V6-GH/GA V5-GH/GA

High performance special inverter for inverter

User manual

V&T

V5/V6 Series

USER'S MANUAL

Foreword

ShenZhen V&T Technologies Co.,Ltd. was certificated as a "National Hi-tech and Double-Software Enterprise" engaged in Variable Frequency Drive, Servo Drive, Electric Vehicle Controller, Inverter and other power electronics product with independent intellectual property rights covering R&D,manufacturing, marketing, with the profound drive know-how, we has won the technical innovation prize,the most competitive brands prize, Champions of National Hybrid Electric Vehicle competition and one of Top Ten Variable Frequency Drive Enterprises in China and etc.

ShenZhen V&T Technologies Co.,Ltd. has advanced asynchronous vector control technology and torque control technology which is the core control technologies in motor drive section, Through continuous technological innovation and international technical

exchange, V&T developed core technology with most experienced R&D team in China and completed industrial design and production capacity, Has a rich standard product line, a variety of industry special machine series, voltage level from 220V to 1140V and power rating from 0.4KW to 3MW; can meet many kinds of applications.

V&T crane special inverter adopts high performance torque vector control technology. It has excellent torque control,reliable brake control timing, speed monitoring, torque monitoring, power optimization, location processing, intelligent deceleration functions, fully guarantee the safety, efficiency and reliability. It be widely used in port, ships , marine engineering, mining, construction, metallurgy,factories and other industries crane machinery. According to the different characteristics of the lifting industry, V&T has launched a variety of lifting products to meet different application needs.

The V6-GH inverter is suitable for hoisting mechanisms with encoder feedback.

The V5−GH inverter is suitable for hoisting mechanisms without encoder feedback.

The V6−GA inverter is suitable for mechanisms with encoder feedback.

The V5−GA inverter is suitable for mechanisms without encoder feedback.

Profile of high performance crane special inverter

◆ Professional crane function, it is a perfect combination of PLC and high-performance vector inverter.

Built-in unique crane special functions for V&T crane special inverter are a perfect combination of crane special PLC and high-performance vector inverter. Its powerful, easy programming ,wiring and cost-effective.

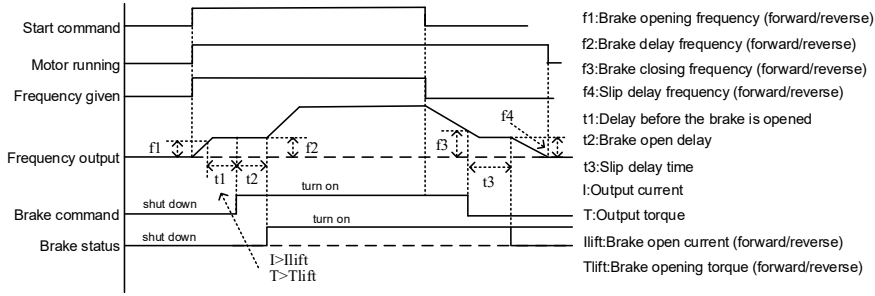
◆ Powerful starting torque in low frequency

The product adopts precise torque vector control algorithm, vector control without encoder 0.5Hz up to 180% rated torque, the torque response is less than 20ms; vector control with encoder 0.00Hz up to 180% rated torque, the torque response is less than 10ms. With reliable brake control logic, to ensure opening and closing of the brake will not appear slip phenomenon.

◆ Reliable brake control to eliminate the phenomenon of slip hook

Precise torque vector control algorithm combined with a reliable brake control logic, to ensure opening and closing of the brake will not appear slip phenomenon.

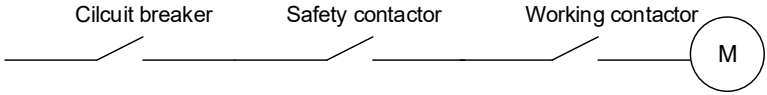
The first thing to start motor is to ensure that the motor has reached a certain frequency, the output torque was sufficient to open the mechanical brake and after process mechanical brake delay can normally accelerate to the setting speed; when stop motor, first of all let the motor as reasonable deceleration gradually decelerate to the brake close speed, and let the motor still output torque, then closed mechanical brake.Through the above functions can be better able to prevent the load slip hook at the moment of opening and closing the brake.



Brake is the most crucial and most important institutions of crane system. Reliability of brake relates to safety of whole machine. Except the brake control time sequence to ensure reliable

operation of the brake, also need to take full account of safety when brake faults. Inverter adopted control circuit three class control logic&main circuit two class contactor control for the aspect hardware of brake control. The three class control logic includes safety protection of whole machine, security protection of machine structure and control operation of PLC and inverter main circuit two class contacts are safety contactor and working contactor. Safety contactors was controlled of interlock by safety protection of whole machine, security protection of machine structure. Working contactor was controlled by PLC and control logic of inverter. In normal security contactor keep

normally closed, brake release and engage was controlled by working contactor. In dangerous situation security protection of the whole machine, security protection of machine structure works. Safety contactors and working contactor will disconnect at same time to ensure the closed brake.



◆ Smooth and reliable up-and-down speed

Unique speed torque control in process of acceleration and deceleration and perfect reliable brake time sequence control function to ensure that the process of the up and down more stable.

◆ Strong overload capacity

Taking the practical condition of crane equipment into account, V6-GH and V5-GH crane dedicated inverter overload capacity is 1.2 times of universal heavy duty inverter. With the more powerful overload capacity achieve excellent control effect.

◆ Has power optimization features

The inverter automatically calculates the weight of the load in the process of motor running and figured out the maximum speed of motor when it carry the load. So that the motor could running in high speed and working in the safety power. Maximize useful motor power, ensuring safety while improving working efficiency.

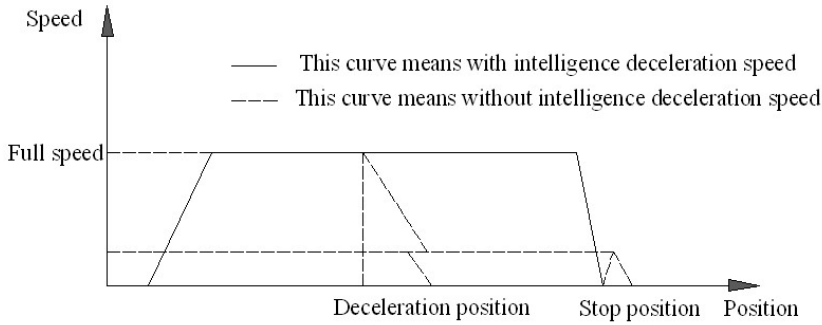
◆ Position processing functionality and intelligence deceleration function

By speed signal processing of PG feedback, it could automatic work out of the actual position without additional device.And it could be precisely to the millimeter. Providing data for position control such as intelligence deceleration, spot parkin, display the data. When inverter power off, it can memorize the location.

Intelligent deceleration function is according to the user's setting or protection requirement

the system determines the motor deceleration time and speed in the shortest time to safely and efficiently achieve designated parking to ensure the safety of the drive system and accurately stop, Accuracy to centimeter.

The unique position protection and hardware limit mutual monitoring to ensure the system more secure and efficient.



◆ International standard bus communication and optimized communication protocol

With dual 485 communication interface, support international standard Modbus protocol (RTU), optional ProfiBus - DP expansion card, CanOpen expansion cards and other communication protocol to meet different application requirements.

Optimized fast communication protocol highly improved the speed of communication.

With communication loop detection function. Once the communication error will immediately braking to ensure system security.

◆ Security perfect keyboard functions

Using the keyboard on-site to operate inverter can achieve all cranes start, stop, control time sequence. The main purpose of this feature is when there is any failure for the crane control system it could operate the keyboard to safely and efficiently put down the load to minimize the impact for production.

◆ Comprehensive monitoring and fault protection

Except common inverter overcurrent, overload, overvoltage and other 30 kinds of protection functions. It also has the speed monitoring function, torque monitoring, communications detection, brake monitoring and other crane special protection. ensure safe, reliable operation.

With fault situation exit function, once the system organization has problem, when it can not start using inverter keyboard could exit the fault situation to minimize the impact for production.

Typical applications crane industry

■ Port tire cranes, portal cranes

- ◆ Reliable brake control time sequence to ensure safe and reliable;
- ◆ Unique torque verification feature ensures the heavy will not have slip phenomenon when the brake release;
- ◆ Innovative power optimization and optimization functions ensure that the motor can up to operation efficiency maximization by safety rated power;
- ◆ Precise position control and intelligent deceleration function to ensure the system more secure and reliable, and through intelligent deceleration to prevent upward to the top phenomenon;
- ◆ fast response capability ensures easy operation, easy jog to position operation;
- ◆ Powerful zero speed torque to ensure safety and reliability of the whole system;
- ◆ Optimized communication format, greatly improving the efficiency and speed of communication;
- ◆ Compatible with a variety of communication modes to meet the communication needs of different systems.

■ Tower cranes/ lifts

- ◆ Arbitrary acceleration and deceleration and arbitrary impact load conditions, the inverter runs stable without tripping on the premise of improving energy efficiency;
- ◆ Strong ability to adapt to the environment, to ensure that the inverter in the wind, rain, sun, strong vibration and other harsh outdoor environment safe and reliable operation;
- ◆ Powerful low frequency torque to ensure that does not occur slip phenomenon when heavy objects is upward;
- ◆ Excellent control performance ensure that the system is compatible with the open-loop and closed-loop control;
- ◆ No need independent fault reset button, intelligent fault reset mode, making the system easy to operate, more secure and reliable;
- ◆ optimized lift control logic, making the rise and fall during the startup and shutdown smoothly without shocks.

■ Electric hoist, overhead crane

- ◆ Modular electric hoist special inverter, installation easier;
- ◆ The characteristics of the motor in the tapered, development control software for conical motor, the inverter perfect integrated with conical motor;
- ◆ Accurate low speed vector running algorithm to ensure that low-speed region can achieve sufficient startup ability to prevent slip hook phenomenon;
- ◆ No need auto tuning normal operation of the performance without affecting, truly maintenance free debugging features;
- ◆ High reliability, low cost nature, no need PLC control circuits, simplifying the technical program, the protection of the product quality and safety of the premise, reduce

customer costs, improve customer competitiveness in the market.

■ Mine hoist, winch

- ◆ Powerful low frequency torque to eliminate the phenomenon of slip hook;
- ◆ smooth acceleration and deceleration process greatly reduces the chance of off road;
- ◆ Easy to use, operating habits unchanged, the operator first operating frequency winch, still remember it perfectly;
- ◆ Support and coexistence of the original system, without changing the original system anything;
- ◆ Combine perfectly brake with safety circuits to use, the safety circuit of original system can be compatible , and also match various mechanical brakes perfectly to maximize the safety protection of the entire system;
- ◆ maximize efficiency, energy-saving space, in line with national energy conservation policy;

■ Grab Control

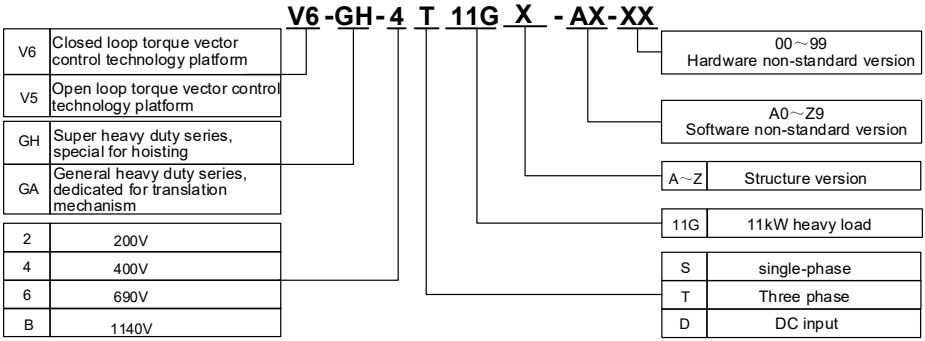
- ◆ for grabs for precise control, crawl quantity controllable;
- ◆ opening and closing have been taken to positions control, reduce excessive closed when closed bucket;
- ◆ Support and opening and closing rope torque balance, neither spillage nor excessive force when opening and closing mechanism;
- ◆ to improve the working efficiency of grab bucket and extend Grab life rope, reduce the labor intensity of drivers.

Contents

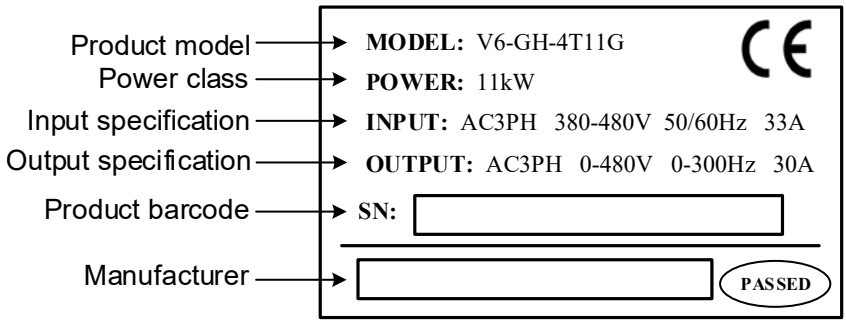
Chapter 1 Introduction of crane series inverter

1.1 Product Model Description

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



1.2 Product Nameplate Description



1.3 Product Series

■ V6-GH-4T□□□G□[*1] and V5-GH-4T□□□G□[*1] Three-phase 400V Constant torque/heavy-duty application

Power（kW）		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
Motor power（kW）		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
Output	Voltage (V)	Three-phase 0 to rated input voltage														
	Rated current (A)	2.5	3.8	5.5	9	13	17	24	30	39	45	60	75	91	112	150
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)														
Input	Rated Voltage /frequency	Three-phase 380V/480V; 50Hz/60Hz														
	Allowable voltage range	323V ~ 528V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%														
	Rated current (A)	2.8	4.2	6.1	10	15	19	26	33	43	50	66	83	100	123	165
Braking unit*2		Built-in as standard														
Protection class		IP20														
Cooling mode		Self-cooling		Forced air convection cooling												

Power (kW)		75	90	110	132	160	185	200	220	250	280	315	355	400	450	
Motor power （kW）		75	90	110	132	160	185	200	220	250	280	315	355	400	450	
Output	Voltage (V)	Three-phase 0 to rated input voltage														
	Rated current (A)	176	210	253	304	350	380	426	470	520	600	650	690	775	860	
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)														
Input	Rated Voltage /frequency	Three-phase 380V/480V; 50Hz/60Hz														
	Allowable voltage range	323V ~ 528V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%														
	Rated current (A)	160*	196*	232*	282*	326*	352*	385*	437*	491*	580*	624*	670*	755*	840*	
Braking unit		External braking unit needed														
Protection class		IP20														
Cooling mode		Forced air convection cooling														

* V6-GH-4T75G and V5-GH-4T75G above products are equipped with external DC reactor as standard.

*1 0.4~22kW structure version is A, 30~37kW structure version A means the main circuit is DC contactor, B is relay, 45kW and above need not be noted.

*2 0.4 to 55kW standard built-in brake unit, 15kW to 55kW If the brake unit is not required, the model must be equipped with −56, Products with 75kW and above must have an external brake unit.

■ V6−GA−4T□□□G□ and V5−GA−4T□□□G□ Three-phase 400V Constant torque/heavy-duty application

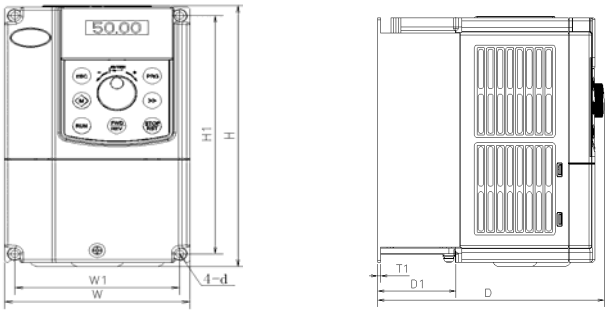
Power (kW)		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Motor power （kW）		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Voltage (V)	Three-phase 0 to rated input voltage														
	Rated current (A)	2.5	3.8	5.5	9	13	17	24	30	39	45	60	75	91	112	150
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)														
Input	Rated Voltage /frequency	Three-phase 380V/480V; 50Hz/60Hz														
	Allowable voltage range	323V ~ 528V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%														
	Rated current (A)	2.8	4.2	6.1	10	15	19	26	33	43	50	66	83	100	123	165
Braking unit*2		Built-in as standard														
Protection class		IP20														
Cooling mode		Self-cooling	Forced air convection cooling													
Power (kW)		90	110	132	160	185	200	220	250	280	315	355	400	450	500	
Motor power （kW）		90	110	132	160	185	200	220	250	280	315	355	400	450	500	
Output	Voltage (V)	Three-phase 0 to rated input voltage														
	Rated current (A)	176	210	253	304	350	380	426	470	520	600	650	690	775	860	
	Overload capacity	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)														
Input	Rated Voltage /frequency	Three-phase 380V/480V; 50Hz/60Hz														
	Allowable voltage range	323V ~ 528V; Voltage unbalancedness ≤3%; allowable frequency fluctuation: ±5%														
	Rated current (A)	160*	196*	232*	282*	326*	352*	385*	437*	491*	580*	624*	670*	755*	840*	
Braking unit		External braking unit needed														
Protection class		IP20														
Cooling mode		Forced air convection cooling														

* V6−GA−4T90G and V5−GA−4T90G above products are equipped with external DC reactor as standard.

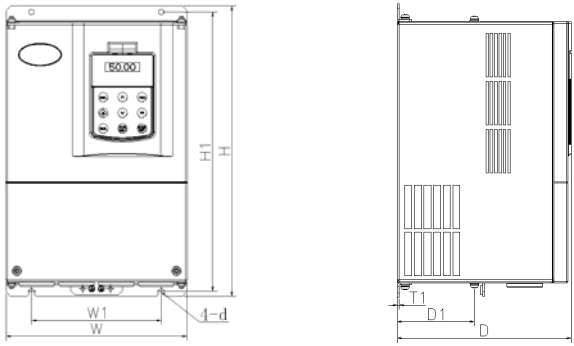
*1 0.7~30kW structure version is A, 37~45kW structure version A means the main circuit is DC contactor, B is relay, 55kW and above need not be noted.

*2 0.7 to 75kW standard built-in brake unit, 18.5kW to 75kW If the brake unit is not required, the model must be equipped with −56, Products with 90kW and above must have an external brake unit.

1.4 Product Outline, Mounting Dimension, and Weight



V6/V5-GH-4T5.5G，V6/V5-GA-4T7.5G and below power class



V6-GH-4T7.5G，V6-GA-4T11G and above power class

Product outline, mounting dimension, and weight

voltage	Inverter item	product outline, mounting dimension（mm）								weight（kg）
		W	H	D	W1	H1	D1	T1	Install hole d	
400V	V6/V5-GH-4T0.4G V6/V5-GA-4T0.75G	118	190	155	105	173	40.8	3	5.5	1.5
	V6/V5-GH-4T0.75G V6/V5-GA-4T1.5G	118	190	175	105	173	60.5	4	5.5	2.6
	V6/V5-GH-4T1.5G V6/V5-GA-4T2.2G									
	V6/V5-GH-4T2.2 G V6/V5-GA-4T3.7G									
	V6/V5-GH-4T3.7G V6/V5-GA-4T5.5G	155	249	185	136	232	69	8	5.5	3
	V6/V5-GH-4T5.5G V6/V5-GA-4T7.5G									
	V6/V5-GH-4T7.5G	210	337	200	150	324	107.5	2.5	7	8.5

voltage	Inverter item	product outline, mounting dimension（mm）								weight（kg）
		W	H	D	W1	H1	D1	T1	Install hole d	
	V6/V5-GA-4T11G									
	V6/V5-GH-4T11G V6/V5-GA-4T15G									
400V	V6/V5-GH-4T15G V6/V5-GA-4T18.5G	285	440	220	200	425	107.5	2.5	7	17
	V6/V5-GH-4T18.5G V6/V5-GA-4T22G									
	V6/V5-GH-4T22G V6/V5-GA-4T30G									
	V6/V5-GH-4T30G V6/V5-GA-4T37G	315	575	227	220	553	123.5	2.5	10	25
	V6/V5-GH-4T37G V6/V5-GA-4T45G									
	V6/V5-GH-4T45G V6/V5-GA-4T55G	400	615	265	270	590	123.5	3.0	10	35
	V6/V5-GH-4T55G V6/V5-GA-4T75G									
	V6/V5-GH-4T75G V6/V5-GA-4T90G	465	745	325	343	715	156	3.0	12	55
	V6/V5-GH-4T90G V6/V5-GA-4T110G									
	V6/V5-GH-4T110G V6/V5-GA-4T132G	540	890	385	370	855	205.5	4.0	14	85
	V6/V5-GH-4T132G V6/V5-GA-4T160G									
	V6/V5-GH-4T160G V6/V5-GA-4T185G									
	V6/V5-GH-4T185G V6/V5-GA-4T200G									
	V6/V5-GH-4T200G V6/V5-GA-4T220G	700	1010	385	520	977	210	4.0	14	125
	V6/V5-GH-4T220G V6/V5-GA-4T250G									
	V6/V5-GH-4T250G V6/V5-GA-4T280G									
	V6/V5-GH-4T280G V6/V5-GA-4T315G	810	1358	425	520	1300	210	4.0	14	215
	V6/V5-GH-4T315G V6/V5-GA-4T355G									
	V6/V5-GH-4T355G V6/V5-GA-4T400G									
	V6/V5-GH-4T400G V6/V5-GA-4T450G									
	V6/V5-GH-4T450G V6/V5-GA-4T500G									

1.5 Brake resistor selection

Inverter item	Brake unit	Brake unit & resistor				BRAKING TORQUE %
		Standard power	Standard resistor	Mini ultimate resistance	QTY	
V6/V5-GH-4T0.4G V6/V5-GA-4T0.75G	Built-in as standard	0.24kW	750Ω	125Ω	1	130
V6/V5-GH-4T0.75G V6/V5-GA-4T1.5G		0.45kW	400Ω	100Ω	1	125
V6/V5-GH-4T1.5G V6/V5-GA-4T2.2G		0.78kW	250Ω	100Ω	1	135
V6/V5-GH-4T2.2G V6/V5-GA-4T3.7G		1.3kW	150Ω	66.7Ω	1	135
V6/V5-GH-4T3.7G V6/V5-GA-4T5.5G		2.2kW	100Ω	66.7Ω	1	135
V6/V5-GH-4T5.5G V6/V5-GA-4T7.5G		3.3kW	75Ω	66.7Ω	1	130
V6/V5-GH-4T7.5G V6/V5-GA-4T11G		4.5kW	50Ω	25Ω	1	135
V6/V5-GH-4T11G V6/V5-GA-4T15G		6.6kW	40Ω	25Ω	1	125
V6/V5-GH-4T15G V6/V5-GA-4T18.5G		9kW	32Ω	20Ω	1	125
V6/V5-GH-4T18.5G V6/V5-GA-4T22G		11kW	27.2Ω	20Ω	1	125
V6/V5-GH-4T22G V6/V5-GA-4T30G		13kW	20Ω	14Ω	1	125
V6/V5-GH-4T30G V6/V5-GA-4T37G		20kW	16Ω	14Ω	1	125
V6/V5-GH-4T37G V6/V5-GA-4T45G		22kW	13.6Ω	10Ω	1	125
V6/V5-GH-4T45G V6/V5-GA-4T55G		13.5kW	20Ω	7Ω	2	135
V6/V5-GH-4T55G V6/V5-GA-4T75G		18kW	13.6Ω	5Ω	2	145

Note:

●The connection mode for multiple braking resistors is parallel connection. For example, the inverter of V6/V5-GH-4T45G, the braking resistor lectotype: it is suggest to select two 13.5kW 20Ωbraking resistor parallel connection, amount to braking resistor is 27kW, 10Ω.

●The selection of the braking resistor needs to be determined according to the actual situation. The braking resistor selection of the above built-in braking unit is 40% ED, which is for reference only. The braking resistor should be selected with sufficient braking torque and the resistance should not be too small to avoid damage to the braking resistor.

●In the case of lifting, the selection of braking resistor and braking unit is related to the inertia of the system, the time of deceleration, the distance of decentralization, and the time (potential energy). It needs to be selected according to the actual situation. The greater the inertia of the system, the shorter the required deceleration time and the more frequent the braking, the greater the power selected by the braking resistor and the smaller the resistance.

Chapter 2 Installation and Wiring of the Inverte

2.1 Product and peripheral device connections and instructions

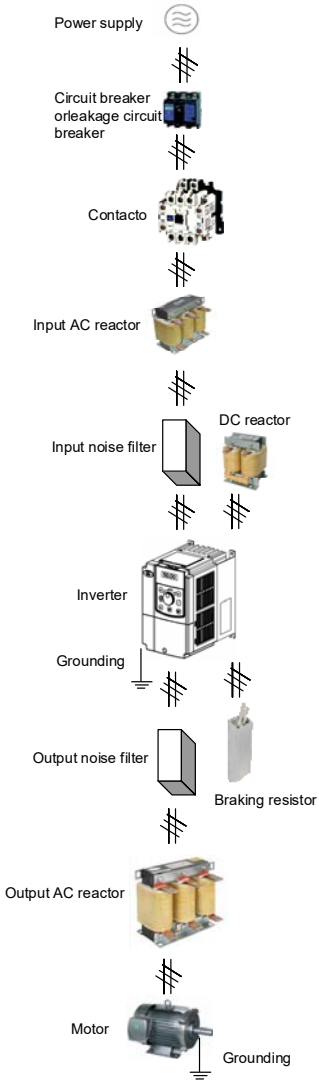
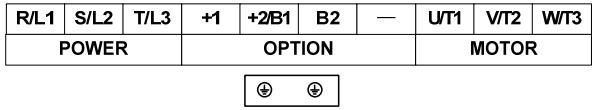


Fig.2-1 Connection diagram of the product and peripheral devices

Power supply	Input power must meet the range specified by the product
Circuit breaker	The capacity of the circuit breaker shall be 1.5 ~ 2 time of the rated current of the inverter. The time features of the circuit breaker shall fully consider the time features of the inverter overload protection.
Leakage circuit breaker	Because the inverter output is the high-frequency pulse, there will be high-frequency leakage current. Selection recommendations: It is suggested that B type leakage circuit breaker be used.
Contactor	To ensure safety, please do not close and disconnect the contactor frequently, avoid frequent power-on and off of the inverter, and avoid starting the inverter directly through the contactor.
Input AC reactor or DC reactor	1. Improve the power factor on the input side 2, effectively improve the three-phase input power imbalance caused by the system interference 3, improve the pulse current damage to the rectifier part of the device 4. Improve the higher harmonics on the input side to prevent damage to other equipment caused by voltage waveform distortion. 5. Improve the influence of high-order harmonics on the input side on the inverter and reduce external conduction and radiation interference.
Input noise filter	Reduce the interference input from the power supply terminal to improve the anti-interference ability of the inverter Reduce external conduction and radiation interference of the inverter
Brake unit and brake resistor	Braking resistors and braking units must be added when fast deceleration is required or when the motor is in a generating state Some inverter brake units are built-in, please refer to the section “Brake resistor selection”.
Thermal protection relay	Although the inverter has motor overload protection function, when one inverter drives two or more motors or multi-pole motors, to prevent the motor overtemperature failure, thermal protection relay shall be installed between the inverter and each motor, and the motor overload protection parameter P9.16 shall be set as “2” (motor protection disabled).
Output noise filter	When the output end of the inverter is connected with noise filter, the conduction and radiation interference can be reduced.
Output AC reactor	When the cable connecting the inverter and the motor is longer than 100m, it is suggested to install AC output reactor to suppress the high-frequency oscillation to avoid the damage to motor insulation, large leakage current and frequent inverter protective action.
Motor	Select the motor that matches the actual use

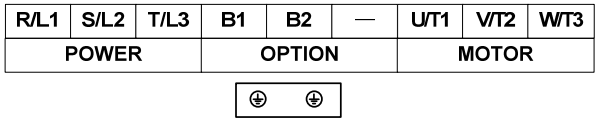
2.2 Functions of Main Circuit Terminal

◆ V6/V5−GH−4T0.4G～V6/V5−GH−4T11G，with buit-in brake unit as standard
V6/V5−GA−4T0.75G～V6/V5−GA−4T15G，with buit-in brake unit as standard：



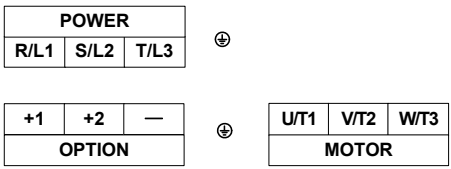
Terminal symbol	Terminal name and function description
R/L1、S/L2、T/L3	Three-phase AC input terminal
+1、+2/B1	DC reactor connecting terminal, short circuited with copper bus upon delivery
+2/B1、B2	Connecting terminal of braking resistor
+2/B1、—	DC power input terminal; DC input terminal of external braking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

◆ Internal Braking Unit for V6/V5−GH−4T15G～V6/V5−GH−4T55G，
Internal Braking Unit for V6/V5−GA−4T18.5G～V6/V5−GA−4T75G：



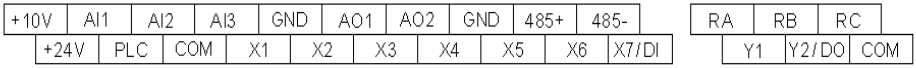
Terminal symbol	Terminal name and function description
R/L1、S/L2、T/L3	Three-phase AC input terminal
B1、B2	Connecting terminal of braking resistor
B1、—	DC power input terminal
U/T1、V/T2、W/T3	Three-phase AC output terminal, motor terminal
⏚	PE Grounding terminal PE

◆ V6/V5−GH−4T75G、V6/V5−GA−4T90G And above power level, no brake unit, wiring is up and down:



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

2.3 Control loop wiring



Type	Terminal symbol	Terminal function description	Technical specification
7 digital inputs	+24V	+24V	24V±10%, internal isolated with GND Maximum output current: 200mA, with overload and short circuit protection
	PLC	Common terminal of the input terminal	Short circuited with +24V by default
	COM	Ground terminal for +24V	Internal isolated with GND
	X1～X6	Multi-function input terminals 1 ~ 6	Input specification: 24VDC,5mA Frequency range: 0 ~ 200Hz Voltage range: 24V±20%
	X7/DI	Multi-function input or pulse input	Multi-function input: same as X1 ~ X6 Pulse input: 0.1kHz ~ 50kHz Voltage range: 24V±20%
3 output terminals (2 open collectors and 1 relay)	Y1	Open collector output	Voltage range: 24V±20%, maximum input current: 50mA
	Y2/DO	Open collector or pulse output	Open collector: same as Y1 Pulse output frequency: 0 ~ 50kHz Pulse output voltage range: 24V±20%
	COM	Open collector output common end	Internal isolated with GND
	RA/RB/RC	Relay output	RA-RB: normally closed RA-RC: normally open Contact capacity: 250VAC/1A, 30VDC/1A
3 Analog input	+10V	Analog input reference voltage	10V ±3%, internal isolated with COM Maximum output current: 10mA, with short circuit and overload protection *
	GND	Analog ground terminal	Internal isolated with GND
	AI1	Analog input channel 1	0~20mA: input impedance 500Ω maximum input current: 30mA 0~10V: input impedance 20kΩ maximum input voltage: 15V Resolution: 12 bits (0.025%) 0 ~ 20mA or 0 ~ 10V analog input can be selected by jumper 4 ~ 20mA or 2 ~ 10V analog input can be changed by parameters
	AI2	Analog input channel 2	Same as AI1
	AI3	Analog input channel 3	-10V ~ 10V: input impedance 20kΩ Resolution: 12 bits (0.025%) Maximum input voltage: ±15V
2 Analog output	AO1	Analog output 1	0 ~ 20mA: allowable output impedance 200 ~ 500Ω 0 ~ 10V: allowable output impedance ≥10kΩ Output precision: 2% Resolution: 10 bits (0.1%), with short circuit protection 0 ~ 20mA or 0 ~ 10V output can be selected by jumper 4 ~ 20mA or 2 ~ 10V analog output can be changed by parameters
	AO2	Analog output 2	Same as AO1
	GND	Analog ground terminal	Internal isolated with COM

Type	Terminal symbol	Terminal function description	Technical specification
Terminal RS485	485+	Positive end of RS485	速率：4800/9600/19200/38400/57600bps 最多并联 32 台，超过 32 台，需使用中继器 最长距离 500m（采用标准的双绞屏蔽电缆）
	485−	Negative end of RS485	
	GND	Ground terminal of RS485 shielding layer	Internal isolated with COM
Operation Panel 485	CN7	485 port of operation panel	When used for communication connection with host computer, it is t Operation the same as terminal 485.
			The maximum distance between the operation panel and the operation panel interface is 15 meters (standard twisted shielded network cable)

2.4 Terminal Wiring diagram

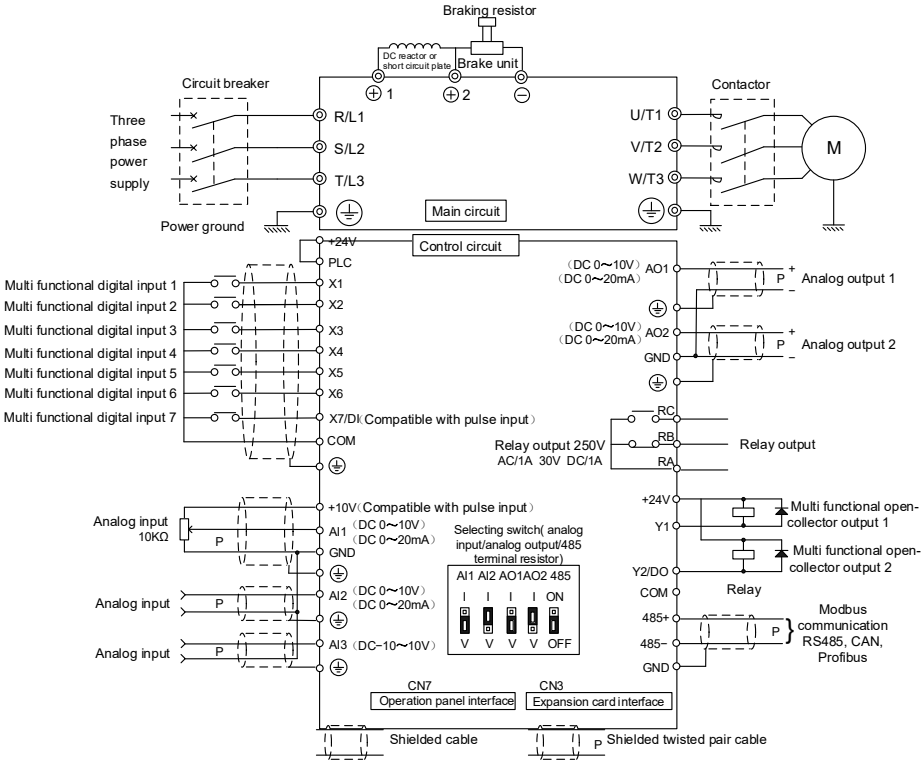
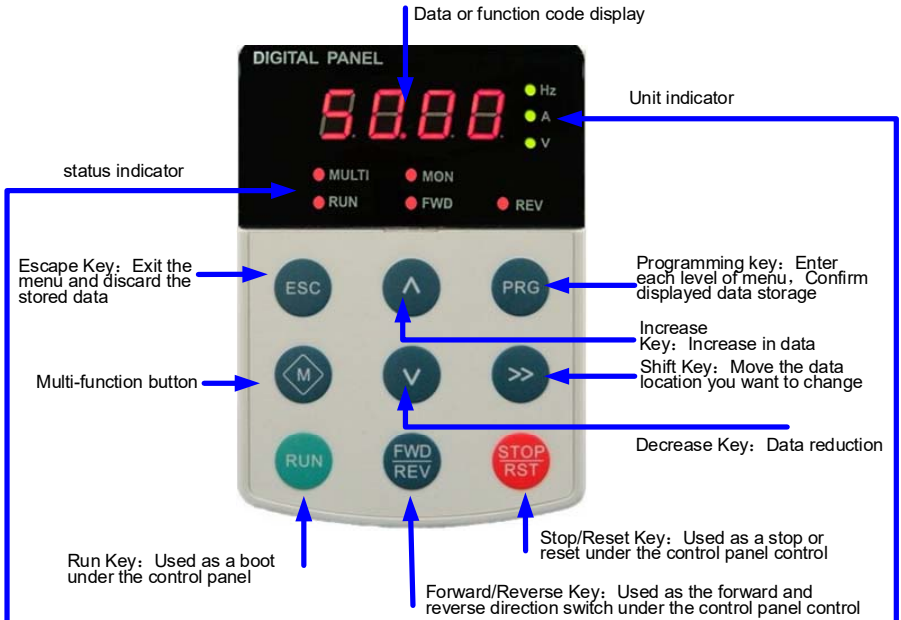


Figure **2−2** Terminal wiring diagram

Chapter 3 Operation Panel Instructions

3.1 Introduction to Operation Panel



Multi-function M key indicator
On: Run command reference is operation panel
Off: Run command reference is terminals
Flash: Run command reference is communication

MON：Run command reference channel indicator
On: Run command reference is operation panel
Off: Run command reference is terminals
Flash: Run command reference is communication

RUN：Running status indicator

On: Inverter is running
Off: Inverter has stopped
Flash: Inverter is stopping

FWD：Run forward indicator

On: In stop status, inverter had run forward command
In running status, inverter is running forward
Flash: Changing from forward running to reverse running

REV：Run reverse indicator

On: In stop status, inverter had run reverse command
In running status, inverter is running reverse
Flash: Changing from reverse running to forward running

Hz：Frequency indicator
On: Current displayed value unit is running frequency
Flash: Current displayed value unit is setting frequency

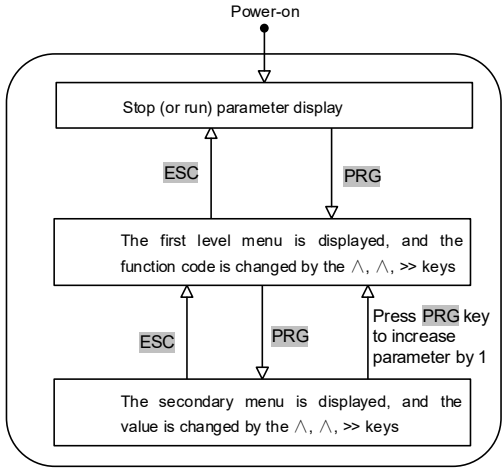
A: Current indicator
V: Voltage indicator
Hz+A：Rotating speed indicator
On: Current displayed value unit is rotating speed
Flash: Current displayed value unit is setting rotating speed

Hz+V：% indicator
A+V：Self definable indicator
Hz+A+V：Time indicator
The indicators are off : Current displayed parameter is no unit

With a 9-button operation panel and a shuttle-type operation panel, the two operation panels are fully compatible and can be selected at will.

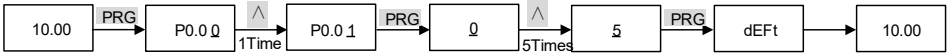
Note: 5.5 kW and below standard for shuttle type operation panel (IE knob type), 7.5 kW and above for Key-type operation panel. If the customer needs to change the operation panel, please specify when ordering.

3.2 Keyboard parameter change process

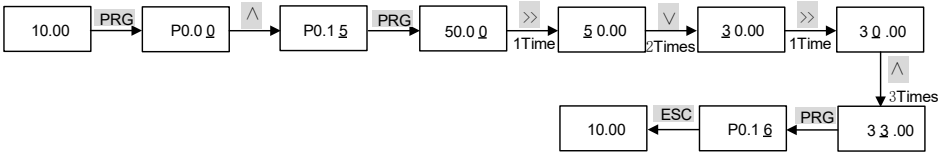


3.3 Operation Example

Example 1: Restore factory parameters, for example, setting P0.01=5: return to factory defaults.



Example 2: Setting the rated motor frequency is 33Hz, ie P0.15=33.00Hz, assuming 50.00Hz.



Chapter 4 Crane special inverter parameters lists

Meaning of each item in function code parameter table:

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

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
Group P0 Basic Function Parameter						
P0.00	User password	0000	0～FFFF	/	○	0：No password; Other: Password protection
P0.01	Function code protection	0	0～5	/	×	0: All the parameters can be modified; 1: All the parameters cannot be modified; 2: Restore parameters in zone P to factory settings; 3: Restore parameters in zone P to factory settings; (except for P9 group) 4: Recover the parameters in zone P and zone A to factory settings; 5: Recover all the parameters to factory settings. (except for d group)
P0.02	Function code display	0	0～3	/	○	0: Basic menu mode 1: Fast menu mode 2: Menu mode of non-leave-factory setting value function codes; 3: Menu mode of last changed 10 function codes;
P0.03	Control operation mode	0	0～11	/	×	0: no encoder feedback vector control 1; 4: no encoder feedback vector control 2; 8: There is encoder feedback vector control 2; (only V6 series is valid)
P0.04	Open loop main reference mode	00	00～FF	/	○	Ones place: 0: Open loop digital frequency reference mode 1: AI1 analog value reference mode 2: AI2 analog value reference mode 3: AI3 analog value reference mode Tens palce: reserved
P0.05	Open loop digital frequency reference	10.00	0.00～300.00	Hz	○	P0.04=0 and the frequency given in the case when the multi-segment frequency terminal is invalid
P0.06	Running command reference mode	0	0～2	/	○	0: Operation panel 1: Terminal 2: Communication

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
P0.07	Running direction command	0	0～1	/	○	0: Run forward 1: Run reverse
P0.11	Maximum output frequency	50.00	0.01～300.00	Hz	×	
P0.12	Maximum output voltage	380	1～480	V	×	The rated voltage of the motor
P0.13	Frequency high limit	50.00	0.00～300.00	Hz	×	Lower frequency limit P0.14 ~ Maximum output frequency P0.11
P0.14	Frequency low limit	0.00	0.00～300.00	Hz	×	
P0.15	Basic operating frequency	50.00	0.00～300.00	Hz	×	The rated frequency of the motor
Group P1 Acceleration and deceleration parameters and torque parameters						
P1.00	Forward acceleration time	8.0	0.0～3600.0	s	○	Acceleration time: the time required to accelerate from 0 to P0.11 Deceleration time: the time required to decelerate from P0.11 to 0 speed If the multi-step acceleration/deceleration time is valid, the multi-stage acceleration/deceleration time is taken as the actual acceleration/deceleration time. Please refer to the description of P4.09~P4.14.
P1.01	Forward deceleration time	8.0	0.0～3600.0	s	○	
P1.02	Reverse Acceleration time	8.0	0.0～3600.0	s	○	
P1.03	Reverse Deceleration time	8.0	0.0～3600.0	s	○	
P1.04	S-curve acceleration and deceleration time	0.0	0.0～6553.5	s	○	
P1.05	Positive torque increase	4.0	0.0～30.0	%	○	Increase the output voltage and torque when the inverter runs at low frequency. The magnitude of the boost should be properly set according to the load conditions, and the lift is too much, and a large current surge will occur during the start-up process. This function is applicable under vector control 1.。
P1.06	Reverse torque increase	3.0	0.0～30.0	%	○	
P1.07	Low speed compensation	100.0	0.0～1000.0	%	○	This function helps the inverter to keep the motor speed stable under load fluctuations and heavy loads. This function is valid in vector 1 control mode.
P1.08	High speed compensation	100.0	0.0～1000.0	%	○	
P1.09	Speed compensation switching frequency	10.00	0.00～300.00	Hz	○	
Group P2 Key and Display Parameters						
P2.00	Key-lock function selection	0	0～3	/	○	0: No locking; 1: Locking all keys; 2: Locking all keys except MULTI key; 3: Locking all keys except RUN and STOP/RST keys
P2.01	Multi-function key definition	1	0～8	/	○	0~20: No function 3: Emergency stop 2 (Coast to stop) 4: Switch running command reference mode(Operation panel / terminal / host computer) 5~8: Reserved
P2.02	Display parameter selection at running	1CB0	0～FFFF	/	○	LED ones place: 0: Reference frequency (Hz);1: Bus voltage (V); 2: AI1(V); 3: AI2(V); 4: AI3(V); 5~6: Reserved 7: Motor rotation speed (rpm); 8~9: saved A: Reference torque (%); B: Running frequency (Hz); C: Output current (A); D: Output torque (%);

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
						E: Output power (kW); F: Output voltage (V); Tens, hundreds, thousands place: Same with above
P2.03	Display parameter selection at stopping	3210	0～FFFF	/	○	Ones place: 0: Reference frequency (Hz) 1: Bus voltage (V) 2: AI1(V) 3: AI2(V) 4: AI3(V) 5~F: Reserved Tens, hundreds, thousands place: Same with above
Group P3 Start/stop Parameters						
P3.00	Startup mode	0	0～1	/	×	0: Normal startup 1: Start after DC injection
P3.02	DC injection time	0.0	0.00～300.0	s	×	Injection current is set to P3.07
P3.03	Startup frequency	0.00 0.50	0.00～60.00	Hz	×	Encoder speed control defaults to 0.00, other controls default to 0.50
P3.04	Startup frequency retention time	0.0	0.0～3600.0	s	×	0.0～3600.0s
P3.05	Stop mode	0	0～1	/	×	0: Deceleration to stop, if P3.08≠0, DC brake after deceleration stop 1: Coast to stop
P3.06	DC braking initial frequency	0.00	0.00～300.00	Hz	×	f P3.08=0, stop after decelerating to 0 frequency; If P3.08≠0, decelerate to the frequency set by P3.06 and then enter DC braking, the DC braking current is set to P3.07, and it will stop completely after the time set by P3.08.
P3.07	DC braking current	0.0	0.0～120.0	%	×	
P3.08	DC braking time	0.0	0.00～300.0	s	×	
P3.09	Anti−reverse selection	0	0～1	/	×	0: Run reverse is enabled 1: Run reverse is disabled
P3.10	Forward / reverse dead zone time	0.0	0.0～3600.0	s	×	0.0～3600.0s
P3.11	Forward and reverse switching frequency	2.00	0.00~300.00	Hz		
Group P4 Multi−step Parameters						
P4.00	V/F curve reference	0	0～6	/	×	0: Direct line 1: Multi−step (P4.01 ~ P4.08) 2~6: Reserved
P4.01	V/F frequency F0	0.00	0.00～300.00	Hz	×	F0<F1
P4.02	V/F voltage value V0	0.0	0.0～100.0	%	×	0.0～100.0%
P4.03	V/F frequency F1	0.00	0.00～300.00	Hz	×	F1<F2
P4.04	V/F voltage value V1	0.0	0.0～100.0	%	×	0.0～100.0%
P4.05	V/F frequency F2	0.00	0.00～300.00	Hz	×	F2<F3
P4.06	V/F voltage value V2	0.0	0.0～100.0	%	×	0.0～100.0%
P4.07	V/F frequency F3	0.00	0.00～300.00	Hz	×	P0.15 F3≤Motor basic frequency P0.15
P4.08	V/F voltage value V3	0.0	0.0～100.0	%	×	0.0～100.0%

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
P4.09	Acceleration time 1	20.0	0.1～3600.0	s	○	
P4.10	Deceleration time 1	20.0	0.1～3600.0	s	○	
P4.11	Acceleration time 2	20.0	0.1～3600.0	s	○	
P4.12	Deceleration time 2	20.0	0.1～3600.0	s	○	
P4.13	Acceleration time 3	20.0	0.1～3600.0	s	○	
P4.14	Deceleration time 3	20.0	0.1～3600.0	s	○	
P4.22	Multi-step frequency 0reference 1	5.00	0.00～300.00	Hz	○	
P4.23	Multi-step frequency reference 2	8.00	0.00～300.00	Hz	○	
P4.24	Multi-step frequency reference 3	10.00	0.00～300.00	Hz	○	
P4.25	Multi-step frequency reference 4	15.00	0.00～300.00	Hz	○	
P4.26	Multi-step frequency reference 5	18.00	0.00～300.00	Hz	○	
P4.27	Multi-step frequency reference 6	20.00	0.00～300.00	Hz	○	
P4.28	Multi-step frequency reference 7	25.00	0.00～300.00	Hz	○	
P4.29	Multi-step frequency reference 8	28.00	0.00～300.00	Hz	○	
P4.30	Multi-step frequency reference 9	30.00	0.00～300.00	Hz	○	
P4.31	Multi-step frequency reference 10	35.00	0.00～300.00	Hz	○	
P4.32	Multi-step frequency reference 11	38.00	0.00～300.00	Hz	○	
P4.33	Multi-step frequency reference 12	40.00	0.00～300.00	Hz	○	
P4.34	Multi-step frequency reference 13	45.00	0.00～300.00	Hz	○	
P4.35	Multi-step frequency reference 14	48.00	0.00～300.00	Hz	○	
P4.36	Multi-step frequency reference 15	50.00	0.00～300.00	Hz	○	

Acceleration deceleration terminal 2	Acceleration deceleration terminal 1	Acceleration deceleration time
OFF	OFF	P1.00～P1.04
OFF	ON	P4.09，P4.10
ON	OFF	P4.11，P4.12
ON	ON	P4.13，P4.14

Frequency terminal4	Frequency terminal 3	Frequency terminal 2	Frequency terminal 1	Setting frequency
OFF	OFF	OFF	OFF	P0.05
OFF	OFF	OFF	ON	P4.22
OFF	OFF	ON	OFF	P4.23
OFF	OFF	ON	ON	P4.24
OFF	ON	OFF	OFF	P4.25
OFF	ON	OFF	ON	P4.26
OFF	ON	ON	OFF	P4.27
OFF	ON	ON	ON	P4.28
ON	OFF	OFF	OFF	P4.29
ON	OFF	OFF	ON	P4.30
ON	OFF	ON	OFF	P4.31
ON	OFF	ON	ON	P4.32
ON	ON	OFF	OFF	P4.33
ON	ON	OFF	ON	P4.34
ON	ON	ON	OFF	P4.35
ON	ON	ON	ON	P4.36

Group P5 Multi-function Input Parameters

P5.00	Digital input terminal X1 function selection	99	0～99	/	×	02: Forward，Only valid in the state of P0.06=1.
P5.01	Digital input terminal X2 function selection	99	0～99	/	×	03: Reverse, valid only in the state of P0.06=1
P5.02	Digital input terminal X3 function selection	99	0～99	/	×	09: Multi-segment frequency terminal 1，Please see P4.22~P4.36
P5.03	Digital input terminal X4 function selection	99	0～99	/	×	10: Multi-segment frequency terminal 2，Please see P4.22~P4.36
P5.04	Digital input terminal X5 function selection	99	0～99	/	×	11: Multi-segment frequency terminal 3，Please see P4.22~P4.36
P5.05	Digital input terminal X6 function selection	99	0～99	/	×	12: Multi-segment frequency terminal 4，Please see P4.22~P4.36
P5.06	Digital input terminal X7 function selection	99	0～99	/	×	13: Multi-stage acceleration/deceleration time terminal 1，Please see P4.9~P4.14
P5.07	X1 to X7 terminal filter time	0.150	0.000～1.000	s	×	14: Multi-stage acceleration/deceleration time terminal 2，Please see P4.9~P4.14
P5.08	X1 terminal delay time	0.0	0.0～999.9	s	×	15: Terminal Up/Dn adjustment frequency is cleared
P5.09	X2 terminal delay time	0.0	0.0～999.9	s	×	16: Speed increment command Up
						17: Speed decrement command Dn

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
						18: Acceleration and deceleration is prohibited，If this terminal function is enabled, the current frequency output will be maintain except stop command. 19: External fault input，When this terminal is ON, inverter will stop running and display “E.oUt” fault. 20: Fault reset 21: external interrupt contact input, the output frequency will be 0 immediately after this function is effective, and the signal will be automatically accelerated from 0 to the set frequency after cancellation 22: Run is prohibited，Once this terminal function is enable, the motor will coast to stop immediately. The inverter is allowed to start only when this terminal function is disabled. 23: The terminal is stopped. When this function is valid, it will stop immediately according to the stop mode. 24: Free stop at the terminal, this function is valid, immediately free parking 25: Stop via terminal with DC braking 1 32: Brake release confirmation ： 33: Location synchronization 34: Forced location sync is invalid 35: The frequency is switched to P0.13. Once closed, the frequency is switched to P0.13. 36: The frequency is switched to P0.05. Once closed, the frequency is switched to P0.05. 37: Forward allows 1, if the forward run is disconnected, then decelerate to stop 38: Reverse allows 1, if the reverse run is disconnected, then decelerate to stop 39: Run permission 1, if the running state is disconnected, decelerate to stop 40: Forward allows 2, if the forward rotation is disconnected, free parking 41: Reverse allows 2, if the reverse run is disconnected, free parking 42: Run permission 2, if the operation is disconnected, free parking
Group P6 Analog Reference Parameters						
P6.00	AI1 ~ AI3, DI analog curve correction	4444	0000～4444	/	○	Ones place: AI1 analog curve correction 0: Determine the reference frequency according to curve 1 (P6.01 to P6.04) 1: Determine the reference frequency according to curve 2 (P6.05 to P6.08) 2: Determine the per unit value determined according to curve 3 (P6.09 to P6.12) 3: Determine the per unit value determined according to curve 4(P6.13 to P6.30) 4: Withput curve correction Tens place: AI2 analog curve correction Same with above Hundreds place: AI3 analog curve correction Same with above Thousands place: DI analog curve correction
P6.01	Curve 1 input point A0	0.0	0.0～110.0	%	○	
P6.02	Reference frequency f0 corresponding to curve1 input point A0	0.00	0.00～300.00	Hz	○	
P6.03	Curve 1 input point A1	100.0	0.0～110.0	%	○	
P6.04	Reference frequency f1 corresponding to curve1 input point A1	50.00	0.00～300.00	Hz	○	
P6.05	Curve2 input point A0	0.0	0.0～110.0	%	○	
P6.06	Reference frequency f0 corresponding to curve2 input point A0	0.00	0.00～300.00	Hz	○	
P6.07	Curve2 input point A1	100.0	0.0～110.0	%	○	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
P6.08	Reference frequency f1 corresponding to curve2 input point A1	50.00	0.00～300.00	Hz	○	Same with above
P6.09	Curve3 input point A0	0.0	0.0～110.0	%	○	
P6.10	Per-unit value B0 corresponding to curve3 input point A0	0.0	0.0～110.0	%	○	
P6.11	Curve3 input point A1	100.0	0.0～110.0	%	○	
P6.12	Per-unit value B1 corresponding to curve3 input point A1	100.0	0.0～110.0	%	○	
P6.13	Curve4 input point A0	0.0	0.0～110.0	%	○	
P6.14	Per-unit value B0 corresponding to curve4 input point A0	0.0	0.0～110.0	%	○	
P6.15	Curve4 input point A1	25.0	0.0～110.0	%	○	
P6.16	Per-unit value B1 corresponding to curve4 input point A1	25.0	0.0～110.0	%	○	
P6.17	Curve4 input point A2	50.0	0.0～110.0	%	○	
P6.18	Per-unit value B2 corresponding to curve4 input point A2	50.0	0.0～110.0	%	○	
P6.19	Curve4 input point A3	100.0	0.0～110.0	%	○	
P6.20	Per-unit value B3 corresponding to curve4 input point A3	100.0	0.0～110.0	%	○	
P6.21	AI1～AI3、DI analog channel function selection	0000	0000～6666	/	×	Ones place: AI1 function selection 0: Open loop frequency reference 1: Torque reference 1 2: Torque reference 2 3~4: Reserved 5: Motor temperature feedback 6: Speed limiting (torque control) Tens place: AI2 function selection: Same with above Hundreds place: AI3 function selection: Same with above Thousands place: DI function selection: Same with above
P6.22	AI1 filtering time	0.150	0.000～1.000	s	○	0.000～1.000s
P6.23	AI2 filtering time	0.150	0.000～1.000	s	○	0.000～1.000s
P6.24	AI3 filtering time	0.150	0.000～1.000	s	○	0.000～1.000s
Group P7 Multi-function Output Parameters						
P7.00	Y1 terminal output function selection	14	0～47	/	○	0: Signal indicating that the inverter is running (RUN) 1: Frequency arrival signal (FAR) 2: Frequency level detection signal 1(FDT1) 3: Frequency level detection signal 2(FDT2) 4: Inverter or motor overload pre-warning (OL)
P7.01	Y2/DO terminal output function selection	02	0～71	/	○	
P7.02	Relay terminal output	32	0～47	/	○	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
	function selection					5: Stop and lock due to under voltage (LU) 6: Stop due to external failure (EXT) 7: Frequency high limit(FHL) 8: Frequency low limit(FLL) 9: Inverter is running at zero speed 10~12: reserved 13:Inverter ready completed 14: Inverter failure 15: Inverter reports alarm 19: Output X1 20: Output X2 22: Zero current detection arrival (relative to motor) 23: Stop command indication 32: Brake control 33~47: reserved
P7.03	AO1 terminal output function selection	48	48～71	/		48：Output operating frequency 49：Output setting frequency 50：Output current 51：Output motor current 52：Output torque 53：Output voltage 54：Bus voltage 55：AI1 56：AI2 57：AI3 58：DI 59：Output power
P7.04	AO2 terminal output function selection	49	48～71	/	○	
P7.05	AO1 gain	100.0	0.0～200.0	%	○	
P7.06	AOAO1 bias	0.0	0.0～200.0	%	○	
P7.07	AO2 gain	100.0	0.0～200.0	%	○	
P7.08	AO2 bias	0.0	0.0～200.0	%	○	
P7.20	FDT1 level high limit	3.00	0.00～300.00	Hz	○	FDT function can be used for less demanding brake control, such as truck, car and other translation mechanism
P7.21	FDT1 level low limit	2.90	0.00～300.00	Hz	○	
P7.22	FDT2 level high limit	3.50	0.00～300.00	Hz	○	FDT function can be used for less demanding brake control, such as truck, car and other translation mechanism
P7.23	FDT2 level low limit	3.40	0.00～300.00	Hz	○	
P7.25	Terminal effiective status selection	0000	0000～1131	/	○	Ones place: Multi function input terminal Xi: 0: If Xi have current flowing, Xi is enabled 1: If Xi without current flowing, Xi is enabled Hundreds place: Relay terminal: Ten digits: Multi-function output terminal Yi 0: Y1 current is valid; Y2 current is valid; 1: Y1 has no current effective; Y2 current is valid; 2: Y1 current is valid; Y2 has no current effective; 3: Y1 has no current effective; Y2 has no current effective; Hundreds place: relay output terminal 0: If relay enabled, relay is in magnetizing status 1: If relay enabled, relay is not in magnetizing status Thousands place: reserved
Group P8 monitoring parameters						
P8.00	Overspeed detection level	110.0	0.0～200.0	%	○	P8.00 is the percentage of the relative maximum frequency P0.11. If the actual speed exceeds the overspeed detection level and continues for the time set by P8.01, the inverter reports an overspeed fault.
P8.01	Overspeed detection delay	0.200	0.000～60.000	s	○	
P8.02	Stall detection level	8.00	0.00～300.00	Hz	○	If the deviation between the actual speed and the given speed is greater than the stall detection level and continues for the time set by P8.03, the inverter reports a stall failure.
P8.03	Stall detection delay	0.200	0.000～60.000	s	○	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
P8.04	Zero current detection level	10.0	0.0～200.0	%	○	Relative to the rated output current of the inverter. If the output current is less than the zero current detection level and the zero current detection delay time continues, the inverter reports a zero current fault.
P8.05	Zero current detection delay	1.000	0.000～60.000	s	○	
Group P9 Motor Parameters						
P9.01	Motor poles	4	2～128	/	×	2～128
P9.02	Motor rated speed	1500	0～30000	rpm	×	0～30000rpm
P9.03	Motor rated power	11.0	0.4～999.9	kW	×	0.4～999.9kW
P9.04	Motor rated current	21.7	0.1～999.9	A	×	0.1～999.9A
P9.05	Zero load current I0	8.4	0.1～999.9	A	×	Set to about 40% of P9.04
P9.06	Stator resistance R1	0.407	0.000～65.000	Ω	×	The parameters of P9.05~P9.14 are obtained by parameter self-tuning. If the load can be disconnected, the rotary auto-tuning is selected. Otherwise, the static auto-tuning can only be selected. The parameters self-tuning steps are as follows: ◆ Input motor parameters: P0.12, P0.15, P9.01~P9.04, P9.05 (set to 40% of P9.04) ◆ Set P0.06=0, P9.15=1 or 2, then press RUN key to perform parameter auto-tuning. Note: The motor may rotate during auto-tuning, please pay attention to safety.
P9.07	Stator leakage inductance L1	2.6	0.0～2000.0	mH	×	
P9.08	Rotor resistance R2	0.219	0.000～65.000	Ω	×	
P9.09	Mutual inductance L2	77.4	0.0～2000.0	mH	×	
P9.10	Magnetic saturation coefficient 1	87.00	0.00～100.00	%	×	
P9.11	Magnetic saturation coefficient 2	80.00	0.00～100.00	%	×	
P9.12	Magnetic saturation coefficient 3	75.00	0.00～100.00	%	×	
P9.13	Magnetic saturation coefficient 4	72.00	0.00～100.00	%	×	
P9.14	Magnetic saturation coefficient 5	70.00	0.00～100.00	%	×	
P9.15	Parameter auto tuning	0	0～2	/	×	0: No action 1: Static auto tuning 2: Rotating auto tuning
P9.16	Motor overload protection	00	00～12	/	×	Ones place: Protection mode: 0: Motor current mode 1: Sensor mode 2: No action Tens place: Low speed derating: 0: Action(Ordinary motor) 1: No action(Inverter motor)
P9.17	Sensor protection threshold of motor	10.00	0.00～10.00	V	×	0.00～10.00V
P9.18	Motor overload protection time	10.0	0.5～30.0	min	×	0.5～30.0min
Group PA Control Parameters						
PA.00	Carrier frequency	8.0 4.0 3.0 2.0	0.7～16.0	kHz	○	15kW And below：0.7kHz～16.0kHz； 18.5kW～45kW：0.7kHz～10.0kHz； 55kW～75kW：0.7kHz～8.0kHz； 90kW And above：0.7kHz～3.0kHz； 15kW or below : 0.7kHz ~ 16.0kHz 18.5kW ~ 45kW: 0.7kHz ~ 10.0kHz 55kW ~ 75kW: 0.7kHz ~ 8.0kHz 90kW or above: 0.7kHz ~ 3.0kHz
PA.01	Carrier frequency automatic adjustment	1	0～1	/	○	0: No auto adjustment 1: Auto adjustment
PA.03	Droop control	0.00	0.00～10.00	Hz	○	0.00～10.00Hz
PA.04	Current limit action selection	1	0～1	/	×	0: Disabled 1: Enabled
PA.05	Current limit value	200.0	20.0～200.0	%	×	20.0~200.0% rated current of the inverter;
PA.06	Voltage adjustment function	000	000～111	/	×	Ones place: Over voltage regulation

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
						0: Disabled 1: Enabled Tens place: Under voltage regulation 0: Disabled 1: Enabled Hundreds place: Over modulation 0: Disabled 1: Enabled
PA.07	Energy saving coefficient	0	0～50	%	○	0～50%
PA.08	Magnetic flux braking selection	1	0～1	/	×	0: Disabled 1: Enabled
PA.09	Dynamic braking selection	1	0～1	/	×	0: Disabled 1: Enabled
PA.10	Brake unit action hysteresis	000	000～100	V	○	
PA.11	Braking unit action voltage	720	650～750	V	○	
PA.12	Relay action when the inverter is fault	100	000～111	/	○	Ones place: Under voltage fault 0: Disabled 1: Enabled Tens place: Auto reset interval 0: Disabled 1: Enabled Hundreds place: Fault locking 0: Disabled 1: Enabled
PA.13	Inverter or motor overload prealarm	000	000～111	/	○	Ones place: Detected value selection: 0: Motor overload pre-alarm, relative to motor rated current 1: Inverter overload pre-alarm, relative to inverter rated current Tens place: Action after overload pre-alarm: 0: Continue running 1: Report overload fault and stop Hundreds place: Detecting condition selection 0: Detect all the time 1: Only detect at constant speed
PA.14	Overload pre-alarm detection level	130.0	20.0～200.0	%	○	20.0～200.0%
PA.15	Overload pre-alarm detection time	5.0	0.1～60.0	s	○	0.1～60.0s
PA.16	Fault shielded and alarm attribute setting 1	0020	0000～2222	/	○	Ones place: Output-ground short circuit Tens place: Power failure during running Hundreds place: Input power error Thousands place: Output phase failure	0: The fault is not blocked, and the fault is stopped; 1: The fault is not blocked, and the alarm does not stop; 2: The fault has been blocked, no alarm and no downtime
PA.17	Fault shielded and alarm attribute setting 2	0000	0000～2222	/	○	Ones place: EEPROM error Tens place: Relay contact open/close failure Hundreds place: Sensor taking sample anomaly Thousands place: Encoder disconnection	
PA.18	Fault shielded and alarm attribute setting 3	2000	0000～2222	/		Ones place: +10V output error Tens place: Analog input error Hundreds place: Motor over temperature (PTC) Thousands place: Communication fault 1 (operation panel 485)	
PA.19	Fault shielded and alarm attribute setting 4	0002	0000～2222	/	○	Ones place: Communication fault 2(terminal 485)	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
						Tens place: Version incompatible Hundreds place: Reserve Thousands place: Reserve
PA.20	Fault locking function selection	0	0～1	/	○	0: Fault is not locked 1: Fault is locked
PA.21	Automatic reset times	0	0～20	/	○	0～20
PA.22	Automatic reset interval	2.0	2.0～20.0	s	○	2.0～20.0s
Group Pb Enhanced Function Parameters						
Pb.00	Hopping frequency 1 low limit	0.00	0.00～300.00	Hz	×	Setting range: P0.13~P0.14 Set hopping frequency range of inverter to avoid mechanical resonance. When the setting frequency of inverter is less than the hopping frequency, the inverter will run automatically at the high limit or low limit of the hopping frequency (change to run at low limit of the hopping frequency when acceleration, for deceleration, change to run at high limit of the hopping frequency)
Pb.01	Hopping frequency 1 high limit	0.00	0.00～300.00	Hz	×	
Pb.02	Hopping frequency 2 low limit	0.00	0.00～300.00	Hz	×	
Pb.03	Hopping frequency 2 high limit	0.00	0.00～300.00	Hz	×	
Pb.04	Hopping frequency 3 low limit	0.00	0.00～300.00	Hz	×	
Pb.05	Hopping frequency 3 high limit	0.00	0.00～300.00	Hz	×	
Pb.15	Restart automatically after power resumes narmal	0	0～1	/	×	0: Disabled 1: Enabled
Pb.16	Waiting time for restar	0.5	0.0～20.0	s	○	0.0～20.0s
Pb.23	Parameter copy	0	0～5	/	×	0: No function 1: Parameter upload 2: Parameter download (without motor parameters) 3: Parameter download (with motor parameters) 4: Parameter upload is prohibited 5: Parameter upload is allowed
Group PC Communication Parameters						
PC.00	Communication baud rate	6	4～8	bps	○	4：4800 bps； 5：9600 bps； 6：19200 bps； 7：38400 bps； 8：57600 bps；
PC.01	Data format	0	0～2	/	○	0: 1−8−1 format, no parity 1: 1−8−1 format, odd parity 2: 1−8−1 format, even parity
PC.02	Local address	1	1～247	/	○	1 ~ 247, 0 is broadcasting address
PC.03	Communication parameters setting	303	000～F0F	/	○	303: communication write RAM F0F: communication write EEPROM Note: To avoid bad communication write EEPROM, please keep the default value
Group Pd Vector Control 2 Parameters						
Pd.00	Speed/torque control	00	00～21	/	○	Ones place: Speed control/torque control selection: 0: Speed control 1: Torque control Tens place:Torque direction under torque control: 0: Determine by analog input 1: Consistent with the running direction 2: Inconsistent with the running direction
Pd.01	Speed loop proportional gain 1 (ASR_P1)	2.00	0.000～30.00	/	○	
Pd.02	Speed loop integral time 1 (ASR_I1)	0.200	0.000～6.000	s	○	

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
Pd.03	Speed loop proportional gain 2 (ASR_P2)	2.00	0.000～30.00	/	○	
Pd.04	Speed loop integral time 2 (ASR_I2)	0.200	0.000～6.000	s	○	
Pd.05	ASR switching frequency	5.00	0.00～300.00	Hz	○	0.00 ~ high frequency limit P0.13
Pd.06	speed limit for forward running when torque control	50.00	0.00～300.00	Hz	○	0.00 ~ high frequency limit P0.13
Pd.07	Maximum speed limit for reverse running when torque control	50.00	0.00～300.00	Hz	○	0.00 ~ high frequency limit P0.13
Pd.08	Drive torque limit	180.0	0.0～200.0	%	○	
Pd.09	Braking torque limit	180.0	0.0～200.0	%	○	
Pd.12	Torque acceleration time	0.10	0.00～120.00	s	○	0.00～120.00s
Pd.13	Torque deceleration time	0.10	0.00～120.00	s	○	0.00～120.00s
Pd.14	Pre-magnetizing time	0.300	0.000～8.000	s	○	0.000～8.000s
Pd.15	Current loop scale coefficient (ACR_P)	1000	0～2000	/	○	0～2000
Pd.16	Current loop integral coefficient (ACR_I)	1000	0～6000	/	○	0～6000
Pd.17	Slip compensation gain (electric)	100.0	10.0～300.0	%	○	10.0～300.0%
Pd.18	Slip compensation gain (power generation)	100.0	10.0～300.0	%	○	10.0～300.0%
Pd.19	ASR input filtering time	2.5	0.0～500.0	ms	○	0.0～500.0ms
Pd.20	ASR output filtering time	0.5	0.0～500.0	ms	○	0.0～500.0ms
Pd.21	Encoder feedback pulse/rev.	1024	1～9999	/	×	1 to 9999 pulses/rev
Pd.22	Encoder direction selection	0	0～1	/	×	0: Forward 1: Reverse
Pd.23	Interrupt detection time of encoder	2.0	0.0～8.0	s	×	0.0~8.0s
Pd.24	Ratio between motor and encoder	1.000	0.001～65.535	/	○	0.001～65.535
Group d0 Fault Record Parameters						
d0.00	Fault type record 2	0	0～62	/	*	
d0.01	Fault type record 1	0	0～62	/	*	
d0.02	Fault type record 0 (Latest)	0	0～62	/	*	
d0.03	Bus voltage of latest fault	0	0～999	V	*	0～999V
d0.04	Current of latest fault	0.0	0.0～999.9	A	*	0.0～999.9A
d0.05	Frequency of latest fault	0.00	0.00～300.00	Hz	*	0.00～300.00Hz
d0.06	Total power-up time	0.000	0.000～65.535	kh	*	0.000～65.535kh
d0.07	Total operation time	0.000	0.000～65.535	kh	*	0.000～65.535kh
d0.11	Module protection fault type	0	0～5	/	*	0～5
Brake control parameters						
H0.00	Brake control enable	0003	0000～FFFF	/	○	Bit1: Frequency acceleration to a given frequency 0: No need to wait until the brake is open; 1: Wait for the brake to open Bit12: Brake feedback enable 0: Disabled; 1: enabled Bit2~bit11, bit13~bit15: reserved

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
H0.01	Forward brake release frequency	3.00	0.00～300.00	Hz	○	At start-up, if the frequency reaches the brake release frequency, the torque reaches the brake release torque, and the current reaches the brake release current, then the open brake condition is met and the brake is opened. Starting from the start time, if the brake has not reached the condition of the brake open after the time reaches the set time of H0.16, the torque verification fault is reported.
H0.02	Forward brake release torque	10.0	0.0～200.0	%	○	
H0.03	Forward brake release current	30.0	0.0～200.0	%	○	
H0.04	Reverse brake release frequency	3.00	0.00～300.00	Hz	○	
H0.05	Reverse brake release torque	0.0	0.0～200.0	%	○	
H0.06	Reverse brake release current	30.0	0.0～200.0	%	○	
H0.07	Forward brake delay frequency	3.00	0.00～300.00	Hz	○	H0.07 ≥ H0.01, H0.08 ≥ H0.04, after the frequency reaches the delay frequency, the frequency is maintained at the brake delay frequency. If the brake open condition is reached, the brake open command is sent after the delay of H0.09 setting, and the acceleration is continued to the given frequency after delaying the H0.10 setting.
H0.08	Reverse brake delay frequency	3.00	0.00～300.00	Hz	○	
H0.09	Delay time before the brake is released	0.000	0.0～60.000	s	○	
H0.10	Delay time after the brake is released	0.000	0.0～60.000	s	○	
H0.11	Forward brake closing frequency	3.00	0.00～300.00	Hz	○	When decelerating, if the frequency is less than the brake closing frequency, the inverter sends an instruction to close the brake.
H0.12	Reverse brake closing frequency	3.00	0.00～300.00	Hz	○	
H0.13	Forward slip delay frequency	3.00	0.00～300.00	Hz	○	H0.11≥H0.13, H0.12≥H0.14, when decelerating, if the frequency drops to the slip delay frequency, the slip delay frequency is maintained, and after the slip delay time is reached, the speed is decelerated to 0.
H0.14	Reverse slip delay frequency	3.00	0.00～300.00	Hz	○	
H0.15	Slip delay time	0.000	0.000～65.535	Hz	○	
H0.16	Torque verification fault detection time	3.000	0.0～60.000	s	○	Detection delay time from start to brake open
H0.17	Brake fault detection time	3.000	0.0～60.000	s	○	If the brake feedback is enabled (bit 12 of H0.00), when the inverter control brake is released, the brake feedback signal is closed; when the inverter control brake is closed, the brake feedback signal is open. The feedback signal is connected to the X terminal and the function is 32: Brake release confirmation If the inverter sends a brake command and the brake feedback is inconsistent, the brake is faulty after the brake failure detection time.
Terminal Up/Dn function (frequency increment and decrement)						
H0.34	Terminal Up/Dn function selection	0000	0000～FFFF	/	○	Ones place; terminal Up/Dn selection 0; invalid 1;Up single terminal mode, no Dn terminal, closed Up terminal frequency increment, disconnected running terminal and Up terminal frequency decreasing 2;Up/Dn double terminals mode1, the frequency of the closed Up terminal is increased, and the frequency of the closed Dn terminal is decreasing. 3;Up/D ndouble terminals mode2, valid during operation stop. Closed Up terminal frequency increment, closed Dn terminal frequency decreasing Ten place; Minimum frequency limit in terminal Up/Dn mode 1 0: The frequency is too low and then close the

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
						running command to maintain the given frequency. 1: The frequency is too low and then close the running command to maintain the lowest frequency.
H0.35	Terminal Up/Dn lowest frequency regulation	5.00	0.00～50.00	Hz	○	
H0.36	Terminal Up/Dn superposition step	0.50	0.00～10.00	Hz	○	Only valid if H0.34=3
H0.37	Terminal Up/Dn superposition delay	0.050	0～60.000	s	○	
Position control function						
H1.00	Position control enable	0000	0000～FFFF	/	○	0: The position calculation is invalid, and the automatic stop is invalid after the position is reached. 1: Position calculation is valid, automatic stop is invalid after reaching the position 5: The position calculation is valid, and the automatic stop is also effective after reaching the position.
H1.01	Reset position pulse high	0000	0000～FFFF	/	○	The multi-function input terminal is set to function No. 33. Once the terminal is closed, the pulse signal is reset to the values set by H1.01 and H1.02 for the initial setting position and for eliminating the accumulated error. Valid on rising edge.
H1.02	Reset position pulse low	0000	0000～FFFF	/	○	
H1.03	Current pulse high	0000	0000～FFFF	/	*	Read-only parameter
H1.04	Current pulse low	0000	0000～FFFF	/	*	Read-only parameter
H1.05	Pulse ratio	1000	0~65535	/	○	How many pulses are 1cm, please calculate according to the actual mechanical reduction ratio
H1.06	current position	0	0~65535	cm	*	只读参数 Read-only parameter
H1.07	Forward maximum position	10000	0～65535	cm	○	If it is greater than 32768, it represents a negative position, with zero as the reference, the upward position is the positive position, the downward direction is the negative position, and the position is - (65535-H1.08)
H1.08	Reverse maximum position	60000	0～65535	cm	○	
H1.09	Forward stop position	6000	0～65535	cm	○	
H1.10	Reverse stop position	64000	0～65535	cm	○	
H1.11	Maximum speed	300	0～65535	cm/s	○	Calculate the maximum mechanical speed based on the actual mechanical reduction ratio.
H1.12	Forward deceleration	40	0～65535	cm/s2	○	Calculate forward deceleration based on maximum mechanical speed and forward deceleration time
H1.13	Reverse deceleration	40	0～65535	cm/s2	○	Calculate the reverse deceleration based on the maximum mechanical speed and the reverse deceleration time
H1.14	Normal position	0	0～1	/	*	If the position is normal, the display is 1; otherwise, it is displayed as 0.
Note: The position calculation is only valid under the V6 series, and a PG feedback card is required. The position calculation and the automatic stop function of the arrival position are only used as auxiliary functions. The mechanical deceleration limit, weight limit, cam limit, etc. of the lifting machinery must not be cancelled. There is an error in the position calculation. Please make sure that each cycle of the operation needs to go through the reset position and reset the position to avoid the error of position calculation. In order to ensure the position calculation function is normal, please regularly maintain and maintain the inverter and motor encoder.						
EX-DT01 expansion card function						
H2.00	EX-DT01 card enabled	0	0～1	/	○	0: EX-DT01 expansion card is not used, PG card can be used at this time 1: EX-DT01 expansion card is used, PG card is not

Function code number	Function code name	Factory setting	Setting range	Unit	Property	Function code selection
						available at this time Note: if this parameter is changed, the power must be completely off and then on
H2.01	RA1 function	47	00～47	/	x	For detailed functions, please see the description of P7.00～P7.02.
H2.02	RA2 function	47	00～47	/	x	
H2.03	RA3 function	47	00～47	/	x	
H2.04	RA1～RA3 terminal filtering time	0.0	0.0～6553.5	s	○	
H2.05	X8 input function	99	00～99	/	x	For detailed functions, please see the description of P5.00~P5.06.
H2.06	X9 input function	99	00～99	/	x	
H2.07	X10 input function	99	00～99	/	x	
H2.08	X11 input function	99	00～99	/	x	
H2.09	X8 ~ X11 terminal filter time	0.150	00～99	s	○	

Chapter 5 Debugging process

5.1Confirm the wiring correct connected and firm

◆ Before wiring, make sure that everything is in the off state;

◆ Main circuit: Input power connect R / S / T, motor connect U / V / W;

If built-in braking unit, braking resistor connect to B1 and B2; if external braking unit connect to +2 and -, braking

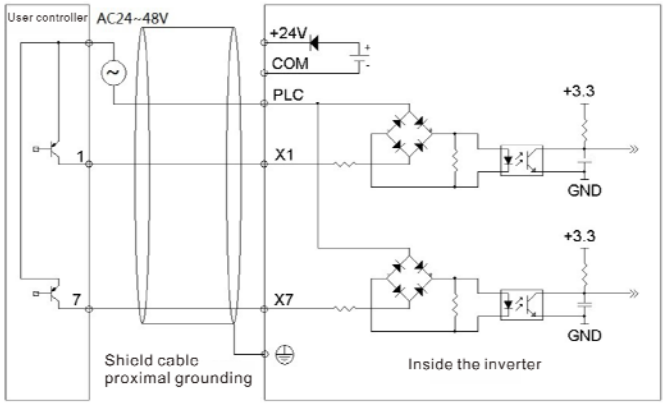
resistor connect to the brake unit;

◆ Control loop: Confirm forward, reverse, speed, fault reset, safety interlock protection, fault output, brakes and other wiring correct;

◆ wiring is completed, check the cables to be reliable, no virtual connection or loose terminals phenomenon.

◆ X terminal supports AC input wiring mode (voltage range: AC24V~48V, if you need X terminal input AC36V or AC48V, please add -67 after ordering model)

Note: Be sure to remove the shorting tab between +24V and PLC.



5.2 Self-learning parameters setting

◆ Please disconnected the motor load when auto tuning, when auto tuning the motor rotates, we must pay attention to safety;

◆ After finished auto tuning please record all the parameter of motors. If later restore parameters no need to auto tuning just input directly;

◆ Confirm forward is upward direction, reverse is downward direction. If the opposite direction, please swap any two motor wires.

Function code	Numerical	Function Code Description
P0.06	0	Panel Control
P0.11		Maximum frequency in(Hz), according to actual requirements set
P0.13		Frequency limit, the unit is Hz, according to actual requirements set
P0.12、P0.15、P9.01～P9.04		Namely motor rated voltage, rated frequency, number of poles, rated speed, rated power, rated current, according to the motor nameplate set
P9.05		Motor no-load current, A, is set to P9.04 30% to40%
P9.15		1. if the load off, set the parameter P9.15 = 2 rotating auto tuning, s when auto tuning the motor rotates, do not touch the motor, the motor shaft the drum and any other things connected with motor. For better results we advise rotate no load auto tuning 2. If cannot no load please setting P9.15 = 1 stationary auto tuning

5.3 With encoder control parameters setting

◆ Only valid for V6 series, invalid for V5 series. No encoder feedback control no need to set;

◆ Setting P0.03 = 0, P0.05 = 5.00 Press the RUN key to run, observed if d2.15 have any data changes;

If d2.15 changed then go to the next step;

If d2.15 always displayed as 0, check the encoder wiring if normal, PG card if well plugged, PG card and encoder if match etc.;

◆ Set P0.03=8, Pd.21=number of pulses per encoder revolution;

◆ Set P0.05=5.00Hz, press the RUN, observe whether it is normal, if normal then go to the next step;

If not normal, if Pd.22 is 0, then change to 1, if Pd.22 is 1, then change to 0;

◆ If the above operating normal, then the closed-loop vector run correctly.

5.4 Startup parameters setting

◆ If using terminal control start and stop the machine, set P0.06 = 1; if communication control, set P0.06 = 2;

◆ Set forward acceleration time, reverse acceleration time, forward deceleration time, reverse deceleration time;

P0.06	1 or 2	Terminal control set to 1, the communication set to 2, must be set, otherwise can't start inverter
P1.00～P1.03		Forward acceleration time, forward deceleration time, reverse acceleration time, reversal deceleration time
P5.00～P5.06		X1 ~ X7 terminal function

5.5 Speed given mode

P0.04、P0.05、P4.22～P4.36	Please set according to actual needs

5.6 Brake control parameters setting

◆ Setting control the brake switch value output function as 32: If via Y1, then set P7.00=32, if via Y2, then set P7.01=32, if via relay, set P7.02 =32;

P7.02	32	Control brake signal via RA-RC relay
H0.01		Forward brake release frequency
H0.02		Forward brake release torque
H0.03		Forward brake release current
H0.04		Reverse brake release frequency
H0.05		Reverse brake release torque
H0.06		Reverse brake release current
H0.07		Forward brake delay frequency
H0.08		Reverse brake delay frequency
H0.09		Delay time before the brake is released
H0.10		Delay time after the brake is released
H0.11		Forward brake closing frequency
H0.12		Reverse brake closing frequency
H0.13		Forward slip delay frequency
H0.14		Reverse slip delay frequency
H0.15		Slip prevention time

5.7 Conical motor debugging

◆ Conical motor brake built-in without external mechanical brake. When strong current through it, the brake will automatically open, no current flows through it, the brake will return to its original position to brake;

◆ For the brake control of the cone motor, set the brake release torque and brake release current to 0;

◆ Appropriately increase the amount of forward torque boost and reverse torque boost.

5.8 Position control calculation

◆ Before the position calculation, if it is the hoisting mechanisms, please make sure that it is turning upwards and reversed downwards. If the direction is wrong, please replace any two-phase motor cable.

◆ Before the position calculation, please ensure that Pd.22=0, and the closed loop vector operation is normal. If the encoder is not in the right direction, please exchange A+ and B+, and A- and B- are interchangeable.

◆ Set H1.00=0005 position calculation is valid and the automatic stop function is valid after reaching the position.

◆ Calculate how many pulses are 1cm according to the machine and set this parameter in H1.05. If you can't calculate it, you can use the following method:

In any position, write down the values of H1.03 and H1.04 at this time, and convert H1.03 and H1.04 into decimal. The total amount of pulses at this time is P1=H1.03*65535+H1. .04.

Run the inverter for a distance, assuming the distance is S, the unit is cm, record the values of H1.03

and H1.04 at this time, convert H1.03 and H1.04 into decimal, and the total pulse is P2. =H1.03*65535+H1.04. Then H1.05 = (P2-P1) / S.

- Please calculate the maximum speed of the hoisting mechanism corresponding to the maximum frequency P0.11 according to the machine and set it in H1.11, the unit is cm/s. H1.12 = H1.11/P1.01, H1.13 = H1.11/P1.03.
- Position correction method: Set the position correction position. If the position is 100cm, the pulse amount at this time is P3=100*H1.05. If P3 is less than 65535, set the data of P3 to H1.02. H1.01 is set to 0; if P3 is greater than 65535, then P3/65535 is calculated, the integer part is set to H1.01, the remainder is set to H1.02, for example, P3=1234567, and the integer part of 1234567/65535 is 18 , the remainder H1.02=1234567-18*65535=54937. When setting, you need to convert to hexadecimal, then H1.01=12, H1.02=D699.

Use an X terminal as the position correction terminal and set this terminal function to 33. If X1 is used, set P5.00=33. Run the inverter to the position of the calibration position. At this time, close the X1 terminal and reset the position to 100cm.

- H1.07 and H1.08 are the position forward maximum position and reverse maximum position. If these two values are exceeded, the inverter will judge the position is disordered and need to re-correct the position.
- H1.09 and H1.10 are the forward stop position and the reverse stop position. If they reach the position, they will not run.

5.9 Parameters copy function for batch debugging

After finished debugging parameters of one inverter, you can use the debug parameter copy function to copy the

parameters to another inverter.

Parameters copy detailed steps as follows:

- Mount keyboard A to a inverter A has finished debugging ;
- Set parameters Pb.23 = 1 for parameter upload;
- Mount keyboard A to one another inverter B haven’t debugging;
- If the motor and inverter are same, set Pb.23=3 to download parameters;
- If the motor or inverter not same, but signal wiring are same, please auto tuning at firs then set Pb.23 = 2 for download without motor parameters，then set P0.06=0 and motor parameters for parameter self-learning. Restore P0.06 to the set value after self-learning;
- Then power off completely re-commissioning is completed, must be completely powered off (the inverter keypad no any display) then power on.

5.10 Method of operating a inverter without a motor

The crane dedicated inverter has built-in current and torque detection and protection parameters. If the inverter is operated without motor under the default parameters, it will alarm.If you need to run the inverter without a motor, please set the following parameters to 0: P8.04, H0.02, H0.03, H0.05, H0.06.

5.11 Parameter monitoring and input terminal status monitoring

◆ Display of running and stop parameters

● In the running and stop state, 4 parameters are displayed by default, and the parameters are switched by the >> key.

● In the running state, the monitoring of the required parameters can be selected through P2.02. Each of the ones, tens, hundreds, and thousands can be monitored by one parameter. A total of four parameters can be monitored, and the >> key can be used to switch.

● Each ones, tens, hundreds, and thousands can be selected from 0 to F, and 0 to F represent 16 monitorable parameters:

0: given frequency (Hz);	：1: bus voltage (V);	2：AI1（V）；	3：AI2（V）；
4：AI3（V）；	5：DI （%）；	6: external count;	7: motor speed (rpm);
8: encoder feedback frequency (/);	9: encoder feedback motor speed;	： A: given torque (%);	B: operating frequency (Hz);
C: output current (A);	D: output torque (%);	E: output power (kW);	F: output voltage (V);

● In the state of shutdown, the monitoring of the required parameters can be selected through P2.02. Each of the ones, tens, hundreds, and thousands can be monitored by one parameter. A total of four parameters can be monitored, and the >> key can be used to switch.The parameters that can be monitored are described in the same table above.

◆ Monitoring of other parameters

● d2.00：Radiator temperature

● d2.09: X terminal input status display, 0 means disconnected, 1 means closed, hexadecimal combination, lowest digit means X1

D2.09 ones: represent X1 ~ X4 state, d2.09 tens: display X5 ~ X7 state.

As shown in the figure below, 0 means invalid and 1 means valid:

Single digit display	X4	X3	X2	X1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
A	1	0	1	0
b	1	0	1	1
C	1	1	0	0
D	1	1	0	1
E	1	1	1	0
F	1	1	1	1

Ten-digit display	X7	X6	X5
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

Chapter 6 Crane specialinverter faults and troubleshooting

6.1 Fault Display

Fault number	Fault Code	Fault Description	Possible Causes	Countermeasure
1	E.oc1	Over current protection when acceleration operation	Low grid voltage	Check input power supply
			Startup during motor free rotation	Restart after the motor standstill
			Rotating inertial of load is too large or shock load is too heavy	Increase the acceleration time and reduce the sudden change of load
			Improper setting motor parameters	Set motor parameters properly
			Set start−up frequency too high	Decrease start−up frequency
			Acceleration time is too short	Prolong acceleration time
			Set V/F curve ratio too large	Adjust V/F setting and torque boost
			Power level of inverter is small	Replace inverter with proper model
2	E.oc2	Over current protection when deceleration operation	Low grid voltage	Check input power supply
			Rotating inertial of load is too large	Choose appropriate dynamic braking unit and braking resistor
			Improper setting motor parameters	Set motor parameters properly
			Deceleration time is too short	Prolong deceleration time
			Power level of inverter is small	Replace inverter with proper model
3	E.oc3	Over current protection when operation with constant speed	Sudden change of load during operation	Decrease load's abrupt frequency change and amplitude
			Improper setting motor parameters	Set motor parameters properly
			Power level of inverter is small	Replace inverter with proper model
4	E.oV1	Over voltage protection when acceleration operation	Motor short to ground	Check motor wiring
			Abnormal input power supply	Check input power supply
			Startup during motor free rotation	Restart after the motor standstill
5	E.oV2	Over voltage protection when deceleration operation	Motor short to ground	Check motor wiring
			Rotating inertial of load is too large	Choose appropriate dynamic braking unit and braking resistor
			Deceleration time is too short	Prolong deceleration time
6	E.oV3	Over voltage protection when operation with constant speed	Motor short to ground	Check motor wiring
			Abnormal input power supply	Check input power supply
			Rotating inertial of load is too large	Choose appropriate dynamic braking unit and braking resistor
7	E.PCU	Interference protection	Severely Interfered by exterior signal	Ask professional technicians to maintain
8	E.rEF	Abnormal comparison benchmark	Loose connection of connectors inside the inverter	Ask professional technicians to maintain
			Abnormal switching power supply	Seek for technical support
			Abnormal signal sampling and comparison circuit	Seek for technical support
9	E.AUt	Auto−tuning failure	Enabled auto−tuning function during motor spining	Perform auto−tuning after the motor stops to rotate
			Auto−tuning overtime	Check whether motor wirings are well connected Length of motor wiring within 100m

Fault number	Fault Code	Fault Description	Possible Causes	Countermeasure
			Incorrect setting of motor parameters in group P9	Please reset the parameters according to the nameplate parameters on the motor.
10	E.FAL	Module protection	Output over current	Check whether the motor the output connection are short circuited, whether the ground is short circuited and whether the load is too hea
			DC terminal overvoltage	Check the mains power supply and whether the large inertia load has no function of quick stop at energy consumption brake.
			Loose connection of connectors inside the inverter	Ask professional technicians to maintain
11	E.oH1	Heatsink 1 over temperature protection	Ambient over−temperature	Lower the ambient temperature and strengthen ventilation and heat dissipation.
			Blockage of air duct	Clean the dusts, wools and other foreign objects in the air duct.
			Fan failure	Check if the fan power cable and fan are normal.
			Inverter module failure	Seek for technical support
			Temperature detection circuit failure	Seek for technical support
12	E.oH2	Heatsink 2 over temperature protection	Ambient over−temperature	Lower the ambient temperature and strengthen ventilation and heat dissipation.
			Blockage of air duct	Clean the dusts, wools and other foreign objects in the air duct.
			Fan failure	Check if the fan power cable and fan are normal.
			Rectifier module failure	Seek for technical support
			Temperature detection circuit failure	Seek for technical support
13	E.oL1	Inverter overload protection	Input power under voltage	Check input power supply
			Fast start−up when motor operates with high speed	Start again after the motor stop rotating
			Keep overloading for a long period of time	Shorten the overloading time and reduce load
			Too short acceleration or deceleration time	Prolong the acceleration or deceleration time
			V/F curve ratio is set too large	Adjust V/F curve setting and torque boost
			Power level of inverter is small	Replace to inverter with proper model
14	E.oL2	Motor overload protection	Input power under voltage	Check input power supply
			Motor rotation is blocked or load mutation occurs	Prevent the motor rotation from blocking and reduce the load mutation

Fault number	Fault Code	Fault Description	Possible Causes	Countermeasure
			Common motor maintains running under heavy load for a long period of time	Replace the common motor with variable frequency motor or improve the running frequency
			Motor overload protection time is set too small	Increase the motor overload protection time
			V/F curve ratio is set too large	Adjust V/F curve setting and torque increment
			DC braking current is set too high	Reduce the DC brake current
15	E.oUt	Peripheral protection	External failure terminal enabled	Check the external failure terminal status
			Stall over voltage or over current and the time lasts for more than one minute	Check whether the external load is normal
19	E.CUr	Current detection fault	Current detection circuit failure	Seek for technical support
20	E.GdF	Output to ground short circuit	Wrong connection	Correct the connection error as per the user's manual
			Motor failure	Replace the motor after performing ground insulation test
			Invert module failure	Seek for technical support
			Ground leakage current at the inverter output side is too large	Seek for technical support
21	E.LV1	Abnormal power failure during running	Mains power fluctuation or momentary power failure	Check the local mains power
22	E.ILF	Input power failure	Abnormal connection, missing connection or disconnection at the power terminal of the inverter	Check the power wiring according to the operating procedures
			Serious imbalance of input power at three phases	Check the three-phase unbalance of the power supply
			Burning of capacitor of the inverter	Seek for technical support
			Abnormal snubber circuit	Seek for technical support
23	E.oLF	Abnormal output phase loss	Abnormal connection, missing connection or disconnection at the output side of the inverter	Check the output side of the inverter
			Imbalance of output three phases	Check whether motor is kept well Shut down the power supply to check whether the terminal characteristics both at the output side and DC side of the inverter are consistent
24	E.EEP	EEPROM failure	EEPROM reading and writing failure	Seek for technical support
25	E.dL3	Relay contact failure	Loose connection of connectors inside the inverter	Ask professional technicians to maintain
			Abnormal snubber circuit	Seek for technical support
26	E.dL2	Temperature sensor taking sample anomaly	Ambient temperature is too low	Check whether the ambient temperature complies with the requirements
			The temperature sampling circuit inside the inverter is faulty	Seek for technical support
27	E.dL1	Encoder cable disconnection	Encoder connection is incorrect	Change the encoder cable connection
			Encoder has no signal output	Check whether the encoder and power supply are normal.
			Encoder cable disconnection	Reconnect
			Abnormal function code setting	Confirm that the relevant function codes of encoder are set properly

Fault number	Fault Code	Fault Description	Possible Causes	Countermeasure
28	E.P10	+10V power output abnormal	+10V power overload	Increase +10V power load impedance Utilize externally independent power supply
			+10V and GND is short circuited	Eliminate the short circuit failure
			+10V power terminal circuit failure	Seek for technical support
29	E.AIF	Analog input abnormal	Analog input voltage is too large	Check whether the analog input voltage complies with the requirements
			Analog input circuit failure	Seek for technical support
			Analog input circuit signal interfered	Increase the P6.22～P6.24 AI filtering time
30	E.Ptc	Motor over temperature(PTC)	The motor temperature signal reaches the alarm setting value	Strengthen ventilation and heat dissipation
			Thermistor resistance failure	Check the thermistor
			The sensor protection threshold of the motor is set improperly	Adjust the sensor protection threshold of the motor
31	E.SE1	Communication abnormal 1 (Operation panel RS485)	The communication of operation panel RS485 is disconnected	Check the connection of the equipment communications
			Communication failure of operation panel RS485	Check if the sending and receiving data meets the agreement
			The inverter is set to master mode	Set the inverter to slave mode
32	E.SE2	Communication abnormal 2 (Terminal 485)	The communication of terminal RS485 is disconnected	Check the connection of the equipment communications
			The baud rate is set improperly	Set compatible baud rate
			Communication failure of terminal RS485	Check if the sending and receiving data meets the agreement
			The communication of terminal RS485 is time−out	Check if the communication timeout setting is appropriate
			Improper setting of failure alarm parameters	Adjust the failure alarm parameter
			The inverter is set to master mode	Set the inverter to slave mode
33	E.VEr	Version compatibility abnormal	Incompatible software version of the operation panel	Seek for technical support
34	E.CPy	Copy failure	The data error when upload	Check connection of operation panel
			he data error when download	Check connection of operation panel
			Parametric copy download without parameter upload	Perform download before uploading the parameters
			Software version incompatible	Check if d1.09 is consistent
36	E.dL4	Expansion card connection abnormal	Expansion card disconnection	Ask professional technicians to maintain
			Expansion card failure	Seek for technical support
37	E.IoF	Terminal mutual exclusion check failed	The functions of X1 to X7, AI1, AI2 and DI terminals are set in a repeated manner	Modify the settings of X1 to X7, AI1, AI2 and DI terminals and ensure the setting functions are not repeated (excluding null function)
38	E.oL3	Hardware overload protection	Load failure	Check whether motor is blocked Replace inverter with proper model

Fault number	Fault Code	Fault Description	Possible Causes	Countermeasure
			nput failure	Check whether there is phase loss
			Output failure	Check whether there are phase loss or short circuit
39	E.tPF	Torque verification failure	output torque does not reach the brake open torque	Check the torque verify value if normal Check the validation failure detection time if too short
40	E.bLF	Brake failure	With brake release command but did not received open feedback	Check the brake for malfunction
41	E.bEF	Brake set failure	With brake engaged command but did not received a close feedback	Check the brake for malfunction
42	E.oPF	Overspeed failure	Speed exceed the setting maximum speed	Check if the given is normal Check if the parameter settings are too small Check if the encoder is normal Check if the inverter is running normally
43	E.PbF	Stall failure	The running speed of the inverter is deviated from the actual speed.	Check if the machine is faulty
44	E.0cF	Zero current failure	Motor output current is less than zero current detection value	Check if the motor cable is connected properly Check if the setting value is too large
63	−LU−	Power under voltage	The power supply voltage is lower than the minimum operating voltage of the inverter	Check input power supply
			Abnormal internal switching power supply	Seek for technical support

6.2Hoisting equipments causes of common failures and analysis

◆ **Slide down when start, low torque is insufficient:**

1) Confirm inverter power if correctly selected , inverter should be selected according to the motor rated current, require inverter rated current to amplify one power level based on corresponding motor rated current. Because it is crane applications, the inverter and the motor are required to leave some margin;

2) Ensure the load weight in the range of rated weigh;

3) Ensure there is no mechanical problem;

4) Do not switch direction during running.

5) If using the traditional brake control, need to check brake control sequence selection if correct , when brake open the inverter output torque if adequate;

6) If it is conical motor, need to set the frequency of brake open bigger, so that current is enough to open the brake;

7) Check already set the motor parameters and finished auto tuning;

8) Improve initial frequency of inverter;

9) If using open-loop control mode P0.03=0 then increase the value of low-speed torque; if using

P0.03=8
closed-loop encoder control then adjust the low speed loop parameters Pd.03 and Pd.04 .

◆ **Speed too fast when downward:**

1) Confirm inverter power if correctly selected , inverter should be selected according to the motor rated current, require inverter rated current to amplify one power level based on corresponding motor rated current. Because it is crane applications, the inverter and the motor are required to leave some margin;
2) Ensure that the braking unit and braking resistor selection is correct, make sure that the braking unit and braking resistor can be in the process of decentralization of energy through the braking resistor freed, the braking resistor selection, also need to Ensure brake resistor and brake unit to match;
3) Ensure that lifting weight is in the range of rated weigh;
4) Confirm the motor parameters have been set already and conduct auto tuning;
5) To ensure inverter output torque is enough, the motor's rated output torque is adequate;
6) Ensure brake resistor is turn on.

◆ **Slide down when stop:**

1) Confirm inverter power if correctly selected , inverter should be selected according to the motor rated current, require inverter rated current to amplify one power level based on corresponding motor rated current. Because it is crane applications, the inverter and the motor are required to leave some margin;
2) Ensure that the load within the range of rated load;
3) If use traditional type brake equipment, ensure there is no problem about brake pads;
4) of it is tapered motor, make sure when motor start to stop it maintains adequate output torque to ensure motor
braking torque is sufficient;
5) Confirm the motor parameters have been set already and conduct auto tuning;
6) Improve the frequency of brake engage.

◆ **Overcurrent, overload:**

1) Confirm inverter power if correctly selected , inverter should be selected according to the motor rated current, require inverter rated current to amplify one power level based on corresponding motor rated current. Because it is crane applications, the inverter and the motor are required to leave some margin;
2) Ensure that the load within the range of rated load;
2) Ensure that the load at rated load range;
3) Confirm the motor parameters have been set already and conduct auto tuning;
4) Ensure that the brake is normal intact, the opening and closing logic is correct, there was no abnormal phenomenon;

5) Ensure reasonable acceleration and deceleration time.

◆ **The rise is normal, but the overvoltage protection fault occurs.**

1) Check if the brake unit is normal;
2) Check if the braking resistor is in good condition;
3) Check that the brake resistor wiring is intact.

◆ **Brake unit damage is the cause**

1) Check if there is a short circuit in the braking resistor;
2) Check if the brake resistor and brake unit cable are short-circuited or short-circuited to ground;
3) Check if the selection of the braking resistor matches the selection of the brake unit;
4) Measure whether the built-in braking unit is damaged. First, disconnect the power supply, remove the wiring of the braking resistors B1 and B2, connect the red meter to “B2”, and the black meter to “B1”. The pressure difference is about 0.4V.

◆ **Tripping occurs when power is applied**

1) Check if there is a short circuit in the three-phase input power supply;
2) Check if the rectifier bridge is normal. The measurement method is as follows: first disconnect the power supply, remove the R, S, T wiring, and set the multimeter to 1 ohm resistor or diode. Use the black pen of the multimeter to connect to the “+1” terminal of the DC bus. The red pen is connected to R, S, and T to observe these three values. Then use the multimeter red pen to connect the “—” terminal, and the black pen is connected to R, S, and T respectively. Observe these three values, the deviation of these six values can not be too large, and the general value is normal from 0.3 to 0.5V.

◆ **A trip occurs at the start-LU-**

1) Check whether the three-phase input power is normal, whether the three-phase input voltage is normal, whether the three-phase input power is balanced, whether there is a virtual connection, etc.
2) Check if the buffer relay of the inverter is normal.

◆ **E.FAL module protection appears as soon as it starts up**

1) Check if there is a phase-to-phase short circuit between the motor wires;
2) Check if there is a short circuit to the ground in the motor three phases;
3) Check if the insulation level of the motor is normal;
4) Check if the inverter inverter module is normal. The measurement method is as follows: first disconnect the power supply, remove the U, V, W wiring, and set the multimeter to 1 ohm resistor or diode. The black pen is connected to "+", the red pen is connected to U, V, W to observe these three values; the red pen is connected to "-", the black pen is connected to U, V, W to observe these three values, these 6 numerical deviations can not Too large, the inverter pressure difference of 0.28~0.5V is normal.

◆ **Advice for improve safety:**

1) 1) The circuit design must ensure fault safety. Ensure that any external safety circuit, inverter, brake, motor or any safety device loses power, short-circuit, fault, etc., and can ensure safety. Parking and no operation;

2) The selection of the inverter and motor must be sufficient to leave sufficient margin;

3) External mechanical auxiliary contacts also can be connected in series into the safety circuit, using the normally closed contact;

4) Regularly check the brake if OK and the wear of brake pads ;

5) Regularly check the perimeter security equipment if intact and if working properly;

6) Without the rigorous verification not recommend run in the constant power region.

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