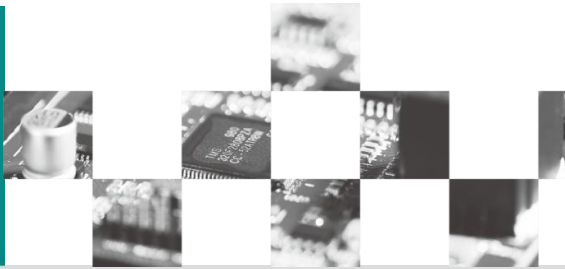
Thinkvert

THINK DRIVES THE WORLD



TI10 Series VFD User Manual

Safety Precautions

Safety statement

- Please read carefully and observe the safety precautions when installing, operating and maintaining the product.
- To ensure personal and equipment safety, when installing, operating and maintaining the product, please follow all safety precautions indicated on the product and the manual.
- The "precautions" and "danger" items in the manual do not represent all safety items that should be followed, but only supplement all safety precautions.
- This product shall be used in an environment that meets the design specification requirements, otherwise it may cause faults, and functional abnormalities or component damage caused by failure to comply with relevant regulations are not within the scope of product quality assurance.
- Our company will not bear any legal liability for personal safety accidents and property losses caused by violation operation of the products.

Definition of safety level

⚠"Danger" means death or serious personal injury if you do not follow the regulations.

⚠"Notice" means that if you do not follow the regulations, it may cause minor physical injury or equipment damage.

Safety precautions

■ Before installation

⚠ Danger
➢ Do not touch control terminals, single board components and Variable Frequency Drive components with your hands directly! ➢ Please do not use the Variable Frequency Drive with missing or damaged components; otherwise there is a risk of failure expansion and personal injury!

⚠ Note
➢ Whether the rated value of the product nameplate is consistent with your order requirements, if not, please do not install it! ➢ Please do not install when the packing list is not consistent with the actual object.

■ Installation

⚠ Danger
➢ Installation must be carried out by qualified personnel; otherwise there is a risk of electric shock! ➢ The Variable Frequency Drive shall be installed on metal or other flame retardant objects, otherwise there is fire danger! ➢ The installation of the Variable Frequency Drive shall be far away from flammable objects and heat sources, otherwise there is fire danger! ➢ The Variable Frequency Drive can not be installed in an environment containing

explosive gas, otherwise there is a risk of explosion!

- Do not twist the fixing bolts of equipment components at will, especially the bolts marked with red, otherwise there is a risk of equipment damage!

⚠ Note

- It shall be handled gently, and the bottom plate of the product is held to prevent foot injury or Variable Frequency Drive damage!
- Please install it in a place that can bear the weight of the Variable Frequency Drive, otherwise there is risk of equipment damage and personal injury when falling!
- Avoid dropping drilling residues, thread ends and screws into the Variable Frequency Drive during installation; otherwise it may cause failure of Variable Frequency Drive.
- When the Variable Frequency Drive is installed in the cabinet, heat dissipation shall be properly handled; otherwise it may cause product failure or damage!

■ Wiring

⚠ Danger

- Wiring must be carried out by qualified personnel; otherwise there is a risk of electric shock or equipment damage!
- Strictly follow this manual during wiring; otherwise there is a risk of electric shock or equipment damage!
- Only when the input power supply is completely disconnected can wiring be carried out, otherwise there is a risk of electric shock!
- All wiring and circuits shall meet the requirements of EMC and safety standards. Please refer to the recommendations in this manual for wire diameter, otherwise accidents may occur!
- The leakage current of the whole Variable Frequency Drive may be more than 3.5mA. In order to ensure safety, the Variable Frequency Drive and the motor must be grounded; otherwise there is a risk of electric shock!
- It must be wired in strict accordance with the screen printing of Variable Frequency Drive terminals, it is forbidden to connect the three-phase power supply to the output terminals U, V and W, otherwise there is a risk of equipment damage!
- Please install the brake resistor at B1 and B2/+ ends correctly, and do not connect to other terminals, otherwise there is a risk of equipment damage!
- Main circuit terminal wiring screw bolts must be tightened; otherwise there is a risk of equipment damage!
- It is forbidden to connect AC 220V voltage grade signals to terminals other than control terminals RA, RB and RC; otherwise there is a risk of equipment damage!

⚠ Note

- All our products have been subjected to withstand voltage test before leaving the factory. It is forbidden to conduct this test on the Variable Frequency Drive; otherwise there is a risk of equipment damage!
- Terminal signal lines of the Variable Frequency Drive shall be far away from main power line, and they be vertically crossed under the condition that the distance cannot be guaranteed, otherwise the control signals shall be interfered!
- When the length of motor cable is more than 100m, it is recommended to select output reactor, otherwise there is a risk of equipment failure!

■ Operation

⚠ Danger

- If the storage time of the Variable Frequency Drive exceeds 2 years, the voltage regulator shall be applied to boost the voltage gradually; otherwise there is a risk of equipment damage!
- After the wiring is finished according to the requirements of section 1.3, the Variable Frequency Drive can only be powered on; otherwise there is a risk of equipment damage or electric shock!
- After the Variable Frequency Drive wiring is confirmed to be correct, the power can only be turned on after the cover plate is covered. It is forbidden to open the cover plate after the power is turned on; otherwise there is a risk of electric shock!
- After the Variable Frequency Drive is powered on, do not touch the Variable Frequency Drive and its peripheral circuits regardless of the state of the Variable Frequency Drive, otherwise there is a risk of electric shock!
- Before running the Variable Frequency Drive, it must check there is no person in surrounding area who can reach the motor so as to prevent personal injury.
- During the operation of the Variable Frequency Drive, foreign matters shall be avoided from falling into the equipment; otherwise there is a risk of equipment damage!
- Non-professional technicians are forbidden to test signals during operation, otherwise there is a risk of personal injury or equipment damage!
- Do not change Variable Frequency Drive parameters at will; otherwise there is a risk of equipment damage!

⚠ Note

- Please confirm whether the number of phases and rated voltage of the power supply are consistent with the nameplate of the product, otherwise equipment damage may be caused!
- Check whether there is short circuit in the peripheral circuit connected to the Variable Frequency Drive and whether the wiring is tight, otherwise the equipment damage may be caused!
- Before operation, please make sure that the motor and machinery are within the allowable range of use, otherwise the equipment may be damaged!

- It is forbidden to touch the fan, radiator and brake resistor directly; otherwise there is a risk of mechanical damage and scalding!
- Do not control the start and stop of the Variable Frequency Drive frequently by switching on and off, otherwise there is a risk of equipment damage!
- Before switching on/off the Variable Frequency Drive output switch or contactor, it must make sure that the Variable Frequency Drive is in a no-output state, otherwise there is a risk of equipment damage!

■ Maintenance

⚠ Danger

- Product maintenance, inspection or replacement of parts must be carried out by engineers with professional qualifications!
- It is forbidden to maintain, inspect or replace parts of the product with electricity; otherwise there is a risk of electric shock!
- It must wait for 10 minutes at least after power failure to ensure the residual voltage of electrolytic capacitor drops below 36V before maintaining, inspecting or replacing the parts!
- After replacing the Variable Frequency Drive, it must be executed again in strict accordance with the above procedures!

⚠ Note

- When maintaining, inspecting or replacing the parts, it shall not touch the part body; otherwise there is a risk of electrostatic damage to the part!
- All pluggable devices can only be plugged and unplugged when power is off!

Contents

Chapter 1 TI10 Series VFD Overview

1.1 Appearance and installation dimensions

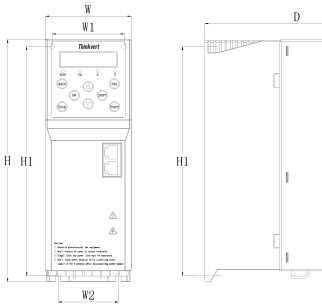


Figure1-1 Installation Dimension Diagram of TI10-4T0.75G/1.5LB~TI10-4T3.7G/5.5LB

Table1-1 TI10 Installation Dimensions

Variable Frequency Drive model	Appearance and installation dimensions (mm)						
	W	H	D	W1	W2	H1	Installation Aperture
TI10-4T0.75G/1.5LB	74	211	158	62	52	200	4.5
TI10-4T1.5G/2.2LB							
TI10-4T2.2G/3.7LB							
TI10-4T3.7G/5.5LB							

1.2 Rated specifications

Table 1-2 rated specifications

Variable Frequency Drive model	Power supply capacity(kVA)	input current (A)	Output current (A)	Adapted motor (KW)
TI10-4T0.75G/1.5LB	2.8	2.4	2.3	0.75
TI10-4T1.5G/2.2LB	5.0	4.6	3.8	1.5

TI10-4T2.2G/3.7LB	6.7	6.3	5.1	2.2
TI10-4T3.7G/5.5LB	12	11.4	9.0	3.7

1.3 Teripheral devices、terminal screw and wiring specifications

Table1-3 Peripheral devices、terminal screw and wiring specifications

Variable Frequency Drive model	Circuit breaker (A)	Contactor (A)	Power terminal		
			Screw	Fastening Torque (N.m)	Cable Specification (mm2)
TI10-4T0.75G/1.5LB	10	9	M4	1.2~1.5	2.5
TI10-4T1.5G/2.2LB	10	9	M4	1.2~1.5	2.5
TI10-4T2.2G/3.7LB	16	12	M4	1.2~1.5	2.5
TI10-4T3.7G/5.5LB	20	18	M4	1.2~1.5	4

1.4 Functional description of main circuit terminal

1)TI10-4T0.75G/1.5LB~TI10--4T3.7G/5.5LB

R	S	T	B1	B2/⊕	⊖	U	V	W

⏚

Terminal marking	Terminal name and function description
R、S、T	Three-phase AC input terminal
B1、B2/⊕	Connecting terminal of brake resistor
B2/⊕、⊖	Positive and negative terminals of DC bus; DC input terminal of external brake unit
U、V、W	Variable Frequency Drive output terminal
⏚	Grounding terminal

1.5 Standard wiring diagram

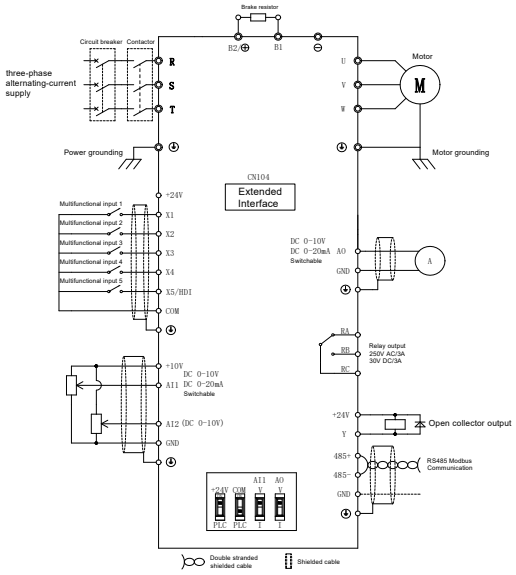


Figure 1-2 Standard Wiring Diagram

1.5.1 Wiring description for control terminals

+10V	AI1	AI2	GND	AO	485+	485-

+24V	COM	X1	X2	X3	X4	X5/HDI	COM	Y	RA	RB	RC

Figure 1-3 Layout of Control Terminal

Table 1-4 Function Description of Control Terminal

Analog input	+10V	Analog input reference voltage	10V ±1%，internally isolated from COM
			The maximum output current is 20mA
	GND	Analog ground	Internal isolation from COM
	AI1	Analog input channel 1	0~10V:input impedance 22kΩ
			0~20mA:input impedance 500Ω
			The switch between 0~10V and 0~20mA analog input is realized through dial switch S400, and the factory default voltage is input.
	AI2	Analog input channel 2	0~10V:input impedance 22kΩ
Analog output	AO	Analog output 2	0~10V:input impedance≥10kΩ
			0~20mA:impedance requirement 200Ω~500Ω
			The switch between 0~10V and 0~20mA analog output is realized through dial switch S400, and the factory default voltage is output.
	GND	Analog ground	Internal isolation from COM
Digital input	COM	+24V ground	Internal isolation from GND
	X1~X4	Multi-functionl input terminals	Input specifications:24VDC，5mA
			Frequency range:0~200Hz
			Voltage range:24V±20%
Digital output	Y	open collector output	Open collector output: 1. Voltage range: 0~24V; 2. Current range: 0~50mA
	COM	Open collector Output common terminal	Internal isolation from GND
Relay Output	RA/RB/RC	Relay output	RB—RC:Normally opened
			RA—RC:Normally closed
			Contact capacity:250VAC/3A，30VDC/3A
Terminal 485	485+	485 differential signal positive	Rate:4800/9600/19200/38400/57600/115200 The longest distance is 500m (adopting standard shielded twisted pair cable)

	485-	485 differential signal negative	
	GND	485 communication shield grounding	Internal isolation from COM

1.6 Selection of brake resistor

Table 1-5 Reference Table for Selection of Brake Resistor

Variable Frequency Drive model	Brake unit	Brake resistor		
		Standard power	Standard resistor	Minimum limit resistance
TI10-4T0.75G/1.5LB	Standard built-in	110W	750Ω	125Ω
TI10-4T1.5G/2.2LB		260W	400Ω	100Ω
TI10-4T2.2G/3.7LB		320W	250Ω	100Ω
TI10-4T3.7G/5.5LB		800W	150Ω	66.7Ω

Chapter 2 Parameter List

Parameter symbol description:

○: Indicate that the parameter can be modified during running

●: Indicate that the parameters cannot be modified during running and can be modified during shutdown.

★: Indicate that the parameters are read-only, such as monitoring parameters

☆: Indicate that the function is supported on the expansion card

Parameter	Name	Setting range	Factory value	Register address	Properties
P00 frequency given parameters					
P00.00	Digital setting of main frequency	0.00Hz~upper limit frequency	50.00Hz	0x0000	○
P00.01	Main frequency source selection	0:digital given (P00.00)+Up/Down adjustment 1: analog input AI1 2: analog input AI2 3:reserve 4:Min[AI1,AI2] 5:Max[AI1,AI2] 6:Sub[AI1,AI2] 7:Add[AI1,AI2] 8: pulse given HDI 9: process PID A: simple PLC B:External keyboard potentiometer C:no given	3	0x0001	○
P00.02	Digital setting of auxiliary frequency	0.00Hz~upper limit frequency	50.00Hz	0x0002	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P00.03	Auxiliary frequency source selection	0: digital given (P00.02) 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI 9: reserve A: reserve B: no given	B	0x0003	○
P00.04	Main given coefficient of frequency	0.0%~200.0%	100.0%	0x0004	○
P00.05	Auxiliary given coefficient of frequency	0.0%~200.0%	100.0%	0x0005	○
P00.06	Main and auxiliary overlay selection of frequency	Ones: frequency given mode 0: frequency main given 1: main and auxiliary operation result of frequency 2: main given and auxiliary given switching of frequency 3: main given and main auxiliary operation result switching of frequency 4: auxiliary given and main auxiliary operation	00	0x0006	○

Parameter	Name	Setting range	Factory value	Register address	Properties
		result switching of frequency Tens: given operation relation of frequency main and auxiliary 0: Min[main, auxiliary] 1: Max[main, auxiliary] 2: Sub[main, auxiliary] 3: Add[main, auxiliary]			
P00.07	Maximum frequency	10.00Hz~300.00Hz	50.00Hz	0x0007	●
P00.08	upper limit frequency	Lower limit frequency~maximum frequency	50.00Hz	0x0008	●
P00.09	Lower limit frequency	0.00Hz~upper limit frequency	0.00Hz	0x0009	●
P00.10	Jumping frequency 1	0.00Hz~upper limit	0.00Hz	0x000A	●
P00.11	Jumping range 1	0.00Hz~30.00Hz	0.00Hz	0x000B	●
P00.12	Jumping frequency 2	0.00Hz~upper limit	0.00Hz	0x000C	●
P00.13	Jumping range 2	0.00Hz~30.00Hz	0.00Hz	0x000D	●
P00.14	Jumping frequency 3	0.00Hz~upper limit	0.00Hz	0x000E	●
P00.15	Jumping range 3	0.00Hz~30.00Hz	0.00Hz	0x000F	●
P00.16	Jog frequency setting	0.00Hz~upper limit	5.00Hz	0x0010	●
P01 start-stop control parameters					

Parameter	Name	Setting range	Factory value	Register address	Properties
P01.00	Running command source selection	0: keyboard command mode 1: terminal command mode 2. communication command mode 3: multi-segment command mode	0	0x0100	●
P01.01	Bundled frequency with command given mode rate source	Ones: selection of keyboard command binding frequency source Tens: selection of terminal command binding frequency source Hundreds: selection of communication command binding frequency source 0: digital given (P00.00)+Up/Down adjustment 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI 9: process PID A: simple PLC B: no binding	BBB	0x0101	●
P01.02	Running direction selection	0: positive direction 1: reverse direction	0	0x0102	●

Parameter	Name	Setting range	Factory value	Register address	Properties
P01.03	Reverse control selection	0: allow reverse rotation 1: forbid reverse rotation	0	0x0103	●
P01.04	Forward/Reverse rotation dead-zone	0.0s~3600.0s	0.0s	0x0104	●
P01.05	Selection of starting mode	0: start from start frequency 1: speed search starting	0	0x0105	●
P01.06	Starting frequency	0.00Hz~upper limit frequency	0.50Hz	0x0106	●
P01.07	Hold time of start frequency	0.0s~3600.0s	0.0s	0x0107	●
P01.08	Starting DC brake current/pre-excitation current	0.0%~100.0%	50.0%	0x0108	●
P01.09	Starting DC braking time/pre-excitation time	0.00s~30.00s 0.00s: Indicate that starting DC brake is invalid	0.00s	0x0109	●
P01.10	Selection of stop mode	0: slow down and stop 1: free stop	0	0x010A	●
P01.11	Starting frequency of stop DC brake	0.00Hz~upper limit frequency	0.50Hz	0x010B	●
P01.12	Stop DC brake current	0.0%~100.0%	50.0%	0x010C	●
P01.13	Stop DC braking time	0.00s~30.00s 0.00s:0.00s: indicate that the stop DC brake is invalid	0.00s	0x010D	●
P02 acceleration and deceleration parameters					
P02.00	Acceleration time 1	0.1s~6000.0s	Model determination	0x0200	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P02.01	Deceleration time 1	0.1s~6000.0s	Model determination	0x0201	○
P02.02	Acceleration time 2	0.1s~6000.0s	Model determination	0x0202	○
P02.03	Deceleration time 2	0.1s~6000.0s	Model determination	0x0203	○
P02.04	Acceleration time 3	0.1s~6000.0s	Model determination	0x0204	○
P02.05	Deceleration time 3	0.1s~6000.0s	Model determination	0x0205	○
P02.06	Acceleration time 4	0.1s~6000.0s	Model determination	0x0206	○
P02.07	Deceleration time 4	0.1s~6000.0s	Model determination	0x0207	○
P02.08	Emergency stop deceleration time	0.1s~6000.0s	Model determination	0x0208	●
P02.09	Jog acceleration	0.1s~6000.0s	Model determination	0x0209	●
P02.10	Jog deceleration	0.1s~6000.0s 25	Model determination	0x020A	●
P02.11	Polyline acceleration time switching frequency	0.00Hz~upper limit frequency	0.00Hz	0x020B	●
P02.12	Polyline deceleration time switching frequency	0.00Hz~upper limit frequency	0.00Hz	0x020C	●
P03 vector control parameter					

Parameter	Name	Setting range	Factory value	Register address	Properties
P03.00	Speed/torque control selection	Ones: Vector control selection 0: speed control 1: torque control Tens: power generation limit 0: invalid 1: whole process 2: constant speed 3: slow down	00	0x0300	●
P03.01	Speed loop high speed proportional gain	0.00~30.00	2.00	0x0301	○
P03.02	Speed loop high speed integration time	0.001~5.000s	0.200s	0x0302	○
P03.03	Speed loop low speed proportional gain	0.00~30.00	2.00	0x0303	○
P03.04	Speed loop low speed integration time	0.001~5.000s	0.200s	0x0304	○
P03.05	Speed loop PI switching frequency 1	0.00Hz~P03.06	5.00Hz	0x0305	○
P03.06	Speed loop PI switching frequency 2	P03.05~upper limit frequency	10.00Hz	0x0306	○
P03.07	Speed feedback filtering time	0.0ms~1000.0ms	15.0ms	0x0307	○
P03.08	Drive torque	Ones: torque control	90	0x0308	●

Parameter	Name	Setting range	Factory value	Register address	Properties
	selection channel	selection channel Tens: speed control selection channel 0: digital setting P03.09 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI 9: maximum value of Variable Frequency Drive			
P03.09	Digital setting of drive torque	-200.0%~200.0%	150.0%	0x0309	○
P03.10	Generation torque selection channel	Ones: torque control selection channel Tens: speed control selecti on channel 0: digital setting P03.11 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI 9: maximum value of Variable Frequency Drive	99	0x030A	●
P03.11	Digital setting of generation torque	-200.0%~200.0%	150.0%	0x030B	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P03.12	Limiting channel of torque control frequency	Ones: frequency forward limit channel Tens: frequency reverse limit channel 0: digital setting P03.13/ P03.14 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI	00	0x030C	●
P03.13	Positive setting of torque control frequency	0.00Hz~maximum frequency	50.00Hz	0x030D	○
P03.14	Reverse setting of torque control frequency	0.00Hz~maximum frequency	50.00Hz	0x030E	○
P03.15	Limiting bias of torque control frequency	0.00Hz~maximum frequency	0.00Hz	0x030F	○
P03.16	Adjustment proportional gain of excitation current	0~60000	2000	0x0310	○
P03.17	Adjustment integral gain of excitation current	0~60000	1000	0x0311	○
P03.18	Adjustment proportional gain of torque	0~60000	2000	0x0312	○

Parameter	Name	Setting range	Factory value	Register address	Properties
	current				
P03.19	Adjustment integral gain of torque current	0~60000	1000	0x0313	○
P03.20	Ascending filtering time of drive torque	0.0s~6000.0s	0.3s	0x0314	○
P03.21	Declining filtering time of drive torque	0.0s~6000.0s	0.3s	0x0315	○
P03.22	Torque limitation coefficient in the weak magnetic area	0.0%~200.0%	100.0%	0x0316	○
P03.23	Power limit coefficient in power generation area	0.0%~200.0%	100.0%	0x0317	○
P03.24	Torque control deviation frequency setting	0.00Hz~10.00Hz	0.00Hz	0x0318	○
P04 Scalar Control Parameters					
P04.00	V/F curve setting	0: straight line V/F 1: multi-stage V/F 2: 1.2 power 3: 1.4 power 4: 1.6 power 5:1.8 power 6: 2.0 power 7: separation V/F	0	0x0400	●
P04.01	V/F frequency value F0	0.00Hz~P04.03	0.00Hz	0x0401	●

Parameter	Name	Setting range	Factory value	Register address	Properties
P04.02	V/F voltage value V0	0.0%~P04.04	0.0%	0x0402	●
P04.03	V/F frequency value F1	P04.01~P04.05	0.00Hz	0x0403	●
P04.04	V/F voltage value V1	P04.02~P04.06	0.0%	0x0404	●
P04.05	V/F frequency value F2	P04.03~P04.07	0.00Hz	0x0405	●
P04.06	V/F voltage value V2	P04.04~P04.08	0.0%	0x0406	●
P04.07	V/F frequency value F3	P04.05~P63.03	50.00Hz	0x0407	●
P04.08	V/F voltage value V3	P04.06~100.0%	100.0%	0x0408	●
P04.09	Torque boost	0.0%~30.0% 0.0%: effective automatic torque promotion	0.0%	0x0409	●
P04.10	Droop control quantity	0.00Hz~10.00Hz	0.00Hz	0x040A	●
P04.11	V/F oscillation suppression gain 1	0~1024	160	0x040B	○
P04.12	V/F oscillation suppression gain 2	0~1024	160	0x040C	○
P04.13	V/F separation mode voltage given selection	0: P04.14 digital setting 1: analog input AI1 2: analog input AI2 3: reserve 4: process PID output 5: process PID output	0	0x040D	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		+AI1			
P04.14	V/F separation mode voltage digital given	0.0%~100.0%	0.0%	0x040E	○
P04.15	V/F separation mode voltage change time	0.00s~600.00s	0.01s	0x040F	○
P10 switching value x input					
P10.00	X1 terminal function selection	00: no function 01: forward running (FWD) 02: reverse running (REV) 03: forward running inching (FJOG) 04: reverse inching (RJOG) 05: 3-wire operation 06: free stop 07: emergency stop 08: external stop 09: operation forbidden 10: operation suspended 11: external fault input 12: fault reset (RESET) 13: terminal adjustment Up 14: terminal adjustment Down 15: Up/Down setting clearing (terminal,	1	0x1000	●
P10.01	X2 terminal function selection		2	0x1001	●
P10.02	X3 terminal function selection		16	0x1002	●
P10.03	X4 terminal function		17	0x1003	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		keyboard) 16: multi-stage frequency terminal 1 17: multi-stage frequency terminal 2 18: multi-stage frequency terminal 3 19: multi-stage frequency terminal 4 20: selection of acceleration and deceleration time 1 21: selection of acceleration and deceleration time 2 22: acceleration and deceleration forbidding 23: command switch to keyboard control 24: command switch to terminal control 25: command switch to communication control 26: frequency source switching (P00.06[ones]) 27: main frequency source switch to frequency digital setting 28: auxiliary frequency source Switch to frequency digital setting 29: stop DC braking+ stop command 30: stop DC braking 31: running DC braking 32: pulse input (X4/HDI			

Parameter	Name	Setting range	Factory value	Register address	Properties
		support high speed) 33: count input 34: count clearing 35: length counting 36: length clearing 37: PID action direction 38: PID parameter switching 39: PID operation suspen 40: PID integral suspending 41: PLC memory clear 42: PLC operation failure 43: PLC operation suspending 44-45: reserve 46: speed/torque switching 47: torque control forbidding			
P10.11	Terminal control operation mode selection	0: 2-wire operation mode 1 1: 2-wire operation mode 2 2: 3-wire operation mode 1 3: 3-wire operation mode 2	0	0x100B	●
P10.12	Logic state setting of input terminal	Ones: BIT0~BIT3:X1~X4 0: positive logic 1: negative logic	000	0x100C	●
P10.13	Input terminal filtering time	0.000s~2.000s	0.010s	0x100D	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P10.14	X1 terminal conduction delay	0.0s~3600.0s	0.0s	0x100E	○
P10.15	X1 terminal disconnection delay	0.0s~3600.0s	0.0s	0x100F	○
P10.16	X2terminal conduction delay	0.0s~3600.0s	0.0s	0x1010	○
P10.17	X2 terminal disconnection delay	0.0s~3600.0s	0.0s	0x1011	○
P10.18	Terminal detection mode	Ones: BIT0~BIT3:X1~X4 0: level valid 1: edge valid	000	0x1012	●
P11 switching value Y/R output					
P11.00	Y1 terminal function selection	00: no output 01: Variable Frequency Drive in operation	0	0x1100	●
P11.02	R relay function selection	02: forward running of Variable Frequency Drive 03: reverse running of Variable Frequency Drive 04: ready to complete of Variable Frequency Drive 05: Variable Frequency Drive in zero frequency operation (stop ON) 06: Variable Frequency Drive in zero frequency operation (stop OFF) 07: frequency reaching	0	0x1102	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		FAR 08: frequency level detection signal FDT1 09: frequency level detection signal FDT2 10: frequency upper limit 11: frequency lower limit 12: torque limiting action (during speed control) 13: speed limiting action (during torque control) 14: X1 terminal status 15: X2 terminal status 16: zero current detection 17: DC braking of Variable Frequency Drive 18: Variable Frequency Drive under-voltage 19: Variable Frequency Drive fault output 20: Variable Frequency Drive alarm output 21: Variable Frequency Drive overload early warning 22: Variable Frequency Drive overheating alarm 23: motor overload early warning 24: motor overheating alarm 25: PLC cycle			

Parameter	Name	Setting range	Factory value	Register address	Properties
		completed 26: PLC stage completed 27: reserve 28: reaching cumulative power-on time 29: reaching cumulative running time 30: reaching the setting count value 31: reaching the specified count value 32: reaching the setting length 33-35: reserve			
P11.04	Y output	0.0s~3600.0s	0.0s	0x1104	○
P11.05	Y output	0.0s~3600.0s	0.0s	0x1105	○
P11.08	R output	0.0s~3600.0s	0.0s	0x1108	○
P11.09	R output	0.0s~3600.0s	0.0s	0x1109	○
P11.12	Logic state setting of output terminal	BIT0: Y BIT2:R 0: positive logic 1: negative logic	00	0x110C	○
P11.13	FDT1 detection mode	0: check out by operating frequency 1: check out by output frequency	0	0x110D	○
P11.14	FDT1 upper level limit	P11.15~maximum frequency	2.50Hz	0x110E	○
P11.15	FDT1 lower level limit	0.00Hz~P11.14	2.00Hz	0x110F	○
P11.16	FDT2 detection mode	0: check out by operating frequency 1: check out by output frequency	0	0x1110	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P11.17	FDT2 upper level limit	P11.18~maximum frequency	2.50Hz	0x1111	○
P11.18	FDT2 lower level limit	0.00Hz~P11.17	2.00Hz	0x1112	○
P11.19	Frequency arrival (FAR) detection width	0.00Hz~maximum frequency	2.50Hz	0x1113	○
P11.20	Zero frequency signal detection value	0.00Hz~maximum frequency	0.50Hz	0x1114	○
P11.21	Zero frequency return range	0.00Hz~maximum frequency	0.00Hz	0x1115	○
P11.22	Zero current detection level	0.0%~50.0%	5.0%	0x1116	○
P11.23	Zero current detection time	0.00s~50.00s	0.50s	0x1117	○
P12 analog AI and high speed pulse HDI input					
P12.00	AI analog curve selection	Ones: AI1 characteristic curve selection Tens: AI2 characteristic curve selection 0: no correction 1: curve 1(2 points) 2: curve 2 (4 points) 3: curve 3 (4 points)	00	0x1200	●
P12.01	Maximum input of curve 1	Minimum input (P12.03)~10.00V	10.00V	0x1201	○
P12.02	Maximum input corresponding curve 1	-100.0%~100.0%	100.0%	0x1202	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P12.03	Minimum input of curve 1	-10.00 v~maximum input (P12.01)	0.00V	0x1203	○
P12.04	Minimum input corresponding curve 1	-100.0%~100.0%	0.0%	0x1204	○
P12.05	Maximum input value of curve 2	Inflection point 2 input (p12.07)~10.00 v	10.00V	0x1205	○
P12.06	Maximum input corresponding curve 2	-100.0%~100.0%	100.0%	0x1206	○
P12.07	Inflection point 2 input value of curve 2	Inflection point 1 input (p12.09)~maximum input (P12.05)	0.00V	0x1207	○
P12.08	Input corresponding value of inflection point 2 of curve 2	-100.0%~100.0%	0.0%	0x1208	○
P12.09	Input value of inflection point 1 of curve 1	Minimum input (p12.11)~inflection point 2 input (P12.07)	0.00V	0x1209	○
P12.10	Input corresponding value of inflection point 1 of curve 2	-100.0%~100.0%	0.0%	0x120A	○
P12.11	Minimum input value of curve 2	-10.00 V~inflection point 1 input (P12.09)	0.00V	0x120B	○
P12.12	Minimum input corresponding value of curve 2	-100.0%~100.0%	0.0%	0x120C	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P12.13	Maximum input value of curve 3	Inflection point 2 input (P12.15)~10.00 v	10.00V	0x120D	○
P12.14	Maximum input corresponding value of curve 3	-100.0%~100.0%	100.0%	0x120E	○
P12.15	Inflection point 2 input value of curve 3	Inflection point 1 input (P12.17)~maximum input (P12.13)	0.00V	0x120F	○
P12.16	Input corresponding value of inflection point 2 of curve 3	-100.0%~100.0%	0.0%	0x1210	○
P12.17	Inflection point 1 input value of curve 3	Minimum input (p12.19)~inflection point 2 input (P12.15)	0.00V	0x1211	○
P12.18	Input corresponding value of inflection point 1 of curve 3	-100.0%~100.0%	0.0%	0x1212	○
P12.19	Minimum input value of curve 3	-10.00 V~inflection point 1 input (P12.17)	0.00V	0x1213	○
P12.20	Minimum input corresponding value of curve 3	-100.0%~100.0%	0.0%	0x1214	○
P12.21	AI1 input bias	-100.0%~100.0%	0.0%	0x1215	○
P12.22	AI1 input gain	-2.000~2.000	1.000	0x1216	○
P12.23	AI1 input filtering time	0.000s~10.000s	0.050s	0x1217	○
P12.24	AI2 input bias	-100.0%~100.0%	0.0%	0x1218	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P12.25	AI2 input gain	-2.000~2.000	1.000	0x1219	○
P12.26	AI2 input filtering time	0.000s~10.000s	0.050s	0x121A	○
P12.33	HDI maximum input frequency	HDI minimum input frequency~100.00kHz	10.00kHz	0x1221	○
P12.34	HDI maximum corresponding value	-100.0%~100.0%	100.0%	0x1222	○
P12.35	HDI minimum input frequency	0.00kHz~HDI maximum input frequency	0.00kHz	0x1223	○
P12.36	HDI minimum corresponding value	-100.0%~100.0%	0.0%	0x1224	○
P12.37	HDI input filtering time	0.000s~1.000s	0.001s	0x1225	○
P13 analog AO output					
P13.00	AO terminal output function selection	00: no output 01: setting frequency 02: output frequency 03: output current (relative Variable Frequency Drive) 04: output torque (absolute value) 05: output voltage 06: bus voltage 07: output power 08: AI1 input 09: AI2 input 10: reserve 11: pulse input (0-50kHz) 12: motor current 13: output torque	2	0x1300	○

Parameter	Name	Setting range	Factory value	Register address	Properties
		(relative value) 14: torque command			
P13.03	AO output bias	-100.0%~100.0%	0.0%	0x1303	○
P13.04	AO output gain	-2.000~2.000	1.000	0x1304	○
P13.05	AO output filtering time	0.000s~10.000s	0.0s	0x1305	○
P20 Operating Keyboard Setting Parameters					
P20.00	Password setting	00000~65535	00000	0x2000	○
P20.01	LCD brightness	10%~100%	80%	0x2001	●
P20.02	LCD language selection	0: Chinese 1: English	0	0x2002	●
P20.03	Function code modification protection	0: all function codes can be modified 1: only P20.00 and P20.03 are allowed to be modified	0	0x2003	●
P20.04	Function code initialization	0: no operation 1: restore factory parameters (no motor parameters) 2: restore factory parameters (including motor parameters) 3: clear fault record information (reserved)	0	0x2004	●
P20.05	Copy of parameters	0: no operation 1: parameter uploading 2: parameter downloading (no motor parameters) 3: parameter downloading (including motor parameters)	0	0x2005	●

Parameter	Name	Setting range	Factory value	Register address	Properties
P20.06	Keyboard locking function	0: not locking 1: full locking 2: locking except Loc/Rem key 3: locking except Start and Stop keys	0	0x2006	●
P20.08	Loc/Rem key function selection	0: no function 1: switch the given mode of operation command 2: inching forward rotation 3: inching reverse rotation 4: forward and reverse switching	2	0x2008	●
P21 Display Setting Parameters					
P21.00	Setting of running display parameter 1	00: invalid display 01: operating frequency 02: setting frequency 03: output frequency 04: synchronization frequency 05: local frequency 06: extended frequency 07: setting speed 08: operating speed 09: bus voltage 10: output voltage 11: output current 12: output power 13: output torque 14: torque given 15: AI1 voltage 16: AI2 voltage	1	0x2100	○
P21.01	Setting of run display parameter 2		11	0x2101	○
P21.02	Setting of run display parameter 3		9	0x2102	○
P21.03	Setting of run display parameter 4		0	0x2103	○
P21.04	Setting of stop display parameter 1		2	0x2104	○
P21.05	Setting of stop display parameter 2		9	0x2105	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P21.06	Setting of stop display parameter 3	17-18: reserve 19: AO voltage 20: reserve	0	0x2106	○
P21.07	Setting of stop display parameter 4	21: HDI input frequency 22: reserve 23: input terminal 24: output terminal 25: machine status 26: radiator temperature 27: motor temperature 28: PID given 29: PID feedback 30: PID error 31: PLC phase 32: main setting channel 33: auxiliary setting channel 34: main setting frequency 35: auxiliary setting frequency 36: external counting value 37: setting length value 38: running length value 39: operating linear speed	0	0x2107	○
P30 Fault and Protection Parameters					
P30.00	Cooling fan control	0: auto run 1: power-on direct operation 2: stop immediately after shutdown	0	0x3000	○
P30.01	Selection of motor	Ones: motor over-temperature	000	0x3001	●

Parameter	Name	Setting range	Factory value	Register address	Properties
	overheating detection	protection 0: forbidden 1: action Tens: sensor type 0: temperature sensor PT100 1: temperature sensor PT1000 Hundreds: analog channel 0: analog Input AI1 1: analog Input AI2			
P30.02	Motor overheat detection level	0.0~200.0℃	85.0℃	0x3002	●
P30.03	Selection of Variable Frequency Drive overload pre-alarm detection	Ones: overload pre-alarm detection selection 0: always check during operation 1: detection at constant speed operation only Tens: selection of overload pre-alarm detection quantity 0: detection level is relative to rated current of motor 1: detection level is relative to rated current of Variable Frequency Drive Hundreds: Overload pre-alarm protection selection 0: overload protection shield 1: overload protection	000	0x3003	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		enabled			
P30.04	Detection level of Variable Frequency Drive overload pre-alarm	20.0%~200.0%	160.0%	0x3004	●
P30.05	Detection time of Variable Frequency Drive overload pre-alarm	0.0s~60.0s	5.0s	0x3005	●
P30.06	Output load drop detection selection of Variable Frequency Drive	0: invalid detection of output load drop of Variable Frequency Drive 1: always check during operation (continue operation) 2: detection only at constant speed (continuous operation) 3: always check during operation (free shutdown) 4: detection only at constant speed (free stop)	0	0x3006	●
P30.07	Output load	0.0%~100.0%	30.0%	0x3007	●

Parameter	Name	Setting range	Factory value	Register address	Properties
	drop detection level of Variable Frequency Drive				
P30.08	Output load drop detection time of Variable Frequency Drive	0.0s~3600.0s	1.0s	0x3008	●
P30.09	Selection of automatic reset times	0~100 0: no automatic reset function	0	0x3009	●
P30.10	Automatic reset interval time	0.1s~100.0s	1.0s	0x300A	●
P30.11	Selection of fault relay action	Ones: during automatic reset 0: action 1: no action Tens: under-voltage period 0: action 1: no action	00	0x300B	●
P30.12	Option of enhanced protection function	Ones: output phase lack detection 0: forbidden 1: action Tens: input phase lack detection 0: forbidden 1: action Hundreds: motor overload detection 0: forbidden 1: action	000	0x300C	●

Parameter	Name	Setting range	Factory value	Register address	Properties
P30.13	Fault record saving method	0: reset of fault record in case of power failure 1: storage of fault record in case of power failure	1	0x300D	●
P30.14	Fault protection action attribute 1	Ones: EEPROM read and write failure 0: continue to run 1: free parking Tens: system interference fault 0: continue to run 1: free parking Hundreds: contactor suction fault 0: continue to run 1: free parking Thousands: current detection fault 0: continue to run 1: free parking	1111	0x300E	●
P30.15	Fault protection action attribute 2	Ones: Variable Frequency Drive overheating 0: continue to run 1: free parking Tens: reserve 0: continue to run 1: free parking Hundreds: motor overheating 0: continue to run 1: free parking Thousands: system customization 0: continue to run 1: free parking	1111	0x300F	●

Parameter	Name	Setting range	Factory value	Register address	Properties
P40 Process PID Control Parameters					
P40.00	PID given mode selection	0: given by P40.01 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI	0	0x4000	●
P40.01	PID digital given	0.0%~100.0%	50.0%	0x4001	○
P40.02	PID feedback mode selection	0: constant zero feedback input 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI	1	0x4002	●
P40.03	Proportional gain Kp1	0.0~100.0	50.0	0x4003	○
P40.04	Integral time Ti1	0.000s~50.000s	0.500s	0x4004	○
P40.05	Differential time Td1	0.000s~50.000s	0.000s	0x4005	○
P40.06	Proportional gain Kp2	0.0~100.0	50.0	0x4006	○
P40.07	Integral time Ti2	0.000s~50.000s	0.500s	0x4007	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P40.08	Differential time Td2	0.000s~50.000s	0.000s	0x4008	○
P40.09	PID parameter switching	0: use Kp1, Ki1 and Kd1 only 1: automatically switch according to input bias 2: switch according to terminals	0	0x4009	●
P40.10	Input bias in PID automatic switching	0.0%~100.0%	20.0%	0x400A	○
P40.11	PID adjustment selection	Ones: output frequency 0: it must be consistent with the set running direction 1: it can be opposite to the set running direction Tens: integral mode 0: when the integral reaches the upper and lower limits, continue to adjust the integral. 1: when the integral reaches the upper and lower limits, stop the integral adjustment.	11	0x400B	●
P40.12	PID positive and negative effects	0: positive effect 1: negative effect	0	0x400C	●
P40.13	PID given filtering time	0.00s~10.00s	0.00s	0x400D	○
P40.14	PID feedback filtering time	0.00s~10.00s	0.00s	0x400E	○
P40.15	PID output filtering time	0.00s~10.00s	0.00s	0x400F	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P40.16	Sampling period	0.001s~50.000s	0.002s	0x4010	○
P40.17	Deviation limit	0.0%~100.0%	0.0%	0x4011	○
P40.18	Differential limit	0.0%~100.0%	0.5%	0x4012	○
P40.19	PID initial value	0.0%~100.0%	0.0%	0x4013	○
P40.20	PID initial value holding time	0.0s~3600.0s	0.0s	0x4014	○
P40.21	PID operation output maximum	0.0%~100.0%	100.0%	0x4015	○
P40.22	PID reverse output cutoff frequency	0.00Hz~upper limit frequency	0.00Hz	0x4016	○
P40.23	PID shutdown operation selection	0:no calculation during shutdown 1: operation during shutdown	0	0x4017	●
P40.24	PID given missing detection value	0.0%~100.0%	0.0%	0x4018	●
P40.25	PID given loss detection time	0.00s~30.00s 0.00s: not detect PID given loss	1.00s	0x4019	●
P40.26	PID feedback missing detection value	0.0%~100.0%	0.0%	0x401A	●
P40.27	PID feedback loss detection time	0.00s~30.00s 0.00s: not detect PID feedback loss	1.00s	0x401B	●
P40.28	PID signal loss shutdown mode	0: free shutdown 1: emergency shutdown	0	0x401C	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P40.29	Upper critical value of zero frequency operation	P40.30~upper limit frequency	0.00Hz	0x401D	●
P40.30	Lower critical value of zero frequency operation	0.00Hz~P40.29	0.00Hz	0x401E	●
P40.31	Sleep wake-up mode selection	0: Frequency sleep wake-up mode Sleep wake-up mode is determined by P40.29 and P40.30 parameter settings 1: Pressure sleep wake-up method Sleep wake-up mode is determined by P40.32 and P40.34 parameter settings	0	0x401F	●
P40.32	Sleep pressure detection value	P40.34～P40.37	1000	0x4020	●
P40.33	Sleep detection delay time	0.00s～30.00s Effective for frequency and pressure detection methods	1.00s	0x4021	●
P40.34	Wakeup pressure detection value	0～P40.32	0	0x4022	●
P40.35	Wakeup detection delay time	0.00s～30.00s Effective for frequency and pressure detection methods	0.50s	0x4023	●
P40.36	reserve				

Parameter	Name	Setting range	Factory value	Register address	Properties
P40.37	Given feedback range	0～10000	1000	0x4025	●
P41 Multistage Frequency					
P41.00	Multistage frequency digital given 1	Lower limit frequency~upper limit frequency	0.00Hz	0x4100	○
P41.01	Multistage frequency digital given 2	Lower limit frequency~upper limit frequency	0.00Hz	0x4101	○
P41.02	Multistage frequency digital given 3	Lower limit frequency~upper limit frequency	0.00Hz	0x4102	○
P41.03	Multistage frequency digital given 4	Lower limit frequency~upper limit frequency	0.00Hz	0x4103	○
P41.04	Multistage frequency digital given 5	Lower limit frequency~upper limit frequency	0.00Hz	0x4104	○
P41.05	Multistage frequency digital given 6	Lower limit frequency~upper limit frequency	0.00Hz	0x4105	○
P41.06	Multistage frequency digital given 7	Lower limit frequency~upper limit frequency	0.00Hz	0x4106	○
P41.07	Multistage frequency digital given 8	Lower limit frequency~upper limit frequency	0.00Hz	0x4107	○
P41.08	Multistage frequency digital given 9	Lower limit frequency~upper limit frequency	0.00Hz	0x4108	○
P41.09	Multistage frequency digital given 10	Lower limit frequency~upper limit frequency	0.00Hz	0x4109	○
P41.10	Multistage frequency digital given 11	Lower limit frequency~upper limit frequency	0.00Hz	0x410A	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P41.11	Multistage frequency digital given 12	Lower limit frequency~upper limit frequency	0.00Hz	0x410B	○
P41.12	Multistage frequency digital given 13	Lower limit frequency~upper limit frequency	0.00Hz	0x410C	○
P41.13	Multistage frequency digital given 14	Lower limit frequency~upper limit frequency	0.00Hz	0x410D	○
P41.14	Multistage frequency digital given 15	Lower limit frequency~upper limit frequency	0.00Hz	0x410E	○
P41.15	Multistage frequency 1 command source selection	0: digital given P41.00 1: analog input AI1 2: analog input AI2 3: reserve 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: pulse given HDI 9: process PID	0	0x410F	●
P42 Simple PLC					
P42.00	Selection of simple PLC operation mode	Ones: simple PLC operation mode 0: shutdown after single cycle 1: maintain final value after single cycle 2: continuous cycle Tens: simple PLC startup mode 0: run from stage 1 1: continue to operate from the stage frequency at the interruption time	0000	0x4200	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		Hundreds: simple PLC power-down memory 0: power-down reset 1: power-down storage Thousands: simple PLC time unit 0: second (s) 1: minute (min)			
P42.01	Setting of PLC stage 1	Ones: operation direction of simple PLC stage 0: positive 1: negative Tens: acceleration and deceleration time of simple PLC stage 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4	00	0x4201	●
P42.02	Running time in stage 1	0.0s(min)~3276.7s(min)	0.0s(min)	0x4202	○
P42.03	Setting of PLC stage 2	refers to the setting mode of stage 1	00	0x4203	●
P42.04	Running time in stage 2	0.0s(min)~3276.7s(min)	0.0s(min)	0x4204	○
P42.05	Setting of PLC stage 3	refers to the setting mode of stage 1	00	0x4205	●
P42.06	Running time in stage 3	0.0s(min)~3276.7s(min)	0.0s(min)	0x4206	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P42.07	Setting of PLC stage 4	refers to the setting mode of stage 1	00	0x4207	●
P42.08	Running time in stage 4	0.0s(min)~3276.7s(min)	0.0s(min)	0x4208	○
P42.09	Setting of PLC stage 5	refers to the setting mode of stage 1	00	0x4209	●
P42.10	Running time in stage 5	0.0s(min)~3276.7s(min)	0.0s(min)	0x420A	○
P42.11	Setting of PLC stage 6	refers to the setting mode of stage 1	00	0x420B	●
P42.12	Running time in stage 6	0.0s(min)~3276.7s(min)	0.0s(min)	0x420C	○
P42.13	Setting of PLC stage 7	refers to the setting mode of stage 1	00	0x420D	●
P42.14	Running time in stage 7	0.0s(min)~3276.7s(min)	0.0s(min)	0x420E	○
P42.15	Setting of PLC stage 8	refers to the setting mode of stage 1	00	0x420F	●
P42.16	Running time in stage 8	0.0s(min)~3276.7s(min)	0.0s(min)	0x4210	○
P42.17	Setting of PLC stage 9	refers to the setting mode of stage 1	00	0x4211	●
P42.18	Running time in stage 9	0.0s(min)~3276.7s(min)	0.0s(min)	0x4212	○
P42.19	Setting of PLC stage 10	refers to the setting mode of stage 1	00	0x4213	●
P42.20	Running time in stage 10	0.0s(min)~3276.7s(min)	0.0s(min)	0x4214	○

Parameter	Name	Setting range	Factory value	Register address	Properties
P42.21	Setting of PLC stage 11	refers to the setting mode of stage 1	00	0x4215	●
P42.22	Running time in stage 11	0.0s(min)~3276.7s(min)	0.0s(min)	0x4216	○
P42.23	Setting of PLC stage 12	refers to the setting mode of stage 1	00	0x4217	●
P42.24	Running time in stage 12	0.0s(min)~3276.7s(min)	0.0s(min)	0x4218	○
P42.25	Setting of PLC stage 13	refers to the setting mode of stage 1	00	0x4219	●
P42.26	Running time in stage 13	0.0s(min)~3276.7s(min)	0.0s(min)	0x421A	○
P42.27	Setting of PLC stage 14	refers to the setting mode of stage 1	00	0x421B	●
P42.28	Running time in stage 14	0.0s(min)~3276.7s(min)	0.0s(min)	0x421C	○
P42.29	Setting of PLC stage 15	refers to the setting mode of stage 1	00	0x421D	●
P42.30	Running time in stage 15	0.0s(min)~3276.7s(min)	0.0s(min)	0x421E	○
P43 Fixed Length and Linear Speed					
P43.00	Set the counting value	1~65535	1000	0x4300	●
P43.01	Designated the counting value	1~p43.00 (set counting value)	1000	0x4301	●
P43.02	Selection of length reach action	Ones: length reaching 0: continue to run 1: shutdown Tens: unit of length	0000	0x4302	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		0: meter 1: 10 meters Hundreds: length shutdown reset 0: invalid 1: action Thousands: counting, stopping and clearing 0: invalid 1: action			
P43.03	Setting length	0m~65535m	0m	0x4303	●
P43.04	Number of pulses per meter	0.1~6553.5	1000.0	0x4304	●
P43.05	Linear speed display coefficient	0.0%~1000.0%	0.0%	0x4305	○
P50 Modbus Communication Parameters					
P50.00	Local address	0~247； 0: broadcast address	1	0x5000	○
P50.01	Communication rate selection	Ones: communication baud rate of terminal port Tens: communication baud rate of keyboard port 0:4800bps 1:9600bps 2:19200bps 3:38400bps 4:57600bps 5:115200bps	31	0x5001	○
P50.02	Data format	Ones: Terminal port data format Tens: Keyboard port	00	0x5002	○

Parameter	Name	Setting range	Factory value	Register address	Properties
		data format 0:1-8-1-N format，RTU 1:1-8-1-E format，RTU 2:1-8-1-O format，RTU 3:1-7-1-N format，ASCII 4:1-7-1-E format，ASCII 5:1-7-1-O format，ASCII			
P50.03	Communication response delay	0.000s~60.000s	0.000s	0x5003	○
P50.04	Overtime detection time	0.0s~600.0s 0.0s: indicate no detection	0.0s	0x5004	○
P50.05	Selection of communication error response shield	Ones: selection of communication port error response shield Tens: selection of keyboard port error response shield 0: valid 1: invalid	00	0x5005	○
P50.06	Master-slave mode selection and slave function code setting	ones: master-slave selection for terminal port communication Tens: Expansion port communication master-slave selection 0: stand-alone use 1: this machine is used as the host 2: this machine is a slave machine Hundreds: operation address of terminal port communication Thousands: communication	0000	0x5006	●

Parameter	Name	Setting range	Factory value	Register address	Properties
		operation address of extended port 0: P00.00 1: P40.01			
P50.07	Interval time of host operation data	0.010s~1.000s	0.050s	0x5007	○
P50.08	Proportion coefficient of receiving date of slave machine	0.00~10.00	1.00	0x5008	○
P60 Motor Control Preparation					
P60.00	Carrier frequency setting	1.0kHz~16.0kHz	6.0kHz	0x6000	●
P60.02	Pulse width modulation mode	0: 3-phase modulation 1: automatic switching	0	0x6002	●
P60.03	DPWM switching frequency	5.00Hz~maximum frequency	8.00Hz	0x6003	●
P60.04	Magnetic flux brake selection	0: forbidden 1: action	0	0x6004	●
P60.05	Energy consumption brake selection	0: forbidden 1: action	0	0x6005	●
P60.06	Energy consumption brake action voltage	650V~750V	720V	0x6006	●
P60.07	Over-voltage stall regulation selection	0: forbidden 1: action	1	0x6007	●
P60.08	Over-voltage stall action	100.0%~150.0% (relative to rated bus	135.0%	0x6008	●

Parameter	Name	Setting range	Factory value	Register address	Properties
	voltage	voltage)			
P60.09	Under-voltage stall regulation selection	0: forbidden 1: action	0	0x6009	●
P60.10	Under-voltage stall action voltage	50.0%~95.0% (relative to rated bus voltage)	85.0%	0x600A	●
P60.11	Current limiting action selection	0: forbidden 1: action	1	0x600B	●
P60.12	Current limiting level	20.0%~200.0% (Relative rated current)	160.0%	0x600C	●
P60.13	Slip compensation gain	0.0~300.0%	100.0%	0x600D	○
P62 Motor Characteristic Parameters					
P62.00	Stator resistance of asynchronous motor	0.001Ω~65.000Ω	Model determination	0x6200	●
P62.01	Rotor resistance of asynchronous motor	0.001Ω~65.000Ω	Model determination	0x6201	●
P62.02	Leakage inductance of asynchronous motor	0.01mH~650.00mH	Model determination	0x6202	●
P62.03	Mutual inductance of asynchronous motor	0.01mH~650.00mH	Model determination	0x6203	●
P62.04	No-load current of	0.1A~P63.02	Model determination	0x6204	●

Parameter	Name	Setting range	Factory value	Register address	Properties
	asynchronous motor				
P62.05	Saturation coefficient of asynchronous motor	0.00%~100.00%	Model determination	0x6205	●
P63 Motor Nameplate Parameters					
P63.00	Rated power of motor	0.2kW~6000.0kW	Model determination	0x6300	●
P63.01	Rated voltage of motor	1V~480V	380V	0x6301	●
P63.02	Rated current of motor	0.1A~6000.0A	Model determination	0x6302	●
P63.03	Rated frequency of motor	10.00Hz~300.00Hz	50.00Hz	0x6303	●
P63.04	Rated speed of motor	1~65535 rpm	1500rpm	0x6304	●
P63.05	Pole number	2~80	4	0x6305	●
P63.07	Self-tuning of motor parameter	0: no request 1: motor static identification 2: motor rotation identification	0	0x6307	●
P63.08	Motor control mode	0: advanced scalar control 1: no PG vector control	0	0x6308	●
U00 Status Monitoring Data					
U00.00	Running frequency	0.00Hz~300.00Hz	Actual value	0x8100	★
U00.01	Setting frequency	0.00Hz~300.00Hz	Actual value	0x8101	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U00.02	Output frequency	0.00Hz~300.00Hz	Actual value	0x8102	★
U00.03	Synchronization frequency	0.00Hz~300.00Hz	Actual value	0x8103	★
U00.04	Local frequency	0.00Hz~300.00Hz	Actual value	0x8104	★
U00.05	Extended frequency	0.00Hz~300.00Hz	Actual value	0x8105	★
U00.06	Setting rotary speed	0rpm~60000rpm	Actual value	0x8106	★
U00.07	Output rotary speed	0rpm~60000rpm	Actual value	0x8107	★
U00.08	Bus voltage	0V~2000V	Actual value	0x8108	★
U00.09	Output Voltage	0V~2000V	Actual value	0x8109	★
U00.10	Output current	0.0A~6000.0A	Actual value	0x810A	★
U00.11	Output power	0.0kW~6000.0kW	Actual value	0x810B	★
U00.12	Output torque	-300.0%~300.0%	Actual value	0x810C	★
U00.13	Given torque	-300.0%~300.0%	Actual value	0x810D	★
U00.14	AI1 voltage	-10.00V~10.00V	Actual value	0x810E	★
U00.15	AI2 voltage	-10.00V~10.00V	Actual value	0x810F	★
U00.18	AO voltage	0.00V~10.00V	Actual value	0x8112	★
U00.20	HDI input frequency	0Hz~60000Hz	Actual value	0x8114	★
U00.22	Input terminal status	Bit0~Bit3 corresponds to 0: input terminal OFF 1: input terminal ON	Actual value	0x8116	★
U00.23	Output terminal status	Bit0 corresponds to Y Bit2 corresponds to R 0: output terminal OFF 1: output terminal ON	Actual value	0x8117	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U00.24	Machine status	Ones: Bit0: run/stop Bit1: forward/reverse rotation Bit2: DC braking Bit3: parameter identification Tens: 0: constant speed 1: acceleration 2: deceleration	Actual value	0x8118	★
U00.25	Radiator temperature	0.0℃~120.0℃	Actual value	0x8119	★
U00.26	Motor temperature	0.0℃~200.0℃	Actual value	0x811A	★
U00.27	PID given	-100.00%~100.00%	Actual value	0x811B	★
U00.28	PID feedback	-100.00%~100.00%	Actual value	0x811C	★
U00.29	PID error	-100.00%~100.00%	Actual value	0x811D	★
U00.30	PLC stage	0~15	Actual value	0x811E	★
U00.31	Main setting channel	0~11	Actual value	0x811F	★
U00.32	Auxiliary setting channel	0~11	Actual value	0x8120	★
U00.33	Main setting frequency	0.00Hz~300.00Hz	Actual value	0x8121	★
U00.34	Auxiliary setting frequency	0.00Hz~300.00Hz	Actual value	0x8122	★
U00.35	External counting value	0~65535	Actual value	0x8123	★
U00.36	Setting length value	0m~65535m	Actual value	0x8124	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U00.37	Running length value	0m~65535m	Actual value	0x8125	★
U00.38	Operating linear speed	0m/s~65535m/s	Actual value	0x8126	★
U00.39	AI1 sampling value	-10.00V~10.00V	Actual value	0x8127	★
U00.40	AI2 sampling value	-10.00V~10.00V	Actual value	0x8128	★
U00.43	Current fault code	0~100	Actual value	0x812B	★
U00.44	Accumulated power-on time	0h~65535h	Actual value	0x812C	★
U00.45	Accumulated running time	0h~65535h	Actual value	0x812D	★
U00.46	High accumulated energy consumption of motor	0kW.h~59999kW.h	Actual value	0x812E	★
U00.47	Low accumulated energy consumption of motor	0.0kW.h~999.9kW.h	Actual value	0x812F	★
U00.48	High operation energy consumption	0kW.h~59999kW.h	Actual value	0x8130	★
U00.49	Low operation energy consumption	0.0kW.h~999.9kW.h	Actual value	0x8131	★
U01 Fault Record Data					
U01.00	Last fault code	0~100	Actual value	0x8200	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U01.01	Given frequency at the last fault	0.00Hz~300.00Hz	Actual value	0x8201	★
U01.02	Output frequency at the last fault	0.00Hz~300.00Hz	Actual value	0x8202	★
U01.03	Output Current at the last fault	0.0A~6000.0A	Actual value	0x8203	★
U01.04	DC bus voltage at the last fault	0V~2000V	Actual value	0x8204	★
U01.05	Output Voltage at the last fault	0V~2000V	Actual value	0x8205	★
U01.06	Input terminal status of last fault	00~F	Actual value	0x8206	★
U01.07	Output terminal status at the last fault	00~F	Actual value	0x8207	★
U01.08	Machine running status of the last fault	00~2F	Actual value	0x8208	★
U01.09	Radiator temperature of the last fault	0.0℃~120.0℃	Actual value	0x8209	★
U01.10	Cumulative running time of the last fault	0.0h~6553.5h	Actual value	0x820A	★
U01.11	The last fault code	0~100	Actual value	0x820B	★
U01.12	Given frequency at previous fault	0.00Hz~300.00Hz	Actual value	0x820C	★
U01.13	Output frequency at previous fault	0.00Hz~300.00Hz	Actual value	0x820D	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U01.14	Given current at previous fault	0.0A~6000.0A	Actual value	0x820E	★
U01.15	DC bus voltage at previous fault	0V~2000V	Actual value	0x820F	★
U01.16	Output voltage at previous fault	0V~2000V	Actual value	0x8210	★
U01.17	Input terminal status at previous fault	00~F	Actual value	0x8211	★
U01.18	Output terminal status at previous fault	00~F	Actual value	0x8212	★
U01.19	Machine running status at previous fault	00~2F	Actual value	0x8213	★
U01.20	Radiator temperature at previous fault	0.0℃~120.0℃	Actual value	0x8214	★
U01.21	Cumulative running time at previous fault	0.0h~6553.5h	Actual value	0x8215	★
U01.22	The first two fault codes	0~100	Actual value	0x8216	★
U01.23	Given frequency during the first two faults	0.00Hz~300.00Hz	Actual value	0x8217	★
U01.24	Output frequency during the first two faults	0.00Hz~300.00Hz	Actual value	0x8218	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U01.25	Output current during the first two faults	0.0A~6000.0A	Actual value	0x8219	★
U01.26	DC bus voltage during first two faults	0V~2000V	Actual value	0x821A	★
U01.27	Output voltage during the first two faults	0V~2000V	Actual value	0x821B	★
U01.28	Input terminal status during the first two faults	00~F	Actual value	0x821C	★
U01.29	Output terminal status during the first two faults	00~F	Actual value	0x821D	★
U01.30	achine operating status during the first two faults	00~2F	Actual value	0x821E	★
U01.31	Radiator temperature during the first two faults	0.0℃~120.0℃	Actual value	0x821F	★
U01.32	Cumulative operation time during the first two faults	0.0h~6553.5h	Actual value	0x8220	★
U01.33	The first three fault codes	0~100	Actual value	0x8221	★
U01.34	Cumulative operation time during the first three faults	0.0h~6553.5h	Actual value	0x8222	★

Parameter	Name	Setting range	Factory value	Register address	Properties
U02 Variable Frequency Drive Information Data					
U02.00	Rated power of Variable	0.0kW~6000.0kW	Model determination	0x8300	★
U02.01	Rated voltage of Variable	0V~2000V	Model determination	0x8301	★
U02.02	Rated current of Variable	0.0A~6000.0A	Model determination	0x8302	★
U02.03	Software series of Variable	H120~TI10	Actual value	0x8303	★
U02.04	Functional version of Variable Frequency	1.00~99.99	Actual value	0x8304	★
U02.05	Performance version of Variable Frequency	1.00~99.99	Actual value	0x8305	★
U02.06	Production year of Variable	2000~2999	Actual value	0x8306	★
U02.07	Production month of Variable Frequency	01/01~12/31	Actual value	0x8307	★
U02.08	Custom series number	00~9999	Actual value	0x8308	★
U02.09	Customer non-label	00~9999	Actual value	0x8309	★
U02.10	Keyboard software version	0.00~99.99	Actual value	0x830A	★

Chapter 3 Fault Diagnosis and Countermeasures

3.1 Fault List and Countermeasures

The Variable Frequency Drive may encounter the following fault types during use. Please refer to the list countermeasures for simple troubleshooting.

Fault code	Failure Display	Fault name	Cause	Countermeasure
1	Er.oc1	Over-current in acceleration	Torque boost value is too large at scalar control	Reduce torque boost value
			Great starting frequency	Reduce the starting frequency value
			Short acceleration time	Prolong acceleration time
			Improper setting of motor parameters	Correct setting of motor nameplate
			Weight overload	Reduce overload
			Restart the rotating motor	Reduce the current limit value or start with speed search
			Output interphase short circuit or short circuit to ground	Check motor wiring and output impedance to ground
			V/F curve is not suitable at scalar control	Correct set of V/F curve
2	Er.oc2	Over-current during deceleration	Short deceleration time	Prolong deceleration time
			There is no additional brake unit and brake resistor	Add braking unit and resistance
3	Er.oc3	Over current in constant speed	Small Variable Frequency Drive power level	Select the appropriate Variable Frequency Drive power
			Low grid input voltage	Check grid voltage
			Weight overload	Reduce overload
4	Er.ou1	Over-voltage during acceleration	Abnormal input voltage	Check grid voltage
			Short acceleration time	Prolong acceleration time
			Large load inertia	Use energy braking
5	Er.ou2	Over-voltage during deceleration	Short deceleration time	Prolong deceleration time
			Abnormal input voltage	Check grid voltage
			Large load inertia	Use energy braking

Fault code	Failure Display	Fault name	Cause	Countermeasure
6	Er.ou3	Over-voltage in constant speed	Abnormal input voltage	Check grid voltage
			Large load fluctuation	Check load
7	Er.Lu1	Variable Frequency Drive under-voltage	The input terminal voltage of the Variable Frequency Drive is not within the range required by the specification.	Adjust voltage to normal range
			Momentary interruption	Reset fault
			Abnormal bus voltage	Seek technical support
			Abnormal rectifier bridge and buffer resistance	Seek technical support
			Abnormal driving plate	Seek technical support
			Abnormal control plate	Seek technical support
8	Er.Cur	Current detection fault	Abnormal connection between control plate and driving plate	Check the cable and reset it
			Abnormal control plate current detection circuit	Seek technical support
			Abnormal driving plate current detection circuit	Seek technical support
			Damaged current sensor	Seek technical support
			Damaged switch power supply	Seek technical support
9	Er.CPU	System interferenc fault	Serious external interference signal	Seek technical support
10	Er.FAL	Module protection fault	Output interphase short circuit or short circuit to ground	Check motor wiring and output impedance to ground
			Over-voltage or over-current	Process according to the over-voltage and over-current method
			Loose connection of control plate	Reset the control plate connector

Fault code	Failure Display	Fault name	Cause	Countermeasure
			Direct connection of Variable Frequency Drive module	Seek technical support
			Abnormal control plate	Seek technical support
			Damaged switch power supply	Seek technical support
11	Er.tun	Motor identification failure	Motor parameters are not set or set incorrectly	Setting motor parameters correctly
			Motor wiring error	Check motor wiring
12	Er.CCL	Contactor suction failure	Abnormal grid input voltage	Check input grid voltage
			Contactor damage	Seek technical support
			Damaged buffer resistance	Seek technical support
			Abnormal switch power supply	Seek technical support
13	Er.EtE	External terminal fault	Input signal of external fault through multi-functional terminal X	Reset
			Input signal of external fault through logic state inversion IO function	Reset
14	Er.oH1	Variable Frequency Drive overheating	High environment temperature	Reduce environment temperature
			Damaged fan	Replace fan
			Air duct blockage	Clean air duct
			Abnormal temperature detection	Seek technical support
			Damaged Variable	Seek technical support
15	Er.oH2	Motor overheating	High environment temperature	Reduce environment temperature
			Abnormal heat dissipation or heavy load of motor	Check motor heat dissipation or reduce load
			Damaged temperature detection circuit	Seek technical support

Fault code	Failure Display	Fault name	Cause	Countermeasure
16	Er.oL1	Variable Frequency Drive overload	Low input power supply voltage	Check grid voltage
			Quick start in high speed rotation of motor	Start the motor after stopping rotating
			Long-term weight overload	Shorten overload time and
			Short acceleration and deceleration time	Prolong acceleration and deceleration time
			High setting of V/F curve ratio	Adjust V/F curve setting and torque lifting amount
			Small power selection of Variable Frequency Drive	Replace the Variable Frequency Drive with
17	Er.oL2	Motor overload	Low input power supply voltage	Check grid voltage
			Motor stalling or serious load mutation	Prevent motor stalling and reduce load mutation
			Long-term, low-speed and heavy-load running of common motors	Change to variable frequency motor or increase operating frequency
			Short motor overload protection time	Increase motor overload protection time
			High setting of V/F curve ratio	Adjust V/F curve setting and torque lifting amount
			Large DC brake current setting	Reduce DC braking current
18	Er.ILF	Variable Frequency Drive input Phase loss	Abnormal three-phase input power supply	Check and eliminate problems in peripheral circuits
			Abnormal driving plate	Seek technical support
			Abnormal control plate	Seek technical support
19	Er.oLF	Variable Frequency Drive output Phase loss	Abnormal wiring at output side of Variable Frequency Drive	Eliminate peripheral faults
			Motor three-phase unbalance	Check the motor or replace the motor

Fault code	Failure Display	Fault name	Cause	Countermeasure
			Abnormal driving plate	Seek technical support
			Abnormal module	Seek technical support
20	Er.LLd	Variable Frequency Drive output Off load	The operating current of the Variable Frequency Drive is less than P30.07	Confirm whether the load is disengaged or whether the P30.07 and P30.08 parameter settings conform to the actual operating conditions.
21	Er.GdF	Variable Frequency Drive Short circuit to ground	Output wiring short circuit to ground	Check motor wiring and output impedance to ground
			Abnormal motor insulation	Check motor
			Abnormal Variable	Seek technical support
			Large output current to floor drain	Seek technical support
22	Er.EEP	EEPROM read and write Failure	Abnormal EEPROM read-write	Seek technical support
23	Er.Sci	Communicatio-n overtime fault	Improper setting of communication baud rate	Correct setting
			Disconnected wiring at communication port	Reconnect
			The upper computer is not working	Make the upper computer work
			Communication parameter error of Variable Frequency Drive	Correct setting
			Large interference on site	Check peripheral equipment or seek services
24	Er.tPA	Reaching power-on time	Accumulative power-on time reaches the setting value.	Seek technical support
25	Er.trA	Reaching running time	Accumulative running time reaches the setting value.	Seek technical support
26	Er.rEF	PID given loss	PID given channel	Check given channel

Fault code	Failure Display	Fault name	Cause	Countermeasure
		during running	exception	
			P40.24 unreasonable parameter setting	Correct setting
27	Er.FbL	PID feedback loss during running	PID feedback channel exception	Check feedback channel
			P40.26 unreasonable parameter setting	Correct setting
28	Er.oEP	Excessive speed bias	Small bias setting between the motor speed and the setting speed	Correctly set the speed bias point
			Large load fluctuation	Stable load
29	Er.oSP	Motor over-speed	Small setting value of over-speed value	Correctly set the speed bias point
			Large load fluctuation	Stable load
37	Er.SEF	Speed estimation fault	The motor is not recognized or the parameters are incorrect.	Re-identification of motor parameters
39	Er.Cpy	Parameter copy fault	Parameter upload or download exception	Seek technical support
			Download directly without parameter on operation keyboard	Seek technical support

Appendix A

Modbus communication protocol

1、Support protocol

Support Modbus protocol, RTU format and ASCII code format; the broadcast address is 0, and the slave address setting values are 1~247, 248~255 reserved.

2、Interface mode

RS485: asynchronous half duplex, least significant bit preferred to send; the high byte precedes the low byte.

3、Frequency Variable Frequency Drive address distribution

The function code address distribution refers to the function list.

4、Bit definition of Variable Frequency Drive control command word (0x8000)

Control command word (bit)	Meaning	Control command word (bit)	Meaning
bit0	0: no operation 1: valid running command	bit5	0: invalid fault shutdown 1: valid fault shutdown
bit1	0: forward rotation 1: reverse rotation	bit6	0: invalid inching forward rotation 1: valid inching forward rotation
bit2	0: invalid deceleration shutdown 1: valid deceleration and shutdown	bit7	0: invalid inching reverse rotation 1: valid inching reverse rotation
bit3	0: invalid emergency shutdown 1: valid emergency shutdown	bit8	0: invalid fault reset command 1: valid fault reset command
bit4	0: invalid free shutdown 1: valid free shutdown	bit9~bit15	Reserve

5、Modbus communication example

Read the setting frequency of 1# Variable Frequency Drive, and the setting frequency of Variable Frequency Drive response is 50.00Hz.

	Premises	Funct-ion code	Register address	Number of register	Number of bytes in contents	Register content	Checksum
Reque-st	0x01	0x03	0x0000	0x0001	No	No	0x840A
Respo nse	0x01	0x03	No	No	0x02	0x1388	0xB512

Start the 1# Variable Frequency Drive to rotate forward

	Premises	Function code	Register address	Register content	Checksum
Request	0x01	0x06	0x8000	0x0001	0x61CA
Response	0x01	0x06	0x8000	0x0001	0x61CA

Thinkvert
THINK DRIVES THE WORLD
THINKVERT TECHNOLOGY LIMITED
Address:Guangming Industiral Park No.21,
Dongcheng Street, Dongguan, P.R.China
TEL:0769-33681702
WEB:www.thinkvert.com
EMAIL:service@thinkvert.com