequency	0	★
32.	F0.10	Running frequency upper limit	F0.11 to F0.08 (maximum output frequency)	50.00Hz	☆
33.	F0.11	Running frequency lower limit	0.00Hz to F0.10 (running frequency upper limit)	0.00Hz	☆
34.	F0.12	Running direction selection	0: default 1: opposite 2: reverse prohibited	0	★
35.	F0.13	AVR function selection	0: Invalid 1: full valid 2: only invalid during deceleration	1	☆

5-1-3.F1 Group - Input terminals

No.	Code	Parameter name	Setting range	Factory default	Change
36.	F1.00	DI1 terminal function selection	0: No function 1: Forward run	1	★

37.	F1.01	DI2 terminal function selection	2: Reverse run	2	★
38.	F1.02	DI3 terminal function selection	3: Three-wire operation control 4: Forward Jog	0	★
39.	F1.03	DI4 terminal function selection	5: Reverse Jog 6: Frequency setting increment (UP)	9	★
40.	F1.04	DI5 terminal function selection	7: Frequency setting decrement (DOWN)	4	★
41.	F1.05	Reserved	8: Free stop 9: Fault reset 10: External fault input 11: Frequency change settings clear 12: Multi-speed terminal 1 13: Multi-speed terminal 2 14: Multi-speed terminal 3 15: Multi-speed terminal 4 16: Ac/deceleration time selection 17: Control command switch terminal 18: Ac/deceleration prohibited 19: PID control pause 20: Wobble pause (stops at the current frequency) 21: Wobble reset (returns to the center frequency) 22: Torque control prohibited 23: Frequency change settings temporarily clear 24: Stop DC braking 25: Reserved		
42.	F1.06	Terminal control operation mode	0: Two-wire type control 1 1: Two-wire type control 2 2: Three-wire type control 1 3: Three-wire type control 2	0	★
43.	F1.07	Change rate of terminal UP/DOWN frequency increment	0.01 to 50.00Hz/s	0.50Hz/s	☆
44.	F1.08	AI1 lower limit	0.00V to F1.10	0.00V	☆
45.	F1.09	AI1 lower limit setting	-100.0% to 100.0%	0.0%	☆
46.	F1.10	AI1 upper limit	F1.08 to 10.00V	10.00V	☆
47.	F1.11	AI1 upper limit	-100.0% to 100.0%	100.0%	☆

		setting			
48.	F1.12	Filter time of AI1 input	0.00s to 10.00s	0.10s	☆
49.	F1.13	AI2 lower limit	0.00V to F1.15	0.00V	☆
50.	F1.14	AI2 lower limit setting	-100.0% to 100.0%	0.0%	☆
51.	F1.15	AI2 upper limit	F1.13 to 10.00V	10.00V	☆
52.	F1.16	AI2 upper limit setting	-100.0% to 100.0%	100.0%	☆
53.	F1.17	Filter time of AI2 input	0.00s to 10.00s	0.10s	☆
54.	F1.18	Times of switching quantity filtering	1 to 10	5	☆
55.	F1.19	DI terminal mode selection	0x000 to 0x1FF	000	★

5-1-4.F2 Group - Output terminals

No.	Code	Parameter name	Setting range	Factory default	Change
56.	F2.00	MO1 output selection	0: No output	1	☆
57.	F2.01	Reserved	1: Motor forward running 2: Motor reverse running		
58.	F2.02	Reserved	3: Fault output 4: Frequency level detection FDT output		
59.	F2.03	Relay output selection	5: Frequency arrival 6: Zero speed running 7: Upper limit frequency arrival 8: Lower limit frequency arrival 9 to 10: Reserved	1	☆
60.	F2.04	AO1 output selection	0: Running frequency 1: Set frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Analog input AI1 value 7: Analog input AI2 value 8: Run speed	0	☆

			9 to 10: Reserved		
61.	F2.05	AO1 output lower limit	0.0% to F2.07	0.0%	☆
62.	F2.06	Lower limit corresponds to AO1 output	0.00V to 10.00V	0.00V	☆
63.	F2.07	AO1 output upper limit	F2.05 to 100.0%	100.0%	☆
64.	F2.08	Upper limit corresponds to AO1 output	0.00V to 10.00V	10.00V	☆
65.	F2.09	MO1 Turn-on delay time	0.0~3600s	0.0s	☆
66.	F2.10	MO1 Turn-off delay time	0.0~3600s	0.0 s	☆
67.	F2.11	Turn-on delay time of relay	0.0~3600s	0.0 s	☆
68.	F2.12	Turn-off delay time of relay	0.0~3600s	0.0 s	☆
69.	F2.13	Reserved			
70.	F2.14	D0 terminal active status selection	0x00 to 0x1F	00	☆
71.	F2.15	MO1 output type selection	0: pulse output 1: digital output		☆
72.	F2.16	MO1 pulse output selection	0:running frequency 1: set frequency 2: output current 3: output torque 4: output power 5: output voltage 6: AI1 input value 7: AI2 input value 8:running speed/RPM 9~10: reserved		☆
73.	F2.17	MO1 lower limit of output pulse	0.0%~F2.19	0.0%	☆
74.	F2.18	Lower limit corresponding M01 pulse output	0.1-10kHz	0.0kHz	☆
75.	F2.19	Higher limit of M01 pulse output	F2.17-100%	100%	☆

76.	F2.20	Higher limit corresponding M01 pulse output	0.1-10kHz	10kHz	☆
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5-1-5.F3 Group - Start and stop control

No.	Code	Parameter name	Setting range	Factory default	Change
77.	F3.00	Start running mode	0: Directly startup 1: Speed tracking restart 2: First DC braking and then start	0	★
78.	F3.01	Startup start frequency	0.00 to 10.00Hz	0.00Hz	☆
79.	F3.02	Hold time for start frequency	0.0 to 50.0s	0.0 s	★
80.	F3.03	Braking current before start	0.0 to 150.0%	0.0%	★
81.	F3.04	Braking time before start	0.0 to 50.0s	0.0 s	★
82.	F3.05	Stop mode selection	0: Deceleration stop 1: Free stop	0	☆
83.	F3.06	Start frequency of stop braking	0.00 to F0.08 (maximum output frequency)	0.00Hz	☆
84.	F3.07	Waiting time of stop braking	0.0 to 50.0s	0.0 s	☆
85.	F3.08	Stop DC braking current	0.0 to 150.0%	0.0%	☆
86.	F3.09	Stop DC braking time	0.0 to 50.0s	0.0 s	☆

5-1-6.F4 Group - V/F control

No.	Code	Parameter name	Setting range	Factory default	Change
87.	F4.00	V/F curve setting	0: linear V/F curve 1: multi-point V/F curve 2: square V/F curve 3:1.25th power V/F curve 4:1.75th power V/F curve	0	★
88.	F4.01	Torque boost	0.0%: automatic torque boost 0.1% to 30.0%	0.0%	☆
89.	F4.02	Torque boost cut-off	0.0% to 50.0% (relative to rated frequency of motor)	20.0%	★

90.	F4.03	V/F frequency point 1	0.00Hz to F4.05	0.00Hz	★
91.	F4.04	V/F voltage point 1	0.0% to 100.0%	0.0%	★
92.	F4.05	V/F frequency point 2	F4.03 to F4.07	0.00Hz	★
93.	F4.06	V/F voltage point 2	0.0% to 100.0%	0.0%	★
94.	F4.07	V/F frequency point 3	F4.05 to b0.04 (rated motor frequency)	0.00Hz	★
95.	F4.08	V/F voltage point 3	0.0% to 100.0%	0.0%	★
96.	F4.09	V/F slip compensation limit	0.0 to 200.0%	0.0%	☆

5-1-7.F5 Group - Vector control group

No.	Code	Parameter name	Setting range	Factory default	Change
97.	F5.00	Speed loop proportional gain 1	0 to 100	20	☆
98.	F5.01	Speed loop integral time 1	0.01 to 10.00s	0.50 s	☆
99.	F5.02	Switching low point frequency	0.00Hz to F5.05	5.00Hz	☆
100.	F5.03	Speed loop proportional gain 2	0 to 100	15	☆
101.	F5.04	Speed loop integral time 2	0.01 to 10.00s	1.00	☆
102.	F5.05	Switching high point frequency	F5.02 to F0.08 (maximum output frequency)	10.00Hz	☆
103.	F5.06	VC slip compensation coefficient	50 to 200.0% (rated inverter current)	100%	☆
104.	F5.07	Torque upper limit setting	0.0 to 200%	150%	☆

5-1-8.F6 Group - Keyboard and display

No.	Code	Parameters	Setting range	Factory default	Change
105.	F6.00	STOP/RST key stop function selection	0: only active to panel control 1: Valid for both panel control and terminal control 2: Valid for both panel control and communication control 3: Valid for all control modes	3	☆
106.	F6.01	Running status display	0 to 0xFFFF BIT0: Running frequency	03FF	☆

		parameters selection	BIT1: Set frequency BIT2: Bus voltage BIT3: Output voltage BIT4: Output current BIT5: Running speed BIT6: Output power BIT7: Output torque BIT8: PID setting value BIT9: PID feedback value BIT10: Input terminal status BIT11: Output terminal status BIT12: Analog AI1 value BIT13: Analog AI2 value BIT14: Current stage of multi-speed BIT15: Torque set value.		
107.	F6.02	Stop status display parameters selection	1 to 0x3FF BIT0: Set frequency BIT1: Bus voltage BIT2: Input terminal status BIT3: Output terminal status BIT4: PID setting value BIT5: PID feedback value BIT6: Analog AI1 value BIT7: Analog AI2 value BIT8: Current stage of multi-speed BIT9: Torque set value. BIT10 to BIT15: Reserved	0FF	☆
108.	F6.03	Speed display coefficient	0.1 to 999.9%	100.0%	☆
109.	F6.04 to F6.07	Reserved			

5-1-9.F7 Group - Auxiliary function

No.	Code	Parameter name	Setting range	Factory default	Change
110.	F7.00	Jog running frequency	0.00 to F0.08 (maximum output frequency)	5.00Hz	☆
111.	F7.01	Jog running acceleration time	0.1 to 3600.0s	Depends on models	☆
112.	F7.02	Jog running deceleration time	0.1 to 3600.0s	Depends on models	☆
113.	F7.03	Acceleration time 2	0.1 to 3600.0s	Depends on models	☆

114.	F7.04	Deceleration time 2	0.1 to 3600.0s	Depends on models	☆
115.	F7.05	Jump frequency	0.00 to F0.08 (maximum output frequency)	0.00Hz	☆
116.	F7.06	Jump frequency range	0.00 to F0.08 (maximum output frequency)	0.00Hz	☆
117.	F7.07	Jump frequency availability during ac/deceleration process	0: Invalid 1: Valid	0	☆
118.	F7.08	Forward/reverse rotation deadband	0.0 to 3600.0s	Depends on models	☆
119.	F7.09	Power terminals running protection selection	0: Power terminals running command Invalid 1: Power terminals running command Valid	0	☆
120.	F7.10	FDT level detection value	0.00 to F0.08 (maximum output frequency)	50.00Hz	☆
121.	F7.11	FDT hysteresis detection value	0.0 to 100.0% (FDT level)	5.0%	☆
122.	F7.12	Frequency reaches detection width	0.0 to 100.0% (Set frequency)	0.0%	☆
123.	F7.13	Braking threshold voltage	115.0 to 140.0% (standard bus voltage) --voltage level 220V	120.0%	☆
			115.0 to 140.0% (standard bus voltage) --voltage level 380V	130.0%	

5-1-10.F8 Group - Fault and protection

No.	Code	Parameter name	Setting range	Factory default	Change
124.	F8.00	Automatic current limiting level	100 to 200%	160%	☆
125.	F8.01	Frequency fall rate at current limiting	0.00 to 100.00Hz/s	10.00Hz/s	☆
126.	F8.02	Current limiting	0: Always valid	0	☆

		action selection	1: Constant speed invalid		
127.	F8.03	Motor overload protection selection	0: OFF 1: normal motor (with low speed compensation) 2: inverter motor (without low speed compensation)	2	★
128.	F8.04	Motor overload protection current	20.0% to 120.0% (rated motor current)	100.0%	☆
129.	F8.05	Overvoltage stall protection	0: Disable 1: Enable	0	☆
130.	F8.06	Overvoltage stall protection voltage	110 to 150% (220V series)	115%	☆
			110 to 150% (380V series)	130%	
131.	F8.07	Number of automatic fault reset	0 to 3	0	☆
132.	F8.08	Automatic fault reset interval setting	0.1 to 100.0s	1.0 s	☆
133.	F8.09	Descending frequency point of momentary power failure	70.0 to 110.0% (standard bus voltage)	80.0%	☆
134.	F8.10	Frequency fall rate at momentary power failure	0.00Hz/s to F0.08 (maximum output frequency)	0.00Hz/s	☆

5-1-11.F9 Group - Communication parameter

No.	Code	Parameter name	Setting range	Factory default	Change
135.	F9.00	Communication baud rate setting	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	3	☆
136.	F9.01	Data bits parity settings	0: no parity (N, 8, 1) for RTU 1: even parity (E, 8, 1) for RTU 2: odd parity (O, 8, 1) for RTU 3: no parity (N, 8, 2) for RTU 4: even parity (E, 8, 2) for RTU 5: odd parity (O, 8, 2) for RTU 6: no parity (N, 7, 1) for ASCII	1	☆

			7: even parity (E, 7, 1) for ASCII 8: odd parity (O, 7, 1) for ASCII 9: no parity (N, 7, 2) for ASCII 10: even parity (E, 7, 2) for ASCII 11: odd parity (O, 7, 2) for ASCII 12: no parity (N, 8, 1) for ASCII 13: even parity (E, 8, 1) for ASCII 14: odd parity (O, 8, 1) for ASCII 15: no parity (N, 8, 2) for ASCII 16: even parity (E, 8, 2) for ASCII 17: odd parity (O, 8, 2) for ASCII		
137.	F9.02	Communication address of this unit	1 to 247, 0 for broadcast address	1	☆
138.	F9.03	Communication response delay	0 to 200ms	5ms	☆
139.	F9.04	Communication timeout fault time	0.0 (Invalid) ; 0.1 to 100.0s	0.0 s	☆
140.	F9.05	Data transfer format selection	0: non-standard MODBUS protocol 1: standard MODBUS protocol 2: ASCII	0	☆
141.	F9.06	Transmission error handling	0: Alarm and free stop 1: No alarm and continue to run 2: No alarm and stop at the selected mode (under communication control mode only) 3: No alarm and stop at the selected mode (under all control modes)	1	☆
142.	F9.07	Transmission response handling	0: Write operations responded 1: Write operations not responded	0	☆

5-1-12.FA Group - Torque control

No.	Code	Parameter name	Setting range	Factory default	Change
143.	FA.00	Torque setting mode selection	0: Keyboard setting (FA.01) 1: Analog AI1 setting 2: Analog AI2 setting 3: Panel potentiometer setting 4: Analog AI1+AI2 setting 5: Multi-segment torque setting 6: Remote communications	0	☆

			setting Note: Option 1 to 6, 100% relative to two times of the rated current of inverter		
144.	FA.01	Keyboard set torque	-200.0% to 200.0% (rated current of inverter)	50.0%	☆
145.	FA.02	low speed torque compensation	0.000-1.000	0.050	☆
146.	FA.03	high speed torque compensation	0.000-1.000	0.000	☆

5-1-13.Fb Group - Control optimization

No.	Code	Parameter name	Setting range	Factory default	Change
147.	Fb.00	Software overcurrent point	0 to 2000A	Depends on models	★
148.	Fb.01	Software undervoltage point	0 to 500V	Depends on models	★
149.	Fb.02	Software overvoltage point	300 to 800V	Depends on models	★
150.	Fb.03	Low-frequency threshold point of oscillation suppression	0 to 500	5	☆
151.	Fb.04	High-frequency threshold point of oscillation suppression	0 to 500	100	☆
152.	Fb.05	Amplitude limit value of oscillation suppression	0 to 10000	5000	☆
153.	Fb.06	Demarcation frequency of high and low frequency of oscillation suppression	0.00Hz to F0.08 (maximum output frequency)	12.50Hz	☆
154.	Fb.07	Oscillation suppression	0: valid 1: invalid	1	☆
155.	Fb.08	PWM selection	0: PWM mode 1 1: PWM mode 2 2: PWM mode 3	0	★
156.	Fb.09	Energy-saving selection	0: OFF 1: Auto	0	★
157.	Fb.10	Deadband time	2 to 5	Depends on models	★

5-1-14.E0 Group - Wobble control

No.	Code	Parameter name	Setting range	Factory default	Change
158.	E0.00	Wobble range	0.0 to 100.0% (relative to setting frequency)	0.0%	☆
159.	E0.01	Sudden jump frequency range	0.0 to 50.0% (relative to Wobble amplitude)	0.0%	☆
160.	E0.02	Wobble rise time	0.1 to 3600.0s	5.0 s	☆
161.	E0.03	Wobble fall time	0.1 to 3600.0s	5.0 s	☆

5-1-15.E1 Group - Multi-speed control

No.	Code	Parameter name	Setting range	Factory default	Change
162.	E1.00	Multi-speed 0	-100.0 to 100.0%	0.0%	☆
163.	E1.01	Multi-speed 1	-100.0 to 100.0%	0.0%	☆
164.	E1.02	Multi-speed 2	-100.0 to 100.0%	0.0%	☆
165.	E1.03	Multi-speed 3	-100.0 to 100.0%	0.0%	☆
166.	E1.04	Multi-speed 4	-100.0 to 100.0%	0.0%	☆
167.	E1.05	Multi-speed 5	-100.0 to 100.0%	0.0%	☆
168.	E1.06	Multi-speed 6	-100.0 to 100.0%	0.0%	☆
169.	E1.07	Multi-speed 7	-100.0 to 100.0%	0.0%	☆
170.	E1.08	Multi-speed 8	-100.0 to 100.0%	0.0%	☆
171.	E1.09	Multi-speed 9	-100.0 to 100.0%	0.0%	☆
172.	E1.10	Multi-speed 10	-100.0 to 100.0%	0.0%	☆
173.	E1.11	Multi-speed 11	-100.0 to 100.0%	0.0%	☆
174.	E1.12	Multi-speed 12	-100.0 to 100.0%	0.0%	☆
175.	E1.13	Multi-speed 13	-100.0 to 100.0%	0.0%	☆
176.	E1.14	Multi-speed 14	-100.0 to 100.0%	0.0%	☆
177.	E1.15	Multi-speed 15	-100.0 to 100.0%	0.0%	☆
178.	E1.16	Section 0 given mode	0 to 5	0	☆

5-1-16.E2 Group - PID control

No.	Code	Parameter name	Setting range	Factory default	Change
179.	E2.00	PID setting source selection	0: Keyboard setting (E2.01) 1: Analog channel AI1 setting 2: Analog channel AI2 setting 3: Panel potentiometer setting 4: Remote communications setting 5: Multi-speed setting	0	☆
180.	E2.01	Keyboard preset PID setting	0.0 to 100.0%	50.0%	☆
181.	E2.02	PID feedback source selection	0: Analog channel AI1 feedback 1: Analog channel AI2 feedback 2: Panel potentiometer feedback 3: AI1-AI2 feedback 4: Remote communications feedback 5: AI1+AI2 feedback 6: MAX (AI1 , AI2) 7: MIN (AI1 , AI2)	0	☆
182.	E2.03	PID output selection	0: PID output is positive 1: PID output is negative	0	☆
183.	E2.04	Proportional gain (KP)	0.00 to 100.00	1.00	☆
184.	E2.05	Integration time (Ti)	0.01 to 10.00s	0.10s	☆
185.	E2.06	Differential time (Td)	0.00 to 10.00s	0.00 s	☆
186.	E2.07	Sampling period (T)	0.01 to 100.00s	0.10s	☆
187.	E2.08	PID control deviation limit	0.0 to 100.0%	0.0%	☆
188.	E2.09	Feedback disconnection detection value	0.0 to 100.0%	0.0%	☆
189.	E2.10	Feedback disconnection detection time	0.0 to 3600.0s	1.0 s	☆

5-1-17.E3 Group - Virtual DI, Virtual DO

No.	Code	Parameter name	Setting range	Factory default	Change
190.	E3.00	VDI1 function selection	0 to 25	0	★
191.	E3.01	VDI2 function selection	0 to 25	0	★
192.	E3.02	VDI3 function selection	0 to 25	0	★
193.	E3.03	VDI4 function selection	0 to 25	0	★
194.	E3.04	VDI5 function selection	0 to 25	0	★
195.	E3.05	VDI active mode	Units digit: Virtual VDI1 Tens digit: Virtual VDI2 Hundreds digit: Virtual VDI3 Thousands digit: Virtual VDI4 Ten thousands digit: Virtual VDI5	00000	☆
196.	E3.06	VDI status setting	Units digit: Virtual VDI1 Tens digit: Virtual VDI2 Hundreds digit: Virtual VDI3 Thousands digit: Virtual VDI4 Ten thousands digit: Virtual VDI5	11111	★
197.	E3.07	AI1_DI function	0 to 25	0	★
198.	E3.08	AI2_DI function selection	0 to 25	0	★
199.	E3.09	Panel potentiometer_DI setting	0 to 25	0	★
200.	E3.10	AI_DI mode	Units digit: AI1 0: high level active 1: low level active Tens digit: AI2 (same as units digit) Hundreds digit: Panel potentiometer (same as units digit)	000	★
201.	E3.11	VDO1 output function	0 to 10	0	☆
202.	E3.12	VDO2 output function	0 to 10	0	☆
203.	E3.13	VDO3 output function	0 to 10	0	☆
204.	E3.14	VDO4 output function	0 to 10	0	☆
205.	E3.15	VDO5 output function	0 to 10	0	☆

206.	E3.16	VDO valid state	Units digit: VDO1 0: positive logic 1: negative logic Tens digit: VDO2 (same as units digit) Hundreds digit: VDO3 (same as units digit) Thousands digit: VDO4 (same as units digit) Ten thousands digit: VDO5 (same as units digit)	00000	☆
207.	E3.17	VDO1 delay time	0.0 to 3600.0s	0.0 s	☆
208.	E3.18	VDO2 delay time	0.0 to 3600.0s	0.0 s	☆
209.	E3.19	VDO3 delay time	0.0 to 3600.0s	0.0 s	☆
210.	E3.20	VDO4 delay time	0.0 to 3600.0s	0.0 s	☆
211.	E3.21	VDO5 delay time	0.0 to 3600.0s	0.0 s	☆

5-1-18.b0 Group - Motor parameters

No.	Code	Parameter name	Setting range	Factory default	Change
212.	b0.00	Inverter type	0: G-type machine; 1: Reserved	0	★
213.	b0.01	Rated motor power	0.4 to 900.0kW	Depends on models	★
214.	b0.02	Rated motor voltage	0 to 460V	Depends on models	★
215.	b0.03	Rated motor current	0.1 to 2000.0A	Depends on models	★
216.	b0.04	Rated motor frequency	0.01Hz to F0.08 (maximum output frequency)	50.00Hz	★
217.	b0.05	Rated motor speed	0 to 36000rpm	Depends on models	★
218.	b0.06	Motor stator resistance	0.001 to 65.535Ω	Depends on models	★
219.	b0.07	Motor rotor resistance	0.001 to 65.535Ω	Depends on models	★
220.	b0.08	Motor stator and rotor inductance	0.1 to 6553.5mH	Depends on models	★
221.	b0.09	Motor stator and rotor mutual inductance	0.1 to 6553.5mH	Depends on models	★

222.	b0.10	Motor no-load current	0.01 to 655.35A	Depends on models	★
223.	b0.11	Motor parameter auto tuning	0: no operation 1: Motor parameters static auto tuning 2: Motor parameters comprehensive auto tuning	0	★

5-1-19.y0 Group - Function code management

No.	Code	Parameter name	Setting range	Factory default	Change
224.	y0.00	Function parameter recovery	0: no operation 1: Restore factory settings,excluding motor parameters 2: Clear fault history 3: Restore factory settings,including motor parameters 4: Backup parameters 5: Restore from backup	0	★
225.	y0.01	User password	0 to 65535	0	★

5-1-20.y1 Group - Fault history search

No.	Code	Parameter name	Setting range	Factory default	Change
226.	y1.00	Type of the first two faults	0 to 22	0	●
227.	y1.01	Type of the first fault	0 to 22	0	●
228.	y1.02	Type of current fault	0 to 22	0	●
229.	y1.03	Running frequency of current fault		0.00Hz	●
230.	y1.04	Output current of current fault		0.0A	●
231.	y1.05	Bus voltage of current fault		0V	●
232.	y1.06	Input terminal status of current fault		0	●
233.	y1.07	Output terminal status of current fault		0	●

5-2.Function parameter description

5-2-1.d0 Group - Monitoring function group

d0 parameters group is used to monitor the inverter running status information,user can view those information through the panel to facilitate on-site commissioning, also read parameters group value via communication for host computer monitoring.

Parameter function code	Parameter name	Smallest unit																				
d0.00	Running frequency	0.01Hz																				
Actual output frequency of inverter running.																						
d0.01	Set frequency	0.01Hz																				
Inverter current actual setting frequency																						
d0.02	DC bus voltage	1V																				
Inverter bus voltage value																						
d0.03	Inverter output voltage	1V																				
Actual output voltage when the inverter running																						
d0.04	Inverter output current	0.1A																				
Actual output current when the inverter running																						
d0.05	Inverter output power	0.1kW																				
Actual output power when the inverter running																						
d0.06	Inverter output torque	1%																				
Actual output torque percentage when the inverter running																						
d0.07	Input terminal status	-																				
DI input terminal status is currently displayed, when it is converted into binary data, one bit corresponds to one DI terminal input signal, 1 indicates that the input terminal is high level signal, 0 indicates that the input terminal is low-level signal.																						
<table border="1"> <thead> <tr> <th>Bit0</th> <th>Bit1</th> <th>Bit2</th> <th>Bit3</th> <th>Bit4</th> </tr> </thead> <tbody> <tr> <td>DI1</td> <td>DI2</td> <td>DI3</td> <td>DI4</td> <td>DI5</td> </tr> <tr> <th>Bit5</th> <th>Bit6</th> <th>Bit7</th> <th>Bit8</th> <th>Bit9</th> </tr> <tr> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> </tr> </tbody> </table>			Bit0	Bit1	Bit2	Bit3	Bit4	DI1	DI2	DI3	DI4	DI5	Bit5	Bit6	Bit7	Bit8	Bit9	Reserved	Reserved	Reserved	Reserved	Reserved
Bit0	Bit1	Bit2	Bit3	Bit4																		
DI1	DI2	DI3	DI4	DI5																		
Bit5	Bit6	Bit7	Bit8	Bit9																		
Reserved	Reserved	Reserved	Reserved	Reserved																		
d0.08	Output terminal status	-																				
Displays current output terminal state value. When it is converted into binary data, one bit corresponds to one output terminal input signal, 1 indicates that the input terminal is high level signal, 0 indicates that the output terminal is low-level signal.																						
<table border="1"> <thead> <tr> <th>Bit0</th> <th>Bit1</th> <th>Bit2</th> <th>Bit3</th> <th>Bit4</th> </tr> </thead> <tbody> <tr> <td>MO1</td> <td>Reserved</td> <td>Reserved</td> <td>R0</td> <td>Reserved</td> </tr> </tbody> </table>			Bit0	Bit1	Bit2	Bit3	Bit4	MO1	Reserved	Reserved	R0	Reserved										
Bit0	Bit1	Bit2	Bit3	Bit4																		
MO1	Reserved	Reserved	R0	Reserved																		
d0.09	Analog AI1 value	0.01V																				
Analog AI1 input voltage value																						
d0.10	Analog AI2 value	0.01V																				

Parameter function code	Parameter name	Smallest unit
Analog AI2 input voltage value		
d0.11	Panel potentiometer voltage	0.01V
Panel potentiometer input voltage value		
d0.12	Motor actual speed	1rpm
Display motor actual running speed		
d0.13	PID setting value	0.1%
Setting value percentage under PID adjustment mode		
d0.14	PID feedback value	0.1%
Feedback value percentage under PID adjustment mode		
d0.15	Current stage of multi-speed	-
Display current stage of multi-speed		
d0.16	Reserved	
d0.17	Inverter module temperature	0.1℃
Display the inverter module temperature		
d0.18	Software version	-
Display DSP software version number		
d0.19	Cumulative running time of this unit	1h
Display the total run time of inverter		
d0.20	Torque setting value	0.1%
Observe the set command torque under the speed control mode or the torque control mode		

5-2-2.F0 Group - Basic function group

Code	Parameter name	Setting range	Factory default	Change	
F0.00	Control mode	Open-loop flux vector control	0	2	★
		Reserved	1		
		V/F control	2		
		Torque control	3		
Select the operating mode of inverter:					

<p>0: open-loop flux vector control: refers to that the open-loop flux vector control is suitable for high-performance general-purpose applications where the encoder PG is not installed, an inverter can only drive one motor. Such as machine tools, centrifuges, wire drawing machines, injection molding machines and other loads. The capacity of frequency inverter and motor should not differ much, frequency inverter capacity can be 2 size bigger or 1 size smaller than motor capacity, otherwise may lead to control performance degradation, or the un-normal operation of drive system.</p> <p>1: Reserved</p> <p>2: V/F control: suitable for applications that demanding less control accuracy, such as fans, pumps and other loads. It can used for occasions that one inverter drives multiple motors.</p> <p>3: Torque control: suitable for applications that demanding less torque control accuracy, such as wound, drawing and other occasions. In torque control mode, the motor speed is determined by the motor load, its acceleration and deceleration speed is no longer determined by the inverter deceleration time.</p> <p>Note: open-loop flux vector control and torque control must perform motor auto tuning firstly.</p>					
F0.01	Keyboard set frequency	0.00Hz to F0.08 (maximum output frequency)	50.00Hz	☆	
When the frequency command is selected as "Keyboard Setting", the function code value is the initial value of inverter frequency digital setting.					
F0.02	Frequency command selection	Keyboard digital setting	0	0	★
		Analog AI1 setting	1		
		Analog AI2 setting	2		
		Panel potentiometer setting	3		
		AI1 + AI2 setting	4		
		Multi-speed operation setting	5		
		PID control setting	6		
		Remote communications setting	7		
<p>Select the inverter frequency command input channels, there are eight kinds of given frequency channels:</p> <p>0: Keyboard setting: to achieve by modifying function code F0.01 "keyboard set frequency" value.</p> <p>1: Analog AI1 setting</p> <p>2: Analog AI2 setting</p> <p>3: Panel potentiometer setting</p> <p>Refers to that the frequency is determined by the analog input terminals, CA SERIES inverter is equipped with standard two-way analog input terminals (AI1, AI2), AI1/AI2 voltage and current optional (0V to 10V/0mA to 20mA), it can be switched by the jumpers JP2 and JP3 on control panel. The corresponding relationship between AI1, AI2 input voltage value and the target frequency can be set through F1 function</p>					

code by user.

Panel potentiometer analog input voltage of 0V to 10V.

4: Analog AI1 + AI2 setting: refers to that the frequency is set by the analog input terminals.

Note: when the analog AI1/AI2 is selected as 0 to 20mA input, the voltage corresponding to 20mA is 10V

5: Multi-speed operation setting: when multi-speed operation setting mode is selected, the inverter will run at multi-speed mode. Select current stage through setting multi-speed terminal combinations of F1 group; determine the running frequency of current stage through parameters of E1 group.

6: PID control setting: when PID control setting mode is selected, the inverter will run at PID control mode. At this point, you need to set E2 group "PID function group". The inverter's operation frequency is the frequency value after PID function is applied. Where the meanings on PID given source, given quantity and feedback source, etc. Please refer to the introduction of E2 group "PID function".

7: Remote communication setting: frequency command is set by the host computer through the communication. For details, please refer to F9 group communication protocol.

F0.03	Keyboard and terminal UP/DOWN setting	valid, and the inverter power failure with data storage	0	0	☆
		valid, and the inverter power failure without data storage	1		
		UP/DOWN setting invalid	2		
		Valid when running, invalid when stop	3		

Set the frequency through keyboard ▲ and ▼ keys and input terminals UP/DOWN (frequency setting increment/frequency setting decrement) function, the setting can be combined with other frequency setting channels. Notably tuning the output frequency is required after completion of the commissioning process in the control system

0: valid, and the inverter power failure with data storage You can set the frequency command that the set frequency value is saved after the inverter with power failure. the set frequency will restored to the frequency at the last power-down when the inverter power-down and power-up again.

1: valid, and the inverter power failure without data storage You can set the frequency command that the set frequency value is not saved after the inverter with power failure.

2: UP/DOWN setting is invalid, keyboard ▲ and ▼ keys and input terminals UP/DOWN function is invalid.

3: Set keyboard ▲ and ▼ keys and terminal UP/DOWN function setting as valid when running, set keyboard ▲ and ▼ keys and input terminals UP/DOWN setting as not save when stop.

Note: after user restores the default value of function parameters of the inverter, the frequency value set by keyboard and input terminals UP/DOWN function is the factory setting value.

F0.04	Command source channel	Keyboard command channel	0	0	★
		Terminal command channel	1		
		Communication command channel	2		

Select inverter control command channel. Inverter control command include: start, stop, forward, reverse, jog and fault reset, etc.

0: keyboard command channel; RUN, STOP/RESET keys on keyboard is used to run commands

1: terminal command channel; multi-function input terminal forward, reverse, forward jog and reverse jog, etc is used to run commands.

2: communication command channel; the host computer runs commands through the communication method.

F0.05	Acceleration time 1	0.1 to 3600.0s	Depends on models	☆
F0.06	Deceleration time 1	0.1 to 3600.0s	Depends on models	☆

Acceleration time: refers to the time required that the inverter accelerates from 0Hz to maximum output frequency (F0.08) ;

Deceleration time: refers to the time required that the inverter decelerates from maximum output frequency (F0.08) to 0Hz.

Actual deceleration time = preset acceleration and deceleration time × (set frequency/maximum frequency)

Acceleration and deceleration time schematic that the set frequency is less than the maximum frequency.

CA SERIES inverter has two groups of deceleration time.

First group: F0.05, F0.06; second group: F7.03, F7.04

Acceleration and deceleration time can be selected by using the multi-function input terminals (F1 group) . The fault value of acceleration and deceleration time is the first group.

F0.07	Carrier frequency setting	1.0 to 15.0kHz	Depends on models	☆
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Carrier Frequency	Electromagnetic noise	Noise, leakage current	Cooling degree
1kHz	Large ↑ ↓ Small	Small ↑ ↓ Large	Small ↑ ↓ Large
10kHz			
15kHz			

Carrier frequency pair impact diagram

The advantage of high carrier frequency: there are more ideal current waveform, less current harmonics and less motor noise.

The disadvantage of high carrier frequency: switching loss increases, the inverter temperature increases, the inverter output is affected, the inverter derates under high carrier frequency; the leakage current of the inverter increases, the electromagnetic interference on external increases.

The low carrier frequency has contrary the case described above, the too low carrier frequency will cause the instability of low frequency operation, the torque reduction even oscillation.

The inverter has been set reasonably before leaving factory. Under normal circumstances, user does not need change the parameters.

If the frequency that user uses is more than the default carrier frequency, the derating is required, derating 20%. each increasing of 1K carrier frequency

F0.08	Maximum output frequency	10.00 to 400.00Hz	50.00Hz	★
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Maximum output frequency is used to set the maximum output frequency of inverter. User shall note that it is the basis of frequency setting, as well as the basis for the speed of acceleration and deceleration.

F0.09	Upper limit frequency setting source selection	Keyboard settings (F0.10)	0	0	★
		Analog AI1 setting	1		
		Analog AI2 setting	2		
		Multi-speed setting	3		
		Remote communications setting	4		

To define the setting mode for upper limit. The upper limit frequency can be set from either digital setting (F0.10), also from analog input channels, multi-speed setting or communication settings. When the analog input setting, multi-speed setting or communication setting is set to upper limit frequency, the analog input setting 100% corresponds to F0.08 (maximum output frequency) .

F0.10	Running frequency upper limit	F0.11 to F0.08 (maximum output frequency)	50.00Hz	☆
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Running frequency upper limit is the upper limit of the inverter output frequency.

The value should be less than or equal to the maximum output frequency.

F0.11	Running frequency lower limit	0.00Hz to F0.10 (running frequency upper limit)	0.00Hz	☆
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Running frequency lower limit is the lower limit of the inverter output frequency. When the set frequency is less than the frequency lower limit, the frequency lower limit will be adopted for running.

Note: maximum output frequency ≥ frequency upper limit ≥ frequency lower limit.

F0.12	Running direction selection	0: default; 1: opposite 2: reverse prohibited	0	★
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0: default After the inverter is powered on, it runs at the actual direction.
1: opposite Used to change the motor rotation, which acts to change the motor direction of rotation by adjusting any two motor wires.
2: reverse prohibited Used to prohibit reverse running of the inverter for the specific occasions.

Note: after the parameter is initialized, the motor running direction will be restored to its original status. When the system debugging is completed, please use with caution where the change of motor steering is strictly prohibited

F0.13	AVR function selection	Invalid	0	1	☆
		Full valid	1		
		Only invalid during deceleration	2		

AVR function that automatically adjusts the output voltage function. When AVR function is disabled, the output voltage will vary with the change of the input voltage (or DC bus voltage) ; when AVR function is enabled, the output voltage will not vary with the change of the input voltage (or DC bus voltage), the output voltage remains substantially constant within the range of output capacity.

5-2-3.F1 Group - Input terminals group

Code	Parameter name	Setting range	Factory default	Change
F1.00	DI1 terminal function selection	0: No function	1	★
F1.01	DI2 terminal function selection	1: Forward run (FWD) 2: Reverse run (REV)	2	★
F1.02	DI3 terminal function selection	3: Three-wire operation control	0	★
F1.03	DI4 terminal function selection	4: Forward Jog 5: Reverse Jog	9	★
F1.04	DI5 terminal function selection	6: Frequency setting increment (UP) 7: Frequency setting decrement (DOWN)	4	★
F1.05	Reserved			

25: Reserved					
F1.06	Terminal control operation mode	Two-wire type control 1	0	0	★
		Two-wire type control 2	1		
		Three-wire type control 1	2		
		Three-wire type control 2	3		
<p>This parameter defines four different modes to control inverter operation through external terminals.</p> <p>0: Two-wire type control 1 Combine ENABLE and direction. This mode is the most commonly used two-wire mode. The forward and reverse running of motor is determined by the defined FWD, REV terminal commands.</p> <p>1: Two-wire type control 2 Separate ENABLE and direction. FWD defined by this mode is the enable terminals. The direction is determined by the defined REV state.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Two-wire type control 1 (Combine ENABLE and direction)</p> </div> <div style="text-align: center;"> <p>Two-wire type control 2 (Separate ENABLE and direction)</p> </div> </div> <p>2: Three-wire type control 1 In this mode, DIn is as the enable terminal, SB1 as level control is active; the running command is controlled by the pulse rising edge of SB2 or SB3 so as to control forward or reverse of the motor; the stop command is controlled by the switch SB1.</p> <p>3: Three-wire type control 2 In this mode, DIn is as the enable terminal, SB1 as level control is active; the running command is produced by FWD, SB2 as pulse edge control is active, the running direction of motor is determined by REV, K1 as level control is active.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Three-wire control mode 1</p> </div> <div style="text-align: center;"> <p>Three-wire control mode 2</p> </div> </div>					

F1.07	Change rate of terminal UP/DOWN frequency increment	0.01 to 50.00Hz/s	0.50Hz/s	☆
When the terminal UP/DOWN is used to adjust the set frequency, the rate of frequency change, i.e. frequency change amount per second.				
F1.08	AI1 lower limit	0.00V to F1.10	0.00V	☆
F1.09	AI1 lower limit setting	-100.0% to 100.0%	0.0%	☆
F1.10	AI1 upper limit	F1.08 to 10.00V	10.00V	☆
F1.11	AI1 upper limit setting	-100.0% to 100.0%	100.0%	☆
F1.12	Filter time of AI1 input	0.00s to 10.00s	0.10s	☆
<p>The above function code defines the relationship between analog input voltage and the analog input, when the analog input voltage exceeds the maximum input or minimum input, the maximum input or the minimum input will be used for calculation.</p> <p>When the analog input is the current input, 0mA to 20mA current corresponds to 0V to 10V voltage.</p> <p>In the different applications, the 100.0% of analog setting vary from the meaning of its corresponding nominal value, please refer to the description of each application for details.</p> <div style="text-align: center;"> <p>Relationship diagram between analog reference and set amount</p> </div> <p>AI1 Input filter time: Adjust analog input sensitivity. if this value is increased appropriately, the anti-interference of analog will be enhanced, but the analog input sensitivity will be weakened.</p>				
F1.13	AI2 lower limit	0.00V to F1.15	0.00V	☆
F1.14	AI2 lower limit setting	-100.0% to 100.0%	0.0%	☆
F1.15	AI2 upper limit	F1.13 to 10.00V	10.00V	☆
F1.16	AI2 upper limit setting	-100.0% to 100.0%	100.0%	☆
F1.17	Filter time of AI2 input	0.00s to 10.00s	0.10s	☆
AI2 function setting is similar with the way of AI1.				

F1.18	Times of switching quantity filtering	1 to 10	5	☆																				
Set sampling filter time of DI1 to DI5 terminals. For the application that input terminals are vulnerable to interference and cause the accidental operation, you can increase this parameter so as to enhance the anti-interference ability. However, the increase of filter time will cause DI terminal slow response.																								
F1.19	DI terminal mode selection	0x000 to 0x1FF	000	★																				
This function code is used to set the polarity of the input terminals. When the bit is set to 0, the polarity of input terminal is positive; when the bit is set to 1, the polarity of input terminal is negative.																								
<table border="1"> <tr> <td>Bit0</td> <td>Bit1</td> <td>Bit2</td> <td>Bit3</td> <td>Bit4</td> </tr> <tr> <td>DI1</td> <td>DI2</td> <td>DI3</td> <td>DI4</td> <td>DI5</td> </tr> <tr> <td>Bit5</td> <td>Bit6</td> <td>Bit7</td> <td>Bit8</td> <td>Bit9</td> </tr> <tr> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> </tr> </table>					Bit0	Bit1	Bit2	Bit3	Bit4	DI1	DI2	DI3	DI4	DI5	Bit5	Bit6	Bit7	Bit8	Bit9	Reserved	Reserved	Reserved	Reserved	Reserved
Bit0	Bit1	Bit2	Bit3	Bit4																				
DI1	DI2	DI3	DI4	DI5																				
Bit5	Bit6	Bit7	Bit8	Bit9																				
Reserved	Reserved	Reserved	Reserved	Reserved																				

5-2-4.F2 Group - Output terminals group

Code	Parameter name	Setting range	Factory default	Change
F2.00	MO1 output selection	0 to 10	1	☆
F2.01	Reserved		-	
F2.02	Reserved		-	
F2.03	Relay output selection		1	☆

Set value	Function	Description
0	No output	The function of Output terminal is disabled.
1	Motor is running forward	Inverter Run Forward: when the inverter runs forward, if the frequency output exists, ON signal will output.
2	Motor is running reverse	Inverter Run Reverse: when the inverter runs reverse, if the frequency output exists, ON signal will output.
3	Fault output	Fault Output: When the inverter occurs failure, and outputs ON signal.
4	Frequency level detection FDT output	For the frequency level detection FDT arrival, please refer to refer to the details on the function code F7.10, F7.11.
5	Frequency arrival	For the frequency arrival, please refer to the details on the function code F7.12.
6	Zero speed running	Zero Speed Running: if the output frequency and the setting frequency of inverter are simultaneously zero, ON signal will output.
7	Upper limit frequency arrival	Upper Limit Frequency Arrival (F0.10) : Outputs ON signal when the operating frequency reaches the upper limit frequency,
8	Lower limit frequency arrival	Lower Limit Frequency Arrival (F0.11) : Outputs ON signal when the operating frequency reaches the lower limit frequency,
9 to 10	Reserved	

F2.04	AO1 output selection	0: Running frequency 1: Set frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Analog input AI1 value 7: Analog input AI2 value 8: Run speed 9 to 10: Reserved	0	☆
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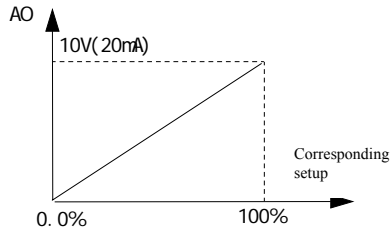
The standard analog output is 0 to 20mA (or 0 to 10V), the jumper JP4 can be used to choose current or voltage output. For the corresponding amount, see the below table:

0	Running frequency	0 to maximum output frequency
1	Set frequency	0 to maximum output frequency
2	Output current	0 to 2 times of rated inverter current
3	Output torque	0 to 2 times of rated motor current
4	Output power	0 to 2 times of rated power
5	Output voltage	0 to 1.2 times of rated inverter voltage
6	AI1 analog input value	0 to 10V/0 to 20mA
7	AI2 analog input value	0 to 10V/0 to 20mA
8	Running speed	0 to 2 times rated motor speed

F2.05	AO1 output lower limit	0.0% to F2.07	0.0%	☆
F2.06	Lower limit corresponds to AO1 output	0.00V to 10.00V	0.00V	☆
F2.07	AO1 output upper limit	F2.05 to 100.0%	100.0%	☆
F2.08	Upper limit corresponds to AO1 output	0.00V to 10.00V	10.00V	☆

The above function code defines the relationship between output value and analog output, when output value is out of the set maximum output or minimum output, the maximum output or the minimum output will be used for calculation. When the analog output is the current output, 1mA current is equivalent to 0.5V voltage.

In the different applications, the 100% of analog output value can be different, please refer to the description of each application for details.



Relationship diagram between analog output and set amount

F2.09	MO1 Turn-on delay time	0.0~3600s	0.0s	☆
F2.10	MO1 Turn-off delay time	0.0~3600s	0.0 s	☆
F2.11	Turn-on delay time of relay	0.0~3600s	0.0 s	☆
F2.12	Turn-off delay time of relay	0.0~3600s	0.0 s	☆

function code is defined as the corresponding delay time of the level change from

output terminal opens and then disconnects.				
F2.13	Reserved			
F2.14	DO output terminal active status selection	0x00 to 0x1F	00	☆

This function code is used to set the polarity of the input terminals. When the bit is set to 0, the polarity of output terminal is positive; when the bit is set to 1, the polarity of output terminal is negative.

Bit0	Bit1	Bit2	Bit3	Bit4
MO1	Reserved	Reserved	R0	Reserved

F2.15	MO1 output type selection	0: pulse output 1: digital output		☆
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MO1 is the reuse programmable terminal, it can be pulse out terminal as well as open collector digital output terminal
As a pulse output, the maximum frequency of output pulse is 10kHz, see detailed information from F2.16.

F2.16	MO1 pulse output selection	0: running frequency 1: set frequency 2: output current 3: output torque 4: output power 5: output voltage 6: AI1 input value 7: AI2 input value 8: running speed/RPM 9~10: reserved		☆
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MO1 pulse output frequency range is 0.01kHz-F2.20 (maximum output pulse value), output pulse set according to F2.17-F2.20, see relative output pulse range from F2.04.

F2.17	MO1 lower limit of output pulse	0.0%~F2.19	0.0%	☆
F2.18	Lower limit corresponding M01 pulse output	0.1-10kHz	0.0kHz	☆
F2.19	Higher limit of M01 pulse output	F2.17-100%	100%	☆
F2.20	Higher limit corresponding M01 pulse output	0.1-10kHz	10kHz	☆

When pulse output value exceed maximum or minimum output range, will calculate based on output higher limit or lower limit, adjust parameters through F2.17-F2.20.

5-2-5.F3 Group - Start and stop control group

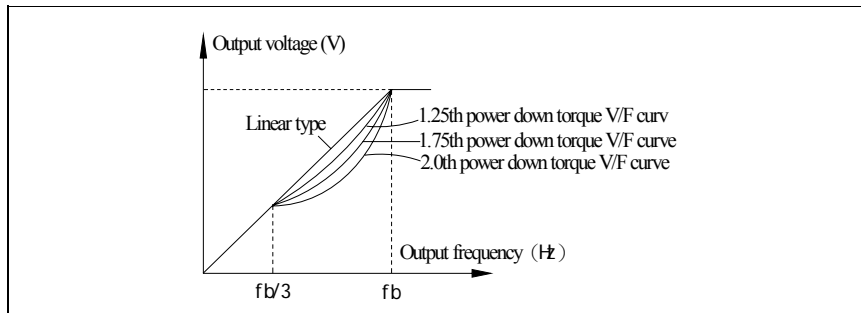
Code	Parameter name	Setting range	Factory default	Change	
F3.00	Start running mode	Direct startup	0	0	★
		Speed tracking restart	1		
		First DC braking and then start	2		
<p>0: Directly startup: starts from the start frequency. 1: Speed tracking restart: the inverter identifies the speed that the motor is running, directly tracks and starts from the identified frequencies, the current and voltage smooth and have not impact during starting. 2: First DC braking and then start: firstly DC braking at the method set by F3.03 and F3.04, and then start from the start frequency. Suitable for the occasion of small inertia load and that the reverse running may occur</p>					
F3.01	Startup start frequency	0.00 to 10.00Hz	0.00Hz	☆	
F3.02	Hold time for start frequency	0.0 to 50.0s	0.0 s	★	
<p>The inverter starts running from the start frequency (F3.01), after the start frequency holding time (F3.02) is passed, and then accelerates up to the target frequency at the set acceleration time, if the target frequency is less than the start frequency, the inverter will enter standby state. The start frequency is not limited by the lower limit frequency.</p>					
F3.03	Braking current before start	0.0 to 150.0%	0.0%	★	
F3.04	Braking time before start	0.0 to 50.0s	0.0 s	★	
<p>When DC braking before F3.03 starts, the applied DC current value is as a percentage of the rated inverter current. F3.04 DC current duration. If the DC braking time is set to 0, then DC braking will be invalid. The larger DC braking current, the greater braking force.</p>					
F3.05	Stop mode selection	Deceleration stop	0	0	☆
		Free stop	1		
<p>0: Deceleration stop: if stop command is enabled, the inverter will reduce output frequency in accordance with the deceleration method and defined deceleration time, and finally stops when the frequency is reduced to 0Hz. 1: Free stop: if stop command is enabled, the inverter will stop output at once. Load will freely stop according to the mechanical inertia.</p>					
F3.06	Start frequency of stop braking	0.00 to F0.08 (maximum output frequency)	0.00Hz	☆	

F3.07	Waiting time of stop braking	0.0 to 50.0s	0.0 s	☆
F3.08	Stop DC braking current	0.0 to 150.0%	0.0%	☆
F3.09	Stop DC braking time	0.0 to 50.0s	0.0 s	☆
<p>Initial frequency of stop braking: if the frequency is arrived when decelerating, DC braking process will start. If the initial frequency of stop braking is 0, DC braking will invalid, the inverter will stop at the set deceleration time. Waiting time of stop braking: the inverter blocks output before performing stop DC braking, and then starts DC braking again after the delay. Used to prevent the overcurrent fault caused by DC braking at high speed. Stop DC braking current: refers to the amount of the applied DC braking. The larger the value, the greater the braking torque. Stop DC braking time: refers to the duration of DC braking.</p>				

5-2-6.F4 Group - V/F control group

F4 group of function code is only valid to V/F control, invalid to vector control.

Code	Parameter name	Setting range	Factory default	Change	
F4.00	V/F curve setting	Linear V/F curve	0	0	★
		Multi-point V/F curve	1		
		Square V/F curve	2		
		1.25th power V/F curve	3		
		1.75th power V/F curve	4		
<p>0: Linear V/F curve Suitable for ordinary constant torque load. 1: multi-point V/F curve, suitable for dehydrator, centrifuge and other special loads Any V/F relationship curves can be obtained by setting parameters F4.03 to F4.08. 2: power V/F curve Suitable for fans, pumps and centrifugal loads. 3 to 4: V/F relationship curve between linear V/F and square V/F.</p>					



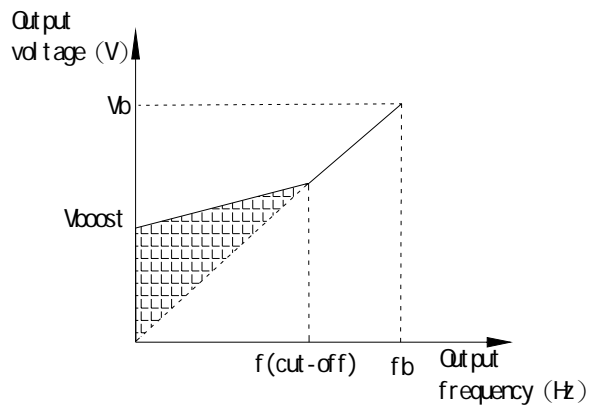
F4.01	Torque boost	0.0%: (Automatic torque boost) 0.1% to 30.0%	0.0%	☆
F4.02	Torque boost cut-off	0.0% to 50.0% (relative to rated motor frequency)	20.0%	★

Torque boost is mainly used in below cutoff frequency (F4.02), V/F curve after boosting is as shown below, the torque boost can improve the characteristics of V/F frequency torque.

Select the amount of torque according to the appropriate load size, the large load can increase the boost, but the boost value should not be set too large, the torque boost is too large, the motor will run over excitation, the inverter output current increases, the motor heats up, and the efficiency is reduced.

When the torque boost is set to 0.0%, the inverter will perform automatic torque boost.

Torque boost cut-off point: below this frequency point, the torque boost is valid, conversely invalid.



Schematic diagram of manual torque boost voltage

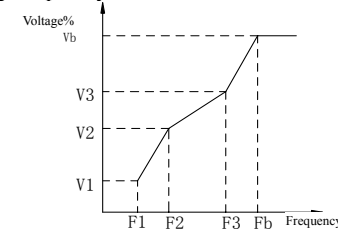
F4.03	V/F frequency point 1	0.00Hz to F4.05	0.00Hz	★
F4.04	V/F voltage point 1	0.0% to 100.0%	0.0%	★

F4.05	V/F frequency point 2	F4.03 to F4.07	0.00Hz	★
F4.06	V/F voltage point 2	0.0% to 100.0%	0.0%	★
F4.07	V/F frequency point 3	F4.05 to b0.04 (rated motor frequency)	0.00Hz	★
F4.08	V/F voltage point 3	0.0% to 100.0%	0.0%	★

F4.03 to F4.08 six parameters are used to define multi-point V/F curve. The multi-point V/F curve is set according to the load characteristics of motor, please be noted that the relationship between three voltage points and three frequency points must be met: $V1 < V2 < V3$, $F1 < F2 < F3$. The setting of multi-point V/F curve is as shown in below figure.

In the state of low frequency, if the voltage is set to a higher value, which may cause motor overheating even burned, the inverter may appear overcurrent stall or overcurrent protection.

$V1$ to $V3$: voltage percentage of the 1st to 3rd stages of multi-speed; $F1$ to $F3$: frequency percentage of the 1st to 3rd stages of multi-speed; Vb : motor rated voltage; Fb motor rated operating frequency.



F4.09	V/F slip compensation limit	0.0 to 200.0%	0.0%	☆
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This parameter can compensate for the changes of motor speed due to the load is applied during V/F control, so as to improve the mechanical properties of the motor hardness. This value should be set to the rated slip frequency of motor, the rated slip frequency is calculated as follows:

$$\text{Rated slip frequency} = \text{FB} - n * p/60$$

Where: FB is for the motor rated frequency, its corresponding function code is b0.04, n is the motor rated speed, its corresponding function code b0.05, P is the number of motor pole pairs.

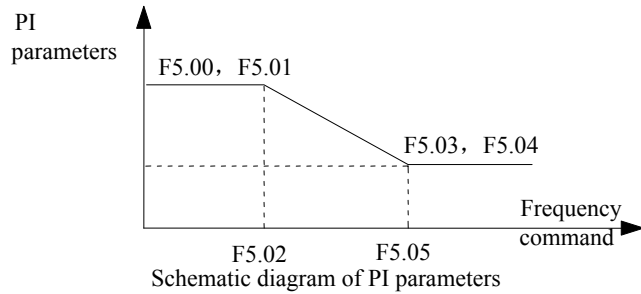
5-2-7.F5 Group - Vector control group

F5 function code is only valid to vector control, invalid to V/F control

Code	Parameter name	Setting range	Factory default	Change
F5.00	Speed loop proportional gain 1	0 to 100	20	☆
F5.01	Speed loop integral time 1	0.01 to 10.00s	0.50 s	☆

F5.02	Switching low point frequency	0.00Hz to F5.05	5.00Hz	☆
F5.03	Speed loop proportional gain 2	0 to 100	15	☆
F5.04	Speed loop integral time 2	0.01 to 10.00s	1.00 s	☆
F5.05	Switching high point frequency	F5.02 to F0.08 (maximum output frequency)	10.00Hz	☆

The above parameters apply only to the vector control mode. Below switching frequency 1 (F5.02), speed loop PI parameters: F5.00 and F5.01. Above switching frequency 2 (F5.05), speed loop PI parameters: F5.03 and F5.04. Between the two, PI parameters are obtained by the linear changes of two sets of parameters, as shown below:



By setting the proportional coefficient and integral time of speed regulator, you can adjust the characteristics of speed loop dynamic response of vector control. Increasing the proportional gain as well as decreasing integral time, which can accelerate the speed loop dynamic response, but the too large proportional gain is or the too small integration time easily cause system oscillation and too large overshoot. The too small proportional gain also easily lead to the system steady-state oscillation, and the speed static difference may exist.

Speed loop PI parameters are closely related to and the inertia of system, shall be adjusted based on the default PI parameters especially for different load needs, in order to meet the needs of a variety of occasions.

F5.06	VC slip compensation coefficient	50% to 200%	100%	☆
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Slip compensation coefficient is used to adjust the slip frequency of vector control, improve the accuracy of system speed control, if the parameter is appropriately adjusted, the speed static difference can be effectively suppressed.

F5.07	Torque upper limit setting	0.0 to 200.0% (rated inverter current)	150.0%	☆
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Set the inverter rated output current corresponding to 100.0%.

5-2-8.F6 Group - Keyboard and display group

Code	Parameter name	Setting range	Factory default	Change
F6.00	STOP/RESET key stop function selection	Valid only for panel control	0	☆
		Valid for both panel control and terminal control	1	
		Valid for both panel control and communication control	2	
		Valid for all control modes	3	

As for fault reset, STOP/RESET key is valid at any situation.

F6.01	Running status display parameters selection	0 to 0xFFFF BIT0: Running frequency BIT1: Set frequency BIT2: Bus voltage BIT3: Output voltage BIT4: Output current BIT5: Running speed BIT6: Output power BIT7: Output torque BIT8: PID setting value BIT9: PID feedback value BIT10: Input terminal status BIT11: Output terminal status BIT12: Analog AI1 value BIT13: Analog AI2 value BIT14: Current stage of multi-speed BIT15: Torque set value	03FF	☆
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Inverter in the running state, the parameters are shown by the F6.01 limit, that is, a 16 bit binary number, if one is 1, then the corresponding parameters can be run at the time, through the SHIFT key to view. If the bit is 0, the corresponding parameter will not be displayed. Set the function code F6.01, the binary number will be converted to sixteen decimal, enter the function code.

Such as:

Choose to monitor load speed, the F6.01 should be set to fifteenth 1; choose to monitor the AI1 voltage, the F6.01 should be set to ninth 1, and so on. The following data is obtained by assuming that all relative positions are set to 1 at the request:

Nb.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
numerical value	0	1	1	1	1	0	1	0	0	1	0	0	1	1	1	1

Data were divided into four groups according to 4 bits:

No.	15-12	11-8	7-4	3-0
numerical value	0111	1010	0100	1111

Then the data is pressed down the table (binary sixteen binary value table) to check the results for 0x7A4F.

F6.02	Stop status display parameters selection	1 to 0x3FF BIT0: Set frequency	OFF	☆
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		BIT1: Bus voltage BIT2: Input terminal status BIT3: Output terminal status BIT4: PID setting value BIT5: PID feedback value BIT6: Analog AI1 value BIT7: Analog AI2 value BIT8: Current stage of multi-speed BIT9: Torque set value. BIT10 to BIT15: Reserved		
The setting on this function is same with F6.01 setting. When CA SERIES inverter stops, the parameters display is effected by this function code.				
F6.03	Speed display coefficient	0.1 to 999.9% Mechanical speed = 120 * running frequency * F6.03/number of motor pole pairs.	100.0%	☆
Mechanical speed = 120 * operating frequency of *F6.03/ motor, the function code is used to correct the speed calibration display error, no impact on the actual speed.				
F6.04 to F6.07	Reserved			

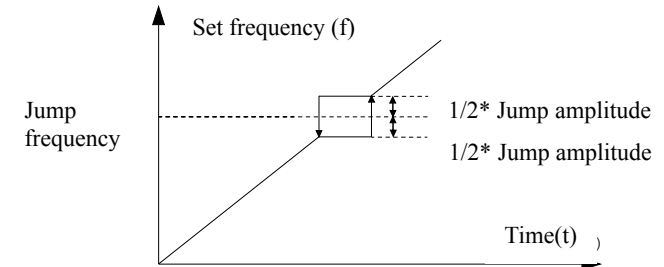
5-2-9.F7 Group - Auxiliary function group

Code	Parameter name	Setting range	Factory default	Change
F7.00	Jog running frequency	0.00 to F0.08 (maximum output frequency)	5.00Hz	☆
F7.01	Jog running acceleration time	0.1 to 3600.0s	Depends on models	☆
F7.02	Jog running deceleration time	0.1 to 3600.0s	Depends on models	☆
Defined the inverter's setting frequency and ac/deceleration time when jogging Jog running start mode: direct start-up, and jog running stop mode: deceleration stop (F3.05 = 0) . Jog running acceleration time refers to the time required that the inverter accelerates from 0Hz to maximum output frequency (F0.08) ; Jog running deceleration time refers to the time required that the inverter decelerates from maximum output frequency (F0.08) to 0Hz.				
F7.03	Acceleration time 2	0.1 to 3600.0s	Depends on models	☆
F7.04	Deceleration time 2	0.1 to 3600.0s	Depends on models	☆

CA SERIES provides two sets of acceleration and deceleration time. Their meanings are the same, please refer to the instructions on F0.05 and F0.06.
 Use multi-function digital input terminal DI to set, switch between ac/deceleration 1 and ac/deceleration time 2. For the detailed method, please refer to the instructions on function codes F1.00 to F1.05.

F7.05	Jump frequency	0.00 to F0.08 (maximum output frequency)	0.00Hz	☆
F7.06	Jump frequency range	0.00 to F0.08 (maximum output frequency)	0.00Hz	☆

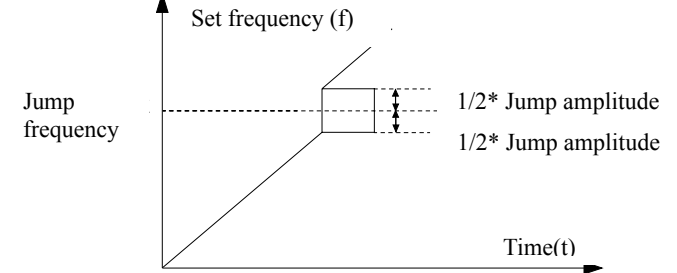
When the set frequency is within the jump frequency range, the actual running frequency will be the boundaries of the jump frequency.
 The inverter can avoid mechanical resonance point of load by setting jump frequency. This inverter can set 1 jump frequency point. If the jump frequency points are set to 0, this function does not work.



Schematic diagram of jump frequency

F7.07	Jump frequency availability during ac/deceleration process	Invalid	0	0	☆
		Valid	1		

The function code is used to set whether the jump frequency is active or not in the process of acceleration and deceleration.
 If it is set to active, when the operating frequency is in the jump frequency range, the actual operating frequency will skip the set jump frequency boundary.



Schematic diagram of jump frequency valid in the process of acceleration.

F7.08	Forward/reverse rotation deadband	0.0 to 3600.0s	Depends on models	☆
<p>In the transition process of setting forward and reverse running of inverter, output transition time at zero frequency.</p> <p>Schematic diagram of Forward/reverse rotation deadband</p>				
F7.09	Power terminals running protection selection	Terminal running command is invalid when it powers on	0	☆
		Terminal running command is valid when it powers on	1	
<p>If the running command channel is set to terminal control, the system automatically detects the status of the running terminals when the inverter powers on. Terminal running command is invalid when it powers on. Even if the command terminal is detected as valid when it powers on, the inverter will not run, the system enters the protection status until undoing the running command terminal and then enabling the terminal again.</p> <p>Terminal running command is valid when it powers on. Namely that the running command terminal is detected as valid when the inverter powers on, once the initialization is complete, the system will automatically start the inverter.</p> <p>Note that the user must be careful to select the function, it may cause serious consequences.</p>				
F7.10	FDT level detection value	0.00 to F0.08 (maximum output frequency)	50.00Hz	☆
F7.11	FDT hysteresis detection value	0.0 to 100.0% (FDT level)	5.0%	☆
<p>When the output frequency exceeds a certain set frequency of FDT level, the instruction signal will output until the output frequency falls to below a certain frequency of FDT level (FDT level - FDT hysteresis detection value).</p>				

<p>Schematic diagram of FDT level</p>				
F7.12	Frequency reaches detection width	0.0 to 100.0% (Set frequency)	0.0%	☆
<p>When the inverter output frequency outputs pulse signal within the positive and negative of detection width of the set frequency, specifically as shown below:</p> <p>Schematic diagram of frequency arrival detection amplitude</p>				
F7.13	Braking threshold voltage	115.0 to 140.0% (standard bus voltage)	120.0%	☆
		115.0 to 140.0% (standard bus voltage) --voltage level 380V	130.0%	
<p>The function code is to set the initial bus voltage of braking, the load can be effectively braked by appropriately adjusting the value.</p>				

5-2-10.F8 Group - Fault and protection group

Code	Parameter name	Setting range	Factory default	Change
F8.00	Automatic current limiting level	100 to 200%	160%	☆
F8.01	Frequency fall rate at	0.00 to 100.00Hz/s	10.00Hz/s	☆

	current limiting				
<p>During the operation of Inverter, due to the load is too large, the actual rising rate of motor speed is lower than the rising rate of output frequency. If no measures taken, it will cause acceleration overcurrent fault and afterwards cause the inverter trips.</p> <p>During the operation of inverter, automatic current limiting function detects the output current, and compares with the current limiting point defined by F8.00. If the output current exceeds the current limiting point, the output frequency of inverter will fall in accordance with the falling rate (F8.01) of over current frequency. When it is detected again that the output current is below the current limiting point, then it resumes normal operation.</p>					
F8.02	Current limiting action selection	Current limiting always valid	0	0	☆
		Current limiting invalid at constant speed	1		
<p>Automatic current limiting function is always valid at the state of acceleration and deceleration, automatic current limiting action selection (F8.02) is used to determine whether automatic current limiting function is valid or not at constant speed.</p> <p>F8.02 = 0 indicates that automatic current limiting is valid at constant speed; F8.02 = 1 indicates that automatic current limiting is invalid at constant speed; When performing automatic current limiting action, the output frequency may vary, so the automatic current limiting function is not suitable for the occasion that the more stable output frequency at constant speed is required.</p> <p>When the automatic current limiting function is valid, the lower limit setting may affect the overload capacity of inverter.</p>					
F8.03	Motor overload protection selection	OFF	0	2	★
		Ordinary motor (with low speed compensation)	1		
		Inverter motor (without low speed compensation)	2		
<p>0: OFF No motor overload protection (be caution), at this time, the inverter has</p>					

<p>not overload protection to load motor.</p> <p>1: Ordinary motor (with low speed compensation) As the cooling effect of ordinary motor at low speed gets worse, the corresponding electronic thermal protection value should be adjusted as appropriate, as mentioned here with low compensation, it refers to lower the overload protection threshold of motor that the running frequency is less than 30HZ.</p> <p>2: Inverter motor (without low speed compensation) Because the cooling function of the inverter dedicated motor is not affected by speed, the low-speed protection adjustment is not required.</p>					
F8.04	Motor overload protection current	20.0% to 120.0% (rated motor current)	100.0%		☆
<p>The formula of motor overload protection current: Motor rated current * F8.04 * 158%, lasts for 10 minutes and then alarms motor overload; Motor rated current * F8.04 * 200%, lasts for 1 minutes and then alarms motor overload;</p>					
F8.05	Overvoltage stall protection	Prohibit	0	0	☆
		Allow	1		
<p>When the inverter decelerates, due to the effects from load inertia, it may occur that the actual falling rate of motor speed is lower than the falling rate of output frequency, at the time the motor will feed back the power to the inverter so that the inverter bus voltage rises, if no measures are taken, the rising of bus voltage will cause the inverter overvoltage fault.</p>					
F8.06	Overvoltage stall protection voltage	110 to 150% (220V series)	115%		☆
		110 to 150% (380V series)	130%		
<p>Overvoltage stall protection voltage refers to that during the operation, the inverter detects the bus voltage and compares it with the overvoltage stall point defined by F8.06 (relative to a standard bus voltage), if the bus voltage exceeds the overvoltage stall point, the inverter's output frequency will stop dropping until that the bus voltage is below detection overvoltage stall point, and then continues to decelerate.</p>					
F8.07	Number of automatic fault reset	0 to 3	0		☆
F8.08	Automatic fault reset interval setting	0.1 to 100.0s	1.0 s		☆
<p>Number of automatic fault reset: when the inverter selects automatic fault reset, it is used to set the number of times of automatic fault reset. When the times of the inverter continuous reset exceed this value, the inverter fault standby, the manual intervention is required.</p> <p>Automatic fault reset interval setting: choose interval between fault occurrence and automatic reset.</p>					
F8.09	Descending frequency	70.0 to 110.0% (standard bus)	80.0%		☆

	point of momentary power failure	voltage)		
F8.10	Frequency fall rate of momentary power failure	0.00Hz/s to F0.08 (maximum output frequency)	0.00Hz/s	☆

5-2-11.F9 Group - Communication parameter group

Code	Parameter name	Setting range	Factory default	Change	
F9.00	Communication baud rate setting	1200bps	0	3	☆
		2400bps	1		
		4800bps	2		
		9600bps	3		
		19200bps	4		
		38400bps	5		
This parameter is used to set the data transfer rate between the host computer and the inverter. Note: the baud rate must be set to the same for the host computer and the inverter, otherwise communication can not be achieved. The larger baud rate, the faster communication speed.					
F9.01	Data bits parity settings	0: no parity (N, 8, 1) for RTU 1: even parity (E, 8, 1) for RTU 2: odd parity (O, 8, 1) for RTU 3: no parity (N, 8, 2) for RTU 4: even parity (E, 8, 2) for RTU 5: odd parity (O, 8, 2) for RTU 6: no parity (N, 7, 1) for ASCII 7: even parity (E, 7, 1) for ASCII 8: odd parity (O, 7, 1) for ASCII 9: no parity (N, 7, 2) for ASCII 10: even parity (E,7,2) for ASCII 11: odd parity (O,7,2) for ASCII 12: no parity (N,8,1) for ASCII 13: even parity (E,8,1) for ASCII 14: odd parity (O,8,1) for ASCII 15: no parity (N,8,2) for ASCII 16: even parity (E,8,2) for ASCII 17: odd parity (O,8,2) for ASCII	1	☆	
Note: the set data for the host computer and the inverter must be the same.					
F9.02	Communication address of this unit	1 to 247, 0 for broadcast address	1	☆	

When the master is in the write-frame, the communication address of the slave is set to 0, that is the broadcasting communication address, all slaves on MODBUS will accept the frame, but the slave does not respond. Note that the slave's address can not be set to 0.					
The communication address of this unit has uniqueness in the communication network, which is the basis of peer-to-peer communication for the host computer and the inverter.					
F9.03	Communication response delay	0 to 200ms	5ms	☆	
Response delay: it refers to the interval time from the end of the inverter receiving data to the start of it sending response data to the host machine. If the response delay is less than the system processing time, then the response delay time is subject to the system processing time; If the response delay is longer than the system processing time, after the system finishes the data processing, and continues to wait until the response delay time, and then sends data to the host computer.					
F9.04	Communication timeout fault time	0.0 (invalid) ; 0.1 to 100.0s	0.0 s	☆	
Communication time-out parameter is not valid when the function code is set to 0.0s.					
When the function code is set to valid, if the interval time between one communication and the next communication exceeds the communication time-out time, the system will report communication failure error (E.CE) .					
Generally, it is set to invalid. If the parameter can be set to monitor the communication status in continuous communication system.					
F9.05	Data transfer format selection	0: non-standard MODBUS protocol 1: standard MODBUS protocol 2: ASCII	0	☆	
F9.06	Transmission error handling	Alarm and free stop	0	1	☆
		No alarm and continue to run	1		
		No alarm and stop at the selected mode (Communication control mode only)	2		
		1: No alarm and stop at the selected mode (All control mode)	3		
In exceptional circumstances, the inverter can shield E.CE fault, stop or continue running by setting the action of handling communication error.					
F9.07	Transmission response handling	0: Write operations responded 1: Write operations not responded	0	☆	
When units digit of the function code LED is 0, the host computer of inverter responds					

both write and read commands.
 When units digit of the function code LED is 1, the host computer of inverter responds read command only, this way can improve communication efficiency.
 When tens digit of the function code LED is 0, the inverter will not save the set value at power failure.

5-2-12.FA Group - Torque control group

Code	Parameter name	Setting range	Factory default	Change
FA.00	Torque setting mode selection	Keyboard settings (FA.01)	0	☆
		Analog AI1 setting (100% relative to 2 times of rated inverter current)	1	
		Analog AI2 setting (same as 1)	2	
		Panel potentiometer setting (same as 1)	3	
		Analog AI1 + AI2 setting (same as 1)	4	
		Multi-speed setting (same as 1)	5	
		Remote communications setting (same as 1)	6	
<p>Only when F0.00 = 3, both torque control and FA.00 function code are valid. Under torque control mode, the inverter outputs torque according to the set output torque command, the output frequency is limited by upper limit frequency, when the load speed is greater than the set upper limit frequency, the inverter output frequency will be limited, at the time the output torque is different from the set torque.</p> <p>When the torque command is set by the keyboard (FA.00 = 0), the torque command can be obtained from setting the function code FA.01. When the torque is set to negative, the motor will reverse. Analog, multi-speed and communication settings, the set 100.0% corresponds to two times of rated inverter current and the set -100.0% corresponds to negative 2 times of rated inverter current.</p> <p>The multi-function input terminals are used to switch between torque control and speed control.</p> <p>When the set torque of inverter is greater than the load torque, the inverter output frequency will rise, when the inverter output frequency reaches the upper limit of the frequency, the inverter will run at the upper limit frequency.</p> <p>When the set torque of inverter is less than the load torque, the inverter output frequency will fall, when the inverter output frequency reaches the lower limit of the frequency, the inverter will run at the lower limit frequency.</p> <p>Note: In the state of stop, the inverter automatically switches from torque control to speed control.</p>				
FA.01	Keyboard set torque	-200.0% to 200.0% (rated inverter current)	50.0%	☆
FA.02	low speed torque	0.000-1.000	0.050	☆

	compensation			
FA.03	high speed torque compensation	0.000-1.000	0.000	☆
<p>Low speed torque compensation is to overcome friction, F5.02 is as cut-off point, compensation value below F5.02 for FA. 02 values. High speed torque compensation is to overcome friction, F5.05 is as cut-off point, compensation value above F5.02 for FA. 05 value. When setting is between F5.02 and F5.05, compensation value is a linear change.</p>				

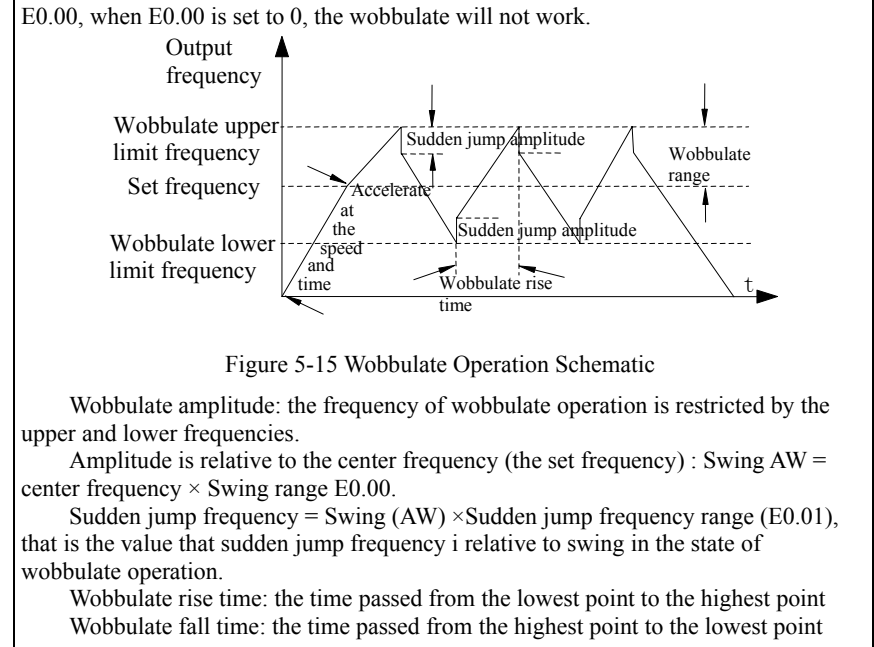
5-2-13.Fb Group - Control optimization group

Code	Parameter name	Setting range	Factory default	Change
Fb.00	Software overcurrent point	0 to 2000A	Depends on models	★
Fb.01	Software undervoltage point	0 to 500V	Depends on models	★
Fb.02	Software overvoltage point	300 to 800V	Depends on models	★
<p>Note: Adjusting these parameter would easily affect protective function of frequency inverters, recommend user to set Fb.00 to Fb.02 parameters very carefully if necessary.</p>				
Fb.03	Low-frequency threshold point of oscillation suppression	0 to 500	5	☆
Fb.04	High-frequency threshold point of oscillation suppression	0 to 500	100	☆
<p>But most of the motors that run at certain frequency range occur current shocks, sometime the motor can not run steadily, even it can lead to the inverter overcurrent. When Fb.07 = 0, the oscillation suppression is enabled; if Fb.03, Fb.04 set very small, both the effect of oscillation suppression and the increase of current are more obvious, conversely, the effect of oscillation suppression is very week.</p>				
Fb.05	Amplitude limit value of oscillation suppression	0 to 10000	5000	☆
<p>The large voltage boost value of oscillation suppression can be restricted by setting Fb.05</p>				
Fb.06	Demarcation frequency of high and low frequency of oscillation suppression	0.00Hz to F0.08 (maximum output frequency)	12.50Hz	☆
<p>Fb.06 is the demarcation point of function code Fb.03 and Fb.04.</p>				

Fb.07	Oscillation suppression	Oscillation suppression valid	0	1	☆
		Oscillation suppression invalid	1		
<p>The oscillation suppression is for VF control, the current oscillation phenomena often occurs when the ordinary motor runs with light load or no load, which can cause abnormal operation of motor or even the overcurrent of inverter. When Fb.07 = 0, the oscillation suppression will be enabled; the inverter will suppress the oscillation of motor according to the parameters of Fb.03 to Fb.06 function group.</p>					
Fb.08	PWM selection	PWM mode 1	0	0	★
		PWM mode 2	1		
		PWM mode 3	2		
<p>PWM mode 1: V/F control is less than 8Hz as the seven-stage type, better than 12Hz as the five-stage type. PWM mode 2: V/F control fully uses the seven-stage type. PWM mode 3: V/F control fully uses the five-stage type.</p>					
Fb.09	Energy-saving selection	OFF	0	0	★
		Auto energy-saving	1		
<p>When the motor runs at constant speed with no load or light load, the inverter detects the load current, adjusts the output voltage, in order to automatically save energy.</p>					
Fb.10	Deadband time	2 to 5	Depends on models		

5-2-14.E0 Group - Wobble control group

Code	Parameter name	Setting range	Factory default	Change
E0.00	Wobble range	0.0 to 100.0% (relative to the set frequency)	0.0%	☆
E0.01	Sudden jump frequency range	0.0 to 50.0% (relative to the wobble amplitude)	0.0%	☆
E0.02	Wobble rise time	0.1 to 3600.0s	5.0 s	☆
E0.03	Wobble fall time	0.1 to 3600.0s	5.0 s	☆
<p>Wobble function is suitable for the textile, chemical, and other industries, as well as occasions that needs traverse and winding function. As shown in Figure 5-15 Wobble function means that the inverter output frequency swings up and down to set the frequency centering around the set frequency, the locus the operating frequency on the timeline is as shown in figure, which the swing amplitude is set by</p>				



5-2-15.E1 Group - Multi-speed control group

Code	Parameter name	Setting range	Factory default	Change
E1.00	Multi-speed 0	-100.0% to 100.0%	0.0%	☆
E1.01	Multi-speed 1	-100.0% to 100.0%	0.0%	☆
E1.02	Multi-speed 2	-100.0% to 100.0%	0.0%	☆
E1.03	Multi-speed 3	-100.0% to 100.0%	0.0%	☆
E1.04	Multi-speed 4	-100.0% to 100.0%	0.0%	☆
E1.05	Multi-speed 5	-100.0% to 100.0%	0.0%	☆
E1.06	Multi-speed 6	-100.0% to 100.0%	0.0%	☆
E1.07	Multi-speed 7	-100.0% to 100.0%	0.0%	☆
E1.08	Multi-speed 8	-100.0% to 100.0%	0.0%	☆
E1.09	Multi-speed 9	-100.0% to 100.0%	0.0%	☆
E1.10	Multi-speed 10	-100.0% to 100.0%	0.0%	☆
E1.11	Multi-speed 11	-100.0% to 100.0%	0.0%	☆

E1.12	Multi-speed 12	-100.0% to 100.0%	0.0%	☆
E1.13	Multi-speed 13	-100.0% to 100.0%	0.0%	☆
E1.14	Multi-speed 14	-100.0% to 100.0%	0.0%	☆
E1.15	Multi-speed 15	-100.0% to 100.0%	0.0%	☆

The start-stop channel selection is determined by the function code F0.02 under the multi-speed mode, multi-speed process is controlled by the combination of terminal 1, terminal 2, terminal 3 and terminal 4. The relationship of stage and multi-speed is followed as:

The relationship of multi-speed and multi-speed terminal is followed as:

Multi-speed terminal 4	Multi-speed terminal 3	Multi-speed terminal 2	Multi-speed terminal 1	Command setting	Parameters
OFF	OFF	OFF	OFF	Multi-speed command 0	E1.00
OFF	OFF	OFF	ON	Multi-speed command 1	E1.01
OFF	OFF	ON	OFF	Multi-speed command 2	E1.02
OFF	OFF	ON	ON	Multi-speed command 3	E1.03
OFF	ON	OFF	OFF	Multi-speed command 4	E1.04
OFF	ON	OFF	ON	Multi-speed command 5	E1.05
OFF	ON	ON	OFF	Multi-speed command 6	E1.06
OFF	ON	ON	ON	Multi-speed command 7	E1.07
ON	OFF	OFF	OFF	Multi-speed command 8	E1.08
ON	OFF	OFF	ON	Multi-speed command 9	E1.09
ON	OFF	ON	OFF	Multi-speed command 10	E1.10
ON	OFF	ON	ON	Multi-speed command 11	E1.11
ON	ON	OFF	OFF	Multi-speed command 12	E1.12
ON	ON	OFF	ON	Multi-speed command 13	E1.13
ON	ON	ON	OFF	Multi-speed command 14	E1.14
ON	ON	ON	ON	Multi-speed command 15	E1.15

When multi-speed is selected as frequency source, the 100.0% of function code E1.00 to E1.15 corresponds to maximum output frequency F0.08.

Multi-stage command is used for the function of multi-speed, also for PID setting source to meet the need to switch between different setting values.

E1.16	Section 0 given mode	Function code E1.00 given	0	0	☆
		analog AI1 given	1		
		analog AI2 given	2		
		analog AI3 given	3		
		PIDcontrol given	4		
		Panel given frequency (F0.01)	5		
This parameter is decided the multistage instruction 0's giving channel. Multistage					

instruction 0 not only can select E1.00, there are a variety of other options too. it is convenience to change the multistage instruction and other given way.

5-2-16.E2 Group - PID control group

Code	Parameter name	Setting range	Factory default	Change	
E2.00	PID setting source selection	Keyboard setting (E2.01)	0	0	☆
		Analog channel AI1 setting	1		
		Analog channel AI2 setting	2		
		Panel potentiometer setting	3		
		Remote communications setting	4		
	Multi-speed setting	5			

When PID is selected as the frequency source, that is to choose 6 for F0.02, the group function will be enabled. This parameter is used to select the process PID target value setting channel.

The amount of process PID setting target is a relative value, the set 100% corresponds to the 100% of feedback signal of the controlled system. The system always operate in relative value (0 to 100.0%) .

Note: The multi-speed setting can be achieved by setting the parameters of E1 group.

E2.01	Keyboard preset PID setting	0.0% to 100.0%	50.0%	☆
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When select E2.00 = 0, that is the target source is from keyboard setting, you need to set this parameter.

The reference value for this parameter is the amount of system feedback.

E2.02	PID feedback source selection	Analog channel AI1 feedback	0	0	☆
		Analog channel AI2 feedback	1		
		Panel potentiometer feedback	2		
		AI1-AI2 feedback	3		
		Remote communications feedback	4		
		AI1 + AI2 feedback	5		
		MAX (AI1 , AI2)	6		
MIN (AI1 , AI2)	7				

This parameter is used to select the PID feedback channel.

Note: the setting channel and the feedback channel can not overlap, or, PID can not be effectively controlled.

E2.03	PID output selection	PID output as positive	0	0	☆
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		PID output as negative	1	
<p>PID output as positive, when the feedback signal is greater than PID setting, the inverter output frequency is required to drop in order to balance PID. Such as winding tension PID control.</p> <p>PID output as negative, when the feedback signal is greater than PID setting, the inverter output frequency is required to rise in order to balance PID. Such as unwinding tension PID control.</p>				
E2.04	Proportional gain (KP)	0.00 to 100.00	1.00	☆
E2.05	Integration time (Ti)	0.01 to 10.00s	0.10s	☆
E2.06	Differential time (Td)	0.00 to 10.00s	0.00 s	☆
<p>Proportional gain (KP) : used to decide the extent of the PID regulator,the greater P,the greater adjusting extent. This parameter 100 means that when the deviation of PID feedback value and setting value is 100%, the PID regulator will adjust the output frequency command to the maximum output frequency (Ignore the integral and differential actions) .</p> <p>Integration time (Ti) : used to decide the speed that PID regulator adjusts integrally the deviation between feedbacks and settings of PID. The integration time means that when the deviation of PID feedback value and setting value is 100%, the integration regulator (Ignore proportional and derivative actions) will successively adjust to the maximum output frequency (F0.08) for the time. The shorter integration time, the greater extent of integral adjustment</p> <p>Differential time (Td) : used to decide the extent that PID regulator adjusts the deviation between feedbacks and settings of PID. The differential time means that the feedback value changes 100% within the time, the differential regulator will adjust to the maximum output frequency (F0.08) (Ignore proportional and integral action) . The longer differential time, the greater extent of adjustment</p> <p>PID is the most commonly used control method in the process control, and the role of its each part varies, the working principle and the adjusting method is briefly described as follows:</p> <p>Proportional adjustment (P) : When the deviation between feedback and setting exists, as for the adjustment amount that the output is proportional to the deviation, if the deviation is constant, then the adjustment amount will be constant too. Proportional adjustment can respond quickly to changes in the feedback, but simply adopt proportional adjustment, which can not realize the control without difference. The larger proportional gain, the faster the system adjustment, but if the too large proportional gain will cause oscillation. How to adjust: firstly set integration time to very long, and set differential time to zero, simply adopt proportional adjustment to make the system running, then change the setting value to observe the deviation (static difference) between feedback signal and setting amount, if the static difference changes in the direction of setting amount (for example, when increasing setting amount, the feedback amount is always less than setting amount after the system is stable), continue to increase the proportional gain, and vice versa reduce the proportional gain, repeat the above process until the static difference is relatively small (it is hard to achieve zero static difference) .</p> <p>Integration time (I) : when the deviation between feedback and setting exists, the</p>				

<p>output adjustment amount continuously increases, if the deviation persists, the adjustment amounts will continue to increase until zero deviation. The integration regulator can effectively eliminate static difference. If the action of integration regulator shows too strong, the overshoot occurs repeatedly, the system shows unstable until oscillation. The oscillations caused by too strong integral action is characterized by that the feedback signal bobs and the range of oscillation gradually increases until the oscillation. The integration time parameter adjustment generally descend, gradually adjust the integration time to observe the effect of system adjustment until the system reaches the steady speed requirements.</p> <p>Differential time (D) : when the deviation of feedback and setting changes, as for the adjustment amount that the output is proportional to the deviation, the adjustment amount only have something to do with the direction and size of deviation change, not itself direction and size. The role of differential regulation adjusts according to the changing trends when the feedback signal changes,thereby suppressing the changes of feedback signal. Please use differential regulator with caution, because the differential easily amplify the interference of system, especially the interference of high changes frequency.</p>				
E2.07	Sampling period (T)	0.01 to 100.00s	0.10s	☆
E2.08	PID control deviation limit	0.0 to 100.0%	0.0%	☆
<p>Sampling period (T) : refers to the sampling period of feedback amount, the regulator operates once each sampling period. The greater sampling period, the slower response.</p> <p>PID control deviation limit: refers to allowable deviation between PID system output value and closed-loop setting value, as shown in figure, PID regulator stops adjustment. The reasonable setting to this function code can adjust the accuracy and stability of PID system.</p>				
<p>The relationship between deviation limit and output frequency</p>				
E2.09	Feedback disconnection detection value	0.0 to 100.0%	0.0%	☆
E2.10	Feedback disconnection	0.0 to 3600.0s	1.0 s	☆

detection time			
<p>Feedback disconnection detection value: the detected value is relative to the full scale (100%), the system has been detecting PID feedback, when the feedback value is less than or equal to the feedback disconnection detection value, the system starts to detect timing. When the detection time exceeds the feedback disconnection detection time, the system will report PID feedback disconnection fault (E.PId) .</p>			

5-2-17.E3 Group - Virtual DI, virtual DO group

Code	Parameter name	Setting range	Factory default	Change
E3.00	VDI1 function selection	0 to 25	0	★
E3.01	VDI2 function selection	0 to 25	0	★
E3.02	VDI3 function selection	0 to 25	0	★
E3.03	VDI4 function selection	0 to 25	0	★
E3.04	VDI5 function selection	0 to 25	0	★

The function of virtual VDI1 to VDI5 is same as DI on the control panel, they can be used as a multi-functional digital inputs, please refer to the introduction of F1.00 to F1.05 for detailed settings.

E3.05	VDI active mode	Units digit	Virtual VDI1	00000	☆
		Invalid	0		
		Valid	1		
		Tens digit	Virtual VDI2 (same as units digit)		
		Hundreds digit	Virtual VDI3 (same as units digit)		
		Thousands digit	Virtual VDI4 (same as units digit)		
		Ten thousands digit	Virtual VDI5 (same as units digit)		
E3.06	VDI status setting	Units digit	Virtual VDI1	11111	★
		The availability of	0		

		VDI depends on the state of virtual VDOx.		
		The availability of VDI depends on the state of function code E3.05.	1	
		Tens digit	Virtual VDI2 (same as units digit)	
		Hundreds digit	Virtual VDI3 (same as units digit)	
		Thousands digit	Virtual VDI4 (same as units digit)	
		Ten thousands digit	Virtual VDI5 (same as units digit)	

It is different from ordinary digital input terminal, the state of virtual VDI has two kinds of setting, the selection depends on E3.06.

If the state of selection VDI is determined by the state of corresponding virtual VDO, the availability of VDI depends on the valid or invalid VDO output, and VDIx only binds VDOx (x is 1 to 5) .

if the state of selection VDI is set by the function code, the status of virtual input terminals can be determined through E3.05 binary bits respectively.

The following example illustrates the use of VDI. Example 1, to achieve the following function: "Upon arrival of running frequency, the inverter will perform free stop" Using the following settings method: set that the VDI state selection depends on VDO, set VDI1 function as "free stop" (E3.00 = 8) ; set that VDI1 terminal active mode depends on VDO1 (E3.06 = xxx0) ; set VDO1 output function as "Frequency Arrival" (E3.11 = 5) ;

When the inverter reaches the set frequency, the state of VDO1 is ON, at the time VDI1 input terminal status is valid, if the inverter VDI1 receives the command of free stop, the inverter will perform free stop.

Example 2, to achieve the following function: " the inverter is powered on, it automatically enters the running state." Using the following settings: the function code E3.05 is used to set the state of VDI, set VDI1 function as "Forward Run" (E3.00 = 1) ; set that VDI1 terminal active mode depends on function code (E3.06 = xxx1) ; set VDI1 terminal status as valid (E3.05 = xxx1) ; set command source as terminal control (F0.04 = 1) ; set start protection option for "terminal command" (F7.09=1);

After the initialization of inverter is completed, it is detected that VDI1 is valid and this terminal corresponds to the forward run, which is equivalent to that the

inverter receives one the forward run command, the inverter begins to run forward.				
E3.07	AI1_DI function	0 to 25	0	★
E3.08	AI2_DI function selection	0 to 25	0	★
E3.09	Panel potentiometer_DI setting	0 to 25	0	★
E3.10	AI_DI mode	Units digit: AI1 0: high level active 1: low level active Tens digit: AI2 (same as units digit) Hundreds digit: Panel potentiometer (same as units digit)	000	★
This function code is used to set AI as DI, when AI is used as DI, when AI input voltage is greater than 7V, AI terminal state is high level, when AI input voltage drops below 3V, AI terminal status is low level. The voltage between 3V to 7V is regarded as the hysteresis, E3.10 is used to determine whether AI high level or low level is active when AI is used as DI. The method of setting AI as DI is same as the ordinary DI setting, please refer to the instructions on DI settings in F1 group.				
E3.11	VDO1 output function	0 to 10	0	☆
E3.12	VDO2 output function	0 to 10	0	☆
E3.13	VDO3 output function	0 to 10	0	☆
E3.14	VDO4 output function	0 to 10	0	☆
E3.15	VDO5 output function	0 to 10	0	☆
E3.16	VDO valid state	Units digit: VDO1 0: positive logic 1: negative logic Tens digit: VDO2 (same as units digit) Hundreds digit: VDO3 (same as units digit) Thousands digit: VDO4 (same as units digit) Ten thousands digit: VDO5 (same as units digit)	00000	☆
E3.17	VDO1 delay time	0.0s to 3600.0s	0.0 s	☆
E3.18	VDO2 delay time	0.0s to 3600.0s	0.0 s	☆
E3.19	VDO3 delay time	0.0s to 3600.0s	0.0 s	☆
E3.20	VDO4 delay time	0.0s to 3600.0s	0.0 s	☆

E3.21	VDO5 delay time	0.0s to 3600.0s	0.0 s	☆
<p>VDO is similar with DO output function, which can used with VDIx together to achieve some simple logic control.</p> <p>When VDOx output function is selected as 0, the state of VDO1 to VDO5 output is determined by the state of DI1 to DI5 input on control panel, at this time VDOx corresponds to VDIx fully.</p> <p>When VDOx output function is not set to 0, the setting and using method of VDOx function is same as DO output in F2 group, please refer to related parameter description in F2 group.</p> <p>Similarly VDOx output active state can be set by E3.16, select positive logic or negative logic.</p>				


5-2-18.b0 Group - Motor parameter group

Code	Parameter name	Setting range	Factory default	Change
b0.00	Inverter type	0.G type (constant torque load type) 1: Reserved	0	★
b0.01	Rated motor power	0.4 to 900.0kW	Depends on models	★
b0.02	Rated motor voltage	0 to 460V	Depends on models	★
b0.03	Rated motor current	0.1 to 2000.0A	Depends on models	★
b0.04	Rated motor frequency	0.01Hz to F0.08 (maximum output frequency)	50.00Hz	★
b0.05	Rated motor speed	0 to 36000rpm	Depends on models	★
<p>Note: please set up according to the motor nameplate parameters. The excellent vector control performance needs the accurate motor parameters.</p> <p>The inverter provides the function of parameter auto tuning. The accurate parameter auto tuning depends on correctly inputing parameters on the motor nameplate.</p> <p>In order to guarantee the control performance, please try to ensure that the inverter power matches the motor power, if the gap between the two is too large, the inverter control performance will be significantly reduced.</p> <p>Note: Resetting the motor rated power (b0.01) will initialize motor parameters b0.06 to b0.10.</p>				
b0.06	Motor stator resistance	0.001 to 65.535Ω	Depends on models	★
b0.07	Motor rotor resistance	0.001 to 65.535Ω	Depends on models	★

b0.08	Motor stator and rotor inductance	0.1 to 6553.5mH	Depends on models	★
b0.09	Motor stator and rotor mutual inductance	0.1 to 6553.5mH	Depends on models	★
b0.10	Motor no-load current	0.01 to 655.35A	Depends on models	★
<p>When the motor parameter auto tuning is completed, the set value of b0.06 to b0.10 will be automatically updated. These parameters as the basis of high-performance vector control have a direct impact on the control performance. Note: user should not arbitrarily change the group of parameters.</p>				
b0.11	Motor parameter auto tuning	0: no operation 1: Motor parameters static auto tuning 2: Motor parameters comprehensive auto tuning	0	☆
<p>0: no operation 1: Static parameter auto tuning: you do not need to disengage the motor and its load, must enter the correct motor nameplate parameters (b0.01 to b0.05) before motor parameter auto tuning, the resistance value of motor stator will be detected after motor parameter auto tuning. The mutual inductance and the no-load current of motor will not be measured, user can enter the appropriate values based on experience. 2: Rotation parameter auto tuning: you must enter the correct motor nameplate parameters (b0.01 ~ b0.05) before motor parameter auto tuning, and disengage the motor and its load so that the motor is in the state of rest or no-load, otherwise the result of motor parameter auto tuning may be incorrect. Before motor parameter auto tuning, set appropriate acceleration time and deceleration time (F0.05, F0.06) based on the size of the motor inertia, otherwise it may occur overcurrent or overvoltage fault in the process of motor parameter auto tuning. Set b0.11 to 2 and then press ENTER key to start the state of motor parameter auto tuning, at this time, the LED displays "-TUN-" and flashes, press RUN key to start parameter auto tuning, when "TUN-0 ~ TUN-3 " is displayed, TUN-4 motor starts running. When the parameter auto tuning is completed, display "-END-", and finally return to the stop interface. When "-TUN-" is flashing, press PRG to exit the state of parameter auto tuning. When performing parameter auto tuning, press STOP/RESET key to terminate the operation of parameter auto tuning. Note: The start and stop of parameter auto tuning can be only controlled by the keyboard; when parameter auto tuning is completed, this function code automatically returns to 0.</p>				

5-2-19.y0 Group - Function code management

Code	Parameter name	Setting range	Factory default	Change
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y0.00	Function parameter recovery	0: no operation 1: Restore factory settings, without motor parameters 2: Clear fault history 3: Restore factory settings, including motor parameters 4: Backup parameters 5: Restore from backup	0	★
<p>0: no operation 1: Restore factory settings, without motor parameters 2: Clear fault history 3: Restore factory settings, including motor parameters 4: Backup the parameters set by the current user. Backup all function parameters. It is easy to restore the default settings when user incorrectly adjust parameters. 5: Restore user backup parameters Note: This operation is completed, the function code value is automatically restored to 0; b0 group of parameters will not be restored to the default values and from Fb.00 to Fb.02 group of parameters.</p>				
y0.01	User password	0 to 65535	0	★
<p>When setting to one any non-zero number, the password protection will take effect. 00000: clear old user password, and disable password protection function, restoring the factory default also able to clear password. When user password is set and takes effect, if user password is incorrect, user will not be able to enter parameter menu, only when the correct password is entered, user can view and modify parameters. Keep firmly in mind the set user password. Password protection will take effect 1 minute after exiting from function code edit mode, otherwise inaccessible.  at this time, if you want to enter function code edit mode by pressing keys, "0.0.0.0.0" will display, the operator must enter the correct password.</p>				

5-2-20.y1 Group - Fault history search group

Code	Parameter name	Setting range	Factory default	Change
y1.00	Type of the first two faults	0: No fault 1: Output phase loss (E.oUt1)	0	●
y1.01	Type of the first fault	2: retain 3: Manufacturers set time to arrive (E.oUt3) 4: Acceleration overcurrent (E.oC1) 5: Deceleration overcurrent (E.oC2)	0	●
y1.02	Type of current fault	6: Constant speed overcurrent (E.oC3) 7: Acceleration overvoltage (E.oU1) 8: Deceleration overvoltage (E.oU2)	0	●

		9: Constant speed overvoltage (E.oU3) 10: Bus undervoltage fault (E.LU) 11: Motor Overload (E.oL1) 12: Inverter overload (E.oL2) 14: output phase lose(E.oUT1) 16: Inverter module overheating fault (E.oH2) 17: External fault (E.SET) 18: Communication fault (E.CE) 19: Current detection fault (E.oCC) 20: Auto tuning fault (E.tE) 21: EEPROM operation fault (E.EEP) 22: PID feedback disconnection fault (E.PID)																						
Record the type of the last three faults of inverter, see the troubleshooting for the details.																								
y1.03	Running frequency of current fault		0.00Hz	•																				
y1.04	Output current of current fault		0.0A	•																				
y1.05	Bus voltage of current fault		0V	•																				
y1.06	Input terminal status of current fault		0	•																				
y1.07	Output terminal status of current fault		0	•																				
The status of current fault input terminal are decimal digits. Display all digital input terminal status of the last fault, the order is:																								
<table border="1"> <tr> <td>Bit0</td> <td>Bit1</td> <td>Bit2</td> <td>Bit3</td> <td>Bit4</td> </tr> <tr> <td>DI1</td> <td>DI2</td> <td>DI3</td> <td>DI4</td> <td>DI5</td> </tr> <tr> <td>Bit5</td> <td>Bit6</td> <td>Bit7</td> <td>Bit8</td> <td>Bit9</td> </tr> <tr> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> </tr> </table>					Bit0	Bit1	Bit2	Bit3	Bit4	DI1	DI2	DI3	DI4	DI5	Bit5	Bit6	Bit7	Bit8	Bit9	Reserved	Reserved	Reserved	Reserved	Reserved
Bit0	Bit1	Bit2	Bit3	Bit4																				
DI1	DI2	DI3	DI4	DI5																				
Bit5	Bit6	Bit7	Bit8	Bit9																				
Reserved	Reserved	Reserved	Reserved	Reserved																				
When the input terminal is ON, the corresponding bit is 1, OFF for 0. This value can be used to understand the state of digital input signal at the sate of failure.																								
The status of current fault output terminal are decimal digits. Display all digital output terminal status of the last fault, the order is:																								
<table border="1"> <tr> <td>Bit0</td> <td>Bit1</td> <td>Bit2</td> <td>Bit3</td> <td>Bit4</td> </tr> <tr> <td>MO1</td> <td>Reserved</td> <td>Reserved</td> <td>R0</td> <td>Reserved</td> </tr> </table>					Bit0	Bit1	Bit2	Bit3	Bit4	MO1	Reserved	Reserved	R0	Reserved										
Bit0	Bit1	Bit2	Bit3	Bit4																				
MO1	Reserved	Reserved	R0	Reserved																				
When the output terminal is ON, the corresponding bit is 1, OFF for 0. This value can be used to understand the state of digital output signal at the sate of failure.																								

Chapter 6 Fault message and troubleshooting

6-1.Fault message and troubleshooting

No.	Fault code	Failure type	Possible causes	Solutions
1	E.oUt1	Output phase loss	1, inverter to the motor lead is not normal 2, the motor running the inverter three-phase unbalanced output 3, driver board abnormal 4, module abnormalities	1, excluding peripheral faults 2, check the motor three-phase winding is normal and troubleshooting 3, to seek technical support
2	Retain			
3	E.oUt3	Factory setting time	Manufacturers set time to arrive	Seeking manufacturers
4	E.oC1	Overcurrent when accelerating	1. Accelerated too quickly 2. Mains voltage is low 3. The inverter power is small 4: Output phase loss	1. Increase acceleration time 2. Check input power 3. Choose the inverter with larger power Inverter 4. Check the output wiring
5	E.oC2	Overcurrent when decelerating	1. Decelerated too quickly 2. Load inertia torque is large 3. The inverter power is small 4: Output phase loss	1. Increase deceleration time 2. Add suitable braking components 3. Choose the inverter with larger power 4. Check the output wiring
6	E.oC3	Overcurrent at constant speed	1. Load mutation or abnormal 2. Mains voltage is low 3. The inverter power is small 4: Output phase loss	1. Check load or reduce load mutation 2. Check input power 3. Choose the inverter with larger power 4. Check the output wiring
7	E.oU1	Overvoltage when accelerating	1. Input voltage is abnormal 2. After momentary power failure, restart the motor that is rotating 3. Acceleration time is too short	1. Check input power 2. Avoid re-starting at the state of stop 3. Increase acceleration time
8	E.oU2	Overvoltage when	1. Decelerated too quickly 2. Large load inertia	1. Increase deceleration time

No.	Fault code	Failure type	Possible causes	Solutions
		decelerating	3. Input voltage is abnormal	2. Increasing braking components of energy consumption 3. Check input power
9	E.oU3	Overvoltage at constant speed	1. Input voltage has abnormal changes 2. Large load inertia	1. Install input reactor 2. Add suitable braking components
10	E.LU	Bus undervoltage Shutdown display	1. Mains voltage is low 2. Parameters are set incorrectly 3. Shutdown prompt	1. Check mains input power 2. Check whether parameters are correct
11	E.oL1	Motor Overload	1. Mains voltage is too low 2. Motor rated current is set incorrectly 3. Motor stall or mutation load is too large 4. The big car Mara	1. Check mains voltage 2. Reset rated motor current 3. Check the load, and adjust torque boost 4. Select the appropriate motor
12	E.oL2	Inverter overload	1. Accelerated too quickly 2. Restart the motor that is rotating 3. Mains voltage is too low 4. Overload	1. Increase acceleration time 2. Avoid re-starting at the state of stop 3. Check mains voltage 4. Choose the inverter with larger power
14	E.oUT1	output phase lose	1. motor phase loss 2. module damage	1. check motor phase 2. check if module damaged
16	E.oH2	Inverter module overheating	1. Instantaneous overcurrent of inverter 2. Output three-phase is interphase or shorted to ground 3. Air duct blockage or damage 4. The ambient temperature is too high 5. The wires or plug-ins of dashboard loosed 6. Auxiliary power supply is damaged, the inverter is undervoltage 7. Straight through of power module bridge 8. The control panel is abnormal	1. See the solutions on overcurrent 2. Re-wiring 3. Clean or replace the air duct 4. Decrease the ambient temperature 5. Check and reconnect 6. Seek for service 7. Seek for service 8. Seek for service

No.	Fault code	Failure type	Possible causes	Solutions
17	E.SET	External fault	External fault input terminal action	Check the external device input
18	E.CE	Communication fault	1. Baud rate is set incorrectly 2. Serial communication error 3. Communication prolonged disruption	1. Set the appropriate baud rate 2. Press stop button to reset, and seek for service 3. Check wiring of the communication interface
19	E.oCC	Current detection circuit fault	1. Bad connection of control board connector 2. Auxiliary power damage 3. Hall device damage 4. Amplification circuit is abnormal	1. Check the connector and re-plug wire 2. Seek for service 3. Seek for service 4. Seek for service
20	E.TE	Motor parameter auto tuning fault	1. The motor's capacity does not match with the inverter's capacity 2. Rated motor parameters is set incorrectly 3. The learned parameters is different from the standard parameters. 4. Auto-tuning timeout	1. Replace the inverter model 2. Set rated parameters according to motor nameplate 3. Run the motor with no load, re-identify 4. Check the motor wiring and parameter setting
21	E.EEP	EEPROM read and write fault	1. Read and write error of control parameters 2. EEPROM damage	1. Press stop button to reset, and seek for service 2. Seek for service
22	E.PId	PID feedback disconnection fault	1. PID feedback disconnection 2. PID feedback source disappeared	1. Check PID feedback signal line 2. Check PID feedback source

6-2. Definition

Electromagnetic compatibility refers to the ability that the electric equipment runs in an electromagnetic interference environment and implements its function stably without interferences on the electromagnetic environment.

6-3. EMC standard

In accordance with the requirements of the Chinese national standard GB/T12668.3, the inverter must comply with the requirements of electromagnetic interference and anti- electromagnetic interference.

Our existing products adopt the latest international standards: IEC/EN61800-3:

2004 (Adjustable speed electrical power drive systems part 3:EMC requirements and specific test methods),which is equivalent to the Chinese national standards GB/T12668.3. EC/EN61800-3 assesses the inverter in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonics interference on the inverter (necessary for civil inverter)

Anti-electromagnetic interference mainly tests the conduction immunity, radiation immunity, surge immunity, EFTB (Electrical Fast Transient Burs) immunity, ESD immunity and power low frequency end immunity (the specific test items includes: 1. Immunity tests of input voltage sag, interrupt and change; 2.commutation notch immunity; 3. harmonic input immunity ; 4. input frequency change; 5. input voltage unbalance; 6. input voltage fluctuation) . The tests shall be conducted strictly in accordance with the above requirements of IEC/EN61800-3, and our products are installed and used according to the guideline of the Section 7.3 and can provide good electromagnetic compatibility in general industry environment.

6-4.EMC directive

6-3-1.Harmonic effect

The higher harmonics of power supply may damage the inverter. Thus, at some places where the quality of power system is relatively poor, it is recommended to install AC input reactor.

6-3-2.Electromagnetic Interference and Installation Precautions

There are two kinds of electromagnetic interferences, one is the interference from electromagnetic noise in the surrounding environment to the inverter, and the other is the interference from the inverter to the surrounding equipments.

Installation Precautions:

- 1) The earth wires of the Inverter and other electric products ca shall be well grounded;
- 2) The power cables of the inverter power input and output and the cable of weak current signal (e.g. control line) shall not be arranged in parallel but in vertical if possible.
- 3) It is recommended that the output power cables of the inverter shall use shield cables or steel pipe shielded cables and that the shielding layer shall be grounded reliably, the lead cables of the equipment suffering interferences shall use twisted-pair shielded control cables, and the shielding layer shall be grounded reliably.
- 4) When the length of motor cable is longer than 100 meters, it needs to install output filter or reactor.

6-3-3.Remedies for the interferences from the surrounding electromagnetic equipments to the inverter:

Generally the electromagnetic interference on the inverter is generated by plenty of relays, contactors and electromagnetic brakes installed near the inverter. When the inverter has error action due to the interferences, the following measures is recommended:

- 1) Install surge suppressor on the devices generating interference;
- 2) Install filter at the input end of the inverter,please refer to Section 6.3.6 for the specific operations.
- 3) The lead cables of the control signal cable of the inverter and the detection line shall use the shielded cable and the shielding layer shall be grounded reliably.

6-3-4.Remedies for the interferences from the inverter to the surrounding electromagnetic equipments:

These noise interferences are classified into two types: one is the radiation interference of the inverter, and the other is the conduction interference of the inverter. These two types of interferences cause that the surrounding electric equipments suffer from the affect of electromagnetic or electrostatic induction. Further,the surrounding equipment produces error action. For different interferences, please refer to the following remedies:

- 1) Generally the meters, receivers and sensors for measuring and testing have more weak signals. If they are placed nearby the inverter or together with the inverter in the same control cabinet, they easily suffer from interference and thus generate error actions. It is recommended to handle with the following methods: away from the interference source as far as possible; do not arrange the signal cables with the power cables in parallel and never bind them together; both the signal cables and power cables shall use shielded cables and shall be well grounded; install ferrite magnetic ring (with suppressing frequency of 30 to 1,000MHz) at the output side of the inverter and wind it 2 to 3 turns; install EMC output filter in more severe conditions.
- 2) When the interfered equipment and the inverter use the same power supply, it may cause conduction interference. If the above methods cannot remove the interference, it shall install EMC filter between the inverter and the power supply.
- 3) The surrounding equipment shall be separately grounded, which can avoid the interference caused by the leakage current of the inverter's grounding wire when common grounding mode is adopted.

6-3-5.Remedies for leakage current

There are two forms of leakage current when using the inverter. One is leakage current to the earth, and the other is leakage current between the cables.

- 1) Factors of affecting leakage current to the earth and its solutions:
There are the distributed capacitance between the lead cables and the earth. The larger the distributed capacitance,the larger the leakage current;the distributed capacitance can be reduced by effectively reducing the distance between the inverter and the motor. The higher the carrier frequency,the larger the leakage current. The leakage current can be reduced by reducing the carrier frequency. However, the carrier frequency reduced may result in the increase of motor noise.Please note that additional installation of reactor is also an effective method to solve leakage current problem.

The leakage current may increase with the increase of circuit current. Therefore, when the motor power is higher, the corresponding leakage current will be higher too.

- 2) Factors of producing leakage current between the cables and its solutions:

There is the distributed capacitance between the output cables of the inverter. If the current passing lines has higher harmonic, it may cause resonance and thus result in leakage current. If the thermal relay is used, it may generate error action.

The solution is to reduce the carrier frequency or install output reactor. It is recommended that the thermal relay shall not be installed in the front of the motor when using the inverter, and that electronic over current protection function of the inverter shall be used instead.

6-3-6. Precautions on Installing EMC input filter at the input end of power supply

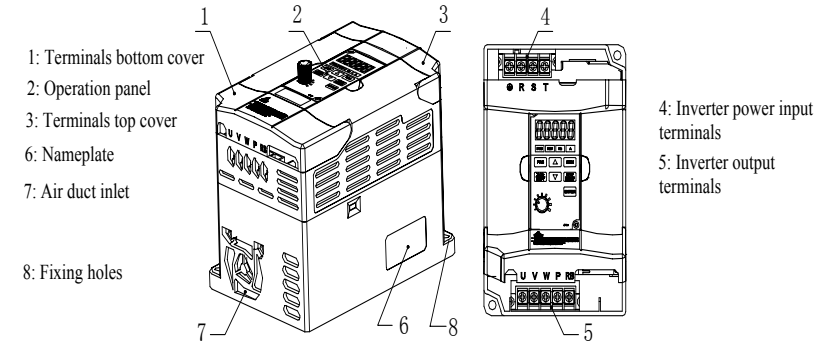
1) Note: when using the inverter, please follow its rated values strictly. Since the filter belongs to Classification I electric appliances, the metal enclosure of the filter and the metal ground of the installing cabinet shall be well earthed in a large area, and have good conduction continuity, otherwise there may be danger of electric shock and the EMC effect may be greatly affected. Through the EMC test, it is found that the filter ground end and the PE end of the inverter must be connected to the same public earth end, otherwise the EMC effect may be greatly affected.

2) The filter shall be installed at a place close to the input end of the power supply as much as possible.

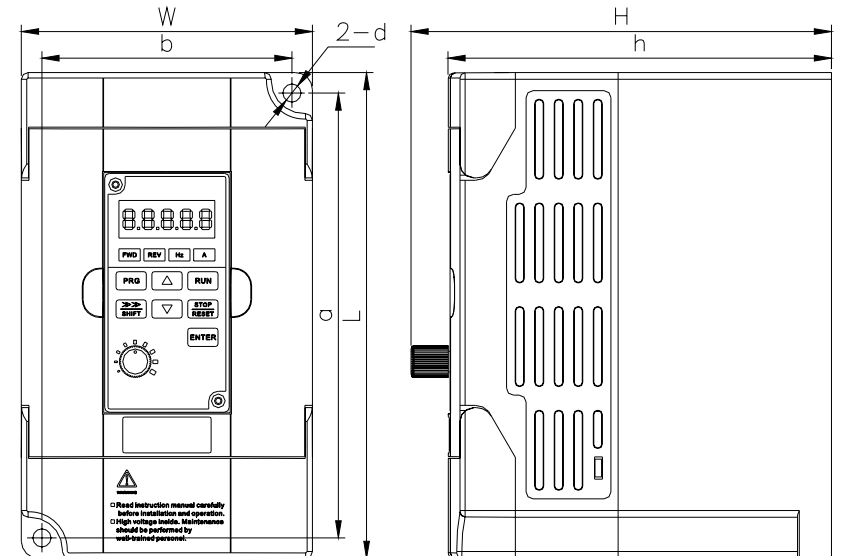
Chapter 7 Dimensions

7-1. Dimensions

7-1-1. Appearance and installation holes size

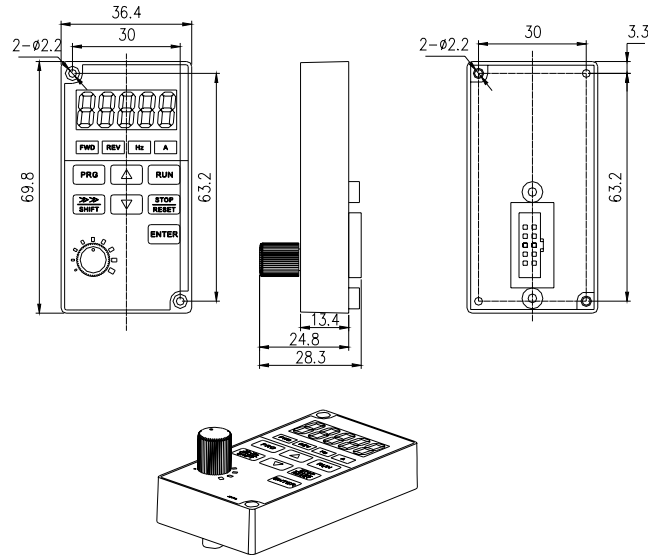


7-1-2. CA SERIES



Base No.	Power supply level	Type	Power (kW)	Dimensions(mm)				Installation Size(mm)			Approximate weight (kg)
				L	W	H	h	a	b	d	
1M2	Single phase 220V	G	0.4~0.75	142	85	122.8	112	130	73	φ 5.3	0.8
	Three phase 220V	G	0.4~0.75								
1M3	Single phase 220V	G	1.5~2.2	151.6	100.6	127.5	116.6	139.7	88.7	φ 5.3	1
	Three phase 220V	G	1.5~2.2								
	Three phase 380V	G	0.4~3.7								

7-1-3.Keyboard size diagram



Chapter 8 Maintenance and repair

8-1. Inspection and maintenance

During normal use of the inverter, in addition to routine inspections, the regular inspections are required (e.g. the overhaul or the specified interval, and the interval shall not exceed 6 months), please refer to the following table to implement the preventive measures.

	Check Date		Check Points	Check Items	Check to be done	Method	Criterion
	Routine	Regular					
√			Display	LED/OLED display	Whether display is abnormal or not	Visually check	As per use status
√	√		Cooling system	Fan	Whether abnormal noise or vibration exists or not	Visually and audibly check	No abnormal
√			Body	Surrounding conditions	Temperature, humidity, dust, and harmful gases	Visually check with smelling and feeling	As per Section 2-1
√			Input/output terminals	Voltage	Inputs, output voltage is abnormal	Test R, S, T and U, V, W terminals	As per standard specifications
		√	Main circuit	Overall	Whether these phenomenon of loose fastenings, overheat, discharging, much dust, or blocked air duct exist or not	Visually check, tighten and clean	No abnormal
				Electrolytic capacitance	Whether appearance is abnormal or not	Visually check	No abnormal
				Wire conductive row	Whether they are loose or not	Visually check	No abnormal
				Terminals	If screws or bolts are loose or not	Tighten	No abnormal

"√" means routine or regular check to be needed

Do not disassemble or shake the device gratuitously during check, and never unplug the connectors, otherwise the system will not run or will enter into fault state and lead to component failure or even damage to the main switching device such as IGBT module.

The different instruments may come to different measurement results when measuring. It is recommended that the pointer voltmeter shall be used for measuring input voltage, the rectifier voltmeter for output voltage, the clamp-on ammeter for input current and output current, and the electric wattmeter for power.

8-2.Parts for regular replacement

To ensure the reliable operation of inverter, in addition to regular care and maintenance, some internal mechanical wear parts (including cooling fan, filtering capacitor of main circuit for energy storage and exchange, and printed circuit board) shall be regularly replaced. Use and replacement for such parts shall follow the provisions of below table, also depend on the specific application environment, load and current status of inverter.

Name of Parts	Standard life time
Cooling fan	1 to 3 years
Filter capacitor	4 to 5 years
Printed circuit	5 to 8 years

8-3.Storage

The following actions must be taken if the inverter is not put into use immediately (temporary or long-term storage) after purchasing:

- ※ It should be stored at a well-ventilated site without damp, dust or metal dust, and the ambient temperature complies with the range stipulated by standard specification
- ※ If the time that the inverter is set aside exceeds one year, a charge test should be made so as to resume the performance of the filtering capacitor of main circuit. When charging, the voltage regulator can be used to slowly rise input voltage of the inverter until the rated input voltage, the charging time is 1 to 2 hours or more. The above test shall be performed at least once a year.
- ※ Voltage withstand test can not be arbitrarily implemented, it will reduce the life of inverter. Insulation test can be made with the 500-volt megger before using, the insulation resistance shall not be less than 4MΩ.

8-4.Capacitor

8-4-1.Capacitor rebuilt

- ※ If the frequency inverter hasn't been used for a long time, before using it please rebuilt the DC bus capacitor according the instruction. The storage time begins from delivery.

Time	Operation instruction
Less than 1 year	No need to recharge
Between 1~2 years	Before the first time to use, the frequency inverter must be recharged for one hour
Between 2~3years	Use adjustable power to charge the frequency inverter: --25% rated power 30 minutes, -- 50% rated power 30minutes,

	-- 75% rated power 30minutes, --Last 100% rated power 30minutes,
More than 3 years	Use adjustable power to charge the frequency inverter: --25% rated power 2hours, --50% rated power 2 hours, -- 75% rated power 2hours, -- Last 100% rated power 2hours.

Instruction of using adjustable power to charge the frequency inverter:

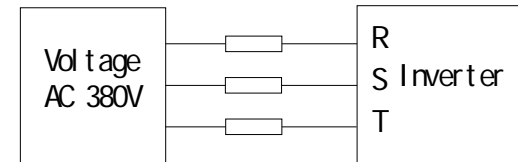
The adjustable power is decided by the frequency inverter input power, for the single phase/3 phase 220v frequency inverter, we use 220v AC/2A Regulator. Both single phase and three phase frequency inverter can be charged by single phase Power Surge(L+ connect R,N connects T) Because it is the same rectifier, so all the DC bus capacitor will be charged at the same time.

You should make sure the voltage(380v) of high voltage frequency inverter, because when the capacitor being charged it almost doesn't need any current, so small capacitor is enough(2A)

The instruction of using resistor(incandescent lights) to charge frequency inverters:

When charge the DC bus capacitor of drive system by connecting power directly, then the time should not be less than 60 minutes. The operation should be carried on under the condition of normal temperature and without load, and moreover ,should be added resistor in the power supply cycle.

380V drive system: use 1K/100W resistor. When the power is less than 380v, 100w incandescent lights is also suitable. When using incandescent lights, the lights will extinct or become very weak.



380V Drive equipment charging circuit example

8-5.Measuring and readings

- ※ If a general instrument is used to measure current, imbalance will exists for the current at the input terminal. generally, the deviation is not more than 10%, that is normal. If the deviation exceeds 30%, please inform the original manufacturer to replace rectifier bridge, or check if the deviation of three-phase input voltage is above 5V or not.

If a general multi-meter is used to measure three-phase output voltage, the reading is not accurate due to the interference of carrier frequency and it is only for reference.

Chapter 9 Warranty

The product quality shall comply with the following provisions (overseas market):

1. Warranty terms

1-1. The product from the ex-factory date, the warranty period of 18 months(except non-standard products), It is based on factory records.

1-2. The product from the ex-factory date. if the product appear quality problem within the normal operating range. we provide free warranty under 18 months.

1-3. The product from the ex-factory date, enjoy lifelong compensable service. If there is a contract, we will according to the priority principle of the contract.

2. Exceptions clause

If belongs to the quality problems caused by following reasons products, we provide compensable service even though under the warranty. we will charge a maintenance fee.

2-1. The user is not in accordance with the "products manual" is used method of operation caused the failure.

2-2. Users without permission to alteration or repair caused by product failure.

2-3. Users beyond the standard specifications require the use of the inverter caused by product failure.

2-4. Users to buy and then fell loss or damage caused by improper handling.

2-5. Because the user use adverse environment (such as: Humid environment, Acid and alkaline corrosion gas and so on) lead to product failure.

2-6. Due to the fault cause of earthquake, fire, lightning, wind or water disaster, abnormal voltage irresistible natural disasters.

2-7. Damaged during shipping ,but users are not rejected goods.

3. The following conditions, manufacturers have the right not to be warranty.

3-1. No product nameplate or product nameplate blurred beyond recognition.

3-2. Not according to the purchase contract agreement to pay the money.

3-3. For installation, wiring, operation, maintenance and other users can not describe the objective reality to the company's technical service center.

4. About the repair fee, according to our company latest price list as a standard.

5. When the products is broken, please complete the form and warranty card, shipping with the failure machine to our company.

6. Dalian TPG Technology Co.,Ltd reserve the right to explain the terms of the event.

Appendix I RS485 communication protocol

I-1.Introduction

CA SERIES inverter provides RS485 communication interface, uses international standard MODBUS communication protocol for the master-slave communication. User can use PC/PLC to control the host computer etc so as to achieve the centralized control (setting control command operating frequency of the inverter, modifying the relevant function code parameters, monitoring the inverter's operating status and fault message) to meet specific application requirements .

I-2.Details

1. Protocol content

This serial communication protocol defines the transmission information and use format in the series communication Including: master polling (or broadcast) format; master encoding method, and contents including: function code of action, transferring data and error checking. The response of slave also adopts the same structure, and contents including: action confirmation, returning the data and error checking etc. If slave takes place the error while it is receiving information or cannot finish the action demanded by master, it will send one fault signal to master as a response.

2. Application Method

The inverter will be connected into a “Single-master Multi-slave” PC/PLC control network with RS485 bus.

3. Bus structure

(1) Interface mode: RS485 hardware interface

(2) Transmission mode

Asynchronous series and half-duplex transmission mode. For master and slave,only one of them can send the data and the other only receives the data at the same time. In the series asynchronous communication, the data is sent out frame by frame in the form of message

(3) Topological structure

Single host machine system. The set range from the machine address is 1~247, 0 for the broadcast communication address. The slave address in the network must be

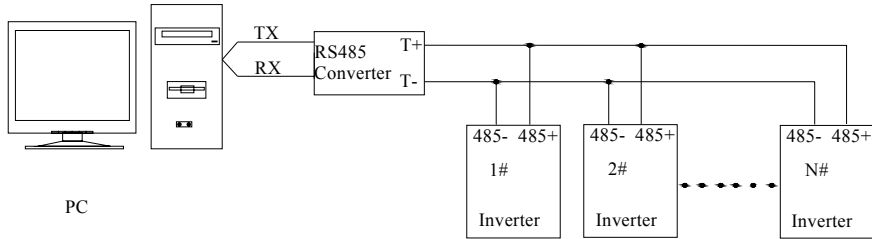
unique.

Single application

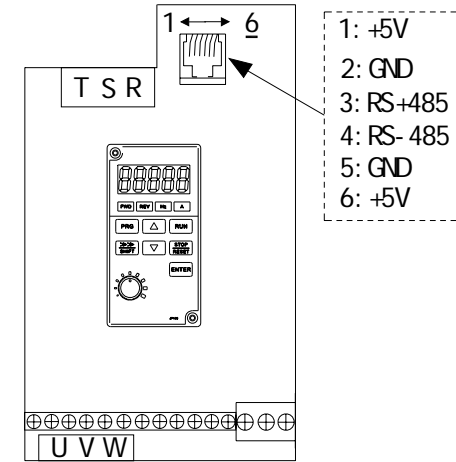
Figure I-3 single inverter and MODBUS set up the PC field wiring diagram.

Because computers are generally not with RS485 interface, so must the computer comes with RS232 interface or a USB interface through the converter conversion for RS485. A RS485 terminal to the 485+ port on the terminal board, the B of the RS485 terminal to the 485- port on the terminal board. Proposed as far as possible with shielded twisted pair. When the rs232-485 converter, computer RS232 interface and the RS232-RS485 converter RS232 interface is connected, line length should be as short as possible, not more than 15m proposal directly to the RS232-RS485 converter to plug it in computer. Similarly when using USB-RS485 converter, the line should be as short as possible.

When the line connected, PC computer choose the correct port (port RS232-RS485 converter, such as COM1) and basic parameters of the communication baud rate, data bits, parity is consistent with the frequency converter.



Note: because the terminal resistors is designed on the control board, 485 communication is not required for connecting external terminal resistors.



4. Protocol description

CA SERIES inverter communication protocol is a asynchronous serial master-slave communication protocol, in the network, only one equipment (master) can build a protocol (known as "Inquiry/Command") . Other equipment (slave) only can response the "Inquiry/Command"of master by providing data or perform the corresponding action according to the "Inquiry/Command"of master. Here, the master refers to a Personnel Computer (PC), an industrial control device or a programmable logic controller (PLC),etc. and the slave refers to CA SERIES inverter. Master can communicate with individual slave, also send broadcasting information to all the lower slaves. For the single "Inquiry/Command"of master, slave will return a signal (that is a response) to master; for the broadcasting information sent by master, slave does not need to feedback a response to master.

5. Communication data structure

MODBUS protocol communication data format of CA SERIES Inverter is divided into RTU (remote terminal unit) mode and ASCII (American Standard Code for Information International Interchange) mode.

(1) In RTU mode, each byte format is as follows:

in RTU mode, messages are sent at a silent interval of at least 3.5 characters. There are

diverse character intervals under network baud rate, which is easiest implemented (as shown in Figure T1-T2-T3-T4). The first field transmitted is the device address. The allowable characters for transmitting are hexadecimal 0 ... 9, A ... F. The networked devices continuously monitor network bus, including during the silent intervals. When the first field (the address field) is received, each device decodes it to find out if it is sent to their own. Following the last transmitted character, a silent interval of at least 3.5 characters marks the end of the message. A new message can begin after this silent interval. The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 1.5 characters occurs before completion of the frame, the receiving device will flush the incomplete message and assumes that the next byte will be the address field of a new message. Similarly, if a new message begins earlier than the interval of 3.5 characters following a previous message, the receiving device will consider it as a continuation of the previous message. This will result in an error, because the value in the final CRC field is not right.

RTU frame format:

Frame header START	T1-T2-T3-T4 (transmission time of 3.5-byte)
Slave address field ADDR	Address: 0 to 247 (decimal) (0 is the broadcast address)
Functional field CMD	03H: read slave parameters; 06H: write slave parameters
Data field DATA (N-1) ... DATA (0)	2*N bytes of data, the part is the main contents of communications, but also the data exchange core during communicating.
CRC CHK low-order	Detection value: CRC checksum (16BIT)
CRC CHK high-order	
Frame tail END	T1-T2-T3-T4 (transmission time of 3.5-byte)

(2) In ASCII mode, each byte format is as follows:

In ASCII mode, the frame header is ":" ("0x3A"), the default frame tail is "CRLF" ("0x0D" "0x0A"). In ASCII mode, in addition to header and trailer, the rest of all data bytes are sent in ASCII code, firstly sent the high 4 bytes, and then send the low 4 bytes. In ASCII mode, the length of data is eight bytes. For 'A' to 'F', the uppercase ASCII code is adopted. At this point the data adopts LRC parity, the parity covers slave's address and data. The sum of parity is equal to the complement of the character sum (discard the carry bit) of all data to be checked.

ASCII frame standard structure:

START	“:” (0x3A)
Address Hi	Address :8-bit address consists of 2 ASCII codes
Address Lo	
Function Hi	Function code :8-bit address consists of 2 ASCII codes

Function Lo	
DATA (N-1) ... DATA (0)	Data Content: nx8-bit data consists of 2n combinations of ASCII code n <= 16, maximum 32 ASCII codes
LRC CHK Hi	LRC check code: 8-bit check code consists of 2 ASCII codes
LRC CHK Lo	
END Hi	Terminator: END Hi = CR (0x0D), END Lo = LF (0x0A)

CMD (Command) and DATA (Data word description) command code: 03H, read N words (Word) (up to 16 words can be read), such as: the starting address 0001 of inverter with slave address 01, which continuously read 2 consecutive messages of RTU master command .

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Start address high-order	F0H
Start address low-order	01H
Data number high-order	00H
Data number low-order	02H
CRC CHK low-order	CRC check value
CRC CHK high-order	
END	T1-T2-T3-T4

RTU slave responding information

F9.05 is set to 0:

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Byte number low-order	00H
Byte number high-order	04H
Data address 0001H high-order	13H
Data address 0001H low-order	88H
Data address 0002H high-order	00H
Data address 0002H low-order	00H
CRC CHK low-order	CRC check value
CRC CHK high-order	
END	T1-T2-T3-T4

When F9.05 is set to 1:

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Byte number	04H
Data address 0001H high-order	13H
Data address 0001H low-order	88H
Data address 0002H high-order	00H
Data address 0002H low-order	00H
CRC CHK low-order	CRC check value
CRC CHK high-order	
END	T1-T2-T3-T4

ASCII master command information

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘3’
Start address high-order	‘0’
	‘0’
Start address low-order	‘0’
	‘4’
Data number high-order	‘0’
	‘0’
Data number low-order	‘0’
	‘2’
LRC CHK Hi	‘F’
LRC CHK Lo	‘6’
END Hi	CR
END Lo	LF

ASCII slave responding information

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘3’
Byte number	‘0’
	‘4’
Data address 0004H high-order	‘1’
	‘3’

Data address 0004H low-order	‘8’
	‘8’
Data address 0005H high-order	‘1’
	‘3’
Data address 0005H low-order	‘8’
	‘8’
LRC CHK Hi	‘C’
LRC CHK Lo	‘2’
END Hi	CR
END Lo	LF

Parity mode - CRC mode: CRC (Cyclical Redundancy Check)

Use RTU frame format, the message includes error check field based on the CRC method. The CRC field checks the whole content of message. The CRC field has two bytes containing a 16-bit binary value. The CRC value calculated by the transmitting device will be added into to the message. The receiving device recalculates the value of the received CRC, and compares the calculated value to the actual value of the received CRC field, if the two values are not equal, then there is an error in the transmission.

The CRC firstly stores 0xFFFF and then calls for a process to deal with the successive eight-bit bytes in message and the value of the current register. Only the 8-bit data in each character is valid to the CRC, the start bit and stop bit, and parity bit are invalid. During generation of the CRC, each eight-bit character is exclusive OR (XOR) with the register contents separately, the result moves to the direction of least significant bit (LSB), and the most significant bit (MSB) is filled with 0. LSB will be picked up for detection, if LSB is 1, the register will be XOR with the preset value separately, if LSB is 0, then no XOR takes place. The whole process is repeated eight times. After the last bit (eighth) is completed, the next eight-bit byte will be XOR with the register's current value separately again. The final value of the register is the CRC value that all the bytes of the message have been applied.

When the CRC is appended to the message, the low byte is appended firstly, followed by the high byte. CRC simple functions is as follows:

```
unsigned int crc_chk_value (unsigned char *data_value, unsigned char length)
```

```

{
  unsigned int crc_value=0xFFFF;

  int i;
  while (length--)
  {
    crc_value^=*data_value++;

    for (i=0;i<8;i++)
    {
      if (crc_value&0x0001)
      {
        crc_value= ( crc_value>>1 ) ^0xa001;
      }
      else
      {
        crc_value=crc_value>>1;
      }
    }
  }
  return (crc_value) ;
}

```

Definition of communication parameter address

The section is about communication contents, it's used to control the operation, status and related parameter settings of the inverter. Read and write function-code parameters (Some functional code is not changed, only for the manufacturer use or monitoring) : the rules of labeling function code parameters address:

The group number and label number of function code is used to indicate the parameter address:

High byte: F0 to FB (F group), A0 to AF (E group), B0 to BF (B group), C0 to C7 (Y group), 70 to 7F (d group), low byte: 00 to FF

For example: address F3.01 indicates F301;

Note: L0 group parameters: neither read nor change; d group parameters: only read, not change.

Some parameters can not be changed during operation, but some parameters can not be changed regardless of the inverter is in what state. When changing the function code parameters, please pay attention to the scope, units, and relative instructions on the parameter.

Besides, due to EEPROM is frequently stored, it will reduce the life of EEPROM, therefore under the communication mode some function code do not need to be stored and you just change the RAM value.

If F group parameters need to achieve the function, as long as change high order F of the function code address to 0. If E group parameters need to achieve the function, as long as change high order F of the function code address to 4. The corresponding function code addresses are indicated below: high byte: 00 to 0F (F group), 40 to 4F (E group), 50 to 5F (B group), 60 to 67 (Y group), low byte: 00 to FF

For example:

Function code F3.01 can not be stored into EEPROM, address indicates as 0301; function code E3.05 can not be stored into EEPROM, address indicates as 4305; the address indicates that only writing RAM can be done and reading can not be done, when reading, it is invalid address. For all parameters, you can also use the command code 07H to achieve the function.

Stop/Run parameters section:

Parameter address	Parameter description
1000H	*Communication set value (-10000 to 10000) (Decimal)
1001H	Set speed
1002H	Bus voltage
1003H	Output voltage
1004H	Output current
1005H	Output power
1006H	Output torque
1007H	Running speed
1008H	Terminal input flag status
1009H	Terminal output flag status
100AH	Analog AI1 value
100BH	Analog AI2 value
100CH	Reserved
100DH	Reserved
100EH	Reserved
100FH	Reserved
1010H	PID setting value
1011H	PID feedback value
1012H	Stage of multi-speed
1013H	Reserved
1014H	Reserved
1015H	Torque direction (0: forward, 1: Reverse)

1016H	Device code
-------	-------------

The set value is the percentage of the relative value, 10000 corresponds to 100.00%, -10000 corresponds to -100.00%.

For frequency dimension data, it is the percentage of the maximum output frequency (F0.08) ; for torque dimension data, the percentage is F5.07 (torque upper limit digital setting) .

Control command is input to the inverter: (write only)

Command word address	Command function
2000H	0001H: Forward run
	0002H: Reverse run
	0003H: Forward Jog
	0004H: Reverse Jog
	0005H: Free stop (emergency stop)
	0006H: Stop
	0007H: Fault reset
	0008H: Jog Stop

Inverter read status: (read-only)

Status word address	Status word function
3000H	0001H: Forward running
	0002H: Reverse running
	0003H: Inverter is in standby
	0004H: Fault is happening

Parameter lock password verification: (If the return code is 8888H, it indicates that password verification is passed)

Password address	Enter password
1F00H	*****

Parameter lock command: (write only)

Lock password command address	Lock password command content
1F01H	55AAH

Inverter fault description:

Inverter fault address:	Fault code	Inverter fault information:
8000H		0000: No fault
	E.oUt1	0001: Output phase loss
	E.oUt2	0002: Retain
	E.oUt3	0003: Factory setting time
	E.oC1	0004: Acceleration overcurrent
	E.oC2	0005: Deceleration overcurrent
	E.oC3	0006: Constant speed overcurrent
	E.oU1	0007: Acceleration overvoltage
	E.oU2	0008: Deceleration overvoltage
	E.oU3	0009: Constant speed overvoltage
	E.LU	000A: Bus undervoltage fault
	E.oL1	000B: Motor Overload
	E.oL2	000C: Inverter overload
	E.oH2	0010: Inverter module overheating fault
	E.SET	0011: External fault
	E.CE	0012: Communication fault
E.oCC	0013: Current detection fault	
E.TE	0014: Motor auto tuning fault	
E.EEP	0015: EEPROM operation fault	
E.PId	0016: PID disconnection fault	

Data on communication failure information description (fault code) :

Communication fault message (fault code) : when the slave device responds, function code field and fault address are used to indicate whether it is a normal response (correct) or an error (called exception response) . If it is the normal response, the slave device will respond corresponding function code and data address or sub-function code. If it is the exception response, the slave device returns a code equivalent to the normal code, but the first position is the logic 1.

For example: a message sent from one master device to one slave device is required to read a set of inverter function code address data, it will produce the following function code: 00000011 (hexadecimal 03H), for the normal response, the slave device will respond the same function code. For the exception response, it returns: 10000011 (hexadecimal 83H) . In addition to the modification to function code for exception, the slave device will respond to a byte of exception code, which defines the reason for exception occurrence.

When the application program of master device gets a exception response, the typical handling process is to resend the message, or change corresponding fault command.

MODBUS Exception Code Table

MODBUS exception code		
Code	Name	Explanations
01H	Password error	The password written into by the password authentication

Warranty Card

MODBUS exception code		
Code	Name	Explanations
		address is different from the password set by user (y0.01) .
02H	Illegal data address	The request data address of host computer is disallowed; particular, the combination of register address and number of bytes transferred are invalid.
03H	Authentication error	When the CRC check bit of RTU format or the LRC check bit of ASCII format in the message sent from by host computer is different from the value sent by auxiliary computer, the authentication error message will be reported.
04H	Illegal function	When the received function code from the host computer is a disallowed operation; the slave in the wrong state may deal with such requests too.
05H	Illegal data value	When the received data field includes in the disallowed values. Note: it does not mean the register data item to be stored includes an value unexpected by application.
06H	Invalid parameter changes	In the write command parameter sent by the host computer, it includes data outside the scope of the parameter or the current state of write address is not available.
07H	System locked	When the host computer performs read or write command, if use has set password and unlocked the password, it will report that the system is locked.
08H	Auxiliary device busy	The inverter is busy (EPPROM is saving)

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第一章 檢查與安全注意事項

TPG Corp. 變頻器在出廠之前均已經過測試和品質檢驗。在購買後，請先檢查產品的包裝是否因運輸不慎而造成損傷；產品的規格、型號是否與訂購之機種相符。如有問題，請聯絡 TPG Corp. 各地經銷商，或直接與本公司聯繫。

1-1. 拆箱之後檢查

- ※ 檢查內部含本機、使用說明書一本、保修卡一張。
- ※ 檢查變頻調速器側面的銘牌，以確定在您手上的產品就是所訂購之產品。

1-1-1. 銘牌說明


變頻器型號	→	MODEL	CA-204A
適用功率	→	POWER	0.75kW
輸入電源規格	→	INPUT	AC 1PH 220V±10% 50Hz/60Hz
輸出電源規格	→	OUTPUT	AC 3PH 0~220V 4.0A 0~400Hz
條碼	→		
管制序號	→	ZPB1A0100001 Taiwan Precision Gear Corp. http://www.tpg-tw.com	

圖 1-1：銘牌說明

1-1-2. 型號說明

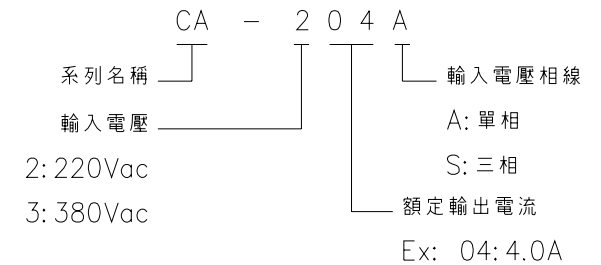




圖 1-2：型號說明

1-2. 安全事項

在本手冊中，安全注意事項分以下兩類：

-  危險：由於沒有按要求操作造成的危險，可能導致人身重傷，甚至死亡的情況
-  注意：由於沒有按要求操作造成的危險，可能導致中度傷害或輕傷，及設備損壞的情況

過程	安全事項類型	安全注意事項內容
安裝前	 危險	<ul style="list-style-type: none"> ★開箱時發現控制系統進水、部件缺少或有部件損壞時，請不要安裝！ ★裝箱單與實物名稱不符時，請不要安裝！ ★搬運時應該輕抬輕放，否則有損害設備的危險！ ★有損傷的驅動器或缺件的變頻器請不要使用。有受傷的危險！ ★不要用手觸及控制系統的元器件，否則有靜電損壞的危險！
	 危險	<ul style="list-style-type: none"> ★請安裝在金屬等阻燃的物體上；遠離可燃物。否則可能引起火警！ ★不可隨意擰動設備元件的固定螺栓，特別是帶有紅色標記的螺栓！
安裝時	 注意	<ul style="list-style-type: none"> ★不能讓導線頭或螺釘掉入驅動器中。否則引起驅動器損壞！ ★請將驅動器安裝在震動少，避免陽光直射的地方。 ★兩個以上變頻器置於同一個櫃子中時，請注意安裝位置，保證散熱效果。
	 危險	<ul style="list-style-type: none"> ★必須遵守本手冊的指導，由專業電氣工程人員施工，否則會出現意想不到的危險！ ★變頻器和電源之間必須有斷路器隔開，否則可能發生火警！ ★接線前請確認電源處於零能量狀態，否則有觸電的危險！ ★請按標準對變頻器進行正確規範接地，否則有觸電危險！ ★絕不能將輸入電源連接到變頻器的輸出端子(U、V、W)上。注意接線端子的標記，不要接錯線！否則引起驅動器損壞！ ★確保所配線路符合 EMC 要求及所在區域的安全標準。所用導線線徑請參考手冊的建議。否則可能發生事故！ ★接制動電阻時，必須將制動電阻接於變頻器 P、RB 端子之間。
上電前	 注意	<ul style="list-style-type: none"> ★請確認輸入電源的電壓等級是否和變頻器的額定電壓等級一致；電源輸入端子(R、S、T)和輸出端子(U、V、W)上的接線位置是否正確；並注意檢查與驅動器相連接的週邊電路中是否有短路現象，所連線路是否緊固，否則引起驅動器損壞！ ★變頻器的任何部分無須進行耐壓試驗，出廠時產品已作過此項測試。否則引起事故！
	 危險	<ul style="list-style-type: none"> ★變頻器必須蓋好蓋板後才能上電。否則可能引起觸電！ ★所有週邊配件的接線必須遵守本手冊的指導，按照本手冊所提供電路連接方法正確接線。否則引起事故！

上電後	 危險	<ul style="list-style-type: none"> ★上電後不要打開蓋板。否則有觸電的危險！ ★不要用濕手觸摸驅動器及周邊電路。否則有觸電危險！ ★不要觸摸變頻器的任何輸入輸出端子。否則有觸電危險！ ★上電初，變頻器自動對外部強電回路進行安全檢測，此時，絕不能觸摸驅動器 U、V、W 接線端子或電機接線端子，否則有觸電危險！ ★若需要進行參數辨識，請注意電機旋轉中傷人的危險。否則可能引起事故！ ★請勿隨意更改變頻器廠家參數。否則可能造成設備的損害！
	 危險	<ul style="list-style-type: none"> ★請勿觸摸散熱風扇及放電電阻以試探溫度。否則可能引起灼傷！ ★非專業技術人員請勿在運行中檢測信號。否則可能引起人身傷害或設備損壞！
運行中	 注意	<ul style="list-style-type: none"> ★變頻器運行中，應避免有東西掉入設備中。否則引起設備損壞！ ★不要採用接觸器通斷的方法來控制驅動器的啟停。否則引起設備損壞！
	 危險	<ul style="list-style-type: none"> ★請勿帶電對設備進行維修及保養。否則有觸電危險！ ★確認在變頻器電壓低於 AC36V 時才能對驅動器實施保養及維修，以斷電後兩分鐘為準。否則電容上的殘餘電荷對人會造成傷害！ ★沒有經過專業培訓的人員請勿對變頻器實施維修及保養。否則造成人身傷害或設備損壞！ ★更換變頻器後必須進行參數的設置，所有可插拔外掛程式必須在斷電情況下插拔！

1-3. 注意事項

序號	注意類型	注意事項內容
1	電機絕緣檢查	電機在首次使用、長時間放置後的再使用之前及定期檢查時，應做電機絕緣檢查，防止因電機繞組的絕緣失效而損壞變頻器。絕緣檢查時一定要將電機連線從變頻器分開，建議採用 500V 電壓型兆歐表，應保證測得絕緣電阻不小於 5M Ω。
2	電機的熱保護	若選用電機與變頻器額定容量不匹配時，特別是變頻器額定功率大於電機額定功率時，務必調整變頻器內電機保護相關參數值或在電機前加裝熱繼電器以對電機保護。
3	工作頻率以上運行	本變頻器可提供 0Hz~400Hz 的輸出頻率。若客戶需在 50Hz 以上運行時，請考慮機械裝置的承受力。
4	機械裝置的振動	變頻器在一些輸出頻率處，可能會遇到負載裝置的機械共振點，可通過設置變頻器內跳躍頻率參數來避開。
5	關於電動機發熱及雜訊	因變頻器輸出電壓是 PWM 波，含有一定的諧波，因此電機的溫升、雜訊和振動同工作頻率運行相比會略有增加。

序號	注意類型	注意事項內容
6	輸出側有壓敏器件或改善功率因數的電容的情況	變頻器輸出是 PWM 波，輸出側如安裝有改善功率因數的電容或防雷用壓敏電阻等，易引發變頻器瞬間過電流甚至損壞變頻器。請不要使用。
7	變頻器輸入、輸出端所用接觸器等開關器件	若在電源和變頻器輸入端之間加裝接觸器，則不允許用此接觸器來控制變頻器的啟停。一定需要用該接觸器控制變頻器啟停時，間隔不要小於一個小時。頻繁的充放電易降低變頻器內電容器的使用壽命。若輸出端和電機之間裝有接觸器等開關器件，應確保變頻器在無輸出時進行通斷操作，否則易造成變頻器內模組損壞。
8	額定電壓值以外的使用	不適合在手冊所規定的允許工作電壓範圍之外使用 CA 系列變頻器，易造成變頻器內器件損壞。如果需要，請使用相應的升壓或降壓裝置進行變壓處理。
9	三相輸入改成兩相輸入	不可將 CA 系列中三相變頻器改為兩相使用。否則將導致故障或變頻器損壞。
10	雷電衝擊保護	本系列變頻器內裝有雷擊過電流保護裝置，對於感應雷有一定的自我保護能力。對於雷電頻發處客戶還應在變頻器前端加裝保護。
11	海拔高度與降額使用	在海拔高度超過 1000m 的地區，由於空氣稀薄造成變頻器的散熱效果變差，有必要降額使用。此情況請向我公司進行技術諮詢。
12	一些特殊用法	如果客戶在使用時需用到本手冊所提供的建議接線圖以外的方法時，如共直流母線等，請向我公司諮詢。
13	變頻器的報廢時注意	主回路及電路板上電解電容焚燒時可能發生爆炸。塑膠件焚燒時會產生有毒氣體。請作為工業垃圾進行處理。
14	關於適用電機	<p>1) 標準適配電機為四極鼠籠式非同步感應電機。若非上述電機請一定按電機額定電流選配變頻器。</p> <p>2) 非變頻電機的冷卻風扇與轉子軸是同軸連接，轉速降低時風扇冷卻效果降低，因此，電機出現過熱的場合應加裝強排氣扇或更換為變頻電機；</p> <p>3) 變頻器已經內置適配電機標準參數，根據實際情況有必要進行電機參數辨識或修改缺省值以儘量符合實際值，否則會影響運行效果及保護性能；</p> <p>4) 由於電纜或電機內部出現短路會造成變頻器報警，甚至燒毀。因此，請首先對初始安裝的電機及電纜進行絕緣短路測試，日常維護中也需經常進行此測試。注意，做這種測試時務必將變頻器與被測試部分全部斷開。</p>

序號	注意類型	注意事項內容
15	其他	<p>1) 絕不可將交流電源接至變頻器輸出端 U、V、W 等端子。</p> <p>2) 送電前須固定面板並鎖好，以免因內部電容等元器件的不良而傷及人身安全。</p> <p>3) 在接通電源後，不可實施配線，檢查等作業。</p> <p>4) 本裝置在通電後，請勿接觸內部線路板及其元器件，以免觸電危險。</p> <p>5) 關閉電源，在鍵盤顯示熄滅後 5 分鐘之內，請勿觸摸機內電路板及任何零部件，且必須用儀錶確認機內電容已放電完畢，方可實施機內作業，否則有觸電的危險。</p> <p>6) 人體靜電會嚴重損壞內部 MOS 場效應電晶體等，未採取防靜電措施時，請勿用手觸摸印刷電路板及 IGBT 等內部器件，否則可能引起故障。</p> <p>7) 使用時，變頻器的接地端子(E 或 卄)請依國家電氣安全規定和其它有關標準正確、可靠的接地。請勿以拉開方式(斷電)停機，等電機運行停止後才可切斷電源。</p> <p>8) 符合 CE 標準須增加選購輸入濾波器附件。</p>

1-4. 使用範圍

- ※ 本變頻器僅適用於一般的工業三相交流非同步電動機。
- ※ 本變頻器只能用在本公司認可的場合，未經認可的使用環境可能導致火災、觸電、爆炸等事件。
- ※ 如果用於因變頻器失靈而可能造成人身傷亡的設備時(例如：運輸人員的升降設備、航空系統、安全設備等)，必須慎重處理，在這種情況下，請向廠家諮詢。

第二章 標準規範

2-1. 技術規格

變頻器型號	額定輸出功率 (kW)	額定輸入電流 (A)	額定輸出電流 (A)	適配電機功率 (kW)
輸入電壓單相 220V ± 10%				
CA-204A	0.75	8.2	4.0	0.75
CA-207A	1.5	14.0	7.0	1.5
CA-210A	2.2	23	10	2.2
輸入電壓三相 220V ± 10%				
CA-204S	0.75	5.3	4.0	0.75
CA-207S	1.5	8.0	7.0	1.5
CA-210S	2.2	11.8	10	2.2
輸入電壓三相 380V ± 10%				
CA-403S	0.75	4.3	2.5	0.75
CA-404S	1.5	5.0	3.8	1.5
CA-405S	2.2	5.8	5.1	2.2
CA-408S	3.7	10	8.5	3.7

注：220V 電壓等級制動單元可做為選配；380V 電壓等級制動單元做為標配，不可以做為選配。

2-2. 技術規範

項目		規範	
電源	電壓頻率等級	單相 220V, 50/60Hz 三相 220V, 50/60Hz 三相 380V, 50/60Hz	
	允許波動	電壓：±10%；頻率：±5% 電壓失平衡率小於 3%；畸變率滿足 IEC61800-2 標準	
控制性能	控制系統	基於 DSP 的高性能向量控制變頻器	
	輸出頻率	0.00~400.00Hz	
	控制方法	V/F 控制 開環磁通向量控制	
	自動轉矩提升功能	實現 V/F 控制方式下低頻率(1Hz)大輸出轉矩控制	
	頻率設定解析度	數字：0.01Hz 模擬：最高頻率×0.2%	
	V/F 曲線方式	線性，平方根多次冪，使用者自訂 V/F 曲線	
	超載能力	額定電流 150%—60s，額定電流 200%—1s	
	轉差補償	可進行轉差補償	
	載波頻率	1kHz~15kHz	
	啟動轉矩	0.5Hz/150%(開環磁通向量控制)	
	調速範圍	1：100(開環磁通向量控制)	
	穩速精度 (速度控制精度)	開環磁通向量控制：≤±0.5%(額定同步轉速)	
	轉矩回應	≤40ms (開環磁通向量控制)	
	轉矩提升	自動轉矩提升；手動轉矩提升0.1%~30.0%	
	加減速直線	直線加減速方式；2種加減速時間；加減速時間範圍 0.1s~3600.0s	
	直流制動	直流制動頻率：0.00Hz~最大輸出頻率 制動時間：0.0~50.0s 制動動作電流值：0.0%~150.0%	
	寸動控制	寸動頻率範圍：0.00Hz~最大輸出頻率； 寸動加減速時間：0.1s~3600.0s	
多段速運行	通過控制端子實現最多16段速運行		
內置 CAD	可方便實現程序控制閉環控制系統		
自動電壓調整 (AVR)	當電網電壓變化時，能自動保持輸出電壓恆定		
運行	輸入信號	運行方法	鍵盤/端子/通訊
		頻率設定	8 種頻率設定方式：數位給定、類比量電壓/電流給定、多段速給定、串列埠給定等
		啟動信號	正轉/反轉運行
		多段速度	最多可以設定 16 段速度(使用多功能端子)
		多段加速度	最多可以設定 2 段加速度(使用多功能端子)

		緊急停止	中斷控制器的輸出
		擺頻運行	程序控制運行
		寸動運行	慢速運行
		故障重置	當保護功能處於有效狀態時，可以自動或手動重置故障狀態。
		CAD 回饋信號	包括 DC 0~10V/0~20mA
	輸出信號	運行狀態	電機狀態顯示，正轉、反轉、程式運行狀態
		故障輸出	繼電器觸點容量 AC 250V/7A
		模擬輸出	1 路類比輸出，可以選擇頻率、電流、電壓等 9 種信號，輸出信號範圍在 DC 0~10V/0~20mA 內可任意設定
		輸出信號	2 路輸出信號，每路有 8 種信號可供選擇
	運行功能		限制頻率，回避頻率，轉差補償，反轉保護，自整定，CAD 控制
	直流電流制動		內置 CAD 調節制動電流，在不過流的前提下，保證足夠的制動轉矩
	運行命令通道		三種通道：操作面板給定、控制端子給定、串列通訊口給定。可通過多種方式切換
	頻率源		共有 8 種頻率源：數位給定、類比電壓給定、類比電流給定、多段速給定、串列埠給定。可通過多種方式切換
	輸入端子		5 個數位輸入端子，可相容有源 PNP 或 NPN 輸入方式。2 個模擬量輸入端子
輸出端子		一個數位式輸出端子（雙極性輸出），一個繼電器輸出端子，一個模擬輸出端子，分別可選 0~20mA/0~10V，可實現設定頻率、輸出頻率、轉速等物理量的輸出。 支援 0.1~10kHz 的方波信號輸出	
保護功能	變頻器保護		過壓保護，欠壓保護，過流保護，超載保護，過熱保護，過流失速保護，過壓失速保護，外部故障，通訊錯誤，CAD 回饋信號異常
	IGBT 溫度顯示		顯示當前 IGBT 溫度
	瞬間斷電再啟動		小於 15 毫秒：連續運行 大於 15 毫秒：自動檢測電機轉速，瞬間斷電再啟動
	轉速啟動追蹤方式		變頻器啟動時自動追蹤電機轉速
	參數保護功能		通過設定管理員密碼和解碼，保護變頻器參數
顯示	LED 鍵盤	運行信息	監視物件包括：運行頻率，設定頻率，輸出電流，直流母線電壓，輸出電壓，電機實際轉速，CAD 給定值，CAD 回饋值，輸入端子狀態，輸出端子狀態，類比量 A11 值，模擬量 A12 值，多段速當前段數，轉矩設定值等。
		錯誤	最多保存有 3 個錯誤資訊，可以查詢故障發生時刻的

		信息	故障類型、電壓、電流、頻率和端子狀態
		LED 顯示	顯示參數
通訊	RS485	按鍵鎖定	實現按鍵全部鎖定，以防止誤操作
		完全隔離的 RS485 通訊模組，實現與上位機聯網通訊	
環境		環境溫度	-10°C~40°C (環境溫度在 40°C~50°C，請降額使用)
		儲存溫度	-20°C~60°C
		環境濕度	小於 90 % RH，無水珠凝結
		振動	5.9m/s ² (=0.6g) 以下
		應用地點	室內，無日光照射或腐蝕性、爆炸性氣體及水蒸氣，無塵埃、可燃性氣體、油霧、水蒸汽、滴水或鹽份等
		海拔高度	低於 1000 公尺
		污染等級	2
		防護等級	IP20
產品標準	產品執行安規標準	IEC61800-5-1:2007	
標準	產品執行 EMC 標準	IEC61800-3:2005	
冷卻方法		強制風冷	

第三章 操作鍵盤

3-1. 操作鍵盤介紹

鍵盤的用途是控制 CA SERIES 變頻器、讀取狀態資料和調整參數。



圖 3-1：操作面板顯示

3-2. 鍵盤指示燈介紹

指示燈標誌	名稱	含義
狀態指示燈	FWD	正轉運行指示燈 燈亮時表示變頻器處於正轉運行狀態。
	REV	反轉運行指示燈 燈亮時表示變頻器處於反轉運行狀態。
	Hz	頻率指示燈 變頻器的頻率單位
	A	電流指示燈 變頻器的電流單位

LED 顯示符號與字元/數位的對應關係如下：

數碼顯示區	顯示字母	對應字母	顯示字母	對應字母	顯示字母	對應字母
	0	0	1	1	2	2
	3	3	4	4	5	5
	6	6	7	7	8	8
	9	9	A	A	b	B
	[C	d	d	E	E

F	F	H	H	I	I
L	L	N	N	n	n
o	o	P	P	r	r
S	S	t	t	U	U
T	T	.	.	-	-
y	y				

3-3. 操作面板按鍵說明

標誌	名稱	功能
PRG	參數設定/跳出鍵	* 進入第一級功能表參數修改狀態 * 退出功能項的資料修改 * 由子功能表或由功能項功能表退出到狀態顯示功能表
SHIFT	移位鍵	* 在停機顯示介面和運行顯示介面下，可迴圈選擇顯示參數；在修改參數時，可以選擇參數的修改位
▲	遞增鍵	* 資料或功能碼的遞增
▼	遞減鍵	* 資料或功能碼的遞減
RUN	運行鍵	* 在鍵盤操作方式下，用於運行操作
STOP/RESET	停止/重置鍵	* 運行狀態時，按此鍵可用於停止運行操作；故障報警狀態時，可用來重置操作，該鍵的特性由功能碼 F6.00 設定。
ENTER	確認鍵	* 逐級進入功能表畫面、設定參數確認。
Knob	鍵盤電位器	* F0.02 設為 3，鍵盤電位器設定運行頻率。
ENTER + SHIFT		同時按下兩個鍵即可鎖定或解鎖鍵盤按鍵。

3-4. 參數設定舉例

功能碼查看、修改方法說明

CA SERIES變頻器的操作面板採用三級功能表結構進行參數設置等操作。三級功能表分別為：功能參數組（一級功能表）→功能碼（二級功能表）→功能碼設定值（三級功能表）。操作流程如圖所示。

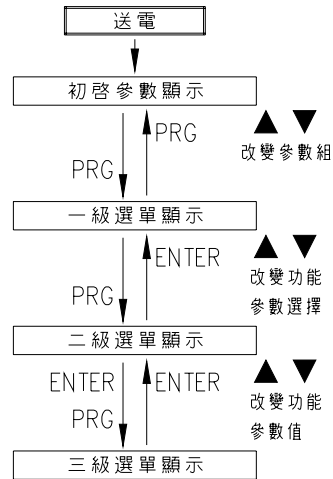
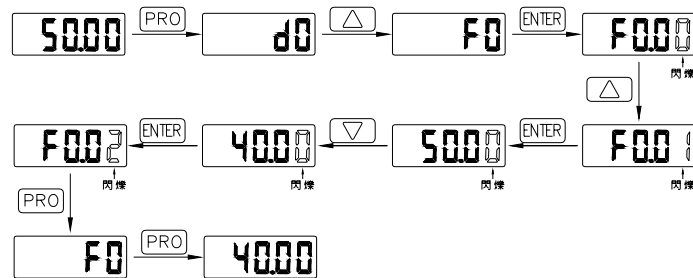


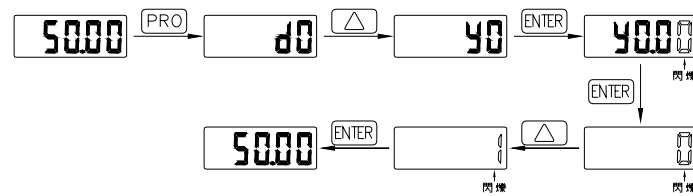
圖3-2：操作流程圖

說明：在三級功能表操作時，可按PRG鍵或ENTER鍵返回二級選單。兩者的區別是：按ENTER鍵將設定參數保存後返回二級功能表，並自動轉移到下一個功能碼；而按PRG鍵則直接返回二級功能表，不存儲參數，並返回到當前功能碼。

例1 將功能碼F0.01從50.00Hz更改為40.00Hz



例2 恢復出廠值



在第三級功能表狀態下，若參數沒有閃爍位，表示該功能碼不能修改，可能原因有：

- 1) 該功能碼為不可修改參數。如實際檢測參數、運行記錄參數等。
- 2) 該功能碼在運行狀態下不可修改，需停機後才能進行修改。

狀態參數的查看方法

在停機或運行狀態下，通過 SHIFT 移位元鍵可分別顯示多種狀態參數。參數顯示選擇由功能碼 F6.01(運行參數)、F6.02(停機參數)的來進行設定。

在停機狀態下，共有十種停機狀態參數可以選擇是否顯示，分別為：設定頻率、母線電壓、DI 輸入狀態、DO 輸出狀態、CAD 給定值、CAD 回饋值、類比輸入 AI1 電壓、類比輸入 AI2 電壓等，按鍵順序切換顯示選中的參數。

運行狀態下，共有 16 種運行狀態可以選擇是否顯示，分別為：運行頻率、設定頻率、母線電壓、輸出電壓、輸出電流、輸出功率、輸出轉矩、DI 輸入狀態、DO 輸出狀態、類比輸入 AI1 電壓、類比輸入 AI2 電壓、線速度、CAD 設定、CAD 回饋等是否顯示由功能碼 F6.01 按位元選擇，按鍵順序切換顯示選中的參數。變頻器斷電後再上電，顯示的參數被預設為變頻器斷電前選擇的參數。

3-4-1. 密碼設置

變頻器提供了使用者密碼保護功能，當 y0.01 設為非零時，即為使用者密碼，退出功能碼編輯狀態密碼保護即生效，再次按 PRG 鍵，將顯示“-----”，必須正確輸入使用者密碼，才能進入普通功能表，否則無法進入。

若要取消密碼保護功能，只有通過密碼進入，並將 y0.01 設為 0 才行。

3-4-2. 電機參數自學習

選擇向量控制運行方式，在變頻器運行前，必須準確輸入電機的銘牌參數，CA SERIES 變頻器據此銘牌參數匹配標準電機參數；向量控制方式對電機參數依賴性很強，要獲得良好的控制性能，必須獲得被控電機的準確參數。

電機參數自學習步驟如下(以非同步電機為例)：

首先將命令源選擇為鍵盤控制(F0.04=0)。然後請按電機實際參數輸入下面的參數(根據當前電機選擇)：

電機選擇	參數
電機	b0.00:電機類型選擇 b0.01:電機額定功率 b0.02:電機額定電壓 b0.03:電機額定電流 b0.04:電機額定頻率 b0.05:電機額定轉速

如果是電機不可和負載完全脫離，則 b0.11 請選擇 1(非同步電機參數靜止自學習)，然後按鍵盤面板上 RUN 鍵；

如果電機可和負載完全脫離，則 b0.11 請選擇 2(非同步電機參數全面自學習)，然後按鍵盤面板上 RUN 鍵，變頻器會自動算出電機的下列參數：

電機選擇	參數
電機	b0.06:非同步電機定子電阻 b0.07:非同步電機轉子電阻 b0.08:非同步電機定子、轉子電感 b0.09:非同步電機定子、轉子互感 b0.10:非同步電機空載電流

完成電機參數自學習。

第四章 安裝及試運行

4-1. 使用環境

- (1) 環境溫度-10°C~50°C。超過 40°C後，按照 1°C降額 3%的比例降額。
不建議在 50°C以上的環境中使用變頻器。
- (2) 防止電磁干擾、遠離干擾源。
- (3) 防止水滴、蒸汽、粉塵、灰塵、棉絮、金屬細粉的侵入。
- (4) 防止油、鹽及腐蝕性氣體侵入。
- (5) 避免震動。最大振幅不超過 5.9m/s (0.6g)。
- (6) 避免高溫多濕且無雨水滴淋，相對濕度小於 90%RH，不允許結露。在存在腐蝕性氣體的空間中，最大相對濕度不能超過 60%。
- (7) 海拔高度。
- (8) 禁止在易燃性、可燃性、爆炸性氣體、液體或固體的危險環境中使用。

4-2. 安裝方向與空間

變頻調速器應安裝於室內通風良好的場所，並採用壁掛式，且必須與周圍相鄰物品或擋板(牆)保持足夠的空間。如下圖所示：

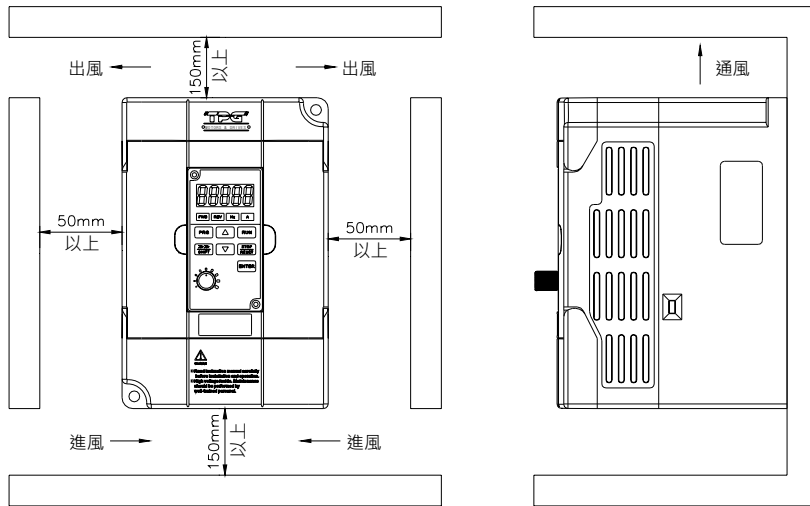


圖 4-1：安裝方向與空間

4-3. 配線圖

變頻器配線，分為主回路及控制回路兩部分。用戶必須依照下圖所示的配線回路正確連接。

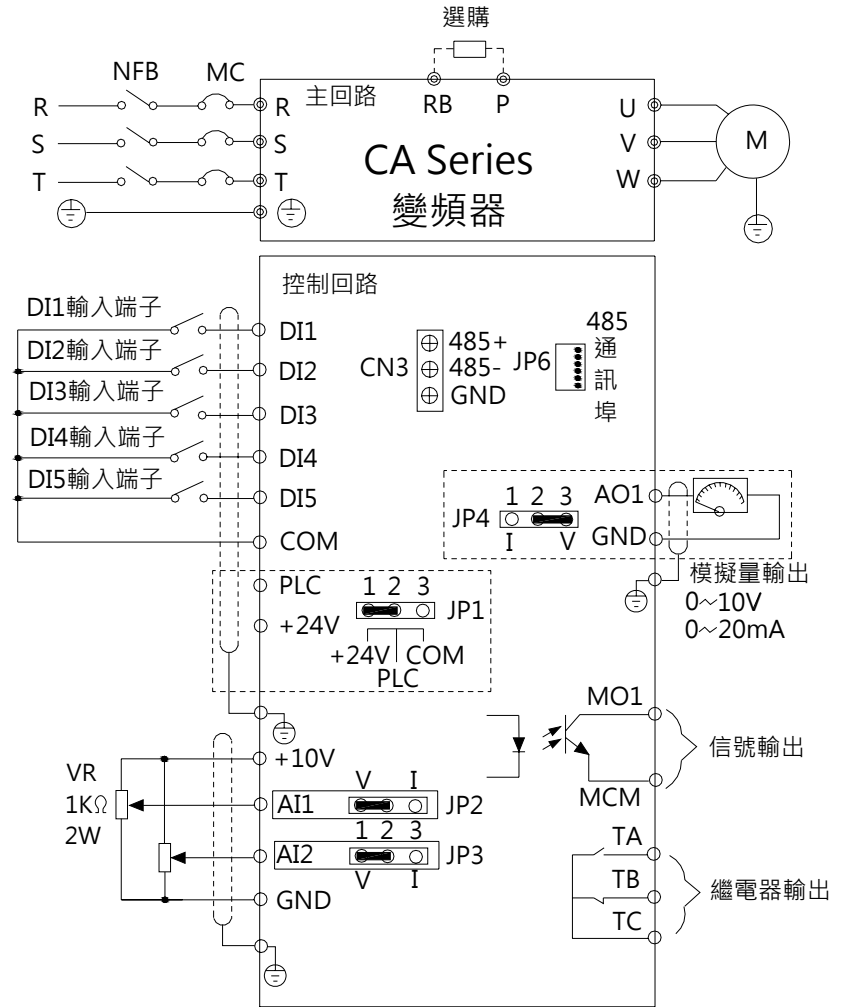


圖 4-2：配線圖

注：控制板 V6 版本及以上 485 通訊口為 CN3，V6 以下為 JP6 埠

4-4. 主回路端子

4-4-1. CA SERIES 主回路端子

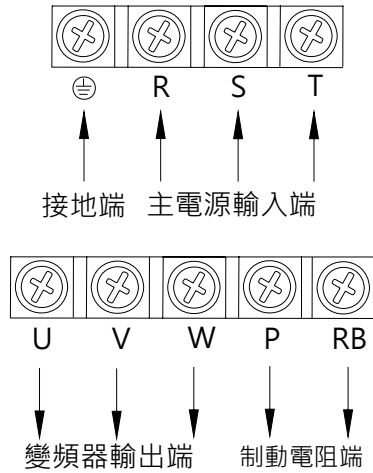


圖 4-3：主回路端子示意圖

4-4-2. 接線端子功能說明

端子	名稱	說明
R、S、T	變頻器輸入端	交流輸入電源電源連接點，單相接 S、T
⊕	接地端子	接地端子
P、RB	制動電阻連接端	接制動電阻
U、V、W	變頻器輸出端子	連接三相電動機

4-5. 控制回路端子

4-5-1. 控制回路端子說明

分類	端子符號	端子名稱	功能說明
電源	+10V、GND	外接+10V 電源	向外提供+10V 電源，最大輸出電流為：10mA 一般作用外接電位器工作電源，電位器阻值範圍：1kΩ~5 kΩ
	+24V、COM	外接+24V 電源	向外提供+24V 電源，一般用作數位輸入輸出端子工作電源和外接感測器電源 最大輸出電流：200mA
	PLC	外部電源輸入端子	利用外部信號驅動時，請將 JP1 跳線拔掉，PLC 需與外部電源連接，出廠默認與+24V 連接

模擬輸入	A11、GND	模擬量輸入端子 1	1、輸入範圍：DC 0V~10V/0~20mA，由控制板上的 JP2 跳線選擇決定。 2、輸入阻抗：電壓輸入時 25.5kΩ，電流輸入時 500Ω。
	A12、GND	模擬量輸入端子 2	1、輸入範圍：DC 0V~10V/0~20mA，由控制板上的 JP3 跳線選擇決定。 2、輸入阻抗：電壓輸入時 25.5kΩ，電流輸入時 500Ω。
數位輸入	DI1~DI5	多功能數位端子	1、光耦隔離，相容雙極性輸入 2、輸入阻抗：3.3kΩ 3、電平輸入時電壓範圍：9V~30V，由控制板上 JP1 跳線選擇決定。
模擬輸出	AO1、GND	模擬輸出端子 1	由控制板上的 JP4 跳線選擇決定電壓或電流輸出。輸出電壓範圍：0V~10V 輸出電流範圍：0mA~20mA
數位輸出	MO1、MCM	輸出信號 1	輸出開路集電極信號 MO1，公共端子為 MCM。輸出電壓範圍：0~24V，輸出電流範圍：0~50mA
繼電器輸出	TA/TB/TC	輸出信號 2	繼電器輸出，TA 常開，TB 常閉，TC 公共端，輸出功能由 F2.03 設定。觸點容量為：7A/AC250V

4-5-2. 控制回路端子排列

1. CA SERIES MCB 板控制回路端子

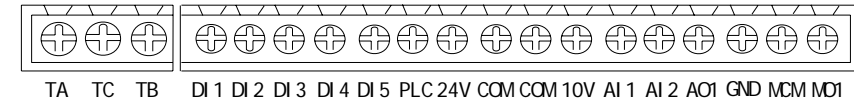


圖 4-4：CA SERIES 控制回路端子

4-6. 接線注意事項

- ※ 在變頻器 U、V、W 輸出端不可以加裝進相電容或阻容吸收裝置。拆換電機時，必須切斷變頻器輸入電源。
- ※ 接線時請勿將金屬碎末或線頭落入變頻器內，否則變頻器可能因此產生故障。
- ※ 在變頻器停止輸出時方可切換電機或進行電源工作頻率的切換。
- ※ 為儘量減少電磁干擾的影響，當使用的電磁接觸器及繼電器等離變頻器較近時，應考慮加裝浪湧吸收裝置。
- ※ 變頻器的外部控制線須加隔離裝置或採用遮罩線。
- ※ 輸入指令信號連線除遮罩外還應單獨走線，最好遠離主回路接線。
- ※ 載波頻率小於 3kHz 時，變頻器與電機間最大距離應在 50 米以內；載波頻率大於 4kHz 時，應適當減少此距離，此接線最好敷設於金屬管內。
- ※ 當變頻器加裝週邊設備（濾波器、電抗器等）時，應首先用 1000 伏兆歐表測量其對地絕緣電阻，保證不低於 4 兆歐。
- ※ 變頻器需較頻繁啟動的情況下，勿將電源關斷，必須使用控制端子或鍵盤或 RS485 運行指令作起停操作，以免損傷到整流橋。
- ※ 勿將交流輸入電源接到變頻器輸出端子 U、V、W。
- ※ 為防止意外事故發生，接地端子(⊕)必須可靠接地(接地阻抗應在 10 歐以

下)，否則會有漏電狀況發生。

- ※ 主回路配線時，配線線徑規格的選擇，請依照國家電工法規有關規定施行配線。
- ※ 電機容量應等於或小於變頻器容量。

4-7. 備用電路

在變頻器故障或跳脫時會引起較大的停機損失或其他意外故障。為儘量避免該情況發生，請增設下圖的電路備用以保安全。

注：備用電路須事先確認及測試運轉特性，確保電源工作頻率與變頻的相序一致。

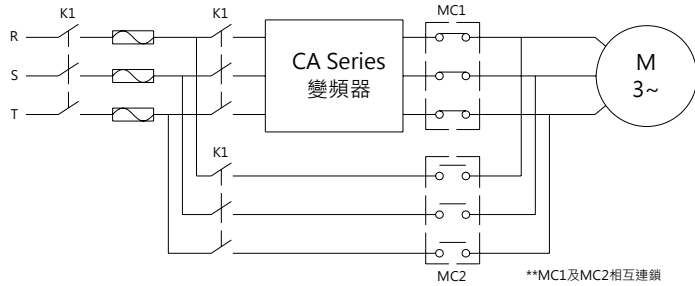


圖 4-5：備用電路電氣圖

4-8. 試運行

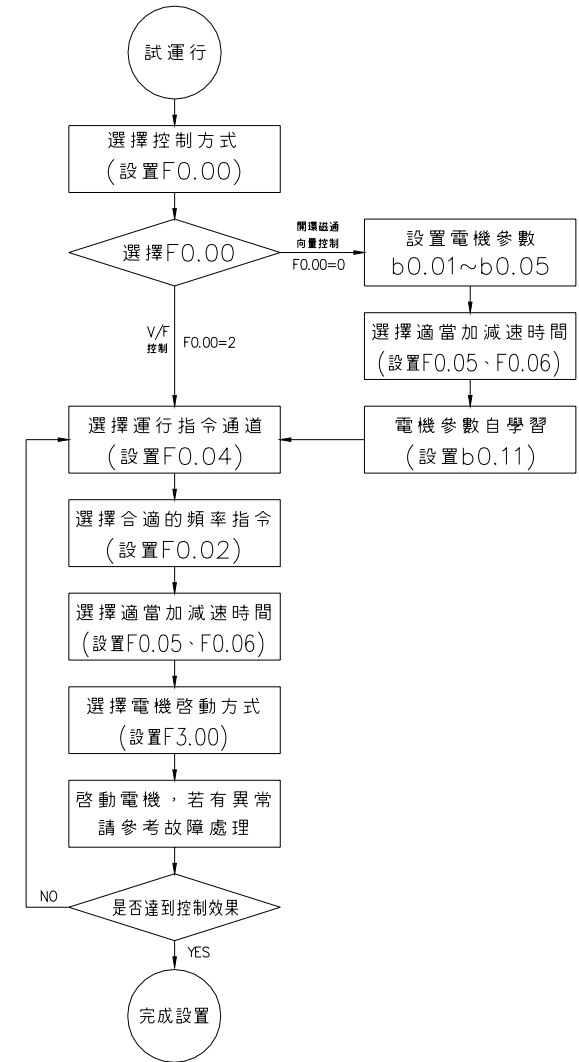


圖 4-6：試運行流程圖

- 將電源連接到變頻器之前，先確認交流輸入電源電壓在變頻器額定輸入電壓範圍之內。
- 將電源連接到變頻器 R，S，T 輸入端。
- 選擇適當的運轉控制方式。

第五章 功能參數說明

5-1. 選單分組

CA SERIES 變頻器的功能參數按功能分組，有 d0 組、F0 組~Fb 組、E0 組~E3 組、b0 組、y0 組~y1 組、L0 組，共有 21 組。每個功能組內包括若干功能碼。

F 組、E 組是基本功能參數，d 組是監視功能參數，b 組是電機參數。

為了更有效的進行參數保護，變頻器對功能碼提供了密碼保護。y0.01 設置參數保護密碼，在功能參數模式下，參數功能表必須在正確輸入密碼後才能進入。y0.01 設為 00000 時，取消密碼。

L0 組為廠家功能參數，用戶無權訪問該組參數。

功能表參數表中“更改”，更改屬性(即是否允許更改和更改條件)符號說明如下：

- “★”：表示該參數的設定值在變頻器處於運行狀態時，不可更改；
- “●”：表示該參數的數值是實際檢測記錄值，不能更改；
- “☆”：表示該參數的設定值在變頻器處於停機、運行狀態中，均可更改；
- “▲”：“廠家參數”，禁止用戶進行操作；
- “-”：表示該參數出廠值無或該值不確定。

代碼	參陣列名稱	功能描述
d0	監視功能組	監視頻率，電流等
F0	基本功能組	頻率設定，控制方式，加減速度時間等
F1	輸入端子組	類比、數位輸入功能
F2	輸出端子組	類比、數位輸出功能
F3	啟停控制組	啟動和停機的控制參數
F4	V/F 控制組	V/F 控制參數
F5	向量控制組	向量控制參數
F6	鍵盤與顯示組	按鍵及顯示功能參數設定
F7	協助工具組	寸動、頻率回避等協助工具參數設定
F8	故障與保護組	故障與保護參數設定
F9	通訊參數組	MODBUS通訊功能的設定
FA	轉矩控制組	轉矩控制方式下的參數設定
Fb	控制優化組	優化控制性能的參數設定
E0	擺頻控制組	擺頻功能的參數設定
E1	多段速控制組	多段速度設定

E2	CAD控制組	內置CAD參數設定
E3	虛擬DI、虛擬DO組	虛擬IO設定
b0	電機參數組	電機參數設定
y0	功能碼管理組	使用者密碼、參數初始化設定
y1	故障歷史查詢組	當前、前一次、前兩次故障資訊

5-1-1. d0 組 監視功能

序號	代碼	參數名稱	功能描述	最小單位	更改
0.	d0.00	運行頻率	變頻器當前的實際輸出頻率	0.01Hz	●
1.	d0.01	設定頻率	變頻器當前的實際設定頻率	0.01Hz	●
2.	d0.02	直流母線電壓	直流母線電壓的檢測值	1V	●
3.	d0.03	變頻器輸出電壓	變頻器的實際輸出電壓	1V	●
4.	d0.04	變頻器輸出電流	變頻器的實際輸出電流	0.1A	●
5.	d0.05	變頻器輸出功率	變頻器實際輸出功率	0.1kW	●
6.	d0.06	變頻器輸出轉矩	變頻器實際輸出轉矩百分比	1%	●
7.	d0.07	輸入端子狀態	輸入端子狀態	-	●
8.	d0.08	輸出端子狀態	輸出端子狀態	-	●
9.	d0.09	模擬量A11值	類比量A11輸入電壓值	0.01V	●
10.	d0.10	模擬量A12值	類比量A12輸入電壓值	0.01V	●
11.	d0.11	面板電位器電壓	面板電位器給定電壓值	0.01V	●
12.	d0.12	電機實際轉速	電機實際運行速度	1rpm	●
13.	d0.13	CAD給定值	CAD調節運行時的給定值百分比	1%	●
14.	d0.14	CAD回饋值	CAD調節運行時的回饋值百分比	1%	●
15.	d0.15	多段速當前段數	多段速當前段數	-	●
16.	d0.16	保留			
17.	d0.17	功率模組溫度	0~100.0°C	0.1°C	●
18.	d0.18	軟體版本	DSP軟體版本號	-	●
19.	d0.19	本機累積執行時間	0~65535h	1h	●

20.	d0.20	轉矩設定值	速度模式或轉矩控制模式時，觀察設定的指令轉矩	0.1%	●
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5-1-2. F0 組 基本功能

序號	代碼	參數名稱	設定範圍	出廠值	更改
21.	F0.00	控制模式	0：開環磁通向量控制 1：保留；2：V/F控制；3：轉矩控制	2	★
22.	F0.01	鍵盤設定頻率	0.00Hz~F0.08(最大輸出頻率)	50.00Hz	☆
23.	F0.02	頻率指令選擇	0：鍵盤設定 1：模擬量AI1設定 2：模擬量AI2設定 3：面板電位器設定 4：AI1+ AI2設定 5：多段速運行設定 6：CAD控制設定 7：遠端通訊設定	0	★
24.	F0.03	鍵盤及端子UP/DOWN設定	0：有效，且變頻器斷電存儲 1：有效，且變頻器斷電不存儲 2：UP/DOWN設定無效 3：運行時設置有效，停機時不存儲	0	☆
25.	F0.04	命令源通道	0：鍵盤指令通道 1：端子指令通道 2：通訊指令通道	0	★
26.	F0.05	加速時間1	0.1~3600.0s	機型確定	☆
27.	F0.06	減速時間1	0.1~3600.0s	機型確定	☆
28.	F0.07	載波頻率設定	1.0~15.0kHz	機型確定	☆
29.	F0.08	最大輸出頻率	10.00~400.00Hz	50.00Hz	★
30.	F0.09	上限頻率設定源選擇	0：鍵盤設定(F0.10) 1：模擬量AI1設定 2：模擬量AI2設定 3：多段速設定 4：遠端通訊設定 注：選項1~4，設定100%對應最大輸出頻率	0	★

31.	F0.10	運行頻率上限	F0.11~F0.08(最大輸出頻率)	50.00Hz	☆
32.	F0.11	運行頻率下限	0.00Hz~F0.10(運行頻率上限)	0.00Hz	☆
33.	F0.12	運行方向選擇	0：默認方向運行 1：相反方向運行 2：禁止反轉運行	0	★
34.	F0.13	AVR功能選擇	0：無效 1：全程有效 2：只在減速時無效	1	☆

5-1-3. F1 組 輸入端子

序號	代碼	參數名稱	設定範圍	出廠值	更改
35.	F1.00	DI1端子功能選擇	0：無功能	1	★
36.	F1.01	DI2端子功能選擇	1：正轉運行 2：反轉運行	2	★
37.	F1.02	DI3端子功能選擇	3：三線式運行控制 4：正轉寸動	0	★
38.	F1.03	DI4端子功能選擇	5：反轉寸動	9	★
39.	F1.04	DI5端子功能選擇	6：頻率設定遞增(UP) 7：頻率設定遞減(DOWN)	4	★
40.	F1.05	保留	8：自由停車 9：故障重置 10：外部故障輸入 11：頻率增減設定清除 12：多段速端子1 13：多段速端子2 14：多段速端子3 15：多段速端子4 16：加減速時間選擇 17：控制命令切換端子 18：加減速禁止 19：CAD控制暫停 20：擺頻暫停(停在當前頻率) 21：擺頻重置(回到中心頻率) 22：轉矩控制禁止 23：頻率增減設定暫時清除 24：停機直流制動		
41.	F1.06	端子控制運行模式	0：兩線式控制1 1：兩線式控制2 2：三線式控制1	0	★

			3：三線式控制2		
42.	F1.07	端子UP/DOWN頻率 增量變化率	0.01~50.00Hz/s	0.50Hz/s	☆
43.	F1.08	A11下限值	0.00V~F1.10	0.00V	☆
44.	F1.09	A11下限對應設定	-100.0%~100.0%	0.0%	☆
45.	F1.10	A11上限值	F1.08~10.00V	10.00V	☆
46.	F1.11	A11上限對應設定	-100.0%~100.0%	100.0%	☆
47.	F1.12	A11輸入濾波時間	0.00s~10.00s	0.10s	☆
48.	F1.13	A12下限值	0.00V~F1.15	0.00V	☆
49.	F1.14	A12下限對應設定	-100.0%~100.0%	0.0%	☆
50.	F1.15	A12上限值	F1.13~10.00V	10.00V	☆
51.	F1.16	A12上限對應設定	-100.0%~100.0%	100.0%	☆
52.	F1.17	A12輸入濾波時間	0.00s~10.00s	0.10s	☆
53.	F1.18	開關量濾波次數	1~10	5	☆
54.	F1.19	DI端子模式選擇	0x000~0x1FF	000	★
55.	F1.20~ F1.24	保留			
56.	F1.25	DI1延遲時間	0.0~3600s	0	★
57.	F1.25	DI2延遲時間	0.0~3600s		★
58.	F1.25	DI3延遲時間	0.0~3600s		★

5-1-4. F2組 輸出端子

序號	代碼	參數名稱	設定範圍	出廠值	更改
59.	F2.00	MO1輸出選擇	0：無輸出	1	☆
60.	F2.01	保留	1：電機正轉運行中 2：電機反轉運行中		
61.	F2.02	保留	3：故障輸出		
62.	F2.03	繼電器輸出選擇	4：頻率水準檢測FDT輸出 5：頻率到達 6：零速運行中 7：上限頻率到達 8：下限頻率到達	1	☆

63.	F2.04	A01輸出選擇	0：運行頻率 1：設定頻率 2：輸出電流 3：輸出轉矩 4：輸出功率 5：輸出電壓 6：模擬A11輸入值 7：模擬A12輸入值 8：運行轉速 9~10：保留	0	☆
64.	F2.05	A01輸出下限	0.0%~F2.07	0.0%	☆
65.	F2.06	下限對應A01輸出	0.00V~10.00V	0.00V	☆
66.	F2.07	A01輸出上限	F2.05~100.0%	100.0%	☆
67.	F2.08	上限對應A01輸出	0.00V~10.00V	10.00V	☆
68.	F2.09	MO1開通延時時間	0.0~3600s	0.0s	☆
69.	F2.10	MO1斷開延時時間	0.0~3600s	0.0s	☆
70.	F2.11	繼電器開通延時時間	0.0~3600s	0.0s	☆
71.	F2.12	繼電器斷開延時時間	0.0~3600s	0.0s	☆
72.	F2.13	保留			
73.	F2.14	DO 端子有效狀態選擇	0x00~0x1F	00	☆
74.	F2.15	MO1輸出類型選擇	0：脈衝輸出； 1：開關量輸出	1	☆
75.	F2.16	MO1脈衝輸出選擇	0：運行頻率 1：設定頻率 2：輸出電流 3：輸出轉矩 4：輸出功率 5：輸出電壓 6：模擬A11輸入值 7：模擬A12輸入值 8：運行轉速 9~10：保留	0	☆
76.	F2.17	MO1脈衝輸出下限	0.0%~F2.19	0.0%	☆
77.	F2.18	下限對應MO1脈衝輸出	0.1~10kHz	0.0kHz	☆

78.	F2.19	MO1脈衝輸出上限	F2.17~100%	100%	☆
79.	F2.20	上限對應MO1脈衝輸出	0.1~10kHz	10kHz	☆

5-1-5. F3 組 啟停控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
80.	F3.00	啟動運行方式	0：直接啟動 1：轉速追蹤再啟動 2：先直流制動再啟動	0	★
81.	F3.01	啟動開始頻率	0.00~10.00Hz	0.00Hz	☆
82.	F3.02	啟動頻率保持時間	0.0~50.0s	0.0s	★
83.	F3.03	啟動前制動電流	0.0~150.0%	0.0%	★
84.	F3.04	啟動前制動時間	0.0~50.0s	0.0s	★
85.	F3.05	停機方式選擇	0：減速停車； 1：自由停車	0	☆
86.	F3.06	停機制動開始頻率	0.00~F0.08(最大輸出頻率)	0.00Hz	☆
87.	F3.07	停機制動等待時間	0.0~50.0s	0.0s	☆
88.	F3.08	停機直流制動電流	0.0~150.0%	0.0%	☆
89.	F3.09	停機直流制動時間	0.0~50.0s	0.0s	☆

5-1-6. F4 組 V/F 控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
90.	F4.00	V/F曲線設定	0:直線V/F曲線 1:多點V/F曲線 2:平方V/F曲線 3:1.25次V/F曲線 4:1.75次V/F曲線	0	★
91.	F4.01	轉矩提升	0.0%：自動轉矩提升 0.1%~30.0%	0.0%	☆
92.	F4.02	轉矩提升截止	0.0%~50.0%(相對電機額定頻率)	20.0%	★
93.	F4.03	V/F頻率點1	0.00Hz~F4.05	0.00Hz	★
94.	F4.04	V/F電壓點1	0.0%~100.0%	0.0%	★
95.	F4.05	V/F頻率點2	F4.03~F4.07	0.00Hz	★
96.	F4.06	V/F電壓點2	0.0%~100.0%	0.0%	★

97.	F4.07	V/F頻率點3	F4.05~b0.04(電機額定頻率)	0.00Hz	★
98.	F4.08	V/F電壓點3	0.0%~100.0%	0.0%	★
99.	F4.09	V/F轉差補償限定	0.0~200.0%	0.0%	☆

5-1-7. F5 組 向量控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
100.	F5.00	速度環比例增益1	0~100	20	☆
101.	F5.01	速度環積分時間1	0.01~10.00s	0.50s	☆
102.	F5.02	切換低點頻率	0.00Hz~F5.05	5.00Hz	☆
103.	F5.03	速度環比例增益2	0~100	15	☆
104.	F5.04	速度環積分時間2	0.01~10.00s	1.00	☆
105.	F5.05	切換高點頻率	F5.02~F0.08(最大輸出頻率)	10.00Hz	☆
106.	F5.06	VC轉差補償係數	50~200.0%(變頻器額定電流)	100%	☆
107.	F5.07	轉矩上限設定	0.0~200%	150%	☆

5-1-8. F6 組 鍵盤與顯示

序號	代碼	參數	設定範圍	出廠值	更改
108.	F6.00	STOP/RESET 鍵 停機功能選擇	0：只對面板控制有效 1：對面板和端子控制同時有效 2：對面板和通訊控制同時有效 3：對所有控制模式均有效	3	☆
109.	F6.01	運行狀態顯示的參數選擇	0~0xFFFF BIT0：運行頻率 BIT1：設定頻率 BIT2：母線電壓 BIT3：輸出電壓 BIT4：輸出電流 BIT5：運行轉速 BIT6：輸出功率 BIT7：輸出轉矩 BIT8：CAD給定值 BIT9：CAD回饋值 BIT10：輸入端子狀態 BIT11：輸出端子狀態 BIT12：模擬量A11值	03FF	☆

			BIT13：模擬量A12值 BIT14：多段速當前段數 BIT15：轉矩設定值		
110.	F6.02	停機狀態顯示的參數選擇	1~0x3FF BIT0：設定頻率 BIT1：母線電壓 BIT2：輸入端子狀態 BIT3：輸出端子狀態 BIT4：CAD給定值 BIT5：CAD回饋值 BIT6：模擬量A11值 BIT7：模擬量A12值 BIT8：多段速當前段數 BIT9：轉矩設定值 BIT10~ BIT15:保留	OFF	☆
111.	F6.03	轉速顯示係數	0.1~999.9%	100.0%	☆

5-1-9. F7 組 協助工具

序號	代碼	參數名稱	設定範圍	出廠值	更改
112.	F7.00	寸動運行頻率	0.00~F0.08(最大輸出頻率)	5.00Hz	☆
113.	F7.01	寸動運行加速時間	0.1~3600.0s	機型確定	☆
114.	F7.02	寸動運行減速時間	0.1~3600.0s	機型確定	☆
115.	F7.03	加速時間2	0.1~3600.0s	機型確定	☆
116.	F7.04	減速時間2	0.1~3600.0s	機型確定	☆
117.	F7.05	跳躍頻率	0.00~F0.08(最大輸出頻率)	0.00Hz	☆
118.	F7.06	跳躍頻率幅度	0.00~F0.08(最大輸出頻率)	0.00Hz	☆
119.	F7.07	加減速過程中跳躍頻率是否有效	0：無效 1：有效	0	☆
120.	F7.08	正反轉靜區時間	0.0~3600.0s	機型確定	☆
121.	F7.09	上電端子運行保護選擇	0：上電時端子運行命令無效 1：上電時端子運行命令有效	0	☆
122.	F7.10	FDT電平檢測值	0.00~ F0.08(最大輸出頻率)	50.00Hz	☆
123.	F7.11	FDT滯後檢測值	0.0~100.0%(FDT電平)	5.0%	☆

124.	F7.12	頻率到達檢出幅度	0.0~100.0%(設定頻率)	0.0%	☆
125.	F7.13	制動閥值電壓	115.0~140.0%(標準母線電壓)--電壓等級220V	120.0%	☆
			115.0~140.0%(標準母線電壓)--電壓等級380V	130.0%	

5-1-10. F8 組 故障與保護

序號	代碼	參數名稱	設定範圍	出廠值	更改
126.	F8.00	自動限流水平	100~200%	160%	☆
127.	F8.01	限流時頻率下降率	0.00~100.00Hz/s	10.00Hz/s	☆
128.	F8.02	限流動作選擇	0：限流一直有效 1：限流恆速時無效	0	☆
129.	F8.03	電機超載保護選擇	0：不保護 1：普通電機(帶低速補償) 2：變頻電機(不帶低速補償)	2	★
130.	F8.04	電機超載保護電流	20.0%~120.0%(電機額定電流)	100.0%	☆
131.	F8.05	過壓失速保護	0：禁止 ;1：允許	0	☆
132.	F8.06	過壓失速保護電壓	110~150%(220V系列)	115%	☆
			110~150%(380V系列)	130%	
133.	F8.07	故障自動重置次數	0~3	0	☆
134.	F8.08	故障自動重置間隔時間設置	0.1~100.0s	1.0s	☆
135.	F8.09	瞬間斷電降頻點	70.0~110.0%(標準母線電壓)	80.0%	☆
136.	F8.10	瞬間斷電頻率下降率	0.00Hz/s~F0.08(最大輸出頻率)	0.00Hz/s	☆

5-1-11. F9 組 通訊參數

序號	代碼	參數名稱	設定範圍	出廠值	更改
137.	F9.00	通訊串列傳輸速率設置	0：1200bps 1：2400bps 2：4800bps 3：9600bps 4：19200bps 5：38400bps	3	☆

138.	F9.01	資料位元校驗設置	0:無校驗(N, 8, 1) for RTU 1:偶校驗(E, 8, 1) for RTU 2:奇數同位檢查(0, 8, 1) for RTU 3:無校驗(N, 8, 2) for RTU 4:偶校驗(E, 8, 2) for RTU 5:奇數同位檢查(0, 8, 2) for RTU 6:無校驗(N, 7, 1) for ASCII 7:偶校驗(E, 7, 1) for ASCII 8:奇數同位檢查(0, 7, 1) for ASCII 9:無校驗(N, 7, 2) for ASCII 10:偶校驗(E, 7, 2) for ASCII 11:奇數同位檢查(0, 7, 2) for ASCII 12:無校驗(N, 8, 1) for ASCII 13:偶校驗(E, 8, 1) for ASCII 14:奇數同位檢查(0, 8, 1) for ASCII 15:無校驗(N, 8, 2) for ASCII 16:偶校驗(E, 8, 2) for ASCII 17:奇數同位檢查(0, 8, 2) for ASCII	1	☆
139.	F9.02	本機通訊位址	1~247, 0為廣播地址	1	☆
140.	F9.03	通訊應答延時	0~200ms	5ms	☆
141.	F9.04	通訊超時故障時間	0.0(無效); 0.1~100.0s	0.0s	☆
142.	F9.05	資料傳送格式選擇	0:非標準的MODBUS協定 1:標準的MODBUS協定 2:ASCII	0	☆
143.	F9.06	傳輸錯誤處理	0:報警並自由停車 1:不報警並繼續運行 2:不報警按停機方式停機(僅通訊控制方式下) 3:不報警按停機方式停機(所有控制方式下)	1	☆
144.	F9.07	傳輸回應處理	0:寫操作有回應 1:寫操作無回應	0	☆

5-1-12. FA 組 轉矩控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
145.	FA.00	轉矩設定方式選擇	0:鍵盤設定(FA.01) 1:模擬量AI1設定 2:模擬量AI2設定 3:面板電位器設定 4:模擬量AI1+AI2設定 5:多段轉矩設定 6:遠端通訊設定 注:選項1~6, 100%相對於2倍變頻器額定電流	0	☆
146.	FA.01	鍵盤設定轉矩	-200.0%~200.0%(變頻器額定電流)	50.0%	☆
147.	FA.02	低速狀態轉矩補償	0.000~1.000	0.050	☆
148.	FA.03	高速狀態轉矩補償	0.000~1.000	0.000	☆

5-1-13. Fb 組 控制優化

序號	代碼	參數名稱	設定範圍	出廠值	更改
149.	Fb.00	軟體過流點	0~2000A	機型確定	★
150.	Fb.01	軟體欠壓點	0~500V	機型確定	★
151.	Fb.02	軟體過壓點	300~800V	機型確定	★
152.	Fb.03	抑制振盪低頻閾值點	0~500	5	☆
153.	Fb.04	抑制振盪高頻閾值點	0~500	100	☆
154.	Fb.05	抑制振盪限幅值	0~10000	5000	☆
155.	Fb.06	抑制振盪高低頻分界頻率	0.00Hz~F0.08(最大輸出頻率)	12.50Hz	☆
156.	Fb.07	抑制振盪	0:抑制振盪有效 1:抑制振盪無效	1	☆
157.	Fb.08	PWM選擇	0:PWM模式1 1:PWM模式2 2:PWM模式3	0	★
158.	Fb.09	節能運行選擇	0:不動作; 1:自動節能運行	0	★
159.	Fb.10	靜區時間	2~5	機型確定	★

5-1-14. E0 組 擺頻控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
160.	E0.00	擺頻幅度	0.0~100.0%(相對設定頻率)	0.0%	☆
161.	E0.01	突跳頻率幅度	0.0~50.0%(相對擺頻幅度)	0.0%	☆
162.	E0.02	擺頻上升時間	0.1~3600.0s	5.0s	☆
163.	E0.03	擺頻下降時間	0.1~3600.0s	5.0s	☆

5-1-15. E1 組 多段速控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
164.	E1.00	多段速0	-100.0~100.0%	0.0%	☆
165.	E1.01	多段速1	-100.0~100.0%	0.0%	☆
166.	E1.02	多段速2	-100.0~100.0%	0.0%	☆
167.	E1.03	多段速3	-100.0~100.0%	0.0%	☆
168.	E1.04	多段速4	-100.0~100.0%	0.0%	☆
169.	E1.05	多段速5	-100.0~100.0%	0.0%	☆
170.	E1.06	多段速6	-100.0~100.0%	0.0%	☆
171.	E1.07	多段速7	-100.0~100.0%	0.0%	☆
172.	E1.08	多段速8	-100.0~100.0%	0.0%	☆
173.	E1.09	多段速9	-100.0~100.0%	0.0%	☆
174.	E1.10	多段速10	-100.0~100.0%	0.0%	☆
175.	E1.11	多段速11	-100.0~100.0%	0.0%	☆
176.	E1.12	多段速12	-100.0~100.0%	0.0%	☆
177.	E1.13	多段速13	-100.0~100.0%	0.0%	☆
178.	E1.14	多段速14	-100.0~100.0%	0.0%	☆
179.	E1.15	多段速15	-100.0~100.0%	0.0%	☆

180.	E1.16	0段給定方式	0：功能碼E1.00給定 1：類比頻道A11給定 2：類比頻道A12給定 3：面板電位器給定 4：CAD控制給定 5：鍵盤設定頻率(F0.01)	0	☆
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5-1-16. E2 組 CAD 控制

序號	代碼	參數名稱	設定範圍	出廠值	更改
181.	E2.00	CAD給定源選擇	0：鍵盤給定(E2.01) 1：類比頻道A11給定 2：類比頻道A12給定 3：面板電位器給定 4：遠端通訊給定 5：多段速給定	0	☆
182.	E2.01	鍵盤預置CAD給定	0.0~100.0%	50.0%	☆
183.	E2.02	CAD回饋源選擇	0：類比頻道A11回饋 1：類比頻道A12回饋 2：面板電位器回饋 3：A11-A12回饋 4：遠端通訊回饋 5：A11+A12回饋 6：MAX(A11 , A12) 7：MIN(A11 , A12)	0	☆
184.	E2.03	CAD輸出特性選擇	0：CAD輸出為正特性 1：CAD輸出為負特性	0	☆
185.	E2.04	比例增益(Kp)	0.00~100.00	1.00	☆
186.	E2.05	積分時間(Ti)	0.01~10.00s	0.10s	☆
187.	E2.06	微分時間(Td)	0.00~10.00s	0.00s	☆
188.	E2.07	採樣週期(T)	0.01~100.00s	0.10s	☆
189.	E2.08	CAD控制偏差極限	0.0~100.0%	0.0%	☆
190.	E2.09	回饋斷線檢測值	0.0~100.0%	0.0%	☆
191.	E2.10	回饋斷線檢測時間	0.0~3600.0s	1.0s	☆

5-1-17. E3 組 虛擬 DI、虛擬 DO

序號	代碼	參數名稱	設定範圍	出廠值	更改
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192.	E3. 00	VDI1 功能選擇	0~25	0	★
193.	E3. 01	VDI2 功能選擇	0~25	0	★
194.	E3. 02	VDI3 功能選擇	0~25	0	★
195.	E3. 03	VDI4 功能選擇	0~25	0	★
196.	E3. 04	VDI5 功能選擇	0~25	0	★
197.	E3. 05	VDI 有效模式	個位：虛擬 VDI1 十位：虛擬 VDI2 百位：虛擬 VDI3 千位：虛擬 VDI4 萬位：虛擬 VDI5	00000	☆
198.	E3. 06	VDI 狀態設置	個位：虛擬 VDI1 十位：虛擬 VDI2 百位：虛擬 VDI3 千位：虛擬 VDI4 萬位：虛擬 VDI5	11111	★
199.	E3. 07	AI1_DI 功能	0~25	0	★
200.	E3. 08	AI2_DI 功能選擇	0~25	0	★
201.	E3. 09	面板電位器_DI 功能	0~25	0	★
202.	E3. 10	AI_DI 模式	個位：AI1 0：高電平有效 1：低電平有效 十位：AI2(同個位) 百位：面板電位器(同個位)	000	★
203.	E3. 11	VD01 輸出功能	0~10	0	☆
204.	E3. 12	VD02 輸出功能	0~10	0	☆
205.	E3. 13	VD03 輸出功能	0~10	0	☆
206.	E3. 14	VD04 輸出功能	0~10	0	☆
207.	E3. 15	VD05 輸出功能	0~10	0	☆
208.	E3. 16	VDO 有效狀態	個位：VD01 0：正邏輯；1：反邏輯 十位：VD02(同個位) 百位：VD03(同個位) 千位：VD04(同個位) 萬位：VD05(同個位)	00000	☆

209.	E3. 17	VD01 延遲時間	0.0~3600.0s	0.0s	☆
210.	E3. 18	VD02 延遲時間	0.0~3600.0s	0.0s	☆
211.	E3. 19	VD03 延遲時間	0.0~3600.0s	0.0s	☆
212.	E3. 20	VD04 延遲時間	0.0~3600.0s	0.0s	☆
213.	E3. 21	VD05 延遲時間	0.0~3600.0s	0.0s	☆

5-1-18. b0 組 電機參數

序號	代碼	參數名稱	設定範圍	出廠值	更改
214.	b0. 00	變頻器類型	0：G型機；1：保留	0	★
215.	b0. 01	電機額定功率	0.4~900.0kW	機型確定	★
216.	b0. 02	電機額定電壓	0~460V	機型確定	★
217.	b0. 03	電機額定電流	0.1~2000.0A	機型確定	★
218.	b0. 04	電機額定頻率	0.01Hz~F0.08(最大輸出頻率)	50.00Hz	★
219.	b0. 05	電機額定轉速	0~36000rpm	機型確定	★
220.	b0. 06	電機定子電阻	0.001~65.535Ω	機型確定	★
221.	b0. 07	電機轉子電阻	0.001~65.535Ω	機型確定	★
222.	b0. 08	電機定、轉子電感	0.1~6553.5mH	機型確定	★
223.	b0. 09	電機定、轉子互感	0.1~6553.5mH	機型確定	★
224.	b0. 10	電機空載電流	0.01~655.35A	機型確定	★
225.	b0. 11	電機參數自學習	0：無操作 1：參數靜止自學習 2：參數全面自學習	0	★

5-1-19. y0 組 功能碼管理

序號	代碼	參數名稱	設定範圍	出廠值	更改
226.	y0. 00	功能參數恢復	0：無操作 1：恢復出廠值，不包括電機參數 2：清除故障檔案 3：恢復出廠值，包括電機參數 4：備份參數 5：恢復備份	0	★

227.	y0.01	使用者密碼	0~65535	0	★
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5-1-20. y1 組 故障歷史查詢

序號	代碼	參數名稱	設定範圍	出廠值	更改
228.	y1.00	前兩次故障類型	0~22	0	●
229.	y1.01	前一次故障類型	0~22	0	●
230.	y1.02	當前故障類型	0~22	0	●
231.	y1.03	當前故障運行頻率		0.00Hz	●
232.	y1.04	當前故障輸出電流		0.0A	●
233.	y1.05	當前故障母線電壓		0V	●
234.	y1.06	當前故障輸入端子狀態		0	●
235.	y1.07	當前故障輸出端子狀態		0	●

5-2. 功能參數說明

5-2-1. d0 組 監視功能組

d0 參數組用於監視變頻器運行狀態資訊，客戶可以通過面板查看，以方便現場調試，也可以通過通訊讀取參數組數值，以用於上位機監控。

參數功能碼	參數名稱	最小單位
d0.00	運行頻率	0.01Hz
變頻器運行時的實際輸出頻率		
d0.01	設定頻率	0.01Hz
變頻器當前的實際設定頻率		
d0.02	直流母線電壓	1V
變頻器母線電壓值		
d0.03	變頻器輸出電壓	1V
變頻器運行時的實際輸出電壓		
d0.04	變頻器輸出電流	0.1A
變頻器運行時的實際輸出電流		
d0.05	變頻器輸出功率	0.1kW
變頻器運行時實際輸出功率		
d0.06	變頻器輸出轉距	1%
變頻器運行時實際輸出轉距百分比		

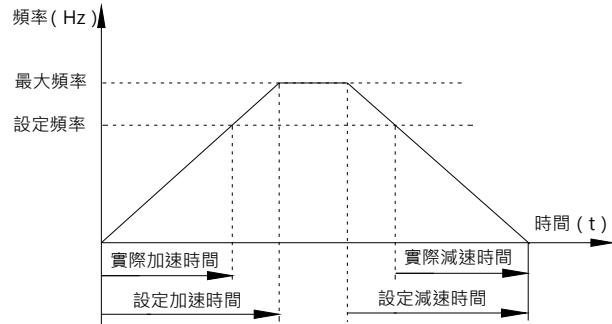
d0.07	輸入端子狀態	-
當前顯示DI輸入端子狀態，轉化為二進位資料後，1個bit位對應一個DI端子輸入信號，表示該輸入端子為高電平信號，0表示該輸入端子為低電平信號。		
Bit0	Bit1	Bit2
DI1	DI2	DI3
Bit3	Bit4	Bit5
DI4	DI5	DI6
Bit6	Bit7	Bit8
保留	保留	保留
Bit9	保留	保留
d0.08	輸出端子狀態	-
顯示當前輸出端子狀態值。轉化為二進位資料後，1個bit位對應一個輸出端子信號，1表示該輸出端子為高電平信號，0表示該輸出端子為低電平信號。		
Bit0	Bit1	Bit2
MO1	保留	保留
Bit3	Bit4	保留
RO	保留	保留
d0.09	模擬量AI1值	0.01V
類比量AI1輸入電壓值		
d0.10	模擬量AI2值	0.01V
類比量AI2輸入電壓值		
d0.11	面板電位器電壓	0.01V
面板電位器輸入電壓值		
d0.12	電機實際轉速	1rpm
顯示電機實際運行速度		
d0.13	CAD給定值	0.1%
CAD調節運行時的給定值百分比		
d0.14	CAD回饋值	0.1%
CAD調節運行時的回饋值百分比		
d0.15	多段速當前段數	-
顯示多段速當前段數		
d0.16	保留	
d0.17	逆變模組溫度	0.1℃
顯示逆變模組溫度		
d0.18	軟體版本	-
顯示DSP軟體版本號		
d0.19	本機累積執行時間	1h
顯示變頻器累計的執行時間		
d0.20	轉矩設定值	0.1%
速度控制模式或轉矩控制模式時，觀察設定的指令轉矩。		

5-2-2. F0 組 基本功能組

代碼	參數名稱	設定範圍	出廠值	更改	
F0.00	控制模式	開環磁通向量控制	0	2	★
		保留	1		
		V/F控制	2		
		轉矩控制	3		
<p>選擇變頻器的運行方式：</p> <p>0：開環磁通向量控制：指開環磁通向量控制適用於不裝編碼器PG的高性能通用場合，一台變頻器只能驅動一台電機。如機床、離心機、拉絲機、注塑機等負載；並且變頻器容量與電機容量的等級不可相差過大，變頻器可以比電機的功率等級大兩級或小一級，否則可能導致控制性能下降，或驅動系統無法正常運行。</p> <p>1：保留。</p> <p>2：V/F控制：適用於對控制精度要求不高的場合，如風機、泵類等負載。可用於一台變頻器拖動多台電機的場合。</p> <p>3：轉矩控制：適用於對轉矩控制精度不高的場合，如線繞，拉絲等場合。在轉矩控制模式下，電機的轉速是由電機負載決定，其加減速快慢不再由變頻器加減速時間決定。</p> <p>注：開環磁通向量控制和轉矩控制都必須先電機自學習</p>					
F0.01	鍵盤設定頻率	0.00Hz~F0.08(最大輸出頻率)	50.00Hz	☆	
當頻率指令選擇為“鍵盤設定”時，該功能碼值為變頻器頻率數位設定初始值。					
F0.02	頻率指令選擇	鍵盤數位設定	0	0	★
		模擬量A11設定	1		
		模擬量A12設定	2		
		面板電位器設定	3		
		A11+ A12設定	4		
		多段速運行設定	5		
		CAD控制設定	6		
		遠端通訊設定	7		
<p>選擇變頻器頻率指令輸入通道，共有8種給定頻率通道：</p> <p>0：鍵盤設定：通過修改功能碼F0.01“鍵盤設定頻率”的值，達到鍵盤設定頻率的目的。</p> <p>1：模擬量A11設定</p> <p>2：模擬量A12設定</p> <p>3：面板電位器設定：指頻率由類比量輸入端子來確定，CA SERIES變頻器標配2路模擬量輸入端子(A11, A12)，A11/A12電壓電流可選(0V~10V/0mA~20mA)，可通過控制板上跳線JP2和JP3選擇進行切換。A11、A12的輸入電壓值，與目</p>					

<p>標頻率的對應關係，使用者可通過F1組功能碼進行設置。面板電位器的模擬量輸入0V~10V電壓。</p> <p>4：模擬量A11+A12設定：指頻率由類比量輸入端子來設定。 注意：當模擬量A11/A12選擇0~20mA輸入時，20mA對應的電壓為10V。</p> <p>5：多段速運行設定：選擇多段速運行設定方式，變頻器以多段速方式運行。通過F1組設定多段速端子組合來選擇當前運行段；過E1組參數來確定當前段運行頻率。</p> <p>6：CAD控制設定：選擇CAD控制設定方式，變頻器運行模式為CAD控制。此時，需要設置E2組“CAD功能組”。變頻器運行頻率為CAD作用後的頻率值。其中CAD給定源、給定量、回饋源等含義請參考E2組“CAD功能”介紹。</p> <p>7：遠端通訊設定：率指令由上位機通過通訊方式給定。詳情請參考F9組通訊協定。</p>					
F0.03	鍵盤及端子UP/DOWN設定	有效，且變頻器斷電存儲	0	0	☆
		有效，且變頻器斷電不存儲	1		
		UP/DOWN設定無效	2		
		運行時設置有效，停機時不存儲	3		
<p>通過鍵盤的▲鍵和▼鍵以及輸入端子UP/DOWN(頻率設定遞增/頻率設定遞減)功能來設定頻率，可以和其它任何頻率設定通道進行組合。主要是完成在控制系統調試過程中微調變頻器的輸出頻率。</p> <p>0：有效，且變頻器斷電存儲。可設定頻率指令，並且在變頻器斷電以後，存儲該設定頻率值，變頻器斷電後再次上電時，頻率為上次斷電時設定頻率。</p> <p>1：有效，且變頻器斷電不存儲。可設定頻率指令，但在變頻器斷電後，該設定頻率值不存儲。</p> <p>2：UP/DOWN設定無效，鍵盤的▲鍵和▼鍵及輸入端子UP/DOWN功能無效。</p> <p>3：運行時設置鍵盤的▲鍵和▼鍵及端子UP/DOWN功能設定有效，停機時鍵盤的▲鍵和▼鍵及輸入端子UP/DOWN設定不存儲。</p> <p>注意：當用戶對變頻器功能參數進行恢復缺省值操作後，鍵盤及輸入端子UP/DOWN功能設定的頻率值為出廠設定值。</p>					
F0.04	命令源通道	鍵盤指令通道	0	0	★
		端子指令通道	1		
		通訊指令通道	2		
<p>選擇變頻器控制指令的通道。變頻器控制命令包括：啟動、停機、正轉、反轉、寸動、故障重置等。</p> <p>0：鍵盤指令通道；鍵盤上的RUN、STOP/RESET按鍵進行運行命令控制。</p> <p>1：端子指令通道；由多功能輸入端子正轉、反轉、正轉寸動、反轉寸動等進行運行命令控制。</p> <p>2：通訊指令通道；運行命令由上位機通過通訊方式進行控制。</p>					
F0.05	加速時間1	0.1~3600.0s	機型確定	☆	
F0.06	減速時間1	0.1~3600.0s	機型確定	☆	

加速時間：指變頻器從0Hz加速到最大輸出頻率(F0.08)所需時間；
減速時間：指變頻器從最大輸出頻率(F0.08)減速到0Hz所需時間。
實際的加減速時間=設定的加減速時間×(設定頻率/最高頻率)



5-1. 設定頻率小於最大頻率的加減速時間示意圖

CA SERIES系列變頻器有2組加減速時間。
第一組：F0.05、F0.06；第二組：F7.03、F7.04
可通過多功能DI輸入端子(F1組)選擇加減速時間。變頻器加減速時間出廠默認為第一組加減速時間。

F0.07	載波頻率設定	1.0~15.0kHz	機型確定	☆
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載波頻率	電磁噪音	雜音、漏電流	散熱度
1kHz	↑ 大 ↓ 小	↑ 大 ↓ 小	↑ 大 ↓ 小
10kHz			
15kHz			

5-2. 載頻對影響的關係圖

高載波頻率的優點：電流波形比較理想、電流諧波少，電機噪音小。
高載波頻率的缺點：開關損耗增大，變頻器溫升增大，變頻器輸出能力受到影響，在高載頻下，變頻器需降額使用；同時變頻器的漏電流增大，對外界的電磁干擾增加。
採用低載波頻率則與上述情況相反，過低的載波頻率將引起低頻運行不穩定，轉矩降低甚至振盪現象。
變頻器出廠時，已經對載波頻率進行了合理的設置。一般情況下，使用者無須對該參數進行更改。
使用者使用超過缺省載波頻率時，需降額使用，每增加1K載頻，降額20%。

F0.08	最大輸出頻率	10.00~400.00Hz	50.00Hz	★
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最大輸出頻率是來設定變頻器的最高輸出頻率。它是頻率設定的基礎，也是加速快慢的基礎，請用戶注意。

F0.09	上限頻率設定源選擇	鍵盤設定 (F0.10)	0	0	★
		模擬量AI1設定	1		
		模擬量AI2設定	2		
		多段速設定	3		
		遠端通訊設定	4		

定義上限頻率的設定方式。上限頻率可以來自於數位設定 (F0.10)，也可來自於模擬量輸入通道、多段速設定或通訊設定。當用模擬輸入設定、多段速設定或通訊設定為上限頻率時，類比輸入設定的100%對應F0.08(最大輸出頻率)。

F0.10	運行頻率上限	F0.11~F0.08(最大輸出頻率)	50.00Hz	☆
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運行頻率上限是變頻器輸出頻率的上限值。該值應該小於或者等於最大輸出頻率。

F0.11	運行頻率下限	0.00Hz~F0.10(運行頻率上限)	0.00Hz	☆
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運行頻率下限變頻器輸出頻率的最低值。當設定頻率低於下限頻率時以下限頻率運行。

注意：最大輸出頻率 ≥ 上限頻率 ≥ 下限頻率。

F0.12	運行方向選擇	0：默認方向運行 1：相反方向運行 2：禁止反轉運行	0	★
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0：默認方向運行。變頻器上電後，按照實際的方向運行。
1：相反方向運行。用來改變電機轉向，其作用相當於通過調整任意兩條電機線來改變電機旋轉方向。

2：禁止反轉運行。禁止變頻器反向運行，應用在特定的禁止反轉運行的場合。
注意：參數初始化後，電機運行方向會恢復原來的狀態。對於系統調試好後嚴禁更改電機轉向的場合，請慎用。

F0.13	AVR功能選擇	無效	0	1	☆
		全程有效	1		
		只在減速時無效	2		

AVR功能即輸出電壓自動調整功能。當AVR功能無效時，輸出電壓會隨輸入電壓(或直流母線電壓)的變化而變化；當AVR功能有效時，輸出電壓不隨輸入電壓(或直流母線電壓)的變化而變化，輸出電壓在輸出能力範圍內將保持基本恆定。

5-2-3. F1 組 輸入端子組

代碼	參數名稱	設定範圍	出廠值	更改
F1.00	DI1端子功能選擇	0:無功能	1	★
F1.01	DI2端子功能選擇	1:正轉運行 (FWD) 2:反轉運行 (REV)	2	★
F1.02	DI3端子功能選擇	3:三線式運行控制 4:正轉寸動	0	★
F1.03	DI4端子功能選擇	5:反轉寸動 6:頻率設定遞增 (UP)	9	★
F1.04	DI5端子功能選擇	7:頻率設定遞減 (DOWN) 8:自由停車	4	★
F1.05	保留	9:故障重置 10:外部故障輸入 11:頻率增減設定清除 12:多段速端子1 13:多段速端子2 14:多段速端子3 15:多段速端子4 16:加減速時間選擇 17:控制命令切換端子 18:加減速禁止 19:CAD控制暫停 20:擺頻暫停 (停在當前頻率) 21:擺頻重置 (回到中心頻率) 22:轉矩控制禁止 23:頻率增減設定暫時清除 24:停機直流制動		

此參數用於設定數位多功能輸入端子對應的功能。
 0:無功能
 1:正轉運行 (FWD)
 2:反轉運行 (REV)
 通過外部端子來控制變頻器正轉和反轉。
 3:三線式運行控制:通過此端子來確定變頻器運行方式是三線控制模式,具體參見F1.06三線制功能碼介紹。
 4:正轉寸動
 5:反轉寸動
 6:頻率設定遞增 (UP)
 7:頻率設定遞減 (DOWN)
 由外部端子給定頻率時用來修改頻率的遞增指令、遞減指令。在頻率源設定為數位設定時,可上下調節設定頻率。
 8:自由停車:命令有效後,變頻器立即封鎖輸出,電機停車過程不受變頻器控制,對於大慣量負載且對停車時間沒有要求時,建議採用該方式,該方式和F3.05所述自由停車含義相同。
 9:故障重置:外部故障重置功能,用於遠距離故障重置,與鍵盤上的STOP/RESET鍵功能相同。
 10:外部故障輸入:該信號有效後,變頻器報外部故障口 (E.SET) 並停機。

- 11: 頻率增減設定清零:利用外部端子修改給定頻率,UP為遞增指令、DOWN為遞減指令,頻率增減設定清零則用來清除通過UP/DOWN設定的頻率值,使給定頻率恢復到由頻率指令通道給定的頻率。
- 12: 13、14、15:多段速端子1~4通過此四個端子的狀態組合,可實現16段速的設定。注意:多段速端子1為低位,多段速端子4為高位。詳見E1組。

多段速4	多段速3	多段速2	多段速1
BIT3	BIT2	BIT1	BIT0

- 16: 加減速時間選擇端子:通過此端子的狀態來選擇加減速時間組:

端子	加速或減速時間選擇	對應參數
OFF	加減速時間1	F0.05、F0.06
ON	加減速時間2	F7.03、F7.04

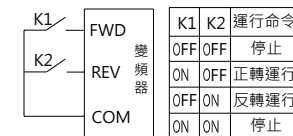
- 17: 控制命令切換端子:當命令源為非鍵盤控制時,實現命令源和鍵盤控制的切換。比如,端子控制時 (F0.04=1),此端子可以進行端子控制與鍵盤控制的切換;通訊控制時 (F0.04=2),此端子可以進行通訊控制與鍵盤控制的切換。
- 18: 加減速禁止:保證變頻器不受外來信號影響 (停機命令除外),維持當前輸出頻率。
- 19: CAD控制暫停:CAD暫時失效,變頻器維持當前頻率輸出
- 20: 擺頻暫停:變頻器暫停在當前輸出,功能撤銷後,繼續以當前頻率開始擺頻運行。
- 21: 擺頻復位:變頻器設定頻率回到中心頻率運行。
- 22: 轉矩控制禁止:變頻器從轉矩控制模式切到速度控制模式。
- 23: 頻率增減設定暫時清零:當端子閉合時可清除“UP”和“DOWN”鍵盤設定的頻率值,使給定頻率恢復到由頻率指令通道給定的頻率,當端子斷開時重新回到頻率增減設定後的頻率值。
- 24: 停機時直流制動:變頻器在減速停機過程中,當該端子閉合時,會使變頻器立即進行直流制動,制動工作狀態由F3.07~F3.09確定。

F1.06	端子控制運行模式	兩線式控制1	0	0	★
		兩線式控制2	1		
		三線式控制1	2		
		三線式控制2	3		

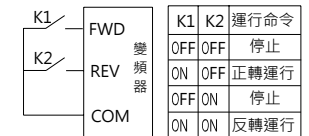
該參數定義了通過外部端子控制變頻器運行的四種不同方式。

- 0: 兩線式控制1
使能與方向合一。此模式為最常使用的兩線模式。由定義的FWD、REV端子命令來決定電機的正、反轉。

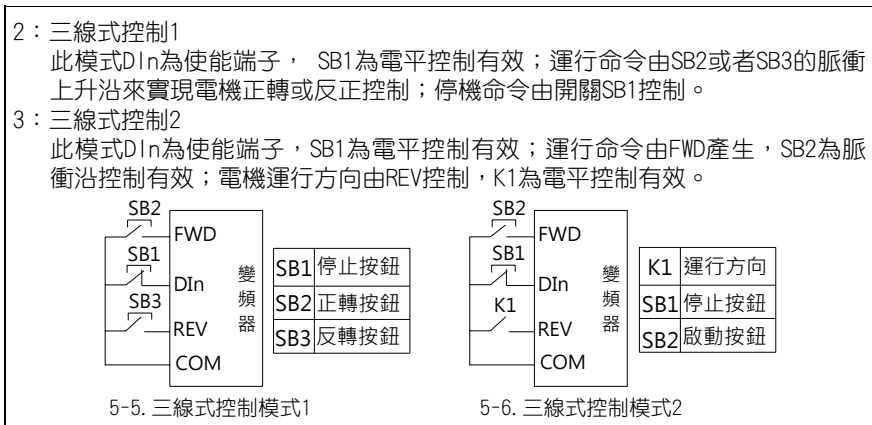
- 1: 兩線式控制2
使能與方向分離。用此模式時定義的FWD為使能端子。方向由定義的REV的狀態來確定。



5-3. 兩線式控制1 (使能與方向合一)



5-4. 兩線式控制2 (使能與方向分離)



F1.07	端子UP/DOWN頻率增量變化率	0.01~50.00Hz/s	0.50Hz/s	☆
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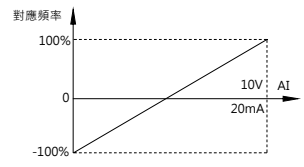
利用設置端子UP、DOWN調整設定頻率時，頻率變化的速度，即每秒鐘頻率的變化率。

F1.08	A11下限值	0.00V~F1.10	0.00V	☆
F1.09	A11下限對應設定	-100.0%~100.0%	0.0%	☆
F1.10	A11上限值	F1.08~10.00V	10.00V	☆
F1.11	A11上限對應設定	-100.0%~100.0%	100.0%	☆
F1.12	A11輸入濾波時間	0.00s~10.00s	0.10s	☆

上述功能碼定義了類比輸入電壓與類比輸入對應設定值之間的關係，當類比輸入電壓超過設定的最大輸入或最小輸入的範圍以外部分將以最大輸入或最小輸入計算。

模擬輸入為電流輸入時，0mA~20mA電流對應為0V~10V電壓。

在不同的應用場合，模擬設定的100.0%所對應的標稱值有所不同，具體請參考各個應用部分的說明。



5-7. 模擬給定與設定量的對應關係圖

A11輸入濾波時間：調整模擬量輸入的靈敏度。適當增大該值可以增強模擬量的抗干擾性，但會減弱模擬量輸入的靈敏度。

F1.13	A12下限值	0.00V~F1.15	0.00V	☆
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F1.14	A12下限對應設定	-100.0%~100.0%	0.0%	☆
F1.15	A12上限值	F1.13~10.00V	10.00V	☆
F1.16	A12上限對應設定	-100.0%~100.0%	100.0%	☆
F1.17	A12輸入濾波時間	0.00s~10.00s	0.10s	☆

A12的功能與A11的設定方法類似。

F1.18	開關量濾波次數	1~10	5	☆
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設置DI1~DI5端子採樣的濾波時間。若使用場合輸入端子易受干擾而引起誤動作，可將此參數增大，以增強則抗干擾能力。但是該濾波時間增大會引起DI端子的回應變慢。

F1.19	DI端子模式選擇	0x000~0x1FF	000	★
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該功能碼用來對輸入端子極性進行設置。當位設置為0值時，輸入端子正極性；當位設置為1值時，輸入端子負極性。

Bit0	Bit1	Bit2	Bit3	Bit4
DI1	DI2	DI3	DI4	DI5
Bit5	Bit6	Bit7	Bit8	Bit9
保留	保留	保留	保留	保留

F1.20~F1.24	保留			
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F1.25	DI1延遲時間	0.0~3600s	0	★
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F1.26	DI2延遲時間	0.0~3600s	0	★
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F1.27	DI3延遲時間	0.0~3600s	0	★
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用於設置DI端子狀態發生變化時，變頻器對該變化進行的延時時間。目前僅僅DI1、DI2、DI3具備設置延遲時間的功能。

5-2-4. F2 組 輸出端子組

代碼	參數名稱	設定範圍	出廠值	更改
F2.00	MO1輸出選擇	0~8	1	☆
F2.01	保留		-	
F2.02	保留		-	
F2.03	繼電器輸出選擇		1	☆

設定值	功能	說明
0	無輸出	輸出端子無任何功能
1	電機正轉運行中	變頻器正轉運行，當變頻器正轉運行，有頻率輸出時，輸出ON信號。
2	電機反轉運行中	變頻器反轉運行，當變頻器反轉運行，有頻率輸出時，輸出ON信號。
3	故障輸出	故障輸出，當變頻器發生故障時，輸出ON信號。
4	頻率水準檢測FDT輸出	頻率水準檢測FDT到達，請參考功能碼F7.10、F7.11的詳細說明。
5	頻率到達	頻率到達，請參考功能碼F7.12的詳細說明。
6	零速運行中	零速運行中，變頻器輸出頻率與給定頻率同時為零時，輸出ON信號。
7	上限頻率到達	上限頻率到達(F0.10)，運行頻率到達上限頻率時，輸出ON信號。
8	下限頻率到達	下限頻率到達(F0.11)，運行頻率到達下限頻率時，輸出ON信號。

F2.04	AO1輸出選擇	0：運行頻率 1：設定頻率 2：輸出電流 3：輸出轉矩 4：輸出功率 5：輸出電壓 6：模擬AI1輸入值 7：模擬AI2輸入值 8：運行轉速 9~10：保留	0	☆
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模擬輸出的標準輸出為0~20mA(或0~10V)，可通過跳線JP4選擇電流或電壓輸出。其表示的相對應量的範圍如下表所示：

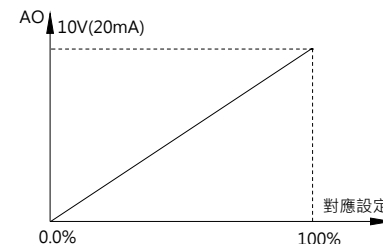
設定值	功能	說明
0	運行頻率	0~最大輸出頻率
1	設定頻率	0~最大輸出頻率
2	輸出電流	0~2倍變頻器額定電流
3	輸出轉矩	0~2倍電機的額定電流
4	輸出功率	0~2倍額定功率
5	輸出電壓	0~1.2倍變頻器額定電壓
6	模擬AI1輸入值	0~10V/0~20mA
7	模擬AI2輸入值	0~10V/0~20mA
8	運行轉速	0~2倍電機額定轉速

F2.05	AO1輸出下限	0.0%~F2.07	0.0%	☆
F2.06	下限對應AO1輸出	0.00V ~10.00V	0.00V	☆
F2.07	AO1輸出上限	F2.05~100.0%	100.0%	☆
F2.08	上限對應AO1輸出	0.00V ~10.00V	10.00V	☆

上述功能碼定義了輸出值與模擬輸出之間的對應關係，當輸出值超過設定的最大輸出或最小輸出的範圍以外部分，將以上限輸出或下限輸出計算。

模擬輸出為電流輸出時，1mA電流相當於0.5V電壓。

在不同的應用場合，輸出值的100%所對應的模擬輸出量有所不同，具體請參考各個應用部分的說明。



5-8. 給定量與模擬量輸出對應關係

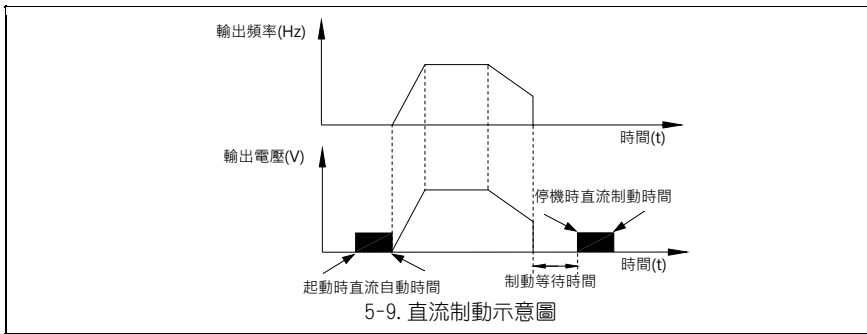
F2.09	MO1開通延時時間	0.0~3600s	0.0s	☆
F2.10	MO1斷開延時時間	0.0~3600s	0.0s	☆
F2.11	繼電器開通延時時間	0.0~3600s	0.0s	☆
F2.12	繼電器斷開延時時間	0.0~3600s	0.0s	☆

功能碼定義為輸出端子從開通和斷開時電平發生變化所對應的延遲時間。						
F2.13	保留					
F2.14	DO輸出端子有效狀態選擇	0x00~0x1F	00	☆		
該功能碼用來對輸入端子極性進行設置。當位設置為0值時，輸出端子正極性；當位設置為1值時，輸出端子負極性。						
		Bit0	Bit1	Bit2	Bit3	Bit4
		M01	保留	保留	R0	保留
F2.15	M01輸出類型選擇	0：脈衝輸出；1：開關量輸出		1	☆	
M01端子是可程式設計的複用端子，可作為脈衝輸出端子，也可以作為集電極開路的開關量輸出端子。 作為脈衝輸出時，輸出脈衝的最高頻率為10kHz，脈衝輸出相關功能參見F2.16說明。						
F2.16	M01脈衝輸出選擇	0：運行頻率 1：設定頻率 2：輸出電流 3：輸出轉矩 4：輸出功率 5：輸出電壓 6：模擬AI1輸入值 7：模擬AI2輸入值 8：運行轉速 9~10：保留		0	☆	
M01脈衝輸出頻率範圍為0.01kHz~F2.20(脈衝輸出上限值)，脈衝輸出根據F2.17~F2.20設置。脈衝輸出表示的相對應量範圍參見F2.04說明。						
F2.17	M01脈衝輸出下限	0.0%~F2.19	0.0%	☆		
F2.18	下限對應M01脈衝輸出	0.1~10kHz	0.0kHz	☆		
F2.19	M01脈衝輸出上限	F2.17~100%	100%	☆		
F2.20	上限對應M01脈衝輸出	0.1~10kHz	10kHz	☆		
當脈衝輸出值超過設定的最大輸出或最小輸出的範圍以外部分，將以上限輸出或下限輸出計算，通過F2.17~F2.20參數進行參數調節。						

5-2-5.F3組 啟停控制組

代碼	參數名稱	設定範圍	出廠值	更改	
F3.00	啟動運行方式	直接啟動	0	0	★
		轉速追蹤再啟動	1		

		先直流制動再啟動	2		
0：直接啟動：從啟動頻率開始啟動。 1：轉速追蹤再啟動：變頻器對正在旋轉的電機進行速度辨識並從識別到的頻率直接跟蹤啟動，啟動過程電流電壓平滑無衝擊。 2：先直流制動再啟動：先按照F3.03和F3.04設定的方式直流制動，再從啟動頻率啟動。適用於小慣性負載在啟動時可能產生反轉的場合。					
F3.01	啟動開始頻率	0.00~10.00Hz	0.00Hz	☆	
F3.02	啟動頻率保持時間	0.0~50.0s	0.0s	★	
變頻器從啟動頻率(F3.01)開始運行，經過啟動頻率保持時間(F3.02)後，再按設定的加速時間加速到目標頻率，若目標頻率小於啟動頻率，變頻器將處於待機狀態。啟動頻率值不受下限頻率限制。					
F3.03	啟動前制動電流	0.0~150.0%	0.0%	★	
F3.04	啟動前制動時間	0.0~50.0s	0.0s	★	
F3.03啟動前直流制動時，所加直流電流值，為變頻器額定電流的百分比。F3.04直流電流持續時間。若設定直流制動時間為0，則直流制動無效。直流制動電流越大，制動力越大。					
F3.05	停機方式選擇	減速停車	0	0	☆
		自由停車	1		
0：減速停車：停機命令有效後，變頻器按照減速方式及定義的減速時間降低輸出頻率，頻率降為0Hz後停機。 1：自由停車：停機命令有效後，變頻器立即終止輸出。負載按照機械慣性自由停車。					
F3.06	停機制動開始頻率	0.00~F0.08(最大輸出頻率)	0.00Hz	☆	
F3.07	停機制動等待時間	0.0~50.0s	0.0s	☆	
F3.08	停機直流制動電流	0.0~150.0%	0.0%	☆	
F3.09	停機直流制動時間	0.0~50.0s	0.0s	☆	
停機制動開始頻率：減速停機過程中，當到達該頻率時，開始停機直流制動。停機制動開始頻率為0，直流制動無效，變頻器按所設定的減速時間停車。 停機制動等待時間：在停機直流制動開始前，變頻器封鎖輸出，經過該延時後再開始直流制動。用於防止在速度較高時開始直流制動引起的過流故障。 停機直流制動電流：指所加的直流制動量。該值越大，制動力矩越大。 停機直流制動時間：直流制動量所持續的時間。					

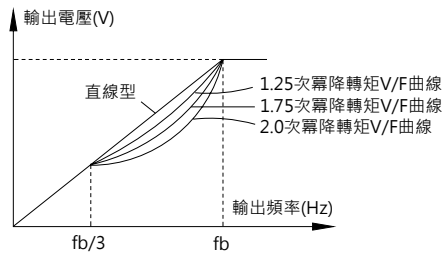


5-2-6. F4 組 V/F 控制組

F4 組功能碼僅對 V/F 控制有效，對向量控制無效。

代碼	參數名稱	設定範圍	出廠值	更改	
F4.00	V/F 曲線設定	直線V/F曲線	0	0	★
		多點V/F曲線	1		
		平方V/F曲線	2		
		1.25次V/F曲線	3		
		1.75次V/F曲線	4		

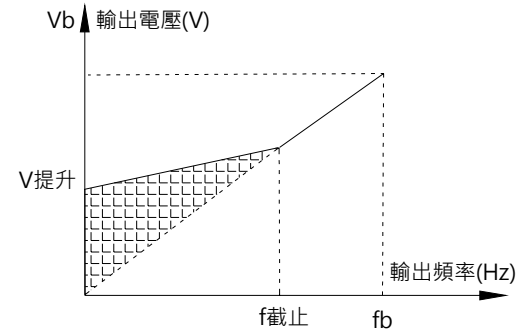
- 0：直線V/F曲線。適合於普通恆轉矩負載。
- 1：多點V/F曲線，適合脫水機、離心機等特殊負載。此時通過設置F4.03~F4.08參數，可以獲得任意的V/F關係曲線。
- 2：平方次V/F曲線。適合於風機、水泵等離心負載。
- 3~4：介於直線V/F與平方V/F之間的V/F關係曲線。



F4.01	轉矩提升	0.0%：(自動轉矩提升)0.1%~30.0%	0.0%	☆
F4.02	轉矩提升截止	0.0%~50.0%(相對電機額定頻率)	20.0%	★

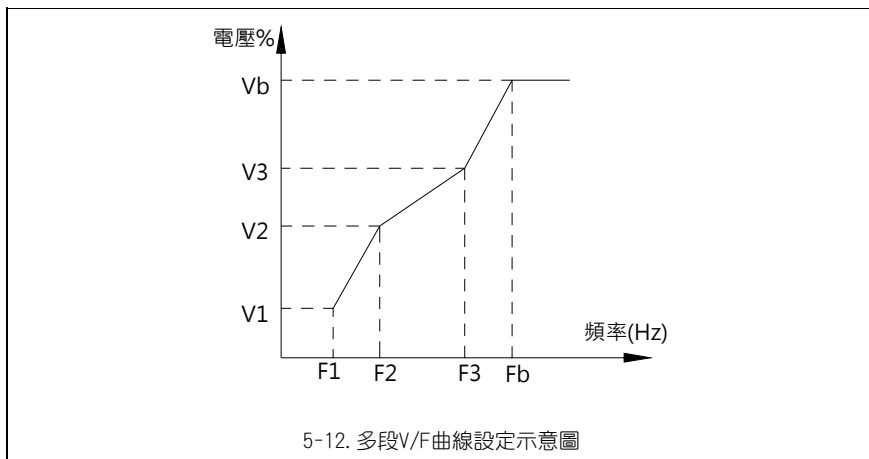
轉矩提升主要應用於截止頻率(F4.02)以下，提升後的V/F曲線如下圖示，轉矩提升可以改善V/F的低頻轉矩特性。應根據負載大小適當選擇轉矩量，負載大可以增大提升，但提升值不應設置過

大，轉矩提升過大時，電機將過勵磁運行，變頻器輸出電流增大，電機發熱加大，效率降低。
當轉矩提升設置為0.0%時，變頻器為自動轉矩提升。
轉矩提升截止點：在此頻率點之下，轉矩提升有效，超過此設定頻率，轉矩提升失效。



F4.03	V/F頻率點1	0.00Hz~F4.05	0.00Hz	★
F4.04	V/F電壓點1	0.0%~100.0%	0.0%	★
F4.05	V/F頻率點2	F4.03~F4.07	0.00Hz	★
F4.06	V/F電壓點2	0.0%~100.0%	0.0%	★
F4.07	V/F頻率點3	F4.05~fb.04(電機額定頻率)	0.00Hz	★
F4.08	V/F電壓點3	0.0%~100.0%	0.0%	★

F4.03~F4.08六個參數定義多段V/F曲線。
多點V/F的曲線要根據電機的負載特性來設定，需要注意的是，三個電壓點和頻率點的關係必須滿足： $V1 < V2 < V3$ ， $F1 < F2 < F3$ 。下圖為多點V/F曲線的設定示意圖。
低頻時電壓設定過高可能會造成電機過熱甚至燒毀，變頻器可能會過流失速或過電流保護。
V1~V3：多段速V/F第1~3段電壓百分比；F1~F3：多段速V/F第1~3段頻率；Vb：電機額定電壓；Fb：電機額定運行頻率。



F4.09	V/F轉差補償限定	0.0~200.0%	0.0%	☆
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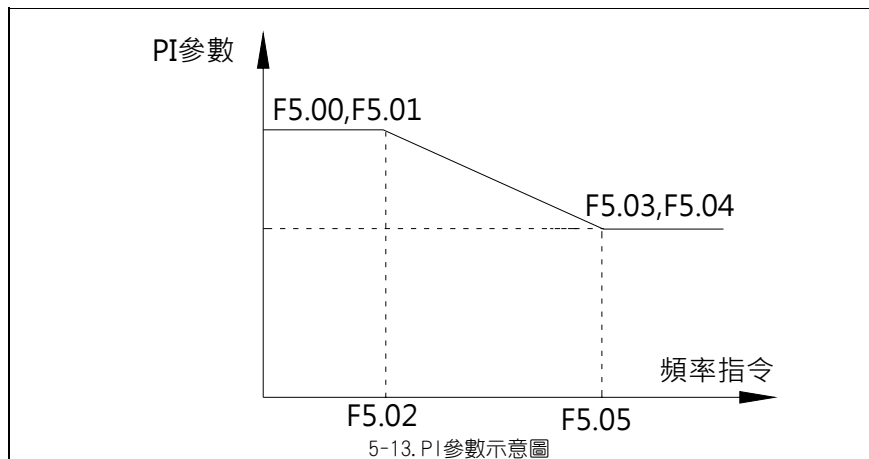
設定此參數可以補償V/F控制時因為帶負載產生的電機轉速變化，以提高電機機械特性的硬度。此值應設定為電機的額定轉差頻率，額定轉差頻率計算如下：
 額定轉差頻率=FB-n*p/60
 其中：FB為電機額定頻率，對應功能碼b0.04，n為電機額定轉速，對應功能碼b0.05，P為電機極對數。

5-2-7. F5 組 向量控制組

F5 組功能碼僅對向量控制有效，對 V/F 控制無效。

代碼	參數名稱	設定範圍	出廠值	更改
F5.00	速度環比例增益1	0~100	20	☆
F5.01	速度環積分時間1	0.01~10.00s	0.50s	☆
F5.02	切換低點頻率	0.00Hz~F5.05	5.00Hz	☆
F5.03	速度環比例增益2	0~100	15	☆
F5.04	速度環積分時間2	0.01~10.00s	1.00s	☆
F5.05	切換高點頻率	F5.02~F0.08(最大輸出頻率)	10.00Hz	☆

以上參數只適用於向量控制模式。在切換頻率1(F5.02)以下，速度環CA參數為：F5.00和F5.01。在切換頻率2(F5.05)以上，速度環CA參數為：F5.03和F5.04。二者之間，CA參數由兩組參數線形變化獲得，如下圖示：



通過設定速度調節器的比例係數和積分時間，可以調節向量控制的速度環動態響應特性。增加比例增益，減小積分時間，均可加快速度環的動態響應，但比例增益過大或積分時間過小均容易導致系統振盪，超調過大。比例增益過小也容易導致系統穩態振盪，且有可能存在速度靜差。
 速度環CA參數與系統的慣性關係密切，針對不同的負載特性需要在缺省CA參數的基礎上進行調整，以滿足各種場合的需求。

F5.06	VC轉差補償係數	50%~200%	100%	☆
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轉差補償係數用於調整向量控制的轉差頻率，改善系統的速度控制精度，適當調整該參數，可以有效抑制速度靜差。

F5.07	轉矩上限設定	0.0~200.0%(變頻器額定電流)	150.0%	☆
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設定100.0%對應變頻器的額定輸出電流。

5-2-8. F6 組 鍵盤與顯示組

代碼	參數名稱	設定範圍	出廠值	更改
F6.00	STOP/RESET 鍵停機功能選擇	只對面板控制有效	0	☆
		對面板和端子控制同時有效	1	
		對面板和通訊控制同時有效	2	
		對所有控制模式均有效	3	

對於故障重置，STOP/RESET鍵任何狀況下都有效。

F6.01	運行狀態顯示的參數選擇	0~0xFFFF BIT0：運行頻率 BIT1：設定頻率 BIT2：母線電壓 BIT3：輸出電壓 BIT4：輸出電流	03FF	☆
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		BIT5: 運行轉速 BIT6: 輸出功率 BIT7: 輸出轉矩 BIT8: CAD給定值 BIT9: CAD回饋值 BIT10: 輸入端子狀態 BIT11: 輸出端子狀態 BIT12: 模擬量A11值 BIT13: 模擬量A12值 BIT14: 多段速當前段數 BIT15: 轉矩設定值																																										
變頻器在運行狀態下，參數顯示受F6.01限制，即為一個16位的二進位數字，如果某一位為1，則該位對應的參數就可在運行時，通過SHIFT鍵查看。如果該位為0，則該位對應的參數將不會顯示。設置功能碼F6.01時，要將二進位數字轉換成十六進位數，輸入該功能碼。 如：選擇監視負載速度，應將 F6.01 第 15 位設置為 1；選擇監視 A11 電壓，應將 F6.01 第 9 位設置為 1，依此類推。假設按使用要求將所有相對的位置設為 1 後得到如下資料：																																												
<table border="1"> <tr> <td>位號</td> <td>15</td> <td>14</td> <td>13</td> <td>12</td> <td>11</td> <td>10</td> <td>9</td> <td>8</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td>數值</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </table>					位號	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	數值	0	1	1	1	1	0	1	0	0	1	0	0	1	1	1	1						
位號	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																												
數值	0	1	1	1	1	0	1	0	0	1	0	0	1	1	1	1																												
把數據按 4 位元一組分成四組：																																												
<table border="1"> <tr> <td>位號</td> <td>15-12</td> <td>11-8</td> <td>7-4</td> <td>3-0</td> </tr> <tr> <td>數值</td> <td>0111</td> <td>1010</td> <td>0100</td> <td>1111</td> </tr> </table>					位號	15-12	11-8	7-4	3-0	數值	0111	1010	0100	1111																														
位號	15-12	11-8	7-4	3-0																																								
數值	0111	1010	0100	1111																																								
然後把資料按下表(二進位十六進位數值對照表)核對出結果為 0x7A4F。																																												
<table border="1"> <thead> <tr> <th>二進制</th> <th>十六進制</th> <th>二進制</th> <th>十六進制</th> <th>二進制</th> <th>十六進制</th> <th>二進制</th> <th>十六進制</th> </tr> </thead> <tbody> <tr> <td>0000</td> <td>0</td> <td>0100</td> <td>4</td> <td>1000</td> <td>8</td> <td>1100</td> <td>C</td> </tr> <tr> <td>0001</td> <td>1</td> <td>0101</td> <td>5</td> <td>1001</td> <td>9</td> <td>1101</td> <td>D</td> </tr> <tr> <td>0010</td> <td>2</td> <td>0110</td> <td>6</td> <td>1010</td> <td>A</td> <td>1110</td> <td>E</td> </tr> <tr> <td>0011</td> <td>3</td> <td>0111</td> <td>7</td> <td>1011</td> <td>B</td> <td>1111</td> <td>F</td> </tr> </tbody> </table>					二進制	十六進制	二進制	十六進制	二進制	十六進制	二進制	十六進制	0000	0	0100	4	1000	8	1100	C	0001	1	0101	5	1001	9	1101	D	0010	2	0110	6	1010	A	1110	E	0011	3	0111	7	1011	B	1111	F
二進制	十六進制	二進制	十六進制	二進制	十六進制	二進制	十六進制																																					
0000	0	0100	4	1000	8	1100	C																																					
0001	1	0101	5	1001	9	1101	D																																					
0010	2	0110	6	1010	A	1110	E																																					
0011	3	0111	7	1011	B	1111	F																																					
F6.02	停機狀態顯示的參數選擇	1~0x3FF BIT0: 設定頻率 BIT1: 母線電壓 BIT2: 輸入端子狀態 BIT3: 輸出端子狀態 BIT4: CAD給定值 BIT5: CAD回饋值 BIT6: 模擬量A11值 BIT7: 模擬量A12值 BIT8: 多段速當前段數 BIT9: 轉矩設定值 BIT10~ BIT15: 保留	0FF	☆																																								
該功能的設置與F6.01的設置相同。CA SERIES系列變頻器處於停機狀態時，參數的顯示受該功能碼作用。																																												

F6.03	轉速顯示係數	0.1~999.9% 機械轉速=120*運行頻率*F6.03/電機極數	100.0%	☆
機械轉速=120*運行頻率*F6.03/電機極數，本功能碼用於校正轉速刻度顯示誤差，對實際轉速沒有影響。				

5-2-9. F7 組 協助工具組

代碼	參數名稱	設定範圍	出廠值	更改	
F7.00	寸動運行頻率	0.00~F0.08(最大輸出頻率)	5.00Hz	☆	
F7.01	寸動運行加速時間	0.1~3600.0s	機型確定	☆	
F7.02	寸動運行減速時間	0.1~3600.0s	機型確定	☆	
定義寸動運行時變頻器的給定頻率及加減速時間。寸動運行中的起停方式為：直接啟動方式和停機方式為減速停機(F3.05=0)。 寸動加速時間指變頻器從0Hz加速到最大輸出頻率(F0.08)所需時間。 寸動減速時間指變頻器從最大輸出頻率(F0.08)減速到0Hz所需時間。					
F7.03	加速時間2	0.1~3600.0s	機型確定	☆	
F7.04	減速時間2	0.1~3600.0s	機型確定	☆	
CA SERIES提供兩組加減速時間。其含義均相同，請參考F0.05和F0.06相關說明。 通過多功能數位輸入端子DI設置，切換在加減速時間1和加減速時間2。具體使用方法請參考功能碼F1.00~F1.05中相關說明。					
F7.05	跳躍頻率	0.00~F0.08(最大輸出頻率)	0.00Hz	☆	
F7.06	跳躍頻率幅度	0.00~F0.08(最大輸出頻率)	0.00Hz	☆	
當設定頻率在跳躍頻率範圍內時，實際運行頻率將是跳躍頻率邊界。 通過設置跳躍頻率，使變頻器避開負載的機械共振點。本變頻器可設置1個跳躍頻率點。若將跳躍頻率點均設為0，則此功能不起作用。					
<p style="text-align: center;">5-14. 跳躍頻率示意圖</p>					
F7.07	加減速過程中跳躍頻	無效	0	0	☆

	率是否有效	有效	1	
<p>該功能碼用於設置，在加減速過程中，跳躍頻率是否有效。 設定為有效時，當運行頻率在跳躍頻率範圍時，實際運行頻率會跳過設定的跳躍頻率邊界。</p>				
<p>5-15. 加減速過程中跳躍頻率有效示意圖</p>				
F7.08	正反轉靜區時間	0.0~3600.0s	機型確定	☆
<p>設定變頻器正反轉過渡過程中，在輸出零頻處的過渡時間。</p>				
<p>5-16. 正反轉靜區時間示意圖</p>				
F7.09	上電端子運行保護選擇	上電時端子運行命令無效 上電時端子運行命令有效	0 1	0 ☆
<p>在運行指令通道為端子控制時，變頻器上電過程中，系統會自動檢測運行端子的狀態。 上電時端子運行命令無效。即使在上電的過程中，檢測到運行命令端子有效，變頻器也不會運行，系統處於運行保護狀態，直到撤銷該運行命令端子，然後再使能該端子，變頻器才會運行。 上電時端子運行命令有效。即變頻器在上電的過程中，如果檢測到運行命令端子有效，等待初始化完成以後，系統會自動啟動變頻器運行。 注意，用戶一定要慎重選擇該功能，可能會造成嚴重的後果。</p>				
F7.10	FDT電平檢測值	0.00~ F0.08(最大輸出頻率)	50.00Hz	☆
F7.11	FDT滯後檢測值	0.0~100.0%(FDT電平)	5.0%	☆
<p>當輸出頻率超過某一設定頻率FDT電平時輸出指示信號直到輸出頻率下降到低於</p>				

<p>FDT電平的某一頻率(FDT電平-FDT滯後檢測值)。</p>				
<p>5-17. FDT電平滯後檢測示意圖</p>				
<p>當輸出頻率超過某一設定頻率FDT電平時輸出指示信號直到輸出頻率下降到低於FDT電平的某一頻率(FDT電平-FDT滯後檢測值)。</p>				
<p>5-18. FDT電平示意圖</p>				
F7.12	頻率到達檢出幅度	0.0~100.0%(設定頻率)	0.0%	☆
<p>當變頻器的輸出頻率在設定頻率的正負檢出寬度內輸出脈衝信號，具體如下圖示：</p>				
<p>5-19. 頻率到達檢出幅值示意圖</p>				

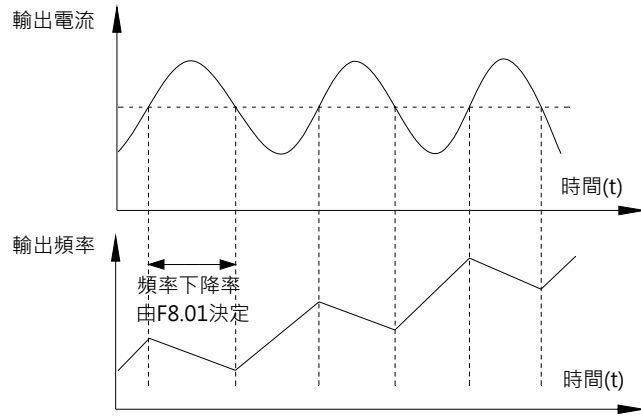
F7.13	制動閥值電壓	115.0~140.0%(標準母線電壓)--電壓等級220V	120%	☆
		115.0~140.0%(標準母線電壓)--電壓等級380V	130%	

該功能碼是設置能耗制動的起始母線電壓，適當調整該值可有效對負載進行制動。

5-2-10. F8 組 故障與保護組

代碼	參數名稱	設定範圍	出廠值	更改
F8.00	自動限流水平	100~200%	160%	☆
F8.01	限流時頻率下降率	0.00~100.00Hz/s	10.00Hz/s	☆

變頻器在運行過程中，由於負載過大，電機轉速的實際上升率低於輸出頻率的上升率，如果不採取措施，則會造成加速過流故障而引起變頻器跳閘。自動限流功能在變頻器運行過程中通過檢測輸出電流，並與F8.00定義的限流水平點進行比較，如果超過限流水平點，變頻器輸出頻率按照過流頻率下降率(F8.01)進行下降，當再次檢測輸出電流低於限流水平點後，再恢復正常運行。



5-20. 限流時頻率下降率示意圖

F8.02	限流動作選擇	限流一直有效	0	0	☆
		限流恆速時無效	1		

自動限流功能在加減速狀態下始終有效，恆速運行時自動限流功能是否有效由自動限流動作選擇(F8.02)決定。
 F8.02=0表示恆速運行時，自動限流有效；
 F8.02=1表示恆速運行時，自動限流無效。
 在自動限流動作時，輸出頻率可能會有所變化，所以對要求恆速運行時輸出頻率較穩定的場合，不宜使用自動限流功能。
 當自動限流有效時，由於限流水平的較低設置，可能會影響變頻器超載能力。

F8.03	電機超載保護選擇	不保護	0	2	★
		普通電機(帶低速補償)	1		
		變頻電機(不帶低速補償)	2		

0：不保護。沒有電機超載保護特性(謹慎使用)，此時，變頻器對負載電機沒有過載保護。
 1：普通電機(帶低速補償)。由於普通電機在低速情況下的散熱效果變差，相應的電子熱保護值也應作適當調整，這裡所說的帶低速補償特性，就是把運行頻率低於30Hz的電機超載保護閥值下調。
 2：變頻電機(不帶低速補償)。由於變頻專用電機的散熱不受轉速影響，不需要進行低速運行時的保護值調整。

F8.04	電機超載保護電流	20.0%~120.0%(電機額定電流)	100.0%	☆
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對電機超載進行保護，電機超載保護電流計算公式：
 電機額定電流*F8.04*158%，持續10分鐘報警電機超載；
 電機額定電流*F8.04*200%，持續1分鐘報警電機超載。

F8.05	過壓失速保護	禁止	0	0	☆
		允許	1		

變頻器減速運行過程中，由於負載慣性的影響，可能會出現電機轉速的實際下降率低於輸出頻率的下降率，此時，電機會回饋電能給變頻器，造成變頻器的母線電壓上升，如果不採取措施，則會引起母線電壓升高造成變頻器跳過壓故障。

F8.06	過壓失速保護電壓	110~150%(220V系列)	115%	☆
		110~150%(380V系列)	130%	

過壓失速保護是在變頻器減速運行過程中通過檢測母線電壓，並與F8.06(相對於標準母線電壓)定義的過壓失速點進行比較，如超過過壓失速點，變頻器輸出頻率停止下降，直到檢測母線電壓低於過壓失速點後，再繼續減速。

F8.07	故障自動重置次數	0~3	0	☆
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F8.08	故障自動重置間隔時間設置	0.1~100.0s	1.0s	☆
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故障自動重置次數：當變頻器選擇故障自動重置時，用來設定可自動復位的次數。當變頻器連續復位次數超過此值，則變頻器故障待機，需要人工干預。
 故障自動重置間隔時間設置：選擇從故障發生到自動重置動作之間的時間間隔。

F8.09	瞬間斷電降頻點	70.0~110.0%(標準母線電壓)	80.0%	☆
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F8.10	瞬間斷電頻率下降率	0.00Hz/s~F0.08(最大輸出頻率)	0.00Hz/s	☆
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5-2-11. F9 組 通訊參數組

代碼	參數名稱	設定範圍	出廠值	更改
F9.00	通訊串列傳輸速率設置	1200bps	0	3 ☆
		2400bps	1	
		4800bps	2	
		9600bps	3	
		19200bps	4	
		38400bps	5	
此參數用來設定上位機與變頻器之間的資料傳輸速率。注意，上位機與變頻器設定的串列傳輸速率必須一致，否則，通訊無法進行。串列傳輸速率越大，通訊速度越快。				
F9.01	資料位元校驗設置	0:無校驗(N, 8, 1) for RTU 1:偶校驗(E, 8, 1) for RTU 2:奇數同位檢查(0, 8, 1) for RTU 3:無校驗(N, 8, 2) for RTU 4:偶校驗(E, 8, 2) for RTU 5:奇數同位檢查(0, 8, 2) for RTU 6:無校驗(N, 7, 1) for ASCII 7:偶校驗(E, 7, 1) for ASCII 8:奇數同位檢查(0, 7, 1) for ASCII 9:無校驗(N, 7, 2) for ASCII 10:偶校驗(E, 7, 2) for ASCII 11:奇數同位檢查(0, 7, 2) for ASCII 12:無校驗(N, 8, 1) for ASCII 13:偶校驗(E, 8, 1) for ASCII 14:奇數同位檢查(0, 8, 1) for ASCII 15:無校驗(N, 8, 2) for ASCII 16:偶校驗(E, 8, 2) for ASCII 17:奇數同位檢查(0, 8, 2) for ASCII	1	☆
上位機與變頻器設定的資料格式必須一致，否則，通訊無法進行。				
F9.02	本機通訊位址	1~247, 0為廣播地址	1	☆

當主機在編寫幀中，從機通訊位址設定為0時，即為廣播通訊位址，MODBUS匯流排上的所有從機都會接受該幀，但從機不做應答。注意，從機位址不可設置為0。
本機通訊位址在通訊網路中具有唯一性，這是實現上位機與變頻器點對點通訊的基礎。

F9.03	通訊應答延時	0~200ms	5ms	☆
應答延時：是指變頻器資料接受結束到向上位機發送應答資料的中間間隔時間。如果應答延時小於系統處理時間，則應答延時以系統處理時間為準，如應答延時長於系統處理時間，則系統處理完資料後，要延遲等待，直到應答延遲時間到，才往上位機發送資料。				
F9.04	通訊超時故障時間	0.0(無效); 0.1~100.0s	0.0s	☆
當該功能碼設置為0.0s時，通訊超時時間參數無效。 當該功能碼設置成有效值時，如果一次通訊與下一次通訊的間隔時間超出通訊超時時間，系統將報通訊故障錯誤(E. CE)。 通常情況下，都將其設置成無效。如果在連續通訊的系統中，設置此參數，可以監視通訊狀況。				
F9.05	資料傳送格式選擇	0：非標準的MODBUS協定 1：標準的MODBUS協定 2：ASCII	0	☆
F9.06	傳輸錯誤處理	報警並自由停車	0	1 ☆
		不報警並繼續運行	1	
		不報警按停機方式停機 (僅通訊控制方式下)	2	
		不報警按停機方式停機 (所有控制方式下)	3	
變頻器在通訊異常情況下可以通過設置通訊錯誤處理動作選擇是遮罩E. CE故障、停機或保持繼續運行。				
F9.07	傳輸回應處理	0：寫操作有回應 1：寫操作無回應	0	☆
當該功能碼LED個位設置為0時，變頻器對上位機的讀寫命令都有回應。 當該功能碼LED個位設置為1時，變頻器對上位機的僅對讀命令都有回應，對寫命令無回應，通過此方式可以提高通訊效率。 當該功能碼LED十位設置為0時，變頻器將對通訊設定值不進行斷電存儲。				

5-2-12. FA 組 轉矩控制組

代碼	參數名稱	設定範圍	出廠值	更改
FA.00	轉矩設定方式選擇	鍵盤設定 (FA.01)	0	☆

		模擬量AI1設定 (100%相對於2倍變頻器額定電流)	1		
		模擬量AI2設定 (同1)	2		
		面板電位器設定 (同1)	3		
		模擬量AI1+AI2設定 (同1)	4		
		多段速設定 (同1)	5		
		遠端通訊設定 (同1)	6		
<p>僅在當F0.00=3時，轉矩控制有效，FA.00功能碼才有效。轉矩控制時，變頻器按設定的轉矩指令輸出轉矩，輸出頻率受上限頻率限制，當負載速度大於設定的上限頻率時，變頻器輸出頻率受限，輸出轉矩將與設定轉矩不相同。</p> <p>當轉矩指令為鍵盤設定時 (FA.00=0時)，通過設置功能碼FA.01來得到轉矩指令。當轉矩設定為負數時，電機將反轉。類比量、多段速和通訊設定，輸入設定的100.0%對應2倍變頻器額定電流，-100.0%對應2倍變頻器額定電流。</p> <p>可通過多功能輸入端子在轉矩控制和速度控制之間進行切換。</p> <p>當變頻器設定轉矩大於負載轉矩，變頻器輸出頻率會上升，當變頻器輸出頻率達到頻率上限時，變頻器一直以上限頻率運行。</p> <p>當變頻器設定轉矩小於負載轉矩，變頻器輸出頻率會下降，當變頻器輸出頻率達到頻率下限時，變頻器一直以下限頻率運行。</p> <p>注意：停機時，變頻器自動從轉矩控制切換到速度控制。</p>					
FA.01	鍵盤設定轉矩	-200.0%~200.0%(變頻器額定電流)	50.0%	☆	
FA.02	低速狀態轉矩補償	0.000~1.000	0.050	☆	
FA.03	高速狀態轉矩補償	0.000~1.000	0.000	☆	
<p>低速轉矩補償是為了克服摩擦力，以F5.02為分界點，低於F5.02的轉矩補償量為FA.02的值。</p> <p>高速轉矩補償是為了克服摩擦力，以F5.05為分界點，高於F5.05的轉矩補償量為FA.03的值。</p> <p>當設置在F5.02和F5.05之間時，補償量呈線性變化。</p>					

5-2-13. Fb 組 控制優化組

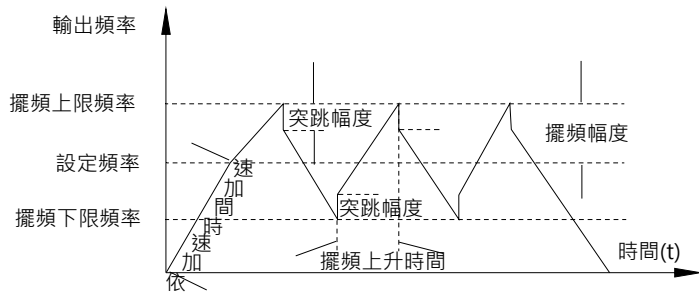
代碼	參數名稱	設定範圍	出廠值	更改
Fb.00	軟體過流點	0~2000A	機型確定	★
Fb.01	軟體欠壓點	0~500V	機型確定	★
Fb.02	軟體過壓點	300~800V	機型確定	★
<p>注意：調整該參數容易影響變頻器保護功能，建議用戶不要隨意更改 Fb.00~Fb.02 參數。</p>				
Fb.03	抑制振盪低頻閾值點	0~500	5	☆

Fb.04	抑制振盪高頻閾值點	0~500	100	☆	
<p>但大多數電機在某些頻率段運行時容易出現電流震盪，輕者電機不能穩定運行，重者會導致變頻器過流。當Fb.07=0時使能抑制振盪，Fb.03，Fb.04設置較小時，抑制振盪效果比較明顯，電流增加較明顯，設置較大時，抑制振盪效果比較弱。</p>					
Fb.05	抑制振盪限幅值	0~10000	5000	☆	
<p>通過設定Fb.05可以限制抑制振盪時的大電壓提升值。</p>					
Fb.06	抑制振盪高低頻分界頻率	0.00Hz~F0.08(最大輸出頻率)	12.50Hz	☆	
<p>Fb.06為功能碼Fb.03和Fb.04的分界點。</p>					
Fb.07	抑制振盪	抑制振盪有效	0	1	☆
		抑制振盪無效	1		
<p>抑制振盪功能是針對VF控制而言的，普通電機在空載或輕載運行時經常會出現電流振盪現象，導致電機運行不正常，嚴重的會讓變頻器過流。Fb.07=0時將使能抑制振盪功能，頻器會按照Fb.03~Fb.06功能組的參數對電機出現的振盪進行抑制。</p>					
Fb.08	PWM選擇	PWM模式1	0	0	★
		PWM模式2	1		
		PWM模式3	2		
<p>PWM模式1為：V/F控制小於8Hz為七段式，大於12Hz為五段式。 PWM模式2為：V/F控制全程用七段式。 PWM模式3為：V/F控制全程用五段式。</p>					
Fb.09	節能運行選擇	不動作	0	0	★
		自動節能運行	1		
<p>電機在空載或輕載過程中恆速運行時，變頻器通過檢查負載電流，調整輸出電壓，達到自動節能的目的是。</p>					
Fb.10	靜區時間	2~5	機型確定		

5-2-14. E0 組 擺頻控制組

代碼	參數名稱	設定範圍	出廠值	更改
E0.00	擺頻幅度	0.0~100.0%(相對設定頻率)	0.0%	☆
E0.01	突跳頻率幅度	0.0~50.0%(相對擺頻幅度)	0.0%	☆
E0.02	擺頻上升時間	0.1~3600.0s	5.0s	☆
E0.03	擺頻下降時間	0.1~3600.0s	5.0s	☆

擺頻功能適用於紡織、化纖等行業及需要橫動、捲繞功能的場合。如圖5-21
擺頻功能是指變頻器輸出頻率以設定頻率為中心進行上下擺動，運行頻率在時間軸的軌跡如下圖所示，其中擺動幅度由E0.00設定，當E0.00設為0時，即擺幅為0，擺頻不起作用。



5-21 擺頻運行示意圖

擺頻幅度：擺頻運行頻率受上、下限頻率約束。
擺幅相對於中心頻率(設定頻率)：擺幅AW = 中心頻率 × 擺幅幅度E0.00。
突跳頻率 = 擺幅AW × 突跳頻率幅度E0.01即擺頻運行時，突跳頻率相對於擺幅的值。
擺頻上升時間：從擺頻的最低點運行到最高點所用的時間。
擺頻下降時間：從擺頻的最高點運行到最低點所用的時間。

5-2-15. E1 組 多段速控制組

代碼	參數名稱	設定範圍	出廠值	更改
E1.00	多段速0	-100.0%~100.0%	0.0%	☆
E1.01	多段速1	-100.0%~100.0%	0.0%	☆
E1.02	多段速2	-100.0%~100.0%	0.0%	☆
E1.03	多段速3	-100.0%~100.0%	0.0%	☆
E1.04	多段速4	-100.0%~100.0%	0.0%	☆
E1.05	多段速5	-100.0%~100.0%	0.0%	☆
E1.06	多段速6	-100.0%~100.0%	0.0%	☆
E1.07	多段速7	-100.0%~100.0%	0.0%	☆
E1.08	多段速8	-100.0%~100.0%	0.0%	☆
E1.09	多段速9	-100.0%~100.0%	0.0%	☆
E1.10	多段速10	-100.0%~100.0%	0.0%	☆
E1.11	多段速11	-100.0%~100.0%	0.0%	☆
E1.12	多段速12	-100.0%~100.0%	0.0%	☆

E1.13	多段速13	-100.0%~100.0%	0.0%	☆
E1.14	多段速14	-100.0%~100.0%	0.0%	☆
E1.15	多段速15	-100.0%~100.0%	0.0%	☆

多段速度運行時的啟動停車通道選擇同樣由功能碼F0.02確定，多段速過程由端子1、端子2、端子3、端子4組合控制。多段速度段的關係如下表所示。

多段速與多段速端子的關係：

多段速端子4	多段速端子3	多段速端子2	多段速端子1	指令設定	對應參數
OFF	OFF	OFF	OFF	多段速指令0	E1.00
OFF	OFF	OFF	ON	多段速指令1	E1.01
OFF	OFF	ON	OFF	多段速指令2	E1.02
OFF	OFF	ON	ON	多段速指令3	E1.03
OFF	ON	OFF	OFF	多段速指令4	E1.04
OFF	ON	OFF	ON	多段速指令5	E1.05
OFF	ON	ON	OFF	多段速指令6	E1.06
OFF	ON	ON	ON	多段速指令7	E1.07
ON	OFF	OFF	OFF	多段速指令8	E1.08
ON	OFF	OFF	ON	多段速指令9	E1.09
ON	OFF	ON	OFF	多段速指令10	E1.10
ON	OFF	ON	ON	多段速指令11	E1.11
ON	ON	OFF	OFF	多段速指令12	E1.12
ON	ON	OFF	ON	多段速指令13	E1.13
ON	ON	ON	OFF	多段速指令14	E1.14
ON	ON	ON	ON	多段速指令15	E1.15

當頻率源選擇為多段速時，功能碼E1.00~E1.15的100.0%，對應最大輸出頻率F0.08。

多段指令除作為多段速功能外，還可以作為CAD的給定源等，以滿足需要在不同給定值之間切換的需求。

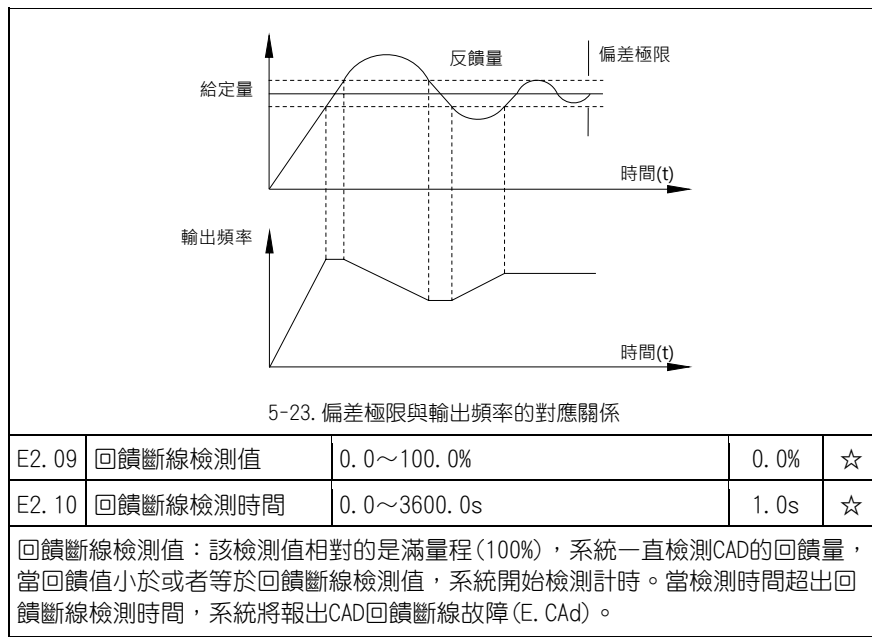
E1.16	0段給定方式	功能碼E1.00給定	0	0	☆
		模擬量A11給定	1		
		模擬量A12給定	2		
		面板電位器給定	3		
		CAD控制給定	4		
鍵盤設定頻率(F0.01)	5				

此參數決定多段指令0的給定通道。
多段指令0除了可以選擇E1.00外，還有多種其他選項，方便在多段指令與其他給定方式之間切換。

5-2-16. E2 組 CAD 控制組

代碼	參數名稱	設定範圍	出廠值	更改	
E2.00	CAD給定源選擇	鍵盤給定(E2.01)	0	0	☆
		類比頻道A11給定	1		
		類比頻道A12給定	2		
		面板電位器給定	3		
		遠端通訊給定	4		
		多段速給定	5		
<p>當頻率源選擇CAD時，即F0.02選擇為6，該組功能起作用。此參數決定過程CAD的目標量給定通道。 過程CAD的設定目標量為相對值，設定的100%對應於被控系統的回饋信號的100%。系統始終按相對值(0~100.0%)進行運算的。 注意：多段速給定，可以通過設置E1組的參數實現。</p>					
E2.01	鍵盤預置CAD給定	0.0%~100.0%	50.0%	☆	
<p>選擇E2.00=0時，即目標源為鍵盤給定，需設定此參數。 此參數的基準值為系統的回饋量。</p>					
E2.02	CAD回饋源選擇	類比頻道A11回饋	0	0	☆
		類比頻道A12回饋	1		
		面板電位器回饋	2		
		A11-A12回饋	3		
		遠端通訊回饋	4		
		A11+A12回饋	5		
		MAX(A11 , A12)	6		
MIN(A11 , A12)	7				
<p>通過此參數來選擇CAD回饋通道。 注：給定通道和回饋通道不能重合，否則，CAD不能有效控制。</p>					
E2.03	CAD輸出特性選擇	CAD輸出為正特性	0	0	☆
		CAD輸出為負特性	1		
<p>CAD輸出為正特性，當回饋信號大於CAD的給定，要求變頻器輸出頻率下降，才能使CAD達到平衡。如收卷的張力CAD控制。 CAD輸出為負特性，當回饋信號大於CAD的給定，要求變頻器輸出頻率上升，才能使CAD達到平衡。如放卷的張力CAD控制。</p>					
E2.04	比例增益(Kp)	0.00~100.00	1.00	☆	

E2.05	積分時間(Ti)	0.01~10.00s	0.10s	☆
E2.06	微分時間(Td)	0.00~10.00s	0.00s	☆
<p>比例增益(Kp)：決定整個CAD調節器的調節強度，P越大，調節強度越大。該參數為100表示當CAD回饋量和給定量的偏差為100%時，CAD調節器對輸出頻率指令的調節幅度為最大輸出頻率(忽略積分作用和微分作用)。 積分時間(Ti)：決定CAD調節器對CAD回饋量和給定量的偏差進行積分調節的快慢。積分時間是指當CAD回饋量和給定量的偏差為100%時，積分調節器(忽略比例作用和微分作用)經過該時間連續調整，調整量達到最大輸出頻率(F0.08)。積分時間越短調節強度越大。 微分時間(Td)：決定CAD調節器對CAD回饋量和給定量的偏差的變化率進行調節的強度。微分時間是指若回饋量在該時間內變化100%，微分調節器的調整量為最大輸出頻率(F0.08)(忽略比例作用和積分作用)。微分時間越長調節強度越大。 CAD是程序控制中最常用的控制方法，其每一部分所起的作用各不相同，下面對工作原理簡要和調節方法簡單介紹： 比例調節(P)：當回饋與給定出現偏差時，輸出與偏差成比例的調節量，若偏差恆定，則調節量也恆定。比例調節可以快速回應回饋的變化，但單純用比例調節無法做到無差控制。比例增益越大，系統的調節速度越快，但若過大會出現振盪。調節方法為先將積分時間設很長，微分時間設為零，單用比例調節使系統運行起來，改變給定量的大小，觀察回饋信號和給定量的穩定的偏差(靜差)，如果靜差在給定量改變的方向上(例如增加給定量，系統穩定後回饋量總小於給定量)，則繼續增加比例增益，反之則減小比例增益，重複上面的過程，直到靜差比較小(很難做到一點靜差沒有)就可以了。 積分時間(I)：當回饋與給定出現偏差時，輸出調節量連續累加，如果偏差持續存在，則調節量持續增加，直到沒有偏差。積分調節器可以有效地消除靜差。積分調節器過強則會出現反復的超調，使系統一直不穩定，直到產生振盪。由於積分作用過強引起的振盪的特點是，回饋信號在給定量的上下擺動，擺幅逐步增大，直至振盪。積分時間參數的調節一般由大到小調，逐步調節積分時間，觀察系統調節的效果，直到系統穩定的速度達到要求。 微分時間(D)：當回饋與給定的偏差變化時，輸出與偏差變化率成比例的調節量，該調節量只與偏差變化的方向和大小有關，而與偏差本身的方向和大小無關。微分調節的作用是在回饋信號發生變化時，根據變化的趨勢進行調節，從而抑制回饋信號的變化。微分調節器請謹慎使用，因為微分調節容易放大系統的干擾，尤其是變化頻率較高的干擾。</p>				
E2.07	採樣週期(T)	0.01~100.00s	0.10s	☆
E2.08	CAD控制偏差極限	0.0~100.0%	0.0%	☆
<p>採樣週期(T)：指對回饋量的採樣週期，在每個採樣週期內調節器運算一次。採樣週期越大回應越慢。 CAD控制偏差極限：CAD系統輸出值相對於閉環給定值允許的最大偏差量，如圖所示，在偏差極限內，CAD調節器停止調節。合理設置該功能碼可調節CAD系統的精度和穩定性。</p>				



5-2-17. E3 組 虛擬 DI、虛擬 DO 組

代碼	參數名稱	設定範圍	出廠值	更改	
E3.00	VDI1 功能選擇	0~25	0	★	
E3.01	VDI2功能選擇	0~25	0	★	
E3.02	VDI3功能選擇	0~25	0	★	
E3.03	VDI4功能選擇	0~25	0	★	
E3.04	VDI5功能選擇	0~25	0	★	
虛擬VDI1~VDI5在功能上，與控制板上DI完全相同，可以作為多功能數位量輸入使用，詳細設置請參考F1.00~F1.05的介紹。					
E3.05	VDI有效模式	個位	虛擬VDI1	00000	☆
		無效	0		
		有效	1		
		十位	虛擬VDI2(同個位)		
		百位	虛擬VDI3(同個位)		
		千位	虛擬VDI4(同個位)		
萬位	虛擬VDI5(同個位)				

E3.06	VDI 狀態設置	個位	虛擬VDI1	11111	★
		由虛擬VDOx的狀態決定VDI是否有效	0		
		由功能碼E3.05的狀態決定VDI是否有效	1		
		十位	虛擬VDI2(同個位)		
		百位	虛擬VDI3(同個位)		
		千位	虛擬VDI4(同個位)		
		萬位	虛擬VDI5(同個位)		
<p>與普通的數位量輸入端子不同，虛擬VDI的狀態可以有兩種設定方式，由E3.06來選擇。</p> <p>當選擇VDI狀態由相應的虛擬VDO的狀態決定時，VDI是否為有效狀態，取決於VDO輸出為有效或無效，且VDIx唯一綁定VDOx(x為1~5)。</p> <p>當選擇VDI狀態選擇功能碼設定時，通過E3.05的二進位位元，分別確定虛擬輸入端子的狀態。</p> <p>下面舉例說明VDI的使用方法。例1，實現如下功能：“運行頻率到達後，變頻器自由停車”。採用如下設置方法：設置VDI的狀態選擇由VDO決定，設置VDI1的功能為“自由停車”(E3.00=8)；設置VDI1端子有效狀態模式為由VDO1確定(E3.06=xxx0)；設置VDO1輸出功能為“頻率到達”(E3.11=5)；則當變頻器運行到達設定頻率時，則VDO1為ON狀態，此時VDI1輸入端子狀態有效，變頻器VDI1接收到自由停車，變頻器會自由停機。</p> <p>例2，實現如下功能：“變頻器上電後，自動進入運行狀態”。可以採用如下設置方法：由功能碼E3.05設定VDI狀態，設置VDI1的功能為“正轉運行”(E3.00=1)；設置VDI1端子有效狀態模式為由功能碼設置(E3.06=xxx1)；設置VDI1端子狀態為有效(E3.05=xxx1)；設置命令源為“端子控制”(F0.04=1)；設置啟動保護選擇為“端子命令有效”(F7.09=1)；</p> <p>2則變頻器上電完成初始化後，檢測到VDI1為有效，且此端子對應正轉運行，相當於變頻器接收到一個端子正轉運行命令，變頻器隨即開始正轉運行。</p>					
E3.07	AI1_DI功能	0~25	0	★	
E3.08	AI2_DI功能選擇	0~25	0	★	
E3.09	面板電位器_DI功能	0~25	0	★	
E3.10	AI_DI 模式	個位：AI1 0：高電平有效；1：低電平有效 十位：AI2(同個位) 百位：面板電位器(同個位)	000	★	
<p>此組功能碼用於將AI當做DI使用，當AI作為DI使用時，AI輸入電壓大於7V時，AI端子狀態為高電平，當AI輸入電壓低於3V時，AI端子狀態為低電平。3V~7V之間為滯環E3.10用來確定AI作為DI時，AI高電平為有效狀態，還是低電</p>					

平為有效狀態。至於AI作為DI時的功能設置，與普通DI設置相同，請參考F1組相關DI設置的說明。				
E3.11	VDO1輸出功能	0~10	0	☆
E3.12	VDO2輸出功能	0~10	0	☆
E3.13	VDO3輸出功能	0~10	0	☆
E3.14	VDO4輸出功能	0~10	0	☆
E3.15	VDO5輸出功能	0~10	0	☆
E3.16	VDO 有效狀態	個位：VDO1 0：正邏輯；：反邏輯 十位：VDO2(同個位) 百位：VDO3(同個位) 千位：VDO4(同個位) 萬位：VDO5(同個位)	00000	☆
E3.17	VDO1延遲時間	0.0s~3600.0s	0.0s	☆
E3.18	VDO2延遲時間	0.0s~3600.0s	0.0s	☆
E3.19	VDO3延遲時間	0.0s~3600.0s	0.0s	☆
E3.20	VDO4延遲時間	0.0s~3600.0s	0.0s	☆
E3.21	VDO5延遲時間	0.0s~3600.0s	0.0s	☆
<p>VDO 與 DO 輸出功能相似，用於與 VDIx 配合，實現一些簡單的邏輯控制。</p> <p>當VDOx輸出功能選擇為0時，VDO1~VDO5的輸出狀態由控制板上的DI1~DI5輸入狀態確定，此時VDOx與VDIx一一對應。</p> <p>當VDOx輸出功能選擇不是0時，VDOx的功能設置及使用方法，與F2組DO輸出相關參數相同，請參考F2組相關參數說明。</p> <p>同樣的VDOx的輸出有效狀態可以通過E3.16的設置，選擇正邏輯或者反邏輯。</p>				

5-2-18. b0 組 電機參數組

代碼	參數名稱	設定範圍	出廠值	更改
b0.00	變頻器類型	0：G型機(恆轉矩負載機型) 1：保留	0	★
b0.01	電機額定功率	0.4~900.0kW	機型確定	★
b0.02	電機額定電壓	0~460V	機型確定	★
b0.03	電機額定電流	0.1~2000.0A	機型確定	★
b0.04	電機額定頻率	0.01Hz~F0.08(最大輸出頻率)	50.00Hz	★

b0.05	電機額定轉速	0~36000rpm	機型確定	★
<p>注意：請按照電機的銘牌參數進行設置。向量控制的優良控制性能，需要準確的電機參數。</p> <p>變頻器提供參數自學習功能。準確的參數自學習來源於電機銘牌參數的正確輸入。</p> <p>為了保證控制性能，請儘量保證變頻器與電機功率匹配，若二者差距過大，變頻器控制性能將明顯下降。</p> <p>注意：重新設置電機額定功率(b0.01)，會初始化b0.06~b0.10電機參數。</p>				
b0.06	電機定子電阻	0.001~65.535Ω	機型確定	★
b0.07	電機轉子電阻	0.001~65.535Ω	機型確定	★
b0.08	電機定、轉子電感	0.1~6553.5mH	機型確定	★
b0.09	電機定、轉子互感	0.1~6553.5mH	機型確定	★
b0.10	電機空載電流	0.01~655.35A	機型確定	★
<p>電機參數自學習正常結束後，b0.06~b0.10的設定值將自動更新。這些參數是高性能向量控制的基準參數，對控制的性能有著直接的影響。</p> <p>注意：用戶不要隨意更改該組參數。</p>				
b0.11	電機參數自學習	0：無操作 1：參數靜止自學習 2：參數全面自學習	0	☆
<p>0：無操作。</p> <p>1：靜止參數自學習：電機靜止參數自學習時，不必將電機與負載脫開，電機參數自學習前，必須正確輸入電機銘牌參數(b0.01~b0.05)，自學習後將檢測出電機的定子電阻。而電機的互感和空載電流將無法測量，使用者可根據經驗輸入相應數值。</p> <p>2：旋轉參數自學習：電機參數自學習前，必須正確輸入電機銘牌參數(b0.01~b0.05)，並將電機與負載脫開，使電機處於靜止、空載狀態，否則電機參數自學習的結果有可能不正確。</p> <p>電機參數自學習前，應根據電機的慣量大小適當設置加、減速時間(F0.05、F0.06)，否則電機參數自學習過程中有可能出現過流、過壓故障。</p> <p>設定b0.11為2然後按ENTER鍵，開始電機參數自學習狀態，此時LED顯示“-TUN-”並閃爍，按RUN開始進行參數自學習，此時顯示“-TUN-0~-TUN-3”後，TUN-4電機開始運行。當參數自學習結束後，顯示“-END-”，最後顯示回到停機狀態介面。當“-TUN-”閃爍時可按PRG退出參數自學習狀態。</p> <p>參數自學習的過程中可以按STOP/RESET鍵終止參數自學習操作。</p> <p>注意：參數自學習的啟動與停止只能由鍵盤控制；參數自學習完成以後，該功能碼自動恢復到0。</p>				

5-2-19. y0 組 功能碼管理組

代碼	參數名稱	設定範圍	出廠值	更改
y0.00	功能參數恢復	0：無操作 1：恢復出廠值，不包括電機參數 2：清除故障檔案 3：恢復出廠值，包括電機參數 4：備份參數 5：恢復備份	0	★
0：無操作 1：變頻器將參數恢復缺省值，不包含電機參數。 2：變頻器清除近期的故障資訊。 3：變頻器將參數恢復缺省值，包含電機參數。 4：備份當前用戶所設置的參數。將當前所有功能參數的設置值備份下來。以方便客戶在參數調整錯亂後恢復。 5：恢復用戶備份參數 注意：該操作完成後，該功能碼值自動恢復到0；恢復缺省值不會Fb.00~Fb.02參數組。				
y0.01	使用者密碼	0~65535	0	★
設定為任意一個非零的數位，密碼保護功能生效。 00000：清除以前設置使用者密碼值，並使密碼保護功能無效，恢復出廠值也能清除密碼。 當使用者密碼設置並生效後，如果使用者密碼不正確，使用者將不能進入參數功能表，只有輸入正確的使用者密碼，使用者才能查看參數，並修改參數。請牢記所設置的使用者密碼。 退出功能碼編輯狀態，密碼保護將在1分鐘後生效，當密碼生效後若按PRG鍵進入功能碼編輯狀態時，將顯示“0.0.0.0.0”，操作者必須正確輸入使用者密碼，否則無法進入。				

5-2-20. y1 組 故障歷史查詢組

代碼	參數名稱	設定範圍	出廠值	更改
y1.00	前兩次故障類型	0：無故障 1：輸出缺相(E.oUt1) 2：保留 3：廠家設定時間達到(E.oUt3) 4：加速過電流(E.oC1) 5：減速過電流(E.oC2) 6：恆速過電流(E.oC3) 7：加速過電壓(E.oU1) 8：減速過電壓(E.oU2) 9：恆速過電壓(E.oU3) 10：母線欠壓故障(E.LU) 11：電機超載(E.oL1) 12：變頻器超載(E.oL2) 16：逆變模組過熱故障(E.oH2) 17：外部故障(E.SET) 18：通訊故障(E.CE) 19：電流檢測故障(E.oCC) 20：電機自學習故障(E.tE) 21：EEPROM操作故障(E.EEP) 22：CAD回饋斷線故障(E.CAd) 23：干擾誤報故障(E.END)	0	●
y1.01	前一次故障類型		0	●
y1.02	當前故障類型		0	●
記錄變頻器最近的三次故障類型，詳細請見故障檢查與排除。				
y1.03	當前故障運行頻率		0.00Hz	●
y1.04	當前故障輸出電流		0.0A	●
y1.05	當前故障母線電壓		0V	●
y1.06	當前故障輸入端子狀態		0	●
y1.07	當前故障輸出端子狀態		0	●

當前故障輸入端子狀態為10進制數位。顯示最近一次故障時所有數位輸入端子的狀態，順序為：

Bit0	Bit1	Bit2	Bit3	Bit4
DI1	DI2	DI3	DI4	DI5
Bit5	Bit6	Bit7	Bit8	Bit9
保留	保留	保留	保留	保留

當時輸入端子為ON，其對應位為1，OFF則為0。通過此值可以瞭解故障時數位輸入信號的狀態。

當前故障輸出端子狀態為10進制數位。顯示最近一次故障時所有數位輸出端子的狀態，順序為：

Bit0	Bit1	Bit2	Bit3	Bit4
MO1	保留	保留	RO	保留

當時輸出端子為ON，其對應位為1，OFF則為0。通過此值可以瞭解故障時數位輸出信號的狀態。

第六章 故障檢查與排除

6-1 · 故障資訊及排除方法

序號	故障代碼	故障類型	可能的故障原因	對策
1	E. oU1	輸出缺相	1、變頻器到電機的引線不正常 2、電機運行時變頻器三相輸出不平衡 3、驅動板異常 4、模組異常	1、排除週邊故障 2、檢查電機三相繞組是否正常並排除故障 3、尋求技術支援
2	保留			
3	E. oU3	廠家設定時間	廠家設定的時間達到	尋求廠家
4	E. oC1	加速運行過電流	1. 加速太快 2. 電網電壓偏低 3. 變頻器功率偏小 4. 輸出缺相	1. 增大加速時間 2. 檢查輸入電源 3. 選用功率大一檔的變頻器 4. 檢查輸出配線
5	E. oC2	減速運行過電流	1. 減速太快 2. 負載慣性轉矩大 3. 變頻器功率偏小 4. 輸出缺相	1. 增大減速時間 2. 外加合適的能耗制動組件 3. 選用功率大一檔的變頻器 4. 檢查輸出配線
6	E. oC3	恆速運行過電流	1. 負載發生突變或異常 2. 電網電壓偏低 3. 變頻器功率偏小 4. 輸出缺相	1. 檢查負載或減小負載的突變 2. 檢查輸入電源 3. 選用功率大一檔的變頻器 4. 檢查輸出配線
7	E. oU1	加速運行過電壓	1. 輸入電壓異常 2. 瞬間停電後，對旋轉中電機實施再啟動 3. 加速時間過短	1. 檢查輸入電源 2. 避免停機再啟動 3. 增大加速時間
8	E. oU2	減速運行過電壓	1. 減速太快 2. 負載慣量大 3. 輸入電壓異常	1. 增大減速時間 2. 增大能耗制動組件 3. 檢查輸入電源
9	E. oU3	恆速運行過電壓	1. 輸入電壓發生異常變動 2. 負載慣量大	1. 安裝輸入電抗器 2. 外加合適的能耗制動組件
10	E. LU	母線欠壓 關機顯示	1. 電網電壓偏低 2. 參數設置不正確 3. 關機提示	1. 檢查電網輸入電源 2. 檢查參數是否正確

序號	故障代碼	故障類型	可能的故障原因	對策
11	E. oL1	電機超載	1. 電網電壓過低 2. 電機額定電流設置不正確 3. 電機堵轉或負載突變過大 4. 大馬拉小車	1. 檢查電網電壓 2. 重新設置電機額定電流 3. 檢查負載，調節轉矩提升量 4. 選擇合適的電機
12	E. oL2	變頻器超載	1. 加速太快 2. 對旋轉中的電機實施再啟動 3. 電網電壓過低 4. 負載過大	1. 增大加速時間 2. 避免停機再啟動 3. 檢查電網電壓 4. 選擇功率更大的變頻器
16	E. oH2	逆變模組過熱	1. 變頻器瞬間過流 2. 輸出三相有相間或接地短路 3. 風道堵塞或風扇損壞 4. 環境溫度過高 5. 控制板連線或外掛程式鬆動 6. 輔助電源損壞，驅動電壓欠壓 7. 功率模組橋臂直通 8. 控制板異常	1. 參見過流對策 2. 重新配線 3. 疏通風道或更換風扇 4. 降低環境溫度 5. 檢查並重新連接 6. 尋求服務 7. 尋求服務 8. 尋求服務
17	E. SET	外部故障	外部故障輸入端子動作	檢查外部設備輸入
18	E. CE	通訊故障	1. 串列傳輸速率設置不當 2. 採用串列通信的通信錯誤 3. 通訊長時間中斷	1. 設置合適的串列傳輸速率 2. 按 stop 鍵重置，尋求服務 3. 檢查通訊介面配線
19	E. oCC	電流檢測電路故障	1. 控制板連接器接觸不良 2. 輔助電源損壞 3. 霍爾器件損壞 4. 放大電路異常	1. 檢查連接器，重新插線 2. 尋求服務 3. 尋求服務 4. 尋求服務
20	E. TE	電機自學習故障	1. 電機容量與變頻器容量不匹配 2. 電機額定參數設置不當 3. 自學習出的參數與標準參數偏差過大 4. 自學習超時	1. 更換變頻器型號 2. 按電機銘牌設置額定參數 3. 使電機空載，重新辯識 4. 檢查電機接線，參數設置
21	E. EEP	EEPROM 讀寫故障	1. 控制參數的讀寫發生錯誤 2. EEPROM 損壞	1. 按 stop 鍵重置，尋求服務 2. 尋求服務

序號	故障代碼	故障類型	可能的故障原因	對策
22	E. Cad	CAD 回饋斷線故障	1. CAD 回饋斷線 2. CAD 回饋源消失	1. 檢查 CAD 回饋信號線 2. 檢查 CAD 回饋源
23	E. END	干擾導致誤報故障	週邊設備引起變頻器誤報故障	1. 尋求服務

6-2 EMC(電磁相容性)

6-2-1. 定義

電磁相容是指電氣設備在電磁干擾的環境中運行，不對電磁環境進行干擾而且能穩定實現其功能的能力。

6-2-2. EMC標準介紹

根據國家標準GB 12668.3-2012/IEC 61800-3:2004的要求，變頻器需要符合電磁干擾及抗電磁干擾兩個方面的要求。

我司現有產品執行的是最新國際標準：IEC/EN61800-3:2004 (Adjustable speed electrical power drive systems part 3:EMC requirements and specific test methods)，等同國家標準GB 12668.3-2012/IEC 61800-3:2004。IEC/EN61800-3主要從電磁干擾及抗電磁干擾兩個方面對變頻器進行考察，電磁干擾主要對變頻器的輻射干擾、傳導干擾及諧波干擾進行測試(對應用於民用的變頻器有此項要求)。

抗電磁干擾主要對變頻器的傳導抗擾度、輻射抗擾度、浪湧抗擾度、快速突變脈衝群抗擾度、ESD抗擾度及電源低頻端抗擾度(具體測試專案有：1、輸入電壓暫降、中斷和變化的抗擾性試驗；2、換相缺口抗擾性試驗；3、諧波輸入抗擾性試驗；4、輸入頻率變化試驗；5、輸入電壓不平衡試驗；6、輸入電壓波動試驗)進行測試。依照上述IEC/EN61800-3的嚴格要求進行測試，我司產品按照6-3所示的指導進行安裝使用，在一般工業環境下將具備良好的電磁相容性。

6-3. EMC 指導

6-3-1. 諧波的影響

電源的高次諧波會對變頻器造成損壞。所以在一些電網品質比較差的地方，建議加裝交流輸入電抗器

6-3-2. 電磁干擾及安裝注意事項

電磁干擾有兩種，一種是周圍環境的電磁雜訊對變頻器的干擾，另外一種干擾是變頻器所產生的對周圍設備的干擾。

安裝注意事項：

- 1) 變頻器及其它電氣產品的接地線應良好接地；
- 2) 變頻器的動力輸入和輸出電源線及弱電信號線(如：控制線路)儘量不要平行佈置，有條件時垂直佈置；
- 3) 變頻器的輸出動力線建議使用遮罩電纜，或使用鋼管遮罩動力線，且遮罩層要可靠接地，對於受干擾設備的引線建議使用雙絞遮罩控制線，並將遮罩層可靠接地；
- 4) 對於電機電纜長度超過100m的，要求加裝輸出濾波器或電抗器。

6-3-3. 周邊電磁設備對變頻器產生干擾的處理方法

一般對變頻器產生電磁影響的原因是在變頻器附近安裝有大量的繼電器、接

觸器或電磁制動器。當變頻器因此受到干擾而誤動作時，建議採用以下辦法解決：

- 1) 產生干擾的器件上加裝浪湧抑制器；
- 2) 變頻器輸入端加裝濾波器，具體參照6.3.6，進行操作；
- 3) 變頻器控制信號線及檢測線路的引線用遮罩電纜並將遮罩層可靠接地。

6-3-4. 變頻器對周邊設備產生干擾的處理辦法

這部分的雜訊分為兩種：一種是變頻器輻射干擾，而另一種則是變頻器的傳導干擾。這兩種干擾使得周邊電氣設備受到電磁或者靜電感應。進而使設備產生了誤動作。針對幾種不同的干擾情況，參考以下方法解決：

- 1) 用於測量的儀錶、接收機及感測器等，一般信號比較微弱，若和變頻器較近距離或在同一個控制櫃內時，易受到干擾而誤動作，建議採用下列辦法解決：儘量遠離干擾源；不要將信號線與動力線平行佈置特別不要平等捆紮在一起；信號線及與動力線用遮罩電纜，且接地良好；在變頻器的輸出側加鐵氧體磁環（選擇抑制頻率在30~1000MHz範圍內），並繞上2~3匝，對於情況惡劣的，可選擇加裝EMC輸出濾波器；
- 2) 受干擾設備和變頻器使用同一電源時，造成傳導干擾，如果以上辦法還不能消除干擾，則應該在變頻器與電源之間加裝EMC濾波器；
- 3) 週邊設備單獨接地，可以排除共地時因變頻器接地線有漏電流而產生的干擾。

6-3-5. 漏電流及處理

使用變頻器時漏電流有兩種形式：一種是對地的漏電流；另一種是線與線之間的漏電流。

- 1) 影響對地漏電流的因素及解決辦法：
導線和大地間存在分佈電容，分佈電容越大，漏電流越大；有效減少變頻器及電機間距離
以減少分佈電容。載波頻率越大，漏電流越大。可降低載波頻率來減少漏電流。但降低載波頻率會導致電機雜訊增加，請注意，加裝電抗器也是解決漏電流的有效辦法。漏電流會隨回路電流增大而增大，所以電機功率大時，相應漏電流大。
- 2) 引起線與線之間漏電流的因素及解決辦法：
變頻器輸出佈線之間存在分佈電容，若通過線路的電流含高次諧波，則可能引起諧振而產生漏電流。此時若使用熱繼電器可能會使其誤動作。
解決的辦法是降低載波頻率或加裝輸出電抗器。建議在使用變頻器時電機前不加裝熱繼電器，使用變頻器的電子過流保護功能。

6-3-6. 電源輸入端加裝EMC輸入濾波器注意事項

- 1) 注意：使用濾波器時請嚴格按照額定值使用；由於濾波器屬於I類電器，濾波器金屬外殼地應該大面積與安裝櫃金屬地接觸良好，且要求具有良好導電連續性，否則將有觸電危險及嚴重影響EMC效果；通過EMC測試發現，濾波器地必須與變頻器PE端地接到同一公共地上，否則將嚴重影響EMC效果。
- 2) 濾波器儘量靠近變頻器的電源輸入端安裝

第七章 外形尺寸

7-1 外形尺寸

7-1-1. 產品外型圖、安裝孔位尺寸

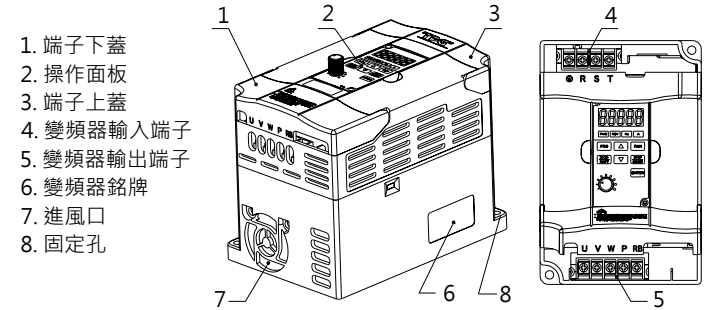
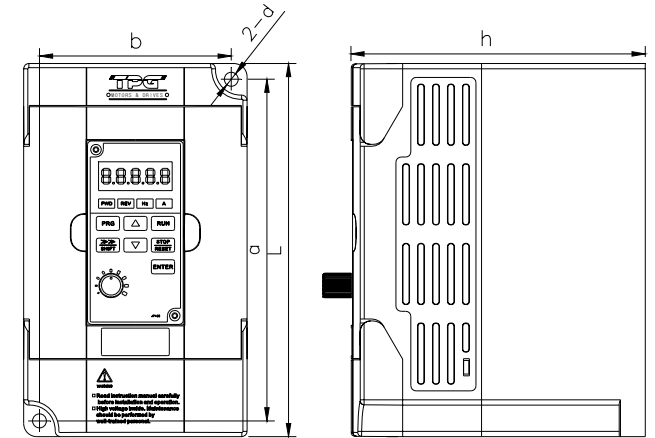


圖7-1：產品外型圖、安裝孔位尺寸

7-1-2. CA SERIES系列



Power supply level Power (kW)	外形尺寸(mm)			安裝尺寸(mm)				重量 (kg)
	L	W	H	h	a	b	d	
Single phase 220V 0.4~0.75	142	85	122.8	112	130	73	φ5.3	0.8
Three phase 220V 0.4~0.75								
Single phase 220V 1.5~2.2	151.6	100.6	127.5	116.6	139.7	88.7	φ5.3	1
Three phase 220V 1.5~2.2								
Three phase 380V 0.4~3.7								

圖 7-2：外形尺寸圖

7-1-3. 鍵盤尺寸圖

尺寸圖：

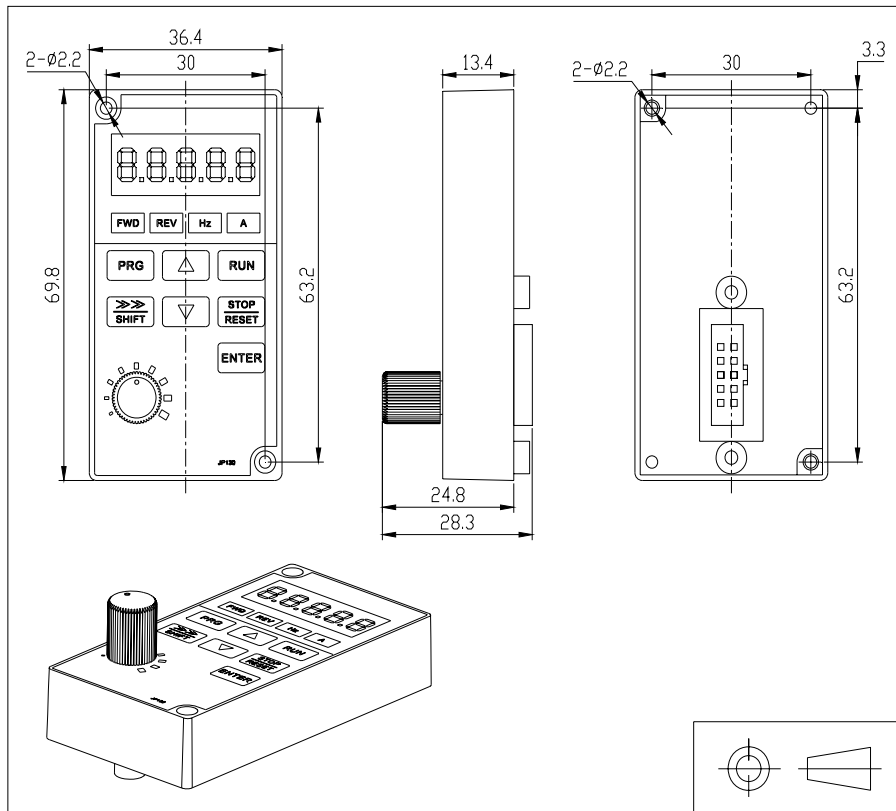


圖7-3：鍵盤尺寸圖

第八章 保養與檢修

8-1. 檢查與保養

變頻器在正常使用時，除日常檢查外尚需定期(如機器大修時或按規定且最多6個月)檢查，請參照下表實施，以防患於未然。

檢查時 日	定	檢查 部位	檢查 項目	檢查事項	檢查方法	判定標 準
√		顯示	LED/OLED 顯示	顯示是否有異常	視覺	按使用 狀態確認
√	√	冷卻 系統	風機	有無異常聲音或 振動	視覺，聽覺	無異常
√		本體	周圍環境	溫度，濕度，灰 塵，有害氣體	視覺，嗅覺，感 覺	按 2-1 條款
√		輸入輸 出端	電壓	輸入，輸出電壓 是否異常	測定 R，S，T 及 U，V，W 端子	按標準規 範的規定
	√	主回 路	全貌	緊固件是否鬆動、 是否有過熱痕跡、 有否放電現象、灰 塵是否太多、風道 是否堵塞	目視，緊固，擦 拭	無異常
	電解電容		表面有無異常	目視	無異常	
	導線導 電排		有否鬆動	目視	無異常	
	端子		螺栓或螺釘有否鬆 動	緊固	無異常	

“√”表示需要進行日常或定期檢查。

在檢查時，不可無故拆卸或搖動器件，更不能隨意拔掉接外掛程式，否則將不能正常運行或進入故障顯示狀態及導致元器件的故障甚至主開關器件 IGBT 模組損壞。

在需要測量時，應注意各種不同的儀錶可能得出差別較大的測量結果。推薦用指標電壓表測量輸入電壓，用整流式電壓表測量輸出電壓，用鉗式電流錶測量輸入輸出電流，用電動式瓦特表測量功率。

8-2. 必需定期更換的器件

為保證變頻器可靠運行，除定期保養、維護外，還應對機內長期承受機械磨損的器件——所有冷卻用的風扇和用於能量存儲與交換的主回路濾波電容器以及印刷電路板等進行定期更換。一般連續使用時，可按下表的規定更換，還應視使用環境、負荷情況及變頻器現狀等具體情況而定。

器件名稱	標準更換年數
冷卻風扇	1~3 年
濾波電容	4~5 年
印刷電路板	5~8 年

8-3. 儲存與保管

變頻器購入後如不立即使用(暫時保管或長期存放)時,應做到下述各項:

- ※ 應放於標準規範所規定溫度範圍內且無潮、無灰塵、無金屬粉塵及通風良好的場所。
- ※ 如果超過一年仍未使用,則應進行充電試驗,以使機內主回路濾波電容器特性得以恢復。充電時,可使用調壓器慢慢升高變頻器的輸入電壓,直至額定輸入電壓,通電時間要在 1~2 小時以上。上述試驗至少每年一次。
- ※ 不可隨意實施耐壓試驗,它將導致變頻器壽命降低。對於絕緣試驗,可於使用前,用 500 伏兆歐表測量,其絕緣電阻不得小於 $4M\Omega$ 。

8-4. 電容

8-4-1. 電容重整

如果變頻器閒置時間過久,使用之前必須根據操作說明對直流母線電容進行電容重整。存放時間從交貨日期計算。

時間	操作原則
存放時間小於 1 年	無須充電操作
存放時間 1~2 年	第一次運行之前,變頻器必須通電 1 小時
存放時間 2~3 年	使用調壓電源給變頻器充電: --加 25%額定電壓 30 分鐘, --然後加 50%額定電壓 30 分鐘, --再加 75%額定電壓 30 分鐘, --最後加 100%額定電壓 30 分鐘。
存放時間大於 3 年	使用調壓電源給變頻器充電: --加 25%額定電壓 2 小時, --然後加 50%額定電壓 2 小時, --再加 75%額定電壓 2 小時, --最後加 100%額定電壓 2 小時。

使用調壓電源對變頻器充電的操作方法:

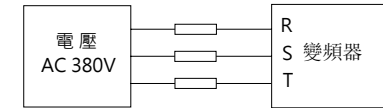
可調電源的選擇取決於變頻器的供電電源,對於進線電壓為單相/三相 220V AC 的變頻器,可採用單相 220V AC/2A 調壓器。單相或三相變頻器均可以採用單相調壓電源充電(L+接 R、N 接 T)。由於是同一個整流器,因此所有的直流母線電容將同時充電。

高電壓等級的變頻器充電時必須要保證所需的電壓(如 380V)。因為電容充電時幾乎不需要電流,所有可以使用小容量的電源(2A 足夠)。

使用電阻(白熾燈)對變頻器充電的操作方法:

如果直接連接供電電源給驅動裝置的直流母線電容充電,充電時間應至少為 60 分鐘。這項操作必須在正常室溫和沒有連接負載的情況下進行,並且必須在供電電源的三相回路中串聯電阻。

380V 驅動裝置:使用 1K/100W 電阻。在電源電壓不大於 380V 的情況下,也可以使用 100W 白熾燈。如果使用白熾燈,在整個充電過程中有可能熄滅或者燈光非常微弱。



380V 驅動裝置充電電路示例

圖 8-1: 380V 驅動裝置充電電路示例

8-5. 測量與判斷

- ※ 使用一般勾表測量電流時,在輸入端的電流會有不平衡的現象,一般差異在 10%以內屬於正常,若差異在 30%時應通知原廠更換整流橋,或檢查輸入三相電壓是否偏差超過 5V。

輸出三相電壓若採用一般萬用表測量時,因載波頻率的干擾,所讀的資料均不準確,只能作參考。

第九章 品質保證

本產品的品質保證依下列規定辦理（非國外銷售機器）：

1· 保修條款

1-1. 本產品自出廠之日起，保修期為十八個月（非標機除外），以出廠記錄為依據。

1-2. 本產品自出廠之日起，在正常使用範圍內，若產品出現品質問題，十八個月內包修，三個月包換。

1-3. 本產品自出廠之日起，享有終身有償服務。
如有契約，以契約優先的原則處理。

2· 免責條款

若屬下述原因引起的產品品質問題，即使在保修期仍實行有償服務，我們將收取一定的維修費。

2-1、使用者未按照《產品說明書》的使用方法進行操作引起的故障。

2-2、用戶未經允許自行改造或修理的產品。

2-3、使用者超出標準規範要求使用變頻器造成的產品故障。

2-4、用戶購買後跌損或搬運不當造成的損壞。

2-5、因現場使用環境（如：環境潮濕、粉塵大或有酸鹼性腐蝕氣體等）不良所引起產品故障。

2-6、由於地震、火災、風水災害、雷擊、異常電壓等不可抗拒的自然災害原因引起的故障。

2-7、在運輸過程中的損壞，用戶未拒收物流貨物。

3· 出現以下情況，廠家有權不予以保修

3-1、無產品銘牌或產品銘牌模糊不清無法辨識。

3-2、未依照產品購買合同付清款項的。

3-3、對於安裝、配線、操作、維護或其他使用情況不能客觀實際描述給本公司的技術服務中心。

4· 對於需要三包服務的機器，需事先與本公司售後服務聯繫處理。否則本公司免於服務。

5· 維修費用的收取，一律按照我公司最新的價目表為準。

6· 產品發生故障時，請您正確填寫產品保修卡中的各項內容，隨故障機一起寄給我們。

7· 本條款解釋權歸屬於大連 TPG Corp. 股份有限公司。

附錄 I RS485 通信協議

I-1. 使用介紹

CA SERIES 系列變頻器，提供 RS485 通信介面，採用國際標準的 MODBUS 通訊協定進行的主從通訊。用戶可通過 PC/PLC、控制上位機等實現集中控制（設定變頻器控制命令、運行頻率、相關功能碼參數的修改，變頻器工作狀態及故障資訊的監控等），以適應特定的應用要求。

I-2. 詳述

一、協定內容

該串列通信協定定義了串列通信中傳輸的資訊內容及使用格式。其中包括：主機輪詢(或廣播)格式；主機的編碼方法，內容包括：要求動作的功能碼，傳輸資料和錯誤校驗等。從機的回應也是採用相同的結構，內容包括：動作確認，返回資料和錯誤校驗等。如果從機在接收資訊時發生錯誤，或不能完成主機要求的動作，它將組織一個故障資訊作為響應回饋給主機。

二、應用方式

變頻器接入具備RS485匯流排的“單主多從”PC/PLC控制網路。

三、匯流排結構

(1) 介面方式:RS485硬體介面

(2) 傳輸方式:

非同步串列，半雙工傳輸方式。在同一時刻主機和從機只能有一個發送資料而另一個只能接收資料。資料在串列非同步通信過程中，是以報文的形式，一幀一幀發送。

(3) 拓撲結構:

單主機多從機系統。從機地址的設定範圍為1~247，0為廣播通信地址。網路中的從機位址必須是唯一的。

單機應用

圖 I-3 單台變頻器和 PC 組建的 MODBUS 現場接線圖。因為電腦一般都不帶 RS485 介面，所以必須將電腦自帶的 RS232 介面或 USB 介面通過轉化器轉換為 RS485。將 RS485 的 A 端接到變頻器端子板上的 485+埠上，將 RS485 的 B 端接到變頻器端子板上的 485-埠上。建議盡量用帶遮罩的雙絞線。當採用 RS232-485 轉

化器時，電腦的 RS232 介面與 RS232-RS485 轉換器的 RS232 介面相接時，線長應儘量短，最長不要超過 15m，建議直接將 RS232-RS485 轉換器對插在電腦上。同理當採用 USB-RS485 轉換器時，線也應儘量短。

當將線路接好後，將電腦上的上位機選擇正確的埠(接 RS232-RS485 轉換器的埠，比如 COM1)，並將通訊串列傳輸速率和資料位元校驗等基本參數設為與變頻器一致。

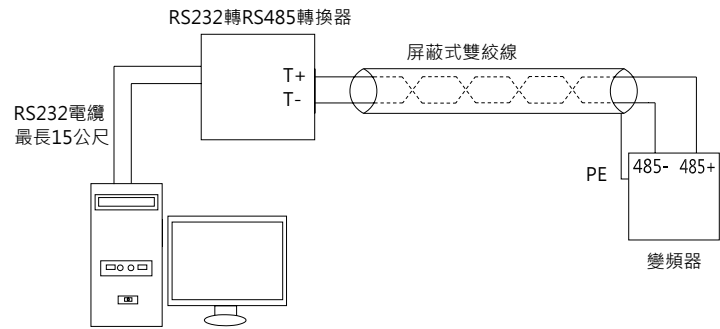


圖 1-3 單機應用示意圖

多台應用

實際多機應用中，一般有兩種接法。

接法 1，兩頭必須接有 120Ω 1/4W 終端電阻。如圖 1-4 所示

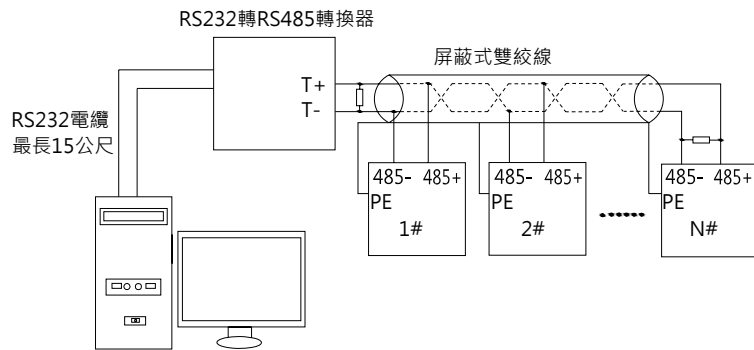


圖 1-4 多台應用示意圖接法 1

接法 2，在線路距離最遠的兩個設備(5#和 8#)上必須連接 120Ω 1/4W 終端電阻。如圖 1-5 所示

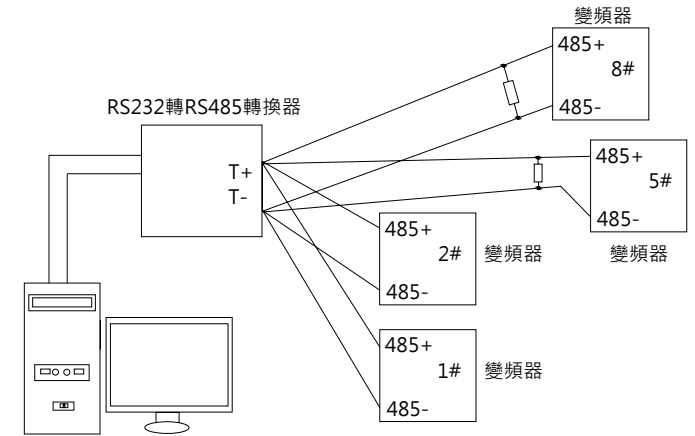
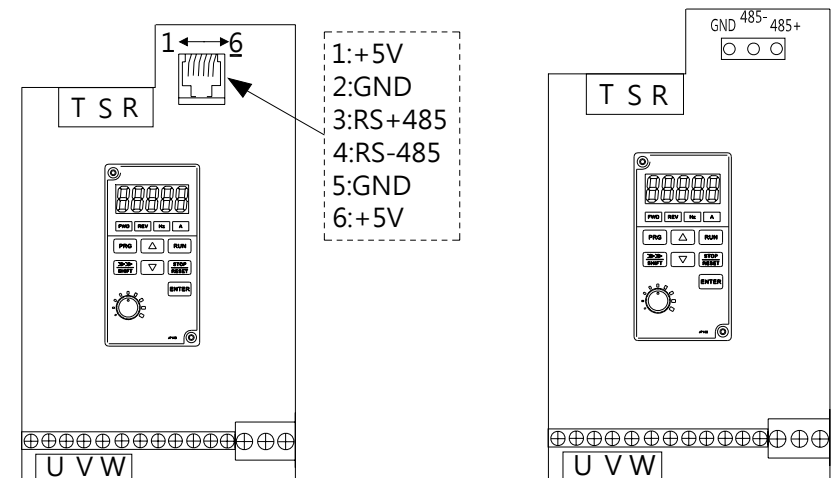


圖 1-5 多台應用示意圖接法 2

多機接法應該儘量採用遮罩線。RS485 線上的所有設備的串列傳輸速率和資料位元校驗等基本參數必須一致，位址必須不能有重複。



注：左邊的圖形為V5及以下版本，右邊圖形為V6及以上版本。

四、協定說明

CA SERIES系列變頻器通信協定是一種非同步串列的主從MODBUS通信協定，網路中只有一個設備(主機)能夠建立協定(稱為“查詢/命令”)。其他設備(從機)只能通過提供資料回應主機的“查詢/命令”，或根據主機的“查詢/命令”做出相應的動作。主機在此是指個人電腦(PC)，工業控制設備或可程式設計邏輯控制器(PLC)等，從機是指CA SERIES變頻器。主機既能對某個從機單獨進行通信，也能對所有下位從機發佈廣播資訊。對於單獨訪問的主機“查詢/命令”，從機都要返回一個資訊(稱為回應)，對於主機發出的廣播資訊，從機無需回饋回應給主機。

五、通訊資料結構

CA SERIES系列變頻器的MODBUS協定通信資料格式分為RTU(遠端終端機單元模

式和ASCII(American Standard Code for Information International Interchange)模式兩種。

(1)RTU模式中，每個位元組的格式如下：

使用RTU模式，消息發送至少要以3.5個字元時間的停頓間隔開始。在網路串列傳輸速率下多樣的字元時間，這是最容易實現的(如下圖的T1-T2-T3-T4所示)。傳輸的第一個域是設備位址。可以使用的傳輸字元是十六進位的0...9, A...F。網路設備不斷偵測網路匯流排，包括停頓間隔時間內。當第一個域(位址域)接收到，每個設備都進行解碼以判斷是否發往自己的。在最後一個傳輸字元之後，一個至少3.5個字元時間的停頓標定了消息的結束。一個新的消息可在此停頓後開始。整個消息必須作為一連續的流傳輸。如果在幀完成之前有超過1.5個字元時間的停頓時間，接收設備將刷新不完整的消息並假定下一位元組是一個新消息的位址域。同樣地，如果一個新消息在小於3.5個字元時間內接著前個消息開始，接收的設備將認為它是前一消息的延續。這將導致一個錯誤，因為在最後的CRC域的值不可能是正確的。

RTU 框架格式：

幀頭START	T1-T2-T3-T4 (3.5個位元組的傳輸時間)
從機地址域ADDR	通訊位址：0~247(十進位)(0為廣播地址)
功能域CMD	03H：讀從機參數； 06H：寫從機參數
資料欄 DATA(N-1)...	2*N個位元組的資料，該部分為通訊的主要內容，也是通訊中，資料交換的核心。

DATA(0)	
CRC CHK 低位	檢測值：CRC校驗值(16BIT)
CRC CHK 高位	
幀尾END	T1-T2-T3-T4(3.5個位元組的傳輸時間)

(2)ASCII 模式中，每個位元組的格式如下：

在 ASCII 模式中，幀頭為“:”(“0x3A”)，幀尾缺省為“CRLF”(“0x0D”“0x0A”)。在 ASCII 方式下，除了幀頭和幀尾之外，其餘的資料位元組全部以 ASCII 碼方式發送，先發送高 4 位位元組，然後發送低 4 位位元組。ASCII 方式下資料為 8 位元長度。對於‘A’~‘F’，採用其大寫字母的 ASCII 碼。此時資料採用 LRC 校驗，校驗涵蓋從從機位址到資料的資訊部分。校驗和等於所有參與校驗資料的字元和(捨棄進位元位)的補數。

ASCII 幀的標準結構：

START	‘:’ (0x3A)
Address Hi	通訊位址：8-bit 位址由2個ASCII碼組合
Address Lo	
Function Hi	功能碼：8-bit 位址由2個ASCII碼組合
Function Lo	
DATA(N-1) ... DATA(0)	資料內容：nx8-bit 資料內容由2n個ASCII碼組合 n<=16，最大32個ASCII碼
LRC CHK Hi	LRC檢查碼：8-bit 檢驗碼由2個ASCII碼組合
LRC CHK Lo	
END Hi	結束符：END Hi=CR(0x0D)，END Lo=LF(0x0A)

CMD(命令指令)及DATA(資料字描述)

命令碼：03H，讀取N個字(Word)(最多可以讀取16個字)例如：從機位址為01的變頻器的啟始位址F0.01連續讀取連續2個值主機命令資訊

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
啟始位址高位	F0H
啟始地址低位	01H
資料個數高位	00H
數據個數低位元	02H
CRC CHK 低位	CRC校驗值
CRC CHK 高位	
END	T1-T2-T3-T4

RTU 從機回應信息
F9.05 設為 0 時：

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
位元組個數低位元	00H
位元組個數高位	04H
資料位址0001H高位	13H
資料位址0001H低位	88H
資料位址0002H高位	00H
資料位址0002H低位	00H
CRC_CHK 低位	CRC校驗值
CRC_CHK 高位	
END	T1-T2-T3-T4

F9.05 設為 1 時：

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
位元組個數	04H
資料位址0001H高位	13H
資料位址0001H低位	88H
資料位址0002H高位	00H
資料位址0002H低位	00H
CRC_CHK 低位	CRC校驗值
CRC_CHK 高位	
END	T1-T2-T3-T4

ASCII 主機命令資訊

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘3’
啟始位址高位	‘0’
	‘0’
啟始地址低位	‘0’
	‘4’
資料個數高位	‘0’
	‘0’

數據個數低位元	‘0’
	‘2’
LRC_CHK Hi	‘F’
LRC_CHK Lo	‘6’
END Hi	CR
END Lo	LF

ASCII 從機回應信息

START	‘.’
ADDR	‘0’
	‘1’
CMD	‘0’
	‘3’
位元組個數	‘0’
	‘4’
資料位址0004H高位	‘1’
	‘3’
資料位址0004H低位元	‘8’
	‘8’
資料位址0005H高位	‘1’
	‘3’
資料位址0005H低位元	‘8’
	‘8’
LRC_CHK Hi	‘C’
LRC_CHK Lo	‘2’
END Hi	CR
END Lo	LF

校驗方式——CRC 校驗方式：CRC(Cyclical Redundancy Check)

使用RTU框架格式，消息包括了基於CRC方法的錯誤檢測域。CRC域檢測了整個消息的內容。CRC域是兩個位元組，包含16位元的二進位值。它由傳輸設備計算後加入到消息中。接收設備重新計算收到消息的CRC，並與接收到的CRC域中的值比較，如果兩個CRC值不相等，則說明傳輸有錯誤。

CRC是先存入0xFFFF，然後調用一個過程將消息中連續的8位元位元組與當前寄存器中的值進行處理。僅每個字元中的8Bit資料對CRC有效，起始位和停止位以及同位檢查位元均無效。CRC產生過程中，每個8位元字元都單獨和寄存器內容

相異或(XOR)，結果向最低有效位方向移動，最高有效位以0填充。LSB被提取出來檢測，如果LSB為1，寄存器單獨和預置的值相異或，如果LSB為0，則不進行。整個過程要重複8次。在最後一位(第8位)完成後，下一個8位元位元組又單獨和寄存器的當前值相異或。最終寄存器中的值，是消息中所有的位元組都執行之後的CRC值。

CRC添加到消息中時，低位元組先加入，然後高位元組。CRC簡單函數如下：

```

unsigned int crc_chk_value(unsigned char *data_value, unsigned
char length)
{
    unsigned int crc_value=0xFFFF;

    int i;
    while(length--)
    {
        crc_value^=*data_value++;
        for(i=0;i<8;i++)
        {
            if(crc_value&0x0001)
            {
                c r c _ v a l u e = ( c r c _ v a l u e >> 1 ) ^ 0 x a 0 0 1 ;
            }
            else
            {
                crc_value=crc_value>>1;
            }
        }
    }
    return(crc_value);
}

```

通信參數的地址定義

該部分是通信的內容，用於控制變頻器的運行，變頻器狀態及相關參數設定。讀寫功能碼參數(有些功能碼是不能更改的，只供廠家使用或監視使用)：

功能碼參數位址標示規則：

以功能碼組號和標號為參數位址表示規則：

高位元組：F0~FB(F組)、A0~AF(E組)、B0~BF(B組)、C0~C7(Y組)、70~7F(d組)低位元組：00~FF

如：F3.01，位址表示為F301；

注意：L0組：既不可讀取參數，也不可更改參數；d組：只可讀取，不可更改參數。

有些參數在變頻器處於運行狀態時，不可更改；有些參數不論變頻器處於何種狀態，均不可更改；更改功能碼參數，還要注意參數的範圍，單位，及相關說明。

另外，由於EEPROM頻繁被存儲，會減少EEPROM的使用壽命，所以，有些功能碼在通訊的模式下，無須存儲，只要更改RAM中的值就可以了。

如果為F組參數，要實現該功能，只要把該功能碼位址的高位F變成0就可以實現。如果為E組參數，要實現該功能，只要把該功能碼位址的高位A變成4就可以實現。相應功能碼位址表示如下：高位元組：00~0F(F組)、40~4F(E組)、50~5F(B組)、60~67(Y組)低位元組：00~FF

如：

功能碼F3.01不存儲到EEPROM中，位址表示為0301；功能碼E3.05不存儲到EEPROM中，位址表示為4305；該位址表示只能做寫RAM，不能做讀的動作，讀時，為無效地址。對於所有參數，也可以使用命令碼07H來實現該功能。

停機/運行參數部分：

參數地址	參數描述
1000H	通訊設定值(-10000~10000)(十進位)
1001H	設定速度
1002H	母線電壓
1003H	輸出電壓
1004H	輸出電流
1005H	輸出功率
1006H	輸出轉矩
1007H	運行轉速
1008H	端子輸入標誌狀態
1009H	端子輸出標誌狀態
100AH	模擬量A11值
100BH	模擬量A12值
100CH	保留
100DH	保留
100EH	保留
100FH	保留
1010H	CAD給定值
1011H	CAD回饋值

1012H	多段速
1013H	保留
1014H	保留
1015H	轉矩方向(0:正向, 1:反向)
1016H	設備代碼

設定值是相對值的百分數，10000對應100.00%，-10000對應-100.00%。

對頻率量綱的資料，該百分比是相對最大輸出頻率(F0.08)的百分數；對轉矩量綱的資料，該百分比是F5.07(轉矩上限數字設定)。

控制命令輸入到變頻器：(只寫)

命令字地址	命令功能
2000H	0001H: 正轉運行
	0002H: 反轉運行
	0003H: 正轉寸動
	0004H: 反轉寸動
	0005H: 自由停機(緊急停機)
	0006H: 停機
	0007H: 故障重置
	0008H: 寸動停止

讀取變頻器狀態：(唯讀)

狀態字位址	狀態字功能
3000H	0001H: 正轉運行中
	0002H: 反轉運行中
	0003H: 變頻器待機中
	0004H: 故障中

參數鎖定密碼校驗：(如果返回為8888H，即表示密碼校驗通過)

密碼位址	輸入密碼的內容
1F00H	*****

參數鎖定命令：(只寫)

鎖定密碼命令位址	鎖定密碼命令內容
1F01H	55AAH

變頻器故障描述：

變頻器故障位址	故障代碼	變頻器故障資訊
8000H		0000:無故障
	E.oUt1	0001:輸出缺相

E.oUt2	0002:保留
E.oUt3	0003:廠家設定時間達到
E.oC1	0004:加速過電流
E.oC2	0005:減速過電流
E.oC3	0006:恆速過電流
E.oU1	0007:加速過電壓
E.oU2	0008:減速過電壓
E.oU3	0009:恆速過電壓
E.LU	000A:母線欠壓故障
E.oL1	000B:電機超載
E.oL2	000C:變頻器超載
E.oH2	0010:逆變模組過熱故障
E.SET	0011:外部故障
E.CE	0012:通訊故障
E.oCC	0013:電流檢測故障
E.TE	0014:電機自學習故障
E.EEP	0015:EEPROM 操作故障
E.CAd	0016:CAD 斷線故障

通訊故障資訊描述資料(故障代碼)：

當從設備回應時，它使用功能代碼域與故障位址來指示是正常回應(無誤)還是有某種錯誤發生(稱作異議回應)。對正常回應，從設備回應相應的功能代碼和資料位址或子功能碼。對異議回應，從設備返回一等同于正常代碼的代碼，但最首的位置為邏輯1。

例如：一主設備發往從設備的消息要求讀一組變頻器功能碼位址資料，將產生如下功能代碼:0 0 0 0 0 0 1 1 (十六進位 03H)對正常回應，從設備回應同樣的功能碼。對異議回應，它返回:1 0 0 0 0 0 1 1 (十六進位 83H)除功能代碼因異議錯誤作了修改外，從設備將回應一位元組異常碼，這定義了產生異常的原因。

主設備應用程式得到異議的回應後，典型的處理過程是重發消息，或者針對相應的故障進行命令更改。

MODBUS 異常碼表格

MODBUS 異常碼		
代碼	名稱	含義
01H	密碼錯誤	密碼效驗位址寫入的密碼與 y0.01 使用者設置的密碼不同
02H	非法資料位址	上位機的請求資料位址是不允許的位址；特別是，寄存器位址和傳輸的位元組數組合是無效的。
03H	校驗錯誤	當上位機發送的幀資訊中，RTU 格式 CRC 校驗位或 ASCII 格式 LRC 校驗位與下位機的校驗計算數不同時，報校驗錯誤資訊。
04H	非法功能	當從上位機接收到的功能碼是不允許的操作；也可能從

MODBUS 異常碼		
代碼	名稱	含 義
		機在錯誤狀態中處理這種請求。
05H	非法數據值	當接收到的資料欄中包含的是不允許的值。注意：它決不意味著寄存器中被提交存儲的資料項目有一個應用程式期望之外的值。
06H	參數更改無效	上位機發送的參數寫命令中，所發的資料在參數的範圍以外或寫位址當前為不可改寫狀態。
07H	系統被鎖定	上位機進行讀或寫時，當設置了使用者密碼，又沒有進行密碼鎖定開鎖，將報系統被鎖定。
08H	從屬設備忙	變頻器忙 (EPPROM 正在存儲中)