



ISO9001:2015 Quality Management System Authentication

EN700 series

Users' Manual

SHENZHEN ENCOM ELECTRIC TECHNOLOGIES CO.,LTD.

## Foreword

First of all, thank you for purchasing EN700 series inverter developed and produced by shenzhen Encom electrical technology co., LTD.

**EN700 series intelligent high performance inverter** adopts advanced control mode to realize high torque, high precision and wide speed regulation drive, and supports speed control and torque control in vector mode without speed sensor, which can meet various requirements of high performance inverter. EN700 series combines the customer demand and industry demands organic products, providing customers with the practical instruction channel switching and simple PID controller, PLC, programmable Input/output terminal control, pulse frequency and the built-in Modbus, given support CAN bus, profibus-dp bus, DeviceNet bus, EtherCAT bus function and platforms, such as for manufacturing and automation engineering, the masses of customers to provide a high level of integration of the integration solution. EN700 series built-in input phase missing, output phase missing, contactor abnormal protection and other effective protection, effectively improve the reliability and security of the system.

This manual provides users with installation wiring, parameter setting, fault diagnosis and countermeasures, daily maintenance and other related matters needing attention. To ensure proper installation and operation of the inverter and its superior performance, please read this manual carefully before installation, and please keep it properly and hand it over to the end user of the inverter.

If there are any question or special requirements for the use of the inverter, please contact our local offices or distributors, or directly contact our technical engineering department, we will wholeheartedly serve you.

This manual is subject to change without prior notice.

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## Safety information and use notice points

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In order to ensure the safety of your personal and equipment, please read this chapter carefully before using the inverter.

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## 1.1 Safety precautions

There are three kinds of safety warnings in this manual as below:

Symbol	Symbol description
	It may cause human death, serious injury or heavy property loss with wrong operation.
	It may result body or device damage with wrong and timeless precautions under operation.
 <b>Note</b>	Should pay extra cautions when inverter in use under this symbol



- (1) Forbid to connect AC power source to output terminal U, V, W, Otherwise it could cause inverter completely damage.
- (2) Not allow for short circuit between (-) and (+), Otherwise it could cause inverter damage and power source short circuit.
- (3) Forbid to install inverter on flammable objects, Otherwise it may cause fire.
- (4) Do not install inverter in a environment with explosive gas, It may cause explosion.
- (5) Bare connection terminal should be insulation treatment after main loop connection, otherwise it may cause electric shock.
- (6) Do not operate inverter with wet hands when inverter power on, Otherwise it may cause electric shock.
- (7) Inverter earth terminal should be well grounding connection.
- (8) Do not open the front cover for wiring when inverter power on. Inverter wiring and check must handle after 10 minutes of inverter power off.
- (9) Wiring connection should handle by qualified person and not allow to slip any conductive objects inside inverter, Otherwise it may cause a electric shock or inverter damage.
- (10) When inverter stocked for more than 6 months, using voltage regulator to boost voltage up and keep inverter in standby status for 1 hour, Otherwise it may cause electric shock and explosion.
- (11) It is strictly forbidden for the user to cut off the power directly during the running, acceleration or deceleration of the inverter. It must be ensured that the inverter has been completely stopped and in standby mode. Otherwise, the damage caused by the inverter, equipment damage and personal accidents shall be borne by the user.



- (1) Forbid to connect control terminals except TA, TB, TC to AC 220V/380V signal, Otherwise it may cause inverter completely damage.
- (2) Do not install and run inverter when inverter damage or spare part less, Otherwise it may cause fire or human injury.
- (3) Inverter should install in a place where can accept itself weight, Otherwise it may cause inverter drop down or belongings damage.

## 1.2 Application range

- (1) This kind of inverter apply to 3 phase ac asynchronous motor only for general industry.
- (2) It should handle cautiously and consult with manufacturer when inverter apply to high reliability required equipment which relevant to life, properties and safety device.
- (3) This kind of inverter is the general motor control device in industry. When inverter apply to dangerous equipment, safeguard should be considerable in case of inverter failure.

## 1.3 Use notice points

(1) EN700 series inverter belong to voltage type inverter, And it is normal with up temperature, Noise and vibration of motor increasing over power frequency run slightly. During the test run, the motor current is confirmed using an operator and a clamp ammeter under mechanical no-load and load conditions. When the current is greater than 150% of the rated current of the inverter, The IGBT inside the inverter will be affected by thermal stress and increase the thermal fatigue of the IGBT. If there is no special low noise requirement, the carrier frequency of the inverter can be reduced to 2~3KHz; In addition, the current can be reduced to below 150% by reducing the load, Extending the acceleration/deceleration time, And increasing the inverter capacity by one step etc.

(2) It is required to match inverter with variable frequency motor running at low speed with constant torque for long time. When match inverter with general asynchronous motor running at low speed, It should take measures to make motor heat dissipation or monitoring motor temperature in avoid of motor flash. The starting and acceleration characteristics of the motor driven by the inverter are limited by the overload

capability of the inverter. The torque characteristic value is usually small compared to starting with an industrial power source. When a large starting torque is required, Select a higher-level inverter or increase the capacity of the motor and inverter at the same time.

(3) It is necessary to take measures in advance for the damage caused for the bad lubrication of the reduction box and wheel gear mechanical devices running at low speed for long time.

(4) It is necessary to assure at first that the use speed range of motor bearings and mechanical devices, also the increasing of motor vibration and noise should be considered, when motor run over rated frequency.

(5) It is necessary to select the suitable brake assembly for hoisting device and big inertia load to make sure the normal work when inverter stripping from power grid for the overcurrent or overvoltage failure.

(6) Inverter start and stop control through terminal or other normal command channel, Otherwise it may cause inverter damage via connecting inverter input terminal to big current switch just like contactor direct to start and stop inverter frequently.

(7) It is necessary to make sure inverter cut off from operation without output, When inverter and motor connect through switch components just like contactor etc. Otherwise it will cause inverter damage.

(8) When inverter output frequency within some range, It may meet mechanical resonance point of load device, Through setting jump frequency to avoid it.

(9) Checking power supply voltage within allowed working range before usage, Otherwise, It need to change voltage or custom special voltage inverter.

(10) Motor should do insulation check before first usage or reusage after lay aside for long time. Checking method show as graph 1-1 below with 500V voltage type megohmmeter , Insulation resistance should not smaller than 5 MΩ, Otherwise inverter maybe damaged.

(11) Forbid inverter output side to assemble capacitor to improve power factor or anti-thunder dependent resistor etc, Otherwise it may cause inverter fault trip or component damage show as graph 1-2.

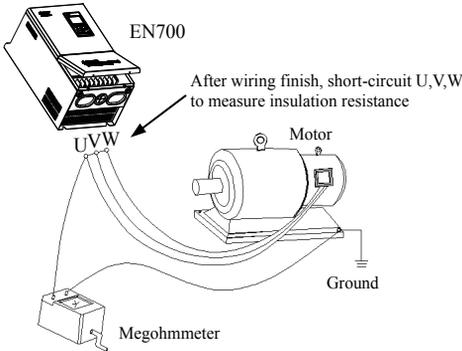


Fig. 1-1 Motor insulation check

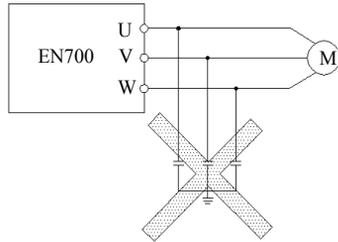


Fig. 1-2 Capacitor at output side is forbidden

## 1.4 Scraping handling notice:

Notices when handling with scrapped inverter and components:

- (1) The unit: dispose the inverter as industrial waste.
- (2) Electrolytic capacitor: It may cause explosion when electrolytic capacitor under burning.
- (3) Plastic: It may result in harmful and poisonous gas when plastic and rubber of inverter burning, And safeguard preparations should be taken before burning.



## Inverter Type and Specification

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## 2.1 Incoming inverter inspect

- (1) Check if there is damage during transportation and inverter itself has damage or fall-off parts.
- (2) Check if parts presented in packing list are all ready.
- (3) Please confirm nameplate data of the inverter is in line with your order requirement.

Our product is guaranteed by strict quality system during manufacturing, packing, Transportation etc., please contact our company or local agent rapidly if some careless omission or mistake arise, We'll deal with it as soon as possible.

## 2.2 Type explanation

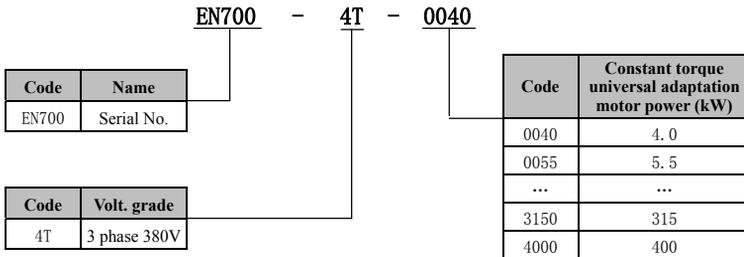


Fig.2-1 Type description

## 2.3 Nameplate explanation

Nameplate presented as Fig.2-2 with type and rating data at the bottom of inverter right side.

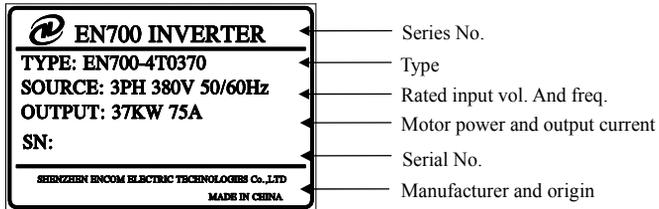


Fig.2-2 Nameplate

## 2.4 Inverter type explanation

Input Voltage	Inverter type	Rated output Current (A)	Adaptable motor (KW)
3 phase 380V~440V	EN700-4T0040	10	4.0
	EN700-4T0055	13	5.5
	EN700-4T0075	17	7.5
	EN700-4T0110	25	11
	EN700-4T0150	33	15
	EN700-4T0185	39	18.5
	EN700-4T0220	45	22
	EN700-4T0300	60	30
	EN700-4T0370	75	37
	EN700-4T0450	91	45
	EN700-4T0550	112	55
	EN700-4T0750	150	75
	EN700-4T0900	176	90
	EN700-4T1100	210	110
	EN700-4T1320	253	132
	EN700-4T1600	304	160
	EN700-4T2000	380	200
	EN700-4T2200	426	220
	EN700-4T2500	460	250
EN700-4T3150	600	315	
EN700-4T4000	740	400	

## 2.5 Appearance and parts name explanation

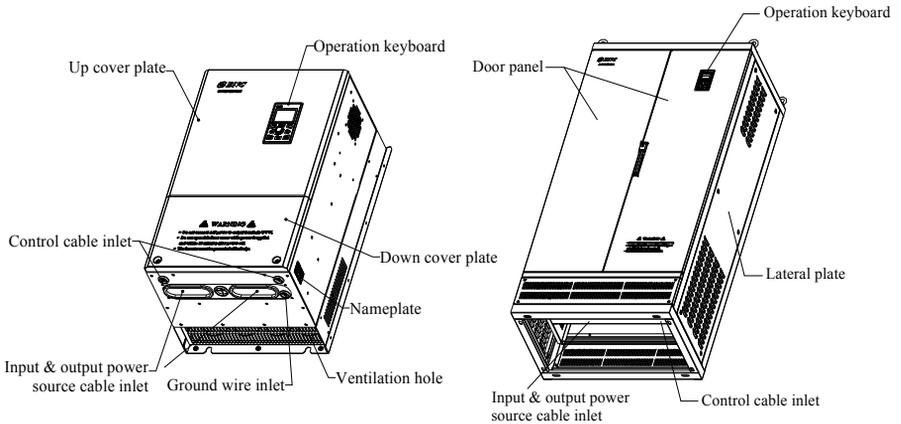


Fig.2-3 Parts name sketch

## 2.6 Outer size

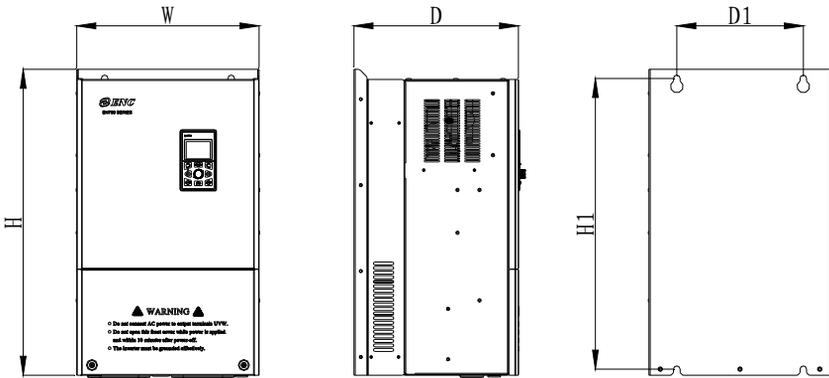


Fig.a

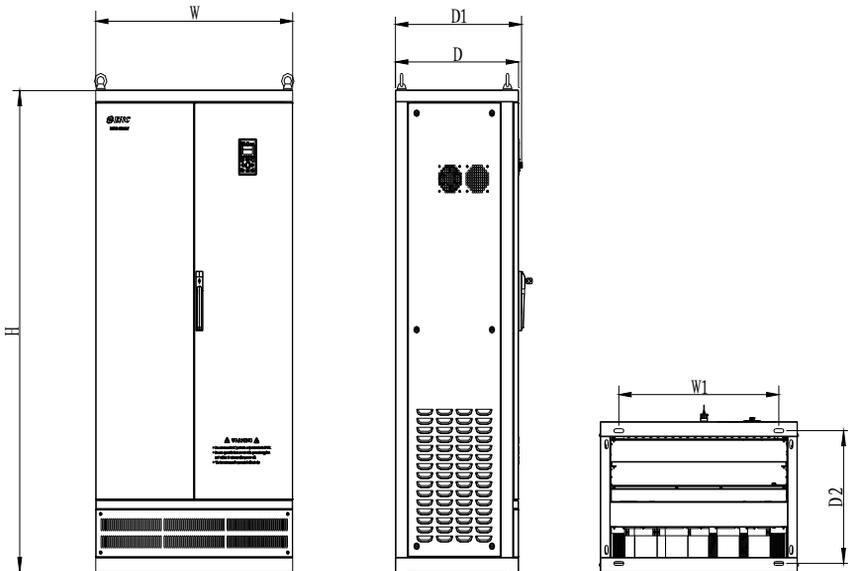


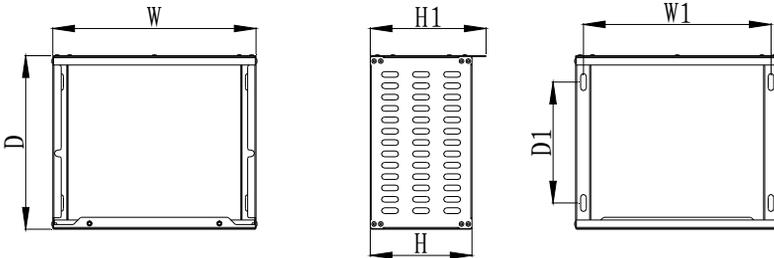
Fig.b

Fig.2-4 Outer dimension

Table 2-1 EN700 Mounting size

Inverter type	W (mm)	W1 (mm)	H (mm)	H1 (mm)	D (mm)	D1 (mm)	D2 (mm)	Fix Hole (mm)	Fig.No.
EN700-4T0040	160	100	320	306	192	205	-	6	Fig.a
EN700-4T0055									
EN700-4T0075									
EN700-4T0110	210	150	365	349	200	213	-	7	
EN700-4T0150									
EN700-4T0185	250	190	420	400	210	223	-	9	
EN700-4T0220									
EN700-4T0300	300	220	560	540	260	263	-	9	
EN700-4T0370									
EN700-4T0450	326	260	610	590	265	278	-	9	
EN700-4T0550									
EN700-4T0750	360	250	605	575	325	348	-	13	
EN700-4T0900									
EN700-4T1100	430	250	710	680	340	353	-	13	
EN700-4T1320									
EN700-4T1600	510	370	1069	1035	430	443	-	13	
EN700-4T2000									
EN700-4T2200	560	420	1069	1035	430	443	-	13	
EN700-4T2500									
EN700-4T3150	800	650	1600	-	500	513	440	13	Fig.b
EN700-4T4000									

## 2.7 EN700 Accessories base



Standard base	W (mm)	D (mm)	H (mm)	W1 (mm)	D1 (mm)	Fix Hole	Inverter type
SP-BS7-0900	360	306	180	332	213	30*10	EN700-4T0750
							EN700-4T0900
SP-BS7-1320	430	320	180	402	228	30*10	EN700-4T1100
							EN700-4T1320
SP-BS7-1600	510	404	205	446	340	φ10	EN700-4T1600
SP-BS7-2200	560	404	204	496	340	φ10	EN700-4T2000
							EN700-4T2200
							EN700-4T2500

## 2.8 Outer size of keypad (Unit: mm)

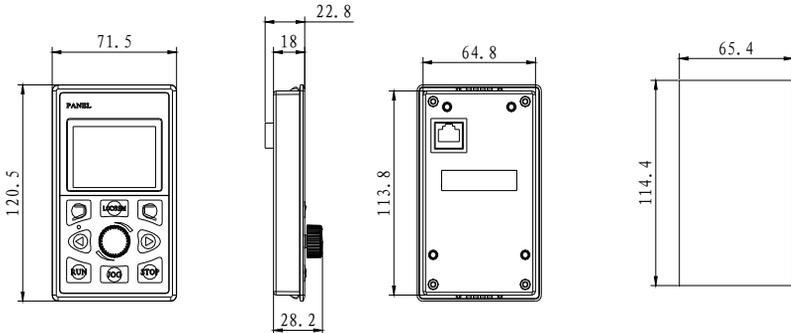


Fig.2-4 Outer size of keypad and hole size



When keypad outer lead, user can adjust the hole size under actual situation on keypad or keypad holder; thickness of install board between 1.0~1.5mm is suggested.

## 2.9 Product technical index and spec

### 2.9.1 Inverter electrical specifications

Item		Specification
Input	Rated voltage, frequency	3 phase AC 380V~440V
	Allowed volt. range	-15%~10%
	Allowed frequency range	±5%
	Overload capability	150% of rated current for 60S
	Carrier frequency	1.0~10.0kHz (The maximum carrier frequency of different capacities is different. Please refer to the E3-01 parameter description.)
	Max. output voltage	3 phase 380V~440V (Corresponding input voltage)
Max. output frequency		245~400Hz (Note: varies depending on different control modes)

### 2.9.2 General specification

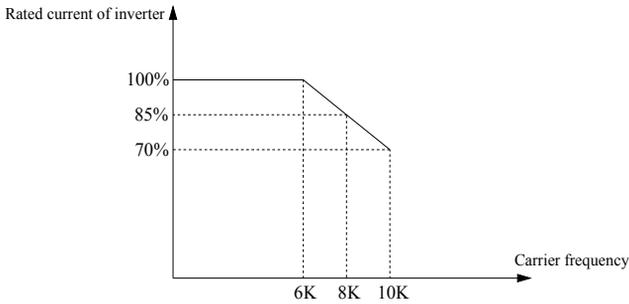
Performance		SVC control mode	VC control mode	V/F control mode
Control performance	Control method	Hybrid vector control		Frequency/voltage control method
		Speed sensorless speed and torque control	High speed and high precision speed and torque control with speed sensor	
	Max.rotate speed	Equivalent to 245Hz		400Hz
	Carrier frequency	1.0~10.0kHz (The inverter needs to be derated when the carrier frequency is greater than the default value.)		
	Overload capability	150% of rated current for 1 minutes		
	Speed control range	1:100(General motor)	1:1000(Special motor)	About 1: 50
	Speed/fr frequency accuracy	Digital input (-10℃~40℃)	±0.5%	±0.01%
Analog input (25℃±10℃)		±0.5%	±0.02%	±0.2% (Frequency accuracy)

	<b>Speed control method</b>	Robust control		No
	<b>Speed control response</b>	200rad/s (-3dB)	400rad/s (-3dB)	No
	<b>Torque control accuracy</b>	≤±8%(general motor)	<±3% (Special motor)	No
	<b>Torque control response</b>	2krad/s (-3dB)		No
	<b>Constant power range</b>	1:4		No
	<b>Zero-speed control</b>	No	Yes	No
	<b>Start-up torque</b>	More than 150%		
	<b>Torque control</b>	It can be set in four quadrants of forward rotation drive, forward rotation regeneration, reverse rotation drive and reverse rotation. The setting range is 0 to 150% (Can be set to 200% due to the difference of the motor in the drive combination).		Can be set on the drive and regeneration side, setting range: 0~150%
<b>Major control function</b>	Torque control, speed control/torque control switching operation, default speed tracking quick start function, high efficiency operation, disable reverse rotation mode selection, prevention of regenerative stall function, DC braking, dynamic braking, stationary and rotating self-learning , torque boost, suppression of unstable function, detachable terminal block with parameter backup function, droop control, mechanical loss compensation setting, speed deviation limit during acceleration and deceleration, multi-speed program running, stop mode, Built-in PID function, Jog operation, Skip function, contact acceleration/deceleration function, cooling fan ON/OFF function, fault retry, timing control, S-curve acceleration/deceleration, acceleration/deceleration time switching, speed/frequency holding function, 2nd motor switching operation, Over-torque detection output, 2-wire and 3-wire sequence control, forward/reverse switching, pre-excitation, torque/speed arrival detection output, FCL over current fault avoidance, MODBUS communication, etc.			
<b>Major protect function</b>	Input and output phase loss protection, motor and inverter overheat protection, capacitor over temperature protection, motor and inverter overload protection, IGBT module abnormality, over current protection, over voltage protection, under voltage protection, optional abnormal protection, external fault protection, Over speed and over torque protection, communication anomalies, speed control errors, speed detector anomalies, main contactor disconnect protection.			
<b>Operation keyboard</b>	<b>LCD display</b>	Parameter copy: Quick copy of parameters can be realized through the operation panel Key lock: implement partial or full lock on the button		
<b>Environment</b>	<b>Use ambient</b>	Indoor, not bare to sun light, no dust, no corrosive gas, no flammable gas, no vapor, no water drop or salt etc.		
	<b>Altitude</b>	Under 1000 meter. (Above 1000 meter require to reduce volume to use, output current reduce about 10% of rated current per 1000 meter high)		
	<b>Environment temperature</b>	-10℃~+40℃ (Environment temperature between 40℃~50℃, need to reduce volume or strengthen heat sink)		
	<b>Environment humidity</b>	Smaller than 95%RH, No drop condenses		
	<b>Vibration</b>	Smaller than 5.9 M/S <sup>2</sup> (0.6g)		
<b>Structure</b>	<b>Storage temperature</b>	-40℃~+70℃		
	<b>Protection grade</b>	IP20		
	<b>Cooling mode</b>	Force-air cooling		
<b>Installation mode</b>		Wall hanging type; cabinet type		

### 2.9.3 Derating

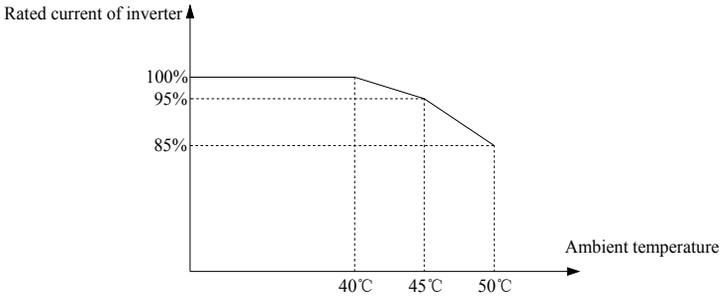
In the case of exceeding the rated conditions (Ambient temperature, altitude , and the carrier frequency at the factory), The inverter derating (Power and current) is required, As described below. When derating is used, if the motor is required to operate at full power, It is necessary to select a larger capacity drive to provide sufficient load capacity. For example, If the motor current requirement is 10A and the inverter is required to operate at 10kHz (Factory value 6KHz) carrier frequency, Then the appropriate inverter model should be selected according to the following formula. The rated current of the inverter that meets the requirements is minimum:  $10A/0.70 = 14.29A$ . Among them, 0.70 is the derating factor for the carrier frequency of 10 kHz (See the section "Carrier Frequency Derating").

(1) Carrier frequency derating: When the carrier frequency is higher than the factory setting, derate according to Fig.2-6.



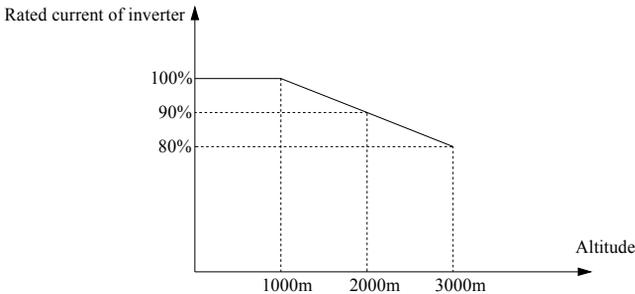
**Fig.2-6 Carrier frequency derating**

(2) Temperature derating: The temperature is between 40°C and 45°C. For every 1°C increase, The rated output current is reduced by 1%. The temperature is between 45°C and 50°C, And the rated output current is reduced by 2% for every 1°C increase. As shown in Fig.2-7.



**Fig.2-7 Ambient temperature derating**

(3) Derating at altitude: If the altitude is more than 1000 meters, the derating will be 1% for every 100 meters. The drive can be installed at an altitude of up to 3000 meters. As shown in Fig.2-8.



**Fig.2-8 Derating at altitude**



**Note**

In order to give full play to the superior performance of this unit, please follow the contents of this chapter and check the relevant contents correctly before wiring.



Correct selection must be made. Incorrect selection may result in abnormal motor operation or damage to the inverter.



## Installation and Wiring

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3.5 Basic running wiring diagram.....	18
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## 3.1 Installation ambient

### 3.1.1 The demands for installation ambient

(1) Installed in drafty indoor place, The ambient temperature should be within  $-10^{\circ}\text{C}\sim 40^{\circ}\text{C}$ , It needs external compulsory heat sink or reduce the volume if temperature is over than  $40^{\circ}\text{C}$ ; when temperature under  $-10^{\circ}\text{C}$ , Please preheat inverter first.

(2) Avoid installing in places with direct sunlight, Much dust, Floating fiber and metal powder.

(3) Don't install in place with corrosive, Explosive gas.

(4) The humidity should be smaller than 95%RH, Without condensation water.

(5) Installed in place of plane fixing vibration smaller than  $5.9\text{m/s}^2(0.6\text{g})$ .

(6) Keep away from electromagnetic disturbance source and other electronic apparatus sensible to electromagnetic disturbance.

### 3.1.2 Installation direction and space

(1) Normally the inverter should be mounted vertically, Horizontal mounting will seriously affect heat dissipation and the inverter must be used in lower volume.

(2) Demand for minimum mounting space and distance, Please see Fig.3-1.

(3) When installing multiple inverters up and down, leading divider must be applied between them, See Fig.3-2.

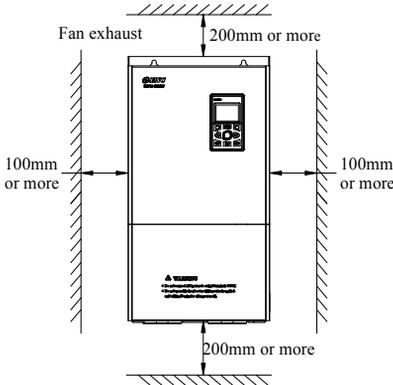


Fig.3-1 Installation distance sketch map

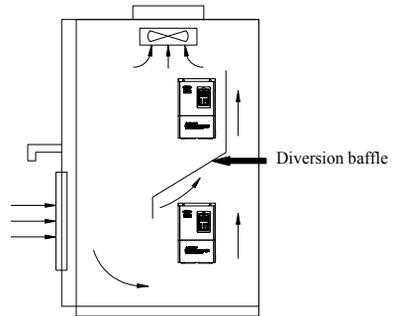


Fig.3-2 Installation diagram of multiple inverters

## 3.2 Parts disassembly and installation

### 3.2.1 Key board disassembly and installation

#### (1) Disassembly

Remove the lower cover and upper cover, Unplug the keyboard line, And use your hand press and hold the buckle on the top and bottom of the keyboard while pushing outwards, then operating keyboard can be removed.

#### (2) Assembly

First align the bottom of the operating keyboard with mounting hole of the machine and press the upper and lower sides of the keyboard after being placed, Then releasing it (Keyboard assemble well when sounding of crisp), Show as Fig.3-3.

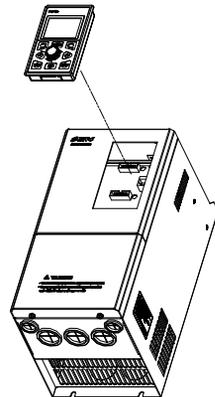


Fig.3-3 Operating keyboard installation diagram

### 3.2.2 Cover disassembly and installation

**(1) Disassembly:**

First remove the two screws at the bottom of the cover, slightly pan outward, Then tilt the cover 15 degrees, Pull out along the shown direction to remove the cover.

**(2) Installation:**

First put the cover parallel to the chassis, So that the cover is just well stuck on both sides of the chassis, Push the cover forward hard so that it insert the top fixing piece into the housing fixing groove and then tighten the two screws on the bottom of cover. As shown in Fig.3-4.

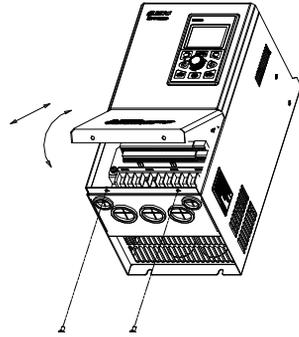


Fig.3-4 Cover removal and installation

### 3.3 Wiring notice points



- (1) Assure power be cut off completely for above 10 minutes before wiring, Otherwise there is danger of getting electric shock.
- (2) Forbid connecting power wire to output U, V, W of the inverter.
- (3) If there is current leakage inside inverter, Inverter and motor must be earth grounding for safety assurance, Please refer to clause 7 in Chapter 3.4.1 for grounding wiring.
- (4) Before shipment compression resistance test of the inverter is Passed, sousers should not conduct compression resistance test again.
- (5) Do not add absorbing capacitor or other resistance-capacitor absorbing device between inverter and motor; also do not add electromagnetic contact. If contactor and other switch component needed to add, please make sure inverter suspended without output, Show as Fig.3-5.
- (6) To provide inverter over-current protection in output side and convenient maintenance under power off, it should be connected to power source through air switch and contactor.
- (7) Control signal wire should select multicore stranded wire or shielding wire. One end of the shielding layer hang in the air, and the other end connect to inverter earth grounding terminal, connection wire shorter than 20m.



- (1) Before wiring, assure power supply is cut off completely for 10 minutes and all LCD indicator light extinguished.
- (2) Before inverter internal wiring, confirm that DC volt. Between main loop end P+ and P- fall down to below DC36V.
- (3) Wiring can only be done by professional person trained and qualified.
- (4) Before power on, Check if voltage grade of the inverter is in line with that of power supply volt., Otherwise will cause personnel injured and device damaged.

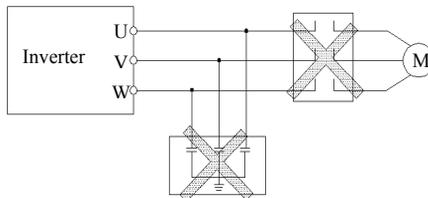


Fig.3-5 Forbid to use contactor and absorbing capacitor

### 3.4 Main loop terminal wiring

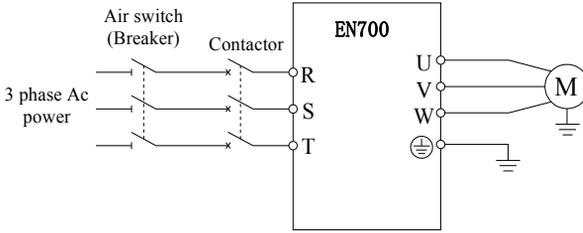


Fig.3-6 Main loop simple wiring

To keep user power grid safety, please choose proper air switch, breaker, wiring at power input side, parameter recommended show as Table 3-1 (**Remark: Wire must choose PVC insulation copper conductor**).

Table 3-1 Parameter recommended for air switch (Breaker), Contactor and wiring selection

Type	Air switching or Breaker	Type	Air switching or Breaker	Type	Air switching or Breaker
EN700-4T0040	16	18	2.5	2.5	0.5
EN700-4T0055	20	25	2.5	2.5	0.75
EN700-4T0075	25	25	4.0	4.0	0.75
EN700-4T0110	32	32	6.0	6.0	0.75
EN700-4T0150	40	40	6.0	6.0	0.75
EN700-4T0185	50	50	10	10	1.0
EN700-4T0220	50	50	10	10	1.0
EN700-4T0300	63	63	16	16	1.0
EN700-4T0370	80	80	25	25	1.0
EN700-4T0450	100	115	35	35	1.0
EN700-4T0550	125	125	50	50	1.0
EN700-4T0750	250	160	70	70	1.5
EN700-4T0900	250	160	95	95	1.5
EN700-4T1100	350	350	120	120	1.5
EN700-4T1320	400	400	120	120	1.5
EN700-4T1600	500	500	150	150	1.5
EN700-4T2000	630	630	185	185	1.5
EN700-4T2200	700	700	240	240	1.5
EN700-4T2500	800	800	120*2	120*2	1.5
EN700-4T3150	1000	1000	150*2	150*2	1.5
EN700-4T4000	1250	1250	240*2	240*2	1.5

### 3.4.1 Connection of inverter and fitting parts

- (1) There must be over-current Protection breaker or fuse in inverter power supply circuit to avoid failure expanding because of the second device failure.
- (2) AC input reactor
 

When high harmonics between inverter and power supply is strong which cannot meet system requirement or input side power factor need to improve, ac input reactor can be added.
- (3) Contactor is used to power supply only, do not use it to control inverter start and stop.
- (4) Input side EMI filter
 

Hoosing optionally EMI filter to restrain high frequency transduction interference and radio-frequency interference from inverter power line.
- (5) Output side EMI filter
 

Choosing optionally EMI filter to restrain radio-frequency Interference and wire leakage current from inverter output side.
- (6) AC output reactor
 

Installing AC output reactor is suggested to avoid motor insulation damage, oversize current leakage and inverter frequent protection when connecting wire between inverter and motor exceeds 50m.
- (7) Safety earth ground wire inverter and motor must be earth ground connection, connection wire should select as shorter and thicker as above 3.5mm<sup>2</sup> multicore copper wire, and earth grounding resistance smaller than10Ω.

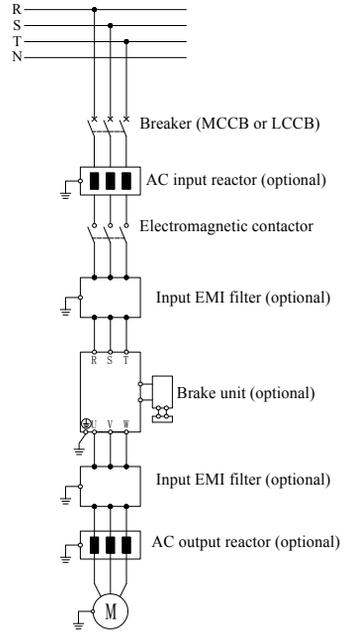


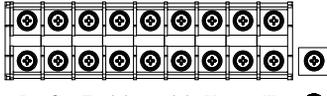
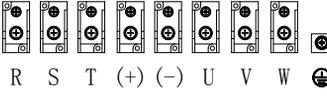
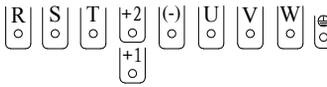
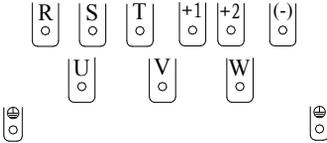
Fig. 3-7 Connection of inverter and fitting parts

### 3.4.2 Main loop terminal wiring

- (1) Main loop input output terminal show as Table 3-2.

Table 3-2 EN700 Main loop input output terminal description

Adapted type	Main loop terminal	Terminal name	Function description
EN700-4T0040 ~ EN700-4T0150		R、S、T	3 phase AC input terminal, connect power source
		P、(+)	External connect to DC reactor
		(+)	DC volt. Positive terminal
		PB	Reserved terminal for external brake resistance
		(-)	DC volt. Negative terminal
		U、V、W	3 phase AC output terminal, connect to motor
		⊕	Grounding terminal
EN700-4T0185 EN700-4T0220		R、S、T	3 phase AC input terminal, connect power source
		P、(+)	External connect to DC reactor
		(+)	DC volt. Positive terminal
		PB	Reserved terminal for external brake resistance
		(-)	DC volt. Negative terminal
		(+), (-)	External connect brake unit

		U、V、W	3 phase AC output terminal, connect to motor
			Grounding terminal
EN700-4T0300 ~ EN700-4T0550		R、S、T	3 phase AC input terminal, connect power source
		(+)	DC volt. Positive terminal
		PB	Reserved terminal for external brake resistance
		(-)	DC volt. Negative terminal
		(+), (-)	External connect brake unit
		U、V、W	3 phase AC output terminal, connect to motor
			Grounding terminal
EN700-4T0750 ~ EN700-4T1600		R、S、T	3 phase AC input terminal, connect power source
		(+)	DC volt. Positive terminal
		(-)	DC volt. Negative terminal
		U、V、W	3 phase AC output terminal, connect to motor
			Grounding terminal
EN700-4T2000 ~ EN700-4T2500		R、S、T	3 phase AC input terminal, connect power source
		+1	Dc side voltage positive terminal 1
		+2	Dc side voltage positive terminal 2
		(-)	DC volt. Negative terminal
		+1, (-)	Can connect External brake
		+2, (-)	Dc power input terminal
		U、V、W	3 phase AC output terminal, connect to motor
			Grounding terminal
EN700-4T3150 EN700-4T4000		R、S、T	3 phase AC input terminal,
		+1	Dc side voltage positive terminal 1
		+2	Dc side voltage positive terminal 2
		(-)	DC volt. Negative terminal
		+1, (-)	Can connect External brake unit
		+2, (-)	Dc power input terminal
		U、V、W	3 phase AC output terminal, connect to motor
	Grounding terminal		



The wiring of the main circuit must be correctly connected according to the terminal specification. It is absolutely not allowed to short-circuit +1, (-) or +2, (-) or directly connect the brake resistance to it. The wrong wiring will cause damage to the equipment or even personal injury.

### 3.5 Basic running wiring diagram

#### 3.5.1 EN700-4T0040~EN700-4T1600 Basic running wiring diagram

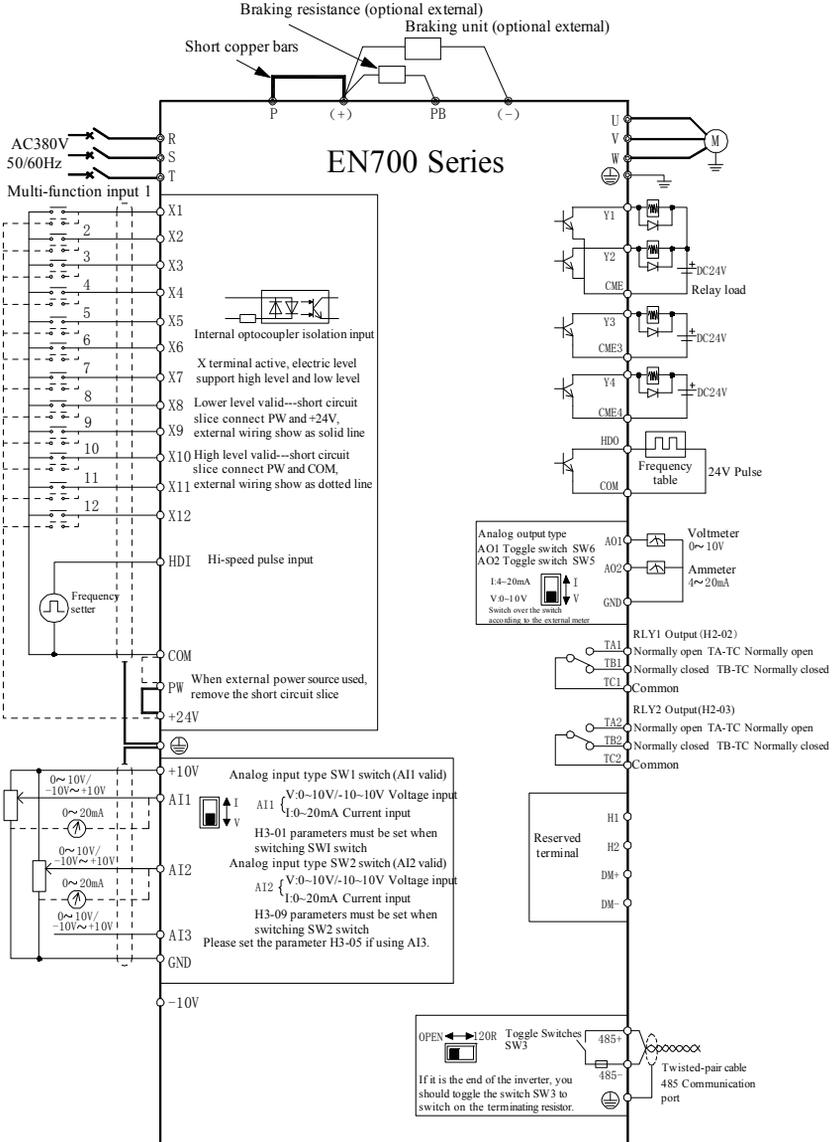


Fig.3-8 EN700-4T0040~N700-4T1600 Basic wiring diagram

Note: When connecting the external dc reactor, please remove the short copper bar between P and (+).

### 3.5.2 EN700-4T2000~EN700-4T4000 Basic running wiring diagram

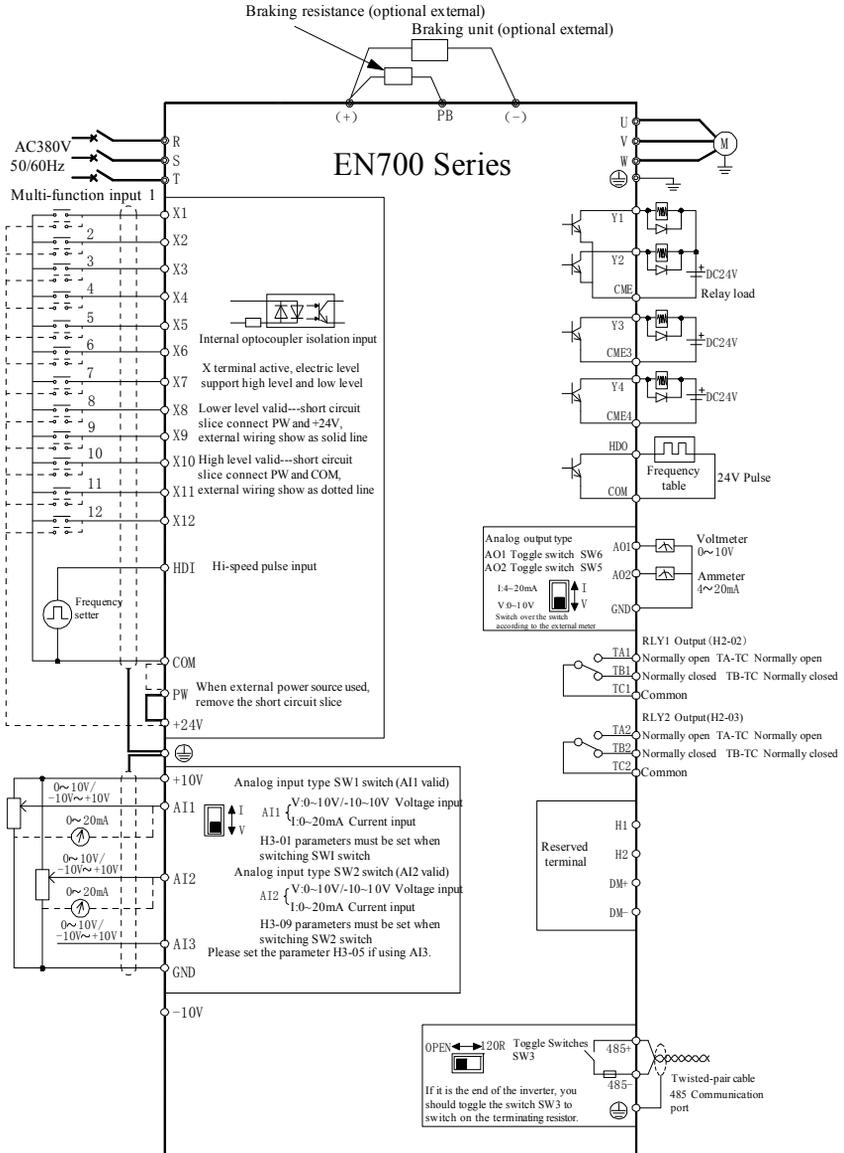


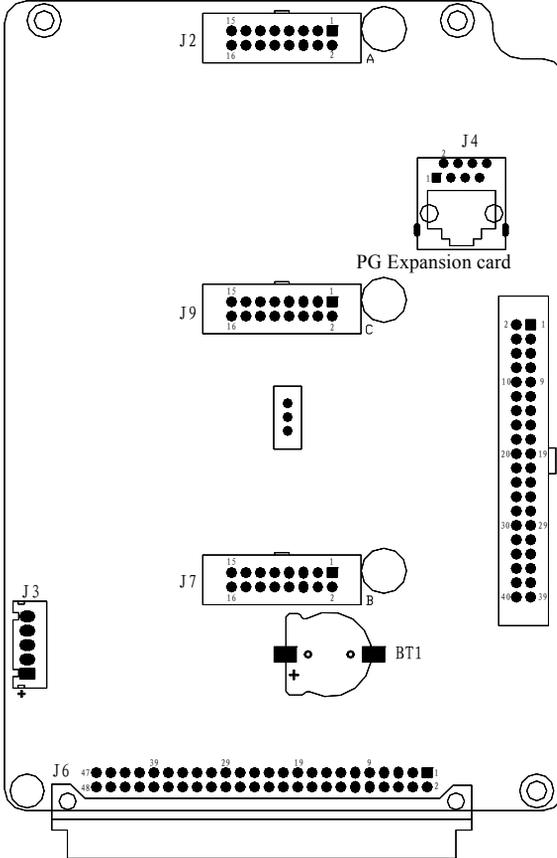
Fig.3-9 EN700-4T2000~N700-4T4000 Basic wiring diagram

### 3.6 Control loop collocation and wiring

#### 3.6.1 Main control board introduction:

Control board terminal location show as Fig.3-9

The terminals CN1 and J3 are used by the manufacturer, and the J4 is the keyboard interface of the machine. The function descriptions of the terminals J2, J6, J7 and J9 provided to the user are shown in Table 3-3. Please read the contents carefully before using the inverter.



### 3.6.2 Terminal board introduction

The positions of the terminals and the pull switch on the inverter terminal board are shown in Fig.3-10.

For the description of the functions of the terminals J1, J3 and CN1 provided to the user, please refer to Table 3-4. For the function of the pull switch and the setting description, please refer to Table 3-5. Please read below contents carefully before using the inverter.

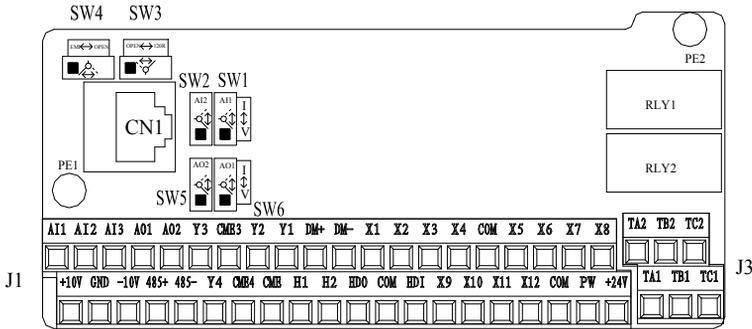


Fig.3-10 Schematic diagram of the terminal block

Table 3-4 Description of the terminal functions provided to the user

No.	Function	Description
J1	External terminal input and output control	Please refer to 3.6.3 when you control the operation of inverter by using external terminals.
J3	RLY1、RLY2 signal output	TA-TC are normally open contacts; TB-TC are normally closed contacts, for details, please refer to 3.6.2.
CN1	Crystal head RS485 communication port	It can be used when RS485 communication is used to realize inverter cascade and other control. For details, please refer to 3.6.2.

Table 3-5 Slide switch function description for users

No.	Function	Setting	Default value
SW1	AI1 analog input signal selection	<input type="checkbox"/> V: H3-01 be 0 0~+10V voltage signal input H3-01 be 1 -10~+10V voltage signal input <input type="checkbox"/> I: H3-01be 2 0~20mA current signal input	H3-01 be 0 0~+10V
SW2	AI2 analog input signal selection	<input type="checkbox"/> V: H3-09 be 0 0~+10V voltage signal input H3-09 be 1 -10~+10V voltage signal input <input type="checkbox"/> I: H3-09 be 2 0~20mA current signal input	H3-09 be 0 0~+10V
SW6	AO1 analog output signal selection	<input type="checkbox"/> V: 0~+10V voltage signal output	0~+10V
SW5	AO2 analog output signal selection	<input type="checkbox"/> I: 4~20mA current signal output	

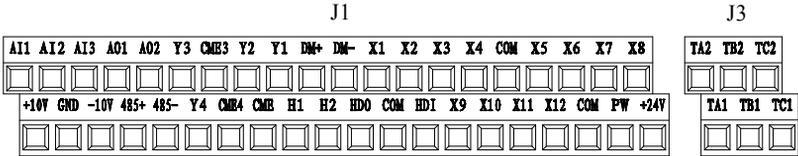
SW3	485 communication terminal resistance	 120R: Connect 120Ω resistance  OPEN: Hanging	Hanging
SW4	EMI suppression selection terminal	 EMI: Earth grounding  OPEN: Hanging	Earth grounding



(1) In the illustration of the toggle switch, the black square indicates the switch toggle position.  
 (2) Only when the interference of the environment affects the signal of the inverter, it is recommended to leave the EMI DIP switch floating.

### 3.6.3 Descriptions for control board terminal

(1) J1 and J3 terminal layout as following



(2) J1 and J3 terminal function description show as Table 3-6.

Table 3-6 Function table for control board terminal

Type	Symbol	Description	Terminal Function and specification
Multifunction input terminal	X1	Multi-function input terminal1	Input voltage range: 15~30V; Opto coupler isolation, Compatible with bipolar input; Factory setting to common emitter mode (Internal power supply); Input impedance: 4.7KΩ Max input frequency: 1KHz
	X2	Multi-function input terminal2	
	X3	Multi-function input terminal3	
	X4	Multi-function input terminal4	
	X5	Multi-function input terminal5	
	X6	Multi-function input terminal6	
	X7	Multi-function input terminal7	
	X8	Multi-function input terminal8	
	X9	Multi-function input terminal9	
	X10	Multi-function input terminal10	
	X11	Multi-function input terminal11	
	X12	Multi-function input terminal12	
	HDI	High-speed pulse input	Input voltage range: 15~30V; High-speed pulse input port, also can be used as the function of X1 ~ X12; Response frequency: 0~50kHz; Input resistance: 2.2kΩ
Power source	+24V	+24V power source	Provide +24V power to external device Max output current: 200mA
	PW	External power source input terminal	Factory default connect to +24V; When use external signal to drive X terminal, It need to connect to external power source and cut off with +24V power terminal.
	+10V	+10V power source	Provide +10V power to external device Max output current: 20mA
	-10V	-10V power source	Provide -10V power to external device Max output current: 20mA
	COM	Common interface	Reference ground for digital signal and +24V power

	GND	Common interface	Reference ground for analog signal and +10V power
Analog input	AI1	Analog input 1	Voltage or current input (Select by toggle switch SW1 and function code H3-01) -10V~10V/-100~100%,0~10V/100%( Input resistance:20kΩ) 4~20mA/100%,0~20mA/100% ( Input resistance:165Ω)
	AI2	Analog input 2	Voltage or current input (Select by toggle switch SW2 and function code H3-09) -10V~10V/-100~100%,0~10V/100%( Input resistance:20kΩ) 4~20mA/100%,0~20mA/100% ( Input resistance:165Ω)
	AI3	Analog input 3	Voltage input (Select by function code H3-05) -10V~10V/-100~100%,0~10V/100%( Input resistance:20kΩ)
Analog output	AO1	Analog output 1	Voltage or current outputs, It is determined by the SW6 (AO1) and SW5 (AO2) DIP switches on the control panel. 0~10V/0~100% 4~20mA/0~100%
	AO2	Analog output 2	
Multi-function output terminal	Y1	Open circuit collector output terminal 1	Optocoupler isolated output, unipolar open collector output Maximum output voltage: 30V Maximum output current: 50mA
	Y2	Open circuit collector output terminal 2	
	CME	Common terminal of open circuit collector output 1 and 2	
	Y3/CME 3	Open circuit collector output terminal 3	
	Y4/CME 4	Open circuit collector output terminal 4	
	HDO/COM	High speed pulse output	The highest output frequency is 50kHz; Internal power supply: load impedance 3K corresponds to high level 5V; 5.1K corresponds to 8V; 10K corresponds to 11.5V; External power supply: less than 30V; to control the current within 20mA, the appropriate load impedance must be adjusted;
RLY1 output	TB1—TC1	Normal closed terminal	Contact rating: AC250V/2A (Cosφ=1) AC250V/1A (Cosφ=0.4) DC30V/1A
	TA1—TC1	Normal open terminal	
RLY2 output	TB2—TC2	Normal closed terminal	
	TA2—TC2	Normal open terminal	
Communication interface	485+	485 differential signal interface	It can communicate with RS-485 through MODBUS communication, and the maximum communication rate is 115.2kbps.
	485-		
Auxiliary interface	CN1	Standard RS485 communication interface	Use twisted pair or shielded wire to connect.
Safety input terminal	H1/COM	Safety input terminal 1	Reserved
	H2/COM	Safety input terminal 2	
Safety monitoring output	DM+	Safety monitoring output	
	DM-	Safety monitoring output public	

(3) RS485 the crystal socket CN1 is arranged as follows:



RS485 terminal CN1 layout								
No.	1	2	3	4	5	6	7	8
Name	485+	485-	-	-	-	-	-	-

### 3.6.4 Wiring of analog input and output terminals

(1) The AI1 terminal accepts the analog voltage or current signal single-ended input and switches through the switch SW1. The wiring is as follows:

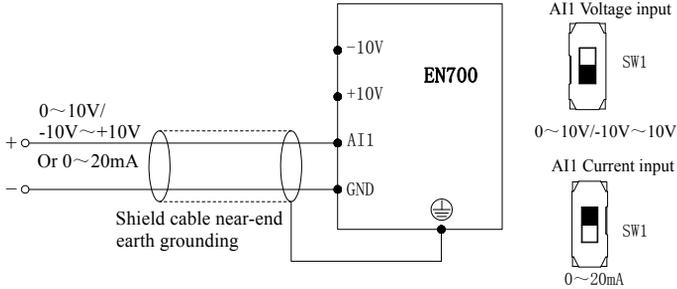


Fig.3-11 AI1 Terminal wiring diagram

(2) The AI2 terminal accepts a single-ended input of analog voltage or current signal and switches through switch SW2. The wiring method is as follows:

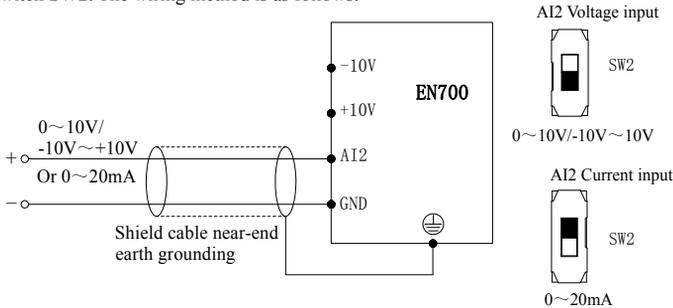


Fig.3-12 AI2 Terminal wiring diagram

(3) The AI3 terminal accepts an analog voltage single-ended input. The wiring method is as follows:

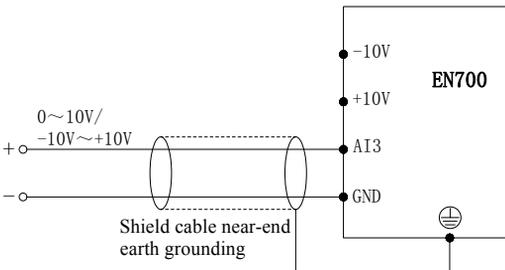


Fig.3-13 AI3 Terminal wiring diagram

(4) The external analog meter of AO1 and AO2 terminals can indicate a variety of physical quantities. The output analog voltage or current signal can be selected and switched through switches SW4 and SW5. The wiring is as follows:

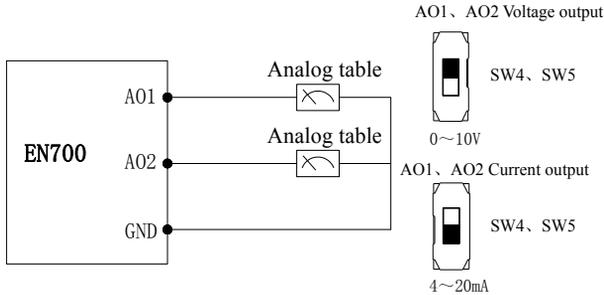


Fig.3-14 Wiring diagram of AO1 and AO2 terminals



Note

- (1) Under analog input mode, filter capacitor or common mode choke can be installed between AI1 and GND or AI2 and GND or AI3 and GND.
- (2) Analog input and output signal can be interfered easily by ambient environment, it need use shield cable for connection and earth grounding well as short as possible.

### 3.6.5 Digital input terminal wiring

(1) To use inverter inbuilt +24V power supply, and NPN source type external controller connection mode.

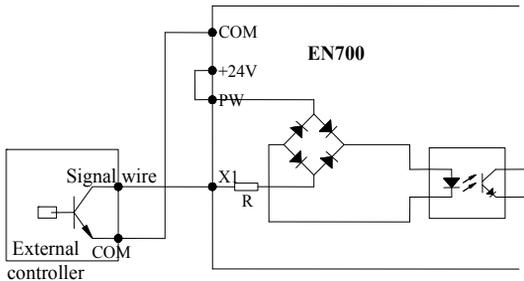


Fig.3-15 Inbuilt 24V source type connection mode

(2) To use inverter inbuilt +24V power supply, and PNP drain type external controller connection mode.

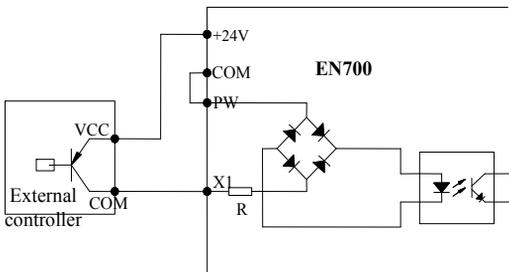
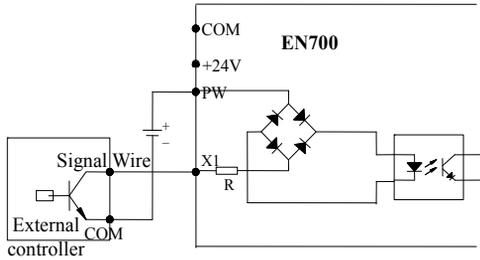


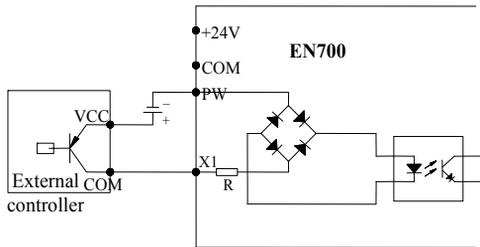
Fig.3-16 Inbuilt24V drain type connection mode

(3) To use external DC 15~30V power supply, and NPN source type external controller connection mode.(Remove the short circuit slice between PW and +24V).



**Fig.3-17 External power supply source type connection mode**

(4) To use external DC 15~30V power supply, and PNP drain type external controller connection mode.(remove the short circuit slice between PW and +24V)



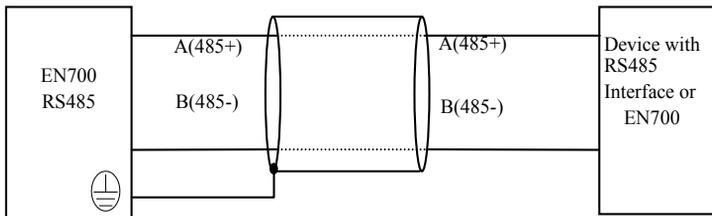
**Fig.3-18 External power supply drain type connection mode**

### 3.6.6 Communication terminal wiring

The EN700 inverter provides the user with an RS485 serial communication interface.

The following wiring methods can be combined into a single master single slave or single master multiple slave control system. The upper computer (PC or PLC controller) software can realize real-time monitoring and operation of the inverter, realize complex operation control such as remote control and high automation; one inverter can be used as the host, and the other inverters are slaves to composite synchronously controlled inverter network.

(1) The RS485 interface of the inverter is wired with other devices with RS485 interface, and can be wired as shown below.



**Fig.3-19 Communication terminal wiring**

(2) The connection between the RS485 interface of the inverter and the host computer (With RS232 interface):

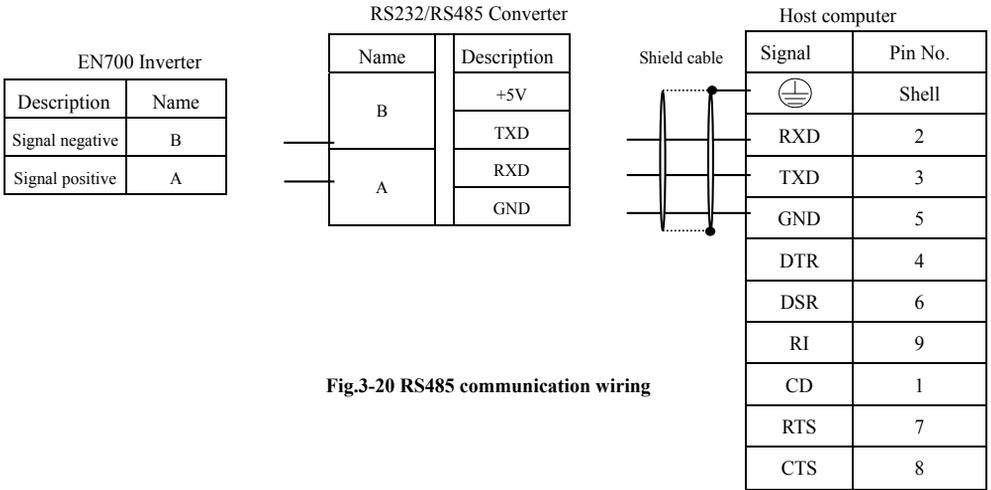


Fig.3-20 RS485 communication wiring



## EMC (Electromagnetic Compatibility) Explanation

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## 4.1 Noise interference restraining

Inverter interference generating for run may have effect to nearby electronic device and the effect depend on the inverter installation surrounding electromagnetic environment and the restrain interference ability of the device.

### 4.1.1 Interference noise type

Because of inverter working principle, there are mainly 3 kinds of noise interference source:

- (1) Circuit conduction interference;
- (2) Space emission interference;
- (3) Electromagnetic induction interference;

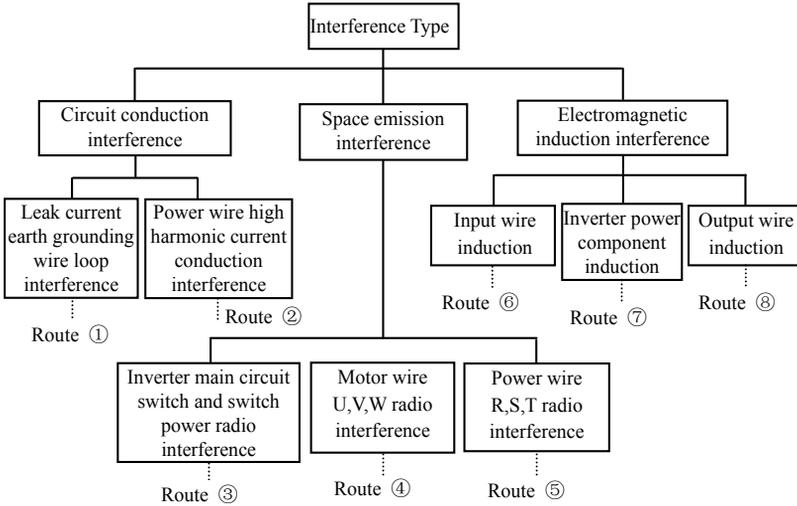


Fig.4-1 Interference noise type

### 4.1.2 Basic countermeasure for restrain interference

Table 4-1 Interference restrain countermeasure

Noise spread road	Countermeasure of weakening effect
①	Earth grounding cable of peripheral device and inverter wiring make up of the closed-loop and leakage current of inverter earth grounding cable will make device perform wrong action. It will decrease wrong action when device not connect to earth grounding.
②	When the power of peripheral device and inverter power belong to the same power source, high harmonic generating from inverter will transmit the voltage and current along with the power line which will interfere other devices within the same power source system. Take some restraining measures as below: install electromagnetic noise filter at inverter input end; use isolation transformer to isolate other devices; connect power end of peripheral device to remote power grid; add power ferrite filter magnetic ring to inverter R、S、T three phase wire to restrain high harmonic current conduction
③④⑤	<ul style="list-style-type: none"> <li>●Keep other sensitive devices and signal wire installed away from inverter. it should use shield wire and make the shield layer single end earth grounding. Besides keep distance from inverter and its input &amp; output wire as possible as. When signal wire need to intersect with strong current cable, it should make them orthogonal crossing not parallel.</li> </ul>

	<ul style="list-style-type: none"> <li>● Install high frequency noise filter (ferrite common mode choke, also called magnetic ring) at the bottom end of the inverter input &amp; output to restrain radio frequency interference of dynamic wire effectively.</li> <li>● Motor cable should be placed in protective object with large thickness, such as placed in larger thickness (over 2mm) pipeline or buried in cemented tank. Putting dynamic wire in metal tube and connect to earth grounding with shield wire (motor cable use 4-core cable, one side is earthed through the inverter, the other side connected to motor casing).</li> </ul>
⑥⑦⑧	To prevent wire parallel or bundled of strong and weak current, it should keep away from inverter assemble device, and wiring should away from inverter R,S,T,U,V,W equipower line. Devices with high field and high magnetic field should notice the corresponding installation position of inverter and keep distance and orthogonal crossing.

## 4.2 Field wiring and earth grounding

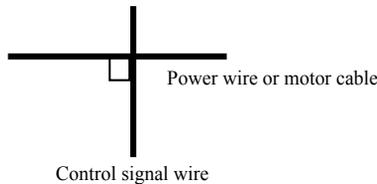
(1) Inverter terminal motor connection wire (U,V,W terminal output wire) and inverter terminal power connection wire (R,S,T terminal input wire) should keep distance enough as possible as can.

(2) U,V,W terminal 3 motor wires should be placed in metal tube or metal wiring tank as possible as.

(3) Generally control signal wire should use shield cable, when shield layer connect to inverter  $\perp$  terminal, it should be the single end earth grounding which closed to inverter side.

(4) Inverter  $\perp$  terminal earth grounding cable must directly connect to floor, it cannot connect to earth grounding through other device, and the location of earth grounding should close to inverter as possible as.

(5) Strong current cable(R,S,T,U,V,W) cannot parallel wiring closely with control signal wire, and bundled together is prohibited. It should keep distance from over 20~60 cm (Relative to strong current size). When it's necessary to intersect, it should be orthogonal crossing, show as Fig.4-2.



**Fig.4-2 System wiring demand**

(6) Earth grounding wire for strong current should separately connect to earth grounding with control signal and sensor earth grounding wire for weak current.

(7) Forbid to connect inverter input terminal (R、S、T) to other devices.

## 4.3 Leak current and countermeasure

The leak current flows through inverter input and output terminal for wire capacitance and motor capacitance, and its size decided by the distributed capacitance and carrier frequency. There are two kinds of leak current: leak current to earth and wire-to-wire. Restraining methods as below:

(1) Diminish the cable length between inverter and motor.

(2) Install ferrite magnetic ring or output reactor at the inverter output terminal.



When reactor installed with rated voltage drop more 5% and long wiring to U, V, W terminal, it would reduce motor's voltage apparently. When motor run at full load, it is possible to flash motor, and it should be used by derating or boosting input and output voltage.

(3) As carrier frequency low, The motor noise would increase accordingly.

#### 4.4 Installation demand for electromagnetic on-off electronic device

It should pay attention that surge absorber must be installed when electromagnetic on-off electronic device like relay, electromagnetic contactor and electromagnetic iron generating noise easily and largely installed near to inverter or in the same control cabinet, show as Fig 4-3.

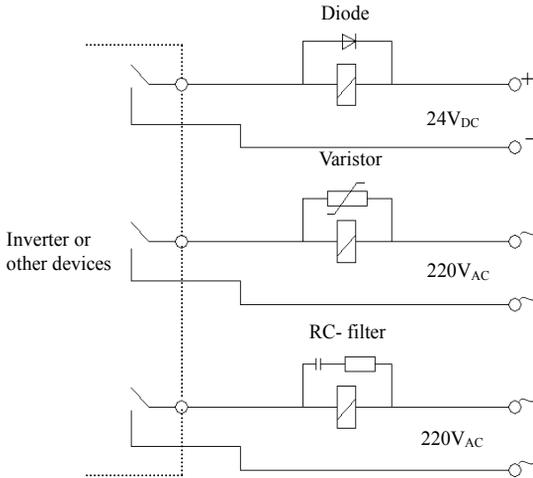


Fig.4-3 Install demand for electromagnetic on-off device

#### 4.5 Noise filter installation instructions

(1) To use strictly as per the rated value; filter metal casing grounding must connect reliably to assemble cabinet metal grounding in large scale and it required good conductive continuity. Otherwise, it may cause electric shock and influence the EMC effect seriously.

(2) Filter grounding and inverter (⊕) terminal must connect to the same common earth grounding, otherwise it will influence the EMC effect seriously.

(3) Filter installed as close as possible to inverter power input terminal.



## Basic operation and trial run

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## 5.1 Instructions for operating the keyboard

By operating the keyboard, inverter Start/stop, Various data display, Parameter setting/changing, warning display etc functions can be achieved.

### 5.1.1 Keyboard layout

The operation key board is the main unit that the inverter accepts commands and displays parameters. The outline drawing of the operation keyboard is shown in Fig.5-1.

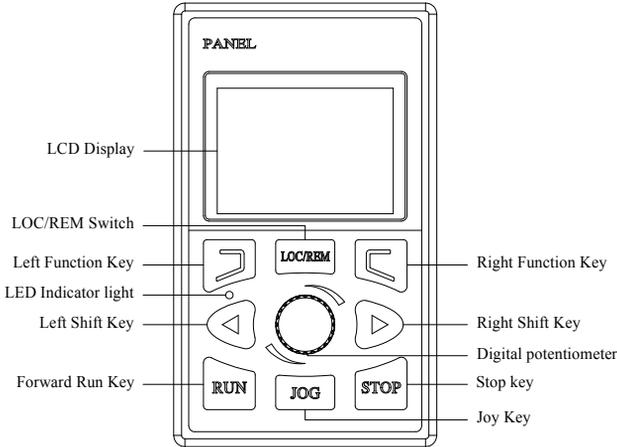


Fig.5-1 Operation keyboard layout

### 5.1.2 Keyboard function description

There are 9 buttons on the operating keyboard of the inverter. The function definition of each button is shown in Table 5-1.

Table 5-1 Keyboard function description

Key	Name	Function description
	Left function key	It varies depending on the current menu display. The name of each function is displayed at the top left of the keyboard below the display.
	Right function key	It varies depending on the current menu display. The name of each function is displayed at the top right of the keyboard below the display.
	Left shift key	When editing the status, you can select the modification bit of the setting data. In the case of operating the keyboard lock, press and hold for more than 2 seconds to unlock the keyboard.
	Right shift key	When editing the status, you can select the modification bit of the setting data. In the normal monitoring interface, press and hold for more than 2 seconds, then operate the keyboard keys to lock.
	LOC/REM switch over key	Using this button to switch over between keyboard operation run (LOCAL) and the external command run (REMOTE).
	Forward run key	In the operation keyboard mode, press this button to run the inverter forward.
	Jog key	In the keyboard mode, press this button to do jog operation.
	Stop key	When the inverter is in normal running state, if the running command channel of the inverter is set to the keyboard stop valid mode, press this button, the inverter will stop according to the set mode.

	Digital potentiometer	Same function as the keyboard increment and decrement keys, rotating to the left represents reduction, and right rotation represents increase, When pressed, it is for function selection or data confirmation; the rotary potentiometer can switch the items displayed in the monitoring item
	LED indicator	When the green light is on, the inverter works normally; When the red light is on, the inverter has failed. The drive warns when the green light is flashing.

### 5.1.3 LCD display

#### 5.1.3.1 LCD display when inverter operates normally

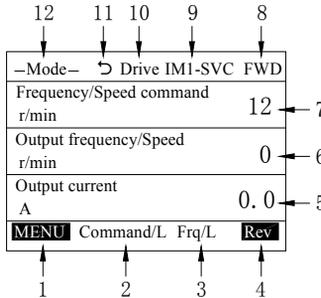


Fig 5-2 LCD display

Table 5-2 The name and function of each part of the LCD display area

NO.	Display	Description
1	Menu	The display corresponds to the key  on the keyboard, and press  to enter the menu.
	Return	Press the key  to return to upper menu.
2	Command/L	The drive run command is given by the keyboard operator.
	Command/R	The drive run command is not given by keyboard operator.
3	Frequency/L	The running frequency of the inverter is given by the keyboard operator.
	Frequency/R	The running frequency of the inverter is not given by the keyboard operator.
4	Reverse	The display corresponds to the key  on the keyboard, and press  to switch over between forward and reverse.
	Choose	Press  key to choose modes parameters, and setting value and enter next step.
5	Monitor item 1 display	Displays the name, value, and unit of the monitoring item 1. The content displayed by this item is determined by o1-01, o1-02.
6	Monitor item 2 display	Displays the name, value, and unit of the monitoring item 2. The content displayed by this item is determined by o1-03, o1-04.
7	Monitor item 3 display	Displays the name, value, and unit of the monitoring item 3. The content displayed by this item is determined by o1-05, o1-06.
8	Forward/Reverse	Displays forward or reverse when press  key to switch over between forward and reverse.
9	IM1-SVC	Currently the mode is no PG vector control mode for the first motor.
	IM1-VC	Currently the mode is PG vector control mode for the first motor.
	IM1-VF	Currently the mode is V/F control mode.
10	Drive	"Drive mode" is selected.
	Program	"Program mode" is selected.
11		The current motor cannot be operated.
		The motor can be operated. When it is rotated counterclockwise, it indicates that the motor is rotating forward. The motor can be operated. When it is rotated clockwise, it indicates the motor is reversed.
12	Mode	No mode has been selected.
	Monitor	"Monitor mode" is selected.
	Check	"Verification mode" is selected.

Basic mode	"Basic program mode" is selected.
Senior mode	"Senior program mode" is selected.

### 5.1.3.2 The LCD display of faults and alarms

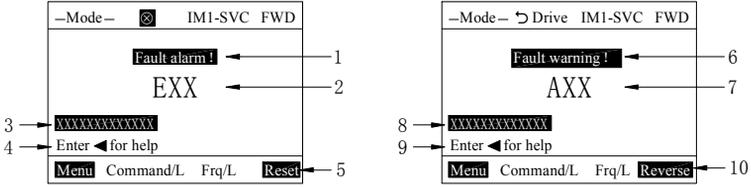
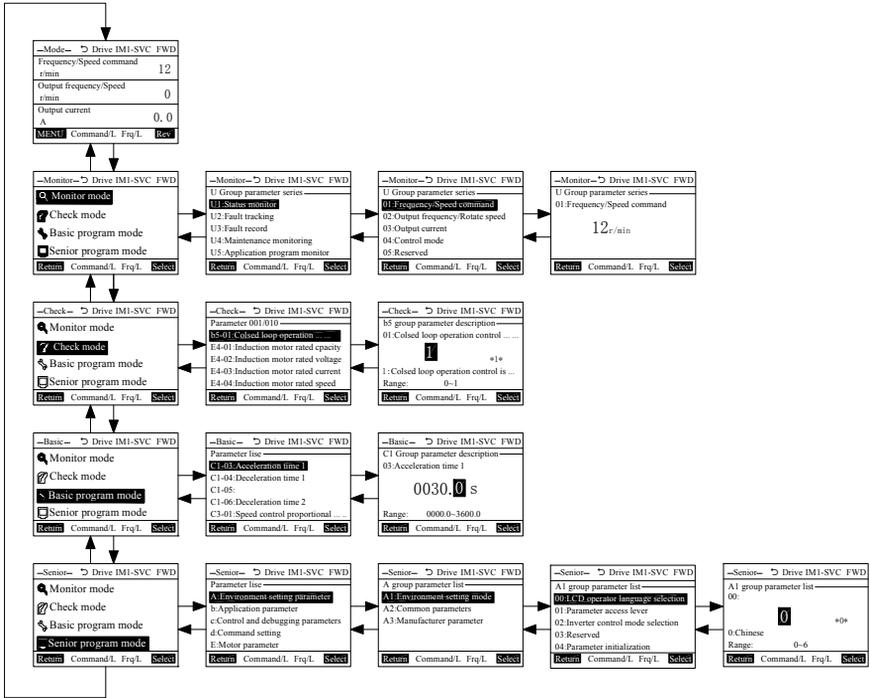


Fig. 5-3 LCD display

Table 5-3 Names and functions of various parts of the LCD display during faults and alarms

Faults			Warning		
NO.	Display	Description	NO.	Display	Description
1	Fault alarm !	Displays fault	6	Fault warning !	Displays warning
2	EXX	Displays fault code	7	AXX	Display warning code
3	XX	Displays fault name	8	XX	Display the warning name
4	Press (Enter) key to enter into help menu	Help tip	9	Press (Enter) key to enter into help menu	Help tip
5	Reset	When solved this fault, press (Reset) to reset	10	Reverse	When an alarm occurs, There is no reset function, and it is automatically reset when the fault is resolved.

## 5.2 Hierarchy of keyboard display functions



## 5.3 Drive mode and program mode

Drive mode: Run the inverter and monitor the operation status.

Program mode: View and set all parameters of the inverter. In program mode, the drive cannot start running. Switch method for the various modes of the operating keyboard:

Mode	Content	Keyboard display	Description
Drive mode	The power is on, Monitoring interface display		This display interface allows the user to monitor parameters and change Frequency/Speed commands while the drive is running. Refer to the o1 group parameters for related monitoring content changes. When the frequency command is displayed as Frequency / L, the frequency / speed command can be adjusted through this  key.
	Monitor mode content		The existing monitoring parameters (U group parameters) in the inverter are listed.
Program	Check mode content		List all parameters that have changed factory settings.
	Basic program mode content		The minimum parameters required for the drive to operate are listed.
	Senior program mode content		Allows the user to view and set all parameters of the drive.

### 5.3.1 Drive mode

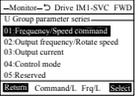
The following operations can be performed in the drive mode:

- ✧ Run/stop of the inverter;
- ✧ Inverter status monitoring display;
- ✧ Alarm content display;
- ✧ Alarm record display.

#### 5.3.1.1 Monitor mode

In monitor mode, View the values of all existing monitoring parameters in the drive.

Operation procedure	LCD display
1. Turn on the inverter power and display the screen.	
2. Press  key to enter into monitor mode selection.	

<p>3. Press  key to enter into U group parameter list interface. At this time, the U1 group parameter is selected.</p>	
<p>4. Press  key to enter into U1 group parameter list interface. At this time, the U1-01 parameter is selected.</p>	
<p>5. Press  key to enter into U1-01 parameter monitor interface. The monitoring parameters are read-only and cannot be modified by the user.</p>	

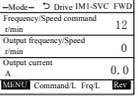
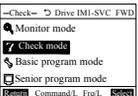
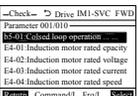
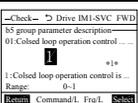
### 5.3.2 Program mode

In program mode, it can be divided into the following modes according to the settings:

- ☆ Check mode: Check and set the parameters that have been changed after leaving the factory;
- ☆ Basic program mode: View and set the minimum parameters required for the inverter to run;
- ☆ Senior program mode: View and set all parameters of the inverter.

#### 5.3.2.1 Check mode

The check mode displays parameters that have been changed due to factory settings such as self-learning mode, parameter setting mode, and usage selection. This helps to confirm the changed parameters when replacing the drive. If there is no change, this mode is displayed without parameters in the data display. The calibration mode not only confirms the changed parameters, but also changes the set values. Specific steps are as follows:

Operation procedure	LCD display
<p>1. Turn on the power of the inverter and display the startup screen.</p>	
<p>2. Press the key  to enter the mode selection interface and rotate  to enter the check mode selection.</p>	
<p>3. Press the button  to enter the parameter list with the factory settings changed. Take the A1-02 inverter control mode selection as an example. The value of this parameter is different from the factory setting.</p>	
<p>4. Press the button  to enter the parameter setting interface. You can rotate  to set parameters and save them by pressing  the button.</p>	

### 5.3.2.2 Basic program mode

In the simple program mode, you can view and set the minimum parameters required for the inverter to operate. Specific steps are as follows:

Operation procedure	LCD display
1. Turn on the power of the inverter and display the startup screen.	
2. Press the key  to enter the mode selection interface and rotate  to enter the simple program mode selection.	
3. Press the button  to enter the simple parameter list. Take C1-03 acceleration time 1 as an example.	
4. Press the button  to enter the parameter setting interface. You can rotate  to set parameters and save them by pressing the button .	

### 5.3.2.3 Senior program mode

In the senior program mode, You can view and set all the parameters required for the inverter to run.

Operation procedure	LCD display
1. Turn on the power of the inverter and display the startup screen.	
2. Press the key  to enter the mode selection interface and rotate  to enter the senior program mode selection.	
3. Press the key  to enter the parameter list list interface. At this time, select the group A parameter.	
4. Press the button  to enter the A group parameter list list interface. At this time, the parameter A1 is selected.	
5. Press the key  to enter the A1 group parameter list list interface. The A1-00 parameter is selected at this time.	
6. Press the button  to enter the parameter setting interface. You can rotate  to adjust setting parameter and save by pressing the button .	

### 5.3.3 LOCAL/REMOTE switching method

When the run command is input by the operation keyboard, it is called LOCAL (local). When the run command is input from outside the operation keyboard, it is called REMOTE.



When [b1-13] (Operation selection after switching the operation command) is set to 1 (when the operation command is switched, the operation is performed according to the switching operation signal), If the operation command is turned ON after switching from LOCAL mode to REMOTE mode, The inverter may suddenly move and may cause personal injury. Before turning on the inverter, please make sure that there are no people around the rotating machine.

The switching method of LOCAL/REMOTE is divided into: operation keyboard switching and multi-function contact input function (LOCAL/REMOTE switching) switching.

(1) Switch by operating the keys  on the keyboard. The invalid/valid of this key is set by [o2-01] (function selection of the LOCAL/REMOTE key).

(2) Switch between the multi-function contact input terminals (X1 to X12).

If any of [H1-02~H1-13] is set to 2, LOCAL/REMOTE switching can be performed by ON/OFF of the terminal.

### 5.3.4 Digital potentiometer switching method of monitoring item 1

(1) In the initial monitoring interface, the content monitored by monitoring item 1 is the given frequency/rotate speed command, the Frequency/Rotate speed command is given by the operation keyboard, the digital potentiometer is rotated, and the Frequency/Rotate speed command is increased or decreased. After resetting the items monitored by the monitoring item 1, rotate the digital potentiometer, and switch to the Frequency/Rotate speed command monitoring interface. The corresponding value will increase or decrease. After two seconds delay, the content of the monitoring item 1 will jump back to the set monitoring item.

(2) When the PID closed loop operation control is valid and the PID reference channel is selected as the operation keyboard, and the monitoring item 1 is monitored as a non-PID reference value, rotate the digital potentiometer, the monitoring item 1 will switch to the PID reference, and the monitoring item 1 jumps back to the set monitoring item after 2 seconds.

## 5.4 Trial run flow chart

### 5.4.1 Main flow chart

The main flow chart explains the method of changing the connected motor operation by the minimum setting. The setting method may be different according to different application conditions and control requirements. If high precision control is not required, please use the factory setting parameters of inverter.

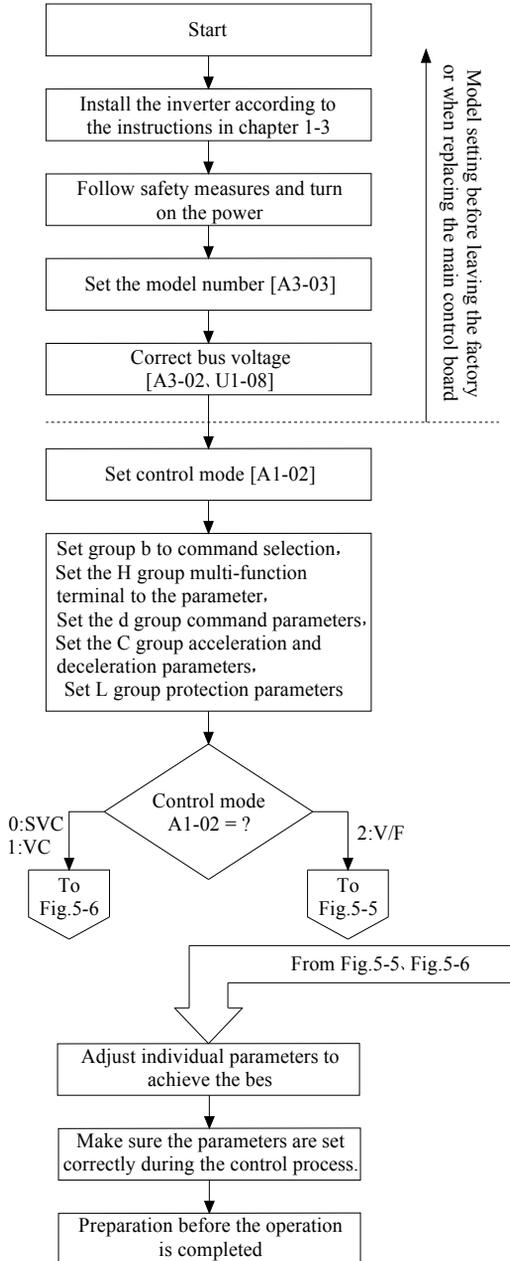
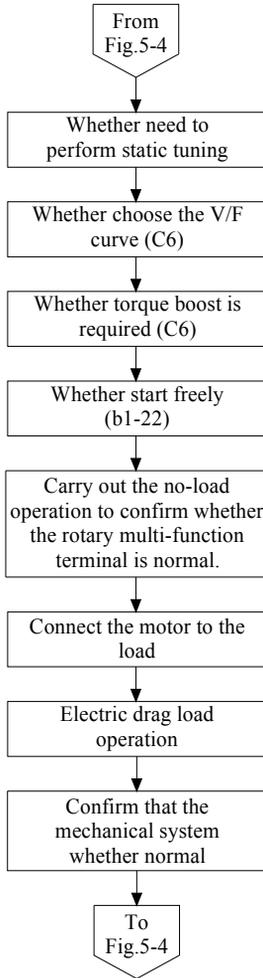


Fig. 5-4 Main flow chart

### 5.4.2 V/F control flow chart



**Fig.5-5 V/F control flow chart**

### 5.4.3 Vector control flow chart

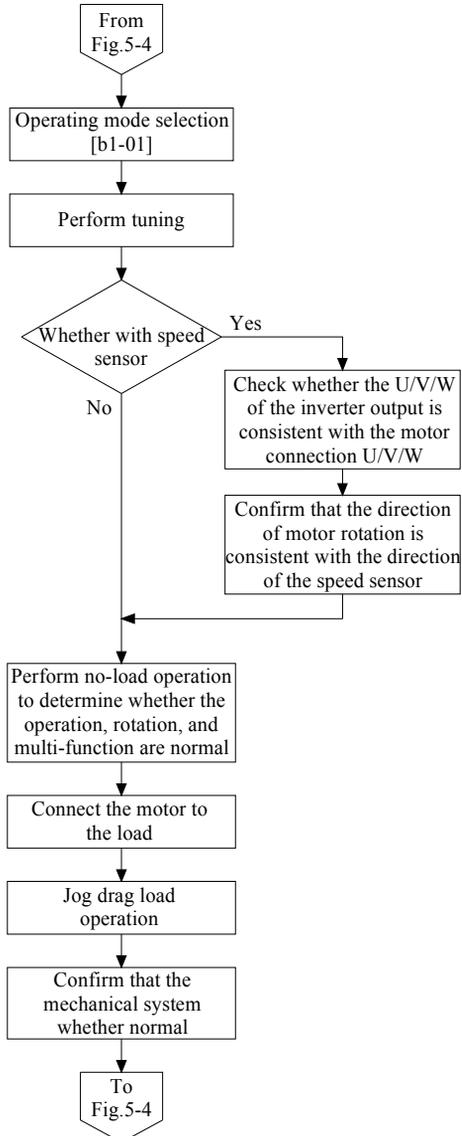


Fig.5-6 Vector control flow chart

## 5.5 Self-tuning

### 5.5.1 Self-tuning

When set to vector control, electrical parameters such as motor resistance and inductance are required, and the algorithm is equipped with an self-tuning function. With this function, the inverter can detect the parameters necessary for these vector controls and set them automatically. Self-tuning must be performed before the inverter is driven by the factory (or the main control board) or after the drive motor is replaced; otherwise The former cannot drive the motor to run, and the latter drives the motor to be abnormal.

There are two tuning modes for self-tuning: static mode tuning and rotary full mode tuning. The static mode setting only detects the nonlinear parameters of the inverter and the primary side resistance of the motor; the full mode tuning determines all the parameters required to drive the motor.

In the V/F control mode, since the inverter has been pre-set with standard motor parameters at the factory, it can be operated even without static setting. However, in order to fully utilize the performance of the inverter, it is recommended to connect the motor to the inverter and implement static mode setting including the connection between the inverter and the motor. This can solve the problem of low frequency and medium frequency oscillation in V/F control in most occasions, making the current envelope smooth and stable during acceleration and deceleration.

Self-tuning must be performed in vector control mode (with speed sensor and without speed sensor). If the motor electrical parameters are known and the rotation setting cannot be performed, input the parameters to the **[E7 Group]** parameter and then perform the stationary setting; otherwise, perform the rotation setting. If the motor electrical parameters are set to **[E7 group]** by manual or upload/download function, the motor cannot be operated because the internal nonlinear parameters of the inverter have not been set, so it is necessary to perform static setting to run. If the full-mode self-tuning has been performed in the vector control, but the power connection line from the motor to the inverter changes during use, it is recommended to perform the static tuning to complete the identification of the motor wiring parameters, especially in the speed sensorless vector control mode. Otherwise, the motor speed control static deviation increases, if the connection changes too much, or even the motor mathematical model changes have more serious consequences.

After the carrier frequency **[E3-01]** is changed, the vector control mode must be statically set to allow operation because the nonlinear parameters of the inverter corresponding to the current carrier need to be detected again. The V/F control mode can be operated but the static setting is recommended. If the full mode tuning is performed, there is no need to consider the tuning of other modes when switching the control mode, and vice versa; if the model parameters are modified, it is equivalent to the factory initialization must follow the entire process of the test run.



Note

Perform full-mode rotary self-tuning. If the load on the drive shaft cannot be disengaged, the rotary self-tuning can be performed, but it will have some influence. If the load is a small inertia gear, the control performance may not be affected. If the load torque exceeds more than 30% of the rated motor torque may cause the motor parameter deviation to be too large or even complete. If the load cannot be disengaged and the load torque is too large, you can select the same type, the same manufacturer, and the same batch of the empty shaft motor to perform the full-mode rotation and download to the corresponding inverter through the upload and download function. All of the above solutions may result in reduced control accuracy due to parameter differences, so full-mode self-tuning should be implemented as far as possible from the load machinery.

5.5.2 Tuning flow chart

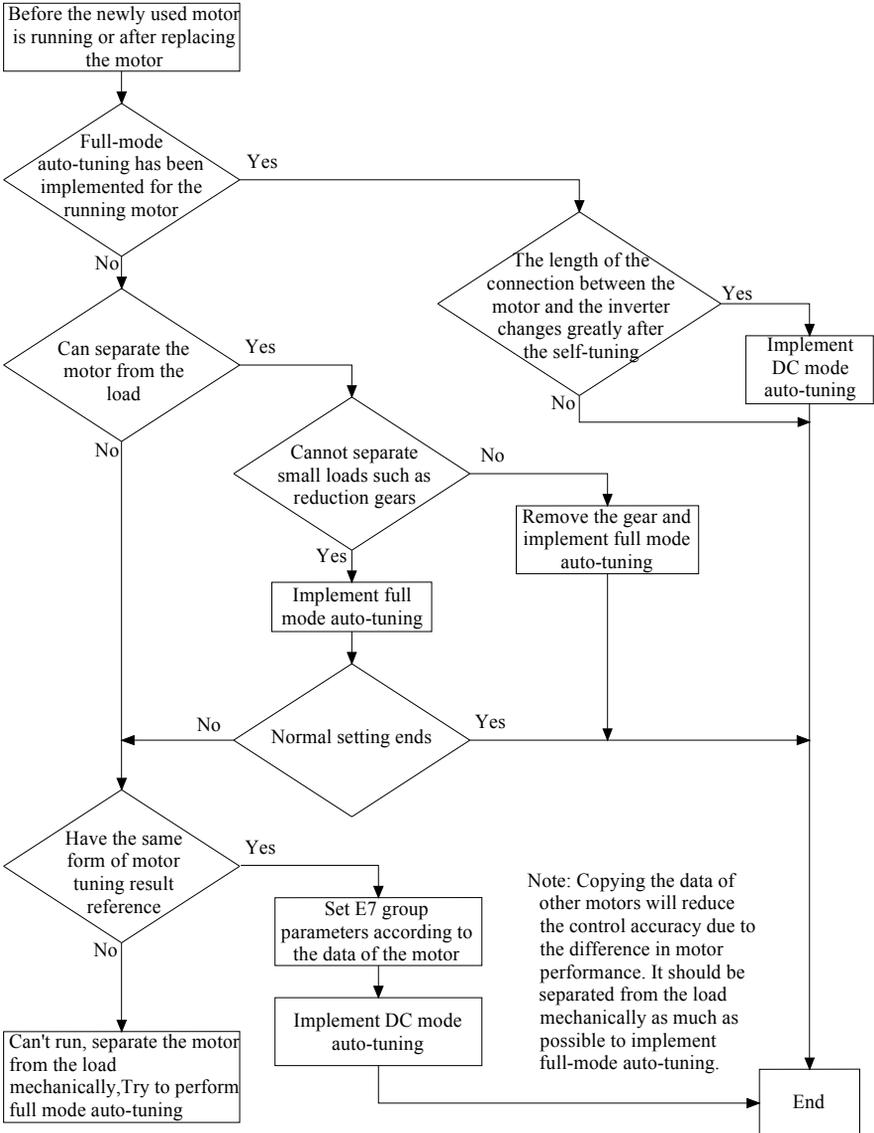


Fig.5-7 Tuning flow chart

### 5.5.3 Preparation before self-tuning

Before the implementation of self-tuning, set the rated value of the motor (the value recorded on the motor's nameplate), the carrier frequency, the allowable speed range and so on in [E2~E4 groups]. Before the parameter setting, the motor nameplate parameters in the vector control mode are all zero, and the relevant parameters need to be set according to the nameplate; the motor nameplate parameters of the same power as the inverter are preset in the V/F control mode, and there may be discrepancies with the actual drive motor. At this time, the nameplate parameters should be set correctly. Related parameters are shown in Table 5-4:

**Table 5-4 Rotate full mode tuning detection data**

Function code	Name	Range
E4-01	Induction motor rated capacity	0~Inverter rated capacity
E4-02	Induction motor rated voltage	0~Inverter rated voltage 120%
E4-03	Induction motor rated current	0~Inverter rated current 150%
E4-04	Induction motor rated speed	0~60000r/min
E4-05	Induction motor pole number	2~12Pole
E4-06	Induction motor rated frequency	0~(Rated speed*pole number/120Hz+5Hz)
E4-07	Induction motor cooling type	0: Natural cooling fan 1: Forced cooling fan

### 5.5.4 Rotating full mode self-tuning operation method

In the full-mode self-tuning process, the E7 group parameters are automatically detected. At this time, the rotation and self-tuning are performed after the load is separated from the motor. If the motor with reduction gear or a certain load torque is self-tuning, if the load and the motor are not disassembled, the self-tuning may not be completed normally, and even if the self-tuning is completed normally, the parameter accuracy may not be high. It is necessary to separate the reduction gear or load from the motor as much as possible; in the V/F control mode, even if the full-mode rotary self-tuning is implemented, the tuning process is the same as the DC mode self-tuning. For details, refer to the DC mode self-tuning project.

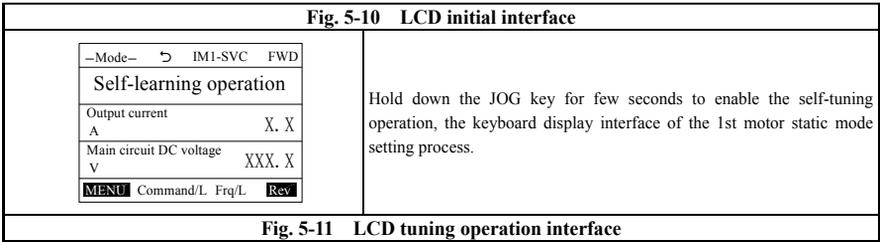
#### Rotate full mode self-tuning operation steps:

- (1) The motor is in mechanical separation from the load and is connected to the inverter. If it is a vector control with speed sensor, the speed sensor wiring is required, and the phase sequence of the speed sensor is unified with the motor rotation direction.
- (2) When the inverter is powered on, set the relevant parameters of [E2~E4 group] according to the motor nameplate and operating conditions.
- (3) Set [E4-09] (Induction motor tuning mode selection) and select the rotary full mode setting.
- (4) Return to the initial interface (as shown in Fig.5-8), press and hold the JOG key to enable the self-tuning operation. At this time, the keyboard displays the setting operation interface (as shown in Fig.5-9). After a few minutes (inverter and there is also a difference in motor power at different times. When the self-tuning is finished, the keyboard returns to the initial interface and the self-tuning ends.

LCD display	Content																
<table border="1"> <tr> <td>-Mode-</td> <td>↔ Drive IM1-SVC FWD</td> </tr> <tr> <td>Frequency/Speed command</td> <td>12</td> </tr> <tr> <td>r/min</td> <td></td> </tr> <tr> <td>Output frequency/Speed</td> <td>0</td> </tr> <tr> <td>r/min</td> <td></td> </tr> <tr> <td>Output current</td> <td>0.0</td> </tr> <tr> <td>A</td> <td></td> </tr> <tr> <td><b>MENU</b></td> <td>Command/L Frq/L <b>Rev</b></td> </tr> </table>	-Mode-	↔ Drive IM1-SVC FWD	Frequency/Speed command	12	r/min		Output frequency/Speed	0	r/min		Output current	0.0	A		<b>MENU</b>	Command/L Frq/L <b>Rev</b>	After setting [E4-09], select the full mode tuning, and return to the initial interface, the LCD interface is displayed.
-Mode-	↔ Drive IM1-SVC FWD																
Frequency/Speed command	12																
r/min																	
Output frequency/Speed	0																
r/min																	
Output current	0.0																
A																	
<b>MENU</b>	Command/L Frq/L <b>Rev</b>																

**Fig.5-8 LCD initial interface**





(5) Enter the [E7 group] parameter to check whether the related setting data is updated, as shown in Table 5-6.

**Table 5-6 Static mode tuning detection data**

Function code	Name	Unit
E7-01	Induction motor primary side resistance	mΩ



In the static mode self-tuning, The motor is applied with a voltage during the DC test. Please be careful not to get an electric shock. In the static mode setting, a small torque will also be generated. In the case of a light load, the motor will rotate slowly in the forward and reverse directions. When self-tuning is performed while the machine is connected to the load, the motor may not rotate or affect the accuracy of the detection parameters.

### 5.5.6 2nd motor self-tuning

The inverter is equipped with one inverter to switch the function of using two motors, that is, the second motor function. When using the second motor, use the contactor or relay to switch the power line and speed sensor wiring between the inverter and the motor. The multi-function input terminal can switch the internal parameters of the inverter to the second motor set in advance. parameter. The following is an introduction to the operation method of the second motor self-tuning.

If only the second motor is self-tuning, the second motor cannot be operated because the motor electrical parameters and the inverter nonlinear parameters obtained by the first motor setting are not set. The second motor must be adjusted after the first motor is set.

When using the second motor, the function selection parameter [F1-03] must be set to "Use the 2nd motor", and the corresponding rating should be set in Table 5-7 with reference to the nameplate of the 2nd motor, and must be enabled thereafter. The second motor is enabled (H1-0X (X=2 to 13) = 37) for the second motor to operate the second motor.

**Table 5-7 2nd motor nameplate parameters**

Function code	Name	Range
F2-01	The 2nd induction motor rated capacity	0~Inverter rated capacity
F2-02	The 2nd induction motor rated voltage	0~Inverter rated voltage120%
F2-03	The 2nd induction motor rated current	0~Inverter rated current 150%
F2-04	The 2nd induction motor rated speed	0~6000r/min
F2-05	The number of poles of the second induction motor	2~12Pole
F2-06	The 2nd induction motor rated frequency	0~( Rated speed*pole number/120Hz+5Hz)
F2-07	The 2nd induction motor cooling type	0: Natural cooling fan 1: Forced cooling fan

The second motor has to be set to the first motor, that is, the calculation of the nonlinear parameters of the inverter (only static setting is required), the second motor can be adjusted; the second motor timing will not be executed. The low frequency forward and reverse phase of the first motor tuning process; the second motor tuning does not support the static tuning, that is, when the tuning enable parameter [E4-09] is non-zero, the full mode setting is performed as long as the tuning enable command is input; V/F The second motor tuning is not supported.

The second motor self-tuning operation steps:

(1) Set the enable parameter [F1-03=1] and set the multi-function terminal parameters (H1-0X (X=2 to 13)=37).

(2) Set the relevant parameters of [E Group] (1st motor corresponding parameter, refer to the full mode setting operation description).

(3) Set the parameters related to [F Group] (the second motor corresponding parameter, refer to the 1st motor parameter setting).

(4) Set [E4-09] (induction motor tuning mode selection), press the JOG key to execute the first motor tuning until the tuning is finished. The tuning process refers to the rotary full mode auto-tuning operation method or the static mode auto-tuning operation method.

(5) Set [E4-09] (induction motor tuning mode selection), enable the terminal to be in the active state, press the JOG key to perform the second motor tuning, and the second motor tuning process as shown above, enter the second motor timing keyboard display. The interface is shown in Figure 5-12.

LCD display	Content
	Set [E4-09] (Induction motor tuning mode selection), after the enable terminal is in the active state, long press the JOG button, the keyboard display interface of the second motor tuning process

Fig. 5-12 The second motor timing keyboard display interface

(6) Enter the [F7 Group] parameter to check whether the related setting data is updated, as shown in Table 5-8.

Table 5-8 Electrical parameters obtained by the second motor setting

Function	Name	Unit
F4-01	The 2nd induction motor primary side resistance	mΩ
F4-02	The 2nd induction motor secondary side resistance	mΩ
F4-03	The 2nd induction motor leakage inductance	mH
F4-04	The 2nd induction motor mutual inductance	mH
F4-05	The 2nd induction motor inductance saturation compensation 1	%
F4-06	The 2nd induction motor inductance saturation compensation 2	%
F4-07	The 2nd induction motor iron loss conductance	mho
F4-08	The 2nd induction motor loss factor 1	%
F4-09	The 2nd induction motor loss factor 2	%



Note

When the second motor is used, the second motor is set and the first motor is set to be continuous. Please follow the above steps strictly. After the tuning is completed, the external system (Contactor or relay) can be combined with the multi-function terminal (H1-0X (X=2 to 13) = 37) to switch between the first motor and the second motor.

### 5.5.7 Anomalies in Self-tuning

(1) When the display Signal is invalid.

As shown in Fig.5-13, the motor nameplate parameter [E4] setting is abnormal, the motor running range parameter [E2] setting is abnormal, and the drive enable (56: Drive Enable) in the terminal function is not enabled. At this point, Modify the settings and restart the auto-tuning.

LCD display	Content
	When setting the parameters of the inverter, when the parameter setting is abnormal, the keyboard will display "Enable signal is not enabled", which needs to reset the parameters and restore the normal interface. In addition, when the drive enable is not enabled in the terminal function, the "enable signal is not enabled" is also displayed, which requires the drive to be enabled.

Fig. 5-13 LCD display enable signal is not enabled

(2) When E20 is displayed

As shown in Fig.5-14, tuning stop command input, fault stop command input, tuning sampling data error, tuning data calculation error, etc. may occur. At this time, the inverter model may be abnormally set, the detected motor power is abnormal, the motor nameplate parameter [E4] is abnormally set, the wiring between the inverter and the motor is abnormal, and whether the motor or electromagnetic brake is released, and whether the motor is connected to a heavy load under full mode. At this point, self-tuning is performed again after the abnormality is determined and resolved.

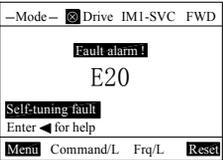
LCD display	Content
	<p>When the STOP button is pressed during the tuning process, or when a tuning fault is detected, the self-tuning fault alarm is displayed and the tuning is interrupted.</p>

Fig. 5-14 LCD display E20

(3) The setting cannot be terminated after the setting time exceeds 10 minutes.

Possible causes are motor rotor abnormality, motor stator winding and magnetic steel abnormality, and the set motor nameplate and the detected motor are seriously different. At this time, it is detected whether the motor is normal or the motor is replaced for tuning.

(4) When other alarms are displayed

In the self-tuning, other types of faults may be generated to generate alarms. In this case, refer to the fault handling section to eliminate the cause of the protection and re-implement the self-tuning.

## 5.6 Debugging

### 5.6.1 Speed control debugging in vector control mode

#### 5.6.1.1 Speed control inertia adjustment

The vector control of EN700 series inverter adopts the combination of feed forward control and cancellation control in speed control to ensure the speed control response performance. By setting the inertia in the controlled motor drive system, high-quality speed control can be performed.

In the parameter [C3-05], by adjusting the sum of the motor rotor inertia and the load mechanical inertia, the equivalent inertia on the motor shaft is converted, and then 20 to 100% is involved in the speed control. Wherein, when the belt is connected, the mechanical part of the load is not included, and only the inertia of the rotor part of the motor and the pulley part connected to the motor shaft is calculated, and the gear transmission may be caused by excessive tooth gap of the gear or by belt connection. The data is set to be smaller than the actual value, or the feed forward control and cancellation control are canceled [C3-06=0, C3-07=0]. When setting the moment of inertia, if you do not know the equivalent moment of inertia of the current motor, you can first set a smaller value than the converted inertia, and then slowly increase it to make adjustment (The moment of inertia setting is too large may cause the motor Vibration), the parameters corresponding to the moment of inertia are shown in Table 5-9:

Table 5-9 Moment of inertia parameter

Function code	Name	Range	Unit
C3-05	Speed control system inertia	0~65535	gm <sup>2</sup>
C3-06	Speed control cancellation selection	0: Inaction 1: Action	
C3-07	Speed control feed forward selection	0: Inaction 1: Action	



The setting unit of [C3-05] is gm<sup>2</sup>, and the value obtained by kgm<sup>2</sup> can be multiplied by 1000 as the set value; and the inertia is set, not GD<sup>2</sup>.

### 5.6.1.2 Proportional gain and integral time constant adjustment in speed control

The driven motor is operated in a mechanically connected state, and the speed control proportional gain [C3-01] and the speed control integral time constant [C3-04] are adjusted to achieve an optimum operating state (Maintaining the factory value in most applications) can). The corresponding parameters are shown in Table 5-10:

**Table 5-10 Speed control parameter**

Function code	Name	Range	Unit
C3-01	Speed control proportional gain 1	3~50	
C3-02	Speed control proportional gain 2	3~100	
C3-04	Speed control integral time constant	20~10000	ms

If the speed is set to the appropriate operating speed for constant speed control, the gain adjustment principle is:

(1) If the speed fluctuation occurs due to the load fluctuation on the load machine side, increase the speed control proportional gain to increase the response speed and improve the speed control dynamic accuracy.

(2) If the speed also fluctuates during constant speed operation, reduce the speed control integral time constant and speed up the deviation convergence time.

(3) If the speed oscillation occurs, causing the pulley of the transmission system to vibrate or the gearbox to roar, reduce the speed control proportional gain, increase the speed control integral time constant, and slow down the speed control strength.

If the speed command step changes, the gain adjustment principle is:

(1) When the speed response is sluggish, increase the speed control proportional gain to increase the response speed and improve the speed control dynamic accuracy.

(2) When the overshoot of excessive speed occurs, the proportional gain is controlled corresponding to the reduced speed.

(3) When the speed is oscillating, reduce the speed control proportional gain, increase the speed control integral time constant, and slow down the speed control strength.

### 5.6.2 V/F stabilization debugging in control mode

In the V/F control mode, if the motor is in no-load or light-load rotation when the drive motor is running, in some cases, the inherent factors of the motor may cause unstable operation such as vibration. In this case, you can adjust by setting [C6-03] (Stabilization amount). When adjusting the stability amount, keep the motor in rotation and ensure the rotation is stable. Slowly increase the stability value from 0.0%. The corresponding parameters are shown in Table 5-11:

**Table 5-11 Stable amount parameter**

Function code	Name	Range	Unit
C6-03	Stable amount	0.0~100.0%	%



## Detailed description of the parameters

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## 6.1 A: Environment setting parameter group

The initial setting of inverter can be carried out by setting the environment parameter (A parameter). For example, Set the access level of parameters, Parameter initialization or password setting.

### 6.1.1 A1: Environment setting mode

<b>A1-00</b>	LCD operator language selection	Range: 0~6	Factory Default: 0
--------------	---------------------------------	------------	--------------------

- 0: Chinese**  
**1~6: Reserved**

<b>A1-01</b>	Parameter access level	Range: 0~2	Factory Default: 2
--------------	------------------------	------------	--------------------

- 0: Monitoring special**  
 It can set or monitor [A1-01], [A1-02] and [A1-06], As well as monitor U parameters.  
**1: User parameters**  
 Can only set or monitor the parameters between [A2-01~A2-42] which have been set.  
**2: All parameters**  
 All parameters can be Set/Monitored.

<b>A1-02</b>	Inverter control mode selection	Range: 0~6	Factory Default: 0
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**0: Vector control without PG (IM-SVC)**

**Vector control with PG mode** can be used in all applications with speed control and torque control requirements. Set this mode when high precision speed control and torque control is required. In this control mode, electric parameters of the motor can be input after rotation setting or static setting is performed. Even if the speed feedback signal of the motor is not used, the speed and torque of the motor can respond quickly. The rated torque can be obtained when the motor is running at a low speed. The speed control range is 1: 150.

**1: Vector control with PG (IM-VC)**

**Vector control with PG mode** can be used in all variable speed control applications which requiring fast speed and torque response and high performance torque control. In this control mode, the motor can be operated only when the electrical parameters are input after the rotation setting or static setting is performed. In order to receive the speed feedback signal of the motor, the speed detection expansion card is required. The frequency converter can make high precision control, even speed up to zero. The speed control range is 1: 1000.

**2: V/F control (IM-VF)**

V/F control mode is used for applications that do not require fast response and low accuracy speed control. More than one motor can be connected with a single inverter. This mode is also used when the motor parameters are not clear or cannot be rotated for self-learning. If the motor is operated after static setting, low-frequency oscillation can be suppressed to ensure smooth current envelope and stable speed. Overcurrent and overvoltage faults can be prevented by setting [L8-01] and [L2-21], and the speed control range is 1: 50.

**3~6: Reserved**

<b>A1-04</b>	Parameter initialization	Range: 0~8	Factory Default: 0
--------------	--------------------------	------------	--------------------

- 0: No action**  
**1: Parameter restores factory value 1.**

Setting [A1-04] as 1 will restore all parameters to factory value except parameters [A1-00], Motor parameters group [E1~E8] and [F1~F5] to factory value, And this parameter will automatically become 0 after the above operation.

**2: Parameter restores factory default value 2.**

Setting [A1-04] to 2 will restore all parameters to the factory value, and the parameter will automatically become 0 after the above operation is completed.

**3: User parameter initialization.**

The use of this function must cooperate with the saving function of parameters set (Involving parameters [o2-03]) and the backup of user parameters of monitoring items (Involving parameters [U1-19]), And the control terminal row must support parameter backup. When using it, please first confirm whether there is a backup of user parameters through [U1-19]. If there is a backup, you can set [A1-04] as 3 to initialize the

backup user parameters to the current parameters. This parameter will automatically become 0 when the above operation is completed.

#### 4~8: Reserved

<b>A1-06</b>	User's password	Range: 0000~9999	Factory Default: 0000
--------------	-----------------	------------------	-----------------------

The user password setting function is used to prevent unauthorized personnel from consulting and modifying the function parameters.

When the user password function is not needed, please set this function code as 0000.

When the user password function is needed, first enter 4 digits as the user password, press the key  $\rightarrow$  to confirm, the password takes effect immediately.

Password change:

Press the key  $\downarrow$  to enter the password verification state, enter the original 4-digit password correctly and enter the parameter editing state, select **[A1-06]**, enter the new password, and press the key  $\rightarrow$  to confirm.



#### Note

Please be sure to save the password, if the password is lost, please consult the manufacturer.

## 6.1.2 A2: Commonly used parameters

<b>A2-01</b>	Common parameter 01	Range: A1-00~03-02	Factory Default: d1-01
<b>A2-02</b>	Common parameter 02	Range: A1-00~03-02	Factory Default: d1-17
<b>A2-03</b>	Common parameter 03	Range: A1-00~03-02	Factory Default: -
<b>A2-04</b>	Common parameter 04	Range: A1-00~03-02	Factory Default: C1-03
<b>A2-05</b>	Common parameter 05	Range: A1-00~03-02	Factory Default: C1-04
<b>A2-06</b>	Common parameter 06	Range: A1-00~03-02	Factory Default: C1-05
<b>A2-07</b>	Common parameter 07	Range: A1-00~03-02	Factory Default: C1-06
<b>A2-08</b>	Common parameter 08	Range: A1-00~03-02	Factory Default: C3-01
<b>A2-09</b>	Common parameter 09	Range: A1-00~03-02	Factory Default: C3-04
<b>A2-10</b>	Common parameter 10	Range: A1-00~03-02	Factory Default: C3-05
<b>A2-11</b> ~ <b>A2-42</b>	Common parameter 11~42	Range: A1-00~03-02	Factory Default: -

The inverter can register 42 parameters mostly. You can also automatically register the recently changed parameters. The registered parameters can be displayed in summary mode.

Registration of common parameters: In order to register the user's desired parameters in **[A2-01~A2-42]**, be sure to set **[A1-01]** (parameter access level) to 2 (all parameters). After registering the parameters in **[A2-01~A2-42]**, If you set **[A1-01]** (parameter access level) to 1 (user parameter), you can set monitor only **[A2-01~A2-42]**.

<b>A2-43</b>	Automatic registration of commonly used parameters	Range: 0, 1	Factory Default: 0
--------------	--	-------------	--------------------

**[A2-43]** is used to set the valid or invalid of automatic registration function, **[A2-17~A2-42]** is common parameters

#### 0: Invalid automatic registration

**[A2-01 ~ A2-42]** must be registered by the user. When the user sets the common used parameters, please set **[A2-43]** to 0.

#### 1: Automatic registration valid

When **[A2-43]** is set to 1, The most recently changed parameters of the user will be automatically registered in **[A2-17~A2-42]**. The latest change parameters will be automatically registered starting from **[A2-17]** (up to 26). More than 26, The saved parameters in **[A2-42]** will be refreshed. Please use this setting in the elementary mode.

### 6.1.3 A3: Factory parameters

<b>A3-01</b>	<b>Factory Password</b>	Range: 0000~9999	Factory Default: 0000
--------------	-------------------------	------------------	-----------------------

Manufacturer setting function, users are not allowed to modify.

## 6.2 b: Application parameter groups

### 6.2.1 b1: Operation mode selection and timing selection

<b>b1-01</b>	<b>Operation mode selection</b>	Range: 0~4	Factory Default: 0
--------------	---------------------------------	------------	--------------------

[b1-01] parameter is used to select operation mode, there is speed control, Torque control and the priority torque command mode. Combined with multi-function terminal can switch between the speed control and torque control. If you set as 1 or 2, According to the characteristics of the torque command can also switch between the speed control and torque control, the corresponding functional block diagram as shown in Fig. 6-1.

#### 0: Speed control mode (ASR).

When [b1-01] is set to 0, After the given speed instruction, Through detecting the feedback speed or the torque instruction (The motor speed is calculated, And then closed-loop adjustment is carried out to obtain torque instruction) output to the next level module (current loop), To complete the speed control.

#### 1: The negative direction (-) side of the torque takes precedence.

Compared the output torque with the given torque, Select small torque value. Example: when the output torque of speed control is greater than the given torque, The output torque is the given torque and runs in the torque control mode.

#### 2: Positive direction (+) of torque takes precedence.

Compared the output torque with the given torque, select the big torque value.

#### 3: Torque control (ATR) mode.

Input the torque instructions by communication, analog and digital Settings, **Input the torque current in the current loop** after conversion, To complete torque control.

#### 4: Contact switching for Speed/Torque control.

By setting the multi-function terminal parameter H1-0x (X=2~13)=57, The Speed/Torque control switch can be carried out.

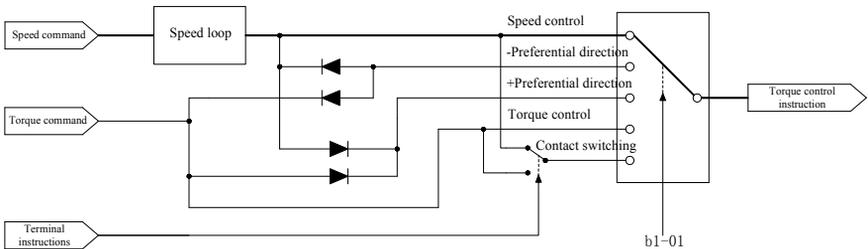


Fig.6-1 Operation mode selection

<b>b1-02</b>	<b>Speed command input selection 1</b>	Range: 0~4	Factory Default: 0
--------------	--	------------	--------------------

#### 0: Operating keyboard

When [b1-02] is set to 0, the instruction of speed instruction channel 1 comes from the operating keyboard, which indicates that the frequency channel is "L". For the change method of speed instruction, please refer to the parameter [o2-01].

#### 1: Control loop terminal (Analog input).

When [b1-02] is set to 1, the instruction of speed instruction channel 1 depends on the analog speed instruction of input voltage signal or current signal of terminals A11, A12 and A13. If terminals A11, A12 and A13 are used as voltage signal input, the usage method please refer to Table 6-1

**Table 6-1 Voltage input for speed instruction**

Terminal	Signal level	Parameter setting				Remark
		Signal level selection	Function selection	Gain	Polarization	
AI1	0~10V	H3-01=0	H3-02=0 (Main speed frequency command)	H3-03	H3-04	Please confirm that the toggle switch SW1 is set on the v-side (voltage).
	-10~10V	H3-01=1				
AI2	0~10V	H3-09=0	H3-10=0 (Main speed frequency command)	H3-11	H3-12	Please confirm that the toggle switch SW2 is set on the v-side (voltage).
	-10~10V	H3-09=1				
AI3	0~10V	H3-05=0	H3-06=0 (Main speed frequency command)	H3-07	H3-08	
	-10~10V	H3-05=1				

If terminals AI1, AI2 and AI3 are used as current signal input, The use method please refer to Table 6-2

**Table 6-2 Current input for speed instruction**

Terminal	Signal level	Parameter setting				Remark
		Signal level selection	Function selection	Gain	Polarization	
AI1	0~20mA	H3-01=2	H3-02=0 (Main speed frequency command)	H3-03	H3-04	Please confirm that the toggle switch SW1 is set on the I side (current).
AI2	0~20mA	H3-09=2	H3-10=0 (Main speed frequency command)	H3-11	H3-12	Please confirm that the toggle switch SW2 is set on the I side (current).

The frequency instruction input of AI1, AI2 and AI3 can be selected between the main speed instruction and the auxiliary speed instruction when the control terminal is given the speed instruction.

The corresponding functions of control terminals AI1, AI2 and AI3 will be affected by parameters **[H3-14]** and terminal function "multi-function analog input selection" when taking effect. The corresponding relationship between analog and rotational speed instruction is shown in the corresponding functions of **[H3 Group]**.

## 2: Communication

When **[b1-02]** is set as 2, the instruction of speed instruction channel 1 is given through MODBUS communication. At this time, please confirm the terminal has been connected with serial communication cable. For detailed usage, please refer to MODBUS communication protocol.

## 3: Option Card

When **[b1-02]** is set to 3, the instruction of speed instruction channel 1 is given through external bus communication. At this time, Please confirm the corresponding bus expansion card and wiring have been installed. Please refer to "communication extension card" for detailed usage.

## 4: Pulse train input.

When **[b1-02]** is set to 3, The instruction of speed instruction channel 1 depends on the frequency of pulse train on the terminal of HDI. When using it, please input pulse monitoring with the monitoring item **[U1-25]** to confirm the correct pulse frequency has been received.

The input ratio of the pulse train set by the parameter **[H6-02]** determines the pulse frequency of the instruction at 100% speed.



**Note**

When the speed instruction channel set by the user is not keyboard, the choice of speed instruction channel is limited by the instruction channel switch key "L/R" on the keyboard. If the keyboard displays "speed /R", the corresponding speed instruction channel will take effect. If the keyboard displays "frequency /L", the current speed instruction weight is the keyboard. Can be switched by "L/R" key.

<b>b1-03</b>	Run command input selection 1	Range: 0~3	Factory Default: 0
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**0: Operating keyboard**

When **[b1-03]** is set to 0, The keyboard will indicate that the current command channel is "L" (Indicating that the command right is on the keyboard). At this time, the inverter can be started and stopped through the keyboard.

**1: Control loop terminal (Sequence input).**

When **[b1-03]** is set to 1, Start and stop operation can be carried out through the control loop terminal. The input method of operation instruction is as follows:

- ☆ Two-wire control 1 (Forward/stop, Reverse/Stop);
- ☆ Two-wire control 2 (Run/stop, Forward/Reverse);
- ☆ Three-wire control 1 (Run/stop, Forward/Reverse).

For detailed operation details, Please refer to the function introduction of **[H1 Group]** multi-function terminal.

**2: Communication.**

When **[b1-03]** is set to 2, Operation instructions are given through MODBUS communication. Please confirm the terminal has been connected with serial communication cable. For detailed usage, please refer to MODBUS communication protocol.

**3: Option card**

When **[b1-03]** is set to 3, Operation instructions are given through external bus communication. Please confirm the corresponding bus expansion card and wiring have been installed. Please refer to "communication extension card" for detailed usage.

**Note**

When the instruction channel set by the user is not keyboard, the choice of instruction channel is limited by the instruction channel switch key "L/R" on the keyboard. If the keyboard displays "command /R", the corresponding operation instruction channel will take effect. If the keyboard displays "command /L", the current running instruction right is the keyboard. Can be switched by "L/R" key.

<b>b1-04</b>	Jog command input selection	Range: 0~3	Factory Default: 0
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**0: Operating keyboard.**

When **[b1-04]** is set to 0, The Jog instruction is given by the keyboard. Keyboard Jog instructions are not restricted by the instruction channel switching key "L/R".

**1: Control loop terminal (Sequence control input).**

When **[b1-04]** is set to 1, The Jog instruction is given by the control loop terminal. When the terminal function "FJOG instruction" is enabled, the forward rotation point movement command takes effect; When the terminal function "RJOG instruction" is enabled, The reverse Jog command takes effect.

**2: Communication.**

When **[b1-04]** is set to 2, the Jog instruction is given by MODBUS communication. Please confirm the terminal is connected to the serial communication cable. For detailed usage, please refer to MODBUS communication protocol.

**3: Option card**

When **[b1-04]** is set to 3, the Jog instruction is given by the external bus communication. Please confirm the corresponding bus expansion card and wiring have been installed. Please refer to "communication extension card" for detailed usage.

<b>b1-05</b>	Torque command input selection	Range: 0~3	Factory Default: 0
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**0: Control loop terminal (analog input).**

When **[b1-05]** is set to 0, The current torque instruction is given by the analog amount of input voltage signal or current signal of terminals AI1, AI2 and AI3.

**1: Communication.**

When **[b1-05]** is set to 1, The current torque instruction is given by MODBUS communication. Please confirm the terminal is connected to the serial communication cable. For detailed usage, please refer to MODBUS communication protocol.

**2: Option card**

When **[b1-05]** is set to 2, The current torque instruction is given by the external bus communication. Please confirm the corresponding bus expansion card and wiring have been installed. Please refer to

"communication extension card" for detailed usage.

**3: Keyboard.**

When [b1-05] is set to 3, The current torque instruction is given by the parameter [d4-01].The keyboard number given channel is generally used for debugging or trial run.



When the user-selected torque instruction channel is non-keyboard, the polarity of the final selected torque instruction will be affected by the "polarity reversal of the external torque instruction" in the [H1 Group] terminal function.

<b>b1-06</b>	Stop mode selection	Range: 0~2	Factory Default: 0
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**0: Free stop.**

The output voltage should be stopped immediately after OFF operation instruction/Jog instruction, as shown in Fig.6-2.

**1: Deceleration stop**

After decelerating to the setting of [b2-01] according to the deceleration time, the output voltage is stopped, as shown in Fig.6-3.

**2: With dc braking deceleration stop.**

Decelerate to the set deceleration time of [b2-01], and enter the braking stop mode. Vector control, the braking current is determined by [b2-02] and the time is determined by [b2-03].V/F control, the braking current is determined by [b2-04] and the time is determined by [b2-03].See Fig.6-4.

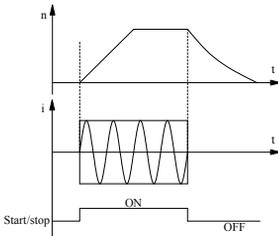


Fig.6-2 Free stop

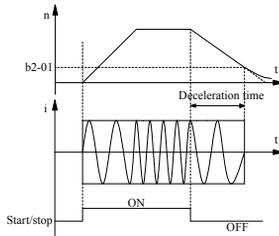


Fig.6-3 Deceleration stop

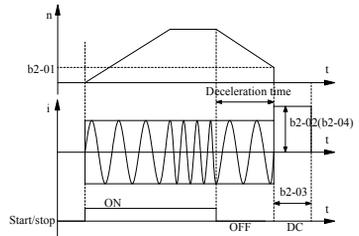


Fig.6-4 With dc braking deceleration stop

<b>b1-08</b>	Reverse mode is prohibited selection	Range: 0~2	Factory Default: 0
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This function is effective for all control modes. In the vector control, It is selected to prohibit the operation in the opposite direction or the opposite direction of the command. In the low-speed zone, due to the restriction of the reverse torque, the speed control characteristics may deteriorate, Please set in the unrestricted run at this situation. When inversion prohibition function takes effect, it is superimposed with the minimum running speed. When [b1-08] is set to 2, if the reverse instruction is input, it will run at the minimum running speed.

**0: No restrictions.**

Normal operation, Both positive and negative is ok

**1: Forbidden to run in the opposite direction of the instruction.**

The inverter is forbidden to run in the opposite direction of the starting operation instruction. It is forbidden to run in the opposite direction until the inverter is stopped. Even if the forward operation instruction and reverse operation instruction are exchanged, If the inverter is not stopped, The forbidden direction will not change. See Table 6-3.

**Table 6-3 Vector Control and VF control Running [b1-18=1]**

Vector Control:

	Speed command>0	Speed command<0	Vector Control
Forward start	Running forward	limited to + minimum speed	On the reverse side, limit the negative torque to 0
Reverse start	Reverse run	limited to - minimum speed	On the positive side, limit the positive torque to 0

V/F Control:

	speed command>0	speed command<0
Forward start	Running forward	limited to + minimum frequency
Reverse start	Reverse run	limited to - minimum frequency

**2: Prohibit operate in the opposite direction.** Regardless of the operation instruction direction of , forbidden the motor to run in the direction which is opposite to the phase sequence direction. The rotation direction of the inverter is positive when the phase sequence of UVW output voltage is 120° in phase sequence. Under the reverse speed instruction, the operating speed is limited to + the lowest degree. Both the vector and VF will limit the operation interval to [+ the lowest speed instruction, the highest speed instruction].See Table 6-4.

**Table 6-4: Vector Control and VF control Running [b1-18=2]**

	Speed command>0	Speed command<0
Forward start	Normal operation	+ Minimum speed
Reverse start	+ Minimum speed	Forward direction runs according to the absolute value of the command

<b>b1-09</b>	Lower limit speed operation selection (closed loop vector is valid)	Range: 0~2	Factory Default: 2
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**0: Run according to the speed command.**

Even if the frequency command is below the set value of [E2-02], The converter will follow the frequency command to control the motor speed.

**1: Free stop.**

When the frequency command is above the set value of [E2-02], The inverter will start the operation of the motor. After the motor runs, when the frequency is lower than [E2-02], The base blockade is executed and the motor becomes free running.

**2: Run at the lowest speed.**

After the input of the operation instruction, If the input frequency instruction is lower than the set value of [E2-02], The frequency converter will operate the motor according to the set frequency of [E2-02].

<b>b1-10</b>	Speed command input selection 2	Range: 0~4	Factory Default: 0
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**0: Operating keyboard.**

**1: Control loop terminal (Analog input).**

**2: Communication.**

**3: Option card**

**4: Pulse train input.**

For specific use, please refer to the detailed description of [b1-02] (Speed instruction selection 1). When the function of "switch instruction of instruction right" of the multi-function input terminal is enabled, the setting of this parameter takes effect.

<b>b1-11</b>	Run command input selection 2	Range: 0~3	Factory Default: 0
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**0: Operating keyboard.**

**1: Control loop terminal (Sequence control input).**

**2: Communication**

**3: Option card**

Please refer to the detailed description of [b1-03] (Operation instruction selection 1) for specific use. When the function of "switch instruction of instruction right" of the multi-function input terminal is enabled, the setting of this parameter takes effect.

<b>b1-13</b>	Run selection after running command switching	Range: 0, 1	Factory Default: 0
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**0: After switch of operation instruction right, Even if input other operation instruction, It will not run** (Turn off the operation signal first, and then enter the operation signal again to start running).

**1: After the switch of the operation instruction, runs according to another operation signal**

When [b1-13] is set to 1, When switching the operation instruction right to REMOTE, if the operation instruction has been input, the motor will start at the same time when switching, please pay attention to

personal safety.

The operation instruction can be switched by "L/R" key on the keyboard, "LOCAL/REMOTE selection" input by multi-function terminal and "instruction right switch instruction" functions. Please refer to parameters [o2-01] and [H1-02] for detailed introduction.

<b>b1-14</b>	Program mode run command selection	Range: 0~2	Factory Default: 0
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Program mode including verification mode, Simple program mode and high-level program mode.

When setting parameters in program mode, for safety reasons, The inverter will not accept operation instructions. When receiving operation instructions from outside in program mode, set [b1-14] to 1 when receiving operation instructions from outside in program mode.

**0: Not operational**

If converted to program mode, no run instructions are accepted.

**1: Operational**

Even if converted to program mode, will accept the running instructions.

**2: Cannot be converted to program mode**

The converter cannot be converted to program mode when running.

<b>b1-15</b>	Forward and Reverse switching selection	Range: 0, 1	Factory Default: 0
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**0: Standard**

**1: Perform a phase reversal (Rotation direction (Forward/Reverse) switch).**

This parameter is used to set the output phase sequence of the inverter. By switching phase sequence, the rotation direction of the motor can be switched. (Terminal operation, terminal inching, PLC running invalid)

<b>b1-16</b>	Operation selection when the power is ON/OFF	Range: 0, 1	Factory Default: 0
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**0: Forbidden** (Motor rotation is also forbidden even when the power is connected and the operation instruction is entered).

**1: Allow** (Such as when the power is switched on, Enter the operation instruction, Then start the operation).

This parameter is used to set the operation starts when the operation instruction is input from the outside after the power is connected. When [b1-16] is set to 0, even when the power is connected and the operation instruction is input, the motor rotation is prohibited. When [b1-16] is set to 1, Such as when the power is switched on and the operation instruction is input, the operation starts.

<b>b1-17</b>	Start selection condition when in vector control with PG	Range: 0, 1	Factory Default: 0
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**0:  $b2-01 \leq \text{Motor speed} < E2-02$ , No run instruction input is received.**

**1:  $b2-01 \leq \text{Motor speed} < E2-02$ , Receive run instruction input.**

This parameter is used to select the start conditions with PG vector control and usually does not need to be changed.

<b>b1-18</b>	High efficiency control selection	Range: 0, 1	Factory Default: 0
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**0: No use.**

**1: Use.**

Automatic adjustment of excitation current for high efficiency operation is under light load or no load. However, If the speed instruction is a step response, the acceleration time is automatically limited to 0.5s. There is a process of automatic adjustment of excitation current, the response performance is affected. If light load requires fast dynamic response, do not choose efficient control.

<b>b1-20</b>	Pre-excitation selection (Vector control mode only)	Range: 0, 1	Factory Default: 1
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To improve the response performance at startup, You can choose to use the pre-excitation function. This function is combined with the multi-function terminal. By setting the multi-function terminal parameter H1-0x(X=2~13)=52, can enable the pre-excitation function. When the pre-excitation is enabled, the algorithm responds to the pre-excitation function of the terminal. Pre-excitation is directly started when the operation instruction is input. If the machine is stopped, the machine should be executed according to the stop mode.

After the stop, the machine should continue to execute the pre-excitation. All Run/JOG/DC brakes are higher than the pre-excitation, and this function is invalid in V/F control mode.

#### 0: AC pre-excitation.

It is only effective for vector control mode with speed sensor. If the motor rotates in the pre-excitation process, the output current frequency will be changed according to the motor speed, but no output torque. AC pre-excitation function, as shown in Fig.6-5.

#### 1: DC pre-excitation (DC pre-excitation can be selected only in SVC mode).

DC pre-excitation can be selected in vector control, But only in vector control mode without speed sensor. In the pre-excitation, even if the motor rotates, The excitation current is still DC. DC pre-excitation function, as shown in Fig.6-6.

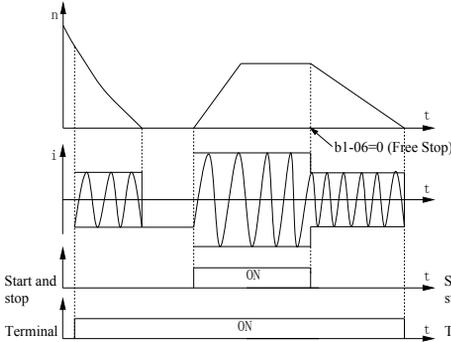


Fig.6-5 AC Pre-excitation

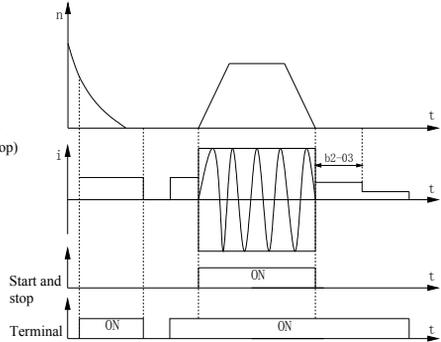


Fig.6-6 DC Pre-excitation

<b>b1-22</b>	Start mode selection	Range: 0、1	Factory Default: 0
<b>b1-23</b>	Restart lag time	Range: 0.100~10.000s	Factory Default: 0.100s

Parameters [b1-23] are only valid for V/F control mode. [b1-22] set the motor start mode, [b1-23] set the frequency converter stop, and set the shortest delay start time after receiving the operation command. During the restarting delay time, even the running signal ON, converter will not start the motor. In starting the large capacity motor, If start immediately after stop, because motor with residual flux, freedom start maybe fail, can increase the start delay time for free start normal again. When the motor is freely stopped under the speed of [E2-01] or [E2-10], the next start will start from the lowest frequency even if free start is selected. If the motor is in V/F mode or vector control mode without speed sensor, and the motor is selected to start freely, the current speed of the motor will be predicted automatically when starting, and the motor will start after the detection is completed. In the vector control mode with speed sensor and select free start, the motor can be started directly by detecting the current speed through the speed sensor.

#### 0: Free start

When the motor is in the state of free rotation after free stop, If the operation instruction is ON, The motor will start from the current speed, and the start process is smooth and no impact torque is generated, as shown in Fig.6-7.

#### 1: Start at the lowest frequency

The motor is rotating or not, if the operation instruction is ON, The motor starts from the minimum operation speed [E2-02]. If the motor rotate freely and then start the motor at the lowest frequency way, is will appear large current at startup time. Under the V/F mode, If current amplitude is bigger than [L8-01] settled, trigger level will limit the current quickly to prevent start over-current protection. If the trigger limiting time is too long, It may lead to overload. Please start the motor after the motor rotation stops to prevent the impact of large current on power components and shorten the service life of the inverter. The starting process is shown in Fig.6-8.

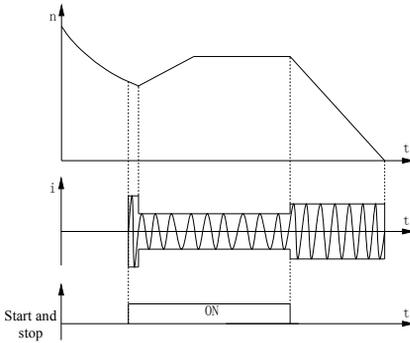


Fig.6-7 Free start

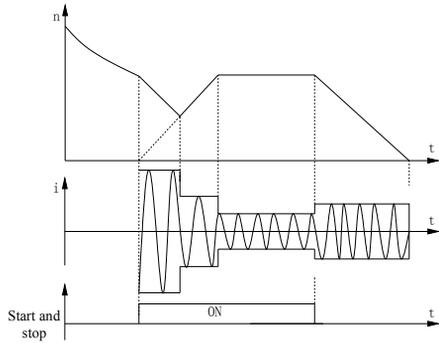


Fig.6-8 Start at the lowest frequency

### 6.2.2 b2: Braking and Deceleration

b2-01	Stop speed (Vector control mode)	Range: 0~300r/min	Factory Default: 30r/min
	Stop frequency (V/F control mode)	Range: 0.0~10.0Hz	Factory Default: 1.0Hz
b2-02	Dc braking current	Range: 20.0~500.0% (Rated excitation current corresponds to 100%)	Factory Default: 100.0%
b2-03	Dc braking time	Range: 0.0~10.0s	Factory Default: 0.0s
b2-04	Dc braking voltage	Range: 0.0~20.0%	Factory Default: 0.0%

If the stop mode [b1-06] is set as not free stop, The motor will slow down to the stop speed or stop frequency according to the set deceleration time, and enter the dc braking mode if the stop mode is required. The sequence diagram can refer to the description of the stop mode [b1-06].

In vector control mode, dc braking current is set through [b2-02], which is set as 100% of the motor excitation current, and dc braking time is set through [b2-03].

In V/F control mode, dc braking voltage is set through [b2-04] and dc braking time is set through [b2-03]. The voltage during dc braking is set as a percentage relative to the rated voltage of the motor [e4-02].

When using dc braking, please take full account of the required braking current and the working condition of the motor to prevent the power components in dc braking from being damaged by overheat due to unbalanced load.

### 6.2.3 b3: Droop function

b3-01	Droop control selection	Range: 0, 1	Factory Default: 0
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0: No use.

1: Use.

b3-02	Droop start speed	Range: 0.0~100.0%	Factory Default: 0.0%
b3-03	Droop rate switching speed	Range: 0.0~100.0%	Factory Default: 0.0%
b3-04	Droop rate	Range: 0.0~50.0%	Factory Default: 0.0%
b3-05	Droop start torque	Range: 0.0~90.0%	Factory Default: 0.0%

The parameters of the droop control are used in the occasion when the torque burden of two motors needs to be balanced. In the droop control, both the speed and the torque are constrained. Only both the speed and torque meet the needs, The droop control will be implemented. The droop control characteristics are shown in Fig.6-9.

[b3-02]: Droop start speed: above this speed, Droop control will be triggered. No droop control will occur below this speed.

[b3-03]: Droop ratio changeover speed: above this speed, droop is controlled according to the percentage of the input speed instruction as the reference value. At this speed, the droop is controlled by the absolute

value of the maximum rotation speed [E2-01] as the reference value. In full speed, if droop control is carried out at the rate relative to the speed instruction, then [b3-03] is set as 0.0%. On the contrary, [b3-03] is set as 100.0% when droop control is carried out at the rate of the highest speed in the full speed field.

**[b3-04]:** Droop rate: using the base determined in [b3-03] (Instruction speed or E2-01\*b3-03/100) by multiplying the droop rate. Get the rotation speed, and then obtained the droop rate at 100.0% torque.

**[b3-05]:** Droop starts torque: starts to trigger droop control above this torque, and does not droop under this torque.

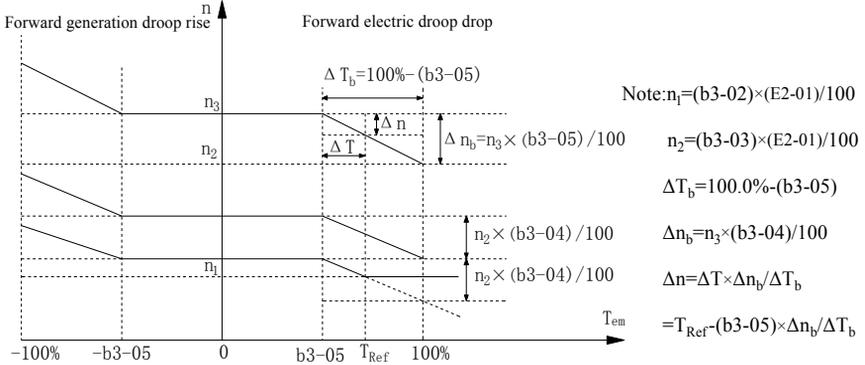


Fig.6-9 Droop control characteristic

#### 6.2.4 b4: Machine loss compensation

<b>b4-01</b>	Mechanical loss compensation selection	Range: 0、 1	Factory Default: 0
<b>b4-02</b>	Mechanical loss offset	Range: 0~100%	Factory Default: 0%
<b>b4-03</b>	Mechanical loss slope	Range: 0~100%	Factory Default: 0%

The mechanical loss compensation is only valid in the vector control mode.

When torque protection or droop control is performed, The torque command after mechanical loss compensation can be added to the torque command. The mechanical loss compensation is shown in Fig.6-10.

**[b4-02]:** Mechanical loss offset, which is the percentage setting of the mechanical loss offset and the rated torque (When the motor speed is zero).

**[b4-03]:** Mechanical loss slope, describing the torque proportional to the motor speed, set with the torque at the highest speed.



#### Note

In the torque control, the input torque command is not compensated, and the torque command monitoring value is not compensated. The mechanical loss compensation is not a torque added to the torque command for the torque control, but a compensation parameter set to solve the additional torque caused by the loss when the torque protection and the droop control are performed. The torque obtained by converging the mechanical loss compensation torque determined by this parameter with the output torque of the speed control is used for over-torque protection, droop control, torque detection,

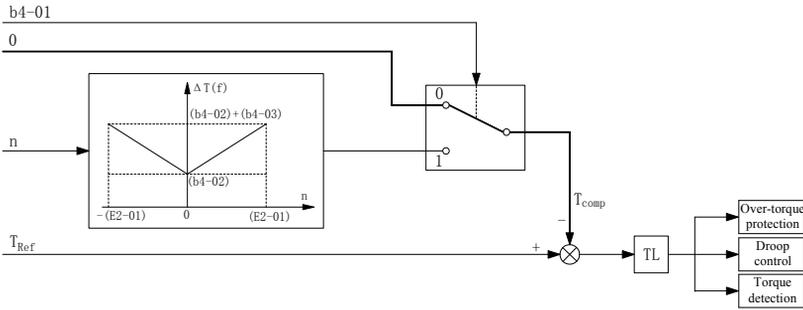


Fig.6-10 Machine loss compensation

6.2.5 b5: PID function

<b>b5-01</b>	Closed loop operation control selection	Range: 0, 1	Factory Default: 0
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- 0: PID Closed loop operation control is invalid
  - 1: PID Closed loop operation control is valid
- Only the [b5-02=1] can open the PID function.

<b>b5-02</b>	PID given channel selection	Range: 0~4	Factory Default: 0
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- 0: **Operating keyboard**  
The PID given is set by [b5-07] and can also be adjusted by the keyboard potentiometer.
- 1: **Control circuit terminal (Analog input).**  
The PID reference value is given by A11, A12, A13. For the specific settings, please refer to the relevant settings of the X terminal function.
- 2: **Communication. (MODBUS)**  
The PID reference value is given by MODBUS communication. For details, please refer to the MODBUS chapter.
- 3: **Option card. (An optional card is required)**  
PID reference value is given by external expansion card (CANOPEN card, PROFIBUS-DP card). For specific settings, please refer to the relevant section of the optional card.
- 4: **Pulse sequence input.**  
The PID reference value is given by an external pulse input.

<b>b5-03</b>	PID feedback channel selection	Range: 0~3	Factory Default: 0
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- 0: **Control circuit terminal (Analog input)**
- 1: **Communication (MODBUS)**
- 2: **Option card (An optional card is required)**
- 3: **Pulse sequence input.**

<b>b5-04</b>	PID given change time	Range: 0.00~650.00s	Factory Default: 0.00s
<b>b5-05</b>	PID feedback channel filtering time	Range: 0.00~60.00s	Factory Default: 0.00s
<b>b5-06</b>	PID output filtering time	Range: 0.00~60.00s	Factory Default: 0.00s

PID given change time refers to the time required for the PID given value to change from 0.0% to 100.0%. When the PID setting changes, the PID setting value changes linearly according to the given change time, which reduces the adverse effect of a given sudden change on the system.

The external given signal and the feedback signal are often superimposed with certain interference. The channel is filtered by setting the filtering time of [b5-05]. The longer the filtering time, the stronger the anti-interference ability, but the response becomes slower; the shorter the filtering time, the faster the response, but the anti-interference ability becomes weaker.

The PID output filter time is the filter time for the closed-loop output (Frequency or torque). The larger the output filter time, The slower the output response.

<b>b5-07</b>	PID given digital setting	Range: 0.0%~100.0%	Factory Default: 50.0%
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This function implements the operation panel digital settings.

<b>b5-08</b>	Proportional gain $K_p$	Range: 0.0~100.0	Factory Default: 20.0
<b>b5-09</b>	Integral gain $K_i$	Range: 0.01s~10.00s	Factory Default: 2.00s
<b>b5-10</b>	Differential gain $K_d$	Range: 0.000s~10.000s	Factory Default: 0.000s
<b>b5-11</b>	Reserved		

The larger the proportional gain  $K_p$ , the faster the response, but it is too large to cause oscillation.

Only use the proportional gain  $K_p$  adjustment, The deviation cannot be completely eliminate. In order to eliminate the residual deviation, The integral gain  $K_i$  can be used to constitute the PI control. The larger the  $K_i$ , The faster the response to the variation, But the larger it is, the more likely it is to oscillate.

The sampling period  $T$  refers to the sampling period of the feedback amount. The PID regulator operates once every sampling period, and the larger the sampling period, the slower the response.

<b>b5-12</b>	Deviation limit	Range: 0.0~100.0%,	Factory Default: 0.0%
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In the closed loop, The maximum deviation allowed by set point, as shown in Fig.6-11, when the feedback amount is within this range, the PID regulator stops regulating. The rational use of this feature helps to coordinate the conflict between the accuracy and stability of the system output.

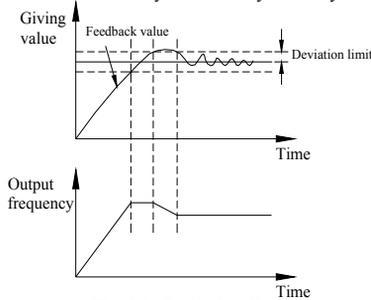


Fig 6-11 Deviation limit diagram

<b>b5-13</b>	PID differential limiting	Range: 0.00~100.00%	Factory Default: 0.10%
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In the PID regulator, the function of the differential is relatively sensitive and can easily cause system oscillation. For this reason, the role of PID differentiation is generally limited to a small range; [b5-13] is used to set the range of PID differential output.

<b>b5-14</b>	Closed loop regulation	Range: 0, 1	Factory Default: 0
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**0: Positive effect.** When the increase is given, the motor speed is required to increase.

**1: Reaction.** When the increase is given, the motor speed is required to be reduced.

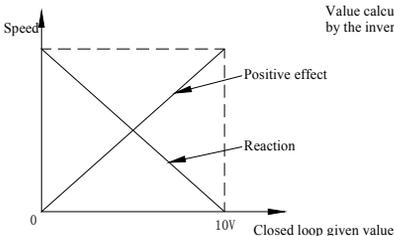


Fig.6-12 Schematic diagram of closed loop regulation

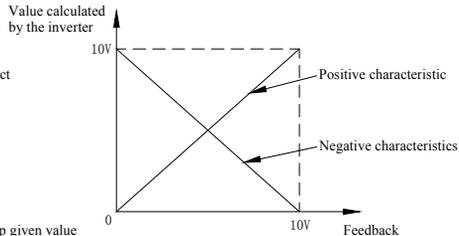


Fig.6-13 Diagram of the  $\pm$  characteristics of the feedback channel

<b>b5-15</b>	Proportional gain $K_{p2}$	Range: 0.0~100.0	Factory Default: 20.0
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<b>b5-16</b>	Integration time Ti2	Range: 0.01s~10.00s	Factory Default: 2.00s
<b>b5-17</b>	Differential time Td2	Range: 0.000s~10.000s	Factory Default: 0.000s

In some applications, a set of PID parameters can not meet the requirements of the entire operation process, and different PID parameters need to be used in different situations. This group of function codes is used to switch between two sets of PIDs. The two sets of parameters can be switched through the DI terminals, or they can be automatically switched according to the deviation.

<b>b5-18</b>	PID integral properties	Range: Units digit: 0、1 Tens digit: 0、1	Factory Default: 00
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**Units digit: Integral separation**

**0: Invalid;**

**1: Valid**

If the integral separation setting is enabled, when the multifunctional digital DI integral hold (function 32) is enabled, the PID integral operation is stopped. At this time, only the proportional and derivative functions of the PID are effective. When the integral separation selection is invalid, the integral separation is invalid regardless of whether the multifunctional digital DI is valid.

**Tens digit: whether to stop integration after output to the limit**

**0: Continue integration;**

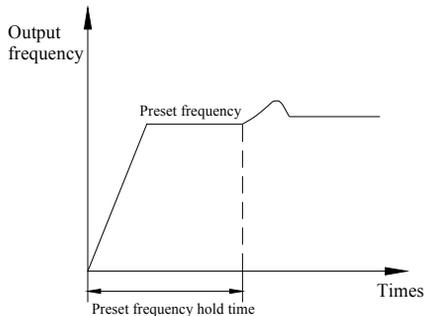
**1: Stop integration**

After the PID operation output reaches the maximum or minimum value, you can choose whether to stop the integration. If you choose to stop the integration, the PID integration will stop calculation at this time, which may help reduce the PID overshoot.

<b>b5-19</b>	Reserved		
<b>b5-20</b>	PID preset frequency	Range: 0.0% ~100.0%	Factory Default: 0.0%
<b>b5-21</b>	PID preset frequency hold time	Range: 0.00~650.00s	Factory Default: 0.00s

This function code allows the closed loop adjustment to quickly enter the stabilization phase.

After the closed-loop operation is started, the frequency accelerates to the closed-loop preset frequency [b5-20] according to the acceleration time, and after running for a period of time [b5-21] at this frequency point, it operates according to the closed-loop.



**Fig.6-14 Closed loop preset frequency operation diagram**

<b>b5-22</b>	PID reverse max speed	Range: 0~Max speed	Factory Default: 0
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In some cases, only when the PID output frequency is negative (That is the inverter reverses), the PID can control the given quantity and the feedback quantity to the same state, but an excessively high reverse frequency is not allowed for some occasions too, [b5-22] is used to determine the upper limit of reverse speed.

<b>b5-24</b>	Multi-stage closed loop given 1	Range: 0.00~10.00V	Factory Default: 0.00V
<b>b5-25</b>	Multi-stage closed loop given 2	Range: 0.00~10.00V	Factory Default: 0.00V
<b>b5-26</b>	Multi-stage closed loop given 3	Range: 0.00~10.00V	Factory Default: 0.00V

<b>b5-27</b>	Multi-stage closed loop given 4	Range: 0.00~10.00V	Factory Default: 0.00V
<b>b5-28</b>	Multi-stage closed loop given 5	Range: 0.00~10.00V	Factory Default: 0.00V
<b>b5-29</b>	Multi-stage closed loop given 6	Range: 0.00~10.00V	Factory Default: 0.00V
<b>b5-30</b>	Multi-stage closed loop given 7	Range: 0.00~10.00V	Factory Default: 0.00V

In the closed loop given channel, in addition to the 7 channels defined by **[b5-02]**, The voltage value given by the multi-stage closed loop defined by **[b5-24~b5-30]** can also be used as the closed loop reference. The multi-segment closed loop reference control has a higher priority than the given channel defined in **[b5-02]**.

Multi-stage closed loop reference 1~7 section voltage selection can be flexibly switched by external terminals, see **[H1-02~H1-13]** terminal functions 61~63.

<b>b5-31</b>	PID parameter switching conditions	Range: 0~2	Factory Default: 0.00V
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**0: Not switch**

**1: Switch via X terminal**

**2: Automatic switching based on deviation**

<b>b5-32</b>	PID parameter switching deviation 1	Range: 0.0%~b5-33	Factory Default: 20.0%
<b>b5-33</b>	PID parameter switching deviation 2	Range: b5-32~100.0%	Factory Default: 80.0%

When automatic switching is selected, the absolute value of the deviation between the reference and feedback is less than the PID parameter switching deviation 1 **[b5-32]**, PID parameter selection parameter group 1. When the absolute value of the deviation between the reference and feedback is greater than the PID switching deviation 2 **[b5-33]**, the PID parameter selection selects parameter group 2. When the deviation between the reference and feedback is between the switching deviation 1 and the switching deviation 2, the PID parameters are linear interpolation values of the two groups of PID parameters.

<b>b5-34</b>	Positive Max value of Twice output deviations	Range: 0.00%~100.00%	Factory Default: 1.00%
<b>b5-35</b>	Opposite Max value of Twice output deviations	Range: 0.00%~100.00%	Factory Default: 1.00%

**[b5-34]** and **[b5-35]** respectively correspond to the maximum value of the absolute value of the output deviation during forward rotation and reverse rotation.

<b>b5-36</b>	PID shutdown calculation	Range: 0~1	Factory Default: 0
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**0: Not operation when shutdown**

**1: Operation during shutdown**

## 6.3 C: Control and debug parameter group

### 6.3.1 C1: Acceleration/Deceleration time

<b>C1-01</b>	Acceleration/Deceleration time selection	Range: 0~3	Factory Default: 0
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**0: Acceleration/Deceleration time 1**

**1: Acceleration/Deceleration time 2**

**2: Acceleration/Deceleration time 3**

**3: Acceleration/Deceleration time 4**

The acceleration time is used to set the time required for the output frequency to accelerate from 0 Hz to the highest output frequency **[E2-01]**; The deceleration time is used to set the time required for the output frequency to decelerate from the highest output frequency **[E2-01]** to 0Hz.

The inverter can set up to 4 kinds of Acceleration/Deceleration time **[C1-03/C1-04~C1-09/C1-10]**. This parameter is used to set the acceleration/deceleration time during normal operation and the factory set acceleration/deceleration time. It is the set value of **[C1-03]**, **[C1-04]**.

<b>C1-02</b>	Jog acceleration/Deceleration time selection	Range: 0~3	Factory Default: 0
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**0: Acceleration/Deceleration time 1**

**1: Acceleration/Deceleration time 2**

**2: Acceleration/Deceleration time 3**

**3: Acceleration/Deceleration time 4**

This parameter is used to set the acceleration/deceleration time during jog operation. The factory-set acceleration/deceleration time is the set value of [C1-03] and [C1-04].

<b>C1-03</b>	Acceleration time 1	Range: 0.0~3600.0s	Factory Default: 30.0s
<b>C1-04</b>	Deceleration time 1	Range: 0.0~3600.0s	Factory Default: 30.0s
<b>C1-05</b>	Acceleration time 2	Range: 0.0~3600.0s	Factory Default: 0.3s
<b>C1-06</b>	Deceleration time 2	Range: 0.0~3600.0s	Factory Default: 0.3s
<b>C1-07</b>	Acceleration time 3	Range: 0.0~3600.0s	Factory Default: 30.0s
<b>C1-08</b>	Deceleration time 3	Range: 0.0~3600.0s	Factory Default: 30.0s
<b>C1-09</b>	Acceleration time 4	Range: 0.0~3600.0s	Factory Default: 30.0s
<b>C1-10</b>	Deceleration time 4	Range: 0.0~3600.0s	Factory Default: 30.0s

The parameters [C1-03/C1-04~C1-09/C1-10] define four sets of acceleration/deceleration time, in units of 0.1s, which can be selected by the acceleration/deceleration time selection function of the multi-function terminal at different acceleration/deceleration times. Switching between (Job mode, program mode, and multi-speed control does not support terminal switching), its priority is higher than the parameter [C1-01]. For specific correspondence, see table 6-5:

**Table 6-5 Acceleration/Deceleration time selection table**

Multi-function input terminal		Valid parameters	
Acceleration/deceleration time selection 2 terminals	Acceleration/deceleration time selection 1 terminal	Acceleration time	deceleration times
0 (Open)	0 (Open)	Determined by C1-01 (Default is C1-03)	Determined by C1-01 (Default is C1-04)s
0 (Open)	1 (Close)	C1-05	C1-06
1 (Open)	0 (Open)	C1-07	C1-08
1 (Open)	1 (Open)	C1-09	C1-10

<b>C1-11</b>	Emergency stop times	Range: 0.0~3600.0s	Factory Default: 10.0s
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[C1-11] is used to set the deceleration time when the terminal is in emergency stop. The input terminal does not need to remain in the closed state, but the emergency stop is triggered even if the time in the closed state is only a moment.

In addition, when "Emergency stop" is selected as the stop mode at the time of fault detection and the stop mode is deceleration stop, it is used as the deceleration time after the fault is detected.

### 6.3.2 C2: S character

<b>C2-01</b>	S curve acceleration and deceleration use selection	Range: 0~2	Factory Default: 0
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**0: Not use.**

**1: Use 1.**

**2: Use 2.**

When the S-curve is used for acceleration and deceleration, the impact of the machine at the start/stop can be reduced. The user can select the appropriate acceleration/deceleration curve by parameter [C2-01].

When [C2-01] is set to 0, linear Acceleration/Deceleration is selected; when [C2-01] is set to 1 or 2, S-curve acceleration/deceleration and two different S-characteristics are selected.

<b>C2-02</b>	S curve rise time 1	Range: 0.0~60.0s	Factory Default: 30.0s
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C2-03	S curve acceleration arrival time 1	Range: 0.0~60.0s	Factory Default: 30.0s
C2-04	S curve fall time 1	Range: 0.0~60.0s	Factory Default: 30.0s
C2-05	S curve deceleration arrival time 1	Range: 0.0~60.0s	Factory Default: 30.0s

The parameter [C2-02~C2-05] defines The S-characteristic of S-curve 1. The slope of the output frequency corresponding to the beginning of the S-curve gradually increases from 0, The slope of the output frequency of the rising section is constant, and the slope of the output frequency of the end section gradually decreases to 0, as shown in Fig.6-15:

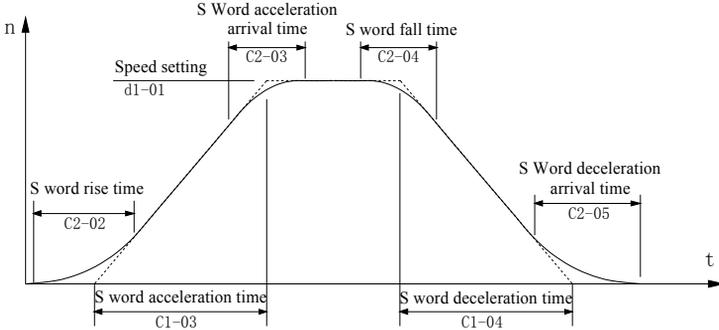


Fig.6-15 S word acceleration and deceleration curve

C2-06	S curve rise time 2	Range: 0.0~60.0s	Factory Default: 30.0s
C2-07	S curve acceleration arrival time 2	Range: 0.0~60.0s	Factory Default: 30.0s
C2-08	S curve fall time 2	Range: 0.0~60.0s	Factory Default: 30.0s
C2-09	S curve deceleration arrival time 2	Range: 0.0~60.0s	Factory Default: 30.0s

The parameter [C2-06~C2-09] defines the S-characteristic of S-curve 2. The user can adjust the corresponding time to achieve the desired S-curve characteristics.

### 6.3.3 C3: Speed controls

C3-01	Speed control proportional gain 1	Range: 3~50	Factory Default: 15
C3-02	Speed control proportional gain 2	Range: 3~100	Factory Default: 15

The [C3-01] and [C3-02] parameters can be used to set the proportional gain of the speed control regulator. At the same time, The multi-function terminal parameters H1-0X (X=2~13) =29 can be combined to select different proportional gains. To meet the requirements of different working conditions of the motor, when the multi-function terminal is in the active state, the speed control proportional gain 2 is selected; otherwise the speed control proportional gain is 1.



#### Note

By modifying the proportional gain, the speed control response speed can be effectively adjusted, and the speed loop cutoff frequency can be improved. However, if the adjustment is too large, the vibration caused by the impact may be caused. At the same time, the type of the transmission system and the transmission unit itself may affect the speed control response speed, so it should be integrated. Consider various factors to adjust the response performance, generally do not modify, and use the factory settings.

C3-03	Proportional gain selection when jogging	Range: 0~2	Factory Default: 0
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0: Speed control proportional gain 1.

1: Speed control proportional gain 2.

2: Special mode selection.

Can use the different speed control proportional gain from the normal operation when Jog. Switch between the proportional gain 1 and the proportional gain 2 by the setting of the jog proportional gain selection parameter. When [C3-03] is set to 2, It is used for Special mode for specific purposes, please do not

set it for non-technical person.



**Note**

Can use the different speed control proportional gain from the normal operation when Jog. Switch between the proportional gain 1 and the proportional gain 2 by the setting of the jog proportional gain selection parameter. When [C3-03] is set to 2, it is used for Special mode for specific purposes, please do not set it for non-technical person.

<b>C3-04</b>	Speed control integral time constant	Range: 20~10000ms	Factory Default: 40ms
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The integration time of the speed control regulator is defined. By setting the speed to control the integral time constant, The shorter the integration time, The faster the speed deviation is corrected, But the too short integration time may cause the regulator output to be unstable, cause the motor to oscillate. In general, it is not necessary to adjust the integral time constant of the speed loop regulator, and use the factory default.

<b>C3-05</b>	Speed control system inertia	Range: 0~65535gm <sup>2</sup>	Factory Default: 10gm <sup>2</sup>
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The inertia is set in gm<sup>2</sup> and is used in speed control. Usually, the input inertia is 20% to 100% of the sum of the load inertia on the motor shaft and the inertia of the motor itself. If it is a belt drive, only the sum of the motor rotor inertia and the pulley inertia is calculated.

In the case of a gear transmission, If the gear clearance is too large, the gear will sound to reduce the set inertia. For belt drive systems, If the vibration is too large, the set inertia is also reduced. In the case where the motor inertia is not known, the set moment of inertia can be gradually increased until the motor vibration is caused.

<b>C3-06</b>	Speed control cancellation use selection	Range: 0, 1	Factory Default: 1
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0: Not use

1: Use.

<b>C3-07</b>	Speed control feedforward selection	Range: 0, 1	Factory Default: 1
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0: Not use

1: Use.



**Note**

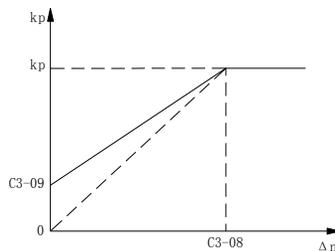
Using the [C3-06], [C3-07] function can improve the dynamic control accuracy of the speed control and improve the speed control response performance. However, If this function is selected, if the regulator and the moment of inertia parameter are set incorrectly, it may cause oscillation.

<b>C3-08</b>	Variable structure proportional gain variable starting speed	Range: 0.01~100.00%	Factory Default: 5.00% (SVC) 0.01% (VC)
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Set the speed deviation when the variable structure proportional gain starts to change. When the speed deviation is greater than this set value, the gain will not change.

<b>C3-09</b>	Variable structure minimum proportional gain ratio	Range: 0~100%	Factory Default: 20% (SVC) 100% (VC)
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Set the minimum proportional gain ratio during variable structure proportional gain. Variable structure proportional gain adjustment, as shown in Fig.6-16.



**Fig.6-16 Variable gain**

### 6.3.4 C4: Vector control related parameter

C4-01	Forward drive torque limit value	Range: 0~200%	Factory Default: 150%
C4-02	Forward regeneration torque limit value	Range: -200~0%	Factory Default: -150%
C4-03	Reverse drive torque limit value	Range: -200~0%	Factory Default: -150%
C4-04	Reverse regeneration torque limit value	Range: 0~200%	Factory Default: 150%

Forward & Reverse drive side and Forward & Reverse regeneration side can be set separately. When the torque command exceeds this setting, limited to the set value; When combined with the multi-function analog input terminal, the torque limit in different quadrants can be jointly determined, as shown in Fig.6-17.

The torque limit value set above is based on the rated torque of the motor, and can be set up to 200%. When the motor capacity matches the inverter capacity, the setting should not exceed the factory setting.

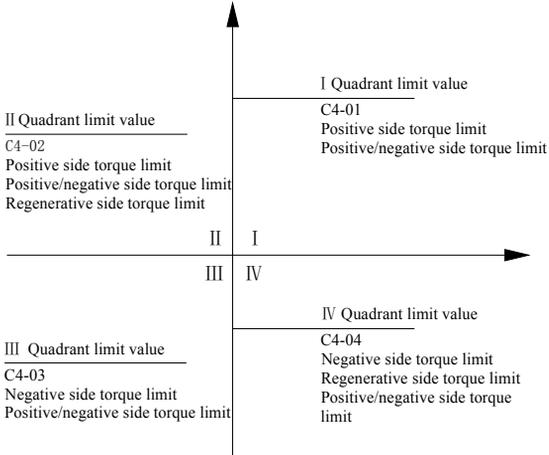


Fig.6-17 Torque limit

C4-05	Torque command mode selection	Range: 0, 1	Factory Default: 0
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**0: % Instruction.**

**1: Absolute value instruction.**

This setting is used to select the characteristics of the torque command in the constant power range. When the % command is set, Even if the torque command is unchanged, in the constant power output field, because the output power is constant, The torque is inversely proportional to the speed. If the speed is increased, the torque decreased. If the absolute value command is set, In the constant power output field, If the torque is constant, the output torque will not change, but the torque limit also decreases with constant power characteristics. As shown in Fig.6-18

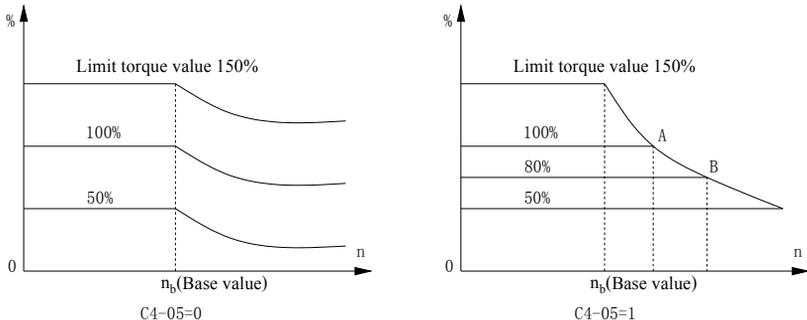


Fig.6-18 Torque command mode

<b>C4-06</b>	Flux command set value	Range: 20.0~150.0%	Factory Default: 100.0%
<b>C4-07</b>	Flux enhancement rate at startup	Range: 100.0~150.0%	Factory Default: 100.0%

The flux command set value is used to set the command value of the flux size used in vector control. Under normal circumstances, It is set to 100.0%, Corresponding to the rated magnetic flux of the motor. There is no special requirement without modification, and keep the default value

The flux enhancement rate at startup is used to set the magnetic flux that is reinforced by the motor at startup, and is used when the starting torque is increased. Part of the motor flux is too strong to work, so there is no special requirement without modification, keeping the default value unchanged.

<b>C4-08</b>	Current control proportional gain	Range: 0.0~9.9	Factory Default: 4.0
<b>C4-09</b>	Current control integral time constant	Range: 0.0~9.9ms	Factory Default: 3.3ms
<b>C4-10</b>	Current control feed forward gain	Range: 0~200	Factory Default: 0

[C4-08~C4-10] is the current control related parameter, which is usually used according to the initial value and has met most of the current control requirements. This group of parameters can be used freely during tuning, vector control, and V/F control. Other conditions are invalid. Do not adjust without the guidance of technical support engineers.

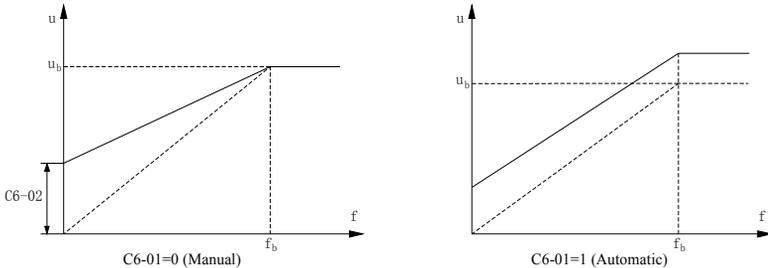
### 6.3.5 C6: V/F special parameters

<b>C6-01</b>	Torque boost mode	Range: 0、1	Factory Default: 0
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**0: Manual boost**

**1: Automatically boost**

This parameter selects the torque boost mode in the V/F control mode. Manual boost and automatic boost can be selected according to the motor and load characteristics. When set to manual boost, increase the output voltage according to the set torque boost. When the automatic boost is set, the boost amount can be automatically adjusted according to the load characteristics, and the set torque boost amount parameter is invalid. When performing automatic boost, because the inverter nonlinear parameters and primary side resistance are required, the static setting is performed before use. Torque boost, shown in Fig.6-19.



**Fig.6-19 Torque Boost**

<b>C6-02</b>	Torque boosting amount	Range: 0.0~20.0%	Factory Default: 0.0%
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The amount of torque boost during manual lift is set relative to the ratio of the rated voltage set in the motor nameplate. When the starting torque is insufficient, Increase this setting to increase the starting current and increase the starting torque. However, If the amount of lifting is increased so that the motor cannot exceed the rated current and the motor cannot be started, It is necessary to expand the inverter capacity to drive the motor to prevent overload or switch to the vector control mode. Do not increase the torque boost arbitrarily, resulting in excessive current at low frequencies, resulting in uneven load on the power device, resulting in overheating failure.

<b>C6-03</b>	Stable amount	Range: 0.0~100.0%	Factory Default: 0.0%
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If the motor rotation is unstable, adjusting the set value can make the running process smooth. When the motor rotates at an unstable frequency, The amount of stability is gradually increased until the motor rotates stably. However, if the amount of stability is set too large, It may cause instability of the motor rotation. In

most cases, if the V/F control mode is executed, the static setting is performed and the motor runs smoothly, so the initial value is set to 0 here.

<b>C6-04</b>	Drive side torque limit value	Range: 0~150%	Factory Default: 150%
<b>C6-05</b>	Regenerative side torque limit value	Range: -150~0%	Factory Default: -150%

In the V/F control mode, the torque limit can be separately indirect applied to the drive side and the regeneration side by the above parameters. However, the accuracy of the calculation is not compensated, so the accuracy of the torque limit is not high. If require high-precision torque limitation, please switch to vector control mode.

<b>C6-06</b>	Select to use the drive side torque limit value	Range: 0, 1	Factory Default: 0
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**0: Not use**

**1: Use.**

<b>C6-07</b>	Select to use the regenerative side torque limit value	Range: 0, 1	Factory Default: 0
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**0: Not use**

**1: Use.**

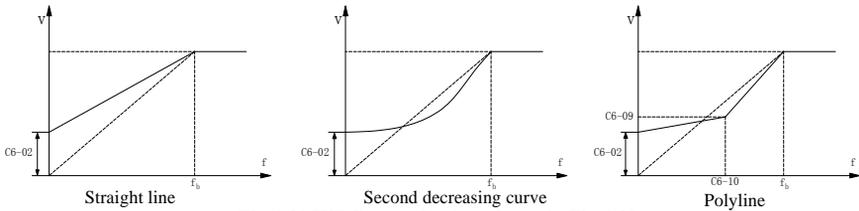
<b>C6-08</b>	V/F curve selection	Range: 0~2	Factory Default: 0
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**0: Straight line.**

**1: Second decreasing curve.**

**2: Polyline.**

V/F curve selection, Shown in Fig.6-20.



**Fig.6-20 V/F Curve selection, shown in Fig.6-20**

<b>C6-09</b>	Break point voltage of polygonal line V/F	Range: 0~400V	Factory Default: 0V
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<b>C6-10</b>	Break point frequency of polygonal line V/F	Range: 0~maximum speed	Factory Default: 0r/min
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## 6.4 d: Command setting parameter group

### 6.4.1 d1: Preset rotation speed

<b>d1-01</b>	Preset rotation speed 1	Range: -maximum speed~maximum speed	Factory Default: 12r/min (SVC) 0r/min (VC)
<b>d1-02</b>	Preset rotation speed 2	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-03</b>	Preset rotation speed 3	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-04</b>	Preset rotation speed 4	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-05</b>	Preset rotation speed 5	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-06</b>	Preset rotation speed 6	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-07</b>	Preset rotation speed 7	Range: -maximum speed~maximum speed	Factory Default: 0r/min

<b>d1-08</b>	Preset rotation speed 8	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-09</b>	Preset rotation speed 9	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-10</b>	Preset rotation speed 10	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-11</b>	Preset rotation speed 11	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-12</b>	Preset rotation speed 12	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-13</b>	Preset rotation speed 13	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-14</b>	Preset rotation speed 14	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-15</b>	Preset rotation speed 15	Range: -maximum speed~maximum speed	Factory Default: 0r/min
<b>d1-16</b>	Preset rotation speed 16	Range: -maximum speed~maximum speed	Factory Default: 0r/min

The inverter can switch at 17 speed segments by 16 preset rotation speeds and 1 preset jog speed. With the multi-function X input, use the current effective Acceleration/Deceleration time, and various speeds can be switched during operation. The [d1~d17] parameter range is from the highest speed to the highest speed, and the maximum speed is determined by [E2-01]. Through the multi-function X input, various speeds can also be switched during operation, and the currently valid acceleration/deceleration time is used. The [d1~d17] parameter range is from negative maxi speed to positive maxi speed, maxi speed is determined by [E2-01].

Multi-speed operation set method

Set the corresponding parameters of [H1-02~H1-12] to 8, 9, 10, and 11 according to the set number of multi-speed commands. When using the jog frequency command, set the corresponding parameter in [H1-02~H1-12] to 12.

When assigning the preset speeds 1 to 3 to the analog input terminals, please pay attention to the following:

**Speed 1:**

If the analog input of terminal AI1 is set to the first speed, set [b1-02] to 1. If [d1-01] is set to the first speed, set [b1-02] to 0.

**Speed 2:**

If the analog input of terminal AI2 is set to the 2nd speed, set [H3-10] (Terminal AI2 function selection) to 2 (auxiliary frequency command 1). If [d1-02] is set to the 2nd speed, set [H3-10] to 99 (straight through mode). When inputting 0 to 10V as the analog input of terminal AI2, set [H3-09] to 0 and set the S1 toggle switch on the control circuit terminal block to the V side (voltage).

**Speed 3:**

Set the analog input of terminal AI3 to the third speed, set [H3-06] (terminal AI3 function selection) to 3 (auxiliary frequency command 2). Set [d1-03] to the 3rd speed, set [H3-06] to 99 (Direct mode).

Detailed description	Multi-speed command 1 The corresponding parameter of H1-02~H1-12 is 8	Multi-speed command 2 The corresponding parameter of H1-02~H1-12 is 9.	Multi-speed command 3 The corresponding parameter of H1-02~H1-12 is 10.	Multi-speed command 4 The corresponding parameter of H1-02~H1-12 is 11	Jog command The corresponding parameter of H1-02~H1-12 is 12
Preset rotation speed 1	OFF	OFF	OFF	OFF	OFF
Preset rotation speed 2	ON	OFF	OFF	OFF	OFF
Preset rotation speed 3	OFF	ON	OFF	OFF	OFF
Preset rotation speed 4	ON	ON	OFF	OFF	OFF
Preset rotation speed 5	OFF	OFF	ON	OFF	OFF
Preset rotation speed 6	ON	OFF	ON	OFF	OFF
Preset rotation speed 7	OFF	ON	ON	OFF	OFF
Preset rotation speed 8	ON	ON	ON	OFF	OFF
Preset rotation speed 9	OFF	OFF	OFF	ON	OFF
Preset rotation speed 10	ON	OFF	OFF	ON	OFF
Preset rotation speed 11	OFF	ON	OFF	ON	OFF
Preset rotation speed 12	ON	ON	OFF	ON	OFF
Preset rotation speed 13	OFF	OFF	ON	ON	OFF
Preset rotation speed 14	ON	OFF	ON	ON	OFF

Preset rotation speed 15	OFF	ON	ON	ON	OFF
Preset rotation speed 16	ON	ON	ON	ON	OFF
Jog frequency command	-	-	-	-	ON



### Note

The jog frequency command takes precedence over any multi-speed command.

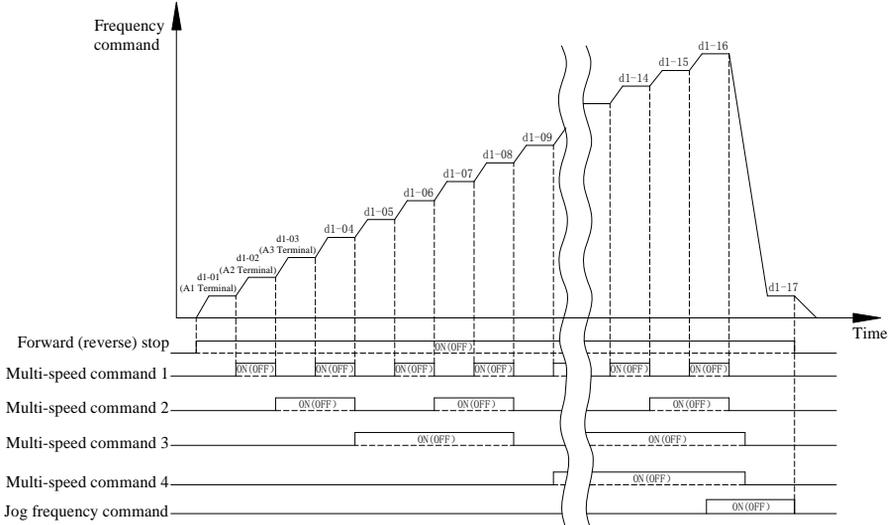


Fig.6-21 Timing diagram for multi-speed command/jog frequency selection

<b>d1-17</b>	Preset jog speed	Range: -maximum speed~ maximum speed	Factory Default: 24r/min
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## 6.4.2 d2: Program operation mode

<b>d2-01</b>	Program operation mode selection	Range: Units digit: 0~3 Tens digit: 0~2 Hundreds digit: 0, 1	Factory Default: 000
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Use the one place, ten place, and hundred place to set the program running mode, restart mode after interrupt, running time unit and power-down storage mode, as follows:

### Units digit: Operation mode selection

**0: Not used.** The program is not working.

**1: Downtime after single cycle.** The inverter automatically stops after completing one cycle, and needs to give the running command again to start.

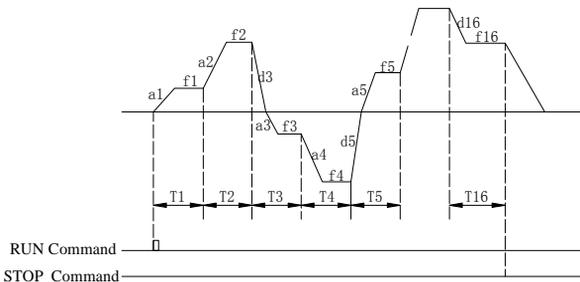
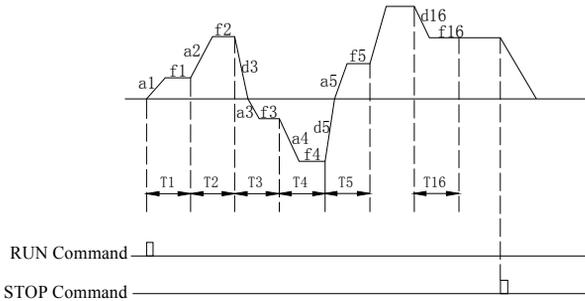


Fig.6-22 PLC Single cycle after shutdown mode

**2: Keep the final value after a single cycle**

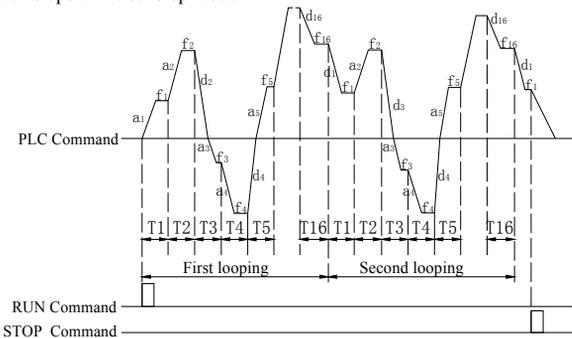
As shown in Fig.6-23, After the inverter completes one cycle, it automatically keeps the running frequency and direction of the last segment until the stop command input, the inverter stops in the set stop mode.



**Fig.6-23 PLC Single loop hold mode**

**3: Loop operation.**

After the inverter completes one cycle, It automatically starts the next cycle until there is a stop command, and then stops in the set stop mode.



**Fig.6-24 PLC Continuous circulation**

a1~a16: Indicates the acceleration time of each stage

d1~d16: Deceleration time for each stage

f1~f16: Indicates the frequency of each stage

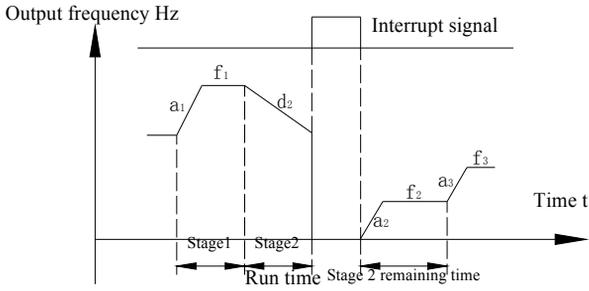
**Tens digit: Interrupt operation restart mode selection**

**0: Start over from the first paragraph**

The operation is stopped by the stop command, Fault or power failure, And starts from the first stage after restarting.

**1: Continue to run from the phase frequency of the interruption moment.**

When the operation is stopped by the stop command or the fault, the inverter automatically records the time that the current phase has been running, and then automatically enters the phase after the start, and continues the remaining time operation at the frequency defined by the phase, Such as power failure, and then start the inverter. The operation will resume from the first paragraph.

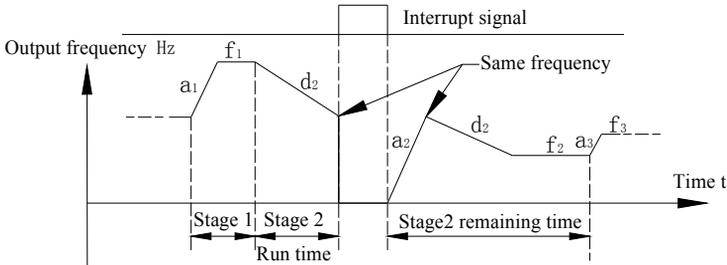


a1: Stage 1 acceleration time      a2: Stage 2 acceleration time  
a3: Stage 3 acceleration time      d2: Stage 2 deceleration time  
f1: Phase 1 frequency              f2: Phase 2 frequency  
f3: Phase 3 frequency

Fig.6-25

## 2: It continues to run from the operating frequency at the time of the interruption.

When the operation is stopped by the stop command or the fault, the inverter not only automatically records the running time of the current stage but also records the running frequency of the stop time. After starting, it will return to the running frequency of the stop time and continue the operation of the remaining stage.



a1: Stage 1 acceleration time      a2: Stage 2 acceleration time  
a3: Stage 1 acceleration time      d2: Stage 2 deceleration time  
f1: Stage 1 frequency              f2: Stage 2 frequency  
f3: Stage 3 frequency

Fig.6-26

## Hundreds digit: Power-down storage options

### 0: Not Saved.

When the power is off, the program is not memorized. After power-on, it starts to run from the first segment.

**1: Store the running status of the power-down time;** including the running phase, running frequency and running time.

Memory program running status when power is off, including power down time, running frequency, and running time. After power-on, according to the ten-defined program, the operation is interrupted and the restart mode is run.

d2-02	Program running time unit selection	Range: 0~2	Factory Default: 0
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**0: Second (s).**

**1: Minute (min).**

**2: Hour (hour).**

This unit is only valid for the program run phase time definition.

<b>d2-03</b>	Program running time 1	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-04</b>	Program running time 2	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-05</b>	Program running time 3	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-06</b>	Program running time 4	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-07</b>	Program running time 5	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-08</b>	Program running time 6	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-09</b>	Program running time 7	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-10</b>	Program running time 8	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-11</b>	Program running time 9	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-12</b>	Program running time 10	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-13</b>	Program running time 11	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-14</b>	Program running time 12	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-15</b>	Program running time 13	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-16</b>	Program running time 14	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-17</b>	Program running time 15	Range: 0.0~3600.0	Factory Default: 0.0
<b>d2-18</b>	Program running time 16	Range: 0.0~3600.0	Factory Default: 0.0

The parameters [d2-03~d2-18] define the running time of each run of the program running phase 1 to phase 16. The time of each run includes the time of acceleration and deceleration.

<b>d2-19</b>	Program operation setting 1	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-20</b>	Program operation setting 2	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-21</b>	Program operation setting 3	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-22</b>	Program operation setting 4	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-23</b>	Program operation setting 5	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-24</b>	Program operation setting 6	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-25</b>	Program operation setting 7	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-26</b>	Program operation setting 8	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-27</b>	Program operation setting 9	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-28</b>	Program operation setting 10	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-29</b>	Program operation setting 11	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-30</b>	Program operation setting 12	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-31</b>	Program operation setting 13	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-32</b>	Program operation setting 14	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-33</b>	Program operation setting 15	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00
<b>d2-34</b>	Program operation setting 16	Range: Units digit: 0~2 Tens digit: 0~3	Factory Default: 00

Units digit: Rotation speed setting

**0: Prefabricated rotation speed X** (X=1~16).

i=1 to 16, defined by [d1-01~d1-16].

**1: Current Speed Command.**

Run according to the current speed command, such as keyboard, MODBUS communication and optional card.

**2: Reserved**

**Tens digit: Acceleration and deceleration time selection**

**0: Acceleration and deceleration time 1.**

**1: Acceleration and deceleration time 2.**

**2: Acceleration and deceleration time 3.**

**3: Acceleration and deceleration time 4.**

The acceleration/deceleration time setting is set by [C1-03 to C1-10].

### 6.4.3 d3: Speed command tuning

<b>d3-01</b>	Speed deviation limit command selection	Range: 0, 1	Factory Default: 0
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**0: No using.**

**1: Using.**

<b>d3-02</b>	Positive direction maximum deviation	Range: 0.0~100.0%	Factory Default: 5.0%
<b>d3-03</b>	Negative direction maximum deviation	Range: -100.0~0.0%	Factory Default: -5.0%

When this function is used, The motor running speed and the command speed of the acceleration/deceleration output will be limited by the interval determined by the deviation in the positive and negative directions. In the speed control, when the load torque is greater than the torque limit value and the speed is reduced, if the load is reduced and the rapid acceleration is caused, if this function is enabled, this phenomenon can be prevented and can be set according to the acceleration/deceleration time. The slope restores the speed. At the same time, if this function is used, the acceleration and deceleration will be limited, which will affect the dynamic response performance.

<b>d3-04</b>	Jump speed 1	Range: 0~Maximum speed	Factory Default: 0r/min
<b>d3-05</b>	Jump speed 2	Range: 0~Maximum speed	Factory Default: 0r/min
<b>d3-06</b>	Jump speed 3	Range: 0~Maximum speed	Factory Default: 0r/min
<b>d3-07</b>	Jump speed 4	Range: 0~Maximum speed	Factory Default: 0r/min

In the mechanical transmission, In order to avoid the resonance point, The jump function parameter can be set, and the jump process, as shown in Fig.6-27.

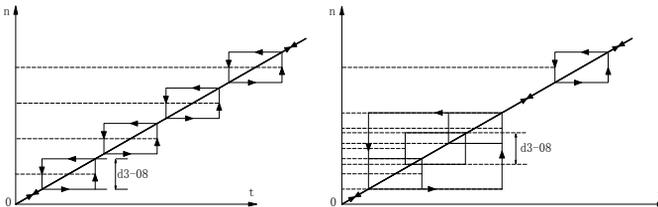


Fig.6-27 Jumping function

<b>d3-08</b>	Speed jump amplitude	Range: 0~300r/min	Factory Default: 0r/min
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<b>d3-09</b>	Current speed memory selection	Range: 0, 1	Factory Default: 1
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**0: No memory**

**1: Memory**

This parameter is used to select whether to save the current frequency command when the power is cut

off, mainly used with other frequency setting modes other than digital frequency setting, such as: communication, expansion card, contact acceleration and deceleration, etc.

When [d3-09] is set to 0, The frequency command of the inverter will be reset to the preset frequency command of [d1-01] when the power is turned off and then re-powered; when [d3-09] is set to 1, The power is disconnected. When the current frequency command is automatically saved, the inverter will be powered on again, and the frequency command will retain the saved value.

<b>d3-10</b>	Contact acceleration and deceleration function selection	Range: 0、1	Factory Default: 2
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- 0: No using
- 1: Using

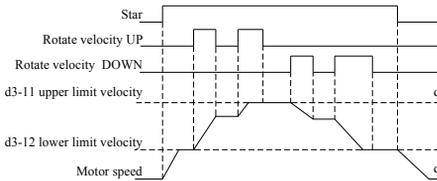
<b>d3-11</b>	Contact acceleration and deceleration function upper limit speed	Range: MRH lower limit speed ~ maximum speed	Factory Default: 300r/min
<b>d3-12</b>	Contact acceleration and deceleration function lower limit speed	Range: -Maximum speed to MRH upper limit speed	Factory Default: 0r/min

When [d3-10] is set to 1, the acceleration/deceleration control can be performed by the contact. At this time, if the running command channel is selected as the control circuit terminal, the speed can be adjusted through the contact function "UP command" and "DOWN command" of the multi-function input terminal.

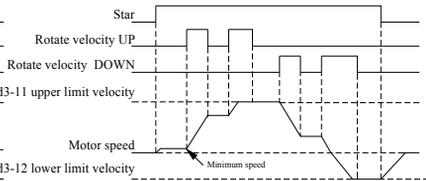
The speed will be accelerated according to the UP command input to the upper limit speed defined by [d3-11], and decelerated according to the DOWN command to the lower speed direction defined by [d3-12]; when there is no UP, DOWN command or the UP and DOWN commands are valid at the same time, the speed constant.

When the speed is not between the [d3-11] and [d3-12] settings, it will automatically accelerate and decelerate to the values set by [d3-11] and [d3-12]. When [d3-12] is set to a negative value, it can also be operated by the contact reverse rotation.

Contact acceleration and deceleration function has higher priority than other frequency commands.



**Fig.6-28 The lower limit speed of contact acceleration and deceleration is set to positive value.**



**Fig.6-29 The lower limit speed of acceleration and deceleration is negative**

<b>d3-13</b>	Contact acceleration and deceleration adjustment step size	Range: 1~300 (Terminal up/down special use)	Factory Default: 3r/min
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The parameter [d3-13] is used to set the adjustment step size of the contact acceleration and deceleration function, Through which the user can change the adjustment rate of the contact acceleration and deceleration.

**6.4.4 d4: Torque control**

<b>d4-01</b>	Torque command given	Range: -200~200%	Factory Default: 0%
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When [b1-05] is set to 3, the current torque instruction channel is given by the keyboard number, That is to say, the torque instruction is determined by [d4-01]. Set 100%, corresponding to the rated torque of the motor. When the number is given, it is usually used in the trial run phase.

**6.4.5 d5: Bias velocity**

<b>d5-01</b>	Offset frequency1	Range: -100.0~100.0%	Factory Default: 0.0%
<b>d5-02</b>	Offset frequency2	Range: -100.0~100.0%	Factory Default: 0.0%

<b>d5-03</b>	Offset frequency3	Range: -100.0~100.0%	Factory Default: 0.0%
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The offset frequency defined by [d5-01~d5-03] is mainly used as the correction value of velocity. Three kinds of offset frequencies can be added and reduced to the frequency instruction. The user selects the offset frequency through the "offset frequency 1 stack", "offset frequency 2 stack" or "offset frequency 3 stack" function of the multifunctional terminal. When the input of multiple terminals is valid at the same time, the selected offset value is added.

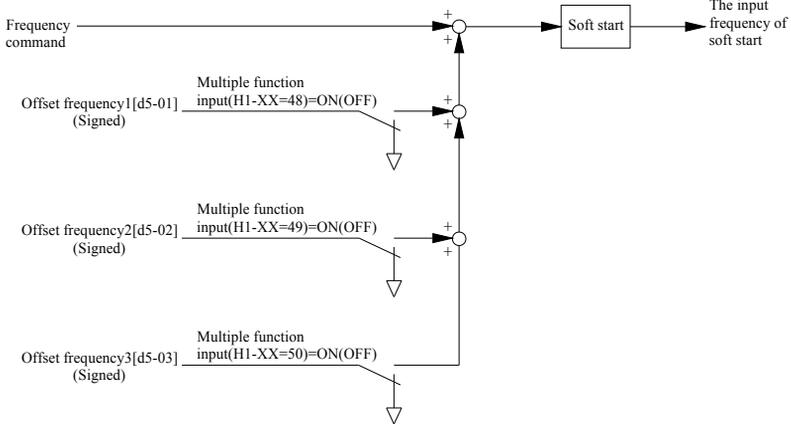


Fig.6-30 Offset frequency block diagram

## 6.5 E: Motor parameter group

### 6.5.1 E1: Motor type

<b>E1-01</b>	Motor type selection	Range: 0~3	Factory Default: 0
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- 0: Ordinary induction motor
- 1: Variable frequency speed regulation induction motor.
- 2: Reserved.
- 3: Reserved.

### 6.5.2 E2: Motor operating range

<b>E2-01</b>	Maximum operating speed of motor	Range: 300~14700r/min	Factory Default: 1500r/min
--------------	----------------------------------	-----------------------	----------------------------

Set the absolute value of the maximum speed of the motor, The frequency inverter will use this value as the reference for speed control. The setting range is generally 1~4 times of the rated speed of the motor used, if used only under the rated speed of the motor, the maximum speed will be set to the rated speed of the motor or the synchronous speed corresponding to the rated frequency.

<b>E2-02</b>	Minimum running speed of motor.	Range: 12~maximum speed (SVC)	Factory Default: 12r/min
		Range: 0~maximum speed (VC)	Factory Default: 0r/min

Setting the absolute value of the minimum speed of the motor. Even if the absolute value of the input speed instruction is under the speed, the motor is limited to the speed, and the output frequency is not limited by this parameter in the case of torque control.

### 6.5.3 E3: Carrier frequency setting

<b>E3-01</b>	Carrier frequency setting	Range: 1.0~10.0kHz	Factory Default: According to the type
--------------	---------------------------	--------------------	---

Set frequency inverter PWM modulation carrier frequency. In vector control, due to the synchronization of torque control period with carrier, the change of carrier frequency control characteristics will also change, especially when the carrier is lower than 2KHz, the torque control period will become longer, resulting in poor control characteristics. Therefore, if there is no special need, please use the default carrier. When the carrier is larger than the default carrier, the rated current use of frequency converter must be reduced because of the increase of loss, that is, the use of capacity reduction.

Power	Maximum carrier frequency	Min carrier frequency	Factory value
3.7~30KW	10kHz	1kHz	6kHz
37~55KW	8kHz	1kHz	6kHz
75~160KW	4kHz	1kHz	6kHz
Above 200KW	3kHz	1kHz	6kHz



#### Note

After the trial run, the change carrier needs to perform the static setting again, otherwise the control characteristics may deteriorate.

### 6.5.4 E4: Nameplate parameters of induction motor

<b>E4-01</b>	Induction motor rated capacity	Range: 0~Inverter rated capacity	Factory Default: According to the machine Type determination
<b>E4-02</b>	Induction motor rated voltage	Range: 0~120% of inverter rated voltage	Factory Default: According to the machine Type determination
<b>E4-03</b>	Induction motor rated current	Range: 0~150% of inverter rated current	Factory Default: According to the machine Type determination
<b>E4-04</b>	Induction motor rated speed	Range: 0~60000r/min	Factory Default: According to the machine Type determination
<b>E4-05</b>	Induction motor pole number	Range: 2~12Pole	Factory Default: 4Pole
<b>E4-06</b>	Induction motor rated frequency	Range: 0~(Rated speed * poles / 120Hz + 5Hz)	Factory Default: According to the machine Type determination

[E4-01~E4-06] parameters are nameplate parameters of induction motor, which should be set according to the rating recorded in motor nameplate or design document. These parameters must be set in advance when they are used in self-tuning and operation. If vector control does not set, it can not run, when setting nameplate parameters, we should pay attention to the connection mode of the motor to enter the correct nameplate.

<b>E4-07</b>	Induction motor cooling type	Range: 0、1	Factory Default: 0
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**0: Self-cooling fan.**

**1: Forced cooling fan.**

This parameter is set according to the cooling mode of the motor. In the speed sensorless vector control mode, setting the forced cooling fan will compensate the motor parameters, but if the self-cooling is set, it will not be performed.

<b>E4-09</b>	Induction motor tuning method selection	Range: 0~2	Factory Default: 0
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**0: No fixed order.**

**1: Static mode setting.**

**2: Rotate full mode setting.**

Set the setting type. It can be operated without setting the setting in the V/F control mode. If the setting is only required to perform the static setting, the motor terminal voltage can obtain the accurate output voltage after the static setting; The vector control must be adjusted before it can run. The electrical parameters of the input motor [E7 Group] can be selected to perform static tuning, or the rotating full mode setting can be

selected. The expected control performance can not be obtained by manually inputting the electrical parameters of the motor. It is recommended to perform the full-mode rotation setting. The full-mode tuning should be disconnected as much as possible. If the load torque is not zero, the parameters will be affected. If the load torque is greater than 30% of the rated motor torque, the parameters obtained by rotating the full-mode setting may be wrong or the tuning failed. If the motor connection is changed after the selection of the full mode setting, the static setting is performed again. If the motor is a variable frequency motor, it is recommended to perform the tuning at room temperature.

### 6.5.5 E7: Induction motor electrical parameters

<b>E7-01</b>	Motor primary side resistance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
--------------	-------------------------------	---	--

Set the primary side resistance of the induction motor and the wiring resistance between the inverter and the motor. If the connection changes, you need to reset or re-execute the static setting to correct the primary side resistance.

<b>E7-02</b>	Induction motor secondary side resistance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
--------------	---	---	--

Set the conversion value of the secondary side resistance of the induction motor to the primary side. When it is not possible to perform the rotation auto-tuning and manually set it according to the motor design manual, it is recommended to set the conversion value of 25°C.

<b>E7-03</b>	Induction motor leakage inductance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
--------------	------------------------------------	---	--

When the leakage inductance of the induction motor is set and it is necessary to manually set the rotation self-tuning according to the motor design manual, the primary side leakage inductance and the average value of the secondary side leakage inductance converted to the primary side are set.

<b>E7-04</b>	Induction motor mutual inductance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
--------------	-----------------------------------	---	--

Set the mutual inductance of the induction motor. When it is not possible to perform the rotation auto-tuning and need to be manually set according to the motor design manual, set the default value or the inductance value when the magnetic flux is rated.

<b>E7-05</b>	Induction motor inductance saturation compensation 1	Range: 0.0~50.0%	Factory Default 0.0%
<b>E7-06</b>	Induction motor inductance saturation compensation 2	Range: 0.0~50.0%	Factory Default: 0.0%

Set the inductance saturation compensation coefficient of the induction motor. When the rotation auto-tuning cannot be performed and it is necessary to manually set it according to the motor design manual, the mutual inductance at 90% and 70% of the rated magnetic flux is set to % with respect to the increase rate at 100%.

<b>E7-07</b>	Induction motor iron loss conductance	Range: 0.0~600.0mho	Factory Default: 0.0mho
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Set the induction motor iron loss conductance. When it is not possible to perform the rotary auto-tuning and need to be manually set according to the motor design manual, Set the equivalent value of the iron loss partial conductance.

<b>E7-08</b>	Induction motor loss factor 1	Range: 0.0~200.0%	Factory Default: 0.0%
<b>E7-09</b>	Induction motor loss factor 2	Range: 0.0~200.0%	Factory Default: 0.0%

This parameter is the electrical and mechanical loss factor obtained by automatic measurement of auto-tuning. It is not necessary to set the rotation auto-tuning when it is impossible to implement.

## 6.6 F: The 2nd motor parameter group

### 6.6.1 F1: The 2nd motor type selection and enable

<b>F1-01</b>	The 2nd motor type selection	Range: 0~3	Factory Default: 0
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- 0: Ordinary induction motor.**
- 1: Frequency control induction motor.**
- 2: Reserved.**
- 3: Reserved.**

<b>F1-03</b>	The 2nd motor use selection	Range: 0, 1	Factory Default: 0
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- 0: The second motor is not used.**
- 1: Use the second motor.**

### 6.6.2 F2: 2nd induction motor nameplate parameters

<b>F2-01</b>	The 2nd induction motor rated capacity	Range: 0~Inverter rated capacity	Factory Default: According to the machine Type determination
<b>F2-02</b>	The 2nd induction motor rated voltage	Range: 0~Inverter rated voltage 120%	Factory Default: According to the machine Type determination
<b>F2-03</b>	The 2nd induction motor rated current	Range: 0~Inverter rated current 150%	Factory Default: According to the machine Type determination
<b>F2-04</b>	The 2nd induction motor rated speed	Range: 0~60000r/min	Factory Default: According to the machine Type determination
<b>F2-05</b>	The 2nd Induction motor pole number	Range: 2~12Pole	Factory Default: 4Pole
<b>F2-06</b>	the 2nd induction motor rated frequency	Range: 0~(Rated speed * poles/120Hz + 5Hz)	Factory Default: According to the machine Type determination

The above parameters are the nameplate parameters of the induction motor. They should be input according to the rating on the motor nameplate or design file. These parameters are used during auto-tuning and operation. They must be set in advance. The vector control is not set and cannot be operated. When setting the nameplate parameters, pay attention to the connection mode of the motor and input the correct nameplate.

<b>F2-07</b>	2nd induction motor cooling type	Range: 0, 1	Factory Default: 0
--------------	----------------------------------	-------------	--------------------

- 0: Self cooling fan**
- 1: Force the cooling fan.**

This parameter is set according to the cooling mode of the motor. In the speed sensorless vector control mode, setting the forced cooling fan will compensate the motor parameters, and if self-cooling is set, it will not be executed.

### 6.6.3 F4: The 2nd induction motor electrical parameters

<b>F4-01</b>	2 induction motor primary side resistance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
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Set the primary side resistance of the induction motor and the wiring resistance between the inverter and the motor. If the connection changes, you need to reset or re-execute the static setting to correct the primary side resistance.

<b>F4-02</b>	Second induction motor secondary side resistance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
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Set the conversion value of the secondary side resistance of the induction motor to the primary side.

When it is not possible to perform the rotation auto-tuning and manually set it according to the motor design manual, it is recommended to set the conversion value of 25°C.

<b>F4-03</b>	The second induction motor leakage inductance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
--------------	---	---	---

When the leakage inductance of the induction motor is set and it is necessary to manually set the rotation self-tuning according to the motor design manual, the primary side leakage inductance and the average value of the secondary side leakage inductance converted to the primary side are set.

<b>F4-04</b>	The second induction motor mutual inductance	Range: Motor capacity is different for different setting ranges	Factory Default: According to the machine Type determination
--------------	--	---	---

Set the mutual inductance of the induction motor. When it is not possible to perform the rotation auto-tuning and need to be manually set according to the motor design manual, set the default value or the inductance value when the magnetic flux is rated.

<b>F4-05</b>	2nd induction motor inductance saturation compensation 1	Range: 0.0~50.0%	Factory Default: 0.0%
<b>F4-06</b>	2nd induction motor inductance saturation compensation 2	Range: 0.0~50.0%	Factory Default: 0.0%

Set the inductance saturation compensation coefficient of the induction motor. When the rotation auto-tuning cannot be performed and it is necessary to manually set it according to the motor design manual, the mutual inductance at 90% and 70% of the rated magnetic flux is set to % with respect to the increase rate at 100%.

<b>F4-07</b>	Second induction motor iron loss conductance	Range: 0.0~600.0mho	Factory Default: 0.0mho
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Set the induction motor iron loss conductance. When it is not possible to perform the rotary auto-tuning and need to be manually set according to the motor design manual, set the equivalent value of the iron loss partial conductance.

<b>F4-08</b>	The 2nd induction motor loss coefficient 1	Range: 0.0~200.0%	Factory Default: 0.0%
<b>F4-09</b>	The 2nd induction motor loss coefficient 2	Range: 0.0~200.0%	Factory Default: 0.0%

This parameter is the electrical and mechanical loss factor automatically measured by auto-tuning. It is not necessary to set the rotation auto-tuning when it cannot be implemented.

#### 6.6.4 F6: 2nd motor supplementary adjustment parameter

<b>F6-02</b>	2nd motor speed control proportional gain	Range: 3~100	Factory Default: 15
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For details of the parameters, please refer to the [C3-01] parameter description.

<b>F6-03</b>	2nd motor speed control integral time constant	Range: 20~10000ms	Factory Default: 40ms
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For details of the parameters, please refer to the [C3-04] parameter description.

<b>F6-04</b>	2nd motor speed control inertia	Range: 0~65535gm <sup>2</sup>	Factory Default: 10gm <sup>2</sup>
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For detailed description of the parameters, please refer to the [C3-05] parameter description.

<b>F6-09</b>	Acceleration/deceleration time selection of the second motor	Range: 0~3	Factory Default: 2
<b>F6-10</b>	Acceleration/deceleration time selection of the second motor	Range: 0~3	Factory Default: 3

**0: Acceleration/Deceleration time 1**

- 1: Acceleration/Deceleration time 2**  
**2: Acceleration/Deceleration time 3**  
**3: Acceleration/Deceleration time 4**

<b>F6-11</b>	The second motor S word acceleration and deceleration use selection	Range: 0~2	Factory Default: 0
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- 0: No using**  
**1: Using 1**  
**2: Using 2**

The inverter has two sets of motor parameters to support the mutual switching between the two motors. Before using this function, the user must set the second motor under normal operation and jog operation by parameters [F6-09~F6-11]. Acceleration and deceleration time and acceleration and deceleration curve. For details, please refer to the description of the parameters related to the 1st motor.

<b>F6-12</b>	Action selection when the second motor generates oS (Overspeed)	Range: 0~4	Factory Default: 4
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- 0: Not detected.**  
**1: Alarm, Continue to run.**  
**2: Alarm, Stop by stop mode**  
**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).  
**4: Failure, Free running stops.**

<b>F6-13</b>	2nd motor forward side over speed setting	Range: 0 to the maximum speed *1.5	Factory Default: 1900r/min
<b>F6-14</b>	2nd motor forward side over speed setting	Range: -Maximum speed *1.5~0	Factory Default: -1900r/min
<b>F6-15</b>	2nd motor oS (Overspeed) detection time	Range: 0.0~2.0s	Factory Default: 0.5s

[F6-12~F6-15] defines the parameters related to the second motor overspeed protection function. Please be sure to set the above parameters correctly when using this function. For details, please refer to the description of the parameters related to the 1st motor.

<b>F6-26</b>	2nd motor overload protection factor	Range: 20~110%	Factory Default: 100%
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For detailed description of the parameters, please refer to the [L1-03] parameter description.

## 6.7 G: Option card

### 6.7.1 G1: PG peed control card

<b>G1-01</b>	Pulse number of PG1	Range: 1~60000ppr	Factory Default: 1024ppr
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<b>G1-02</b>	PG1 rotation direction setting	Range: 0, 1	Factory Default: 0
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- 0: When the motor is rotating forward, phase A leads.**  
**1: When the motor rotates forward, phase B leads.**

<b>G1-03</b>	PG1 gear teeth number 1	Range: 0~1000	Factory Default: 0
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<b>G1-04</b>	PG1 gear teeth number 2	Range: 0~1000	Factory Default: 0
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<b>G1-05</b>	PG1 output frequency division ratio	Range: 0(1/1) ~ 5(1/32)	Factory Default: 0
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<b>G1-06</b>	PG1 hardware disconnection checkout selection	Range: 0、1	Factory Default: 1
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- 0: The hardware disconnection check is invalid.**  
**1: Hardware disconnection check is valid.**

<b>G1-07</b>	Optional card function selection of PG1	Range: 0、1	Factory Default: 1
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- 0: Phase A is detected.**  
**1: AB phase check out**

<b>G1-11</b>	Action selection when PGo (PG disconnection) is detected	Range: 0~4	Factory Default: 4
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- 0: Not detected.**  
**1: Alarm, Continue to run.**  
**2: Alarm, Stop by stop mode.**  
**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).  
**4: Failure, Free running stops.**

<b>G1-12</b>	PGo (PG disconnection) checkout time	Range: 0.0~10.0s	Factory Default: 2.0s
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<b>G1-16</b>	dEv(Speed deviation is too large)action selection when detected	Range: 0~4	Factory Default: 4
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- 0: Not detected.**  
**1: Alarm, continue to run.**  
**2: Alarm, stop by stop mode.**  
**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).  
**4: Failure, free running stops.**

<b>G1-17</b>	dEv (Speed deviation too large) detected value	Range: 0~50%	Factory Default: 10%
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<b>G1-18</b>	dEv (Speed deviation too large) detection time	Range: 0.0~10.0s	Factory Default: 0.5s
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<b>G1-19</b>	PG1's dv3 (Reverse detection) detection time	Range: 0~10	Factory Default: 10
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<b>G1-20</b>	PG1's dv4 (Prevent reverse detection) checkout selection	Range: 0~5000ppr	Factory Default: 128ppr
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## 6.7.2 G6: Communication option card

<b>G6-01</b>	Action selection when bUS (Optional communication failure) is detected	Range: 0~4	Factory Default: 0
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- 0: Not detected.**

When an optional card communication failure occurs, the inverter decelerates to stop at the deceleration time of [C1-01].

- 1: Alarm, continue to run.**

When the optional card communication fault occurs, the inverter IGBT module output is blocked, and the inverter stops in the free stop mode.

**2: Alarm, stop by stop mode.**

When an optional card communication failure occurs, the inverter stops in emergency mode, and the down time is determined by [C1-11].

**3: Alarm, emergency stop.**

When an optional card communication failure occurs, the inverter operates in the original operating mode.

**4: Failure, Free running stops.**

<b>G6-02</b>	bUS (optional communication failure) checkout selection	Range: 0、 1	Factory Default: 0
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**0: Ivalid**

The inverter always detects whether the optional card communicates with the inverter normally. The detection time is determined by [G6-04].

**1: Effective.**

The inverter only detects whether the optional card communicates with the inverter normally in the running state. The detection time is determined by [G6-04].

<b>G6-04</b>	bUS (optional communication failure) checkout time	Range: 0~10s	Factory Default: 0s
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If the communication between the optional card and the inverter is not normal, the inverter will generate an optional card communication fault. The fault code depends on the type of the optional card. If the optional card is a CANOPEN card, the fault code is A08. If the purchase card is a PROFIBUS-DP card, the fault code is A09. When [G6-04=0], the optional card failure detection is invalid.

<b>G6-05</b>	PROFIBUS-DP version	Range: -	Factory Default: -
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Only for Profibus-DP expansion cards, it will valid after inserting a Profibus-DP card into the expansion card A interface or the expansion card B interface.

<b>G6-06</b>	PROFIBUS-DP Control word: AND	Range: 0~65535	Factory Default: 65535
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After the PZD1 control word is bit-operated with this parameter, the result is stored in the upper-level buffer of [G6-07], and then Operation with [G6-07], and finally stored in the inverter. For example, the PZD1 control word has a hexadecimal value of 0x47F. When the value of this parameter is 50 (hexadecimal is 0x32), the result of the two is 0x72, and 0x72 will be stored in the upper level cache of [G6-07].

Only for Profibus-DP expansion cards, it will valid after inserting a Profibus-DP card into the expansion card A interface or the expansion card B interface. When [G6-07] is modified, it will only take effect the next time the inverter is powered on. On STEP7 or blog, ControlWord Format must be selected as 1 or 2 or 3. For details, please refer to the EN700 Communication Expansion Card manual.

<b>G6-07</b>	PROFIBUS-DP control word: Or	Range: 0~65535	Factory Default: 0
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[G6-07] The upper level cache data is Ored with this parameter, and the operation result is stored in the inverter. The operation result is the final control word for controlling the inverter operation. For example, the [G6-07] upper level cache data is 0x72 in hexadecimal format. When the value of this parameter is 1166 (Hexadecimal is 0x48E), the result of the phase is 0x4FE, and 0x4FE is the final control word.

Only for Profibus-DP expansion cards, it will valid after inserting a Profibus-DP card into the expansion card A interface or the expansion card B interface. When [G6-07] is modified, it will only take effect the next time the inverter is powered on. On STEP7 or blog, ControlWord Format must be selected as 1 or 2 or 3. For details, please refer to the EN700 Communication Expansion Card manual.

<b>G6-08</b>	PROFIBUS-DP status word: With	Range: 0~65535	Factory Default: 65535
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After the PZD1 status word is bit-operated with this parameter, the result is stored in the upper level cache of [G6-09], and then Ored with [G6-09], and finally returned to the PLC. For example, the PZD1 status hexadecimal value is 0x1370. When the value of this parameter is 50 (hexadecimal is 0x32), the result of the two is 0x30, and 0x30 will be stored in the upper level cache of [G6-09].

Only for Profibus-DP expansion cards, it will valid after inserting a Profibus-DP card into the expansion

card a interface or the expansion card B interface. When **[G6-08]** is modified, it will only take effect the next time the inverter is powered on. On STEP7 or blog, ControlWord Format must be selected as 1 or 2 or 3. For details, please refer to the EN700 Communication Expansion Card manual.

<b>G6-09</b>	PROFIBUS-DP status word: Or	Range: 0~65535	Factory Default: 0
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**[G6-09]** After the upper level cache data is bitwise ORed with this parameter, The result is returned to the PLC. For example, the **[G6-09]** upper level cache data has a hexadecimal value of 0x30. When the value of this parameter is 4983 (hexadecimal is 0x1377), The result of the two is 0x1377, and 0x1377 will eventually return to the PLC.

Only for Profibus-DP expansion cards, valid after inserting a Profibus-DP card into the expansion card A interface or the expansion card B interface. When **[G6-09]** is modified, it will only take effect the next time the inverter is powered on. On STEP7 or blog, ControlWord Format must be selected as 1 or 2 or 3. For details, please refer to the EN700 Communication Expansion Card manual.

<b>G6-10</b>	Write PZD1 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-11</b>	Write PZD2 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-12</b>	Write PZD3 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-13</b>	Write PZD4 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-14</b>	Write PZD5 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-15</b>	Write PZD6 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-16</b>	Write PZD7 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-17</b>	Write PZD8 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-18</b>	Write PZD9 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-19</b>	Write PZD10 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%

Write the values of PZD1~PZD10 and **[G6-10]~[G6-19]** corresponding scale factors and store them in the inverter. **[G6-31]** is used to set the sign bit of PZD1~PZD10. The corresponding bit is 1, he value takes a negative value, Otherwise it is a positive value. (According to the computer principle, the number of symbols in the PLC is stored in the complement form. For example, the 16-bit signed number - 10 is stored internally as 65526.65526. The symbol in PZD is determined by **[G6-31]**. Bit is 1, then PZD = -10, otherwise PZD = 65526) For example, the values of writing PZD1~PZD10 are 5000, -4000, 3000, -2000, 1000, -1000, -2000, -3000, -4000, -5000 Then, **[G6-31]** needs to set the hexadecimal value to 0x3EA (binary value is 1111101010, decimal is 1002), and the values of **[G6-10]~[G6-19]** are 300.0%, 200.0%, 100.0%, 100.0%, respectively. , 50.0%, 10.0%, 10.0%, 50.0%, 100.0%, 200.0%, 300.0%; write the inverter results are 15000, -8000, 3000, -1000, 100, -100, -1000, -3000, -8000, -15000.

Only for Profibus-DP expansion cards, It will valid after inserting a Profibus-DP card into the expansion card A interface or the expansion card B interface. **[G6-10]** is not used in the general Profibus expansion card program and is reserved for Profibus development. When **[G6-10]~[G6-19]** is modified, it will only take effect when the inverter is powered on next time.

<b>G6-20</b>	Read PZD1 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-21</b>	Read PZD2 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-22</b>	Read PZD3 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-23</b>	Read PZD4 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-24</b>	Read PZD5 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-25</b>	Read PZD6 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-26</b>	Read PZD7 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-27</b>	Read PZD8 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-28</b>	Read PZD9 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%
<b>G6-29</b>	Read PZD10 scale factor	Range: 0.1%~6553.5%	Factory Default: 100.0%

Read the values of PZD1~PZD10 and **[G6-20]~[G6-29]** corresponding scale factors and return them to

PLC. **[G6-32]** is used to set the sign bit of PZD1~PZD10. When the corresponding bit is 1, the value takes a negative value, otherwise it is a positive value. (According to the computer principle, the number of symbols inside the inverter is stored in the complement form. For example, the 16-bit signed number -10 is stored internally as 65526. The symbol of 65526 in PZD is determined by **[G6-32]**. When the corresponding bit is 1, then PZD=-10, otherwise PZD=65526) For example, the values of reading PZD1~PZD10 are 5000, -4000, 3000, -2000, 1000, -1000, -2000, -3000, -4000, respectively., -5000, then **[G6-32]** need to set the hexadecimal value to 0x3EA (binary value is 111101010, decimal is 1002), the values of **[G6-20]** ~ **[G6-29]** are 300.0%, 200.0% respectively 100.0%, 50.0%, 10.0%, 10.0%, 50.0%, 100.0%, 200.0%, 300.0%; the results returned to the PLC are 15000, -8000, 3000, -1000, 100, -100, -1000, -3000, -8000, -15000.

Only for Profibus-DP expansion cards, it will valid after inserting a Profibus-DP card into the expansion card A interface or the expansion card B interface. **[G6-20]** is not used in the general Profibus expansion card program and is reserved for Profibus development. When **[G6-20]**-**[G6-29]** is modified, it will only take effect when the inverter is powered on next time.

<b>G6-30</b>	PROFIBUS-DP Node address	Range : 1~247	Factory Default : 1
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Only for PROFIBUS-DP communication cards. When **[G6-30]** is modified, It will only take effect the next time the inverter is powered on. For details, please refer to the PROFIBUS-DP manual.

<b>G6-31</b>	Write PZD symbol settings	Range: 0~1023	Factory Default: 0
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**[G6-31]** is used to set the sign bit of PZD1~PZD10. When the corresponding bit is 1, The value takes a negative value, Otherwise it is positive.

<b>G6-32</b>	Read PZD symbol settings	Range: 0~1023	Factory Default: 0
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**[G6-32]** is used to set the sign bit of PZD1~PZD10. When the corresponding bit is 1, the value takes a negative value, otherwise it is a positive value.

<b>G6-33</b>	DeviceNet Site	Range: 0~63	Factory Default: 0
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Only for DeviceNet communication cards. When **[G6-33]** is modified, It will only take effect the next time the inverter is powered on.

<b>G6-34</b>	DeviceNet Baud rate	Range: 0~2	Factory Default: 0
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0: 500K

1: 250K

2: 125K

Only for Device Net communication cards. When **[G6-34]** is modified, It will only take effect the next time the inverter is powered on.

<b>G6-35</b>	CANopen Node address	Range: 1~247	Factory Default: 1
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Only for CAN OPEN communication cards. When **[G6-35]** is modified, It will only be valid when the inverter is powered on next time. For more details, Please refer to the CANOPEN manual.

<b>G6-36</b>	CAN open Communication speed	Range: 0~7	Factory Default: 3
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0: 1M.

1: 800K.

2: 500K.

3: 250K.

4: 125K.

5: 100K.

6: 50K.

7: 20K.

The baud rate of the master station must be the same as the baud rate set by **[G6-36]**, Otherwise the communication between the CANOPEN card and the master station will generate an abnormality. For more

details, Please refer to the CANOPEN manual.

<b>G6-37</b>	DeviceNet IO input length	Range: 0~16	Factory Default: 0
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Only for Device Net communication cards. When [**G6-37**] is modified, It will only be valid when the inverter is powered on next time. For details, please refer to the DeviceNet manual.

<b>G6-38</b>	DeviceNet IO Output length	Range: 0~16	Factory Default: 0
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Only for device net communication card. When [**G6-38**] is modified, it will only be valid when the inverter is powered on next time. For details, please refer to the DeviceNet manual.

<b>G6-39</b>	DeviceNet IO Input address area 1	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-40</b>	DeviceNet IO Input address area 2	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-41</b>	DeviceNet IO Input address area 3	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-42</b>	DeviceNet IO Input address area 4	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-43</b>	DeviceNet IO Input address area 5	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-44</b>	DeviceNet IO Input address area 6	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-45</b>	DeviceNet IO Input address area 7	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-46</b>	DeviceNet IO Input address area 8	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-47</b>	DeviceNet IO Input address area 9	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-48</b>	DeviceNet IO Input address area 10	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-49</b>	DeviceNet IO Input address area 11	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-50</b>	DeviceNet IO Input address area 12	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-51</b>	DeviceNet IO Input address area 13	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-52</b>	DeviceNet IO Input address area 14	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-53</b>	DeviceNet IO Input address area 15	Range: 0x3000~0x301 or 0x0B01~0x0B92	Factory Default: 0
<b>G6-54</b>	DeviceNet IO Input address area 16	Range: 0x3000~0x3012 or 0x0B01~0x0B92	Factory Default: 0

Only for device Net communication cards. When [**G6-39**]~[**G6-54**] is modified, It will only be valid when the inverter is powered on next time. For details, Please refer to the DeviceNet manual.

<b>G6-55</b>	DeviceNet IO Output address area 1	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-56</b>	DeviceNet IO Output address area 2	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-57</b>	DeviceNet IO Output address area 3	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-58</b>	DeviceNet IO Output address area 4	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-59</b>	DeviceNet IO Output address area 5	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-60</b>	DeviceNet IO Output address area 6	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-61</b>	DeviceNet IO Output address area 7	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-62</b>	DeviceNet IO Output address area 8	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-63</b>	DeviceNet IO Output address area 9	Range: 0x3000~0x3012	Factory Default: 0

<b>G6-64</b>	DeviceNet IO Output address area 10	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-65</b>	DeviceNet IO Output address area 11	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-66</b>	DeviceNet IO Output address area 12	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-67</b>	DeviceNet IO Output address area 13	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-68</b>	DeviceNet IO Output address area 14	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-69</b>	DeviceNet IO Output address area 15	Range: 0x3000~0x3012	Factory Default: 0
<b>G6-70</b>	DeviceNet IO Output address area 16	Range: 0x3000~0x3012	Factory Default: 0

Only for device Net communication cards. When [G6-55] ~ [G6-70] is modified, It will only be valid when the inverter is powered on next time. For details, please refer to the DeviceNet manual.

## 6.8 H: Terminal function selection

### 6.8.1 H1: Multi-function contact input terminal

<b>H1-01</b>	Multi-function input terminal positive and negative logic setting	Range: 0000~0FFFH	Factory Default: 0000
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Thousands digit	Hundreds digit	Tens digit	Units digit	
				BIT0: The positive and negative logic definition of X1 BIT1: The positive and negative logic definition of X2 BIT2: The positive and negative logic definition of X3 BIT3: The positive and negative logic definition of X4
				BIT0: The positive and negative logic definition of X5 BIT1: The positive and negative logic definition of X6 BIT2: The positive and negative logic definition of X7 BIT3: The positive and negative logic definition of X8
				BIT0: The positive and negative logic definition of X9 BIT1: The positive and negative logic definition of X10 BIT2: The positive and negative logic definition of X11 BIT3: The positive and negative logic definition of X12
				BIT0~BIT4:Reserved

The setting of this parameter is to convert to binary setting. The relationship between binary and hexadecimal is shown in Table 6-6.

**Table 6-6 Correspondence between binary settings and bit display values**

Binary setting				Hexadecimal (Bit display value)
BIT3	BIT2	BIT1	BIT0	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	A
1	0	1	1	B
1	1	0	0	C

1	1	0	1	D
1	1	1	0	E
1	1	1	1	F

The bit display value refers to the Units digit, tens digit, and hundreds digit displayed on the operation panel.

The [H1-01] parameter defines the effective logic state of the Xi input terminal:

Positive logic: The Xi terminal and the corresponding common terminal are closed, and the disconnection is invalid;

When BIT bit selects 0, It means positive logic; Select 1 means inverse logic. Proper setting of this parameter allows the correct logic input to be achieved without changing the terminal wiring.

<b>H1-02</b>	X1 Terminal function selection	Range: 0~99	Factory Default: 4
<b>H1-03</b>	X2 Terminal function selection	Range: 0~99	Factory Default: 5
<b>H1-04</b>	X3 Terminal function selection	Range: 0~99	Factory Default: 42
<b>H1-05</b>	X4 Terminal function selection	Range: 0~99	Factory Default: 35
<b>H1-06</b>	X5 Terminal function selection	Range: 0~99	Factory Default: 8
<b>H1-07</b>	X6 Terminal function selection	Range: 0~99	Factory Default: 9
<b>H1-08</b>	X7 Terminal function selection	Range: 0~99	Factory Default: 12
<b>H1-09</b>	X8 Terminal function selection	Range: 0~99	Factory Default: 21
<b>H1-10</b>	X9 Terminal function selection	Range: 0~99	Factory Default: 0
<b>H1-11</b>	X10 Terminal function selection	Range: 0~99	Factory Default: 0
<b>H1-12</b>	X11 Terminal function selection	Range: 0~99	Factory Default: 0
<b>H1-13</b>	X12 Terminal function selection	Range: 0~99	Factory Default: 0

The multi-function input terminals X1~X12 provide users with a variety of options, which can be selected according to the needs of the site. See parameter function table 6-7 for details.

**Table 6-7 Multi-function input function selection table**

Set value	Corresponding function	Set value	Corresponding function
0	Direct mode	33	PID Control cancellation
1	Three-wire system	34	PID Input characteristic switching
2	LOCAL/REMOTE select	35	Fault reset
3	Command instruction switching instruction	36	emergency stop
4	Forward run command (2-wire system)	37	Motor switching command (Motor 2 selection)
5	Reverse run command (2-wire system)	38	Timing function input
6	Running command (2-wire system 2)	39	Reserved
7	Forward/reverse command 2 (2-wire system control 2)	40	External fault signal 1 (Detected when it is always open, alarmed and stopped according to the stop mode)
8	Multi-speed selection command 1	41	External fault signal 2 (Detected during normal operation, alarm and stopped according to stop mode)
9	Multi-speed selection command 2	42	External fault signal 3 (Detected when it is always open, fault and free stop)
10	Multi-speed selection command 3	43	External fault signal 4 (Checked out during normal open operation, fault and free stop)
11	Multi-speed selection command 4	44	External fault signal 5 (Detected when it is always open, alarm and emergency stop)
12	Jog (JOG) frequency selection	45	External fault signal 6 (Normally detected in normal operation, alarm and emergency stop)
13	UP command	46	External fault signal 7 (Detected when it is always open, alarmed and continues to run)
14	DOWN command	47	External fault signal 8 (Checked out during normal

			operation, alarm and continue to run)
15	Reserved	48	Offset frequency 1 stacking
16	Reserved	49	Bias frequency 2 stacking
17	FJOG command	50	Offset frequency 3 stacking
18	RJOG command	51	DC braking command
19	Acceleration time selection 1	52	Pre-excitation command
20	Acceleration time selection 2	53	Reserved
21	Base blockade command	54	Reserved
22	Speed/frequency retention	55	Reserved
23	S-character acceleration and deceleration prohibited	56	Drive Enable
24	Reserved	57	Speed/torque control switching
25	Droop control does not work	58	Polarity reversal command of external torque command
26	Inverter overheat warning	59	Reserved
27	Multi-function analog input selection	60	Reserved
28	Analog frequency command sampling/holding	61	Multi-section closed-loop terminal 1
29	Speed Control (ASR) Proportional Gain Switching	62	Multi-section closed-loop terminal 2
30	PID Control pause	63	Multi-section closed-loop terminal 3
31	PID parameter switching	64~99	reserved
32	PID Integral retention	-	-

**0: Direct mode**

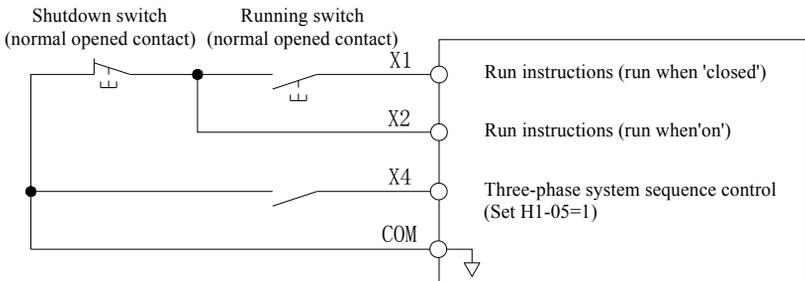
Unused terminal can be set to pass-through mode

Pass-through mode is temporarily reserved as a contact input function for other function blocks

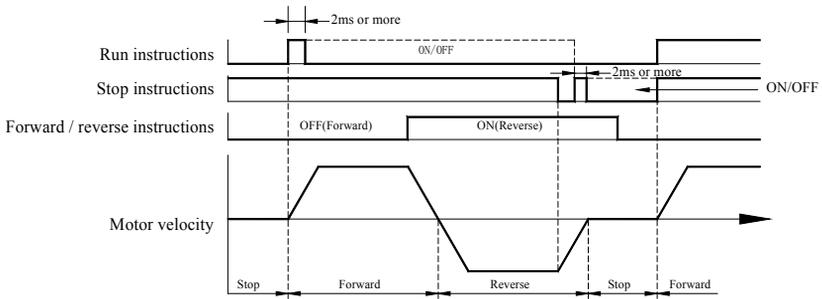
**1: Three-wire system**

When the multi-function contact input terminal other than the terminals X1 and X2 is set to the 3-wire system sequence control, This terminal becomes the input terminal of the Forward/Reverse rotation command. Terminals X1 and X2 are automatically assigned to the run command (RUN) and the stop command (STOP), respectively.

If the terminal X1 (run command) input is closed for more than 2ms, The inverter drives the motor to run. When the input of terminal X2 (stop command) is off, The inverter stops working immediately. When the input terminal set to the 3-wire system is turned off, the inverter performs forward rotation and reverses when it is in the closed state.



**Fig.6-31 3 Wire connection sequence example**



**Fig.6-32 Timing diagram of line system sequence control**

When entering the run command, Please close it for more than 2ms.

When the power is turned ON/OFF, since [b1-16] (Operation selection at power ON/OFF) is set to 0 (Operation prohibited), The protection function is activated if the power is turned ON. In this case, If you need to start normally, set [b1-16] to 1 (allow operation).

Safety measures when the machine is restarted;

(1) Please correctly wire the run/stop circuit and the safety circuit and confirm that the machine is in a normal state after the inverter is energized. If the wiring is wrong, it may cause a personal accident due to a sudden start of the machine. When the 3-wire system is set, the inverter may start due to the instantaneous closing of the control circuit terminals.

(2) When the inverter is operated with the power ON/OFF, if the parameter is kept at the initial setting (2-wire system sequence control), if the 3-wire system is connected, the motor will be reversed while the power is turned ON. In order to avoid this, the power can be disabled by turning on the motor by [b1-16] (operation selection at power ON/OFF). If [b1-16] is set to 1 (permitted), operation by power ON/OFF is allowed.

## 2: LOCAL/REMOTE selection

The inverter's operating mode (LOCAL/REMOTE) is switched by the ON/OFF of the input terminals.

When the LOCAL/REMOTE selection is set from the multi-function button contact input terminal, The LOC/REM button on the operation keypad is valid.

When LOCAL is selected, The keyboard displays "Command / L"

LOCAL/REMOTE switching is not possible during the run command input. For the operation method after switching from LOCAL to REMOTE, refer to "[b1-13] Operation selection after switching the operation command".

## 3: Command instruction switching instruction

The command input position of the inverter is switched by Opening/Closing the input terminal. The valid run command and frequency command are selected by parameters as shown below. In the process of running the command input, The command right cannot be switched.

Command right switching instruction input status	Content
Open	b1-02(Speed command input location selection 1), b1-03(Run command input location selection 1)
Close	b1-10(Speed command input location selection 2), b1-11(Run command input location selection 1)

## 4/5: Forward/reverse run command (Line control) .

☆ When the input terminal is set to 4, The input terminal is rotated forward when it is closed, and the motor is stopped when it is disconnected. If set to 5, The input terminal is reversed when it is closed, and the motor is stopped when it is disconnected. When both input terminals are closed, operation will stop.

☆ This function cannot be used with set values 6 and 7 at the same time.

☆ These functions are assigned to the X1 and X2 terminals when the drive is initialized to a 2-wire sequence.

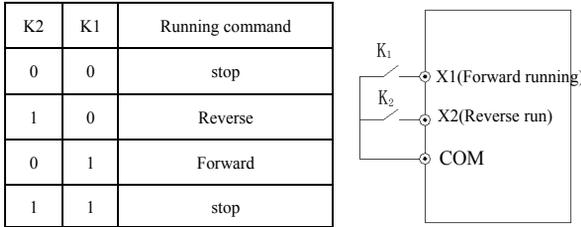


Fig.6-33

**6: Running command (2-wire system 2).**

**7: Forward/Reverse command (2-wire system control 2).**

When the input terminal is set to 6, The input terminal is operated in the selected direction when it is closed, and is stopped when it is off. In addition, The set value 7 is used to select the direction of rotation. The input terminal K2 is reversed when it is closed, And it is rotated forward when it is disconnected.

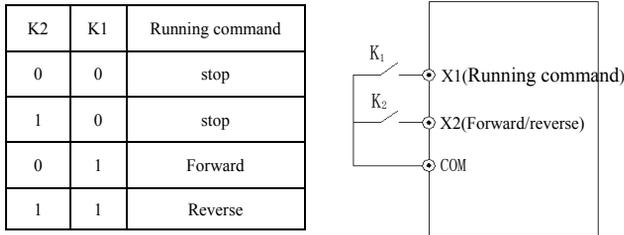


Fig.6-34

**8~11: Multi-speed selection command 1~4.**

Up to 15 speeds can be set by selecting the terminal ON/OFF combination of these functions. The acceleration/deceleration time of each segment of multi-speed is set by C1-01.

**Table 6-8 Multi-speed running selection Table**

K <sub>4</sub>	K <sub>3</sub>	K <sub>2</sub>	K <sub>1</sub>	Frequency setting
OFF	OFF	OFF	OFF	Other operating frequency
OFF	OFF	OFF	ON	Multi-segment frequency 1
OFF	OFF	ON	OFF	Multi-segment frequency 2
OFF	OFF	ON	ON	Multi-segment frequency 3
OFF	ON	OFF	OFF	Multi-segment frequency 4
OFF	ON	OFF	ON	Multi-segment frequency 5
OFF	ON	ON	OFF	Multi-segment frequency 6
OFF	ON	ON	ON	Multi-segment frequency 7
ON	OFF	OFF	OFF	Multi-segment frequency 8
ON	OFF	OFF	ON	Multi-segment frequency 9
ON	OFF	ON	OFF	Multi-segment frequency 10
ON	OFF	ON	ON	Multi-segment frequency 11
ON	ON	OFF	OFF	Multi-segment frequency 12
ON	ON	OFF	ON	Multi-segment frequency 13
ON	ON	ON	OFF	Multi-segment frequency 14
ON	ON	ON	ON	Multi-segment frequency 15

When using multi-speed operation and program operation mode, The above multi-speed frequency [d1-02~d1-16] can be used, And the following multi-speed operation is taken as an example:

The control terminals X1, X2, X3, and X4 are defined as follows:

[H1-02=8], [H1-03=9], [H1-04=10], [H1-05=11] X1, X2, X3, X4 are used to achieve multi-speed operation, as shown in Figure 6- 35 is shown.

I-speed operation, as shown in Fig.6-35 is shown.

In Fig.6-35, The terminal operation command channel is taken as an example, And X5 is set as the forward rotation terminal and X6 is the reverse rotation terminal, And the forward and reverse operation control is performed.

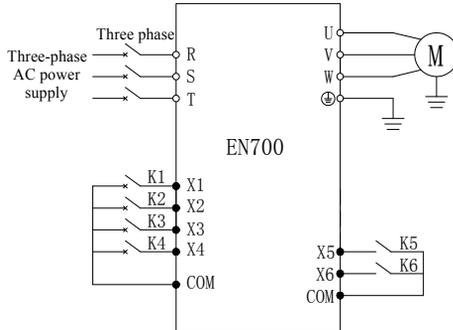


Fig.6-35 Multi-speed operation wiring diagram

### 12: Jog (JOG) frequency selection.

When the input terminal is closed, The preset jog speed set by [d1-17] is effective.

### 13: UP Command

With the UP command and the DOWN command, The inverter frequency command can be increased or decreased with 2 push button switches. In order to use Xi=13 (UP command) and Xi= 14 (DOWN command) in pairs, Be sure to assign two terminals. The frequency command is incremented when the UP command is input, and the frequency command is decreased when the DOWN command is input.

The UP command and the DOWN command take precedence over any of the frequency command from the operation keypad, The frequency command from the analog input terminal, and the frequency command [b1-02=0,1,4] from the pulse sequence input. Therefore, when using the UP command or the DOWN command, Other frequency commands are invalid. The actions for the UP command and the DOWN command state are shown in Table 6-9.

### 14: DOWN

Table 6-9 UP and DOWN command status

Command status		Action
UP command (13)	DOWN command (14)	
off	off	Maintain current frequency command
on	off	Increase frequency command
off	on	Decrease frequency command
on	on	Maintain current frequency command

The UP/DOWN command can only be used to run the contact acceleration and deceleration function when the command channel is the terminal of the control loop in REMOTE mode, and when it is turned on, its priority is higher than other frequency commands.

### 15、16: Reserved.

### 17: FJOG command.

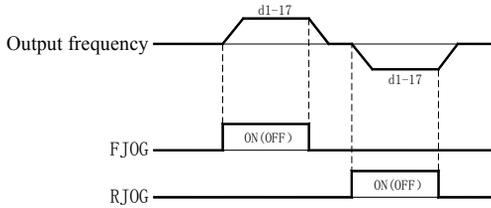
### 18: RJOG command.

FJOG/RJOG command refers to the function of running at the preset point speed. If you use the FJOG/RJOG instruction, You don't need to enter a run command.If the input terminal set in FJOG command is closed, the inverter will carry out forward rotation at the inching speed set in [d1-17].RJOG command are also reversed at the same inching speed set in [d1-17].You can also set only one of the FJOG command or RJOG command.



Note

FJOG/RJOG commands take precedence over other frequency commands. But when [b1-08=2] (inversions forbidden), RJOG command react.It relate to the direction of the inching frequency.



**Fig.6-36 Inching operation curve**

**19、 20: Acceleration and deceleration time: 1、 2.**

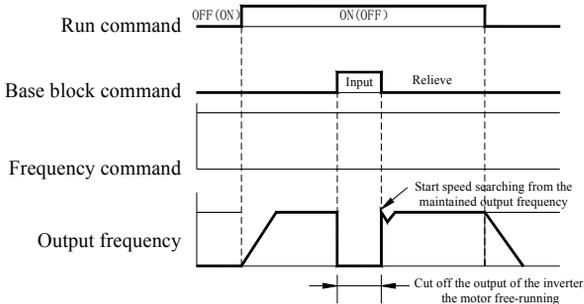
By combining terminals Xi=19 (Acceleration and deceleration time select 1) and Xi=20 (Acceleration and deceleration time select 2), The selection can be made between acceleration and deceleration time 1, 2, 3 and 4. Details are shown in Table 6-10:

**Table 6-10 Acceleration and deceleration time selection table**

Multifunction input terminal		Acceleration and deceleration time selection
Acceleration and deceleration time selection 2(20)	Acceleration and deceleration time selection 1(19)	
0(off)	0(off)	Acceleration deceleration time1
0(off)	1(on)	Acceleration deceleration time2
1(on)	0(off)	Acceleration deceleration time3
1(on)	1(on)	Acceleration deceleration time4

**21: Base block command.**

Input base block command, Immediately cut off the inverter output. At this time, The motor is in free running state, And the operating keyboard shows the fault of E47 (In base block). After the base block command is relieved, If input the operation command, It will restart the operation through speed search (Enable speed search function under VF mode).



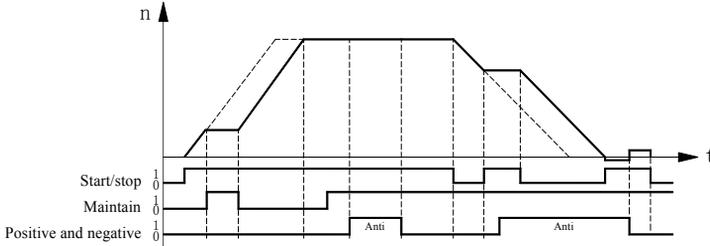
**Fig.6-37**



When using base block command in lifting load, If the output of inverter is cut off due to base block input, Please make sure to set the brake as "closed" state. If the setting and confirmation are not forget, The motor will suddenly become free running when input the base block command, Which may cause a fall or slip accident.

**22: Speed/Frequency maintain.**

If the enable is maintained, The current speed remains the same under operating conditions, Even if there is a reverse instruction input. If input the stop instruction, stop the machine according to the instruction. If the hold instruction is valid, the reverse start will be kept at the minimum speed of reverse. In the same way, the rotation speed is maintained, as shown in Fig.6-38.



**Fig.6-38 Speed maintain**

**23: Forbid S word acceleration and deceleration.**

Function parameters enable S word and operate according to S word, If the terminal enable, then run in a straight line; If S word is forbidden at the present, the S field corresponding to the current moment is cancelled. Even if the terminal is cancelled, The S word of the current segment is not restored. If the terminal is cancelled before the beginning of the next increase and decrease curve, The next monotonic increase and decrease S curve takes effect.

**24: Reserved.**

**25: Droop control no action.**

The droop function refers to [b3 Group] parameters. When the terminal is enabled, the droop function will not be executed even if the droop function set.

**26: Inverter overheat warning.**

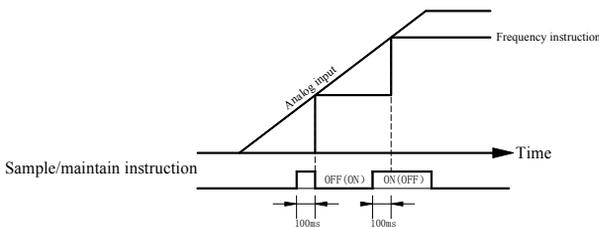
When the input terminal close, The A-26 warning will be displayed and operate as the setting mode of L8-05

**27: Multifunction analog input selection.**

Set the multifunction analog input to select Valid/Invalid. When the set multi-function contact input terminal disconnects, the input to the analog input terminal which selected by [H3-14] will be ignored. To make the analog input terminal which selected by [H3-14] valid, close the input terminal.

**28: Analog frequency instruction Sampling/Maintain.**

Analog frequency instruction Sampling/Maintain function will sample analog frequency instruction input from terminals AI1, AI2, or AI3, and continue to operate while maintaining analog frequency. After the input terminal close for 100ms, Sample and maintain the analog frequency instruction. Then, If the input instruction of Sample/Maintain, The analog frequency instruction is sampled again. See Fig.6-39. After the power cut off, The sampled and maintained analog frequency is deleted, and the frequency command is reset to 0.



**Fig.6-39 Action example**

The Sample/Maintain function of the analog frequency command cannot be set simultaneously with the following functions.

UP instruction, DOWN instruction (Set value: 13, 14)

Offset frequency (Set value: 48~50)

**29: Speed control (ASR) proportional gain switching.**

The speed control proportional gain [C3-01] (High speed) and [C3-02] (Low speed) can be switched by open/close the input terminal. When the input terminal closed, The proportional gain is switched to [C3-02] (low speed). When the input terminal disconnected, The proportional gain is switched to [C3-01] (high-speed). For details of the features, refer to the "C3 Speed control: Automatic Speed Regulator".

**30: PID control pause.**

PID temporary failure, Inverter maintains the current output frequency, no longer run the PID adjustment

of frequency source.

**31: PID parameter switching.**

When the input terminal closed, The integral value of PID control reset to 0 and maintain.

**32: PID integral maintain.**

When the input terminal closed, The integral value controlled by PID will be maintained compulsively. When the input terminal disconnects, The PID control will restart the integral.

**33: PID control cancel.**

When the PID function set to be valid by using [b5-01] (Closed-loop operation control selection), The PID function can be independent and invalid by making the input terminal closed. When the input terminal disconnected, the PID control becomes valid.

**34: PID input feature switching.**

Switch the PID input characteristics (Polarity) by Open/Close the input terminal.

**35: Fault resetting.**

When the inverter detects "Fault", It will make the output of the fault contact "closed", Cut off the output of the inverter and make the motor free-running. But for the fault that can choose stop method, It will stop according to the set stop method. When restarting the inverter, please temporarily cancel the operation instruction and press the reset key of the operating keyboard, or set one of [H1-02~H1-09] to 35 (fault reset) and then close the fault reset signal.

**36: Emergency stop.**

If input an emergency stop instruction during the operation of the inverter, the inverter will slow down and stop at the deceleration time set by [C1-11]. Please refer to "[C1-11] emergency stop time". After input the emergency stop command, the inverter cannot be re-run until it is completely stopped. Even if the emergency stop input relieved, if the operation instruction is not relieved, the inverter will not restart.

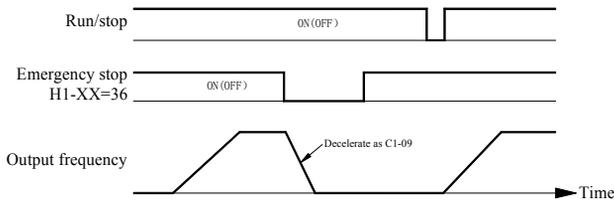


Fig.6-40

**37: Motor switch instruction (Motor 2 selection).**

If the terminal state enabled and select the second motor, But the second motor enable operation must meet two conditions: parameter selection enable and multi-function terminal state enable, both are indispensable.

**38: Timing function input.**

Terminal. Input terminal for timing function.

**39: Reserved.**

**40: External fault signal 1** (If detected during long time normal open, alarm and stop the machine according to the stop mode).

**41: External fault signal 2** (If detected during normal open operation, alarm and stop the machine according to the stop mode).

**42: External fault signal 3** (If detected during long time normal open, Fault and free stop) .

**43: External fault signal 4** (If detected during normal open operation, fault and free stop) .

**44: External fault signal 5** (If detected during long time normal open, alarm and emergency stop) .

**45: External fault signal 6** (If detected during normal open operation, alarm and emergency stop) .

**46: External fault signal 7** (If detected during long time normal open, alarm and continue operating) .

**47: External fault signal 8** (If detected during normal open operation, alarm and continue operating) .

When the peripheral machine connected to the inverter fails, It will make the fault contact output action and stop the inverter. When using the external fault function, Set X1~X12 to function 40~47. If input an external fault, The keyboard operator displays an external fault signal. Select the value which set to Xi from the following 3 conditional combination.

- ✧ Input contact mode for signals from peripheral machines.
- ✧ External fault detection method.

◇ Stop methods.

The relationship between the combination of each condition and set value is shown in Table 6-11.

**Table 6-11 The relationship between the combination of conditions and set value**

Set value	Input contact mode		Detection methods		Stop methods			
	Normally off contact	Normally on contact	Normally detection	Detection only running	Stop as stop mode (alarm)	Free running stop (fault)	Emergency stop (alarm)	Continue running (alarm)
40	○		○		○			
41	○			○	○			
42	○		○			○		
43	○			○		○		
44	○		○				○	
45	○			○			○	
46	○		○					○
47	○			○				○

◇ Please set the mode of input contact for fault detection with signal on or off. (Normally open contact: external fault when closed, normally closed contact: external fault when open).

◇ Please set the method of fault detection in normal or only in operation

◇ When using the emergency stop function of external fault, please change the current stop mode to decelerate stop.

#### 48: Offset frequency 1 iteration.

#### 49: Offset frequency 2 iteration.

#### 50: Offset frequency 3 iteration.

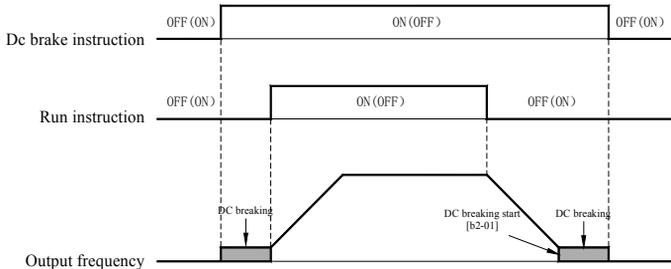
When the input terminals with offset frequency set 1/2/3 iteration are closed, the speed of offset frequency set in [d5-01~d5-03] will be folded to the frequency instruction. Please refer to "[d5-01~d5-03] offset frequency 1 ~ 3" for details.

#### 51: Dc brake command

After this instruction enabled, DC current flows through the motor to apply dc braking. At this time, the current instruction is determined by [b2-02] in vector control, while V/F is determined by DC braking voltage [b2-04]. When the terminal instruction is cancelled, it will stop after the braking time set by [b2-03]. When the instruction and the operation/inching instruction are input at the same time, the operation/inching instruction will take precedence.

If input DC braking instruction when the inverter stops, DC braking can be applied to stop the motor. If input a running or inching instruction, the DC brake will be removed. For details of DC braking instruction setting, refer to "b2 braking and deceleration".

Sequence of DC braking function is shown in Fig.6-41.



**Fig.6-41 Sequence diagram of DC braking**

#### 52: Pre-excitation instruction.

The terminal pre-excitation can only take effect in vector control mode. After the command enabled, the motor will run pre-excitation when the excitation current flows through the motor. It is generally used in cases where pre-excitation is required to speed up the start-up response, especially in the mode without speed sensor, which can improve the speed of response to the running instructions. Pre-excitation operation can be divided into AC and DC. For details, refer to [b1-02]. DC pre-excitation can only be selected in the mode without speed sensor. When the pre-excitation terminal instruction is input simultaneously with the operation/inching/braking instruction, the operation/inching/braking instruction takes precedence.

**53~55: Reserved.**

**56: Drive Enable.**

Before the input terminal closed, the inverter does not accept operation instructions. When the input terminal disconnected, the operator will display "enable signal not enabled". When the run command closed prior to Drive Enable input, the inverter will not run until the run command is released and reentered. When Drive Enable input disconnected during the operation of the inverter, stop as the method set by **[b1-06]** (stop mode selection). Please refer to "**[b1-06]** stop mode selection" for details.

**57: Speed/Torque control switch.**

When **[b1-01]** (operation mode selection) set to 4(speed/torque control contact switch), use this function to switch speed control and torque control, and select torque control when the terminal enabled, refer to **[b1-01]** for details.

**58: Polarity reversal instruction for external torque instruction.**

Switch the rotate direction of the torque instruction by opening/closing the input terminal. Reverse direction when the input terminal closed, positive direction when the input terminal disconnected.

**59, 60: Reserved.**

**61: Multiple closed loop terminals 1.**

**62: Multiple closed loop terminals 2.**

**63: Multiple closed loop terminals 3.**

Through ON/OFF combination of Multistage closed-loop preset terminals, the preset selection of Multistage closed-loop in the table below can be realized.

**Table 6-12 Multistage closed-loop preset selection table**

Multistage closed-loop preset select terminal 3	Multistage closed-loop preset select terminal 2	Multistage closed-loop preset select terminal 1	Multistage closed-loop preset selection
OFF	OFF	OFF	The closed-loop preset determined by <b>[b5-02]</b>
OFF	OFF	ON	Multistage closed-loop preset 1 <b>[b5-24]</b>
OFF	ON	OFF	Multistage closed-loop preset 2 <b>[b5-25]</b>
OFF	ON	ON	Multistage closed-loop preset 3 <b>[b5-26]</b>
ON	OFF	OFF	Multistage closed-loop preset 4 <b>[b5-27]</b>
ON	OFF	ON	Multistage closed-loop preset 5 <b>[b5-28]</b>
ON	ON	OFF	Multistage closed-loop preset 6 <b>[b5-29]</b>
ON	ON	ON	Multistage closed-loop preset 7 <b>[b5-30]</b>

**64~99: Reserved.**

<b>H1-14</b>	Terminal detection debounce time	Range: 0~65535ms	Factory Default: 0ms
--------------	----------------------------------	------------------	----------------------

**[H1-14]** Parameter set the filter time of input terminal detection. When the state of the input terminal changes, If it remains unchanged after the set filtering time, The change in the state of the terminal is considered valid. Otherwise, it still remains in the previous state, thus effectively reducing the malfunction caused by interference. The state monitored by the **[U Group]** monitoring input terminal is the state after this parameter processed. When the terminal is required to be used as a high-speed function, the value of this parameter should be minimized to avoid signal loss.

<b>H1-16</b>	X1 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-17</b>	X1 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-18</b>	X2 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-19</b>	X2 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-20</b>	X3 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-21</b>	X3 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-22</b>	X4 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-23</b>	X4 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-24</b>	X5 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-25</b>	X5 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
<b>H1-26</b>	X6 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s

H1-27	X6 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-28	X7 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-29	X7 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-30	X8 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s </td
H1-31	X8 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-32	X9 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-33	X9 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-34	X10 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-35	X10 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-36	X11 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-37	X11 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-38	X12 terminal ON delay time	Range: 0.0~3000.0s	Factory Default: 0.0s
H1-39	X12 terminal OFF delay time	Range: 0.0~3000.0s	Factory Default: 0.0s

[H1-16~H1-39] parameter defines the delay time of Xi input terminal from close to break or from break to close, To meet the diversity requirements from customers. This parameter has no effect on the monitoring value of the input terminal state. When the field interference is strong, these parameters can also be modified for filtering.

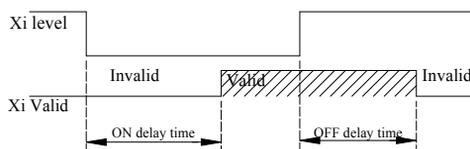


Fig.6-42 Time delay diagram of ON and OFF

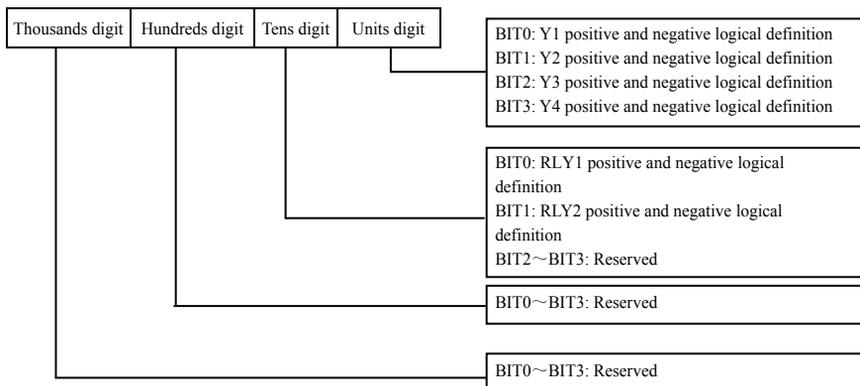
## 6.8.2 H2: Multifunction contact output terminal

H2-01	Multifunction output terminal positive and negative logic setting	Range: 0000~003FH	Factory Default: 0000
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This parameter defines the output logic of multifunction output terminal Y1 ~ Y4 and multifunction relay M1 and M2.

0: Positive logic, The close of output terminal and common terminal is in valid state, While the disconnection is in invalid state.

1: Anti logical, The close of output terminal and common terminal is in invalid state, While the disconnection is in valid state.



The parameter is set as the final conversion to binary setting. The relation between binary and hexadecimal is shown in Table 6-6.

<b>H2-02</b>	RLY1 Function selection (Contact)	Range: 0~99	Factory Default: 11
<b>H2-03</b>	RLY2 Function selection (Contact)	Range: 0~99	Factory Default: 1
<b>H2-04</b>	Terminal Y1 Function selection (Photoelectric coupler)	Range: 0~99	Factory Default: 31
<b>H2-05</b>	Terminal Y2 Function selection (Photoelectric coupler)	Range: 0~99	Factory Default: 32
<b>H2-06</b>	Terminal Y3 Function selection (Open collector)	Range: 0~99	Factory Default: 3
<b>H2-07</b>	Terminal Y4 Function selection (Open collector)	Range: 0~99	Factory Default: 12

The parameter [**H2-02~H2-07**] is used to select the function of the multifunction relay M1~M2 and the multifunction output terminal. Table 6-13 is optional for the above 6 function parameters, allow to reselect the same output terminal function.

**Table 6-13 Multifunction output function selection table**

Set value	Corresponding function	Set value	Corresponding function
0	Direct Mode	30	Reserved
1	Running	31	Zero-speed
2	Running mode(1 is Local)	32	Frequency (speed) consistent 1
3	The inverter is ready for operation	33	Random frequency (speed) consistent 1
4	Drive Enable	34	Frequency (speed) consistent 2
5	Frequency instruction select state(1 is the operator)	35	Random frequency (speed) consistent 2
6	Operation instruction status (1 for the operator)	36	Frequency (FOUT) detected 1
7	Reserved	37	Frequency (FOUT) detected 2
8	Reserved	38	Frequency (FOUT) detected 3
9	Reserved	39	Frequency (FOUT) detected 4
10	Reserved	40	Frequency command lost
11	Fault	41	Torque rich/ lack of torque detected 1
12	Light fault	42	Torque rich/ lack of torque detected 2
13	Fault reset	43	Timing function output
14	Fault retry	44	Reversing
15	Base locked	45	Reserved
16	Uv (Lack-voltage in main loop) check out	46	Motor selection (Motor 2 selecting)
17	Motor overload ol1(including oh3) warning	47	Speed searching
18	Oh (Frequency inverter overheating warning) warning	48	Reserved
19	Reserved	49	Emergency stopping
20	Reserved	50	Reserve
21	Reserved	51	PID Feedback abnormal
22	Reserved	52	PID The amount of feedback error abnormal
23	Reserved	53	Torque limitation (Current limiting)
24	FCL running	54	Reserved
25	Reserved	55	Reserved
26	Reserved	56	Reserved
27	Reserved	57	Frequency outputting
28	Reserved	58~99	Reserved
29	Reserved	-	-

**0: Direct Mode.**

Set the unused output terminal to direct mode and it will no longer work. Direct mode is temporarily retained as the output node function of other function modules.

**1: Running.**

When the inverter outputs voltage, The output terminal closed.

Output state	Content
off	Inverter stop
on	Operation instruction input, inverter deceleration or DC braking

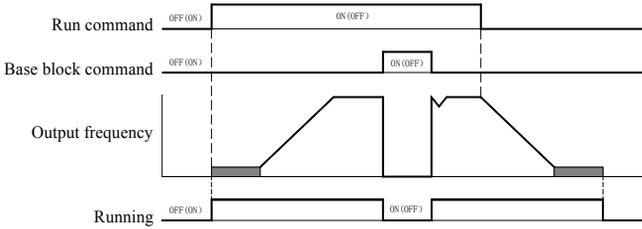


Fig.6-43 Sequence diagram in action

**2: Operation mode (1 for Local).**

LOCAL: output terminal close, REMOTE: off.

Output state	Content
Off	REMOTE: External instructions selected by [b1-02]/[b1-03] or [b1-10]/[b1-11] have the power of operation instruction/frequency instruction
On	LOCAL: The keyboard has the power of operation instruction/frequency instruction

**3: The inverter is ready for operation (READY).**

The output terminal of the signal closed when the inverter is ready to run. As shown below, the output terminal disconnects in the event of a failure occur and when the failure signal is not outputted but the input operation instruction not running, the output terminal will disconnect.

- ✧ When the power cut off;
- ✧ Failure or partial alarm occurs;
- ✧ Bad parameter Settings.

**4: Drive Enable.**

The output reflects the status of the multifunction input terminal "Drive Enable command". When the Drive Enable input terminal closes, the output terminal will close.

**5: Frequency instruction selection state (1 for operator).**

The output signal represents the current selected frequency instruction authority.

Output state	Content
Off	Select the frequency instruction 1 or 2 of the external instruction set by [b1-02] or [b1-10]
On	Select the frequency command of the keyboard

**6: Run instruction status (1 for operator).**

The output signal represents the current selected run instruction authority.

Output state	Content
Off	Select the operation instruction 1 or 2 of the external instruction set by [b1-03] or [b1-11]
On	Select the operation command of the keyboard

**7~10: Reserved.****11: Fault.**

When the inverter fails, The output terminal will closed.

**12: Light fault.**

In light fault, The output terminal will closed.

**13: Fault resetting**

When the user attempts to reset the fault through the control loop terminal and communication, The set output terminal will closed.

**14: Fault retrying.**

If the user enables the fault self-recovery function, The inverter will enter the fault retry state when the fault occurs, Here the set output terminal will closed. After the fault automatically reset with the fault self-recovery function, The output terminal in the fault retry disconnected. In addition, If the fault cannot be reset after exceeding the time of set self-recovery, The output terminal will disconnected after fault detection.

**15: Base locked.**

Output terminal disconnects in base locked. The output transistor of the converter will no longer switch

and output the voltage of the main circuit under the condition of base locked.

Output state	Output state
Off	Base locked
On	Not in base locked

**16: UV (lack-voltage in main loop) check out.**

When the DC voltage of the main loop is lower than the operating voltage of the inverter, the output terminal closed. Under voltage detection value is set by [L2-01]. The output terminal will also closed in the event of an "under voltage" fault in the DC bus of the main loop.

Output state	Output state
Off	The main loop DC voltage is higher than the set value [L2-01]
On	The main loop DC voltage drops to the set value [L2-01]

**17: Motor overload oL1 (Includ oH3) warning.**

When the value of the electronic thermal relay of the motor overload protection function reaches 90% of the detected value, The output terminal will closed. The user can view this value by monitoring parameter [U4-14]. For details, please refer to [L1 Group] Motor Overload Protection Function.

**18: oH (Inverter overheat warning) warning.**

When the module temperature of the inverter reaches the value set by [L8-04], the output terminal will close. For details of inverter overheat detection, please refer to [L8 Group] inverter overheat protection function.

**19~23: Reserved.**

**24: FCL running.**

When the instantaneous current in any phase output by the inverter exceeds the limit value of [L8-01], the FCL function will activate and the output terminal will close; When the current drops, The inverter output will automatically recover and the output terminal will disconnect.

**25~30: Reserved.**

**31: Zero-speed.**

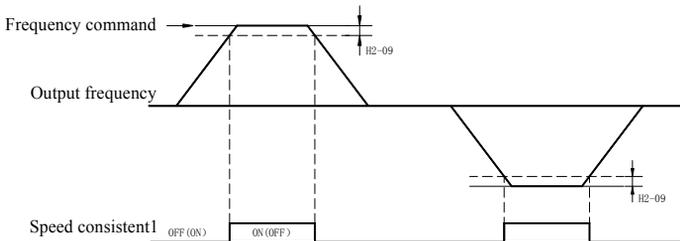
The output frequency is lower than [E2-02] (Motor minimum operating frequency) and the output terminal closed.

Output state	Content
Off	Output frequency is higher than [E2-02] (Motor minimum operating frequency)
On	Output frequency is lower than [E2-02] (Motor minimum operating frequency)

**32: Consistent frequency (Speed) 1.**

Regardless of the rotate direction, The output terminal will close when the output frequency within the range of the frequency command  $\pm[H2-09]$  (Frequency detection amplitude).

Output state	content
Off	Although the inverter is running, the output frequency is inconsistent with the frequency command
Close	The output frequency within the range of frequency instruction $\pm[H2-09]$ (Frequency detection amplitude)



**Fig.6-44 Sequence chart of speed consistent 1**

**33: Random frequency (speed) is consistent 1.**

Regardless of rotate direction, When the output frequency and frequency instruction within the set range of [H2-08] (Frequency detection value)  $\pm[H2-09]$  (Frequency detection amplitude), The set output terminal will close.

Output state	Content
OFF	The output frequency or frequency instruction is outside the range of "[H2-08] (Frequency detection value) ±[H2-09] (frequency detection amplitude)"
ON	The output frequency and frequency instruction are both within the range of "[H2-08] (Frequency detection value) ±[H2-09] (frequency detection amplitude)"

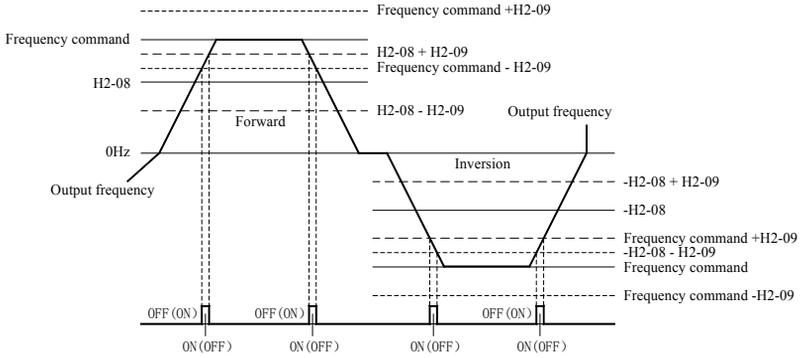


Fig.6-45 Sequence chart of any speed consistent 1

**34: Frequency (speed) is consistent 2.**

Regardless of rotate direction, the output terminal will be closed when the output frequency is within the range of frequency instruction ± [H2-11] (Frequency detection amplitude).

Output state	Content
off	Although the inverter is running, the output frequency is inconsistent with the frequency command
on	The output frequency is within the range of frequency instruction ±[H2-11] (frequency detection amplitude)

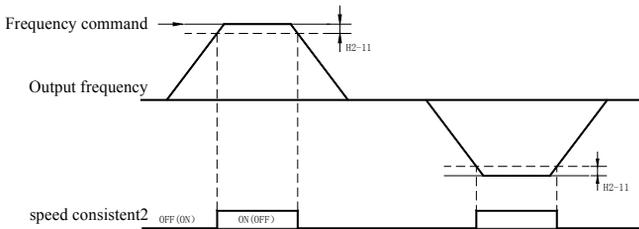
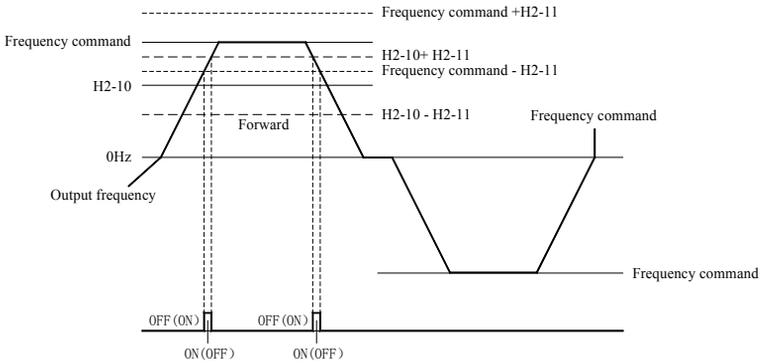


Fig.6-46 sequence chart of speed consistent 2

**35: Random frequency (speed) is consistent 2.**

When the output frequency and frequency instruction are within the set range of [H2-10] (Frequency detection value) ±[H2-11] (Frequency detection amplitude), The set output terminal will be closed. The set value of [H2-10] is a signed value and therefore has a specific checkout direction.

Output state	Content
OFF	The output frequency or frequency instruction is outside the range of "[H2-10] (Frequency detection value) ±[H2-11] (Frequency detection amplitude)"
ON	The output frequency and frequency instruction are both within the range of "[H2-10] (Frequency detection value) ±[H2-11] (Frequency detection amplitude)"

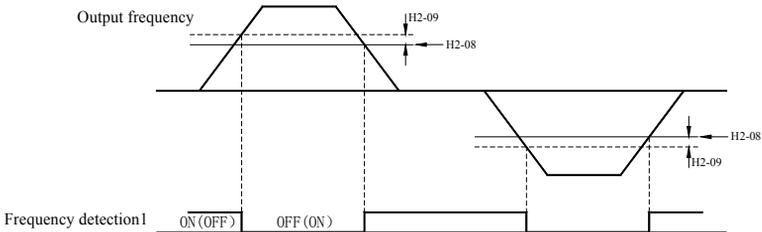


**Fig.6-47 Sequence chart of any speed consistent 2**

**36: Frequency (FOUT) detection 1.**

Regardless of rotation direction, when the output frequency is higher than [H2-08] (Frequency detection value) + [H2-09] (Frequency detection amplitude), The output terminal is disconnected. After the output terminal is disconnected, It will remain disconnected until the output frequency reaches [H2-08].

Output state	Content
Off	Output frequency exceeds "[H2-8] (Frequency detection value) + [H2-9] (Frequency detection amplitude)"
On	Output frequency is lower than "[H2-8] (Frequency detection value)" or not more than "[H2-8] (Frequency detection value) + [H2-9] (Frequency detection amplitude)"

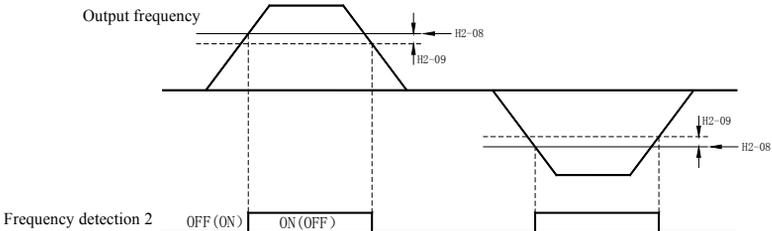


**Fig.6-48 Time sequence diagram of frequency (FOUT) detection 1**

**37: Frequency (FOUT) detection 2.**

When the output frequency is higher than the set value [H2-08] (Frequency detection value) regardless of rotation direction, the output terminal will be closed. After the output terminal is closed, it will remain closed until the output frequency reaches [H2-08] - [H2-09].

Output state	Content
off	Output frequency is lower than "[H2-08] (Frequency detection value) - [H2-09] (Frequency detection amplitude)" or less than "[H2-08] (Frequency detection value)"
on	Output frequency exceeds "[H2-08] (Frequency detected value)"

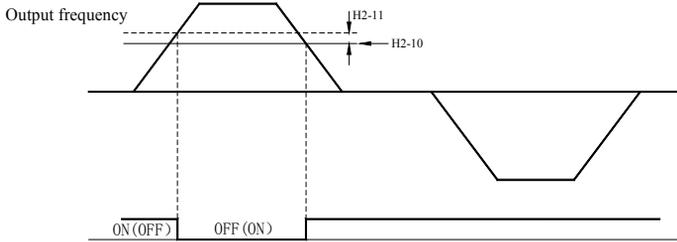


**Fig.6-49 Time sequence diagram of frequency (FOUT) detection 2**

**38: Frequency (FOUT) detection 3.**

When the output frequency is higher than **[H2-10]** (Frequency detection value) + **[H2-11]** (Frequency detection amplitude), the output terminal is disconnected. After the output terminal is disconnected, it will remain disconnected until the output frequency reaches **[H2-10]**. The detection value set by **[H2-10]** is a signed value and therefore has a specific detection direction.

Output state	Content
off	Output frequency exceeds "[H2-10] (Frequency detection value) + [H2-11] (Frequency detection amplitude)"
on	Output frequency is lower than "[H2-10] (Frequency detection value)" or not more than "[H2-10] (Frequency detection value) + [H2-11] (Frequency detection amplitude)"

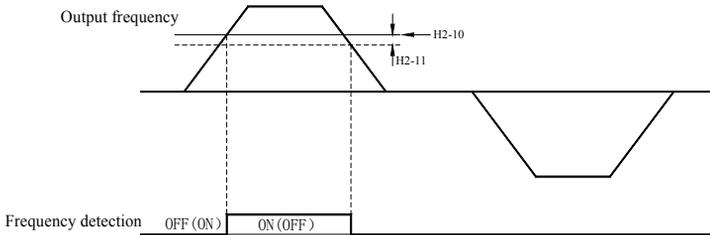


**Fig.6-50 Time sequence diagram of frequency (FOUT) detection 3**

**39: Frequency (FOUT) detection 4**

When the output frequency is higher than the set value of **[H2-10]** (Frequency detection value), The output terminal will be closed. After the output terminal is closed, It will remain closed until the output frequency reaches **[H2-10] - [H2-11]**. The checkout value set by **[H2-10]** is a signed value and therefore has a specific checkout direction.

Output state	Content
OFF	Output frequency is lower than "[H2-10] (Frequency detection value) - [H2-11] (Frequency detection amplitude)" or less than [H2-10] (Frequency detection value)"
ON	Output frequency exceeds "[H2-10] (Frequency detected value)"



**Fig.6-51 Sequence chart of frequency (FOUT) detection 4**

**40: Frequency command lost.**

When frequency instruction lost is detected, The specified output terminal is closed. For details, please refer to the introduction of action selection when the frequency instruction of group L4 is lost.

**41: Over torque/Under torque detection 1.****42: Over torque/Under torque detection 2.**

The over-torque/under-torque detection function is used to output the current torque output state to the external machine. Before using this feature, check out the torque settings and select the output settings from the following table. Please refer to **[H2-13 ~ H2-18]** for details.

Set value	Command state	Content
41	ON	The ON condition of "over-torque/under-torque detection 1" terminal is the time when the output current/torque exceeds the torque value set by H2-14 (Over-torque/under-torque detection 1) ("insufficient state "at H2-13 >4) for H2-15 (Over-torque/under-torque detection time 1).

42	ON	The ON condition of "over-torque/under-torque detection 2" terminal is the time when the output current/torque exceeds the torque value set by H2-17 (Over-torque/under-torque detection 2) ("insufficient state "at h2-16 >4) for h2-18 (Over-torque/under-torque detection time 2).
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**43: Timing function output.**

Use the set output terminal as the output terminal of timing function. When using the timing function, the user should set the delay time of input and output. For details, please refer to the functions of [H1-16~H1-39] and [H2-22~H2-33].

**44: Roll back.**

When the motor rotates in the reverse direction, The output terminal is closed.

Output state	Content
OFF	The motor is running or stopping
ON	The motor rotates in the reverse direction

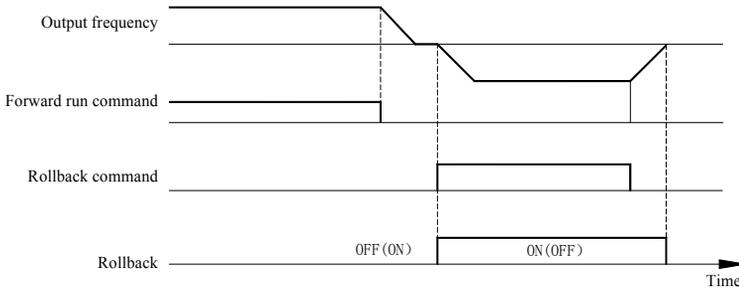


Fig.6-52 Sequence chart of rollback output

**45: Reserved.**

**46: Motor selection (Motor 2 selected).**

The selected state of motor 1 and motor 2 are displayed by OFF/ON the output terminal. Please refer to the function of multi-function input terminal for details of motor switching.

Output state	Content
OFF	Select motor 1
ON	Select motor 2

**47: Speed searching.**

For speed searching, the output terminal is closed.

**48: Reserved.**

**49: Emergency stopping.**

When performing an emergency stop, The output terminal is closed. Please refer to the function of multi-function input terminal for details.

**50: Reserved.**

**51: PID feedback abnormal.**

When the PID feedback is abnormal, the output terminal is closed. If the PID feedback value is lower than the set value [L8-14] and the duration exceeds the set time [L8-15], The PID feedback is considered abnormal.

**52: PID feedback error amount abnormal.**

When the PID feedback error amount is abnormal, The output terminal is closed. If the PID feedback error amount value is higher than the set value [L8-16] and the duration exceeds the set time [L8-17], It is considered that the PID feedback error amount is abnormal.

**53: Torque limiting (Current limit).**

When the torque instruction reaches the torque limit set by the input of [Group C4] parameter or analog value, The output terminal is closed. Please refer to torque limit function for details.

**54~56: Reserved.**

**57: Frequency outputting.**

When frequency inverter outputs frequency, the output terminal is closed.

Output state	Content
OFF	Frequency inverter does not output frequency (Stopping, base blocking, DC braking, pre-excitation)
ON	Inverter output frequency

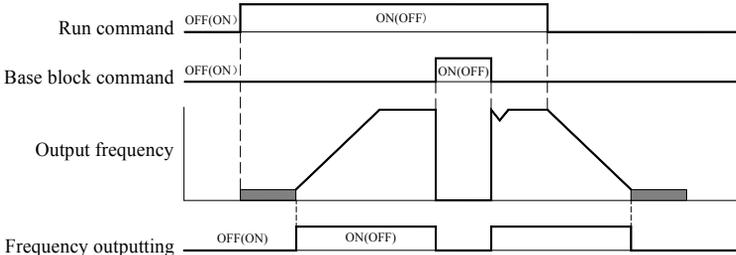


Fig.6-53 Sequence chart of frequency outputting

58~99: Reserved

<b>H2-08</b>	Frequency detection value	Range: 0 ~ maximum speed	Factory Default: 0r/min
<b>H2-09</b>	Frequency detection amplitude	Range: 0 ~ 600r/min	Factory Default: 150r/min

Parameters [H2-08] and [H2-09] are used to set the frequency of Multi-function output terminals to be consistent 1, Random frequency consistent 1, Frequency detection 1 and frequency detection 2 function detection value and detection amplitude. For more information, Please refer to the function of multi-function output terminal.

<b>H2-10</b>	Frequency detection value (± single side checkout)	Range: -maximum speed ~ maximum speed	Factory Default: 0r/min
<b>H2-11</b>	Frequency detection amplitude (± single side checkout)	Range: 0~600r/min	Factory Default: 150r/min

Parameters [H2-10] and [H2-11] are used to set the multi-function output terminal consistent frequency 2, consistent random frequency 2, Frequency detection 3 and frequency detection 4 function for detection value and detection amplitude. For more information, Please refer to the function of multi-function output terminal.

<b>H2-12</b>	Frequency detection condition	Range: 0、1	Factory Default: 0
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**0: No frequency detection during halt.**

**1: Frequency detection is also performed during fault.**

The parameter [H2-12] defines the detection condition of the frequency detection function. It should be used with parameters [H2-08 ~ H2-11].

<b>H2-13</b>	Over-torque/under-torque detection action selection 1	Range: 0~8	Factory Default: 0
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**0: Invalid**

**1: Only detect the over-torque which speed is consistent, and the operation continues after detection (Warning).** Over-torque detection valid only the output frequency is consistent with the frequency command. That is, acceleration and deceleration cannot be detected. After check out, the inverter will display alarm, but can continue to run.

**2: When the over-torque is detected at normal running, It will continue to run (Warning).**

When the operation instruction valid, The over-torque detection valid. After check out, the inverter will display alarm, but can continue to run.

**3: The over-torque is only detected when the speed is consistent, and the output is cut off after detection (Protective action).**

Over-torque detection valid only when the output frequency is consistent with the frequency command. That is, acceleration and deceleration cannot be detected. After check out, The inverter will display fault warning and stop running.

**4: When the over-torque is checked out, the output is cut off (Protective action).**

When the operation instruction valid, The over-torque detection valid at normal running. After check out,

the inverter will display fault warning and stop running.

**5: The under-torque only detect when speed is consistent, And the operation continues after detection (Warning).**

Only when the output frequency is consistent with the frequency command the torque detected is valid. That is, Acceleration and deceleration cannot be detected. After check out, The inverter will display alarm, But can continue to run.

**6: Under-torque is detected in normal operation, And operation continues after detection (Warning).**

When the operation instruction valid, The detection of under-torque valid. After check out, the inverter will display alarm, but can continue to run.

**7: The under-torque only detect when speed is consistent, and the output is cut off after detection (Protective action).**

Only when the output frequency is consistent with the frequency command the torque detected is valid. That is, acceleration and deceleration cannot be detected. After check out, the inverter will display fault warning and stop running.

**8: During normal operation, under-torque is detected and output is cut off after detection (Protective action).**

When the operation instruction valid, the detection of under-torque valid. After check out, the inverter will display fault warning and stop running.

<b>H2-14</b>	Over-torque/under-torque detection value 1	Range: 0~300%	Factory Default: 150%
<b>H2-15</b>	Over-torque/under-torque detection time 1	Range: 0.0~10.0s	Factory Default: 0.1s

Parameters [H2-14] and [H2-15] define the detection value and detection time of over-torque /under-torque detection function 1. For detailed introduction of this function, please refer to the related function introduction of multi-function output terminal.

<b>H2-16</b>	Over-torque/under-torque detection action option 2	Range: 0~8	Factory Default: 0
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**0: Invalid.**

**1: Only the over-torque which speed is consistent is detected, and the operation continues after detection (Warning).**

**2: When the torque is detected in normal operation, it will continue to run (Warning).**

**3: Only the over-torque which speed is consistent is detected, cut off output after check out (Protection action).**

**4: When the over-torque is detected in normal operation, the output is cut off after detection (Protective action).**

**5: Only the under-torque which speed is consistent is detected, and the operation continues after detection (Warning).**

**6: Over-torque is detected in normal operation, and operation continues after detection (Warning).**

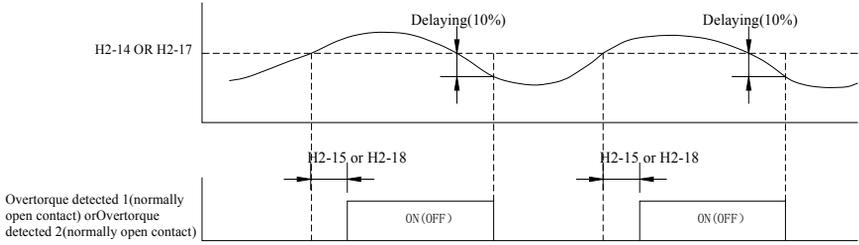
**7: Only the under-torque which speed is consistent is detected, the output is cut off after detection (Protective action).**

**8: Insufficient torque is detected in normal operation, the output is cut off after detection (Protective action).**

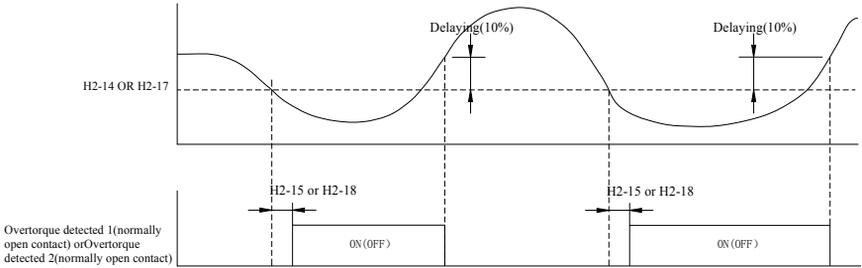
The detection action selection of over-torque/under-torque detection function 2 is the same as that of over-torque/under-torque detection function 1, please refer to parameters [H2-13] for introduction.

<b>H2-17</b>	Over-torque/under-torque detection value 2	Range: 0~300%	Factory Default: 150%
<b>H2-18</b>	Over-torque/under-torque detection time 2	Range: 0.0~10.0s	Factory Default: 0.1s

Parameters [H2-17] and [H2-18] define the detection value and detection time of over-torque/ under-torque detection function 2. For detailed introduction of this function, please refer to the related function introduction of multi-function output terminal.



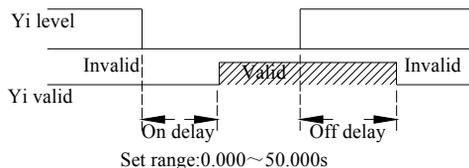
**Fig.6-54 Sequence chart of over-torque detection**



**Fig.6-55 Sequence chart of under-torque detection**

<b>H2-22</b>	H2-02terminal ON delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-23</b>	H2-02terminal OFF delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-24</b>	H2-03terminal ON delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-25</b>	H2-03terminal OFF delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-26</b>	H2-04terminal ON delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-27</b>	H2-04terminal OFF delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-28</b>	H2-05terminal ON delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-29</b>	H2-05terminal OFF delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-30</b>	H2-06terminal ON delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-31</b>	H2-06terminal OFF delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-32</b>	H2-07terminal ON delay time	Range: 0~65535ms	Factory Default: 0ms
<b>H2-33</b>	H2-07terminal OFF delay time	Range: 0~65535ms	Factory Default: 0ms

The parameter [H2-22 ~ H2-33] defines the delay time corresponding to the change of the multi-function output terminal and relay from on or off to the level. Fig.6-56 is the action diagram of the multi-function output terminal. The user can cooperate with the timer function output of multi-function output terminal to realize the internal timer independent of the inverter.



**Fig.6-56 Action diagram of multi-function output terminal**

### 6.8.3 H3: Multifunction analog input terminal

<b>H3-01</b>	Terminal AI1 signal level selection	Range: 0~2	Factory Default: 0
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With this parameter, analog input AI1 can be configured as current input or voltage input type. When selecting different types of current and voltage signals, the dial code switch (SW1, SW2) at the lower left end of the CPU board should be dial to the corresponding position.

- 0: 0~10V.
- 1: -10~10V.
- 2: 0~20mA.



NOTE

Terminal AI1 voltage/current input switching is set by toggle switch SW1.

<b>H3-02</b>	Terminal AI1 Function Selection	Range: 0~99	Factory Default: 0
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**Table 6-14 Multifunction analog input function selection table**

Set value	Corresponding function	Set value	Corresponding function
0	Main speed frequency instruction (multiple terminal repeated Settings)-- for the speed of the first section	11	PID target value
1	gain frequency	12	Reserve
2	Auxiliary frequency instruction 1	13	Reserve
3	Auxiliary frequency instruction 2	14	Motor temperature input (PTC input)
4	Frequency offset (fold to main speed)	15	Positive side torque limit value
5	Reserve	16	Negative torque limit value
6	Reserve	17	Regenerative torque limit value
7	Over-torque/under-torque detected value	18	Torque limit value of positive and negative sides
8	Reserve	19	Reserve
9	Output frequency lower limiting value	20~98	Reserve
10	PID feedback	99	Direct mode

#### 0: Main speed frequency instruction(Multiple terminal repeated Settings)-For the speed of section

1.

In this function, The analog input value of terminal will be overlapped into the analog frequency instruction. It can also be set when terminal input frequency command from only 1 analog quantity.

Either terminal AI1 or AI2 will be delivered at this set point. If terminal AI1 and AI2 are used at the same time, The frequency instruction value is the sum of the two input values.

For example, 20% offset is set in terminal AI2 when the incoming order is 50% from terminal AI1, The frequency command will be 70% of the max output frequency.

##### 1: Gain frequency.

The analog input value of terminal is multiplied by the analog frequency instruction value.

Example: If you want to input an 80% command from terminal AI1 and set an 50% gain from terminal AI2, The command will be 40% of the maximum output frequency.

##### 2: Auxiliary frequency instruction 1.

When multi-stage speed operation is selected, The analog input of terminal is changed to the auxiliary (Section 2 speed) frequency instruction 1. For details, please refer to "setting method of multi-stage speed operation".

##### 3: Auxiliary frequency instruction 2.

When multi-stage speed operation is selected, The analog input of terminal is changed to the auxiliary (section 3 speed) frequency instruction 2. For details, please refer to "setting method of multi-stage speed operation".

##### 4: Frequency offset (Fold to main speed).

The frequency corresponding to the input voltage of the terminal is added to the frequency command as an offset value.

When setting a parameter [H3-06=4] or [H3-10=4], The frequency corresponding to the terminal AI2 or AI3 input voltage is added as the offset to terminal AI1.

##### 5: Reserved.

**6: Reserved.****7: Over-torque/Under-torque detected value.**

Over-torque/Under-torque detection value can be set by input the analog value of terminal. This function is a replacement function of [L1-06] (Over-torque/under-torque detection value 1).When the input is set to 100% (10V, 20mA), The rated torque of the motor is 100%, And the frequency converter is rated current. Please refer to "L1 over-torque/under-torque detection" for details.

**8: Reserved.****9: Output frequency lower limiting value.**

The lower limiting value of output frequency can be adjusted by input of analog value of terminal.

**10: PID feedback.**

PID feedback can be set by input the analog value of terminal. When using this function, set [b5-01] (Closed loop operation control option) to valid. For more information about the features, see "PID features".

**11: PID target value.**

The PID target value can be set by inputting the analog value of terminal. At this time, the instruction set by [b1-02] (speed instruction input site selection 1) is invalid. When using this function, set [b5-01] (closed loop operation control option) to valid. For more information about the features, see "PID features".

**12: Reserved.****13: Reserved.****14: Motor temperature input (PTC input).**

As a supplement or alternative to the inverter motor overload fault detection function, PTC thermistor can be used to protect the motor from heat.

**15/16/17/18: Positive/Negative/Regenerative/Positive and Negative torque limiting value**

The torque limit is set by using the analog value input. If the analog function is enabled, It will be combined with the torque limit parameters of [C4 Group] to determine the real torque limit value in the four quadrants by the minimum value, Please refer to the description of [C4 Group] for details. This value is set as a percentage of the rated torque.

**19: Torque command.**

When 19 (Torque instruction) is selected, Torque instruction can be set through analog quantity input.

**20~98: Reserved.****99: Direct mode.**

When the unused input terminal is set as 99, The signal input to the terminal can be used as the analog input of the upper controller through MEMOBUS or communication purchase card. At this point, Due to the input signal, The inverter does not operate.

<b>H3-03</b>	Terminal A11 input gain	Range: -999.9~999.9%	Factory Default: 100.0%
<b>H3-04</b>	Terminal A11 input offset	Range: -999.9~999.9%	Factory Default: 0.0%

A preset offset of A11 is expressed as a percentage of the maximum input (10V or 20mA) to set the up and down translation of the A11 analog input. Taking voltage input and positive offset as examples, the adjustment relationship before and after preset offset and gain adjustment as follows:

Analog input A11 (After correction) = Input gain [H3-03] × analog input A11 (Before correction) + Preset offset [H3-04] × 10V

In current input, Offset is positive, For example, preset offset and gain adjustment before and after the adjustment relations as follows:

Analog input A11 (adjusted) = Input gain [H3-03] \* Analog input A11 (correction) + Preset offset [H3-04] x 20 mA.

<b>H3-05</b>	Terminal A13 Signal level selection	Range: 0、1	Factory Default: 0
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This parameter allows you to configure the input voltage type that simulates the input of A13.

**0: 0~10V.**

**1: -10~10V.**

<b>H3-06</b>	Terminal A13 Function Selection	Range: 0~99	Factory Default: 2
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Choose terminal A13 function. Please refer to [H3-02] parameter description.

<b>H3-07</b>	TerminalA13 input gain	Range: -999.9~999.9%	Factory Default: 100.0%
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<b>H3-08</b>	Terminal AI3 input offset	Range: -999.9~999.9%	Factory Default: 0.0%
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The preset offset of AI3 is expressed as a percentage of the maximum input (10V), Which is used to set the up and down translation of AI3 simulation input. , with voltage input and positive preset as example, preset offset and gain adjustment before and after the adjustment relations as follows:

Analog input AI3 (adjusted) = Input gain [H3-07] \* analog input AI1 (correction) + a preset offset [H3-08] x 10V

<b>H3-09</b>	Terminal AI2 Signal level selection	Range: 0、 1	Factory Default: 2
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With this parameter, analog input AI1 can be configured as current input or voltage input type. When selecting different types of current and voltage signals, the dial code switch (SW1, SW2) at the lower left end of the CPU board should be dial to the corresponding position.

- 0: 0~10V.
- 1: -10~10V.
- 2: 0~20mA.

Note: The voltage/current switch for terminal AI2 is set by toggle switch SW2.

<b>H3-10</b>	Terminal AI2 function selection	Range: 0~99	Factory Default: 0
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Choose terminal AI2. Please refer to [H3-02] parameter description.

<b>H3-11</b>	Terminal AI2 input gain	Range: -999.9~999.9%	Factory Default: 100.0%
<b>H3-12</b>	Terminal AI2 input offset	Range: -999.9~999.9%	Factory Default: 0.0%

The preset offset of AI2 is expressed as a percentage of the maximum input (10V or 20mA), which is used to set the up and down translation of AI2 simulation input. Taking voltage input and bias as positive examples, the adjustment relationship before and after given bias and gain adjustment as follows:

Analog input AI2 (After correction) = Input gain [H3-11] × analog input AI2 (Before correction) + Preset offset [H3-12] × 10V

In current input, offset is positive, For example, Preset offset and gain adjustment before and after the adjustment relations are as follows:

Analog input AI2 (adjusted) [H3 -11] x = Input gain analog input AI2 (correction) + Preset offset [H3 -12] x 20 mA.

<b>H3-13</b>	Filter time constant of analog input	Range: 0.00~2.00s	Factory Default: 0.03s
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Analog quantity input filtering time to set software filtering time,When the field analog quantity is easy to be interfered, The filtering time can be increased to make the detection value of the analog quantity tend to be stable. However, The larger the filtering time is, the slower the response speed to the detection of the analog quantity. How to set should according to the actual application situation.

<b>H3-14</b>	Analog input terminal valid/invalid selection	Range: 0~7	Factory Default: 7
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When set [H1-XX] (Multi-function contact input terminal) =27 (Multi-function analog input selection), select the analog input terminal that is valid when closed (Invalid when opened).

- 1: Object for terminal AI1.
- 2: Object for terminal AI2.
- 3: Object for terminal AI1、 AI2.
- 4: Object for terminal AI3.
- 5: Object for terminal AI1、 AI3.
- 6: Object for terminal AI2、 AI3.
- 7: Object for al terminal.

#### 6.8.4 H4: Multifunction analog output terminal

<b>H4-01</b>	Terminal AO1monitor selection	Range: U1-01~U6-20 (The monitored value corresponds to the relevant parameters in the monitored group)	Factory Default: U1-02
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Set the number of monitoring items from [U1-01~U6-20], And refer to "U monitoring parameter group"

for the list of monitoring items.

<b>H4-02</b>	Terminal AO1 Monitor gain	Range: 0.0~999.9%	Factory Default: 100.0%
<b>H4-03</b>	Terminal AO1 Monitor offset	Range: -999.9~999.9%	Factory Default: 0.0%

[H4-02] set the gain of terminal AO1 by % and [H4-03] set the offset of terminal AO1 by %. Both [H4-02] and [H4-03] are set with 10V as 100%, and the maximum output voltage is 10V. The following figure illustrates the working principle of gain and offset.

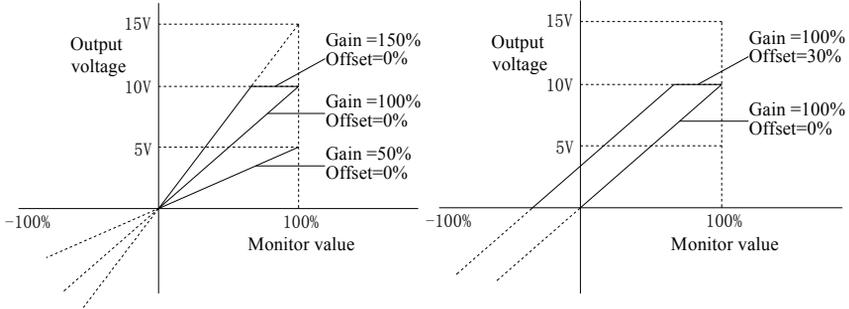


Fig.6-57

<b>H4-04</b>	TerminalAO2 monitor selection	Range: U1-01~U6-20 (The monitored value corresponds to the relevant parameters in the monitored group)	Factory Default: U1-03
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Same as [H4-01].

<b>H4-05</b>	TerminalAO2 Monitor gain	Range: 0.0~999.9%	Factory Default: 50.0%
<b>H4-06</b>	Terminal AO2 monitor offset	Range: -999.9~999.9%	Factory Default: 0.0%

Same as [H4-02]and[H4-03].

## 6.8.5 H5: MODBUS communication terminal

<b>H5-01</b>	Slave station	Range: 0~255	Factory Default: 1
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Parameters are only used in MODBUS RTU mode and ASCII mode. When [H5-01=0], The frequency inverter only receives data frames from the upper computer and executes corresponding instructions. For other addresses, The frequency inverter not only receives data frames from the upper computer, But also returns execution results to the upper computer.

<b>H5-02</b>	Choice of communication speed	Range: 0~6	Factory Default: 3
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- 0: 2400bps.
- 1: 4800bps.
- 2: 9600bps.
- 3: 19200bps.
- 4: 38400bps.
- 5: 57600bps.
- 6: 115200bps.

It is used to set the baud rate of MODBUS RTU mode and ASCII mode. Only when the baud rate of MODBUS master station is the same as that of frequency inverter, Can the frequency inverter receive the data frame of MODBUS master station and return the correct execution result.

<b>H5-03</b>	Communication data format selection	Range: 0~5	Factory Default: 0
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- 0: 1-8-1 Format, No validation, RTU.
- 1: 1-8-1 Format, Even parity check, RTU.
- 2: 1-8-1 Format, Odd parity check, RTU.

**3~5: Reserved.**

When [H5-03=0, 1, 2], MODBUS supports RTU format; When [H5-03=3, 4, 5], MODBUS supports ASCII format. Only when the communication data format of the MODBUS master station is the same as that set by [H5-03], The reliable communication between the MODBUS master and slave can be guaranteed.

<b>H5-04</b>	Action selection when CE (MODBUS communication fault) is detected	Range: 0~4	Factory Default: 2
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When [H5-05=1] and within the time set by [H5-09], If the inverter does not receive valid MODBUS data frame, The inverter will cause MODBUS communication failure with the fault code of A07. If [H5-09=0], The inverter will not cause MODBUS communication failure whether or not the inverter receives valid MODBUS data frame.

**0: No detection.**

No matter whether the inverter has MODBUS communication fault or not, The inverter will keep the original running state.

**1: Warning, Continue to run.**

When MODBUS communication failure occurs, The inverter will generate A07 warning code, But the inverter will continue to run.

**2: Warning, Halt as stop mode.**

When MODBUS communication failure occurs to the frequency inverter, The frequency inverter will generate A07 warning code, And the frequency inverter will halt according to the halt mode [b1-06].

**3: Warning, Emergency stop**

When MODBUS communication failure occurs to the frequency inverter, The frequency inverter will generate A07 warning code. At this time, The frequency inverter will halt according to the halt mode [b1-06]. If it is deceleration halt, it will halt according to the emergency stop time [C1-11].

**4: Failure, Free running stop.**

When MODBUS communication failure occurs to the frequency inverter, The frequency inverter will generate E25 fault code, And the inverter will stop in the way of free halt.

<b>H5-05</b>	CE(MODBUS Communication failure) check out option	Range: 0, 1	Factory Default: 0
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**0: Invalid.****1: Valid.**

When [H5-05 =1], the frequency inverter will detect whether it receives valid MODBUS data frames within the time set by [H5-09]. If the inverter does not receive valid MODBUS data frames within the time set by [H5-09], the inverter will detect MODBUS communication fault.

When [H5-05 =0], the inverter will not detect whether MODBUS communication timeout.

<b>H5-06</b>	Communication waiting time	Range: 5~100ms	Factory Default: 5ms
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After receiving valid data frame and processing by inverter, If [H5-01] is not equal to 0, the inverter will delay the time specified by [H5-06] and return the execution result to the MODBUS main station.

<b>H5-09</b>	CE (MODBUS Communication failure) check out time	Range: 0.0~10.0s	Factory Default: 2.0s
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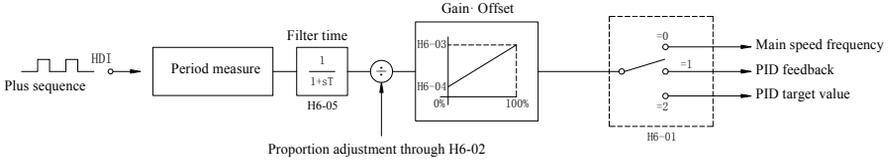
It is used to set MODBUS communication timeout time for inverter detection. When [H5-09 =0], No matter when the inverter receives valid MODBUS data frame, It will not have MODBUS communication fault.

### 6.8.6 H6: Pulse sequence input/output terminal

The maximum 50khz signal can input to terminal HDI. The pulse sequence signal can be used in frequency command, PID function, PID target value as motor speed feedback.

Terminal HDO can output the monitor value of inverter through the maximum 50khz pulse sequence signal. Please use [H6-XX] to set the proportion and function of input terminal HDI and output terminal HDO of impulse sequence.

The input block diagram of the impulse sequence is shown in Fig.6-58:



**Fig.6-58 Block diagram of input pulse sequence**

<b>H6-01</b>	Pulse sequence input function selection	Range: 0~3	Factory Default: 0
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Select the terminal HDI function for the pulse sequence in **[H6-01]**.

**0: Frequency command.**

Frequency instruction power is set when pulse sequence input **[b1-02]** and **[b1-10]**, the frequency inverter will input frequency instruction through HDI terminal according to this setting.

**1: PID feedback value.**

According to this setting, the PID controlled feedback value will be sent to terminal HDI via the pulse.

**2: PID target value.**

According to this setting, the PID controlled target value will be sent to terminal HDI via the pulse.

**3: Reserved.**

<b>H6-02</b>	Pulse sequence input ratio	Range: 100~50000Hz	Factory Default: 1440Hz
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Set the frequency of 100% in Hz.

<b>H6-03</b>	Pulse sequence input gain	Range: 0.0~1000.0%	Factory Default: 100.0%
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Set the gain which input to terminal HDI.

<b>H6-04</b>	Pulse sequence input offset	Range: -100.0~100.0%	Factory Default: 0.0%
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Set the instruction quantity when the impulse sequence input to terminal HDI is 0.

<b>H6-05</b>	Pulse sequence input filter time	Range: 0.00~2.00s	Factory Default: 0.10s
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The time parameter of a delay filter is set in seconds.

<b>H6-06</b>	Pulse sequence input lowest frequency	Range: 0.1~1000.0Hz	Factory Default: 0.5Hz
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The minimum input frequency of the pulse sequence is set as 0.1Hz.

If the input pulse frequency below the set frequency, it is 0.0 Hz.

Valid at **[H6-01 = 0, 1, 2]**.

<b>H6-07</b>	Pulse sequence monitoring selection	Range: U1-01~U6-20	Factory Default: U1-02
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Select terminal HDO for pulse sequence monitoring output via **[H6-07]**, Refer to “U monitoring parameter group” for details



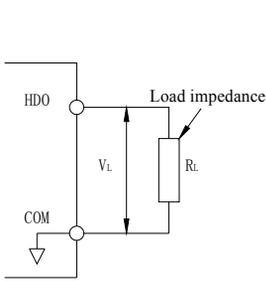
- (1) When using pulse sequence monitoring, connect peripheral devices according to the following load conditions.  
 (2) Different from the following load conditions, may result in performance degradation or mechanical damage.

When used as a common collector output:

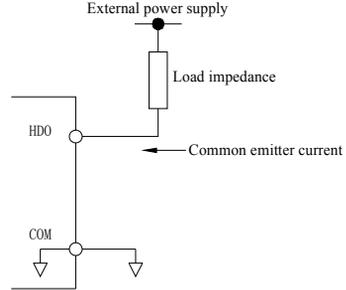
Output voltage (type of insulation) VRL (V <sub>L</sub> )	Load impedance (kΩ)
5V or more	3KΩ or more
8V or more	5.1KΩ or more
10V or more	10KΩ or more

When used as a common emitter input:

<b>External power supply (V)</b>	<b>DC12V±10%, DC15V±10%, DC24V±10%</b>
<b>Common emitter current (mA)</b>	<b>20mA Max</b>



**Fig.6-59 Common Collector Output**



**Fig.6-60 Common emitter input**

<b>H6-08</b>	<b>Pulse sequence monitoring ratio</b>	<b>Range: 100~50000Hz</b>	<b>Factory Default: 1440Hz</b>
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Set the number of pulses to be output at 100% speed. If [H6-07] is set to [U1-02] (Output frequency) and [H6-08] is set to the motor rated frequency, the pulse train will output the same frequency as the inverter output frequency.

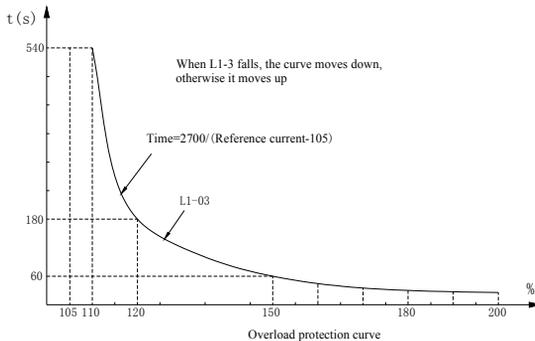
## 6.9 L: Protective function

### 6.9.1 L1: Motor protection

<b>L1-03</b>	<b>Motor overload protection coefficient</b>	<b>Range: 20~110%</b>	<b>Factory Default: 100%</b>
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The motor overload protection factor is used to adjust the motor overload protection curve and adjust the parameters of the motor's overload strength. The ratio of the rated current to the motor is used as the reference current value for the overload protection. When the motor current effective value exceeds 105% of the reference current, it enters the overload state of the motor. At this time, the overload protection counter starts counting, and the motor is overloaded 1.5 times for 1 minute, and the overload protection curve is as shown in Fig.6-61.

The count value of the motor overload protection counter can be observed by operating the keyboard. Compared with the motor over-torque protection counter and the inverter overload protection counter, And the large count is displayed. When the count value shows 100%, the overload protection action occurs and the inverter trips.



**Fig.6-61 Motor overload protection curve**

<b>L1-05</b>	<b>Over torque protection function selection (vector control)</b>	<b>Range: 0,1</b>	<b>Factory Default: 1</b>
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- 0: Invalid.
- 1: Valid.

<b>L1-06</b>	Over torque protection action value setting	Range: 110~400%	Factory Default: 150%
<b>L1-07</b>	Over-torque protection action reference torque	Range: 50~105%	Factory Default: 150%

The [L1-05], [L1-06], and [L1-07] parameters can protect the motor from over-torque. Because the output torque is an indirect estimation value during V/F control mode, The accuracy is not high, it only takes effect in the vector control mode. Effective. The over torque protection function can be selected with [L1-05].

When the motor over-torque protection function is used, If the output torque command exceeds the reference torque set in [L1-07]. It is in the over-torque state and the over-torque counter starts to counting, as shown in Fig.6-62, When the torque command reaches [L1-06]--the set protection value intersects the curve at 60s, the over-torque protection action. The output torque used for calculation in over-torque protection may be an instruction that deducts mechanical loss compensation from the actual torque command. For details, refer to the [b4 Group] parameter.

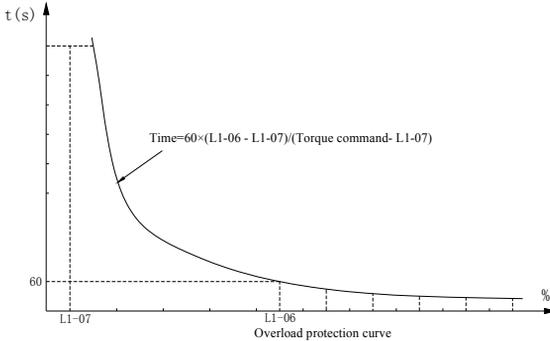


Fig.6-62 Motor over torque protection curve

## 6.9.2 L2: DC voltage control function

<b>L2-01</b>	Main circuit undervoltage detection value	Range: 300.0 ~ 420.0V (380V voltage level)	Factory Default: 400.0V
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Set the detection value of the undervoltage of the main circuit. When the input voltage of the inverter and the voltage of the drive motor change, The undervoltage threshold can be adjusted. If the undervoltage detection value is set lower than the factory value, consider adding an AC reactor to the input power side of the inverter to prevent damage to the internal components of the inverter.

<b>L2-10</b>	Brake tube brake starting voltage	Range: 600.0 ~ 820.0V (380V voltage level)	Factory Default: 750.0V
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Through this parameter, you can set the brake starting voltage of the brake pipe. Do not set the brake voltage higher than the factory value. If you need to pay attention to the pressure resistance of the inverter, consult the manufacturer.

<b>L2-21</b>	Prevent regeneration stall function selection	Range: 0, 1	Factory Default: 0
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0: Not used.

1: Use.

<b>L2-22</b>	Overvoltage suppression starting voltage	Range: 600.0 ~ 820.0V (380V voltage level)	Factory Default: 720.0V
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The anti-regeneration stall function is valid for the full mode. [L2-22] sets the suppression start voltage. If the main circuit voltage is detected to be higher than the suppression start voltage, The main circuit voltage is controlled to be at the suppression voltage to prevent overvoltage protection.

### 6.9.3 L4: Overspeed protection and speed control error

<b>L4-01</b>	Action selection when oS (over speed) occurs	Range: 0~4	Factory Default: 4
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**0: Do not detect.**

**1: Alarm, continue to run.**

**2: Alarm, stop by stop mode.**

**3: Alarm, emergency stop** (If it is deceleration stop, Press C1-11 emergency stop time to decelerate to stop).

**4: Failure, free running stops.**

The parameter [L4-01] defines the inverter operation mode when the overspeed is detected. The user should pay attention to when the [L4-01] is set to 3, The action mode of the inverter is also affected by the stop mode. If it is the deceleration stop mode, it will enter the emergency stop state.

<b>L4-02</b>	Forward side over speed setting	Range: 0~the maximum speed * 1.5	Factory Default: 1900r/min
<b>L4-03</b>	Reverse side over speed setting	Range: - Maximum speed * 1.5 ~ 0	Factory Default: -1900r/min
<b>L4-04</b>	oS (overspeed) checkout time	Range: 0.0~2.0s	Factory Default: 0.5s

The parameters [L4-02~L4-04] define the detection threshold and detection time of the overspeed protection function. Overspeed protection is detected when the motor speed exceeds the set speed of [L4-02], [L4-03] and the duration exceeds the detection time defined by [L4-04]. The motor overspeed protection function distinguishes the direction of motor rotation. The user must correctly set the relevant parameters when using.

<b>L4-05</b>	Speed control error function use selection	Range: 0, 1	Factory Default: 0
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**0: Not used.**

**1: Use.**

<b>L4-06</b>	Speed control error speed amplitude detected on the positive side	Range: 50 ~ 500r / min	Factory Default: 100r/min
<b>L4-07</b>	Speed control error speed amplitude detected on the negative side	Range: -500~-50r/min	Factory Default: -100r/min

The speed control error function can be selected during vector control, And the detection range is set by [L4-06], [L4-07].When this function is used, when the current command speed of the motor deviates from the current feedback speed by more than the detection range, a speed control error occurs and the inverter trips.

<b>L4-08</b>	Action selection when frequency command is lost	Range: 0~2	Factory Default: 0
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<b>L4-08</b>	Action selection when frequency command is lost	Range: 0~2	Factory Default: 0
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**0: Do not detect.**

**1: Alarm, Continue to run.**

**2: Alarm, Run at a reduced speed.**

The inverter can detect the loss signal of the frequency command from AI1, AI2, AI3. When the value of the main speed frequency command input to the inverter suddenly decreases (In the time less than 400 ms, the frequency command is reduced to less than 10% before), it is judged that the frequency command is lost.

The parameter [L4-08] is used to select the action when the detection frequency command is lost. When [L4-08] is set to 2, if the detected frequency command is lost, the inverter displays an alarm and the frequency command operates at the frequency set by [L4-09].

<b>L4-09</b>	Frequency command when frequency command is lost	Range: 0.0~100.0% (Set the frequency command value when the frequency command is lost.)	Factory Default: 80.0%
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The parameter [L4-09] defines the frequency command when the [L4-08] is set to 2 and the frequency command is lost.

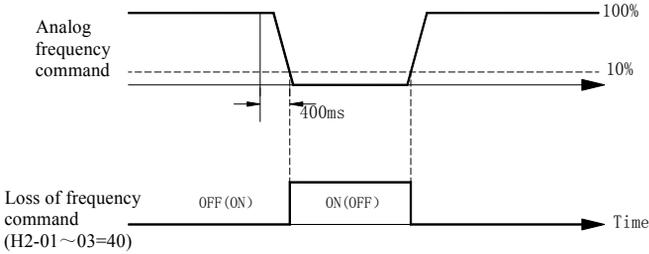


Fig.6-63 Function when the frequency command is lost

## 6.9.4 L5: Fault Management

<b>L5-01</b>	Fault retry times	Range: 0~10	Factory Default: 0
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Self-diagnosis occurs when a fault occurs while the inverter is running. If the cause of the fault has been eliminated and the self-diagnosis ends normally, the inverter will automatically restart by the speed search mode (It needs to be set to the speed tracking start in VF mode), Which is the fault retry function.

The following faults are non-retryable faults.

Error code	Fault name	Error code	Fault name
E08	Main circuit undervoltage	E22	Parameter upload failure
E09	Inverter overload protection	E23	Parameter download failure
E10	Motor overload protection	E26	B communication port failure
E11	Motor underload protection	E27	A communication port failure
E14	Inverter module failure	E34	In-field failure 1
E15	Short circuit to ground during operation	E35	On-site fault 2
E16	Power-on short to ground	E37	Main control board FRAM operation failure
E17	Module overheat protection	E39	PG disconnection failure
E18	Capacitor overheat protection	E43	Speed control error
E20	Self-tuning failure	E50	Motor over torque protection
E21	Current detection current fault	E51	FCL overload fault

The parameter **[L5-01]** defines the number of times the fault is retried. If the fault retry reaches the number of times set by **[L5-01]**, the inverter stops running. Please manually restart the inverter after troubleshooting the cause. The count of the number of failed retries will be reset in the following cases:

- ☆ After the fault is retried, the normal state lasts for 1 minute;
- ☆ The protection work starts, and after the fault is determined, the fault reset signal is input;
- ☆ When the power is turned off and then turned back on.

<b>L5-02</b>	Fault contact action selection during fault retry	Range: 0, 1	Factory Default: 0
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**0: The fault contact is not output during the fault retry.**

**1: Output fault contact in fault retry.**

The parameter **[L5-02]** is used to select the action of the fault signal of the Multi-function output terminal during the fault retry of the inverter.

<b>L5-03</b>	Fault retry interval timing	Range: 0.5~600.0s	Factory Default: 10.0s
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The parameter **[L5-03]** is used to set the time interval for performing a fault retry. This function is valid when **[L5-01]** is greater than 0.

<b>L5-05</b>	Protection action selection 1	Range: Units digit: 0~4 Tens digit: 0~4 Hundreds digit: 0~4	Factory Default: 000
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Units digit: PID given loss detection action

**0: Do not detect.**

**1: Alarm, Continue to run.**

**2: Alarm, Stop by stop mode.**

**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).

**4: Failure, Free running stops.**

Tens digit: PID feedback loss detection action

**0: Do not detect.**

**1: Alarm, Continue to run.**

**2: Alarm, Stop by stop mode.**

**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).

**4: Failure, Free running stops.**

Hundreds digit: PID error amount abnormal detection action

**0: Do not detect.**

**1: Alarm, Continue to run.**

**2: Alarm, Stop by stop mode.**

**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).

**4: Failure, Free running stops.**

This parameter defines the type of action the drive will have with the internal PID controller given loss, feedback loss, and error. The setting is 0 and 1. In the abnormal situation, the inverter does not make any protection action (1 will output an alarm prompt), please set the user to make reasonable settings according to the actual working conditions. The user should pay attention to the fact that when the protection type is set to 3, the operation mode of the inverter is also affected by the stop mode. If it is the deceleration stop mode, it will enter the emergency stop state.

<b>L5-06</b>	Protection action selection 2	Range: Units digit: 0~4 Tens digit: 0~4	Factory Default: 11
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Units digit: Terminal block E<sup>2</sup>PROM operation abnormal detection action

**0: Do not detect.**

**1: Alarm, continue to run.**

**2: Alarm, stop by stop mode.**

**3: Alarm, emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).

**4: Failure, free running stops.**

Tens digit: Main control board FRAM operation abnormal detection action

**0: Do not detect.**

**1: Alarm, Continue to run.**

**2: Alarm, Stop by stop mode.**

**3: Alarm, Emergency stop** (If it is deceleration stop, press C1-11 emergency stop time to decelerate to stop).

**4: Failure, free running stops.**

This parameter defines the action type of the inverter when the internal detection of the inverter is abnormal. The setting is 0 and 1. When the abnormality is detected, the inverter does not perform any protection action (1 will output an alarm prompt), please make reasonable settings according to the actual working conditions. The user should pay attention to the fact that when the protection type is set to 3, the operation mode of the inverter is also affected by the stop mode. If it is the deceleration stop mode, it will enter the emergency stop state.

### 6.9.5 L8: Other protection

<b>L8-01</b>	FCL level adjustment	Range: 80~125%	Factory Default: 100%
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Set the limit current of the fast current limit (FCL) function. When setting 100%, it corresponds to 200% of the rated current of the inverter. Normally, It is set to 100%. This function is valid for all control modes. When the inverter output current is greater than the set limit value, the current limit is controlled by the fast current limit to prevent overcurrent. If the current limit is too long and the specified amplitude is too long, the FCL will be overloaded, and the overload time will be shortened with the output frequency. If the FCL is overloaded due to the continuous current limiting action, The inverter trips to protect the motor and the inverter.

<b>L8-02</b>	Minimum base blockade (bb) time	Range: 0.1~5.0s	Factory Default: 0.1s
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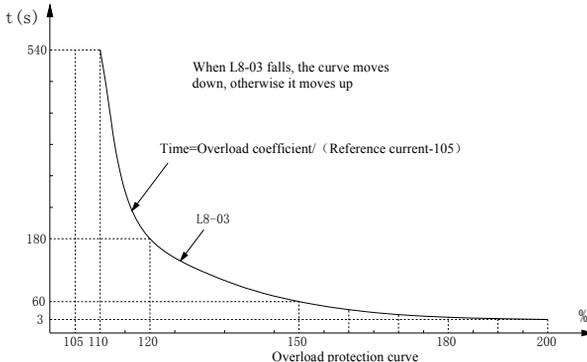
This setting is the duration of the terminal base block function. Set the time when the residual voltage disappears based on the secondary circuit time constant of the motor. If the overcurrent or overvoltage fault occurs during speed search after power failure and DC braking start, increase this value.

<b>L8-03</b>	Inverter overload protection factor	Range: 20~110%	Factory Default: 100%
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The inverter overload protection factor is used to adjust the inverter overload protection curve and adjust the parameters of the inverter's overload strength. The ratio of the rated current to the inverter is used as the reference current value for the overload protection. When the inverter output current effective value exceeds 105% of the reference current, it enters the overload state of the inverter. At this time, the overload protection counter starts counting, the inverter is overloaded 1.5 times for 1 minute, and the overload protection curve is as shown in Fig.6-64.

The count value of the inverter overload protection counter can be observed by operating the keyboard, compared with the motor over-torque protection counter and the motor overload protection counter, and the large count is displayed. When the count value shows 100%, The overload protection action occurs and the inverter trips.

The overload capacity of the inverter under the default carrier is 1.5 times of the rated current of the inverter every 5 minutes, That is, the inverter trips when the overload protection action occurs. At this time, the overload counter counts down, and after a certain time, the count returns to zero, If the counter is zeroed. When the motor is started again before, The rated current of the inverter is maintained at 1.5 times less than 1 minute, And the overload function is repeated.



**Fig.6-64 Inverter overload protection**

<b>L8-04</b>	oH (inverter overheating) warning detection value	Range: 50~130°C (Set the inverter overheat warning)	Factory Default: 80°C
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[L8-04] is used to set the oH (Inverter overheat) warning detection temperature. When the module temperature exceeds the set value, an alarm will be output. When the temperature of the heat sink reaches the inverter overheat fault value, the inverter will display the fault prompt and stop running.

When the temperature of the module exceeds the [L8-04] setting and the user sets the "inverter overheat warning function" of the multi-function output terminal, the terminal will close.

<b>L8-05</b>	oH (inverter overheating) warning action selection	Range: 0~3	Factory Default: 1
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**0: Do not detect.**

**1: Alarm, Continue to run.**

**2: Alarm, Stop by stop mode.**

**3: Alarm, Emergency stop** (If it is deceleration stop, Press C1-11 emergency stop time to decelerate to stop).

**[L8-05]** Set the action when the inverter detects the overheat warning, which is set to 0 and 1. When the overheat warning is detected, the inverter does not make any protection action (1 will output an alarm prompt), please cooperate with the user. The actual working conditions are reasonably set. The user should pay attention to the fact that when the protection type is set to 3, the operation mode of the inverter is also affected by the stop mode. If it is the deceleration stop mode, It will enter the emergency stop state.

<b>L8-07</b>	Input phase loss protection option	Range: 0、1	Factory Default: 1
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**0: Invalid.**

**1: Invalid.**

**[L8-07]** is used to set the input phase loss detection Valid/Invalid. When the input phase loss function is turned on, when the input power source phase loss or three-phase imbalance causes the main circuit capacitor to age, The input phase loss is detected.

<b>L8-08</b>	Output phase loss protection option	Range: 0、1	Factory Default: 0
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**0: Invalid.**

**1: Invalid.**

This output phase loss protection is calculated by software. When the inverter output phase loss protection is enabled, The three-phase output current is zero at V/F mode without reporting the output phase loss. In any case of vector control, any phase If the output current is not zero, the output phase loss will be reported. The output phase loss protection will not be performed during tuning, DC braking, pre-excitation, speed search, and fast current limiting.

<b>L8-10</b>	Cooling fan ON/OFF control selection	Range: 0、1	Factory Default: 0
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**0: ON/OFF Control is active** (Only operates during inverter operation).

The cooling fan operates when a run command is input. The cooling fan is turned off after the operation command is touched and the time set by **[L8-11]** (Delay time of cooling fan ON/OFF control) is set. With this function, the life of the cooling fan can be extended.

**1: ON/OFF Control is invalid** (Always operation when the power is turned ON).

When the power of the inverter is input, the cooling fan will always operate.

<b>L8-11</b>	Delay time of cooling fan ON/OFF control	Range: 0~300s	Factory Default: 60s
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When **[L8-10=0]** (Only when the inverter is running), Set the delay time from the release of the run command to the shutdown of the cooling fan.

<b>L8-12</b>	PID given loss detection value	Range: 0~100%	Factory Default: 0%
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<b>L8-13</b>	PID given loss detection time	Range: 0.0~20.0s	Factory Default: 0.5s
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When the given value of the PID is continuously less than the value defined by **[L8-12]** (Based on the maximum reference) and the duration exceeds the detection time defined by **[L8-13]**, The PID reference is lost and the inverter is pressed. **[L5-05]** One-bit setting action. The loss detection diagram in the PID is shown in Fig.6-65.

<b>L8-14</b>	PID feedback loss detection value	Range: 0~100%	Factory Default: 12%
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<b>L8-15</b>	PID feedback loss detection time	Range: 0.0~20.0s	Factory Default: 5s
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When the feedback value of PID is continuously less than the value defined by **[L8-14]** (Based on the given value) and the duration exceeds the detection time defined by **[L8-15]**, the PID feedback is lost, and the inverter presses **[L5-05]** Tens digit setting action. PID given loss detection diagram, as shown in Fig.6-65.

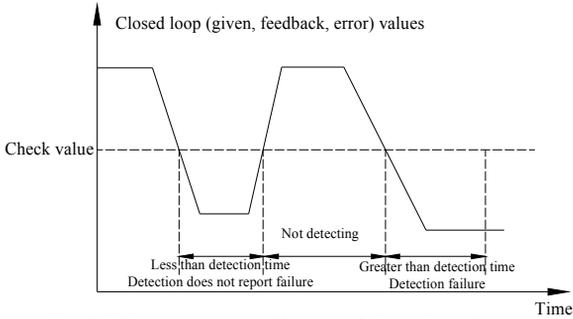


Fig.6-65 Timing sequence diagram of closed loop detection

<b>L8-16</b>	PID error amount abnormal detection value	Range: 0~100%	Factory Default: 50%
<b>L8-17</b>	PID error amount abnormal detection time	Range: 0.0~20.0s	Factory Default: 5s

When the error amount of PID continuously exceeds the value defined by [L8-16] (Based on the given value) and the duration exceeds the detection time defined by [L8-17], The PID error amount is abnormal, and the inverter presses [L5-05] Hundreds of setting action. Schematic diagram of PID error detection, as shown in Fig.6-65.

<b>L8-20</b>	Current warning selection	Range: 0, 1	Factory Default: 0
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When the output current is too large, set whether to output a light fault (Current alarm).

When [L8-20] is set to 0, no current alarm is output; when [L8-20] is set to 1, when the output current exceeds 150% of the rated current, the output current is alarmed. If the user sets the “light fault” function of the multi-function output terminal, the terminal is closed.

## 6.9.6 L9: Maintenance

<b>L9-02</b>	Cumulative run time selection	Range: 0, 1	Factory Default: 0
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**0: Accumulates the power-on time of the inverter** (The cumulative time from the start of power-on to the cut-off).

**1: Accumulate the running time of the inverter** (The time of accumulating the output status of the inverter).

This parameter is used to select the cumulative condition of the cumulative runtime. When [L9-02] is set to 0, the time from when the power is turned on to when the power is turned off is accumulated; when [L9-02] is set to 1, the time at which the inverter output voltage is accumulated.

<b>L9-07</b>	U2, U3 initialization selection	Range: 0, 1	Factory Default: 0
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**0: Maintain U2 and U3 group fault record parameters.**

**1: Clear the U2 and U3 group fault record parameters.**

The [U2, U3 Group] parameters are used to record the fault information. Even if the inverter parameters are initialized, the [U2, U3 Group] parameters will not be reset. When [L9-07] is set to 1, the [U2, U3 Group] parameter can be initialized, and the set value will be automatically reset to zero after initialization.

<b>L9-09</b>	Run time initialization selection	Range: 0, 1	Factory Default: 0
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**0: Keep running times.**

Keep the contents of [U4-02] (The number of times the inverter is running).

**1: Initialize the number of runs (Returns 0 after initialization).**

Initialize [U4-02] (The number of times the inverter is running), and the set value will be automatically reset to zero after initialization.

## 6.10 o: Operator related parameters

### 6.10.1 o1: Display settings/selections

<b>o1-01</b>	Drive mode display 1 item selection	Range: U1-04(Control mode)~ U6-20	Factory Default: U1-05
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[o1-01] is used to select the content to be monitored for display 1 item. This setting needs to be used with [o1-02], and the [U2, U3 Group] group parameters cannot be selected.

<b>o1-02</b>	Monitor display 1 item selection when power is ON	Range: 1~4	Factory Default: 1
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[o1-02] is used to select the content displayed by the monitor display 1 item when the power is turned on.

- 1: **Frequency/Speed command** [U1-01].
- 2: **Output frequency/Speed** [U1-02].
- 3: **Output current** [U1-03].
- 4: **Monitor items set with o1-01.**

When [o1-02] is set to 4, the desired monitor item can be displayed from the [U Group] parameter, and the monitor item is selected by [o1-01].

<b>o1-03</b>	Drive mode display 2 item selection	Range: U1-04 (Control mode)~ U6-20	Factory Default: U1-06
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[o1-03] is used to select the content to be monitored for the display 2 item. This setting needs to be used with [o1-04], and the [U2, U3 Group] parameter cannot be selected.

<b>o1-04</b>	Monitor display 2 item selection when power is ON	Range: 1~4	Factory Default: 2
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[o1-04] is used to select the content displayed by the monitor display 2 item when the power is turned on.

- 1: **Frequency/speed command** [U1-01].
- 2: **Output frequency/Speed** [U1-02].
- 3: **Output current** [U1-03].
- 4: **Monitor item set with o1-03.**

When [o1-04] is set to 4, the desired monitor item can be displayed from the [U Group] parameter, and the monitor item is selected by [o1-03].

<b>o1-05</b>	Drive mode display 3 item selection	Range: U1-04 (Control mode)~ U6-20	Factory Default: U1-07
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[o1-05] is used to select the content to be monitored for display 3 items. This setting needs to be used with [o1-06], and the [U2, U3 Group] parameters cannot be selected.

<b>o1-06</b>	Monitor display 3 item selection when power is ON	Range: 1~4	Factory Default: 3
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[o1-06] is used to select the content displayed by the monitor display 3 item when the power is turned on.

- 1: **Frequency/speed command** [U1-01].
- 2: **Output frequency / speed** [U1-02].
- 3: **Output current** [U1-03].
- 4: **Monitor items set with o1-05.**

When [o1-06] is set to 4, the desired monitor item can be displayed from the [U Group] parameter, and the monitor item is selected by [o1-05].

<b>o1-07</b>	Frequency related parameter display unit setting	Range: 0, 1	Factory Default: 0
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[o1-07] The unit used to select the frequency command and monitor value. The V/F control mode defaults to [o1-07=0]; the vector control mode defaults to [o1-07=1].

- 0: **In units of 0.1 Hz.**

**1: Min-1 unit** (Automatically calculated by the highest output frequency and motor pole number) .

When the unit setting is changed with [o1-07], the display unit of the following parameters will be changed.

[b2-01]、[b5-16]、[b5-17]、[b5-20]、[b6-01]、[b6-03]、[C6-10]、[d1-01~d1-17]、[d3-04~d3-08]、[d3-11~d3-13]、[E2-01]、[E2-02]、[F6-13]、[F6-14]、[H2-08~H2-11]、[L4-02]、[L4-03]、[U1-01]、[U1-02]、[U1-18]、[U1-35~U1-40]、[U2-03]、[U2-04]、[U4-13]。

Example: When [o1-07=0], [d1-01] is 0.4Hz, and when [o1-07] is set to 1, Then [d1-01] is 12r/min and the motor pole number is 4 .

When [o1-07=1], Be sure to set the number of motor poles in [E4-05], [F2-05].

### 6.10.2 o2: Multi-function selection

<b>o2-01</b>	Function selection of LOCAL/REMOTE button	Range: 0、 1	Factory Default: 1
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When the run command is input by the operation keyboard, it is called LOCAL (local). When the run command is input from outside the operation keyboard, it is called REMOTE. [o2-01] is used to set the valid or invalid LOCAL/REMOTE button on the operation keypad.

**0: Invalid.**

The switching with the LOCAL/REMOTE button is invalid.

**1: Valid.**

The switching using the LOCAL/REMOTE button is valid. Switching can only be performed when the inverter is stopped, and LOCAL/REMOTE switching cannot be performed during the operation command input.



When setting [b1-13=1], Please note the following:

When switching from LOCAL mode to REMOTE mode, if the running command from the outside is ON, it may cause a personal accident due to sudden operation of the inverter. Be sure to confirm the rotation of the mechanical system and the connection of the electrical system in advance.

For the relationship between the [o2-01] and [b1-13] setting values, refer to Table 6-15.

**Table 6-15 Relationship between [o2-01] and [b1-13] setting values**

<b>o2-01</b>	<b>b1-13</b>	<b>LOCAL → REMOTE</b>	<b>REMOTE → LOCAL</b>
0	0	Can't switch	Can't switch
	1	Can't switch	Can't switch
1	0	It does not run even if a run command is entered. But it starts running when you enter the run command again.	Not running
	1	If a run command is entered, the operation starts at the same time as the LOCAL → REMOTE switch.	Not running

<b>o2-02</b>	STOP button function selection	Range: 0、 1	Factory Default: 1
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When the running command of the inverter is set to remote (Keyboard display command/R), select whether the STOP button of the operation keyboard is valid/invalid.

**0: Invalid.**

**1: Valid.**

The STOP button is valid even if the operation command is not assigned to the operation keyboard.

When the inverter is started again after the STOP button is input, disconnect the external operation command and then turn it on again.

<b>o2-03</b>	User parameter setting value saving (used with terminal block)	Range: 0~2	Factory Default: 0
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When [o2-03] is set to 1, The parameter setting content at this time will be stored as the user parameter setting value in an area different from the inverter main body parameter (Control terminal block that supports parameter backup). When [A1-04] is set to 3 (User parameter initialization), the internal parameters of the inverter are restored to the parameters when [o2-03] is set to 1. For the initialization of the inverter, please

refer to "A1-04 Parameter Initialization".

**0: Invalid.**

**1: Save begins.**

The parameter setting contents at this time are saved as initialization parameters. After [o2-03] is set to 1, press [ENTER] to save and [o2-03] will be automatically reset to zero.

**2: Save clear.**

Clear the user-set initialization parameters saved when [o2-03=1]. When [o2-03] is set to 2, press the ENTER key to clear the saved value, and [o2-03] will automatically reset to zero. [A1-04] Set to 3 (User parameter initialization) is invalid.

<b>o2-06</b>	Action selection when the operator is disconnected	Range: 0、 1	Factory Default: 0
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When the running command channel is selected to operate the keyboard or the running command is switched to the LOCAL mode, when the connecting cable of the operating keyboard is disconnected from the inverter or short-circuited, select whether to stop the inverter.

**0: Invalid.**

The inverter can continue to run even if the operating keyboard short line is detected.

**1: Valid.**

After detecting the operation keyboard short line, the inverter stops running and the E24 fault is displayed. The motor runs freely.

<b>o2-07</b>	UP/DOWN integration function selection	Range: 0、 1	Factory Default: 0
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**0: Enable.**

When the operation keyboard UP/DOWN is active, If the frequency is continuously adjusted in the same direction, An integral effect will occur.

**1: Prohibited.**

When the operation keyboard UP/DOWN is invalid, if the frequency is continuously adjusted in the same direction, the integral effect will not occur.

<b>o2-08</b>	UP/DOWN adjustment step	Range: 1~300	Factory Default: 1
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When the operation keyboard UP/DOWN integration function is invalid, the single step of the frequency adjustment amount is fixed to the set value of [o2-08].

When [o1-06=1], When R/Min is selected, the range of [o2-08] is 1~300r/min;

When [o1-06=0], When the unit is selected in Hz, the range of [o2-08] is 0.1~30.0Hz.

### 6.10.3 o3: Copy/read function

<b>o3-01</b>	Copy action selection	Range: 0~2	Factory Default: 0
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Use the operating keypad to save the parameters of the drive or copy the parameters to other drives. This parameter is used to select the upload/download action of the parameter.

**0: Copy instruction waits.**

**1: Upload the inverter parameters.**

The parameter settings are read from the drive and saved to the operating keypad. Set [o3-02] to 1 before starting the parameter upload.

**2: Download the inverter parameters.**

Write the parameter settings in the operating keypad to the drive.

<b>o3-02</b>	Read action permission	Range: 0、 1	Factory Default: 0
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Select [o3-01=1] to enable/disable the read operation.

**0: Invalid.**

It is not allowed to read parameters into the operating keyboard.

**1: Valid.**

Allows parameters to be read into the operating keyboard.

## 6.11 U: Monitoring

By monitoring the parameters, the operating keypad can be used to confirm various information related to the operating conditions of the inverter. In the monitoring parameters, certain parameters can be monitored from the analog output 1 terminal (AO1) and analog output 2 terminal (AO2) by setting a specific monitor number for [H4-01] and [H4-04]. For details on the functions assigned to the multi-function analog output terminals, refer to "H4-01/H4-04 Terminal AO1/Terminal AO2 Monitor Selection".

### 6.11.1 U1: Status Monitoring

The status of the inverter such as the output frequency and output current can be confirmed by the status monitoring parameters. The following describes some of the parameters:

(1) The status of the external I/O terminal of the inverter can be obtained by looking at the [U1-11], [U1-12], [U1-13] parameters. The corresponding position is 1 when the external terminal is closed, otherwise it is set to 0. You can switch between the hands using the left and right buttons of the operating keyboard.

(2) The current status of the inverter can be obtained by viewing the [U1-14] and [U1-20] parameters. Use the left and right keys of the operation keyboard to switch between the statuses. For the meaning of each status, please refer to Table 6-16.

Table 6-16 List of inverter status

Inverter status U1-14		Inverter status U1-20	
BIT0=1	Bus voltage establishment	BIT0=1	FCL limit
BIT1=1	Running	BIT1=1	Fault recovery
BIT2=1	Reverse operation	BIT2=1	Normal running command is valid
BIT3=1	DC braking	BIT3=1	Jog command is active
BIT4=1	Accelerating	BIT4=1	Reserved
BIT5=1	Slow down	BIT5=1	Self-tuning
BIT6=1	Alarm	BIT6=1	Pre-excitation
BIT7=1	malfunction	BIT7=1	Speed search

For a list of U1-XX monitoring parameters, refer to "U1: Status Monitoring".

### 6.11.2 U2: Fault Tracking

The fault tracking parameters can be used to confirm the status of the inverter at the time of the fault.

This information is useful for understanding the cause of the failure. For a list of [U2 Group] monitoring parameters, refer to "U2: Fault Tracking" in Appendix A Parameter List.

Even if the inverter is initialized, the contents of [U2 Group] monitoring will not be reset. For the initialization of the fault tracing, refer to "L9-07 U2, U3 Initialization Selection".

### 6.11.3 U3: Fault Record

The fault record parameters can be used to confirm the fault content of the inverter so far and the cumulative running time of the inverter when the fault occurs. For a list of [U3 Group] monitors, refer to "U3: Fault log" in Appendix A Parameter List.

Even if the inverter is initialized, the contents of [U3 Group] monitoring will not be reset. For the initialization of the fault log, refer to "L9-07 U2, U3 Initialization Selection".

### 6.11.4 U4: Maintenance Monitoring

Maintenance monitoring parameters show the following items:

1) The cumulative running time of the inverter and cooling fan, and the number of executions of the running command.

2) Module, ambient temperature.

3) Output frequency at peak hold current and peak hold current during operation.

4) Overload cumulative value.

5) Inverter overload factor.

6) U, V, W phase instantaneous current.

For a list of [U4 Group] monitors, refer to "U4: Maintenance Monitor" in Appendix A Parameter List.

### **6.11.5 U5: Application Monitoring**

Through application monitoring, parameters related to PID control can be monitored. Please confirm the PID control block diagram. For the function of PID monitoring parameters, please refer to "PID Control Block Diagram".

For a list of **[U5 Group]** monitoring, refer to "U5: Application Monitoring" in Appendix A Parameter List.

### **6.11.6 U6: Control Monitoring**

The control monitor parameters show the following items.

- 1) Calculated value of motor rotor current.
- 2) Calculated value of motor excitation current.
- 3) The count value of PG.
- 4) Dynamic control accuracy.
- 5) Torque allowable range.

For a list of **[U6 Group]** monitors, refer to "U6: Control Monitor" in Appendix A List of Parameters.

## Fault diagnosis and countermeasures

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## 7.1 Failure phenomena and countermeasures

Table 7-1 and 7-2 show the types of faults or alarms that may occur in the EN700 series. Fault types are classified into faults and alarms. For example, EXX is displayed when the inverter is faulty, And the corresponding alarm shows AXX. In the event of a fault in the inverter, the fault type is stored in the "U3: Fault Log" parameter group. When an alarm occurs, The alarm status is displayed until the alarm source is released. The alarm status is not recorded in the "U3: Fault Record" parameter group. Some of the reserved fault codes are prepared for the ongoing intelligent self-diagnosis function. When the inverter is faulty, the user should first check according to the prompts of the table, And record the fault phenomenon in detail. When technical service is required, Please contact the technical engineering department of our company or the agents of our company.

**Table 7-1 Fault alarm content and countermeasures**

Failure code	Failure type	Possible reason	Countermeasure
E00	No failure	No Failure	No
E01	Overcurrent during accelerating process	Accelerating time is too short	Prolong accelerating time
		Improper V/F curve	Adjust V/F curve setting, adjust manual torque boost or change to automatic torque boost
		Low power source voltage	Check input power supply
		Too small power of the inverter	Choose inverter with high-power
		Output phase lose under vector control	Check whether the motor wiring is in good condition.
E02	Overcurrent during decelerating process	Decelerating time is too short	Prolong decelerating time
		Have potential energy load or big Inertia load	Increase braking power of external energy consumption braking subassembly
		Power of inverter is a bit small	Choose inverter with high-power
E03	Overcurrent during constant speed process	Load change suddenly or have unwanted phenomena	Check or reduce break of the load
		Acce./Dece. time is set to too short	Prolong accelerating decelerating time properly
		low power source voltage	Check input power supply
		Power of inverter is a bit small	Choose inverter with high-power
E04	Overvoltage during accelerating process	Unwanted input voltage	Check input power supply
		Acce. time is set to too short	Prolong accelerating time properly
		Restart rotating motor	Set speed checking restart function
E05	Overvoltage during decelerating process	Decelerating time is too short	Prolong decelerating time
		Have potential energy load or big inertia load	Increase braking power of external energy consumption braking subassembly
E06	Overvoltage during constant speed process	Unwanted input voltage	Check input power supply
		Acce./Dece. time is set to too short	Prolong accelerating decelerating time properly
		Input voltage change abnormally	Assemble reactor
		Load inertia is a bit big	Use energy consumption subassembly
E07	Inverter control power supply overvoltage	Unwanted input voltage	Check input power supply or look for service
E08	Main circuit undervoltage	The input terminal of the input power supply is loose	Check wiring and input terminals for looseness
		The power supply voltage has changed	Confirm input voltage
		Main circuit capacitor circuit aging inside the inverter	Use L9-04 to determine capacitor maintenance period

		The relay or contactor of the inverter internal shock prevention circuit malfunctions	Switch the power supply to confirm whether it has failed
E09	Inverter overload	Acce. time is set to too short	Prolong accelerating time
		DC injection braking is too big	Reduce DC injection braking Current, Prolong braking time
		Improper V/F curve	Adjust V/F curve and torque boost
		Restart rotating motor	Set speed checking restart function
		Power source voltage is too low	Check power source voltage
E10	Motor overload protection	Improper V/F curve	Adjust V/F curve and torque boost
		Power source voltage is too low	Check power source voltage
		General motor run at low speed with big load	Can choose frequency conversion motor for long time low speed run
		Motor overload protection factor set incorrectly	To set motor overload protection factor correctly
		Motor blocked up or load change too suddenly and quickly	Check the load
E11	Motor under load protection	Load divorced from motor	Checking whether the load divorced from motor
E12	The input phase lose	The three-phase input power supply is abnormal	Check the three-phase input power line is off or poor contact
		Power supply board anomaly	Look for service from manufacturer or agent
		The control board anomaly	Look for service from manufacturer or agent
E13	The output phase lose	When the motor runs inverter three-phase output unbalanced	Check whether the motor three-phase winding is balance
		Power supply board anomaly	Look for service from manufacturer or agent
		The control board anomaly	Look for service from manufacturer or agent
		When the motor runs inverter three-phase output unbalanced	Check whether the motor three-phase winding is balance
E14	Inverting module protection	Transient overcurrent of the inverter	Refer to countermeasure for overcurrent
		Phase to phase short circuit or earthing short circuit of output 3 phase	Wiring again
		Air-path blocked or fan damaged	To clear air-path or replace the fan
		Ambient temperature is too high	Lower ambient temperature
		Connecting wire or insert on control board loose	Check and connect the wire again
		Unwonted current wave caused by missing output phase etc.	Check wiring
E15	Short circuit to ground when operation	Motor short circuit to ground	The replacement of cable or motor
		Hall component is damaged or the hall writing is poor or the current detection circuit is abnormal	Look for service from manufacturer or agent
E16	Short circuit to ground when power on	Motor short circuit to ground	Change the cable or motor
		The power supplier of the inverter and the motor wiring are reversed	Change the cable or motor wiring
		Hall component is damaged or the hall writing is poor	Look for service from manufacturer or agent
E17	Inverter overheat	Duct blockage	Cleaning or to improve the ventilation duct
		The ambient temperature is too	To improve the ventilation

		high	conditions, decreasing the carrier frequency
		Fan damage	Change new one
E18	The bus capacitor overheating	Poor cooling environment	Improve the inverter heat dissipation environment
		The inverter capacity is too small	Select inverter match motor
		Bus capacitance cooling fan is damaged	Replace the bus capacitor cooling fan
E19	Reserved		
E20	Self tuning failure	Parameter setting not according to the motor nameplate	Set parameter correctly according to the motor nameplate
		Current anomaly when tuning	Select inverter match the motor
		Motor wiring error	Check the motor three-phase wiring
E21	Current detecting circuit failure	Connecting wire or insert on control board loose	Check and connect the wire again
		Assistant power supply damaged	Look for service from manufacturer or agent
		Hall component damaged	Look for service from manufacturer or agent
		Unwonted amplifying circuit	Look for service from manufacturer or agent
E22	Parameter upload failure	Read parameter abnormal	Re-upload
E23	Parameter download failure	The inverter power code is different	Set consistent power code
		Write parameter abnormal	download again
E24	Keyboard communication is abnormal	The keyboard and the main control board are disconnected	Check that the wiring is correct
E25	MODBUS communication failure	Incorrect parameter setting	Confirm the contents set by the H5 group and the host computer
		H5-09 setting is too short	Set H5-09 longer
		Communication line disconnection	Replace the communication cable
		Environmental interference	Confirm the anti-interference condition
E26	B communication port failure	Incorrect parameter setting	Confirm the contents of the host computer settings
		Communication line disconnection	Replace the communication cable
		Environmental interference	Confirm the anti-interference condition
E27	A communication port failure	Incorrect parameter setting	Confirm the contents of the host computer settings
		Communication line disconnection	Replace the communication cable
		Environmental interference	Confirm the anti-interference condition
E28	24V power supply abnormal protection		Look for service from manufacturer or agent
E29	Reserved		
E30	Start terminal protection	Terminal command effective when power on .	Check the external input terminal state
E31	Temperature detecting disconnection	Temperature sensor fault	Look for service from manufacturer or agent
		The temperature detection circuit anomaly	Look for service from manufacturer or agent
E32	Reserved		
E33	Contact anomaly	Power board anomaly	Look for service from manufacturer or agent

		Contactor anomaly	Replace contactor
E34	The fault 1	Debugging use in factory	
E35	The fault 2	Debugging use in factory	
E36	Terminal E <sup>2</sup> PROM error	Mistake take place when read or write control parameter	Look for service from manufacturer or agent
E37	Main control board FRAM operation failure		Look for service from manufacturer or agent
E38	Overspeed protection	Short acceleration time	Prolong acceleration time
		Motor overspeed detection parameter setting is unreasonable	The motor overspeed detection parameter setting is unreasonable, and the parameters are reasonably set according to the actual situation.
E39	PG disconnection failure	PG cable disconnection	Correct the broken part
		PG cable wiring error	Corrected wiring
		No power supply	Confirm PG cable power wiring
		PG is braked	When using the brake, confirm that the brake is open
E40	PID Given loss	PID given loss threshold setting is not reasonable	To reset the relevant parameters
		External given disconnection	Check external given wiring
		The control board anomaly	Look for service from manufacturer or agent
E41	PID feedback loss	PID feedback loss threshold setting is not reasonable	To reset the relevant parameters
		Feedback signal disconnection	Check external feedback signal wiring
		The control board anomaly	Look for service from manufacturer or agent
E42	PID error amount abnormal	PID error abnormal detection threshold setting is not reasonable	To reset the relevant parameters
		The control board anomaly	Look for service from manufacturer or agent
E43	Speed control error	Improper setting of L4-06 and L4-07	Reset L4-06, L4-07
E44	Reserved		
E45	Over torque/Under torque protection 1	Improper setting of H2-14 and H2-15	Reset H2-14, H2-15
		Mechanical side failure	Confirm the mechanical use status and eliminate the malfunction on the mechanical side
E46	Over torque/Under torque protection 2	Improper setting of H2-17 and H2-18	Reset H2-17, H2-18
		Mechanical side failure	Confirm the mechanical use status and eliminate the malfunction on the mechanical side
E47	Base blockade	An external base blocking signal is input from the multi-function contact input terminals (X1 to X12)	Check the external circuit and correct the input time of the base block signal
E48	External fault 3 protection	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
E49	External fault 4 protection	External machine alarm function action	Eliminate external failure causes

		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
E50	Motor over torque protection	Motor output torque is too large	Determine if the drive shaft is blocked
		Over torque protection parameter setting is abnormal	Determine if the load characteristics match the output capability of the motor
E51	FCL overload fault	Excessive load or circuit failure	Reset L1-06 and L1-07
		The current limit level setting is not appropriate	Setting the acceleration time too short in VF mode

**Table 7-2 Warning contents and countermeasures**

Failure code	Fault name	Possible reason	Countermeasure
A00	No warning	No warning	No
A01	Current warning	Excessive load	Excessive load, lighten load
		The set acceleration/deceleration time is too short	Extend the acceleration and deceleration time
		Use a special motor or a motor with a maximum applicable capacity or more	Confirm motor capacity
A02	Speed control error	Improper parameter setting	Reset L4-06, L4-07
A03	Loss of frequency command	Improper parameter setting	Reset L4-09
A04	Motor overspeed	Improper parameter setting	Reset L4-02, L4-03, L4-04
A05	Motor overheat warning	Motor overheating	Re-execute PTC wiring
			Troubleshoot the mechanical side
			Reduce the load and increase the acceleration and deceleration time
			Adjust V/F curve
			Confirm motor rated current setting and motor cooling system
A06	NTC resistance disconnection	NTC resistance disconnection	Rewire
A07	MODBUS communication alarm	Incorrect parameter setting	Confirm the contents set by the H5 group and the host computer
		H5-09 setting is too short	Set H5-09 longer
		Communication line disconnection	Replace the communication cable
		Environmental interference	Confirm the anti-interference condition
A08	B communication port alarm	Incorrect parameter setting	Confirm the contents of the host computer settings
		Communication line disconnection	Replace the communication cable
		Environmental interference	Confirm the anti-interference condition
A09	A communication port alarm	Incorrect parameter setting	Confirm the contents of the host computer settings
		Communication line disconnection	Replace the communication cable
		Environmental interference	Confirm the anti-interference condition
A10	Over torque/Under torque warning 1	Parameter setting is incorrect	Reset H2-14, H2-15
		Mechanical side failure	Confirm the mechanical use status and eliminate the malfunction on the mechanical side

A11	Over torque/Under torque warning 2	Parameter setting is incorrect	Reset H2-17, H2-18
		Mechanical side failure	Confirm the mechanical use status and eliminate the malfunction on the mechanical side
A12	External fault 1 alarm	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
A13	External fault 2 alarm	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
A14	External fault 5 alarm	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
A15	External fault 6 alarm	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
A16	External fault 7 alarm	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
A17	External fault 8 alarm	External machine alarm function action	Eliminate external failure causes
		Wiring is incorrect	Connect the signal cable correctly
		Multi-function contact input is not assigned correctly	Change allocation
A18	PG disconnection alarm	PG cable disconnection	Correct the broken part
		PG cable wiring error	Corrected wiring
		No power supply	Confirm PG cable power wiring
		PG is braked	When using the brake, confirm that the brake is open
A19	Keyboard communication is abnormal	The keyboard and the main control board are disconnected	Check that the wiring is correct
A20	PID Given loss	PID given loss threshold setting is not reasonable	To reset the relevant parameters
		External given disconnection	Check external given wiring
		The control board anomaly	Look for service from manufacturer or agent
A21	PID feedback loss	PID feedback loss threshold setting is not reasonable	To reset the relevant parameters
		Feedback signal disconnection	Check external feedback signal wiring
		The control board anomaly	Look for service from manufacturer or agent
A22	PID error amount abnormal	PID error abnormal detection threshold setting is not reasonable	To reset the relevant parameters
		The control board anomaly	Look for service from manufacturer

			or agent
A23	Terminal E <sup>2</sup> PROM alarm	Mistake take place when read or write control parameter	Power on or off or initialization
A24	Main control board FRAM operation failure		Look for service from manufacturer or agent
A25	Motor overheat warning	Motor overheating	Reduce load or confirm environment temperature
A26	Module overheat warning		Check the cause of the inverter overheat warning, and take countermeasures to cancel the inverter overheat warning input of the multi-function contact input terminal.
A27	Capacitor overheat warning	The inverter has poor heat dissipation environment	The heat dissipation environment of the inverter is poor. Improve the heat dissipation environment of the inverter.
		The inverter capacity is too small	The inverter capacity is too small, select the inverter that matches the motor.
		Bus capacitor cooling fan is damaged	Bus capacitor cooling fan is damaged, Replace bus capacitor cooling fan
A28	Incorrect parameter setting	Incorrect parameter setting	Check the setup parameters
A29	FO signal abnormal alarm		Look for service from manufacturer or agent
A30	OC signal abnormal alarm		Look for service from manufacturer or agent
A31	OU signal abnormal alarm		Look for service from manufacturer or agent
A32	Motor illegal switching alarm		Look for service from manufacturer or agent
A33	Drive blocking alarm		Look for service from manufacturer or agent

## 7.2 Fault Record Search

The U3 Group parameters of this inverter series record the fault codes that have occurred in the last 10 times and the cumulative running time of the inverters in the last 10 faults. The U2 group parameters record the relevant parameters of the inverter when the fault occurred in the past. Looking up this information can help you find the cause of the failure.

The fault information is stored in the U2 and U3 group parameters. Please refer to the keyboard operation method to enter the U2 and U3 Group parameter search information.

Code	Content	Code	Content
U2-01	Current fault	U2-14	Operating state at fault 1
U2-02	Past failure	U2-15	Cumulative running time at failure
U2-03	Frequency command at fault	U2-16	Soft start speed command at fault
U2-04	Output frequency at fault	U2-17	Q-axis current of the motor at fault
U2-05	Output current at fault	U2-18	D-axis current of the motor at fault
U2-06	Motor speed at fault	U2-19	Operating state at fault 2
U2-07	Output voltage command at fault	U2-20	Module temperature at fault
U2-08	Main circuit DC voltage at fault	U2-21	Peak hold current at fault
U2-09	Reserved	U2-22	Peak hold frequency at fault

U2-10	Torque command at fault	U2-23	Reserved
U2-11	Status 1 of the input terminal at the time of failure	U2-24	U-phase current instantaneous value at fault
U2-12	Status 2 of the input terminal at the time of failure	U2-25	Instantaneous value of V phase current in fault
U2-13	Status of the output terminal at the time of failure	U2-26	W phase current instantaneous value at fault

Code	Content	Code	Content
U3-01	Fault content occurred 1 time before	U3-11	Cumulative running time when failure occurred 1 time before
U3-02	Fault content occurred 2 times before	U3-12	Cumulative running time when failure occurred 2 times before
U3-03	Fault content occurred 3 times before	U3-13	Cumulative running time when failure occurred 3 times before
U3-04	Fault content occurred 4 times before	U3-14	Cumulative running time when failure occurred 4 times before
U3-05	Fault content occurred 5 times before	U3-15	Cumulative running time when failure occurred 5 times before
U3-06	Fault content occurred 6 times before	U3-16	Cumulative running time when failure occurred 6 times before
U3-07	Fault content occurred 7 times before	U3-17	Cumulative running time when failure occurred 7 times before
U3-08	Fault content occurred 8 times before	U3-18	Cumulative running time when failure occurred 8 times before
U3-09	Fault content occurred 9 times before	U3-19	Cumulative running time when failure occurred 9 times before
U3-10	Fault content occurred 10 times before	U3-20	Cumulative running time when failure occurred 10 times before

### 7.3 Fault reset



- (1) The cause of the fault must be thoroughly checked and eliminated before resetting, otherwise it may cause permanent damage to the inverter.
- (2) If the fault cannot be reset or reset, the cause should be checked. Continuous reset will damage the inverter.
- (3) The overload and overheat protection should be reset for 5 minutes.
- (4) When an E14 fault occurs, pressing the reset button is invalid. You need to power down to check the motor wiring and restart the inverter.
- (5) When the E16 is faulty, please do not run directly after resetting. Check whether the input and output lines are reversed.

To resume normal operation when the inverter fails, you can choose any of the following operations:

- (1) After setting any of the terminals X1 to X12 to the external RESET input, it is turned off after the COM terminal is closed.
- (2) When the fault code is displayed, after confirming that it can be reset, press the key.
- (4) Communication reset. Please refer to the communication attachment instructions.
- (3) Turn off the power.

### 7.4 Alarm Reset

When an alarm occurs, you must eliminate the alarm source represented by this alarm code to restore the alarm. Otherwise, the alarm cannot be eliminated or reset by the reset button.

## Maintenance and repair

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## 8.1 Daily maintenance

The inverter must be installed and operated in strict accordance with the requirements of this User Manual. Due to the influence of environmental temperature, Humidity, Vibration, aging and wear of internal components during operation, potential faults may occur in the inverter. In order to make the inverter run stably for a long time, It is necessary to carry out daily and regular maintenance of the inverter

**Table 8-1 Daily and Periodic Inspection Items of the Inverter**

Frequency of inspection		Inspection item
Daily	Periodic	
√		Daily cleaning: (1) The inverter should be kept clean. (2) Remove dust from the upper surface of the inverter to prevent dust from entering the inverter (Especially metal dust). (3) Remove the oil from the inverter's cooling fan.
	√	Check the air duct and clean it regularly.
	√	Check for loose screws.
	√	Check the inverter for corrosion.
√		Whether the inverter installation environment has changed.
√		Whether the inverter cooling fan works normally.
√		Is the inverter overheated?
√		Whether the sound changes abnormally when the motor is running.
√		Whether abnormal vibration occurs during motor operation.
	√	Check the wiring terminals for traces of arcing.
	√	Main circuit insulation test

## 8.2 Inspection and replacement of consumable parts

Some components in the inverter will wear or degrade during long-term use. To ensure stable and reliable operation of the inverter, In order to ensure the stable and reliable operation of the inverter, the inverter should be regularly maintained and replaced if necessary.

### (1) Cooling fan

When the fan has bearing wear, blade aging, etc. The fan may have abnormal noise, Even vibration sound, and you should consider replacing the fan.

### (2) Filter electrolytic capacitor

When the ambient temperature is high, Frequent load jumps cause the pulsating current to increase. When the electrolyte ages, the electrolytic capacitor may be damaged. In this case, the electrolytic capacitor should be replaced.

## 8.3 Inverter warranty

(1) Under normal use, If the fault or damage occurs, The manufacturer provides a free warranty during the warranty period. The warranty period is shown in the Warranty Card.

A reasonable repair fee will be charged for the warranty period.

(2) During the warranty period, If the following conditions occur, Our company will charge a certain maintenance fee as appropriate.

1> Failures caused by exceeding the standard specifications in accordance with the User Manual or in an environment that does not meet the requirements of the User Manual;

2> Faults caused when the inverter is used for abnormal functions;

3> Failure caused by self-repair and modification without permission;

4> Damage caused by improper storage, loss or other external factors after purchase;

5> Faults caused by natural disasters such as voltage anomalies, Lightning, Water mist, Fire, Salt erosion, Gas corrosion, Earthquakes, Storms, Or the causes associated with disasters;

6> Unauthorized tearing of product identification (Eg nameplate, etc.) or body number does not match the warranty card.

(3) The service fee is calculated based on the actual cost. If there is another contract, it shall be handled on the principle of contract priority.

(4) If you have any questions, please contact the agent or contact us directly.



**Note**

For machines that exceed the warranty period, the company will also provide lifetime paid repair services.

## 8.4 Storage

After the user purchases the inverter, the following points must be noted for temporary storage and long-term storage:

(1) Avoid storing the inverter in a place with high temperature, humidity, dust and metal dust, and ensure good ventilation.

(2) Long-term storage will cause deterioration of electrolytic capacitors. It must be ensured that the power is turned on once within 1 year. The power-on time is not less than 1 hour. The input voltage must be gradually raised to the rated value with a voltage regulator. The regulator can use 250W power. At the same time, please ensure that the inverter is disconnected from the motor.

# Appendix A

## Parameter list

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## A.1 Symbol description in the table

× ---- Parameters cannot be modified during the running process.

○ ---- Parameters can be modified during the running process.

\* ---- Read-only parameter, cannot be modified.

## A.2 Function parameter list

### A.2.1 A:Environment setting parameter group

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>A1: Environment setting mode</b>					
A1-00	LCD language selection	0: Chinese 1~6: Reserved	0	○	53
A1-01	Parameter access level	0: Dedicated for monitoring 1: User parameters 2: All parameters	2	○	53
A1-02	Control mode selection	0: Without PG vector control (IM-SVC) 1: PG vector control (IM-VC) 2: V/F control (IM-VF) 3~6: Reserved	0	×	53
A1-04	Parameter initialization	0: No action 1: Restore the factory default value 1 (Do not restore parameter A1-00, Mmotor parameter group E1~E8, F1~F5) 2: Restore the factory default value 2 (Restore parameter A1-00, Motor parameter group E1~E8, F1~F5) 3: User parameter initialization (For multi-function terminal block with parameter backup) 4~8: Reserved	0	×	53
A1-06	User password	0000~9999	0000	○	54
<b>A2: Common parameters</b>					
A2-01	Common parameter01	A1-00~03-02	d1-01	×	54
A2-02	Common parameter02	A1-00~03-02	d1-17	×	54
A2-03	Common parameter03	A1-00~03-02	-	×	54
A2-04	Common parameter04	A1-00~03-02	C1-03	×	54
A2-05	Common parameter05	A1-00~03-02	C1-04	×	54
A2-06	Common parameter06	A1-00~03-02	C1-05	×	54
A2-07	Common parameter07	A1-00~03-02	C1-06	×	54
A2-08	Common parameter08	A1-00~03-02	C3-01	×	54
A2-09	Common parameter09	A1-00~03-02	C3-04	×	54
A2-10	Common parameter10	A1-00~03-02	C3-05	×	54
A2-11	Common parameter11	A1-00~03-02	-	×	54
A2-12	Common parameter12	A1-00~03-02	-	×	54
A2-13	Common parameter13	A1-00~03-02	-	×	54
A2-14	Common parameter14	A1-00~03-02	-	×	54
A2-15	Common parameter15	A1-00~03-02	-	×	54
A2-16	Common parameter16	A1-00~03-02	-	×	54
A2-17	Common parameter17	A1-00~03-02	-	×	54
A2-18	Common parameter18	A1-00~03-02	-	×	54
A2-19	Common parameter19	A1-00~03-02	-	×	54
A2-20	Common parameter20	A1-00~03-02	-	×	54
A2-11	Common parameter11	A1-00~03-02	-	×	54
A2-12	Common parameter12	A1-00~03-02	-	×	54
A2-13	Common parameter13	A1-00~03-02	-	×	54
A2-14	Common parameter14	A1-00~03-02	-	×	54
A2-15	Common parameter15	A1-00~03-02	-	×	54
A2-16	Common parameter16	A1-00~03-02	-	×	54

Parameter list

A2-17	Common parameter17	A1-00~o3-02	-	×	54
A2-18	Common parameter18	A1-00~o3-02	-	×	54
A2-19	Common parameter19	A1-00~o3-02	-	×	54
A2-20	Common parameter20	A1-00~o3-02	-	×	54
A2-21	Common parameter21	A1-00~o3-02	-	×	54
A2-22	Common parameter22	A1-00~o3-02	-	×	54
A2-23	Common parameter23	A1-00~o3-02	-	×	54
A2-24	Common parameter24	A1-00~o3-02	-	×	54
A2-25	Common parameter25	A1-00~o3-02	-	×	54
A2-26	Common parameter26	A1-00~o3-02	-	×	54
A2-27	Common parameter27	A1-00~o3-02	-	×	54
A2-28	Common parameter28	A1-00~o3-02	-	×	54
A2-29	Common parameter29	A1-00~o3-02	-	×	54
A2-30	Common parameter30	A1-00~o3-02	-	×	54
A2-31	Common parameter31	A1-00~o3-02	-	×	54
A2-32	Common parameter32	A1-00~o3-02	-	×	54
A2-33	Common parameter33	A1-00~o3-02	-	×	54
A2-34	Common parameter34	A1-00~o3-02	-	×	54
A2-35	Common parameter35	A1-00~o3-02	-	×	54
A2-36	Common parameter36	A1-00~o3-02	-	×	54
A2-37	Common parameter37	A1-00~o3-02	-	×	54
A2-38	Common parameter38	A1-00~o3-02	-	×	54
A2-39	Common parameter39	A1-00~o3-02	-	×	54
A2-40	Common parameter40	A1-00~o3-02	-	×	54
A2-41	Common parameter41	A1-00~o3-02	-	×	54
A2-42	Common parameter42	A1-00~o3-02	-	×	54
A2-43	Automatic registration function of common parameter	0: Automatic registration is invalid 1: Automatic registration is valid	0	×	54
<b>A3: Manufacturer parameter</b>					
A3-01	Manufacturer parameter	0000~9999	0000	○	55

**A.2.2 B:Application parameter group**

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>b1: Operation mode and time sequence selection</b>					
b1-01	Operation mode selection	0: Speed Control (ASR) mode 1: Negative direction of the torque (-) side is preferred 2: Positive direction of the torque (+) side is preferred 3: Torque control (ATR) mode 4: SpeedTorque control contact switching	0	×	55
b1-02	Speed command input selection 1	0: Operating keyboard 1: Control circuit terminal (Analog input) 2: Communication 3: Option card 4: Pulse sequence input	0	×	55
b1-03	Run command input selection 1	0: Operating keyboard 1: Control circuit terminal (Sequence input) 2: Communication 3: Option card	0	×	57
b1-04	Jog command input selection	0: Operating keyboard 1: Control circuit terminal (Sequence input) 2: Communication 3: Option card	0	×	57
b1-05	Torque command input selection	0: Control circuit terminal (Analog input) 1: Communication 2: Option card 3: Keyboard	0	×	57
b1-06	Stop mode selection	0: Free stop	0	○	58

		1: Deceleration stop 2: Deceleration stop with DC brake			
b1-08	Reverse mode is prohibited selection	0: No restrictions 1: Prohibit operation opposite to the command direction 2: Reverse operation is prohibited	0	×	58
b1-09	Lower limit speed running selection	0: Run according to speed command 1: Free stop 2: Run at minimum speed	2	×	59
b1-10	Speed command input selection 2	0: Operating keyboard 1: Control circuit terminal (Analog input) 2: Communication 3: Option card 4: Pulse sequence input	0	×	59
b1-11	Run command input selection 2	0: Operating keyboard 1: Control circuit terminal (Sequence input) 2: Communication 3: Option card	0	×	59
b1-13	Run selection after running command switching	0: After the operation command is switched, even if the input command of the switching party is not executed 1: After the running command is switched, it runs according to the running signal of the switching party.	0	○	59
b1-14	Program mode run command selection	0: Can not run 1: Can run 2: Cannot be converted to program mode	0	×	60
b1-15	Forward and reverse switching selection	0: Standard 1: Perform phase sequence switching (Rotation direction (Forward/Reverse) switching)	0	×	60
b1-16	Operation selection when the power is ON/OFF	0: Prohibited (Prohibit the motor to rotate even if the run command is input while the power is turned on) 1: Allow (The motor start running when enter the run command while the power is on)	0	○	60
b1-17	Start selection condition when in vector control with PG	0: b2-01 ≤ motor speed < E2-02, Does not receive the run command input 1: b2-01 ≤ motor speed < E2-02, Receive run command input	0	×	60
b1-18	High efficiency control selection	0: Not use 1: Use	0	×	60
b1-20	Pre-excitation selection (vector control mode only)	0: AC pre-excitation 1: DC pre-excitation (Only DC pre-excitation can be selected in SVC mode)	1	×	60
b1-22	Start mode selection	0: Free start 1: Start at lowest frequency	0	×	61
b1-23	Restart lag time	0.100~10.000s	0.100s	×	61
<b>b2: Braking and deceleration</b>					
b2-01	Stop speed (vector control mode)	0~300r/min	30r/min	○	62
	Stop frequency (V/F control mode)	0.0~10.0Hz	1.0Hz	○	62
b2-02	DC braking current	20.0~500.0% (Rated excitation current corresponds to 100%)	100.0%	×	62
b2-03	DC braking time	0.0~10.0	0.0s	×	62
b2-04	DC braking voltage	0.0~20.0%	0.0%	×	62
<b>b3: Droop function</b>					
b3-01	Droop control use selection	0: Not use 1: Use	0	×	62
b3-02	Droop start speed	0.0~100.0%	0.0%	○	62
b3-03	Droop rate switching speed	0.0~100.0%	0.0%	○	62
b3-04	Droop rate	0.0~50.0%	0.0%	○	62
b3-05	Droop start torque	0.0~90.0%	0.0%	○	62

b4: Mechanical loss compensation					
b4-01	Mechanical loss compensation selection	0: Not use 1: Use	0	×	63
b4-02	Mechanical loss offset	0~100%	0%	○	63
b4-03	Mechanical loss slope	0~100%	0%	○	63
b5: PID function					
b5-01	PID operation control selection	0: Invalid 1: Valid	0	×	64
b5-02	PID given channel selection	0: Operating keyboard 1: Control circuit terminal (Analog input) 2: Communication 3: Option card 4: Pulse sequence input	0	○	64
b5-03	PID feedback channel selection	0: Control circuit terminal (Analog input) 1: Communication 2: Option card 3: Pulse sequence input	0	○	64
b5-04	PID given change time	0.01~650.00s	0.00s	×	64
b5-05	PID feedback channel filtering time	0.01~60.00s	0.00s	×	64
b5-06	PID output filtering time	0.00~60.00s	0.00s	○	64
b5-07	PID given digital setting	0.0%~100.0%	50.0%	○	65
b5-08	Proportional gain Kp	0.0~100.0	20.0	○	65
b5-09	Integral gain Ki	0.01s~10.00s	2.00s	○	65
b5-10	Differential gain Kd	0.000s~10.000s	0.000s	○	65
b5-11	Reserved				
b5-12	Deviation limit	0.0~100.0%	0.0%	○	65
b5-13	PID differential limiting	0.00~100.00%	0.10%	○	65
b5-14	Closed loop regulation	0: Positive action 1: Negative action	0	○	65
b5-15	Proportional gain Kp2	0.0~100.0	20.0	○	65
b5-16	Integration time Ti2	0.01s~10.00s	2.00s	○	66
b5-17	Differential time Td2	0.000s~10.000s	0.000s	○	66
b5-18	PID integral properties	Units digit: Integral separation 0: Invalid; 1: Valid Tens digit: Whether to stop integration after output to the limit 0: Continue integration; 1: Stop integration	00	○	66
b5-19	Reserved				66
b5-20	PID preset frequency	0.0%~100.0%	0	○	66
b5-21	PID preset frequency hold time	0.00~650.00s	0.00s	○	66
b5-22	PID reverse max speed	0~Max speed	0	×	66
b5-24	Multi-stage closed loop given 1	0.00~10.00V	0.00V	○	66
b5-25	Multi-stage closed loop given 2	0.00~10.00V	0.00V	○	66
b5-26	Multi-stage closed loop given 3	0.00~10.00V	0.00V	○	66
b5-27	Multi-stage closed loop given 4	0.00~10.00V	0.00V	○	66
b5-28	Multi-stage closed loop given 5	0.00~10.00V	0.00V	○	67
b5-29	Multi-stage closed loop given 6	0.00~10.00V	0.00V	○	67
b5-30	Multi-stage closed loop given 7	0.00~10.00V	0.00V	○	67
b5-31	PID parameter switching conditions	0: Not switch 1: Switch via X terminal 2: Automatic switching based on deviation	0	×	67
b5-32	PID parameter switching deviation 1	0.0%~b5-33	20.0%	○	67
b5-33	PID parameter switching deviation 2	B5-32~100.0%	80.0%	○	67
b5-34	Positive Max value of Twice output deviations	0.00%~100.0%	1.00%	○	67
b5-35	Opposite Max value of Twice output deviations	0.00%~100.0%	1.00%	○	67

b5-36	PID shutdown calculation	0: Not operation when shutdown 1: Operation during shut down	0	○	67
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### A.2.3 C:Control and debug parameter group

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>C1: Acceleration / Deceleration time</b>					
C1-01	Acceleration / deceleration time selection	0: Acceleration/Deceleration time 1 1: Acceleration/Deceleration time 2 2: Acceleration/Deceleration time 3 3: Acceleration/Deceleration time 4	0	×	67
C1-02	Jog acceleration/deceleration time selection	Same as above	0	×	67
C1-03	Acceleration time 1	0.0~3600.0s	30.0s	○	68
C1-04	Deceleration time 1	0.0~3600.0s	30.0s	○	68
C1-05	Acceleration time 2	0.0~3600.0s	0.3s	○	68
C1-06	Deceleration time 2	0.0~3600.0s	0.3s	○	68
C1-07	Acceleration time 3	0.0~3600.0s	30.0s	○	68
C1-08	Deceleration time 3	0.0~3600.0s	30.0s	○	68
C1-09	Acceleration time 4	0.0~3600.0s	30.0s	○	68
C1-10	Deceleration time 4	0.0~3600.0s	30.0s	○	68
C1-11	Emergency stop time	0.0~3600.0s	10.0s	×	68
<b>C2: S curve characteristic</b>					
C2-01	S curve acceleration and deceleration use selection	0: Not use 1: Use 1 2: Use 2	0	×	68
C2-02	S curve rise time 1	0.0~60.0s	30.0s	○	68
C2-03	S curve acceleration arrival time 1	0.0~60.0s	30.0s	○	68
C2-04	S curve fall time 1	0.0~60.0s	30.0s	○	69
C2-05	S curve deceleration arrival time 1	0.0~60.0s	30.0s	○	69
C2-06	S curve rise time 2	0.0~60.0s	30.0s	○	69
C2-07	S curve acceleration arrival time 2	0.0~60.0s	30.0s	○	69
C2-08	S curve fall time 2	0.0~60.0s	30.0s	○	69
C2-09	S curve deceleration arrival time 2	0.0~60.0s	30.0s	○	69
<b>C3: Speed control</b>					
C3-01	Speed control proportional gain 1	3~50	15	○	69
C3-02	Speed control proportional gain 2	3~100	15	○	69
C3-03	Proportional gain selection when jogging	0: Speed control proportional gain 1 1: Speed control proportional gain 2 2: Special mode selection	0	○	69
C3-04	Speed control integral time constant	20~10000ms	40ms	○	70
C3-05	Speed control system inertia	0~65535gm <sup>2</sup>	10gm <sup>2</sup>	○	70
C3-06	Speed control cancellation use selection	0: Not use 1: Use	1	×	70
C3-07	Speed control feed forward selection	0: Not use 1: Use	1	×	70
C3-08	Variable structure proportional gain variable starting speed	0.01~100.00%	(SVC)	○	70
			5.00%	○	
C3-09	Variable structure minimum proportional gain ratio	0~100%	(SVC)	○	70
			20%	○	
(VC)	○	100%			
<b>C4: Vector control associated parameter</b>					
C4-01	Forward drive torque limit value	0~200%	150%	○	71
C4-02	Forward regenerative torque limit value	-200~0%	-150%	○	71
C4-03	Reverse drive torque limit value	-200~0%	-150%	○	71
C4-04	Reverse regenerative torque limit	0~200%	150%	○	71

Parameter list

	value				
C4-05	Torque command mode selection	0: % Command 1: Absolute value command	0	×	71
C4-06	Flux command set value	20.0~150.0%	100.0%	○	72
C4-07	Flux enhancement rate at startup	100.0~150.0%	100.0%	○	72
C4-08	Current control proportional gain	0.0~9.9	4.0	○	72
C4-09	Current control integral time constant	0.0~9.9ms	3.3ms	○	72
C4-10	Current control feed forward gain	0~200	0	○	72
<b>C6: V/F special parameter</b>					
C6-01	Torque boosting mode	0: Manual boost 1: Automatic boost	0	×	72
C6-02	Torque boost value	0.0~20.0%	0.0%	×	72
C6-03	Stable amount	0.0~100.0%	0.0%	○	72
C6-04	Drive side torque limit value	0~150%	150%	○	73
C6-05	Regenerative side torque limit value	-150~0%	-150%	×	73
C6-06	Select to use the drive side torque limit value	0: Not use 1: Use	0	×	73
C6-07	Select to use the regenerative side torque limit value	0: Not use 1: Use	0	×	73
C6-08	V/F curve selection	0: Straight line 1: Second decreasing curve 2: Broken line	0	×	73
C6-09	Break point voltage of polyline V/F	0~400V	0V	×	73
C6-10	Break point frequency of polyline V/F	0~maximum speed	0r/min	×	73

**A.2.4 D:Command setting parameter group**

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>d1: Preset rotation speed</b>					
d1-01	Preset rotation speed 1	-Maximum speed~maximum speed	(SVC) 12r/Min	○	73
			(VC) 0r/Min	○	
d1-02	Preset rotation speed 2	-Maximum speed~Maximum speed	0r/Min	○	73
d1-03	Preset rotation speed 3	-Maximum speed~Maximum speed	0r/Min	○	73
d1-04	Preset rotation speed 4	-Maximum speed~Maximum speed	0r/Min	○	73
d1-05	Preset rotation speed 5	-Maximum speed~Maximum speed	0r/Min	○	73
d1-06	Preset rotation speed 6	-Maximum speed~Maximum speed	0r/Min	○	73
d1-07	Preset rotation speed 7	-Maximum speed~Maximum speed	0r/Min	○	73
d1-08	Preset rotation speed 8	-Maximum speed~Maximum speed	0r/Min	○	73
d1-09	Preset rotation speed 9	-Maximum speed~Maximum speed	0r/Min	○	74
d1-10	Preset rotation speed 10	-Maximum speed~Maximum speed	0r/Min	○	74
d1-11	Preset rotation speed 11	-Maximum speed~Maximum speed	0r/Min	○	74
d1-12	Preset rotation speed 12	-Maximum speed~Maximum speed	0r/Min	○	74
d1-13	Preset rotation speed 13	-Maximum speed~Maximum speed	0r/Min	○	74
d1-14	Preset rotation speed 14	-Maximum speed~Maximum speed	0r/Min	○	74
d1-15	Preset rotation speed 15	-Maximum speed~Maximum speed	0r/Min	○	74
d1-16	Preset rotation speed 16	-Maximum speed~Maximum speed	0r/Min	○	74
d1-17	Preset jog speed	-Maximum speed~Maximum speed	24r/Min	○	75
<b>d2: Program operation mode</b>					
d2-01	Program operation mode selection	Units digit: Operation mode selection 0: Not use 1: Stop after single cycle 2: Keep the final value after a single cycle 3: Loop operation Tens digit: Interrupt operation restart mode selection 0: Restart from the first stage	000	×	75

		1: Continue to run from the stage frequency of the interruption moment 2: Continue to run from the running frequency of the interruption moment Hundreds digit: Power-down storage selection 0: No storage 1: Store the running status of the power-down time; including the running stage, running frequency and running time			
d2-02	Program running time unit selection	0: Second (S) 1: Minute (Min) 2: Hour (Hour)	0	×	77
d2-03	Program running time 1	0.0~3600.0	0.0	○	78
d2-04	Program running time 2	0.0~3600.0	0.0	○	78
d2-05	Program running time 3	0.0~3600.0	0.0	○	78
d2-06	Program running time 4	0.0~3600.0	0.0	○	78
d2-07	Program running time 5	0.0~3600.0	0.0	○	78
d2-08	Program running time 6	0.0~3600.0	0.0	○	78
d2-09	Program running time 7	0.0~3600.0	0.0	○	78
d2-10	Program running time 8	0.0~3600.0	0.0	○	78
d2-11	Program running time 9	0.0~3600.0	0.0	○	78
d2-12	Program running time 10	0.0~3600.0	0.0	○	78
d2-13	Program running time 11	0.0~3600.0	0.0	○	78
d2-14	Program running time 12	0.0~3600.0	0.0	○	78
d2-15	Program running time 13	0.0~3600.0	0.0	○	78
d2-16	Program running time 14	0.0~3600.0	0.0	○	78
d2-17	Program running time 15	0.0~3600.0	0.0	○	78
d2-18	Program running time 16	0.0~3600.0	0.0	○	78
d2-19	Program operation setting 1	Units digit: Rotation speed setting 0: Preset rotation speed X (X=1 to 16) 1: Current speed command 2: Reserved Tens digit: Acceleration/Deceleration time selection 0: Acceleration/Deceleration time 1 1: Acceleration/Deceleration time 2 2: Acceleration/Deceleration time 3 3: Acceleration/Deceleration time 4	00	×	78
d2-20	Program operation setting 2	Same as above	00	×	78
d2-21	Program operation setting 3	Same as above	00	×	78
d2-22	Program operation setting 4	Same as above	00	×	78
d2-23	Program operation setting 5	Same as above	00	×	78
d2-24	Program operation setting 6	Same as above	00	×	78
d2-25	Program operation setting 7	Same as above	00	×	78
d2-26	Program operation setting 8	Same as above	00	×	78
d2-27	Program operation setting 9	Same as above	00	×	78
d2-28	Program operation setting 10	Same as above	00	×	78
d2-29	Program operation setting 11	Same as above	00	×	78
d2-30	Program operation setting 12	Same as above	00	×	78
d2-31	Program operation setting 13	Same as above	00	×	78
d2-32	Program operation setting 14	Same as above	00	×	78
d2-33	Program operation setting 15	Same as above	00	×	78
d2-34	Program operation setting 16	Same as above	00	×	78
<b>d3: Program speed command tuning</b>					
d3-01	Speed deviation limit command selection	0: Not use 1: Use	0	○	79
d3-02	Positive direction maximum deviation	0.0~100.0%	5.0%	○	79
d3-03	Negative direction maximum deviation	-100.0~-0.0%	-5.0%	○	79
d3-04	Jump speed 1	0~Maximum speed	0r/Min	○	79
d3-05	Jump speed 2	0~Maximum speed	0r/Min	○	79
d3-06	Jump speed 3	0~Maximum speed	0r/Min	○	79

Parameter list

d3-07	Jump speed 4	0~Maximum speed	0r/Min	○	79
d3-08	Speed jump amplitude	0~300	0r/Min	○	79
d3-09	Current speed memory selection	0: Not memorize 1: Memorize	1	○	79
d3-10	Contact acceleration and deceleration function selection	0: Not use 1: Use	0	×	80
d3-11	Contact acceleration and deceleration function upper limit speed	MRH lower limit speed~maximum speed	300r/Min	○	80
d3-12	Contact acceleration and deceleration function lower limit speed	-Maximum speed~MRH upper limit speed	0r/Min	○	80
d3-13	Contact acceleration and deceleration adjustment step size	1~300(Special for terminal UP/DOWN)	3r/Min	○	80
<b>d4: Program speed command tuning</b>					
d4-01	Torque command given	-200~200%	0%	○	80
<b>d5: Offset frequency</b>					
d5-01	Offset frequency 1	-100.0~100.0%	0.0%	○	80
d5-02	Offset frequency 2	-100.0~100.0%	0.0%	○	80
d5-03	Offset frequency 3	-100.0~100.0%	0.0%	○	81

**A.2.5 E:Motor parameter group**

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>E1: Motor type</b>					
E1-01	Motor type selection	0: Ordinary induction motor 1: Variable frequency motor 2: Reserved 3: Reserved	0	×	81
<b>E2: Motor operating range</b>					
E2-01	Maximum operating speed of the motor	300~14700r/Min	1500r/Min	×	81
E2-02	Minimum operating speed of the motor	(SVC) 12~Maximum speed	12r/Min	○	81
		(VC) 0~Maximum speed	0r/Min	○	81
<b>E3: Carrier frequency setting</b>					
E3-01	Carrier frequency setting	1.0~10.0kHz	6.0kHz	×	82
<b>E4: Motor nameplate parameters</b>					
E4-01	Motor rated capacity	0~Inverter rated capacity	Determined by model	×	82
E4-02	Motor rated voltage	0~120% of inverter rated voltage	Determined by model	×	82
E4-03	Motor rated current	0~150% of inverter rated current	Determined by model	×	82
E4-04	Motor rated speed	0~60000r/min	Determined by model	×	82
E4-05	Motor pole number	2~12Pole	4Pole	×	82
E4-06	Motor rated frequency	0~(Rated speed* Poles / 120Hz + 5Hz)	Determined by model	×	82
E4-07	Motor cooling type	0: Self-cooling fan 1: Forced cooling fan	0	×	82
E4-09	Motor tuning method selection	0: No tuning command 1: Still mode tuning 2: Rotate full mode tuning	0	×	82
<b>E7: Motor electrical parameters</b>					
E7-01	Motor primary side resistance	Different setting ranges for different motor capacity	Determined by model	×	83
E7-02	Motor secondary side resistance	Different setting ranges for different motor capacity	Determined by model	×	83

E7-03	Motor leakage inductance	Different setting ranges for different motor capacity	Determined by model	×	83
E7-04	Motor mutual inductance	Different setting ranges for different motor capacity	Determined by model	×	83
E7-05	Motor inductance saturation compensation 1	0.0~50.0%	0.0%	○	83
E7-06	Motor inductance saturation compensation 2	0.0~50.0%	0.0%	×	83
E7-07	Motor iron loss conductance	0.0~600.0mho	0.0mho	×	83
E7-08	Motor loss coefficient 1	0.0~200.0%	0.0%	×	83
E7-09	Motor loss coefficient 2	0.0~200.0%	0.0%	×	83

## A.2.6 F:2nd motor parameter group

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>F1: 2nd Motor type selection and enable</b>					
F1-01	The 2nd motor type selection	0: Ordinary induction motor 1: Variable frequency motor 2: Reserved 3: Reserved	0	×	84
F1-03	The 2nd motor use selection	0: Do not use the 2nd motor 1: Use the 2nd motor	0	×	84
<b>F2: 2nd Motor nameplate parameters</b>					
F2-01	The 2nd Induction motor rated capacity	0~Inverter rated capacity	Determined by model	×	84
F2-02	The 2nd Induction motor rated voltage	0~120% of inverter rated voltage	Determined by model	×	84
F2-03	The 2nd Induction motor rated current	0~150% of inverter rated current	Determined by model	×	84
F2-04	The 2nd Induction motor rated speed	0~6000r/min	Determined by model	×	84
F2-05	The number of poles of the second induction motor	2~12Pole	4Pole	×	84
F2-06	The 2nd Induction motor rated frequency	0~(Rated speed * poles / 120Hz + 5Hz)	Determined by model	×	84
F2-07	The 2nd Induction motor cooling type	0: Self-cooling fan 1: Forced cooling fan	0	×	84
<b>F4: 2nd motor electrical parameters</b>					
F4-01	The 2nd Induction motor primary side resistance	Different setting ranges for different motor capacity	Determined by model	×	84
F4-02	The 2nd Induction motor secondary side resistance	Different setting ranges for different motor capacity	Determined by model	×	84
F4-03	The 2nd Induction motor leakage inductance	Different setting ranges for different motor capacity	Determined by model	×	85
F4-04	The 2nd Induction motor mutual inductance	Different setting ranges for different motor capacity	Determined by model	×	85
F4-05	The 2nd Induction motor inductance saturation compensation 1	0.0~50.0%	0.0%	○	85
F4-06	The 2nd Induction motor inductance saturation compensation 2	0.0~50.0%	0.0%	×	85
F4-07	The 2nd Induction motor iron loss conductance	0.0~600.0mho	0.0mho	×	85
F4-08	The 2nd Induction motor loss coefficient 1	0.0~200.0%	0.0%	×	85
F4-09	The 2nd Induction motor loss coefficient 2	0.0~200.0%	0.0%	×	85
<b>F6: 2nd motor supplementary adjustment parameter</b>					
F6-02	The 2nd Induction motor	3~100	15	○	85

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	speed control proportional gain				
F6-03	The 2nd Induction motor speed control integral time constant	20~10000ms	40ms	○	85
F6-04	The 2nd Induction motor speed control inertia	0~65535gm <sup>2</sup>	10gm <sup>2</sup>	○	85
F6-09	The 2nd Induction motor acceleration/deceleration time selection	0: Acceleration/Deceleration time 1 1: Acceleration/Deceleration time 2 2: Acceleration/Deceleration time 3 3: Acceleration/Deceleration time 4	2	×	85
F6-10	The 2nd Induction motor jog acceleration/deceleration time selection	Same as above	3	×	85
F6-11	The 2nd Induction motor S curve acceleration /deceleration use selection	0: Not use 1: Use 1 2: Use 2	0	×	86
F6-12	Action selection when the 2nd motor generates oS (over speed)	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, Decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop	4	×	86
F6-13	The 2nd Induction motor forward side over speed setting	0~Maximum speed *1.5	1900r/Min	×	86
F6-14	The 2nd Induction motor reverse side over speed setting	-Maximum speed *1.5~0	-1900r/Min	×	86
F6-15	The 2nd Induction motor oS (over speed) detection time	0.0~2.0s	0.5s	×	86
F6-26	The 2nd Induction motor overload protection coefficient	20~110%	100%	○	86

**A.2.7 G:Optional card**

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>G1: PG card</b>					
G1-01	Pulse number of PG1	1~6000ppr	1024ppr	×	86
G1-02	PG1 rotation direction setting	0: When the motor rotates forward, phase A advance 1: When the motor rotates forward, phase B advance	0	×	86
G1-03	PG1 gear teeth number 1	0~1000	0	×	86
G1-04	PG1 gear teeth number 2	0~1000	0	×	86
G1-05	PG1 output frequency division ratio	0 (1/1)~5 (1/32)	0	×	86
G1-06	PG1 hardware disconnection checkout selection	0: Hardware disconnection detection is invalid. 1: Hardware disconnection detection is valid	1	×	87
G1-07	Optional card function selection of PG1	0: A phase is detected 1: AB phase are detected	1	×	87
G1-11	Action selection when PGo (PG disconnection) is detected	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop	4	×	87
G1-12	PGo (PG disconnection) checkout time	0.0~10.0s	2.0s	×	87
G1-16	dEv (Speed deviation is too large) action selection when detected	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop,	0	×	87

		decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop			
G1-17	dEv (Speed deviation too large) detection value	0~50%	10%	×	87
G1-18	dEv (Speed deviation too large) detection time	0.0~10.0s	0.5s	×	87
G1-19	PG1's dv3 (Reverse detection) detection time	0~10	10	×	87
G1-20	PG1's dv4 (Prevent reverse detection) checkout selection	0~5000ppr	128ppr	×	87
<b>G6: Communication card</b>					
G6-01	Action selection when bUS (Optional communication card fault) is detected	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop 4: Fault, Free running stop	0	○	87
G6-02	bUS (optional communication failure) detection selection	0: Invalid 1: Valid	0	○	88
G6-04	bUS (optional communication failure) detection time	0~10s	0s	○	88
G6-05	PROFIBUS-DP Version	-		○	88
G6-06	PROFIBUS-DP Control word: AND	0~65535	0	○	88
G6-07	PROFIBUS-DP Control word: OR	0~65535	65535	○	88
G6-08	PROFIBUS-DP Status word: AND	0~65535	0	○	88
G6-09	PROFIBUS-DP Status word: OR	0~65535	65535	○	89
G6-10	Write PZD1 scale factor	0.1%~6553.5%	100.0%	○	89
G6-11	Write PZD2 scale factor	0.1%~6553.5%	100.0%	○	89
G6-12	Write PZD3 scale factor	0.1%~6553.5%	100.0%	○	89
G6-13	Write PZD4 scale factor	0.1%~6553.5%	100.0%	○	89
G6-14	Write PZD5 scale factor	0.1%~6553.5%	100.0%	○	89
G6-15	Write PZD6 scale factor	0.1%~6553.5%	100.0%	○	89
G6-16	Write PZD7 scale factor	0.1%~6553.5%	100.0%	○	89
G6-17	Write PZD8 scale factor	0.1%~6553.5%	100.0%	○	89
G6-18	Write PZD9 scale factor	0.1%~6553.5%	100.0%	○	89
G6-19	Write PZD10 scale factor	0.1%~6553.5%	100.0%	○	89
G6-20	Read PZD1 scale factor	0.1%~6553.5%	100.0%	○	89
G6-21	Read PZD2 scale factor	0.1%~6553.5%	100.0%	○	89
G6-22	Read PZD3 scale factor	0.1%~6553.5%	100.0%	○	89
G6-23	Read PZD4 scale factor	0.1%~6553.5%	100.0%	○	89
G6-24	Read PZD5 scale factor	0.1%~6553.5%	100.0%	○	89
G6-25	Read PZD6 scale factor	0.1%~6553.5%	100.0%	○	89
G6-26	Read PZD7 scale factor	0.1%~6553.5%	100.0%	○	89
G6-27	Read PZD8 scale factor	0.1%~6553.5%	100.0%	○	89
G6-28	Read PZD9 scale factor	0.1%~6553.5%	100.0%	○	89
G6-29	Read PZD10 scale factor	0.1%~6553.5%	100.0%	○	89
G6-30	PROFIBUS-DP Node address	1~247	1	○	90
G6-31	Write PZD symbol settings	0-1023	0	○	90
G6-32	PROFIBUS-DP protocol type	0: PPO1 1: PPO2 2: PPO3 3: PPO5	0	○	90
G6-33	DeviceNet Site	0~63	0	○	90
G6-34	DeviceNet baud rate	0: 500K 1: 250K 2: 125K	0	○	90
G6-35	CANopen Node address	1~247	1	○	90
G6-36	CANopen communication	0: 1M	3	○	90

	speed	1: 800K 2: 500K 3: 250K 4: 125K 5: 100K 6: 50K 7: 20K			
G6-37	DeviceNet IO input length	0~16	0	×	91
G6-38	DeviceNet IO output length	0~16	0	×	91
G6-39 ~ G6-54	DeviceNet IO input address area	From 0x3000-0x3012 or from 0x0B01-0x0B92, The specific meaning refer to DeviceNet manual	0	×	91
G6-55 ~ G6-70	DeviceNet IO output address area	From 0x3000-0x3012, the specific meaning refer to DeviceNet manual	0	×	91

## A.2.8 H:Terminal function selection

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>H1:Multi-function input terminal</b>					
H1-01	Multi-function input terminal positive and negative logic setting	0000~0FFFH	0000	×	92
H1-02	X1 terminal function selection	0: Pass mode 1: Three-wire control 2: LOCAL/REMOTE selection 3: Command switching 4: Forward running command (2-wire control) 5: Reverse running command (2-wire control) 6: Run command (2-wire control 2) 7: Forward/Reverse command 2 (2-wire control 2) 8: Multi-speed selection command 1 9: Multi-speed selection command 2 10: Multi-speed selection command 3 11: Multi-speed selection command 4 12: Jog frequency selection 13: UP command 14: DOWN command 15: Reserved 16: Reserved 17: FJOG command 18: RJOG command 19: Acceleration/Deceleration time selection 1 20: Acceleration/Deceleration time selection 2 21: Base blockade command 22: Speed/Frequency maintain 23: S curve acceleration and deceleration is prohibited 24: Reserved 25: Droop control does not work 26: Inverter overheat warning 27: Multi-function analog input selection 28: Analog frequency command Sampling/Maintaining 29: Speed control (ASR) proportional gain switching 30: PID control pause 31: PID parameterswitching 32: PID integral maintain 33: PID control canceled 34: PID input feature switching 35: Fault reset 36: Emergency stop	4	×	93

		37: Motor switching command (Motor 2 selection) 38: Timing function input 39: Reserved 40: External fault signal 1 (Detected when it is normally open, Alarmed and stopped according to stop mode) 41: External fault signal 2 (Checked out during normally open running, Alarm and stopped according to stop mode) 42: External fault signal 3 (Detected when it is normally open, fault and free stop) 43: External fault signal 4 (Checked out during normally open running, fault and free stop) 44: External fault signal 5 (Checked out when it is normally open, alarm and emergency stop) 45: External fault signal 6 (Always checked out when it is normally open, alarm and emergency stop) 46: External fault signal 7 (Checked out when it is normally open, alarm and continue to run) 47: External fault signal 8 (Checked out during normally open running, alarm and continue to run) 48: Offset frequency 1 stacking 49: Offset frequency 2 stacking 50: Offset frequency 3 stacking 51: DC braking command 52: Pre-excitation command 53: Reserved 54: Reserved 55: Reserved 56: Drive enable 57: Speed/Torque control switching 58: Polarity reversal command of external torque command 59: Reserved 60: Reserved 61: Multi-section closed-loop terminal 1 62: Multi-section closed-loop terminal 2 63: Multi-section closed-loop terminal 3 64~99: Reserved			
H1-03	X2 terminal function selection	Same as above	5	×	93
H1-04	X3 terminal function selection	Same as above	42	×	93
H1-05	X4 terminal function selection	Same as above	35	×	93
H1-06	X5 terminal function selection	Same as above	8	×	93
H1-07	X6 terminal function selection	Same as above	9	×	93
H1-08	X7 terminal function selection	Same as above	12	×	93
H1-09	X8 terminal function selection	Same as above	21	×	93
H1-10	X9 terminal function selection	Same as above	0	×	93
H1-11	X10 terminal function selection	Same as above	0	×	93
H1-12	X11 terminal function selection	Same as above	0	×	93
H1-13	X12 terminal function selection	Same as above	0	×	93
H1-14	Terminal detection debounce time	0~65535ms	0ms	○	102
H1-16	X1 terminal ON delay time	0.0~3000.0s	0.0s	○	102
H1-17	X1 terminal OFF delay time	0.0~3000.0s	0.0s	○	102
H1-18	X2 terminal ON delay time	0.0~3000.0s	0.0s	○	102
H1-19	X2 terminal OFF delay time	0.0~3000.0s	0.0s	○	102
H1-20	X3 terminal ON delay time	0.0~3000.0s	0.0s	○	102
H1-21	X3 terminal OFF delay time	0.0~3000.0s	0.0s	○	102
H1-22	X4 terminal ON delay time	0.0~3000.0s	0.0s	○	102
H1-23	X4 terminal OFF delay time	0.0~3000.0s	0.0s	○	102

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H1-24	X5 terminal ON delay time	0.0~3000.0s	0.0s	○	102
H1-25	X5 terminal OFF delay time	0.0~3000.0s	0.0s	○	102
H1-26	X6 terminal ON delay time	0.0~3000.0s	0.0s	○	102
H1-27	X6 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
H1-28	X7 terminal ON delay time	0.0~3000.0s	0.0s	○	103
H1-29	X7 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
H1-30	X8 terminal ON delay time	0.0~3000.0s	0.0s	○	103
H1-31	X8 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
H1-32	X9 terminal ON delay time	0.0~3000.0s	0.0s	○	103
H1-33	X9 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
H1-34	X10 terminal ON delay time	0.0~3000.0s	0.0s	○	103
H1-35	X10 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
H1-36	X11 terminal ON delay time	0.0~3000.0s	0.0s	○	103
H1-37	X11 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
H1-38	X12 terminal ON delay time	0.0~3000.0s	0.0s	○	103
H1-39	X12 terminal OFF delay time	0.0~3000.0s	0.0s	○	103
<b>H2:Multi-function output terminal</b>					
H2-01	Multi-function output terminal positive and negative logic setting	0000~003FH	0000	×	103
H2-02	RLY1 Function selection (Contact)	0: Pass mode 1: Running 2: Run mode (1 is Local) 3: The inverter is ready for operation (READY) 4: Drive enable 5: Frequency command selection status (1 is the operator) 6: Run command status (1 is the operator) 7~10: Reserved 11: Fault 12: Light fault 13: Fault reset 14: Fault retry 15: Base blockade 16:Uv (Main circuit under voltage) detecting 17: Motor overload oL1 (Including oH3) warning 18: oH (Inverter overheat warning) warning 19~23: Reserved 24: FCL action 25~30: Reserved 31: Zero speed 32: Frequency (Speed) is consistent 1 33: Any frequency (Speed) is consistent 1 34: Frequency (Speed) is consistent 2 35: Any frequency (Speed) is consistent 2 36: Frequency (FOUT) checkout 1 37: Frequency (FOUT) checkout 2 38: Frequency (FOUT) checkout 3 39: Frequency (FOUT) checkout 4 40: Loss of frequency command 41: Over torque/Under torque detection 1 42: Over torque/Under torque detection 2 43: Timing function output 44: Reverse running 45: Reserved 46: Motor selection (Motor 2 selection) 47: Speed search 48: Reserved 49: Emergency stop 50: Reserved 51: PID feedback is abnormal 52: PID feedback error amount is abnormal 53: Torque limit (Current limit)	11	×	104

		54~56: Reserved 57: Frequency output 58~99: Reserved			
H2-03	RLY2 Function selection (contact)	Same as above	1	×	104
H2-04	Terminal Y1 function selection (Photocoupler)	Same as above	31	×	104
H2-05	Terminal Y2 function selection (Photocoupler)	Same as above	32	×	104
H2-06	Terminal Y3 function selection (Open collector)	Same as above	3	×	104
H2-07	Terminal Y4 function selection (Open collector)	Same as above	12	×	104
H2-08	Frequency detection value	0~Maximum speed	0r/Min	×	111
H2-09	Frequency detection amplitude	0~600r/min	150r/min	×	111
H2-10	Frequency detection value (± single side checkout)	-maximum speed~maximum speed	0r/Min	×	111
H2-11	Frequency detection amplitude (± Single side checkout)	0~600r/min	150r/min	×	111
H2-12	Frequency detection condition	0: Frequency detection is not performed during shutdown 1: Frequency detection is also performed during shutdown	0	×	111
H2-13	Over torque/under torque detection action selection 1	0: Invalid 1: Only detect the over-torque when the speed is consistent, and it continues to run after the detection (Warning) 2: Detect the over-torque during running, and it continues to run after the detection.(Warning) 3: Only detect the over-torque when the speed is consistent, and cut off the output after detection (Protection action) 4: Detect the over-torque during running, and cut off the output after detection (Protection action) 5: Only detect the under torque when the speed is consistent, and it continues to run after the detection.(Warning) 6: Detect the under torque during running, and it continues to run after the detection.(Warning) 7: Only detect the under torque when the speed is consistent, and cut off the output after detection (Protection action) 8: Detect the under torque during running, and cut off the output after detection (Protection action)	0	×	111
H2-14	Over torque/Under torque detection value 1	0~300%	150%	×	112
H2-15	Over torque/Under torque detection time 1	0.0~10.0s	0.1s	×	112
H2-16	Over torque/Under torque detection action selection 2	0: Invalid 1: Only detect the over-torque when the speed is consistent, and it continues to run after the detection.(Warning) 2: Detect the over-torque during running, and it continues to run after the detection.(Warning) 3: Only detect the over-torque when the speed is consistent, and cut off the output after detection (Protection action) 4: Detect the over-torque during running, and cut off the output after detection (Protection action) 5: Only detect the under torque when the speed is consistent, and it continues to run after the detection.(Warning) 6: Detect the under torque during running, and it	0	×	112

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		continues to run after the detection.(Warning) 7: Only detect the under torque when the speed is consistent, and cut off the output after detection (Protection action) 8: Detect the under torque during running, and cut off the output after detection (Protection action)			
H2-17	Over torque/Under torque detection value 2	0~300%	150%	×	112
H2-18	Over torque / Under torque detection time 2	0.0~10.0s	0.1s	×	112
H2-22	H2-02 terminal ON delay time	0~65535ms	0ms	○	113
H2-23	H2-02 terminal OFF delay time	0~65535ms	0ms	○	113
H2-24	H2-03 terminal ON delay time	0~65535ms	0ms	○	113
H2-25	H2-03 terminal OFF delay time	0~65535ms	0ms	○	113
H2-26	H2-04 terminal ON delay time	0~65535ms	0ms	○	113
H2-27	H2-04 terminal OFF delay time	0~65535ms	0ms	○	113
H2-28	H2-05 terminal ON delay time	0~65535ms	0ms	○	113
H2-29	H2-05 terminal OFF delay time	0~65535ms	0ms	○	113
H2-30	H2-06 terminal ON delay time	0~65535ms	0ms	○	113
H2-31	H2-06 terminal OFF delay time	0~65535ms	0ms	○	113
H2-32	H2-07 terminal ON delay time	0~65535ms	0ms	○	113
H2-33	H2-07 terminal OFF delay time	0~65535ms	0ms	○	113
<b>H3:Multi-function analog input terminal</b>					
H3-01	Terminal A11 signal level selection	0: 0~10V 1: -10~10V 2: 0~20mA Note: The switching of the Voltage/Current input of terminal A11 is set by toggle switch SW1.	0	×	114
H3-02	Terminal A11 function selection	0: Main frequency command (Stacking when multiple terminals are repeatedly set) - For the first speed 1: Frequency gain 2: Auxiliary frequency command 1 3: Auxiliary frequency command 2 4: Frequency offset (Stacked to the main speed) 5: Reserved 6: Reserved 7: Over torque/under torque detection value 8: Reserved 9: Output frequency lower limit 10: PID feedback 11: PID target value 12: Reserved 13: Reserved 14: Motor temperature input (PTC input) 15: Positive side torque limit value 16: Negative side torque limit value 17: Regenerative torque limit value 18: Positive and negative torque limit values on both sides 19: Torque command 20~98: Reserved 99: Pass mode	0	×	114
H3-03	Terminal A11 input gain	-999.9~999.9%	100.0%	○	115
H3-04	Terminal A11 input offset	-999.9~999.9%	0.0%	○	115
H3-05	Terminal A13 signal level selection	0: 0~10V 1: -10~10V	0	×	115

H3-06	Terminal AI3 function selection	Same as H3-02	2	×	115
H3-07	Terminal AI3 input gain	-999.9~999.9%	100.0%	○	115
H3-08	Terminal AI3 input offset	-999.9~999.9%	0.0%	○	115
H3-09	Terminal AI2 signal level selection	0: 0~10V 1: -10~10V 2: 0~20mA Note: The switching of the Voltage/Current input of terminal AI2 is set by toggle switch SW2.	2	×	116
H3-10	Terminal AI2 function selection	Same as H3-02	0	×	116
H3-11	Terminal AI2 input gain	-999.9~999.9%	100.0%	○	116
H3-12	Terminal AI2 input offset	-999.9~999.9%	0.0%	○	116
H3-13	Filter time constant of analog input	0.00~2.00s	0.03s	○	116
H3-14	Analog input terminal valid / invalid selection	1: The object is terminal AI1 2: The object is terminal AI2 3: The object is terminal AI1, AI2 4: The object is terminal AI3 5: The object is terminal AI1, AI3 6: The object is terminal AI2, AI3 7: The object is all terminals	7	×	116
<b>H4:Multi-function analog output terminal</b>					
H4-01	Terminal AO1 monitor selection	U1-01~U6-20(The monitored value corresponds to the relevant parameter in the monitoring group)	U1-02	×	116
H4-02	Terminal AO1 monitor gain	0.0~999.9%	100.0%	○	117
H4-03	Terminal AO1 monitor offset	-999.9~999.9%	0.0%	○	117
H4-04	Terminal AO2 monitor selection	U1-01~U6-20(The monitored value corresponds to the relevant parameter in the monitoring group)	U1-03	×	117
H4-05	Terminal AO2 monitor gain	0.0~999.9%	50.0%	○	117
H4-06	Terminal AO2 monitor offset	-999.9~999.9%	0.0%	○	117
<b>H5:MODBUS communication</b>					
H5-01	Slave address	0~255 (Set the slave address of the inverter, it is valid after the power is turned on again)	1	×	117
H5-02	Communication speed selection	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps 4: 38400bps 5: 57600bps 6: 115200bps	3	×	117
H5-03	Communication data format selection	0: 1-8-1 format, No parity check, RTU 1: 1-8-1 format, Even parity check, RTU 2: 1-8-1 format, Odd parity check, RTU 3~5: Reserved	0	×	117
H5-04	Action selection when CE (MODBUS communication error) is detected	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop 4: Fault, Free running stop	2	×	118
H5-05	CE (MODBUS communication failure) detection selection	0: Invalid 1: Valid	0	×	118
H5-06	Communication waiting time	5~100ms	5ms	×	118
H5-09	CE (MODBUS communication failure) check time	0.0~10.0s	2.0s	×	118
<b>H6:Pulse sequence input/output terminal</b>					
H6-01	Pulse sequence input function selection	0: Frequency command 1: PID feedback value 2: PID target value 3: Reserved	0	×	119

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H6-02	Pulse sequence input ratio	100~5000Hz	1440Hz	○	119
H6-03	Pulse sequence input gain	0.0~1000.0%	100.0%	○	119
H6-04	Pulse sequence input bias	-100.0~100.0%	0.0%	○	119
H6-05	Pulse sequence input filtering time	0.00~2.00s	0.10s	○	119
H6-06	Pulse sequence input minimum frequency	0.1~1000.0Hz	0.5Hz	×	119
H6-07	Pulse sequence monitoring selection	U1-01~U6-20	U1-02	○	119
H6-08	Pulse sequence monitoring ratio	100~5000Hz	1440Hz	○	120

**A.2.9 L:Protection selection**

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>L1: Motor protection</b>					
L1-03	Motor overload protection coefficient	20~110%	100%	○	120
L1-05	Over torque protection function selection (Vector control)	0: Invalid 1: Valid	1	×	120
L1-06	Over torque protection action value setting	110~400%	150%	○	121
L1-07	Over torque protection action reference torque	50~105%	105%	○	121
<b>L2: DC voltage control function</b>					
L2-01	Main circuit under voltage detection value	300.0~420.0V(380VAC voltage level)	400.0V	×	121
L2-10	Brake tube brake starting voltage	600.0~820.0V(380VAC voltage level)	750.0V	×	121
L2-21	Prevent regeneration stall function selection	0: Not use 1: Use	0	×	121
L2-22	Overvoltage suppression starting voltage	600.0~820.0V(380VAC voltage level)	720.0V	×	121
<b>L4: Over speed protection and speed control error</b>					
L4-01	Action selection when oS (over speed) occurs	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop	4	×	122
L4-02	Forward side overspeed setting	0~Maximum speed *1.5	1900r/min	×	122
L4-03	Reverse side overspeed setting	-Maximum speed *1.5~0	-1900r/min	×	122
L4-04	oS (overspeed) checkout time	0.0~2.0s	0.5s	×	122
L4-05	Speed control error function selection	0: Not use 1: Use	0	×	122
L4-06	Speed control error speed amplitude detected on the forward side	50~500r/Min	100r/min	×	122
L4-07	Speed control error speed amplitude detected on the reverse side	-500~-50r/Min	-100r/min	×	122
L4-08	Action selection when frequency command is lost	0: No detection 1: Alarm, Continue to run 2: Alarm, Slow down running When the frequency command is reduced to "frequency command before 0.4 seconds × 10% ", It	0	×	122

		is operated according to "frequency command before 0.4 seconds × speed of L4-06".			
L4-09	Frequency command when frequency command is lost	0.0~100.0% (Frequency command value when the setting frequency command is lost)	80.0%	×	122
<b>L5: Fault management</b>					
L5-01	Fault retry times	0~10	0	×	123
L5-02	Fault contact action selection during fault retry	0: Fault contact is not output during fault retry 1: Output fault contact in fault retry	0	×	123
L5-03	Fault retry interval timing	0.5~600.0s	10.0s	×	123
L5-05	Protection action selection 1	Units digit: PID given loss detection action 0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop Tens digit: PID feedback loss detection action 0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, free running to stop Hundreds digit: PID error amount abnormal detection action 0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop	000	×	123
L5-06	Protection action selection 2	Units digit: Terminal block E <sup>2</sup> PROM operation abnormal detection action 0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, free running to stop Tens digit: control board FRAM operation abnormal detection action 0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode 3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time) 4: Fault, Free running to stop	11	×	124
<b>L8: Other protection</b>					
L8-01	FCL level adjustment	80~125%	100%	○	125
L8-02	Minimum base blockade (bb) time	0.1~5.0s	0.1s	×	125
L8-03	Inverter overload protection coefficient	20~110	100%	*	125
L8-04	oH (Inverter overheating) warning detection value	50~130℃(Set inverter overheat warning)	80℃	*	125
L8-05	oH (Inverter overheating) warning action selection	0: No detection 1: Alarm, Continue to run 2: Alarm, Stop by stop mode	1	×	126

Parameter list

		3: Alarm, Emergency stop (If it is deceleration stop, decelerate to stop according to C1-11 emergency stop time)			
L8-07	Input phase loss protection selection	0: Invalid 1: Valid	1	×	126
L8-08	Output phase loss protection selection	0: Invalid 1: Valid	0	×	126
L8-10	Cooling fan ON/OFF control selection	0: ON/OFF control is valid (only action during inverter operation) 1: ON/OFF control is invalid (action when power is turned ON)	0	×	126
L8-11	Delay time of cooling fan ON/OFF control	0~300s	60s	×	126
L8-12	PID given loss detection value	0~100%	0%	○	126
L8-13	PID given loss detection time	0.0~20.0s	0.5s	○	126
L8-14	PID feedback loss detection value	0~100%	12%	○	126
L8-15	PID feedback loss detection time	0.0~20.0s	0.5s	○	126
L8-16	PID error amount abnormal detection value	0~100%	50%	○	127
L8-17	PID error amount abnormal detection time	0.0~20.0s	0.5s	○	127
L8-20	Current warning selection	0: Invalid (No output) 1: Valid (Output)	0	×	127
<b>L9: Maintenance</b>					
L9-02	Cumulative running time selection	0: Accumulated power-on time of the inverter (Accumulated time from power-on to cut-off) 1: Accumulated inverter running time (Accumulated time of inverter output status)	0	×	127
L9-07	U2, U3 initialization selection	0: Keep U2 and U3 group fault record parameters 1: Clear U2 and U3 group fault record parameters	0	×	127
L9-09	Running times initialization selection	0: Keep running times 1: Initialize the running times (Returns 0 after initialization)	0	×	127

**A.2.10 O: Operator related parameters**

Function code	Name	Setting range	Factory setting	Modify	Page No.
<b>o1: Display setting/selection</b>					
o1-01	Drive mode display 1 item selection	U1-04 (Control mode)~U6-20	U1-05	×	128
o1-02	Monitor display 1 item selection when power is ON	1: Frequency/Speed command [U1-01] 2: Output frequency/Speed [U1-02] 3: Output current [U1-03] 4: Monitoring items set with o1-01	1	×	128
o1-03	Drive mode display 2 item selection	U1-04 (control mode)~U6-20	U1-06	×	128
o1-04	Monitor display 2 item selection when power is ON	1: Frequency/Speed command [U1-01] 2: Output frequency/Speed [U1-02] 3: Output current [U1-03] 4: Monitoring items set with o1-03	2	×	128
o1-05	Drive mode display 3 item selection	U1-04 (Control mode)~U6-20	U1-07	×	128
o1-06	Monitor display 3 item selection when power is ON	1: Frequency/Speed command [U1-01] 2: Output frequency/Speed [U1-02] 3: Output current [U1-03] 4: Monitoring items set with o1-05	3	×	128
o1-07	Frequency related parameter display unit setting	0: In units of 0.1 Hz 1: Min-1 unit (Automatically calculated by the highest output frequency and motor pole number)	0	×	128

o2:Multi-function selection					
o2-01	Function selection of LOCAL/REMOTE button	0: Invalid 1: Valid	1	×	129
o2-02	STOP button function selection	0: Invalid 1: Valid	1	×	129
o2-03	User parameter setting value saving (Used with terminal block)	0: Invalid 1: Saving start 2: Saving clear	0	×	129
o2-06	Action selection when the operator is disconnected	0: Invalid 1: Valid	0	×	130
o2-07	UP/DOWN integration function selection	0: Enable 1: Prohibited	0	×	130
o2-08	UP/DOWN adjustment step size	1~300	1	×	130
o3:Copy/read function					
o3-01	Copy action selection	0: Copy command waiting 1: Upload parameters 2: Download parameters	0	×	130
o3-02	Read action permission	0: Invalid (Parameters are not allowed to be read into the operator) 1: Valid (Parameters are allowed to be read into the operator)	0	×	130

## A.2.11 U: Monitoring

Function code	Name	Setting range	Minimum unit	Output signal level at multi-function analog output
U1: Status monitoring				
U1-01	Frequency/Speed command	-32767~32767r/min	1r/min	10V: Max. freq.
U1-02	Output frequency/Speed	-32767~32767r/min	1r/min	10V: Max. freq.
U1-03	Output current	0.0~6553.5A	0.1A	10V: 2 times inverter rated current
U1-04	Control mode	0~6	1	Cannot output
U1-06	Motor speed	-32767~32767r/min	1r/min	10V: 3 times motor synchronous speed
U1-07	Output voltage command	0.0~1000.0V	0.1V	10V: 400Vrms
U1-08	Main circuit DC voltage	0.0~1000.0V	0.1V	10V: 800.0V
U1-10	Torque command (Internal)	-400%~400%	1%	10V: 2 times motor rated torque
U1-11	Input terminal status 1	0~65535	1	Cannot output
U1-12	Input terminal status 2	0~65535	1	Cannot output
U1-13	Output terminal status	0~65535	1	Cannot output
U1-14	Running status 1	0~65535	1	Cannot output
U1-15	A11 input voltage	Display terminal A11 input voltage	0.1%	10V: 100.0%
U1-16	A12 input voltage	Display terminal A12 input voltage	0.1%	10V: 100.0%
U1-17	A13 input voltage	Display terminal A13 input voltage	0.1%	10V: 100.0%
U1-18	Frequency after soft start	-32767~32767r/min	1r/min	10V: Max. freq.
U1-19	User parameter backup	0: Without backup 1: With backup	1	Cannot output
U1-20	Running status 2	0~65535	1	Cannot output
U1-21	Number of program runs	0~16	1	Cannot output
U1-25	Input pulse monitoring	0~100.00KHz	0.01Hz	
U1-26	Function CPU version 1	0.00~655.35	-	Cannot output
U1-27	Function CPU version 2	0.00~655.35	-	Cannot output
U1-28	Algorithm CPU version	0.000~65.535	-	Cannot output
U1-34	Internal latching reason	0~255	-	
U1-35	U phase DC bias	-32768~32767	-	
U1-36	V phase DC bias	-32768~32767	-	
U1-37	W phase DC bias	-32768~32767	-	
U1-38	Internal model	0~65535	-	

Parameter list

U1-39	Internal carrier frequency	1.0~15.0	1kHz	
U1-40	Internal control mode	0~65535	-	
U1-41	Internal command status 1	0~65535	-	Cannot output
U1-42	Internal command status 2	0~65535	-	Cannot output
U1-43	Internal command status 3	0~65535	-	Cannot output
U1-44	Internal command status 4	0~65535	-	Cannot output
U1-45	Internal feedback status 1	0~65535	-	Cannot output
U1-46	Internal feedback status 2	0~65535	-	Cannot output
U1-47	Internal feedback status 3	0~65535	-	Cannot output
U1-48	Internal feedback status 4	0~65535	-	Cannot output
<b>U2: Fault tracking</b>				
U2-01	Currently happening fault	0~200	-	Cannot output
U2-02	Past faults	0~200	-	Cannot output
U2-03	Frequency command at fault	-32767~32767r/min	1r/min	Cannot output
U2-04	Output frequency at fault	-32767~32767r/Min	1r/Min	Cannot output
U2-05	Output current at fault	0.0~6553.5A	A	Cannot output
U2-06	Motor speed at fault	-32767~32767r/Min	1r/Min	Cannot output
U2-07	Output voltage command at fault	0.0~1000.0V	0.1V	Cannot output
U2-08	Main circuit DC voltage at fault	0.0~1000.0V	0.1V	Cannot output
U2-10	Torque command at fault	-400%~400%	1%	Cannot output
U2-11	Input terminal status 1 at fault	0~65535	-	Cannot output
U2-12	Input terminal status 2 at fault	0~65535	-	Cannot output
U2-13	Output terminal status at fault	0~65535	-	Cannot output
U2-14	Running status 1 at fault	0~65535	-	Cannot output
U2-15	Cumulative running time at fault	0~65535h	1h	Cannot output
U2-16	Soft start speed command at fault	-32767~32767r/min	1r/Min	Cannot output
U2-17	q axis current of the motor at fault	-400.0~400.0%	1%	Cannot output
U2-18	d axis current of the motor at fault	-400.0~400.0%	1%	Cannot output
U2-19	Running status 2 at fault	0~65535	-	Cannot output
U2-20	Module temperature at fault	0~150	1℃	Cannot output
U2-21	Peak hold current at fault	0.0~6553.5A	A	Cannot output
U2-22	Peak hold frequency at fault	-32767~32767r/min	1r/Min	Cannot output
U2-24	U phase current instantaneous value at fault	-3276.7~3276.7A	0.1A	Cannot output
U2-25	V phase current instantaneous value at fault	-3276.7~3276.7A	0.1A	Cannot output
U2-26	W phase current instantaneous value at fault	-3276.7~3276.7A	0.1A	Cannot output
<b>U3: Fault record</b>				
U3-01	Fault content occurred 1 time before	Display fault content occurred 1 time before	-	Cannot output
U3-02	Fault content occurred 2 times before	Display fault content occurred 2 times before	-	Cannot output
U3-03	Fault content occurred 3 times before	Display fault content occurred 3 times before	-	Cannot output
U3-04	Fault content occurred 4 times before	Display fault content occurred 4 times before	-	Cannot output
U3-05	Fault content occurred 5 times before	Display fault content occurred 5 times before	-	Cannot output
U3-06	Fault content occurred 6 times before	Display fault content occurred 6 times before	-	Cannot output
U3-07	Fault content occurred 7 times before	Display fault content occurred 7 times before	-	Cannot output
U3-08	Fault content occurred 8 times before	Display fault content occurred 8 times before	-	Cannot output
U3-09	Fault content occurred 9 times before	Display fault content occurred 9 times before	-	Cannot output
U3-10	Fault content occurred 10 times before	Display fault content occurred 10 times before	-	Cannot output
U3-11	Cumulative running time when a fault occurs before 1 time	Display cumulative running time when a fault occurs before 1 time	h	Cannot output

U3-12	Cumulative running time when a fault occurs before 2 times	Display cumulative running time when a fault occurs before 2 times	h	Cannot output
U3-13	Cumulative running time when a fault occurs before 3 times	Display cumulative running time when a fault occurs before 3 times	h	Cannot output
U3-14	Cumulative running time when a fault occurs before 4 times	Display cumulative running time when a fault occurs before 4 times	h	Cannot output
U3-15	Cumulative running time when a fault occurs before 5 times	Display cumulative running time when a fault occurs before 5 times	h	Cannot output
U3-16	Cumulative running time when a fault occurs before 6 times	Display cumulative running time when a fault occurs before 6 times	h	Cannot output
U3-17	Cumulative running time when a fault occurs before 7 times	Display cumulative running time when a fault occurs before 7 times	h	Cannot output
U3-18	Cumulative running time when a fault occurs before 8 times	Display cumulative running time when a fault occurs before 8 times	h	Cannot output
U3-19	Cumulative running time when a fault occurs before 9 times	Display cumulative running time when a fault occurs before 9 times	h	Cannot output
U3-20	Cumulative running time when a fault occurs before 10 times	Display cumulative running time when a fault occurs before 10 times	h	Cannot output
<b>U4: Maintenance monitoring</b>				
U4-01	Cumulative running time	0~65535h	h	Cannot output
U4-02	Running times	0~65535	-	Cannot output
U4-03	Fan running time	0~65535h	h	Cannot output
U4-08	Module temperature	0~150	1℃	10V: 100℃
U4-09	Ambient temperature	-10~100℃	1℃	Cannot output
U4-12	Peak hold current	0~6553.5A	0.1A	Cannot output
U4-13	Peak hold frequency	-32767~32767r/min	1r/min	Cannot output
U4-14	Overload cumulative value	0.0%~100.0%	0.1%	10V: 100%
U4-15	Inverter overload factor	10~100%	1%	
U4-22	U phase instantaneous current	-3276.7~3276.7A	0.1A	Cannot output
U4-23	V phase instantaneous current	-3276.7~3276.7A	0.1A	Cannot output
U4-24	W phase instantaneous current	-3276.7~3276.7A	0.1A	Cannot output
<b>U5: Application monitoring</b>				
U5-01	PID feedback	-100.00~100.00%	0.01%	10V: 100%
U5-02	PID input	-100.00~100.00%	0.01%	10V: 100%
U5-03	PID output	-100.00~100.00%	0.01%	10V: 100%
<b>U6: Control monitoring</b>				
U6-01	q axis current (Iq)	Displays the calculated value of the motor rotor current	0.1A	Cannot output
U6-02	d axis current (Id)	Displays the calculated value of the motor excitation current	0.1A	Cannot output
U6-13	Speed detection PG1 value	0~65535ppr	1ppr	10V: 65536
U6-14	Speed detection PG2 value	0~65535ppr	1ppr	10V: 65536
U6-15	Dynamic control accuracy	0~655.35	0.01	
U6-16	Torque allowable range	0~200%	1%	



# Appendix B

## Modbus communication protocol

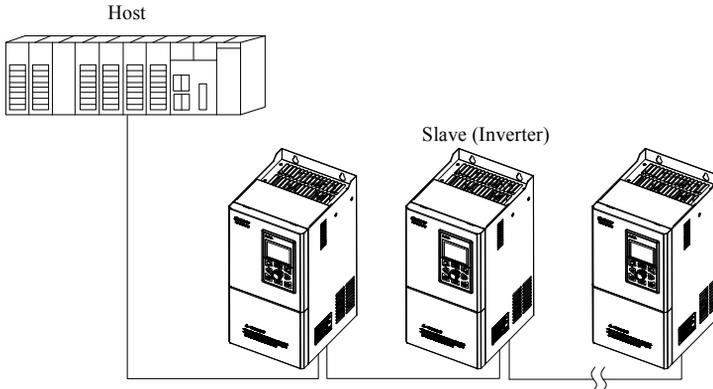
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## B.1 Modbus communication protocol

The Modbus communication protocol enables serial communication with programmable controllers (PLCs) such as the Modbus series. Modbus communication consists of one master station (PLC) and up to 31 slave stations. The communication between the primary station and the secondary station is usually performed in such a manner that the primary station starts communication and the secondary station responds. The primary station simultaneously communicates with one slave. Therefore, the address number is set in advance for each slave station, and the master station designates the number for signal communication. The slave station that receives the master station instruction performs the specified function and responds to the master station.



## B.2 Communication specification

Modbus communication specification as below

Item	Specification
Interface	RS-485
Communication parameter	Baud rate:2400、4800、9600、19200、38400、57600、115200bps
	Date size:8 unit (Constant)
	Verify: No verify、 odd verify、 even verify
	Stop position:1 unit (Constant)
Synchronous mode	Asynchronous (Star-end synchronous)
Communication protocol	RTU/ASCII
Number of connection	Max.31 units (Use RS485)

## B.3 The steps of communication with PLC

The steps of communication with PLC as below:

(1) When power off, Connect the communication cables between PLC and inverter. The connection terminals of the Modbus communication cable are A and B of the inverter terminal block.

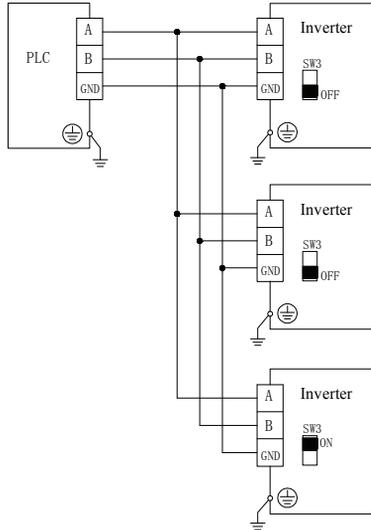
(2) Please determine if the slave as a network terminal is equipped with a terminating resistor. For the terminating resistor of this inverter, refer to "Setting the terminating resistor".

(3) Power on.

(4) Use the keyboard to set the parameters required for communication [H5 Group].

(5) Communication with PLC.

Wiring diagram for multiple connections Wiring instructions for connecting multiple inverters with Modbus communication. Setting the terminating resistor when using RS-485 communication (2-wire system).



In Modbus communication, It is necessary to use the terminating resistor of the inverter as the end of the slave. This inverter does not have a built-in terminating resistor. It is necessary to connect a 120 ohm terminating resistor in parallel with the slave at the end of the network.

### B.4 Modbus communication setup parameter

The following describes the parameters required for Modbus communication settings.

<b>H5-01</b>	Slave address	Range: 0~255(Slave address of setup inverter, that will effective after connect power)	Factory Default: 1
--------------	---------------	--	--------------------

The parameters are only used in MODBUS RTU mode and ASCII mode. When **[H5-01=0]**, The inverter only receives the data frame from the host computer and executes the corresponding command. At other addresses, The inverter not only receives the data frame from the host computer, But also returns the execution result to the host computer.

<b>H5-02</b>	The select of communication speed	Range: 0~6	Factory Default: 3
--------------	-----------------------------------	------------	--------------------

- 0: 2400bps
- 1: 4800bps
- 2: 9600bps
- 3: 19200bps
- 4: 38400bps
- 5: 57600bps
- 6: 115200bps

It is used to set the baud rate of MODBUS RTU mode and ASCII mode. Only when the baud rate of the MODBUS master station is the same as the baud rate of the inverter, The inverter can receive the data frame of the MODBUS master station and return to the correct execution result.

<b>H5-03</b>	Choice of communication data format	Range: 0~5	Factory Default: 0
--------------	-------------------------------------	------------	--------------------

- 0: 1-8-1 Format, No verify, RTU.
- 1: 1-8-1 Format, Even verify, RTU.
- 2: 1-8-1 Format, Odd verify, RTU.
- 3: 1-7-1 Format, No verify, ASCII.
- 4: 1-7-1 Format, Odd verify, ASCII.
- 5: 1-7-1 Format, Odd verify, ASCII.

When **[H5-03=0, 1, 2]**, MODBUS supports RTU format. When **[H5-03=3, 4, 5]**, MODBUS supports

ASCII format. Only when the communication data format of the MODBUS master station is the same as the communication data format set by [H5-03] can the reliable communication between the MODBUS master and slave be guaranteed.

<b>H5-04</b>	Action selection when CE (MODBUS communication fault) is detected	Range: 0~4	Factory Default: 2
--------------	---	------------	--------------------

When [H5-05=1], If the inverter does not receive a valid MODBUS data frame within the time set by [H5-09], The inverter will generate MODBUS communication fault, The fault code is A07, If [H5-09=0], The inverter will not generate MODBUS communication failure regardless of whether the inverter receives a valid MODBUS data frame.

**0: No detection**

Regardless of whether the inverter has a MODBUS communication fault, The inverter will maintain its original operating status.

**1: Alarm, Continue to run**

When the inverter has a MODBUS communication fault, the inverter will generate the A07 warning code, but the inverter will continue to run.

**2: Alarm, Stop by stop mode**

When the MODBUS communication fault occurs in the inverter, the inverter will generate the A07 warning code. At this time, the inverter will stop according to the stop mode of [b1-06].

**3: Alarm, Emergency stop**

When the MODBUS communication fault occurs in the inverter, the inverter will generate the A07 warning code. At this time, the inverter will stop according to the stop mode of [b1-06]. If it is the deceleration stop, press the emergency stop time of [C1-11] to decelerate to stop.

**4: Failure, Free running stops**

When the MODBUS communication fault occurs in the inverter, The inverter will generate XX fault code. At this time, the inverter will stop in the free stop mode.

<b>H5-05</b>	CE (MODBUS communication failure) checkout selection	Range: 0, 1	Factory Default: 0
--------------	--	-------------	--------------------

**0: Invalid.**

**1: Valid**

If and only when [H5-05=1], The inverter will detect whether the inverter receives a valid MODBUS data frame within the time set by H5-09. If the inverter does not have the time specified in [H5-09], The inverter does not have Upon receipt of a valid data frame, the drive will detect a MODBUS communication fault. When [H5-05=0], The inverter will not detect if the MODBUS communication has timed out.

<b>H5-06</b>	Communication waiting time	Range: 5~100ms	Factory Default: 5ms
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After the inverter receives a valid data frame and processes it through the inverter, If [H5-01] is not equal to 0, The inverter will delay the time specified by [H5-06] and return the execution result to the MODBUS master station.

<b>H5-09</b>	CE (MODBUS communication failure) checkout time	Range: 0.0~10.0s	Factory Default: 2.0s
--------------	---	------------------	-----------------------

It is used to set the inverter to detect the MODBUS communication timeout time. When [H5-09=0], the inverter will not generate MODBUS communication fault whenever the inverter receives a valid MODBUS data frame.

## B.5 Run the inverter with Modbus communication

Even when the inverter is operated by Modbus communication, it is set by the parameters of the inverter. The types of functions that can be used and related parameters are described below.

Features that can be performed via Modbus communication:

(1) When using the PLC, the following operations can be performed by Modbus communication regardless of the parameter setting.

- ① Monitor the running status and operation of the inverter from the PLC

- ② Parameter setting and viewing
- ③ Fault reset

(2) When controlling the inverter, When the motor is Running/Stopping and setting the frequency command by Modbus communication, Select the external command as shown in the table below.

Run mode	Function code	name	Set point
External directive 1	b1-02	Frequency directive selection 1	2
	b1-03	Run directive selection 1	2
External directive 2	b1-10	Frequency directive selection 2	2
	b1-11	Run directive selection 2	2

## B.6 Communication timing

In order to prevent overshoot from the station side, The master station cannot send information to the same inverter within a certain period of time. Similarly, In order to prevent overshoot of the master station side, The slave station cannot send response information to the master station within a certain period of time. The interval between data frames is at least 3.5 characters. Take Modbus 1-8-1 format as an example. The minimum time interval is as follows.

Baud rate	Minimum time interval (us)
2400	14583
4800	7292
9600	3646
19200	1823
38400	912
57600	608
115200	304

## B.7 Message format

### B.7.1 Message content

Modbus takes the form of a master station giving instructions to the slave station and the slave station responding. The reception and transmission of the information format are as follows. The length of the data portion changes depending on the content of the command.

Slave address
Function code
data
Verify code

### B.7.2 Slave address

Set the slave address of the inverter. Please set the value of 0-F7 (Hex). When the slave address is set to 0, the master sends an instruction to all slaves. (Broadcast transmission) For broadcast transmission, the slave does not respond to the primary station.

### B.7.3 Function code

The function code is the code used to specify the instruction.

The RTU frame format is as follows:

Frame header	3.5 character time pause
Slave address	Slave address:0~247
Communication command code	03H:Read slave parameter 06H:Write slave parameter
DATA	Content in the data package:
DATA	Parameter address (16bit);

.....	Number of arguments or number of bytes of parameter values; Parameter value (16bit)。
.....	
CRC check value low byte	16 bit unsigned check value
CRC check value high byte	
Frame tail	3.5 character time pause

Please refer to the verification method section for how to generate the CRC check value.

ASCII frame format:

Frame header	‘:’ (0x3A)
Slave address Hi	Slave address:2个ASCII code combined into 8bit slave address 0-247
Slave address Lo	
Command code Hi	Command code:2个ASCII code combined into 8bit command code 03H:read slave parameter, 06H:write slave parameter,
Command code Lo	
DATA	Content in the date package:
.....	
.....	
LRC CHK Hi	LRC verify value include 2个ASCII code
LRC CHK Lo	
Frame tail Hi	Frame tail Hi = CR (0x0D)
Frame tail Lo	Frame tail Lo = LF (0x0A)

## B.8 Host read slave parameters

Command code 03H. The host initiates a communication transaction to read one or more (Up to 20) parameters. For example, read 2 parameter values continuously from the 0101H address of the inverter with address 01, the contents of the host command packet:

ADR	01H
CMD	03H
Parameter start address high byte	01H
Parameter start address low byte	01H
Parameter number high byte	00H
Parameter number low byte	02H
CRC check value low byte	94H
CRC check value high byte	37H

Slave response packet content:

ADR	01H
CMD	03H
Parameter value byte number	04H
Address 0000H content high byte	00H
Address 0000H content low byte	02H
Address 0001H content high byte	00H
Address 0001H content low byte	02H
CRC check value low byte	DAH
CRC check value high byte	32H

## B.9 Host write slave parameter

Command code 06H. The host can write one parameter by initiating a communication transaction. For example, write the decimal 2 to the 0101H address of the inverter with the slave address 01, and the host command packet contents:

ADR	01H
CMD	06H
Parameter start address high byte	01H
Parameter start address low byte	01H
Parameter number high byte	00H
Parameter number low byte	02H
CRC check value low byte	58H
CRC check value high byte	37H

Slave response packet content:

ADR	01H
CMD	06H
Parameter number high byte	01H
Parameter number low byte	01H
Address 0001H content high byte	00H
Address 0001H content low byte	02H
CRC check value low byte	58H
CRC check value high byte	37H

## B.10 Data communication address assignment

### B.10.1 Function code A1-00~U6-20 group communication address, other address

analogy:

0x0101 → A1.01	0x0201 → A2.01
0x1101 → b1.01	0x1201 → b2.01
0x2101 → C1.01	0x2201 → C2.01
0x3101 → D1.01	0x3201 → D2.01
0x4101 → E1.01	0x4201 → E2.01
0x5101 → F1.01	0x5201 → F2.01
0x6101 → G1.01	0x6201 → G2.01
0x7101 → H1.01	0x7201 → H2.01
0x8101 → L1.01	0x8201 → L2.01
0x9101 → N1.01	0x9201 → N2.01
0xa101 → O1.01	0xa201 → O2.01
0xb101 → U1.01	0xb201 → U2.01

### B.10.2 Control command and status word communication address

Variable name	Communication address	Read and write properties	Command data or response value meaning
Operation command word	3000H	Read and write	0: No meaning
			1: Jog forward
			2: Jog inversion
			3: Forward
			4: Inversion
			5: Stop
			6: Free stop
			7: Error reset
			8~65535: Reserved
Communication frequency given	3001H	Read and write	0~65535
Communication speed given	3002H	Read and write	0~65535
Communication torque reference	3003H	Read and write	0~65535

Inverter status 1	3004H	Only read	See status list
Inverter status 2	3005H	Only read	See status list
Error code	3008H		See error list
Alarm code	3009H		See alarm list
PID given	300AH		0~65535
PID feedback	300BH		0~65535

## B.11 Processing when communication error occurs

When the inverter receives the verification error and finds that the parameter address of the read/write is illegal or the parameter value is illegal, the communication error response packet is sent to the host. The communication error response packet will be (Command command code + 80H) as the command code with a 1-byte error code.

The communication error response packet format is as follows:

ADR	01H
CMD	83H/86H
Communication error code	01H~06H (See the table below for meaning)
CRC check value low byte	Need to calculate
CRC check value high byte	Need to calculate

The meaning of the error code value of the response is as follows:

Communication error code value	Communication error type	priority
0x01	CRC Checksum error	1
0x02	Illegal command code	2
0x03	Illegal access to the register address	3
0x04	The value of the write register is illegal	4
0x05	Parameters are not allowed to change	5
0x06	Illegal number of read registers	6

## B.12 Data frame example

### B.12.1 RTU mode

1、Star#1 run inverter

Data field	Slave address	Command code	Register address high byte	Register address low byte	Date high byte	Date low byte	CRC Low position	CRC High position
Host command frame	01	06	30	00	00	03	C6	CB
Slave response frame	01	06	30	00	00	03	C6	CB

2、Stop #1 inverter run

Data field	Slave address	Command code	Register address high byte	Register address low byte	Date high byte	Date low byte	CRC Low position	CRC High position
Host command frame	01	06	30	00	00	05	46	C9
Slave response frame	01	06	30	00	00	05	46	C9

3、Setup #1 The inverter frequency reference value is 50.0Hz

Data field	Slave address	Command code	Register address high byte	Register address low byte	Date high byte	Date low byte	CRC Low position	CRC High position
Host command frame	01	06	30	01	01	F4	D7	1D
Slave response frame	01	06	30	01	01	F4	D7	1D

4、Read #1 inverter status

Data field	Slave address	Command code	Register address high byte	Register address low byte	Date high byte	Date low byte	CRC Low position	CRC High position
Host command frame	01	03	30	04	00	01	CA	CB
Slave response frame	01	03	(Response value byte number)02		00	01	79	84

**B.12.2 ACSII mode**

(1) Host read slave, command code:03

**Host frame**

Host frame format																
	Frame start symbol	Slave address	Slave address	Command code	Command code	Register address	Register address	Register address	Register address	Register number	Register number	Register number	Register number	verify	verify	end
Send byte	1	2	2	2	2	4				4				2	2	2

Explanation:

➤ **Star symbol:**

The lower computer judges the frame header of the ASCII frame accordingly. Here is:','

➤ **Salve address :**

Single inverter ID code, range: 0~247. Among them, address 0 is the broadcast address. The broadcast address can control all connected slaves at the same time, and the slave will no longer return any data to the host. That is, the slave only accepts at this time and does not send it. The Modbus protocol does not have a host address.

➤ **Register address:**

The memory address of the inverter function parameter is 4 bytes. Converted from hexadecimal to ASCII mode, the corresponding relationship between specific parameters and memory address is shown in B10.1.

➤ **Register number:**

The number of parameters to read in one frame. It is 4 bytes. Converted from hexadecimal to ASCII mode

➤ **Checksum:**

From the "slave address" to the previous byte of the checksum, the LRC checksum of this string.

➤ **End symbol:**

Enter, line feed. Is:0x0D,0x0A

## Response frame

Response frame format											
	Frame start symbol	Slave address	Slave address	Command code	Command code	Date byte	Date byte	Data string value	checksum	checksum	End symbol
Send byte	1	2		2		2		N*2	2		2

Explanation:

➤ **Star symbol:**

The lower computer judges the frame header of the ASCII frame accordingly. Here is:':'

➤ **Slave address :**

Single inverter ID code, range: 0~247. Among them, address 0 is the broadcast address. The broadcast address can control all connected slaves at the same time, and the slave will no longer return any data to the host. That is, the slave only accepts at this time and does not send it. The Modbus protocol does not have a host address.

➤ **Register address:**

The memory address of the inverter function parameter is 4 bytes. Converted from hexadecimal to ASCII mode, The corresponding relationship between specific parameters and memory address is shown in B10.1.

➤ **Register number:**

The number of parameters to read in one frame. It is 4 bytes. Converted from hexadecimal to ASCII mode

➤ **Checksum:**

From the "slave address" to the previous byte of the checksum, the LRC checksum of this string.

➤ **End symbol:**

Enter, line feed. Is:0x0D,0x0A

➤ Below, an example of reading a command frame and a return frame, all data being ASCII characters.

➤ **Ask frame:**

: 0 1 0 3 0 1 0 1 0 0 0 1 F 9 \n\r

(Detailed description of each byte)

“:”: star symbol

0 1: Slave address

0 3: Read command

0 1 0 1:Read parameter memory address

0 0 0 1:Number of read parameters

F A:{0 1 0 3 0 1 0 1 0 0 0 1}LRC checksum.

0xF9 = 0x100 - (0x01 + 0x03 + 0x01 + 0x01 + 0x00 + 0x01)

➤ **Response frame:**

: 0 1 0 3 0 2 0 0 2 F 8 \n\r

(Detailed description of each byte)

“:”: star symbol

0 1: slave address

0 3:read command

0 2:Returns the byte length of the parameter data.

0 0 0 2:Return parameter, current memory value

F 8:{ 0 1 0 3 0 2 0 0 2} LRC checksum.

0xF8 = 0x100 - (0x01 + 0x03 + 0x02 + 0x00 + 0x02)

(2) Host write slave single register, command code: 06

**Host frame**

Host frame format															
	Frame star symbol	Slave address	Slave address	Command code	Command code	Register address	Register address	Register address	Register address	Date	Date	Date	verify	verify	End
Send byte	1	2		2		4				4			2		2

Explanation :

➤ **Slave address:**

Single inverter ID code, range: 0~247. The 00 address is a broadcast address.

➤ **Command code:**

The command to write parameters or data from the inverter, here value is:06

➤ **Register address:**

The memory address of the inverter function parameter is double-byte. The high byte is first and the low byte is after.

The correspondence between specific parameters and memory addresses can be found in the following table.

➤ **Date :**

Rewrite the new value of the parameter.

➤ **Checksum :**

From the "slave address" to the previous byte of the checksum, the LRC checksum of this string.

**Response frame**

Host frame format																
	Frame star symbol	Slave address	Slave address	Command code	Command code	Register address	Register address	Register address	Register address	Date	Date	Date	Date	verify	verify	End
Send byte	1	2		2		4				4				2		2

Explanation :

➤ **Slave address:**

Single inverter ID code, range: 0~247. The 00 address is a broadcast address.

➤ **Command code:**

The command to write parameters or data from the inverter, here value is:06

➤ **Register address:**

The memory address of the inverter function parameter is double-byte. The high byte is first and the low byte is after.

The correspondence between specific parameters and memory addresses can be found in the following table.

➤ **Date :**

Rewrite the new value of the parameter.

➤ **Checksum :**

From the "slave address" to the previous byte of the checksum, the LRC checksum of this string.

Below, an example of reading a command frame and a return frame, all data being ASCII characters.

➤ **Ask frame:**

: 0 1 0 6 0 1 0 1 0 0 0 2 F 5 \n\r

(Detailed description of each byte)

“:”: star symbol

**0 1**: slave address

**0 6**:write command

**0 1 0 1**:Write the parameter memory address.

**0 0 0 2**:Write the value of the parameter

**F 5**:{**0 1 0 6 0 1 0 1 0 0 0 2**}LRC checksum.

**0xF5** = **0x100 - (0x01 + 0x06 + 0x01 + 0x01 + 0x00 + 0x02)**

➤ **Response frame:**

**: 0 1 0 6 0 1 0 1 0 0 0 2 F 5 \n\r**

(Detailed description of each byte)

“:”: star symbol start symbol

**0 1**: slave address

**0 6**:write command

**0 1 0 1**:Write the parameter memory address.

**0 0 0 2**:Write the value of the parameter

**F 5**:{**0 1 0 6 0 1 0 1 0 0 0 2**} LRC checksum.

**0x5C** = **0x100 - (0x01 + 0x06 + 0x01 + 0x01 + 0x00 + 0x02)**



**Note**

(1) In the ASCII frame, the 8Bit hexadecimal data is divided into high and low 4 bits and 2 characters for transmission. Arrived at the destination and combined into one 8Bit hexadecimal data.

(2) Frame header, add ":", add "\n\r" this carriage return line break at the end of the frame.

(3) The valid character set in the protocol is: , 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F and hexadecimal 0DH, lowercase ASCII The letters a, b, c, d, e, and f are illegal.

(4) It's subject data volume is twice of the RTU, check and LRC check.

(5) If you want to know other information, please check the official standard agreement.

## B.13 CRC verify style

The CRC check value calculation function written in C language is as follows:

```
unsigned int cal_crc_value (unsigned char *pval, unsigned char len)
{
    unsigned int crc_value=0xFFFF;
    unsigned int i;

    while(len--)
    {
        crc_value ^= *pval++;
        for(i=0; i<8; i++)
        {
            if(crc_value & 0x0001)
            {
                crc_value >>= 1;
                crc_value ^= 0xA001;
            }
            else
            {
                crc_value >>= 1;
            }
        }
    }
    return(crc_value);
}
```

## **B.14 LRC verify style**

LRC=0x100- (from the "slave address" to the "check" the previous byte corresponds to the algebra of the hexadecimal format)

See Section 13.12.2 for an example.

# Appendix C

## Keyboard

---

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## C.1 Keyboard selection:

No.	Type	Explanation	Remark
1	EN-LCD6-D	Native LCD display keyboard (With parameter copy function)	Standard
2	EN-LCD6-DR	Remote control LCD liquid crystal display keyboard (With parameter copy function)	Optional

At present, The keyboard that our company can choose for customers is EN-LCD6-DR. The shape and installation dimensions of the keyboard are the same as the standard EN-LCD6-D. For the specific dimensions, please refer to the dimensions of the operating keyboard in Chapter 2.

## C.2 LCD liquid crystal display keyboard

### C.2.1 LCD liquid crystal display keyboard classification:

- (1) This machine comes standard with LCD display keyboard model: EN-LCD6-D.
- (2) LCD remote control LCD display keyboard model: EN-LCD6-DR.



Note

- (1) EN-LCD6-D, EN-LCD6-DR two keyboards with parameter copy function.
- (2) The parameter copy function can be operated by the o3-01 and o3-02 parameters.

### C.2.2 Keyboard layout

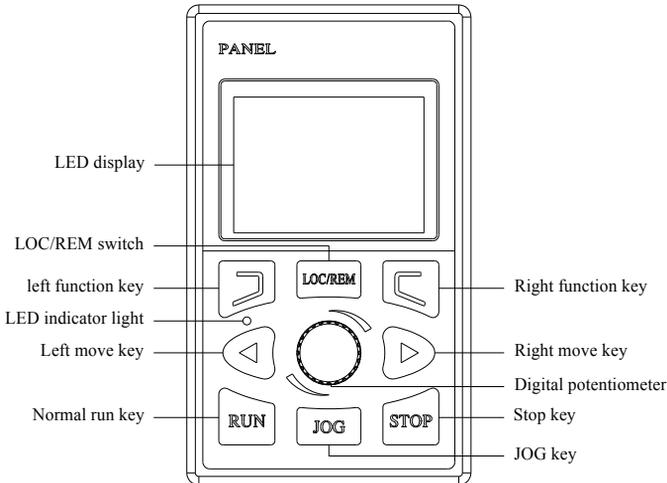


Fig. F-1 EN-LCD6-D, EN-LCD6-DR operation keyboard layout

### C.2.3 Keyboard function, LCD display and indicator description

The LCD liquid crystal display keyboard consists of an LCD liquid crystal display, 8 buttons, 1 shuttle and 1 indicator light.

LCD display: display function settings, operation monitoring, fault monitoring codes and parameters.

Refer to the keyboard function description in Chapter 5 for the definition of the button functions on the operation keyboard, the shuttle and the indicator.



Note

Please refer to the fifth chapter for the LCD LCD keyboard operation instructions and fault inquiry status.

### **C.2.4 Communication parts**

The farthest electrical distance between the local operating keyboard EN-LCD6-D and the inverter connected to the inverter is 2 meters.

The RS485 communication mode is adopted between the inverter and the remote operation keyboard EN-LCD6-DR. Only one common network cable (568B) is connected between the two, and the maximum electrical distance can reach 1000 meters. According to the master-slave mode communication, the remote operation keyboard is the master and the inverter is the slave. The terminal is connected by a crystal head for easy maintenance. The power supply needs to be externally cited by the customer. The external power supply voltage range is DC 10~24V, and the current is  $\geq 500\text{mA}$ . It is recommended to use 0.75mm<sup>2</sup> PVC insulated copper wire connection.

The remote operation keyboard can realize the following functions:

(1) It can control the operation, stop, jog, fault reset of the slave, change the set frequency, change the function parameters and the running direction.

(2) It can automatically recognize the slave model, monitor the slave's running frequency, set frequency, output voltage, output current, analog closed loop feedback, analog closed loop setting and external count value.

# Appendix D

## Communication extension card

---

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## D.1 Expansion card selection:

At present, our company can choose the following communication expansion cards for customers.

No.	Type	Explanation	Remark
1	EN-PR03	PROFIBUS-DP expansion card (Used in 7.5KW and below power stage machines)	Optional
2	EN-PR04	PROFIBUS-DP expansion card (For 11KW and above power segment machines)	Optional
3	EN-CAN3	CANopen Expansion card	Optional
4	EN-CAT1	EtherCAT Expansion card	Optional
5	EN-NET1	DeviceNet Expansion card	Optional

## D.2 PROFIBUS-DP expansion card

### D.2.1 PROFIBUS profile

The EN-PRO3/EN-PRO4 expansion card connects the inverter to the PROFIBUS-DP bus. The indicators of the expansion card are as follows:

- (1) PROFIBUS-DP communication card external communication baud rate support: 9.6Kbps, 19.2Kbps, 45.45Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps
- (2) Support PPO1, PP02, PP03, PP05 data packing types in PROFIDRIVE.
- (3) Support reading, writing and monitoring of inverter parameters.
- (4) Support the DPV0 sub-protocol in the PROFIBUS-DP protocol.

### D.2.2 PROFIBUS-DP appearance and terminal definition description

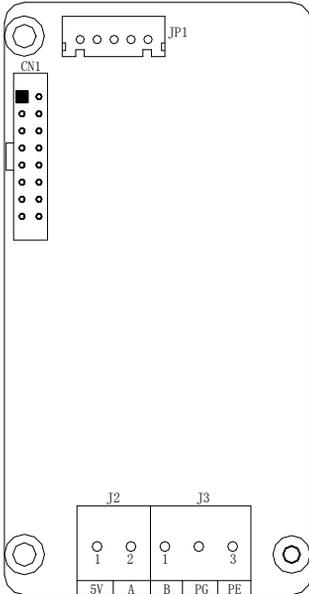


Fig.a EN-PR03 outline drawing

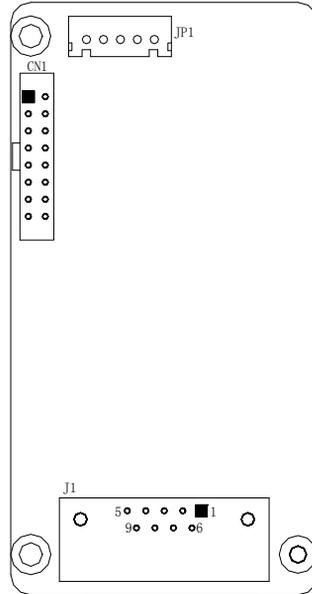


Fig.b EN-PR04 outline drawing

Fig.D-1 PROFIBUS-DP Dimensional Drawing

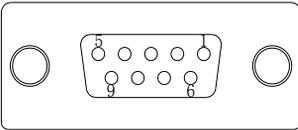
**Table D-1 Function Description of EN-PR03 Terminal**

Terminal no.	Name	Description	Remark
J2	TPOS	Connect the DP9 D-type connector adapter cable delivered by the manufacturer.	
J3	TPOS	Connect the DP9 D-type connector adapter cable delivered by the manufacturer.	
CN1	Board level docking socket	Connect this plug to J2 (A) or J7 (B) on the main control board during installation.	
JP1	Program download port	Factory use	

**Table D-2 Function description of EN-PR04 terminal**

Terminal no.	Name	Description	Remark
J1	DP9 D type connector	Communication signal connection interface, 9-pin DP9 female.	
CN1	Board level docking socket	Connect this plug to J2 (A) or J7 (B) on the main control board during installation.	
JP1	Program download port	Factory use	

**(1) J1 plug pin definition:**



Position	Definition	Position	Definition
1	Empty	6	Power 5V
2	Empty	7	Empty
3	communication single	8	communication single B
4	Empty	9	Empty
5	Power PG	-	-

**(2) J2 Interface pin definition:**

Position	Definition	Position	Definition
1	Power 5V	2	communication single A

**(3) J3 Interface pin definition:**

Position	Definition	Position	Definition
1	communication single B	2	Power PG
3	Earth PE	-	-

**(4) PROFIBUS extension cable**



Table D-3 Correspondence between the left end plug and the right end plug pin

Left end pin	The right terminal is connected to J2 and J3 of EN-PR03	Left end pin	The right terminal is connected to J2 and J3 of EN-PR04
1	-	6	5V
2	-	7	-
3	A	8	B
4	-	9	-
5	PG	Iron shell (shield)	PE

## D.3 CANopen expansion card

### D.3.1 CANopen profile

The CANopen expansion card supports modification and monitoring of the drive parameters. The protocol is mainly composed of SDO, PDO, NMT, BootUp, SYNC, EMCY, LSS, Heartbeat or NodeGuard. Note that Heartbeat and NodeGuard cannot be used at the same time. SDO supports 4-byte accelerated upload and download for reading and writing parameters of the inverter; PDO supports up to 4 channels for monitoring the inverter.

### D.3.2 CANopen outline and terminal definition

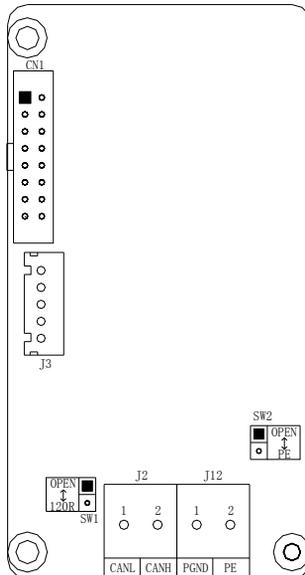


Fig.D-2 CANopen outline drawing

Table D-4 Terminal function explanation

Position	Name	Description	remark
J2	Communication terminal block	The communication device port connected to the CAN bus by the customer.	
J12	Communication terminal block	The signal ground port PGND of the CAN bus is connected by the customer. Port PE for shielded wires connected to	

		the earth.	
CN1	Board level docking socket	Connect this plug to J2 (A) or J7 (B) on the main control board during installation.	
J3	Program download port	Factory use	

**(1) J2 Interface pin definition**

Position	Definition	Position	Definition
1	Single CANL	2	Single CANH

**(2) J12 Interface pin definition**

Position	Definition	Position	Definition
1	PGND	2	PE

**Table D-5 Toggle switch function description**

Position	Function	Setup	Factory default
SW1	Terminal resistance on/off switch	 OPEN: Disconnect the terminating resistor  120R: Access terminal resistance	Disconnect the terminating resistor
SW2	EMI suppression option	 OPEN: Hanging  PE: Pick up the earth	hanging

## D.4 EtherCAT expansion card

### D.4.1 EtherCAT profile

The EtherCAT expansion card supports 100Mbit/s full-duplex mode, which realizes the modification of the inverter parameters and the monitoring function of the inverter.

### D.4.2 EtherCAT outline and terminal definition

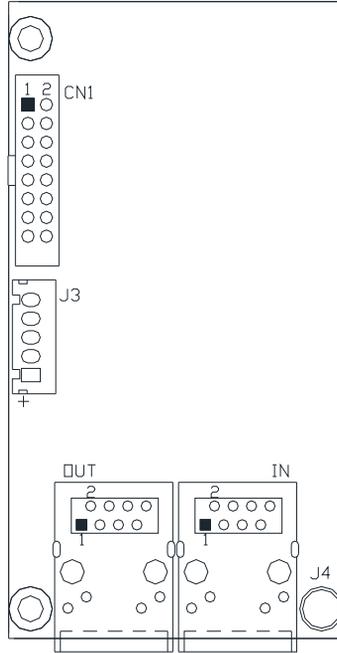


Fig.D-3 EtherCAT outline drawing Table

D-6 Terminal Function Description

Position	Name	Description	Remark
IN	Standard Ethernet input port	The terminal type is J0011D01BNL, and the standard	
OUT	Standard Ethernet output port	Ethernet cable (Super Category 5 network cable) is used. The cable length is less than 100m.	
CN1	Board level docking socket	Connect this plug to J2 (A) or J7 (B) on the main control board during installation.	
J3	Factory debugging port	Manufacturer use	

### (1) Specification

Communication protocol	EtherCAT Industrial Real-Time Bus Protocol
Maximum communication speed	Ethernet 100Mbps
Station range	1-125, The internal address is automatically arranged in the network bus connection sequence

**(2) Specific performance**

No.	Item	Specification
1	Communication protocol	EtherCAT Industrial Real-Time Bus Protocol
2	Support service	CoE(SDO PDO)
3	Synchronous mode	DC distributed clock
4	Physical layer	100BASE-TX
5	Baud rate	100Mbit/s
6	Duplex mode	Full duplex
7	Topology	Linear topology
8	Transmission medium	cable
9	Transmission distance	Less than 100m between two nodes
10	Slave number	Max reach 125
11	Synchronous jitter of two slaves	< 1us

**D.5 DeviceNet expansion card**

**D.5.1 DeviceNet profile**

(1) Support DeviceNet communication protocol Group 2 only connection mode, support I/O polling data exchange

(2) I/O mapping supports up to 16 words, 16 words

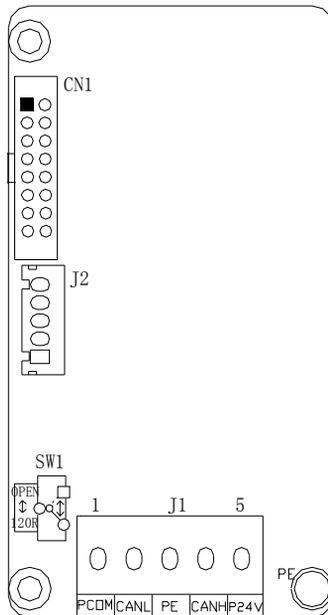
(3) Support DeviceNet bus three communication rates of 125kbps, 250kbps, 500kbps

(4) Node address and communication rate are set directly on the inverter

(5) External input 24V working power supply

(6) Support EN700 universal platform

**D.5.2 DeviceNet form factor and terminal definition:**



**Fig.D-4 EtherCAT Dimensions**

**Table D-7 EtherCAT Terminal Function Description**

Position	Name	Description	Remark
J1	Communication terminal block	The port of the communication device connected to the DeviceNet bus by the customer.	
CN1	Board level docking socket	Connect this plug to J2 (A) or J7 (B) on the main control board during installation.	
J2	Program download port	Used by manufacturers.	

**(1) J1 interface pin definition**

Position	Name	Definition	Remark
1	PCOM	Ground port of external 24V power supply	
2	CANL	Signal CANL	
3	PE	Communication cable shield grounding port	
4	CANH	Signal CANH	
5	P24V	External 24V power supply access port	

**Table D-8 Description of the toggle switch function**

Position	Function	Setup	Factory fault
SW1	Terminal resistance on/off switch	 OPEN: Disconnect the terminating resistor  120R: Access terminal resistance	Disconnect the terminating resistor

**(2) Product technical indicators and specifications**

Item	Specification	Remark
connector	5PIN open pluggable connector	
Transfer method	CAN	
Transmission cable	DeviceNet special thick cable, thin cable, flat cable	
Transmission rate	125kbps、250kbps、500kbps	
Network protocol	DeviceNet protocol	



# Appendix E

## General encoder expansion card

---

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## E.1 Expansion card selection

Universal encoder expansion card (PG) card, used as an optional component, Is the frequency converter to do closed-loop vector control options.

No.	Type	Description	Note
1	EN-PG05	Differential input PG card, encoder input signal through optical coupling isolation, strong anti-interference ability.	Optional
2	EN-PG06	OC input PG card, encoder input signal through optical coupling isolation, strong anti-interference ability.	Optional
3	EN-PG07	Rotary transformer PG card, only 7.5kw and below power section.	Optional
4	EN-PG08	Rotary transformer PG card, only 11KW and above power section.	Optional

## E.2 EN-PG05、EN-PG06 Shape and terminal definition

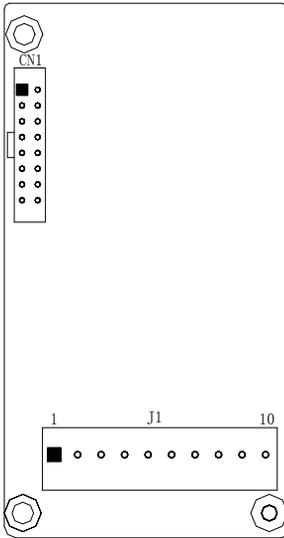


Fig. E-1 EN-PG05 contour diagram

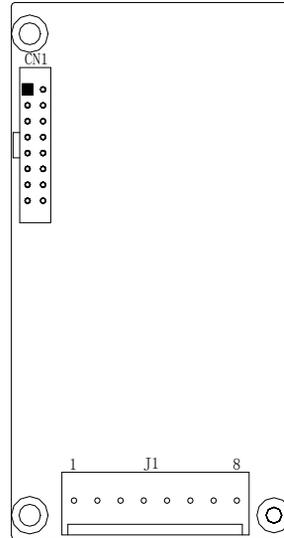


Fig. E-2 EN-PG06 contour diagram

Table E-1 Terminal function description

Terminal No.	Name	Description	Note
CN1	Board terminal butt socket	Connect this plug to J9 (C) on the main control board during installation.	
J1	User connection port	Connect encoder to use	

### (1) J1 Terminal definition of EN-PG05

Pin No.	Terminal label	Description
1	P5V	External supply of 5V/1500mA power (only supply power to 5V encoder)
2	COM	Power Ground
3	A+	Encoder output A signal is positive
4	A-	Encoder output A signal is negative

5	B+	Encoder output B signal is positive
6	B-	Encoder output B signal is negative
7	Z-	Encoder output Z signal is negative
8	Z+	Encoder output Z signal is positive
9	Vacancy	-
10	PE	Shielding terminal

**(2) J1 Terminal definition of EN-PG06**

Pin No.	Terminal label	Description
1	A	Encoder output A signal
2	B	Encoder output B signal
3	Z	Encoder output Z signal
4	P12V	External supply of 5V/1500mA power (Only supply power to 12V encoder)
5	COM	Power Ground
6	Vacancy	
7	Vacancy	
8	PE	Shielding terminal

**E.3 EN-PG07、EN-PG08 Shape and terminal definition**

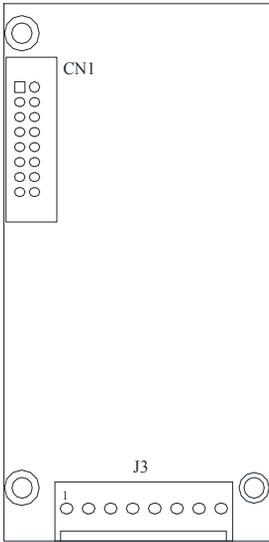


Fig. a EN-PG07 contour diagram

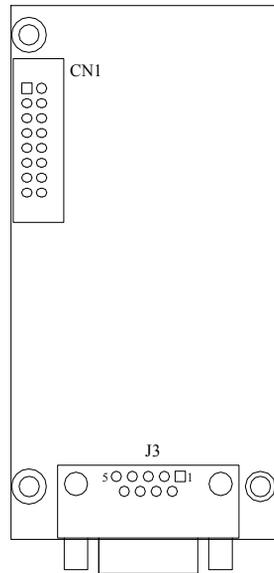


Fig. b EN-PG08 contour diagram

Fig.E-3 Contour diagram

Table E-2 Terminal function description

Terminal No.	Name	Description
CN1	Board terminal butt socket	Connect this plug to J9 (C) on the main control board during installation.
J3	User connection port	Connect encoder to use

**(1) J3 Terminal definition of EN-PG07**

Terminal No.	Terminal label	Description
1	COS+	Rotating transformer feedback cos is positive
2	COS-	Rotating transformer feedback cos is negative
3	SIN+	Rotating transformer feedback sin is positive
4	SIN-	Rotating transformer feedback sin is negative
5	EXC+	The rotary transformer excites positively
6	EXC-	The rotary transformer excites negatively
7	Vacancy	-
8	PE	Shielding terminal

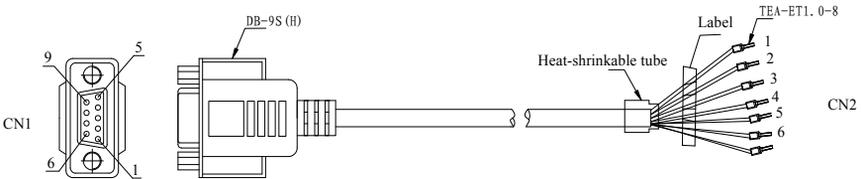
**(2) J3 Terminal definition of EN-PG08**

Terminal No.	Terminal label	Description
1	EXC-	The rotary transformer excites negatively
2	EXC+	The rotary transformer excites positively
3	SIN-	Rotating transformer feedback sin is negative
4	SIN+	Rotating transformer feedback sin is positive
5	COS-	Rotating transformer feedback cos is negative
6	Vacancy	
7	Vacancy	
8	Vacancy	
9	COS+	Rotating transformer feedback COS is positive

**(3) PG card specifications:**

User connection port	DB9 primary connection port
Wire specification type	>22AWG
Resolution ratio	12 bits
Excitation ratio	10kHz
VRMS	7V
VP-P	3.15±27%

**(4) Transfer connection wire**



**Table E-3 Correspondence between CN1 and CN2 terminal labels**

CN1	Right end terminal label	CN1	Right end terminal label
1	EXC-	5	COS-
2	EXC+	9	COS+
3	SIN-	Iron case (shield)	PE
4	SIN+		



**Note**

- (1) Rotating transformer selection must meet the requirements of the parameters of the expansion card, especially the incentive of input dc resistance must be greater than the  $17\ \Omega$  (or multimeter measurement), expansion card can't work normally.
- (2) In order to avoid overloading the expansion card by selecting a rotating transformer with a high polar logarithm, it is recommended not to select a rotating transformer with a polar logarithm higher than 4 pairs.

# Appendix F

## Brake unit and brake resistance

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## F.1 Brake unit and brake resistance

In the operation process of the inverter, if the speed of the controlled motor drops too fast or the load of the motor shakes too fast, its electromotive force can reverse charge the capacitor inside the inverter, thus making the voltage pump at both ends of the power module rise, which is easy to cause damage to the inverter. The inverter internal control will control this according to the load condition, when the customer needs the braking function, only need to add the external braking resistance, can realize the timely release of energy. The external braking resistance belongs to the energy-consuming braking mode, and its energy will be dissipated in the power braking resistance.

The EN700 series is standard with built-in brake units. When the user is in use, the inverter needs external brake resistance, please click the following configuration table for external brake resistance.

**Brake unit and brake resistance configuration and external brake resistance configuration table**

VFD Type	Built-in brake resistance	Can add External brake resistance	Quantity	Braking resistance power (50% braking rate)	Braking resistance power (100% braking rate)
EN700-4T0040	No	$\geq 125\Omega$	1PCS	$\geq 2KW$	$\geq 400W$
EN700-4T0055	No	$\geq 80\Omega$	1PCS	$\geq 3.8KW$	$\geq 750W$
EN700-4T0075	No	$\geq 80\Omega$	1PCS	$\geq 3.8KW$	$\geq 750W$
EN700-4T0110	No	$\geq 50\Omega$	1PCS	$\geq 5KW$	$\geq 1KW$
EN700-4T0150	No	$\geq 40\Omega$	1PCS	$\geq 7.5KW$	$\geq 1.5KW$
EN700-4T0185	No	$\geq 27\Omega$	1PCS	$\geq 9KW$	$\geq 1.8KW$
EN700-4T0220	No	$\geq 22\Omega$	1PCS	$\geq 11KW$	$\geq 2.2KW$
EN700-4T0300	No	$\geq 19\Omega$	1PCS	$\geq 15KW$	$\geq 3KW$
EN700-4T0370	No	$\geq 16.8\Omega$	1PCS	$\geq 18.5KW$	$\geq 3.7KW$
EN700-4T0450	No	$\geq 13\Omega$	1PCS	$\geq 22KW$	$\geq 4.5KW$
EN700-4T0550	No	$\geq 11\Omega$	1PCS	$\geq 28KW$	$\geq 5.5KW$





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