IMD_E Series
User Manual

Preface

First of all, thank you for purchasing and using the IMD_E Series closed-loop servo drive developed by INNOVERT

IMD_E series variable frequency drive is a high-performance current vector control motor drive, which can be used for controlling AC asynchronous motor and synchronous motor. IMD_E series adopt high-performance vector control technology to realize high torque output at low speed and has good dynamic characteristics and super overload capability. Through fast current control and voltage control technology, smooth and fast acceleration and deceleration characteristics are realized. It can be used to dedicated industries such as CNC high speed main spindle-MT, flying shearing/tension control-TC, hydraulic servo-YZ, and direct driving-DD.

Brief Introduction of IMD_E Series Drive

Functional features

✧ Compared with universal drives in the same industry, the product has smaller structure volume and larger power density.

✧ Design of wide voltage range: rated input three-phase AC 360-460V, wide voltage range can reach 323V-528V.

✧ Built-in DC reactor: built-in DC reactor for 160kW~450 kW models.

✧ More optimal built-in brake unit: built-in brake unit below 37kW, 37kW~132kW optional built-in brake unit.

✧ Fast and smooth wave-tracing current limiting function could avoid frequency over-current faults of the drive.

✧ The optimal over-excitation function can inhibit the rise of bus voltage during deceleration process effectively, evading frequent over-voltage alarms and at the same time realizing fast braking under the condition where brake resistor is not connected.

✧ Precise rotor position detection function makes sure the PM synchronous motor would not rotate reversely at the moment of start.

✧ Precise auto-learning of motor parameters ensures more accurate vector control.

✧ V/F separation function enable it to be used as variable-frequency power source.

✧ Optimal comprehensive whole device protection functions such as short-circuit protection to ground, output short-circuit protection, short-circuit protection of various power supplies, etc.

Precautions for Use

✧ For users who use this product for the first time, they shall carefully read this manual firstly. If they have any questions about some functions and performance, please consult our technical personnel for timely help so as to use this product conveniently, quickly and correctly.

Unpacking Inspection

✧ Please unpack and carefully confirm whether the model and rated values on the nameplate of this drive are consistent with your order. The box contains the product you ordered (product certificate attached) and user manual (product warranty card attached). Should the products be damaged during transportation or any omission is found, please contact our company or your supplier to solve it immediately

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 "Notice" 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 operation 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, Independent 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!

 Notice
➢ Check whether the rated values on 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 risk of fire!
- 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 parts casually, especially the bolts marked with red, otherwise there is a risk of equipment damage!

Notice

- 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!
- Please confirm that the installation environment meets the requirements of section 2.2.1. If it cannot meet the requirements, it shall be derated or cannot be used; otherwise, it may cause equipment failure or damage!
- Avoid dropping drilling residues, wire 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-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 R1A, R1B,R1C, and R2A, R2B and R2C; otherwise there is a risk of equipment damage!

Notice
➢ All our products have been subjected to voltage withstanding 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!
- The encoder must use shielded cable and the shielding layer must be grounded correctly!

■ Running

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!
- The variable frequency drive could only be powered on after the wiring is finished according to the requirements of section 2.3, otherwise there is a risk of equipment damage or electric shock!
- The power could only be turned on after the variable frequency drive wiring is confirmed to be correct and 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 be checked that there is no person in surrounding area of motor rotary part 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 casually; otherwise there is a risk of equipment damage!

Notice
➢ 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 becaused! ➢ 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 your hands might be burnt and there is a risk of mechanical damage! ➢ Do not control the start and stop of the variable frequency drive frequently by switching on and off the power, otherwise there is a risk of equipment damage! ➢ Before switching on/off the variable frequency drive output side switch or contactor, it must be sure that the variable frequency drive has no output at this moment, 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, the above procedures must be carried out again with strict accordance!

Notice
➢ When maintaining, inspecting or replacing the parts try best not touching the components, otherwise there is a risk of electrostatic damage to the components! ➢ All pluggable parts can only be plugged and unplugged when power is off!

Content

Chapter I Product Information

1.1 Product Naming

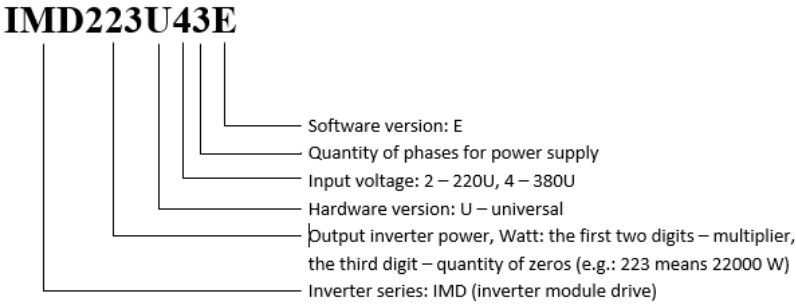


Fig. 1-1 Product Naming

1.2 Product nameplate description

Fig. 1-2 Nameplate Description

Chapter II System Installation and Wiring

2.1 Peripheral system connection diagram

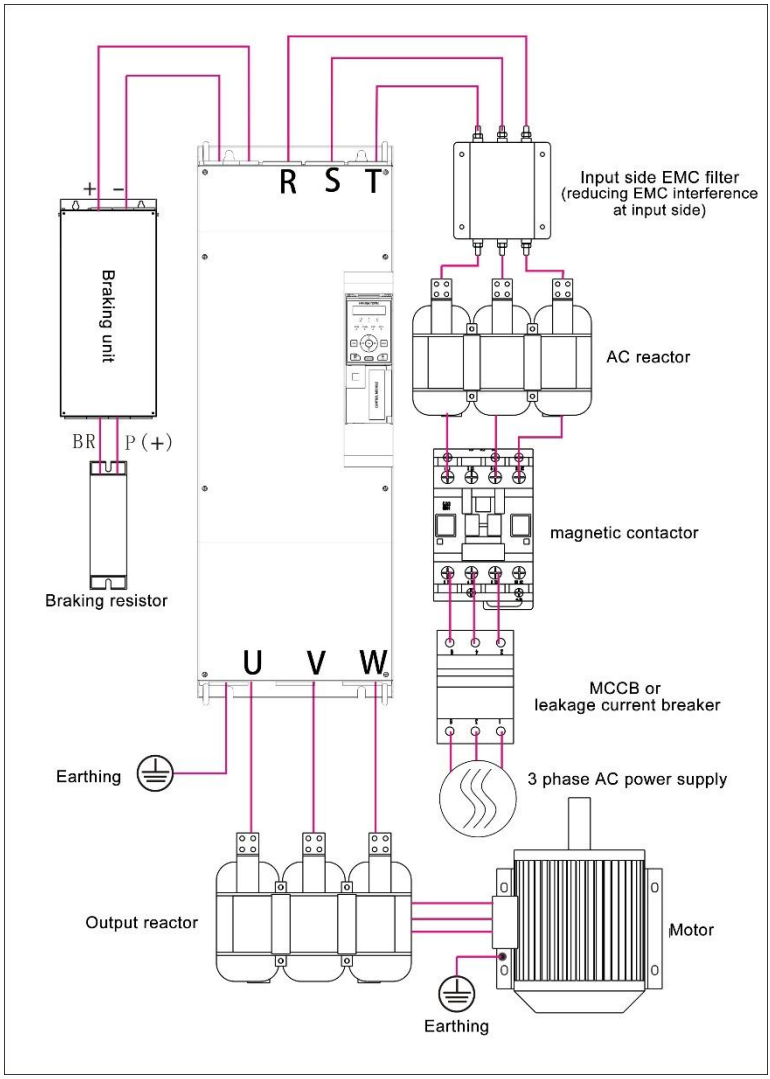


Fig. 2-1 Composition diagram with peripheral system

2.2 Installation

2.2.1 Installation environment

1) Environment temperature: the operating environment temperature has a great influence on the service life of the drive. The operating environment temperature of the variable frequency drive is not allowed to exceed the allowable temperature range (-10°C ~+50 °C).

2) The variable frequency drive is installed on the surface of the flame-retardant object, leaving enough heat dissipation space around. When the variable frequency drive works, it is easy to generate a large amount of heat. And it shall be vertically installed on the installation support base by screws.

3) The variable frequency drive is installed in a place that is not easy to vibrate. If it is installed in a vibrating place, it must ensure that the vibration is not more than 0.6g. Pay special attention to keep away from punching machines and other equipment.

4) The variable frequency drive shall be avoided being installed in places with direct sunlight, humidity and condensed water drops.

5) It is avoided being installed in corrosive, flammable and explosive air.

6) It is avoided being installed in occasions with oil stains and dust.

2.2.2 Installation space and direction

IMD_E series variable frequency drives have different installation spacing recommendation for different power ratings.

When installing the variable frequency drive, it shall be installed in a vertical and upward direction. It is forbidden to install it by lying down, lying on one's side, upside down and other installation methods that do not meet the installation requirements.

See the following figure for details:

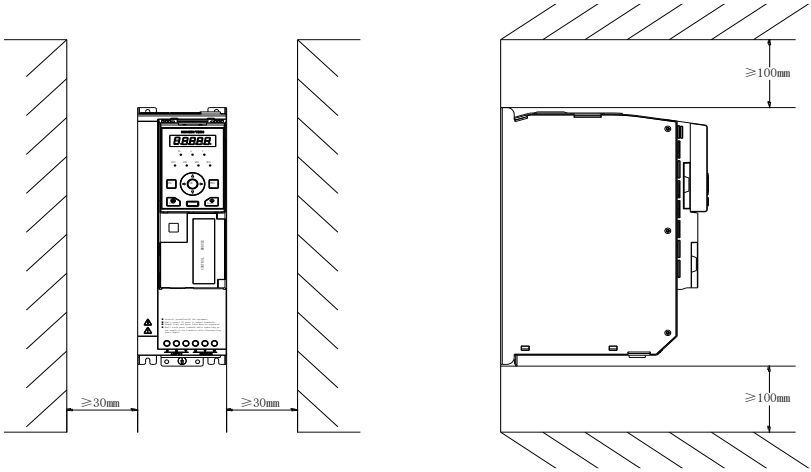


Figure 2-2 Installation direction and spacing requirement for IMD153U43E and below power ratings

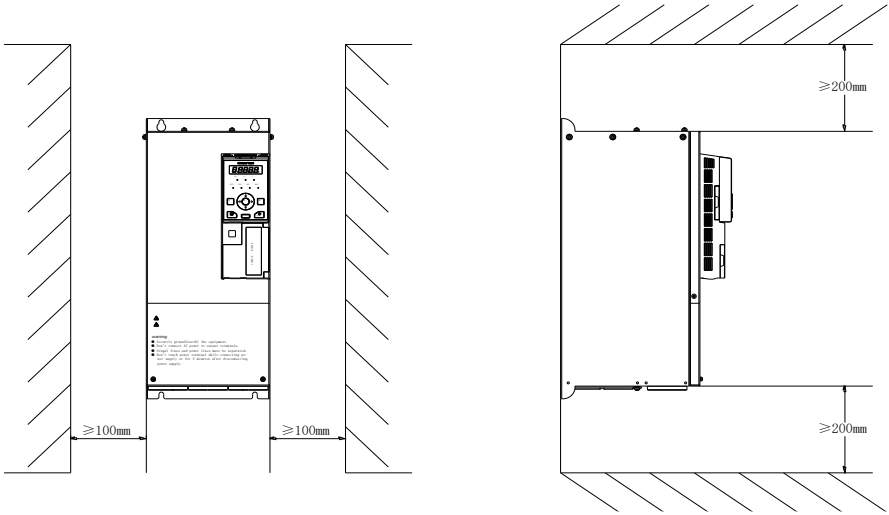


Figure 2-3 Installation direction and spacing requirement for IMD183U43E and above ratings

2.3 Wiring

2.3.1 Standard wiring diagram

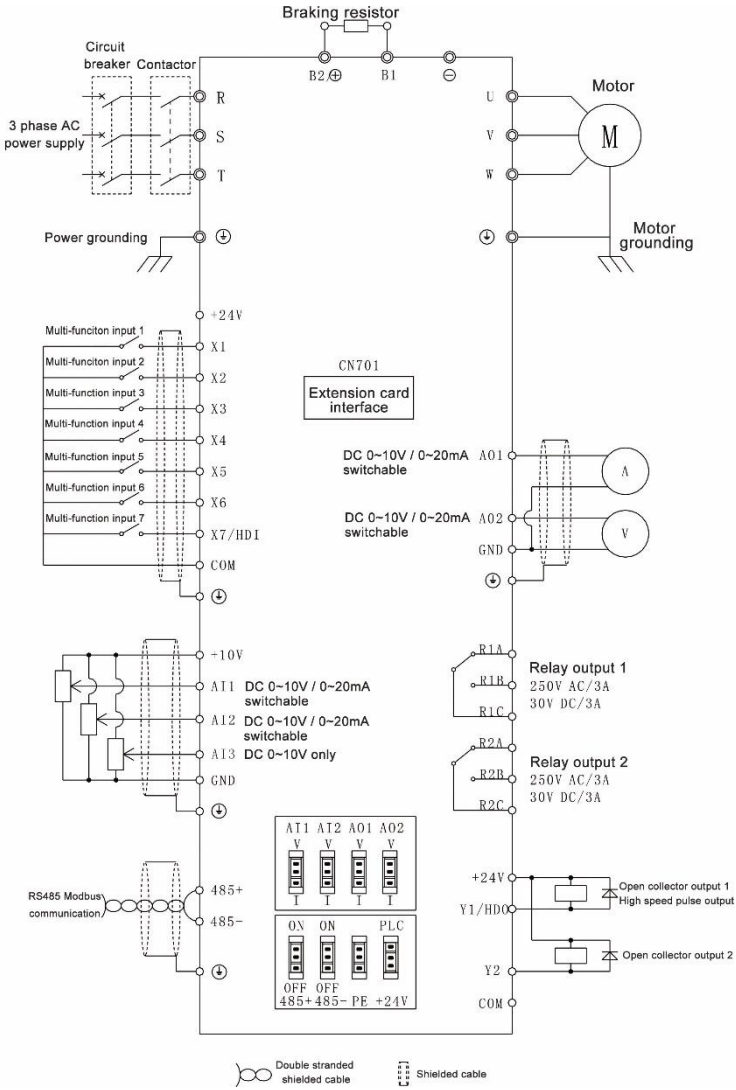
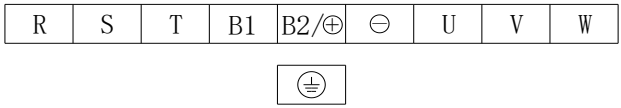


Figure 2-4 Standard Wiring Diagram

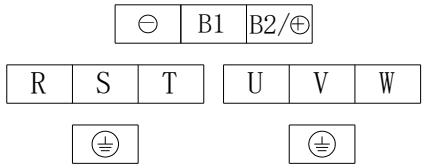
2.3.2 Main control circuit terminals function description

1) IMD152U43E～IMD552U43E



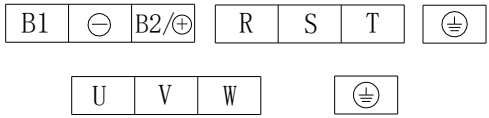
Terminal Marking	Terminal name and function description
R、S、T	Three- phase AC input terminal
B1、B2/⊕	Terminals for connecting brake resistor
B2/⊕、Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
U、V、W	Variable frequency drive output terminals
⏚	Grounding terminal

2) IMD752U43E～IMD303U43E



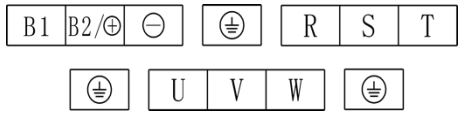
Terminal Marking	Terminal name and function description
B2/⊕、Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
B1、B2/⊕	Terminals for connecting brake resistor
R、S、T	Three- phase AC input terminals
U、V、W	Variable frequency drive output terminals
⏚	Grounding terminal

3) IMD373U43E～IMD453U43E



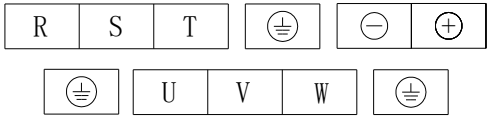
Terminal Marking	Terminal name and function description
R、S、T	Three- phase AC input terminals
U、V、W	Variable frequency drive output terminals
⏚	Grounding terminal
B2/⊕、Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
B1、B2/⊕	Terminals for connecting brake resistor

4) IMD553U43E～IMD134U43E



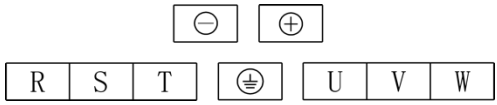
Terminal Marking	Terminal name and function description
B1、B2/⊕	Terminals for connecting brake resistor
B2/⊕、Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
⏚	Grounding terminal
R、S、T	Three- phase AC input terminals
U、V、W	Variable frequency drive output terminals

5) IMD164U43E～IMD204U43E



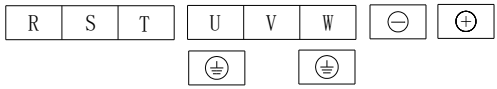
Terminal Marking	Terminal name and function description
R、S、T	Three- phase AC input terminals
U、V、W	Variable frequency drive output terminals
⊕, Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
⏚	Grounding terminal

6) IMD224U43E～IMD454U43E



Terminal Marking	Terminal name and function description
⊕、Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
R、S、T	Three-phase AC input terminals
U、V、W	Variable frequency drive output terminals
⏚	Grounding terminal

7) IMD504U43E～IMD714U43E



Terminal Marking	Terminal name and function description
⊕、Θ	Positive and negative terminals of DC bus; DC input terminals of external brake unit
R、S、T	Three-phase AC input terminals
U、V、W	Variable frequency drive output terminals
⏚	Grounding terminal

2.3.3 Terminal screw and wiring specifications

Table 2-1 Terminal Screw and Wiring Specifications

Drive Model	Power Terminals			Grounding Terminal		
	Screw	Fastening Torque (N.m)	Cable size (mm^2)	Screw	Fastening Torque (N.m)	Cable size (mm^2)
IMD152U43E IMD222U43E	M4	1.2～1.5	2.5	M3	0.5～0.6	2.5
IMD302U43E IMD402U43E	M4	1.2～1.5	4	M3	0.5～0.6	4
IMD552U43E	M5	2.5～3.0	4	M5	2.5～3.0	4
IMD752U43E	M5	2.5～3.0	6	M5	2.5～3.0	6

IMD113U43E	M5	2.5～3.0	6	M5	2.5～3.0	6
IMD153U43E	M5	2.5～3.0	6	M5	2.5～3.0	6
IMD183U43E	M6	4.0～5.0	10	M6	4.0～5.0	10
IMD223U43E	M6	4.0～5.0	16	M6	4.0～5.0	16
IMD303U43E	M6	4.0～5.0	25	M6	4.0～5.0	16
IMD373U43E	M8	9.0～10.0	25	M8	9.0～10.0	16
IMD453U43E	M8	9.0～10.0	35	M8	9.0～10.0	16
IMD553U43E	M8	9.0～10.0	50	M8	9.0～10.0	25
IMD753U43E	M10	17.6～22.5	60	M8	9.0～10.0	35
IMD903U43E	M10	17.6～22.5	70	M8	9.0～10.0	35
IMD114U43E	M10	17.6～22.5	100	M8	9.0～10.0	50
IMD134U43E	M10	17.6～22.5	120	M8	9.0～10.0	70
IMD164U43E	M12	31.4～39.2	150	M12	31.4～39.2	95
IMD184U43E	M12	31.4～39.2	150	M12	31.4～39.2	95
IMD204U43E	M12	31.4～39.2	185	M12	31.4～39.2	95
IMD224U43E	M12	31.4～39.2	185	M12	31.4～39.2	120
IMD254U43E	M12	31.4～39.2	120×2	M12	31.4～39.2	120
IMD284U43E	M12	31.4～39.2	150×2	M12	31.4～39.2	150
IMD314U43E	M12	31.4～39.2	185×2	M12	31.4～39.2	95×2
IMD354U43E	M12	31.4～39.2	240×2	M12	31.4～39.2	120×2
IMD404U43E	M12	31.4～39.2	240×2	M12	31.4～39.2	120×2
IMD454U43E	M12	31.4～39.2	300×2	M12	31.4～39.2	150×2
IMD504U43E	M12	31.4～39.2	300×2	M12	31.4～39.2	150×2

IMD564U43E	M12	31.4～39.2	400×2	M12	31.4～39.2	185×2
IMD634U43E	M12	31.4～39.2	400×2	M12	31.4～39.2	185×2
IMD714U43E	M12	31.4～39.2	400×2	M12	31.4～39.2	185×2

2.3.4 Main circuit wiring notice

1) Input power terminals R、S、T

- No phase sequence requirement for the input side wiring of the variable frequency drive.
- The specifications and installation methods of external power wiring shall conform to the requirements of local regulations and relevant IEC standards.
- For power cable wiring, please select copper wires with corresponding sizes according to the values in the recommendation table in chapter 2.3.3.

2) DC bus+,-

- Pay attention to the residual voltage at the terminals (+), (-) of the DC bus just after the power failure, and wait for the indicator lamp to turn off, and confirm to have 10 minutes waiting before wiring operation, otherwise there is a risk of electric shock.
- When selecting external brake unit for 160kW and above, pay attention to that the polarity of (+), (-) cannot be reversed, otherwise the variable frequency drive will be damaged or even fire disaster.
- Wiring length of brake unit shall not exceed 10m. Twisted pair or two-wire closed parallel wiring shall be used.
- Do not connect the brake resistor directly to the DC bus, and it may cause damage to the variable frequency drive or even fire disaster.

3) Brake resistor terminals B1, B2/+

- For models with 132kW or below, the brake resistor wiring terminal is valid only if the brake unit is confirmed inbuilt.
- The brake resistor selection shall be selected according to the recommended value and the wiring distance shall be less than 5m. Otherwise, the variable frequency drive may be damaged.

4) Variable frequency drive outputs U, V, W

- The specifications and installation methods of external power wiring shall comply with requirements of local regulations and relevant IEC standards.
- For power cable wiring, please select copper wires with corresponding sizes according to the values in the recommendation table in 2.3.3.
- Capacitors or surge absorbers shall not be connected to the output side of the variable frequency drive; otherwise the variable frequency drive will be frequently protected or even damaged.
- When the motor cable is too long, it is easy to generate electrical resonance due to the influence of distributed capacitance, so it could cause insulation damage of the motor or larger leakage current which triggers the variable frequency drive over-current protection. When the length of the motor cable is more than 100m, an AC output reactor must be installed near the variable frequency drive.

5) Grounding terminal

- Terminals must be reliably grounded and the resistance of grounding wire must be less than 10Ω. Otherwise, the equipment will work abnormally or even be damaged.
- Do not share the grounding terminal with the N terminal of the neutral line of the power supply.
- The impedance of the protective grounding conductor must meet the requirement of withstanding short-circuit large current in case of failure.
- The size of the protective grounding conductor shall be selected according to the following table.

The sectional area (S) of a phase cable	Minimum sectional Area (Sp) of protective conductors
$S \leqslant 16mm^2$	S
$16mm^2 < S \leqslant 35mm^2$	$16mm^2$
$35mm^2 < S$	S/2

2.3.5 Control Unit

1) Control unit layout

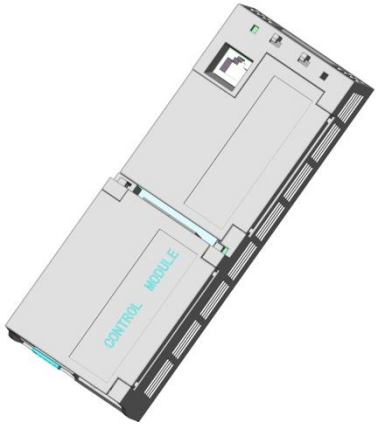


Figure 2-5 Control Module

2) Wiring description for control terminals

STO	COM	485+	485-

CN3 Layout from left to right

R1A	R1B	R1C	R2A	R2B	R2C	Y1/HDO	Y2

CN2 Layout from top to bottom

+10	AI1	AI2	AI3		GND	AO1	AO2	COM	COM	X1	X2	X3	X4	X5	X6	X7/HD1	+24V

CN1 Layout from top to bottom

Figure 2-6 Control Terminals Layout

Table 2-2 Control Terminals Function Description

Analog Input	+10V	AI reference voltage	10V ± 1%, internally isolated from COM
			The maximum output current is 20mA
	GND	Analog ground	Internally isolation from COM
	AI1/A12	Analog input 1/2	0~10V: input impedance22 kΩ
			0~20mA: input impedance 500Ω
			Switching between 0~10V and 0~20mA analog input by jumper setting, factory default is voltage input

	AI3	Analog input 3	0~10V: input impedance22 kΩ
Analog output	AO1/AO2	Analog output 1/2	0~10V: impedance requirement ≥ 10kΩ
			0~20mA: impedance requirement 200Ω~500Ω
			Switching between 0~10V and 0~20mA analog output by jumper setting, factory default is voltage output
	GND	Analog grounding	Internally isolated from COM
Digital Inputs	+24V	+24V	24V± 20%, internally isolated from GND
			Maximum load 200mA
	COM	+24V grounding	Internal isolation from GND
	X1～X7	Multi-function input terminal 1~7	Input specifications: 24VDC, 5mA
			Frequency range: 0~200Hz
			Voltage range: 24V±20%
	X7/HDI	Multi-function input /Pulse input	Multi-functions input: Same as X1~X7
			Pulse input: 0.1Hz~50kHz; Voltage range: 24V ±20%
Digital Outputs	Y1/HDO	open collector output/pulse output	Open collector output: 1. Voltage range: 0~24V; 2. Current range: 0~50mA
			Pulse output: 0~100.00kHz
	Y2	open collector output	Open collector output: 1. Voltage range: 0~24V; 2. Current range: 0~50mA
	COM	Open collector outputs common terminal	Internally isolated from GND
Relay1 output	R1A/R1B/R1C	Relay output 1	R1B— R1C: Normally opened
			R1A— R1C: Normally closed
			Contact capacity:250VAC/3A ,30VDC/3A
Relay2 output	R2A/R2B/R2C	Relay output 2	R2B— R2C: Normally opened
			R2A— R2C: Normally closed
			Contact capacity:250VAC/3A ,30VDC/3A
STO /485	STO	Safe Torque Off	If STO is activated when motor stands still, it prevents motor from start accidently.
			If STO is activated when motor is running, motor freewheels untill stop. And if motor has mechanical brake, the brake would closed immediately
	COM	STO COM	Internally isolated from GND

	485+	485 differential signal positive	Baud rate: 4800/9600/19200/38400/57600/115200bps The longest distance is 500m (adopting standard shielded twisted pair cable)
	485-	485 differential signal negative	
Extension interface	CN701	Port for expansion card	

3) Control loop cable selection

Table 2-3 Control loop cable specifications

Cable type	Cable specification (mm^2)
Shielded cable	0.5

4) Analog inputs and outputs usage instruction

Analog input and output voltage signals are particularly subjected to external interference, so shielded cables are generally used for transmission, and the wiring distance shall be as short as possible, and one end of the shielding layer closed to the variable frequency drive shall be well grounded, and the transmission distance shall not exceed 20 meters.

When wiring, the control cable shall keep a distance of more than 20cm from the main circuit and high-voltage lines (such as power cable, motor cable, relays and contactor cables), and avoid parallel placement with high-voltage lines. When crossing with high-voltage lines cannot be avoided, vertical wiring is recommended to prevent mis-operation of variable frequency drive caused by interference.

In some sites where analog input and output signals are seriously disturbed, filter capacitors or ferrite cores shall be installed on the analog signal source side.

5) Operating instructions for multi-functional input/out terminals

Multi-functional input and output signals are generally transmitted by shielded cables, and the wiring distance is as short as possible, and one end of the shielding layer closed to the variable frequency drive shall be well grounded, and the transmission distance is not more than 20m. When driving in active mode, necessary filtering measures shall be taken for crosstalk of power supply, and dry contact control mode is usually recommended.

When wiring, the control cable shall keep a distance of more than 20cm from the main circuit and high-voltage lines (such as power line, motor line, relay connection line and contactor connection line), and avoid parallel placement with high-voltage lines. When crossing with high-voltage lines cannot be avoided, vertical wiring is recommended to prevent mis-operation of variable frequency drive caused by interference.

Dry contact mode wiring method

When using internal power supply, the jumper switch(PLC-24V) short-circuit connection is shown in Figure 2-7.

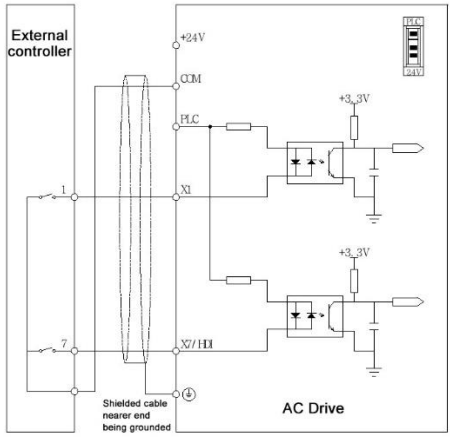


Figure 2-7 Dry contact mode using internal power supply

When using external power supply, the jumper switch(PLC-24V) short-circuit connection is shown in Figure 2-8.

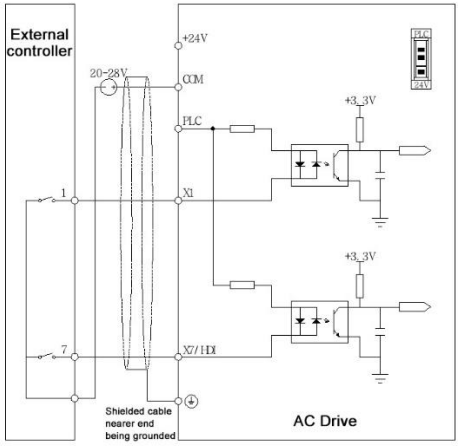


Figure 2-8 Dry contact mode using external power supply

Open collector NPN wiring method

When using internal power supply in open collector NPN mode, the jumper switch(PLC-24V) short-circuit connection is shown in Figure 2-9.

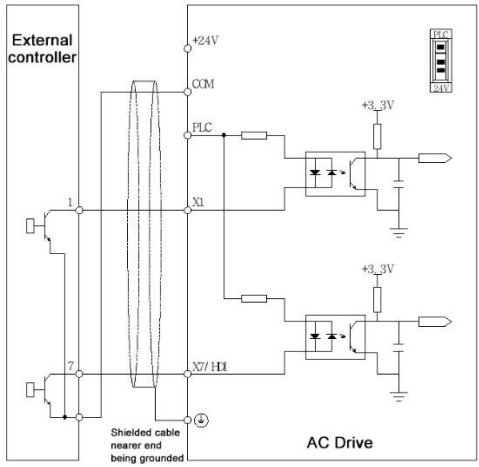


Figure 2-9 Open collector NPN mode using internal power supply

When using external power supply in open collector NPN mode, the jumper switch(PLC-24V) short-circuit connection is shown in Figure 2-10.

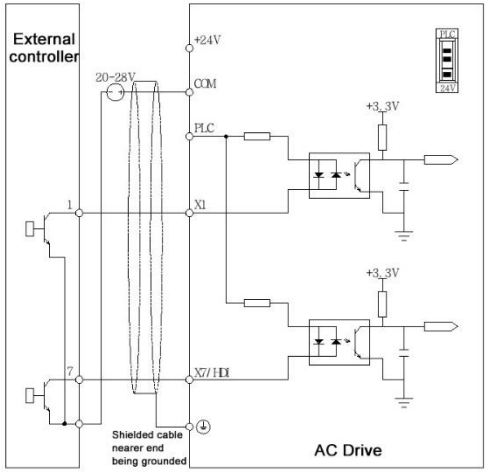


Figure 2-10 Open collector NPN mode using external power supply

Open collector PNP wiring method

When using internal power supply in open collector PNP mode, the jumper switch(PLC-24V) short-circuit connection is shown in Figure 2-11.

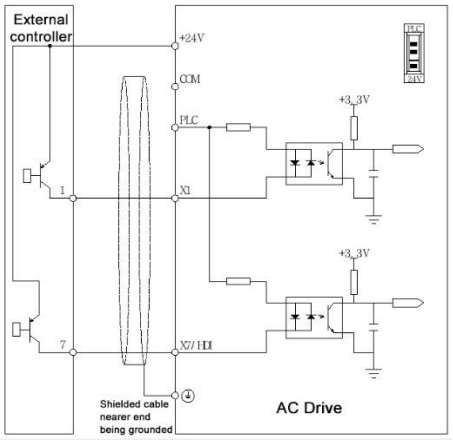


Figure 2-11 Open collector PNP mode using internal power supply

When using external power supply in open collector PNP mode, the jumper switch(PLC-24V) short-circuit connection is shown in Figure 2-12.

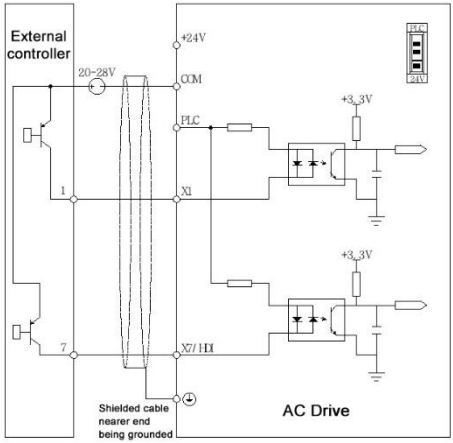


Figure 2-12 Open collector PNP mode using external power supply

Multifunction terminals wiring

Wiring of Y1/HDO and Y2 is shown in figures 2-13 and 2-14.

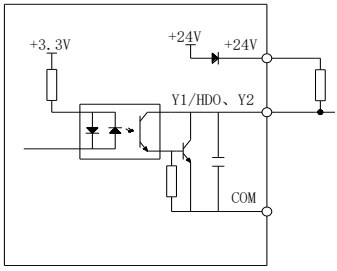


Fig. 2-13 Internal power supply adopted

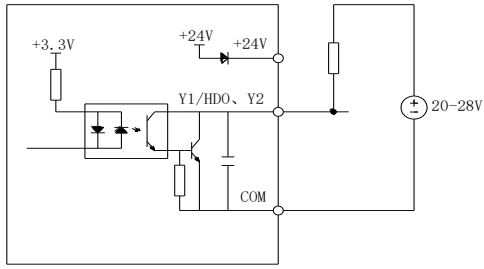


Fig. 2-14 External power supply adopted

When Y1/HDO and Y2 are used to activate the relay, wiring is shown in figures 2-15 and 2-16.

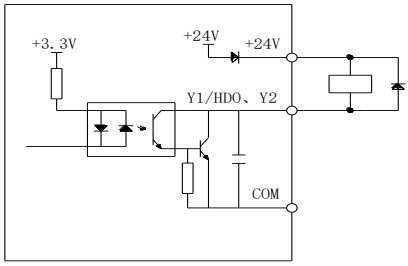


Fig. 2-15 Internal power supply adopted

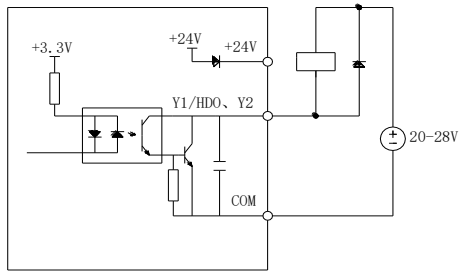


Fig. 2-16 External power supply adopted

Chapter III Operation Keypad and Trial Run

3.1 Operation keypad instruction

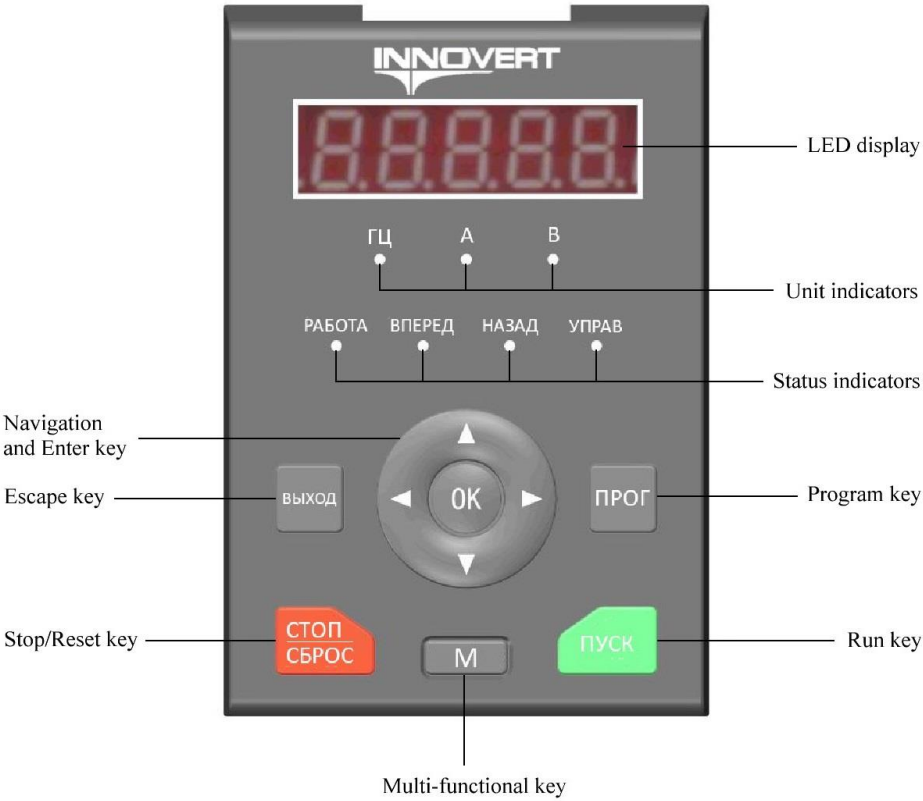


Fig. 3-1 Operation keypad drawing

3.1.1 Key function of operation keyboard

There are 10 keys on the operation keyboard of the variable frequency drive, and the function definition of each key is as shown in Table 3-1.

Table 3-1 Key Function Table of Operation Keyboard

Key	Key Description	Key Functions
PRG	Programming key	Entry of primary menu
ESC	Escape key /Enter level-1 menu	Return to the previous menu and enter of monitor menu
OK	Confirm Key	Parameter saving or Monitoring menu
▲	Increase key	1. Increase the number of the selected bit of function code 2. Increase the number of edited bit of parameter value 3. Increase the frequency reference digital setting value
▼	Decrease key	1. Decrease the number of the selected bit of function code 2. Decrease the number of edited bit of parameter value 3. Decrease the frequency reference digital setting value
◄	Left shift key	1. Left shift the selected digit of the function code 2. Left shift the edited digit of parameter value 3. Switch the displayed parameters of STOP/RUN state 4. Switch the fault state to parameter display state
►	Right shift key	1. Right shift the selected digit of the function code 2. Right shift the edited digit of parameter value 3. Switch the displayed parameters of STOP/RUN state 4. Switch the fault state to parameter display state
Start	Run key	Run the variable frequency inverter
Stop	Stop key	1. Stop running 2. Fault reset
Loc/Rem	Multifunction key	Refer to Table 3-2 Multifunction Loc/Rem key Function Definition for details

Table 3-2 Multifunction Loc/Rem key Function Definition

Loc/Rem Definition (P20.08)	Function	Function explanation
0	No function	Multi-function key invalid
1	RUN command modes switching	Keypad control → Terminal control → Communication control cycle switching
2	Jog forward	Jog in forward direction
3	Jog reversely	Jog in reverse direction
4	FWD/REV switching	Switch the motor running direction between Forward and Reverse

3.1.2 Description of operation keyboard indicator light

Table 3-3 Description of Indicator Light

Indicator		Name	Meaning
State indicators	MON	Run command mode indicating	On: keyboard control Off: terminal control Flash: communication control
	RUN	Running state indicating	On: running Off: in stop state
	FWD	Forward running	On: in the running state, the variable frequency drive runs in the forward direction.
	REV	Reverse running	On: in the running state, the variable frequency drive runs in the reverse direction.
Unit indicators	Hz	Frequency indication	On: the current displayed parameter is frequency
	A	Current indication	On: the current displayed parameter is current
	V	Voltage indication	On: the current displayed parameter is voltage
	Hz+A	Rotary speed indication	On: the current displayed parameter is rotate speed
	A+V	Percentage indication	On: the current displayed parameter is percentage
	Hz+V	Power indication	On: the current displayed parameter is power
	Hz+V+A	Time indication	On: the current displayed parameter is time
		Dimensionless indication	Off: the current displayed parameter is dimensionless quantity

3.1.3 Examples of keyboard operation

1. For example, the setting value of function parameter P00.00 is changed from 50.00Hz to 40.00Hz, as shown in Figure 3- 2.

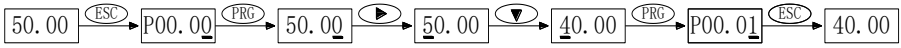


Figure 3-2 Functional Parameter Setting

2. Long pressing "►" for 3 seconds, the keyboard enters the non-factory-default value menu mode for viewing the parameters which have been modified by the user.

3. When the parameter has set keypad lock function, press "ESC+▲" together at the same time will lock the keys on keypad. And the keypad would display "Lock".

4. Press “ESC+▼” together at the same time would unlock the keypad keys, and the keypad display “ULock”

3.2 Basic Operation and Trial Operation

3.2.1 Motor parameters learning(tuning)

After power up the variable frequency drive, firstly set P63 group parameters of the drive according to the actual nameplate specifications of the motor, then choose the appropriate tuning mode according to the working conditions by setting the correspond value to P63.07, and press the "Start" key to do tuning of motor parameters. See Figure 3-3 for the specific flow of procedures:

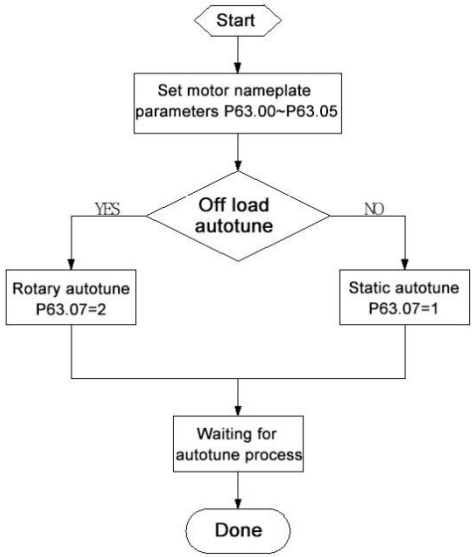


Figure 3-3 Motor self-tuning procedures

3.2.2 Motor control mode selection

Function code	Detailed description	Application
P63.08: Motor control	0: advanced scalar control	It is suitable for occasions where the load has lower control requirements or occasions where one variable frequency drive control multiple motors, such as fan and water pump

mode		loads.
	1: Sensor-less vector control (SVC)	It is suitable for general high performance control occasions such as lathe, wire-drawing machines where high torque output is required. One drive could only control one motor
	2: Closed-loop vector control (VC)	Motor encoder should be added to use this control mode. It is suitable for occasions where high precision speed control or torque control is required such as lifting, slitting machine, and rolling etc. One drive could only drive one motor.

3.2.3 Start and stop commands and modes

1) Start and stop command sources

Function code	Setting range	Application description
P01.00: Run command source selection	0: Keyboard command mode	Control the start and stop of the drive by pressing the "start" and "stop" keys on the keyboard.
	1: Terminal command mode	Control the start and stop of the variable frequency drive by setting the multi-functional input X terminal as FWD, REV, FJOG and RJOG command.
	2: Communication command mode	Control the start and stop of the drive by communication with the upper controller.
	3: Multi-step command mode	The multi-functional input X terminals are set as multi-step frequency command to directly control Pthe start and stop of the variable frequency drive .

2) Start and stop mode selection

Function code	Setting range	Application description
P01.05 Start mode selection	0: start from starting frequency	The inverter starts to run from the frequency set in P01.06, holds this frequency for a period of time set in P01.07, and then starts to speed up by acceleration time to the frequency reference setting for constant speed operation. However, when P01.09 is set to non-0, the drive performs start-stage DC brake firstly, and then start from frequency set in P01.06.
	1: Start with speed tracking /Flying start (realized by	After receiving the start command, the variable frequency drive starts to search for the actual speed of the motor, then starts to run from the

Function code	Setting range	Application description
	software)	searched speed, and judges whether the searched speed is greater than or less than the set frequency so as to speed down or accelerate.
	2: Start with speed tracking /Flying start (realized by hardware)	This start mode requires to add a flying start expansion card. Once receive the start command, the variable frequency drive starts to search for the actual speed of the motor, then starts to run from the searched speed, and judges whether the searched speed is greater than or less than the set frequency so as to speed down or accelerate.
P01.10 Stop mode selection	0: Stop by deceleration	Once the variable frequency drive receives the stop command, it starts to slow down; when the speed is reduced to the stop-stage DC brake activation frequency set in P01.11 and when P01.13 is set to non-0, it performs the stop-stage DC brake; otherwise it continues to slow down until the output frequency of the variable frequency drive is 0 and the stop process is completed.
	1: freewheeled stop	When the variable frequency drive receives the stop command, it immediately blocks the output of the drive, and the motor has freewheeled stop mode.

3.2.4 Frequency reference source selection

1) Frequency main reference setting

Function code	Frequency main reference setting		Factory default	0
P00.01	Setting range	0	Digital setting (P00.00) + terminal Up/Down or keyboard ▲/▼ up/down	
		1	Analog input AI1	
		2	Analog input AI2	
		3	Analog input AI3	
		4	Min[AI1,AI2]	
		5	Max[AI1,AI2]	

		6	Sub[AI1,AI2]
		7	Add[AI1,AI2]
		8	Pulse setting by HDI
		9	Process control PID
		A	Simple PLC
		B	Keyboard potentiometer
		C	No setting

2) Frequency auxiliary reference setting

Function code	Auxiliary frequency reference setting		Factory default	0
P00.03	Setting range	0	Digital setting (P00.02)	
		1	Analog input AI1	
		2	Analog input AI2	
		3	Analog input AI3	
		4	Min[AI1,AI2]	
		5	Max[AI1,AI2]	
		6	Sub[AI1,AI2]	
		7	Add[AI1,AI2]	
		8	Pulse setting by HDI	
		9	Reserved	
		A	Reserved	
		B	No setting	

Chapter IV Parameter Table

Parameter Flag description:

○: indicate that the parameter can be modified during running

●: Indicate that the parameter cannot be modified during running and can be modified during STOP.

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

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

Parameter	Description	Setting Range	Default	Register	Flag
P00 Frequency reference setting parameters					
P00.00	Main frequency reference digital setting	0.00Hz ~ Frequency upper limit	50.00Hz	0x0000	○
P00.01	Main frequency reference source selection	0: digital setting (P00.00) +Up/Down adjustment 1: analog input AI1 2: analog input AI2 3: Reserved 4: Min [AI1, AI2] 5: Max [AI1, AI2] 6: Sub [AI1, AI2] 7: Add [AI1, AI2] 8: pulse setting by HDI 9: process PID A: simple PLC B: keyboard potentiometer C: no setting	0	0x0001	○
P00.02	Auxiliary frequency reference digital setting	0.00Hz ~ Frequency upper limit	50.00Hz	0x0002	○

Parameter	Description	Setting Range	Default	Register	Flag
P00.03	Auxiliary frequency reference source selection	0: digital setting (P00.02) 1: analog input AI1 2: analog input AI2 3: analog input AI3 4: Min [AI1, AI2] 5: Max [AI1, AI2] 6: Sub [AI1, AI2] 7: Add [AI1, AI2] 8: Pulse setting by HDI 9: Reserved A: Reserved B: No setting	B	0x0003	○
P00.04	Main frequency reference coefficient	0.0%～200.0%	100.0%	0x0004	○
P00.05	Auxiliary frequency reference coefficient	0.0%～200.0%	100.0%	0x0005	○
P00.06	Main and auxiliary frequency reference combination selection	**Ones place:** Frequency reference mode selection 0: Main frequency reference 1: Main and auxiliary frequency setting calculation result 2: Switching between main reference setting and auxiliary reference setting 3: Switching between main frequency setting and the calculation result of main and auxiliary frequency setting 4: Switching between auxiliary frequency setting and the calculation result of main and auxiliary frequency setting **Tens place:** Calculation method of main and auxiliary frequency setting	00	0x0006	○

Parameter	Description	Setting Range	Default	Register	Flag
		0: Min [main, auxiliary] 1: Max [main, auxiliary] 2: Sub [main, auxiliary] 3: Add [main, auxiliary]			
P00.07	Max. frequency	10.00Hz～300.00Hz	50.00Hz	0x0007	●
P00.08	Frequency upper limit	Freq. lower limit~Max. frequency	50.00Hz	0x0008	●
P00.09	Frequency lower limit	0.00Hz~ Freq. upper limit	0.00Hz	0x0009	●
P00.10	Frequency jumping point 1	0.00Hz ~ Freq. upper limit	0.00Hz	0x000A	●
P00.11	Jumping range 1	0.00Hz ~ 30.00Hz	0.00Hz	0x000B	●
P00.12	Frequency jumping point 2	0.00Hz ~ Freq. upper limit	0.00Hz	0x000C	●
P00.13	Jumping range 2	0.00Hz ~30.00Hz	0.00Hz	0x000D	●
P00.14	Frequency jumping point 3	0.00Hz ~ Freq. upper limit	0.00Hz	0x000E	●
P00.15	Jumping range 3	0.00Hz ~ 30.00Hz	0.00Hz	0x000F	●
P00.16	Jog frequency setting	0.00Hz ~ Freq. upper limit	5.00Hz	0x0010	●
P01 Start and Stop Control Parameters					
P01.00	Run command source selection	0: Keypad command mode 1: Terminal command mode 2: Communication command mode 3: Multi-step command mode	0	0x0100	○
P01.01	Run command source bonds with frequency reference setting	**Ones place:** Frequency reference setting bonded to Keypad run command mode **Tens palce:** Frequency reference setting bonded to Terminal run command mode **Hundreds place:** Frequency reference setting bonded to Communication run command mode 0: digital setting (P00.00) +Up/Down adjustment	BBB	0x0101	●

Parameter	Description	Setting Range	Default	Register	Flag
		1: analog input AI1 2: analog input AI2 3: analog input AI3 4: Min [AI1, AI2] 5: Max [AI1, AI2] 6: Sub [AI1, AI2] 7: Add [AI1, AI2] 8: pulse setting by HDI 9: process PID A: simple PLC B: no bonding			
P01.02	Running direction selection	0: Forward 1: Reverse	0	0x0102	●
P01.03	Reverse running control selection	0: Reverse allowed 1: Reverse forbidden	0	0x0103	●
P01.04	FWD/REV rotation dead-zone	0.0s ~ 3600.0s	0.0s	0x0104	●
P01.05	Start mode selection	0: start from starting frequency 1: Flying start (Software) 2: Flying start (Hardware)	0	0x0105	●
P01.06	Starting frequency	0.00Hz ~ frequency upper limit	0.50Hz	0x0106	●
P01.07	Starting frequency holding time	0.0s~3600.0s	0.0s	0x0107	●
P01.08	Start stage DC brake current /pre-excitation current	0.0%~100.0%	50.0%	0x0108	●
P01.09	Start stage DC brake time /pre-excitation time	0.00s~30.00s 0.00s means start-stage DC brake function invalid	0.00s	0x0109	●
P01.10	Stop mode	0: Stop by deceleration 1: Freewheeled stop	0	0x010A	●
P01.11	Stop stage DC brake activation frequency	0.00Hz~ Freq. upper limit	0.50Hz	0x010B	●

Parameter	Description	Setting Range	Default	Register	Flag
P01.12	Stop stage DC brake current	0.0%~100.0%	50.0%	0x010C	●
P01.13	Stop stage DC brake time	0.00s~30.00s 0.00s means stop stage DC brake function invalid	0.00s	0x010D	●
P02 Acceleration(Acc.) and Deceleration(Dec.) Parameters					
P02.00	Acc. time 1	0.1s~6000.0s	Depends on model	0x0200	○
P02.01	Dec. time 1	0.1s~6000.0s	Depends on model	0x0201	○
P02.02	Acc. time 2	0.1s~6000.0s	Depends on model	0x0202	○
P02.03	Dec. time 2	0.1s~6000.0s	Depends on model	0x0203	○
P02.04	Acc. time 3	0.1s~6000.0s	Depends on model	0x0204	○
P02.05	Dec. time 3	0.1s~6000.0s	Depends on model	0x0205	○
P02.06	Acc. time 4	0.1s~6000.0s	Depends on model	0x0206	○
P02.07	Dec. time 4	0.1s~6000.0s	Depends on model	0x0207	○
P02.08	Emergency stop Dec. time	0.1s~6000.0s	Depends on model	0x0208	●
P02.09	Jog Acc. time	0.1s~6000.0s	Depends on model	0x0209	●
P02.10	Jog Dec. time	0.1s~6000.0s	Depends on model	0x020A	●
P02.11	Polyline Acc. time switching frequency	0.00Hz~ Freq. upper limit	0.00Hz	0x020B	●
P02.12	Polyline Dec. time switching frequency	0.00Hz~ Freq. upper limit	0.00Hz	0x020C	●
P02.13	Acc./Dec. curve selection	0～1	0	0x020D	●
P02.14	Acc. curve starting slope	0%～200%	50%	0x020E	●
P02.15	Acc. curve ending slope	0%～200%	50%	0x020F	●

Parameter	Description	Setting Range	Default	Register	Flag
P02.16	Acc. middle slope	0%～200%	0%	0x0210	●
P02.17	Dec. curve starting slope	0%～200%	50%	0x0211	●
P02.18	Dec. curve ending slope	0%～200%	50%	0x0212	●
P02.19	Dec. middle slope	0%～200%	0%	0x0213	●
P03 Vector Control Parameters					
P03.00	Speed/Torque control selection	**Ones place:** Vector control selection 0: speed control 1: torque control **Tens place:** Generative power limit 0: invalid 1: full time limit 2: constant speed limit 3: deceleration limit	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	P03.05~ Freq. upper limit	10.00Hz	0x0306	○

Parameter	Description	Setting Range	Default	Register	Flag
	frequency 2				
P03.07	Speed feedback filtering time	0.0ms～1000.0ms	15.0ms	0x0307	○
P03.08	Motoring torque channel selection	**Ones place:** torque control channel selection **Tens place:** speed control motoring torque upper limit 0: digital setting P03.09 1: analog input AI1 2: analog input AI2 3: analog input AI3 4: Min [AI1, AI2] 5: Max [AI1, AI2] 6: Sub [AI1, AI2] 7: Add [AI1, AI2] 8: pulse setting by HDI 9: maximum value of variable frequency drive	90	0x0308	●
P03.09	Motoring torque digital setting	-200.0%～200.0%	150.0%	0x0309	○
P03.10	Generating torque channel selection	**Ones place:** torque control channel selection **Tens place:** speed control generating torque upper limit 0: digital setting P03.11 1: analog input AI1 2: analog input AI2 3: analog input AI3 4: Min [AI1, AI2] 5: Max [AI1, AI2] 6: Sub [AI1, AI2] 7: Add [AI1, AI2] 8: pulse setting by HDI 9: maximum value of variable frequency drive	99	0x030A	●
P03.11	Generating torque digital setting	-200.0%～200.0%	150.0%	0x030B	○

Parameter	Description	Setting Range	Default	Register	Flag
P03.12	Torque control frequency limiting channel	**Ones place:** frequency forward limit channel **Tens place:** frequency reverse limit channel 0: digital setting P03.13 /P03.14 1: analog input AI1 2: analog input AI2 3: analog input AI3 4: Min [AI1, AI2] 5: Max [AI1, AI2] 6: Sub [AI1, AI2] 7: Add [AI1, AI2] 8: pulse setting by HDI	00	0x030C	●
P03.13	Torque control frequency forward limit digital setting	0.00Hz~Max. frequency	50.00Hz	0x030D	○
P03.14	Torque control frequency reverse limit digital setting	0.00Hz~Max. frequency	50.00Hz	0x030E	○
P03.15	Torque control frequency limit increment	0.00Hz~Max. frequency	0.00Hz	0x030F	○
P03.16	Proportional gain of excitation current tuning	0~60000	2000	0x0310	○
P03.17	Integral gain of excitation current tuning	0~60000	1000	0x0311	○
P03.18	Proportional gain of torque current tuning	0~60000	2000	0x0312	○
P03.19	Integral gain of torque current tuning	0~60000	1000	0x0313	○
P03.20	Driving torque rising filter time	0.0s~6000.0s	0.3s	0x0314	○

Parameter	Description	Setting Range	Default	Register	Flag
P03.21	Driving torque descending filter time	0.0s~6000.0s	0.3s	0x0315	○
P03.22	Torque limitation coefficient in weak magnetic area	0.0%~200.0%	100.0%	0x0316	○
P03.23	Power limitation coefficient in generating area	0.0%~200.0%	100.0%	0x0317	○
P03.24	Frequnecy deviaton of torque control	0.00Hz~10.00Hz	0.00Hz	0x0318	○
P03.25	Current loop parameters adjustment	0x0000~0xFFFF	0x0000	0x0319	○
P04 Scalar Control Parameters					
P04.00	V/F curve setting	0: straight line V/F 1: multi-segment V/F 2: 1.2 power 3: 1.4 power 4: 1.6 power 5: 1.8 power 6: 2.0 power 7: V/F separation	0	0x0400	●
P04.01	V/F frequency F0	0.00Hz~P04.03	0.00Hz	0x0401	●
P04.02	V/F voltage V0	0.0%~P04.04	0.0%	0x0402	●
P04.03	V/F frequency F1	P04.01~P04.05	0.00Hz	0x0403	●
P04.04	V/F voltage V1	P04.02~P04.06	0.0%	0x0404	●
P04.05	V/F frequency F2	P04.03~P04.07	0.00Hz	0x0405	●
P04.06	V/F voltage V2	P04.04~P04.08	0.0%	0x0406	●
P04.07	V/F frequency F3	P04.05~P63.03	50.00Hz	0x0407	●
P04.08	V/F voltage V3	P04.06~100.0%	100.0%	0x0408	●
P04.09	Torque boost	0.0%~30.0% 0.0%: Automatic torque boost	0.0%	0x0409	○
P04.10	Droop control volume	0.00Hz~10.00Hz	0.00Hz	0x040A	●
P04.11	V/F oscillation	0~1024	160	0x040B	○

Parameter	Description	Setting Range	Default	Register	Flag
	suppression gain 1				
P04.12	V/F oscillation suppression gain 2	0~1024	160	0x040C	○
P04.13	V/F separation mode voltage reference channel	0: P04.14 digital setting 1: analog input AI1 2: analog input AI2 3: analog input AI3 4: process PID output 5: process PID output +AI1	0	0x040D	●
P04.14	V/F separation voltage digital setting	0.0%~100.0%	0.0%	0x040E	○
P04.15	V/F separation voltage slope time	0.00s~600.00s	0.01s	0x040F	○
P10 Digital input terminal X					
P10.00	X1 function selection	00: no function 01: Forward running (FWD) 02: Reverse running (REV) 03: Forward jogging (FJOG) 04: Reverse jogging (RJOG) 05: 3-wire running 06: Freewheeled stop 07: Emergency stop 08: External stop 09: Run forbidden 10: Run pause 11: External fault input 12: Fault reset (RESET) 13: Terminal Up 14: Terminal Down 15: Up/Down clearance (Terminal, keypad) 16: Multi-step terminal 1 17: Multi-step terminal 2 18: Multi-step terminal 3 19: Multi-step terminal 4 20: Acc./Dec. time seletion 1 21: Acc./Dec. time seletion 2	1	0x1000	●
P10.01	X2 function selection		2	0x1001	●
P10.02	X3 function selection		16	0x1002	●
P10.03	X4 function selection		17	0x1003	●
P10.04	X5 function selection		18	0x1004	●
P10.05	X6 function selection		0	0x1005	●
P10.06	X7/HDI function selection		0	0x1006	●
P10.08	AI1 function selection		0	0x1008	●
P10.09	AI2 function selection		0	0x1009	●
P10.10	AI3 function selection				

Parameter	Description	Setting Range	Default	Register	Flag
		22: Acc./Dec. forbbiden 23: Switching to Keypad control command 24: Switching to terminal control command 25: Switching to communication control command 26: Frequency reference source switching (P00.06 ones place) 27: Main frequency reference switch to frequency digital setting 28: Auxiliary frequency reference switch to frequency digital setting 29: Stop stage DC brake+ Stop command 30: Stop stage DC brake 31: DC brake during running 32: Pulse input (X7/HDI workable for high speed) 33: Count input 34: Count clearance 35: Length counting 36: Length clearance 37: PID reaction direction 38: PID parameters switching 39: PID operation pause 40: PID integration pause 41: PLC memory clearance 42: PLC running disabled 43: PLC running pause 44~45: Reserved 46: Speed/Torque control switch 47: Torque control forbidden			
P10.11	Terminal control run mode selection	0: two-wire run mode 1 1: two-wire run mode 2 2: Three-wire run mode 1 3: three-wire run mode 2	0	0x100B	●

Parameter	Description	Setting Range	Default	Register	Flag
P10.12	Input terminal action logic setting	**Ones place:** Bit0~Bit3: X1~X4 **Tens place:** Bit4~Bit6: X5~X7 **Hundreds place:** Bit8~Bit9: AI1~AI2 0: Positive logic 1: Negative logic	000	0x100C	●
P10.13	Input terminal filtering time	0.000s~2.000s	0.010s	0x100D	○
P10.14	X1 conduction delay	0.0s～3600.0s	0.0s	0x100E	○
P10.15	X1 disconnection delay	0.0s～3600.0s	0.0s	0x100F	○
P10.16	X2 conduction delay	0.0s～3600.0s	0.0s	0x1010	○
P10.17	X2 disconnection delay	0.0s～3600.0s	0.0s	0x1011	○
P10.18	Terminal detection mode	**Ones place:** Bit0~Bit3: X1~X4 **Tens place:** Bit4~Bit6: X5~X7 **Hundreds place:** Bit8~Bit9: AI1~AI2 0: Electric level effective 1: Rising edge effective	000	0x1012	●
P10.19	Virtual terminal input enabling	0x000～0x7FF	0x000	0x1013	○
P10.20	Virtual terminal input setting	0x000～0x7FF	0x000	0x1014	○
P11 Digital Y/R output					
P11.00	Y1 function selection	00: No output function 01: Running 02: Running forward 03: Running in reverse 04: Inverter ready to work	0	0x1100	●
P11.01	Y2 function selection		0	0x1101	●
P11.02	R1 relay function selection		19	0x1102	●

Parameter	Description	Setting Range	Default	Register	Flag
P11.03	R2 relay function selection	05: Zero frequency running (Stop state ON) 06: Zero frequency running (Stop state OFF) 07: Frequency arrival (FAR) 08: Frequency detection FDT1 09: Frequency detection FDT2 10: Frequency uppper limitation 11: Frequency lower limitation 12: Torque limitation 13: Speed limitation 14: X1 terminal state 15: X2 terminal state 16: Zero current detection 17: Inverter DC braking 18: Inverter under-voltage 19: Inverter fault output 20: Inverter alarm output 21: Inverter overload alarm 22: Inverter overheat alarm 23: Motor overload alarm 24: Motor overheat alarm 25: PLC cycle completed 26: PLC stage completed 27: Reserved 28: Total power-on time arrival 29: Total running time arrival 30: Preset count number arrival 31: Specified count number arrival 32: Preset length arrival 33: Reserved	0	0x1103	●
P11.04	Y1 output connection delay	0.0s～3600.0s	0.0s	0x1104	○
P11.05	Y1 output disconnection delay	0.0s～3600.0s	0.0s	0x1105	○
P11.06	Y2 output connection delay	0.0s～3600.0s	0.0s	0x1106	○
P11.07	Y2 output disconnection delay	0.0s～3600.0s	0.0s	0x1107	○

Parameter	Description	Setting Range	Default	Register	Flag
P11.08	R1 output connection delay	0.0s～3600.0s	0.0s	0x1108	○
P11.09	R1 output disconnection delay	0.0s～3600.0s	0.0s	0x1109	○
P11.10	R2 output connection delay	0.0s～3600.0s	0.0s	0x110A	○
P11.11	R2 output disconnection delay	0.0s～3600.0s	0.0s	0x110B	○
P11.12	Output terminal action logic setting	Bit0: Y1/HDO Bit1: Y2 Bit2: R1 Bit3: R2 Bit4: Reserved 0: Positive logic 1: Negative logic	00	0x110C	○
P11.13	FDT1 detection mode	0: Detect by running freq. 1: Detect by output frequency	0	0x110D	○
P11.14	FDT1 upper limit	P11.15~ Max. Frequency	2.50Hz	0x110E	○
P11.15	FDT1 lower limit	0.00Hz~P11.14	2.00Hz	0x110F	○
P11.16	FDT2 detection mode	0: Detect by running freq. 1: Detect by output frequency	0	0x1110	○
P11.17	FDT2 upper limit	P11.15~ Max. Frequency	2.50Hz	0x1111	○
P11.18	FDT2 lower limit	0.00Hz~P11.17	2.00Hz	0x1112	○
P11.19	Frequency arrival (FAR) detection width	0.00Hz~ Max. Frequency	2.50Hz	0x1113	○
P11.20	Zero frequency detection value	0.00Hz~ Max. Frequency	0.50Hz	0x1114	○
P11.21	Zero frequency hysteresis	0.00Hz~ Max. 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	○

Parameter	Description	Setting Range	Default	Register	Flag
P12 Analog AI and High Speed Pulse HDI Input					
P12.00	AI analog curve selection	**Ones place**:AI1 characteristic curve selection **Tens place**: AI2 characteristic curve selection **Hundreds place:** AI3 characteristic curve selection 0: No curve correction 1: curve 1 (2 points) 2: curve 2 (4 points) 3: curve 3 (4 points)	000	0x1200	●
P12.01	Curve1 Max. input voltage	Minimum input (P12.03)~10.00V	10.00V	0x1201	○
P12.02	Curve1 Max. input relative level value	-100.0%~100.0%	100.0%	0x1202	○
P12.03	Curve1 Min. input voltage	-10.00V~ Maximum input (P12.01)	0.00V	0x1203	○
P12.04	Curve1 Min. input relative level value	-100.0%~100.0%	0.0%	0x1204	○
P12.05	Curve2 Max. input voltage	Inflection point 2 input (P12.07) ~10.00V	10.00V	0x1205	○
P12.06	Curve2 Max. input relative level value	-100.0%~100.0%	100.0%	0x1206	○
P12.07	Curve2 Inflection point 2 input	Inflection point 1 input (P12.09)~ Maximum input (P12.05)	0.00V	0x1207	○
P12.08	Curve2 inflection point2 input relative level value	-100.0%~100.0%	0.0%	0x1208	○
P12.09	Curve2 Inflection point 1 input	Minimum input (P12.11) ~ inflection point2 input (P12.07)	0.00V	0x1209	○
P12.10	Curve2 Inflection point1 input relative level value	-100.0%~100.0%	0.0%	0x120A	○
P12.11	Curve2 Min.	-10.00V~ inflection point1 input (P12.09)	0.00V	0x120B	○

Parameter	Description	Setting Range	Default	Register	Flag
	input voltage				
P12.12	Curve2 Min. input relative level value	-100.0%~100.0%	0.0%	0x120C	○
P12.13	Curve3 Max. input voltage	Inflection point2 input (P12.15) ~10.00V	10.00V	0x120D	○
P12.14	Curve3 Max. input relative level value	-100.0%~100.0%	100.0%	0x120E	○
P12.15	Curve3 Inflection point 2 input	Inflection point1 (P12.17)~ Max. input (P12.13)	0.00V	0x120F	○
P12.16	Curve3 Inflection point2 input relative level value	-100.0%~100.0%	0.0%	0x1210	○
P12.17	Curve3 Inflection point 1 input	Min. input (P12.19)~ inflection point2 input (P12.15)	0.00V	0x1211	○
P12.18	Curve3 Inflection point1 input relative level value	-100.0%～100.0%	0.0%	0x1212	○
P12.19	Curve 3 Min. input voltage	-10.00V~ inflection point1 input (P12.17)	0.00V	0x1213	○
P12.20	Curve 3 Min. input relative level value	-100.0%～100.0%	0.0%	0x1214	○
P12.21	AI1 input offset	-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 offset	-100.0%～100.0%	0.0%	0x1218	○
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	○
P12.27	AI3 input offset	-100.0%～100.0%	0.0%	0x121B	○
P12.28	AI3 input gain	-2.000～2.000	1.000	0x121C	○
P12.29	AI3 input filtering time	0.000s～10.000s	0.050s	0x121D	○

Parameter	Description	Setting Range	Default	Register	Flag
P12.33	HDI Max. input frequency	P12.35～100.00kHz	10.00kHz	0x1221	○
P12.34	HDI Max. input corresponding level value	-100.0%～100.0%	100.0%	0x1222	○
P12.35	HDI Min. input frequency	0.00kHz～P12.33	0.00kHz	0x1223	○
P12.36	HDI Min. input corresponding level value	-100.0%～100.0%	0.0%	0x1224	○
P12.37	HDI input filtering time	0.000s～1.000s	0.001s	0x1225	○
P13 Analog output AO and High Speed Pulse output HDO					
P13.00	AO1 output function selection	00: no output 01: Preset frequency 02: Output frequency 03: Output current (relative to inverter) 04: Output torque (absolute value) 05: output voltage 06: bus voltage 07: output power 08: AI1 input 09: AI2 input 10: AI3 input 11: pulse input (0-100kHz) 12: motor current 13: output torque (relative value) 14: torque command	2	0x1300	○
P13.01	AO2 output function selection		1	0x1301	○
P13.02	HDO output function selection		0	0x1302	○
P13.03	AO1 output offset	-100.0%～100.0%	0.0%	0x1303	○
P13.04	AO1 output gain	-2.000～2.000	1.000	0x1304	○
P13.05	AO1 output filtering time	0.000s～10.000s	0.0s	0x1305	○
P13.06	AO2 output offset	-100.0%～100.0%	0.0%	0x1306	○
P13.07	AO2 output gain	-2.000～2.000	1.000	0x1307	○

Parameter	Description	Setting Range	Default	Register	Flag
P13.08	AO2 output filtering time	0.000s～10.000s	0.0s	0x1308	○
P13.09	HDO maximum output pulse frequency	0.01kHz～100.00kHz	10.00kHz	0x1309	○
P13.10	HDO output zero point selection	0: starts from 0 1: starts from center point (P13.09)/2. When frequency is higher than center point value, it corresponds to positive measuring range of the chosen function	0	0x130A	●
P13.11	HDO output filtering time	0.000s～10.000s	0.0s	0x130B	○
P20 Operation panel (keypad) Setting Parameters					
P20.00	Password setting	00000～65535	00000	0x2000	○
P20.01	LCD brightness	10%～100%	80%	0x2001	●
P20.02	LCD language	0: Chinese 1: English	0	0x2002	●
P20.03	Function parameters modification protection	0: All function codes are allowed to 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: Reset to factory default (Except motor parameters) 2: Reset to factory default (Including motor parameters) 3: Clear fault history record (Reserved)	0	0x2004	●
P20.05	Copy of Parameters	0: No operation 1: Parameters upload 2: Parameters download (except motor parameters) 3: Parameters download (including motor parameters)	0	0x2005	●
P20.06	Keypad lock function	0: no lock 1: all keys locked 2: keys locked except Loc/Rem 3: keys locked except Start/Stop	0	0x2006	●

Parameter	Description	Setting Range	Default	Register	Flag
P20.08	Loc/Rem key function selection	0: no function 1: Run command source switching 2: Jog forward 3: Jog reverse 4: FWD/REV running switching	2	0x2008	●
P20.09	▲/▼ keys and Up/Dn terminal regulation setting	**Ones place:** Action at stop 0: Up/Dn value clearance at stop 1: Up/Dn value maintained at stop **Tens place:** Action at power failure 0: Up/Dn value clearance at power failure 1: Up/Dn value maintained at power failure **Hundreds place:** Up/Dn tuning rate selection 0: Automatic rate 1: Customized rate 2: Frequency setting Up/Dn invalid **Thousands place:** PID digital setting value Up/Down 0: Forbidden 1: Allowed	1011	0x2009	○
P20.10	Manual Up/Down tuning rate	0.00Hz/s～10.00Hz/s	1.00Hz/s	0x200A	○
P21 Display Setting Parameters					
P21.00	Running state displayed parameter1	00: No display 01: Running frequency 02: Preset frequency 03: Output frequency 04: Synchronous frequency 05: Speed measuring frequency 06: Reserved 07: Preset rotary speed 08: Running rotary speed	1	0x2100	○
P21.01	Running state displayed parameter2		11	0x2101	○
P21.02	Running state displayed parameter3		9	0x2102	○

Parameter	Description	Setting Range	Default	Register	Flag
P21.03	Running state displayed parameter4	09: Bus voltage 10: Output voltage 11: Output current 12: Output power 13: Output torque 14: Preset torque 15: AI1 voltage 16: AI2 voltage 17: AI3 voltage 18: Reserved 19: AO1 voltage 20: AO2 voltage 21: HDI input frequency 22: HDO output frequency 23: Input terminal 24: Output terminal 25: Inverter state 26: Heatsink temperature 27: Motor temperature 28: PID preset value 29: PID feedback value 30: PID error 31: PLC stage 32: Main frequency setting channel 33: Auxiliary frequency setting channel 34: Main channel preset frequency 35: Auxiliary channel preset frequency 36: External count number 37: Preset length 38: Run length 39: Running linear velocity	0	0x2103	○
P21.04	Stop state displayed parameter1		2	0x2104	○
P21.05	Stop state displayed parameter2		9	0x2105	○
P21.06	Stop state displayed parameter3		0	0x2106	○
P21.07	Stop state displayed parameter4		0	0x2107	○
P23 Communication Free Mapping Configuration Parameters					
P23.00	Source ID0	0x0000～0xFFFF	0000	0x2300	●
P23.01	Mapping ID0	0x0000～0xFFFF	0000	0x2301	●
P23.02	Source ID1	0x0000～0xFFFF	0000	0x2302	●
P23.03	Mapping ID1	0x0000～0xFFFF	0000	0x2303	●
P23.04	Source ID2	0x0000～0xFFFF	0000	0x2304	●

Parameter	Description	Setting Range	Default	Register	Flag
P23.05	Mapping ID2	0x0000～0xFFFF	0000	0x2305	●
P23.06	Source ID3	0x0000～0xFFFF	0000	0x2306	●
P23.07	Mapping ID3	0x0000～0xFFFF	0000	0x2307	●
P23.08	Source ID4	0x0000～0xFFFF	0000	0x2308	●
P23.09	Mapping ID4	0x0000～0xFFFF	0000	0x2309	●
P23.10	Source ID5	0x0000～0xFFFF	0000	0x230A	●
P23.11	Mapping ID5	0x0000～0xFFFF	0000	0x230B	●
P23.12	Source ID6	0x0000～0xFFFF	0000	0x230C	●
P23.13	Mapping ID6	0x0000～0xFFFF	0000	0x230D	●
P23.14	Source ID7	0x0000～0xFFFF	0000	0x230E	●
P23.15	Mapping ID7	0x0000～0xFFFF	0000	0x230F	●
P23.16	Source ID8	0x0000～0xFFFF	0000	0x2310	●
P23.17	Mapping ID8	0x0000～0xFFFF	0000	0x2311	●
P23.18	Source ID9	0x0000～0xFFFF	0000	0x2312	●
P23.19	Mapping ID9	0x0000～0xFFFF	0000	0x2313	●
P23.20	Source ID10	0x0000～0xFFFF	0000	0x2314	●
P23.21	Mapping ID10	0x0000～0xFFFF	0000	0x2315	●
P23.22	Source ID11	0x0000～0xFFFF	0000	0x2316	●
P23.23	Mapping ID11	0x0000～0xFFFF	0000	0x2317	●
P23.24	Source ID12	0x0000～0xFFFF	0000	0x2318	●
P23.25	Mapping ID12	0x0000～0xFFFF	0000	0x2319	●
P23.26	Source ID13	0x0000～0xFFFF	0000	0x231A	●
P23.27	Mapping ID13	0x0000～0xFFFF	0000	0x231B	●
P23.28	Source ID14	0x0000～0xFFFF	0000	0x231C	●
P23.29	Mapping ID14	0x0000～0xFFFF	0000	0x231D	●
P30 Fault and Protection Parameters					
P30.00	Cooling fan control	0: Automatic control 1: Working right after power-on 2: Stop working immediately after inverter stop	0	0x3000	○

Parameter	Description	Setting Range	Default	Register	Flag
P30.01	Motor thermal protection selection	**Ones place:** motor thermal protection 0: forbidden 1: enabled **Tens place:** sensor type 0: temperature sensor PT100 1: temperature sensor PT1000	000	0x3001	●
P30.02	Motor overheat detection value	0.0～200.0℃	85.0℃	0x3002	●
P30.03	Inverter overload pre-alarm detection selection	**Ones place:** Overload pre-alarm detection selection 0: always check during running 1: delection at constant speed operation only **Tens place:** Overload pre-alarm detection level selection 0: detection level is relative to rated current of motor 1: detection level is relative to rated current of variable frequency drive **Hundreds place:** Overload pre-alarm protection validation 0: overload pre-alarm disabled 1: overload pre-alarm enabled	100	0x3003	●
P30.04	Detection level of overload pre-alarm	20.0%～200.0%	160.0%	0x3004	●
P30.05	Overload pre-alarm detection time	0.0s～60.0s	5.0s	0x3005	●

Parameter	Description	Setting Range	Default	Register	Flag
P30.06	Inverter output side load loss detection	0: Inverter output side load loss detection invalid 1: Always detect during runing (Continue running) 2: Only detect during constant speed (continue running) 3: Always detect during runing (freewheeled stop) 4: Only detect during constant speed (freewheeled stop)	0	0x3006	●
P30.07	Inverter output side load loss detection level	0.0%～100.0%	30.0%	0x3007	●
P30.08	Inverter output side load loss detection time	0.0s～3600.0s	1.0s	0x3008	●
P30.09	Automatic reset time(s)	0～100 0 means automatic reset invalid	0	0x3009	●
P30.10	Automatic reset interval	0.1s～100.0s	1.0s	0x300A	●
P30.11	Fault relay action selection	**Ones place:** action during automatic reset 0: Active 1: No action **Tens place:** action during undervoltage 0: Active 1: No action	00	0x300B	●
P30.12	Option of enhanced protection functions	**Ones place:** output phase loss detection 0: disabled 1: enabled **Tens place:** input phase loss detection 0: disabled 1: enabled **Hundreds place:** motor overload detection	101	0x300C	●

Parameter	Description	Setting Range	Default	Register	Flag
		0: disabled 1: enabled			
P30.13	Fault history record saving	0: fault history reset at power failure 1: fault history saved at power failure	1	0x300D	●
P30.14	Fault protection action options 1	**Ones place:** EEPROM read/write fault 0: continue running 1: freewheeled stop **Tens place:** system interference fault 0: continue running 1: freewheeled stop **Hundreds place:** contactor actuation fault 0: continue running 1: freewheeled stop **Thousands place:** current detection fault 0: continue running 1: freewheeled stop	1111	0x300E	●
P30.15	Fault protection action options 2	**Ones place:** Inverter overheat 0: continue running 1: freewheeled stop **Tens place:** encoder fault 0: continue running 1: freewheeled stop **Hundreds place:** motor overheating fault 0: continue running 1: freewheeled stop	1111	0x300F	●

Parameter	Description	Setting Range	Default	Register	Flag
		Thousands place: system self-defined 0: continue running 1: freewheeled stop			
P40 Process PID Control Parameters					
P40.00	PID reference setting channel selection	0: digital setting in P40.01 1: setting by analog input AI1 2: setting by analog input AI2 3: setting by analog input AI3 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: Setting by pulse input HDI	0	0x4000	●
P40.01	PID digital setting value	0.0%～100.0%	50.0%	0x4001	○
P40.02	PID feedback channel selection	0: Constant zero feedback 1: feedback by analog input AI1 2: feedback by analog input AI2 3: feedback by analog input AI3 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8：feedback by pulse input 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	○
P40.08	Differential time Td2	0.000s～50.000s	0.000s	0x4008	○
P40.09	PID parameters switching method	0: use Kp1、Ki1 and Kd1 only (no switching) 1: Switching according to input bias value 2: Switching by terminal	0	0x4009	●

Parameter	Description	Setting Range	Default	Register	Flag
P40.10	Input bias value for PID switching	0.0%～100.0%	20.0%	0x400A	○
P40.11	PID regulating selection	**Ones place:** Output frequency 0: shall be same as preset running direction 1: could be reversed to preset running direction **Tens place:** Integral mode 0: Integral regulating continues when it reaches uppler/lower limit 1: Integral regulating stops when it reaches uppler/lower limit	11	0x400B	●
P40.12	PID positive and negative effect	0: Positive effect 1: Negative effet	0	0x400C	●
P40.13	PID giving 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	○
P40.16	Sampling period	0.001s～50.000s	0.002s	0x4010	○
P40.17	Deviation tolerance	0.0%～100.0%	0.0%	0x4011	○
P40.18	Differential amplitude 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 value	0.0%～100.0%	100.0%	0x4015	○
P40.22	PID reverse output cutoff frequency	0.00Hz~ Freq. upper limit	0.00Hz	0x4016	○
P40.23	PID operator selection at stop state	0: no PID operating at stop state 1: PID operating at stop state	0	0x4017	●

Parameter	Description	Setting Range	Default	Register	Flag
P40.24	PID reference loss detection level	0.0%～100.0%	0.0%	0x4018	●
P40.25	PID reference loss detection time	0.00s～30.00s 0.00s: PID reference loss detection invalid	1.00s	0x4019	●
P40.26	PID feedback loss detection level	0.0%～100.0%	0.0%	0x401A	●
P40.27	PID feedback loss detection time	0.00s～30.00s 0.00s: PID feedback loss detection invalid	1.00s	0x401B	●
P40.28	PID signal loss stop mode	0: Freewheeled stop 1: Emergency stop	0	0x401C	○
P40.29	Zero frequency upper threshold	P40.30~ Freq. upper limit	0.00Hz	0x401D	●
P40.30	Zero frequency lower threshold	0.00Hz～P40.29	0.00Hz	0x401E	●
P40.31	Dormancy waking up mode	0: Waking up by frequency threshold (parameters setting in P40.29 and P40.30) 1: Waking up by pressure threshold (parameters setting in P40.32 and P40.34)	0	0x401F	●
P40.32	Dormancy pressure detection value	P40.34～P40.37	1000	0x4020	●
P40.33	Dormancy detection delay time	0.00s～30.00s Valid for both frequency and pressure detection modes	1.00s	0x4021	●
P40.34	Waking up pressure value	0～P40.32	0	0x4022	●
P40.35	Waking up detection delay time	0.00s～30.00s Valid for both frequency and pressure detection modes	0.50s	0x4023	●
P40.37	PID reference and feedback pressure measuring range	0～10000	1000	0x4025	●

Parameter	Description	Setting Range	Default	Register	Flag
P41 Multi-step Frequency					
P41.00	Multi-step digital setting 1	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4100	○
P41.01	Multi-step digital setting 2	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4101	○
P41.02	Multi-step digital setting 3	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4102	○
P41.03	Multi-step digital setting 4	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4103	○
P41.04	Multi-step digital setting 5	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4104	○
P41.05	Multi-step digital setting 6	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4105	○
P41.06	Multi-step digital setting 7	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4106	○
P41.07	Multi-step digital setting 8	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4107	○
P41.08	Multi-step digital setting 9	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4108	○
P41.09	Multi-step digital setting 10	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x4109	○
P41.10	Multi-step digital setting 11	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x410A	○
P41.11	Multi-step digital setting 12	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x410B	○
P41.12	Multi-step digital setting 13	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x410C	○
P41.13	Multi-step digital setting 14	Freq. lower limit ~ Freq. upper limit	0.00Hz	0x410D	○
P41.14	Multi-step digital setting 15	Freq. lower limit ~ Freq. upper	0.00Hz	0x410E	○

Parameter	Description	Setting Range	Default	Register	Flag
		limit			
P41.15	Multi-step frequency 1 setting channel	0: Digital setting P41.00 1: Analog input AI1 2: Analog input AI2 3: Analog input AI3 4: Min[AI1,AI2] 5: Max[AI1,AI2] 6: Sub[AI1,AI2] 7: Add[AI1,AI2] 8: Pulse setting by HDI 9: Process PID	0	0x410F	●
P42 Simple PLC					
P42.00	Simple PLC operation mode selection	**Ones place:** Simple PLC running mode 0: Run a single cycle and stop 1: Run a single cycle and maintain final value 2: Continuous cycle running **Tens place:** Simple PLC starting mode 0: Start from stage-1 1: Start from frequency of the interrupted stage **Hundreds place:** Simple PLC saving options at power failure 0: Reset at power failure 1: Saved at power failure Thousands place: Simple PLC time unit 0: Second (s) 1: Minute (min)	0000	0x4200	●
P42.01	PLC stage 1 setting	**Ones place:** Stage running direction of simple PLC 0: Forward 1: Reverse **Tens place:** Stage Acc./Dec. time of simple PLC	00	0x4201	●

Parameter	Description	Setting Range	Default	Register	Flag
		0: Acc./Dec. time 1 1: Acc./Dec. time 2 2: Acc./Dec. time 3 3: Acc./Dec. time 4			
P42.02	Stage 1 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x4202	○
P42.03	PLC stage 2 setting	Refer to stage 1 setting	00	0x4203	●
P42.04	Stage 2 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x4204	○
P42.05	PLC stage 3 setting	Refer to stage 1 setting	00	0x4205	●
P42.06	Stage 3 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x4206	○
P42.07	PLC stage 4 setting	Refer to stage 1 setting	00	0x4207	●
P42.08	Stage 4 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x4208	○
P42.09	PLC stage 5 setting	Refer to stage 1 setting	00	0x4209	●
P42.10	Stage 5 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x420A	○
P42.11	PLC stage 6 setting	Refer to stage 1 setting	00	0x420B	●
P42.12	Stage 6 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x420C	○
P42.13	PLC stage 7 setting	Refer to stage 1 setting	00	0x420D	●
P42.14	Stage 7 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x420E	○
P42.15	PLC stage 8 setting	Refer to stage 1 setting	00	0x420F	●
P42.16	Stage 8 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x4210	○
P42.17	PLC stage 9 setting	Refer to stage 1 setting	00	0x4211	●
P42.18	Stage 9 running time	0.0s (min) ~3276.7s (min)	0.0s（min）	0x4212	○
P42.19	PLC stage 10 setting	Refer to stage 1 setting	00	0x4213	●

Parameter	Description	Setting Range	Default	Register	Flag
P42.20	Stage 10 running time	0.0s (min) ~3276.7s (min)	0.0s （min）	0x4214	○
P42.21	PLC stage 11 setting	Refer to stage 1 setting	00	0x4215	●
P42.22	Stage 11 running time	0.0s (min) ~3276.7s (min)	0.0s （min）	0x4216	○
P42.23	PLC stage 12 setting	Refer to stage 1 setting	00	0x4217	●
P42.24	Stage 12 running time	0.0s (min) ~3276.7s (min)	0.0s （min）	0x4218	○
P42.25	PLC stage 13 setting	Refer to stage 1 setting	00	0x4219	●
P42.26	Stage 13 running time	0.0s (min) ~3276.7s (min)	0.0s （min）	0x421A	○
P42.27	PLC stage 14 setting	Refer to stage 1 setting	00	0x421B	●
P42.28	Stage 14 running time	0.0s (min) ~3276.7s (min)	0.0s （min）	0x421C	○
P42.29	PLC stage 15 setting	Refer to stage 1 setting	00	0x421D	●
P42.30	Stage 15 running time	0.0s (min) ~3276.7s (min)	0.0s （min）	0x421E	○
P43 Fixed length control and Linear Velocity Parameters					
P43.00	Preset count number	1～65535	1000	0x4300	●
P43.01	Specified count number	1~ P43.00(Preset count number)	1000	0x4301	●
P43.02	Length arrival action selection	**Ones place:** Length arrival 0: Continue running 1: Stop **Tens palce:** Length unit 0: meter 1: 10 meters **Hundreds place:** Length clearance at stop state 0: clearance disabled 1: clearance enabled	0000	0x4302	●
P43.03	Preset length	0m~65535m	0m	0x4303	●

Parameter	Description	Setting Range	Default	Register	Flag
P43.04	Pulse number per meter	0.1~6553.5	1000.0	0x4304	●
P43.05	Linear velocity display coefficient	0.0%~1000.0%	0.0%	0x4305	○
P50 Modbus Communication Parameters					
P50.00	Local address	0～247; 0: Broardcast address	1	0x5000	○
P50.01	Communication baud rate selection	**Ones place:** terminal port communicatio baud rate **Tens place:** Keypad port communication baud rate 0: 4800bps 1: 9600bps 2: 19200bps 3: 38400bps 4: 57600bps 5: 115200bps	31	0x5001	○
P50.02	Data format	**Ones plac**e: Terminal port data format **Tens place:** Keyboard port 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	00	0x5002	○
P50.03	Local response delay	0.000s～60.000s	0.000s	0x5003	○
P50.04	Overtime detection time	0.0s～600.0s 0.0s: no overtime detection	0.0s	0x5004	○
P50.05	Communication error response masking selection	**Ones place:** terminal port error response masking(screening) **Tens place:** keypad port error response masking(screening) 0: Masking valid	00	0x5005	○

Parameter	Description	Setting Range	Default	Register	Flag
		1: Masking invalid			
P50.06	Master-slave mode selection and slave function setting	**Ones place:** Terminal port communication master/slave selection 0: Operate stand-alone 1: Operate as Master 2: Operate as slave **Tens place:** Terminal port operation register 0: P00.00 1: P40.01	0000	0x5006	●
P50.07	Master data operation time interval	0.010s～1.000s	0.050s	0x5007	○
P50.08	Slave received data proportional coefficient	0.00~10.00	1.00	0x5008	○
P50.11	Communication special functions	**Ones place:** 0: communication written parameters are not saved. 1: communication written parameters are saved. **Tens place:** 0: Register mapping function disabled 1: Register mapping function enabled	0x0000	0x500B	○
P60 Motor Control Parameters					
P60.00	Carrier frequency	≤ 15kW: 1.0kHz~16.0kHz， Default value: 6.0kHz 18.5kW-45kW: 1.0kHz~10.0kHz Default value: 4.0kHz 55kW-75kW: 1.0kHz~8.0kHz Default value: 3.0kHz ≥ 90kW: 1.0kHz~3.0kHz， Default value: 2.0kHz	Depends on model	0x6000	○

Parameter	Description	Setting Range	Default	Register	Flag
P60.01	Carrier frequency adjustment option	**Ones place:** Random carrier frequency. Only used in asynchronous motor scalar control. Noise is relatively large. 0: Random carrier frequency disabled 1: Random carrier frequency enabled **Tens place:** Carrier frequency varying with temperature 0: carrier frequency varying temperature 1: Preset carrier frequency **Hundreds place:** Carrier frequency automatic switching according to running frequency 0: carrier frequency switching enabled. 1: carrier frequency switching disabled	000	0x6001	●
P60.02	Pulse width modulation mode	0: three phase modulation 1: automatic switching	0	0x6002	●
P60.03	DPWM switching frequency	5.00Hz~ Max. frequency	8.00Hz	0x6003	●
P60.04	Magnetic flux brake selection	0: disabled 1: enabled	1	0x6004	●
P60.05	Energy consumption brake selection	0: disabled 1: enabled	0	0x6005	●
P60.06	Energy comsumption brake activation voltage	650V~750V	720V	0x6006	●
P60.07	speed adjusting for suppressing overvoltage	0: disabled 1: enabled	1	0x6007	●
P60.08	Activation voltage for oV suppression speed adjusting	100.0%~150.0% (corresponds to rated DC bus voltage)	135.0%	0x6008	●
P60.09	speed adjusting	0: disabled	0	0x6009	●

Parameter	Description	Setting Range	Default	Register	Flag
	for countering undervoltage	1: enabled			
P60.10	Activation voltage for uV countering speed adjusting	50.0%~95.0% (corresponds to rated DC bus voltage)	85.0%	0x600A	●
P60.11	Current limit action selection	0: disabled 1: enabled	1	0x600B	●
P60.12	Current limit level	20.0%～200.0% (ralative to inverter rated current)	160.0%	0x600C	●
P60.13	Slip compensation gain	0.0～300.0%	100.0%	0x600D	○
P60.14	Frequency resolution selection	0: 0.01Hz (Maximum frequency 300Hz and below) 1: 0.1Hz (0Hz-1500Hz)	0	0x600E	●
P61 Encoder Parameters					
P61.00	Speed feedback encoder type	0: wire-sharing photoelectric encoder 1: Position type photoelectric encoder 2: Resolver encoder	0	0x6100	☆
P61.01	Encoder resolution	1~10000	1024	0x6101	☆
P61.02	Electric angle offset	0.00° ~359.99°	0.00°	0x6102	☆
P61.03	Encoder signal phase	0: Normal, i.e. A phase leads B phase in forward running 1: Reverse, i.e. B phase leads A phase in forward running	0	0x6103	☆
P61.04	Numberator of electronic gear ratio	1~65535	1000	0x6104	☆
P61.05	Denominator of electronic gear ratio	1~65535	1000	0x6105	☆
P61.06	Resolver pole pairs number	1～32	1	0x6106	☆
P61.07	Sine signal offset	1～65535	0	0x6107	☆
P61.08	Cosine signal offset	1～65535	0	0x6108	☆
P61.09	Sine signal gain	1～8192	4096	0x6109	☆

Parameter	Description	Setting Range	Default	Register	Flag
P61.10	Cosine signal gain	1～8192	4096	0x610A	☆
P61.11	Overspeed detection level	0.0%～120.0%	120.0%	0x610B	☆
P61.12	Overspeed detection time	0.00s～20.00s	0.00s	0x610C	☆
P61.13	Over-deviation detection level	10.0%～50.0%	10.0%	0x610D	☆
P61.14	Over-deviation detection time	0.00s～20.00s	0.00s	0x610E	☆
P61.15	Off-line detection time	0.0s～8.0s	0.0s	0x610F	☆
P62 Motor Characteristics Parameters					
P62.00	Asynchronous motor stator resistance	0.001Ω～65.000Ω	Depends on model	0x6200	●
P62.01	Asynchronous motor rotor resistance	0.001Ω～65.000Ω	Depends on model	0x6201	●
P62.02	Asynchronous motor leakage inductance	0.01mH～650.00mH	Depends on model	0x6202	●
P62.03	Asynchronous motor mutual inductance	0.01mH～650.00mH	Depends on model	0x6203	●
P62.04	Asynchronous motor no-load current	0.1A～P63.02	Depends on model	0x6204	●
P62.05	Asynchronous motor stator resistance high level	0～65535	Depends on model	0x6205	●
P62.06	Asynchronous motor rotor resistance high level	0～65535	Depends on model	0x6206	●
P62.07	Asynchronous motor leakage inductance high level	0～65535	Depends on model	0x6207	●
P62.08	Asynchronous motor mutual inductance high level	0～65535	Depends on model	0x6208	●

Parameter	Description	Setting Range	Default	Register	Flag
P62.09	Synchronous motor stator resistance	0.001Ω～65.000Ω	Depends on model	0x6209	●
P62.10	Synchronous motor direct axis inductance	0.01mH～650.00mH	Depends on model	0x620A	●
P62.11	Synchronous motor quadrature axis inductance	0.01mH～650.00mH	Depends on model	0x620B	●
P62.12	Synchronous motor counter EMF	0.1V～2000.0V	Depends on model	0x620C	●
P62.13	Synchronous motor stator resistance high level	0～65535	Depends on model	0x620D	●
P62.14	Synchronous motor direct axis inductance high level	0～65535	Depends on model	0x620E	●
P62.15	Synchronous motor quadrature axis inductance high level	0～65535	Depends on model	0x620F	●
P62.16	Synchronous motor field-weakening mode	0: no field-weakening function 1: Automatic regulating mode 2: Direct calculation mode	0	0x6210	●
P62.17	Synchronous motor field-weakening gain	0.0%～100.0%	10.0%	0x6211	●
P62.18	Synchronous motor initial angle detection mode	0: Detection disabled 1: Detection in each time of run 2: Detection in first time of run after powered up	1	0x6212	●
P62.19	Synchronous motor initial angle detection current	30.0%～100.0%	100.0%	0x6213	●

Parameter	Description	Setting Range	Default	Register	Flag
P62.20	Synchronous motor Max. torque/current ratio	**Ones place:** Maximum torque/current ratio 0: Disabled 1: Enabled Tens place: Reserved Hundreds place: Reserved **Thousands place:** Synchronous motor current loop adjustment 0: Current decoupling mode 1 1: Current decoupling mode 2	0	0x6214	●
P62.21	Synchronous motor salient pole ratio adjusting gain	50.0%～500.0%	100.0%	0x6215	●
P62.22	Synchronous motor inductance detection current	30.0%～120.0%	80.0%	0x6216	●
P62.23	Synchronous motor running excitation current	0.0%～P62.24	0.0%	0x6217	●
P62.24	Synchronous motor low speed excitation current	P62.23～120.0%	30.0%	0x6218	●
P62.25	Synchronous motor low speed switching frequency	0.0%～100.0%	20.0%	0x6219	●
P63 Motor Nameplate Parameters					
P63.00	Motor rated power	0.2kW～6000.0kW	Depends on model	0x6300	●
P63.01	Motor rated voltage	1V～480V	380V	0x6301	●
P63.02	Motor rated current	0.1A～6000.0A	Depends on model	0x6302	●
P63.03	Motor rated frequency	10.00Hz～300.00Hz	50.00Hz	0x6303	●
P63.04	Motor rated rotary speed	1～65535rpm	1500rpm	0x6304	●
P63.05	Motor pole	2～80	4	0x6305	●

Parameter	Description	Setting Range	Default	Register	Flag
	number				
P63.06	Motor type	0: Asynchronous motor 1: PM synchronous motor	0	0x6306	●
P63.07	Motor parameters autotune	0: No autotune 1: Static autotune 2: Dynamic autotune	0	0x6307	●
P63.08	Motor control mode	0: Advanced scalar control 1: No-PG vector control (SVC) 2: With-PG vector control (VC)	0	0x6308	●
U00 Status Monitoring Parameters					
U00.00	Running frequency	0.00Hz～300.00Hz	Actual value	0x8100	★
U00.01	Preset frequency	0.00Hz～300.00Hz	Actual value	0x8101	★
U00.02	Output frequency	0.00Hz～300.00Hz	Actual value	0x8102	★
U00.03	Sychronous frequency	0.00Hz～300.00Hz	Actual value	0x8103	★
U00.04	Speed-detection frequency	0.00Hz～300.00Hz	Actual value	0x8104	★
U00.05	Reserved			0x8105	★
U00.06	Preset rotary speed	0rpm～60000rpm	Actual value	0x8106	★
U00.07	Output rotary speed	0rpm～60000rpm	Actual value	0x8107	★
U00.08	DC 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	Preset 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	★
U00.16	AI3 voltage	-10.00V～10.00V	Actual value	0x8110	★
U00.18	AO1 voltage	0.00V～10.00V	Actual value	0x8112	★
U00.19	AO2 voltage	0.00V～10.00V	Actual value	0x8113	★
U00.20	HDI input frequency	0Hz～60000Hz	Actual value	0x8114	★
U00.21	HDO output frequency	0Hz～60000Hz	Actual value	0x8115	★

Parameter	Description	Setting Range	Default	Register	Flag
U00.22	Input terminal status	Bit0~Bit6 correspons to X1~X7 Bit8~Bit9 correspons to AI1~AI2 0: input terminal OFF 1: input terminal ON	Actual value	0x8116	★
U00.23	Output terminal status	Bit0~Bit1 correspons to Y1~Y2 Bit2~Bit3 correspons to R1~R2 0: output terminal OFF 1: output terminal ON	Actual value	0x8117	★
U00.24	Inverter status	**Ones place:** Bit0: 1 for running /0 for stop Bit1: 1 for REV /0 for FWD Bit2: 1 for DC brake /0 for no DC brake Bit3: 1 for parameters tuning/0 for no parameters tunning **Tens place:** 0: Constant speed 1: Acceleration 2: Deceleration	Actual value	0x8118	★
U00.25	Heatsink temperature	0.0℃～120.0℃	Actual value	0x8119	★
U00.26	Motor temperature	0.0℃～200.0℃	Actual value	0x811A	★
U00.27	PID preset value	-100.00%～100.00%	Actual value	0x811B	★
U00.28	PID feedback value	-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 reference channel	0～11	Actual value	0x811F	★
U00.32	Auxiliary reference channel	0～11	Actual value	0x8120	★
U00.33	Main frequency reference value	0.00Hz～300.00Hz	Actual value	0x8121	★
U00.34	Auxiliary frequency reference value	0.00Hz～300.00Hz	Actual value	0x8122	★
U00.35	External count	0～65535	Actual value	0x8123	★

Parameter	Description	Setting Range	Default	Register	Flag
	number				
U00.36	Preset length	0m～65535m	Actual value	0x8124	★
U00.37	Ran length	0m～65535m	Actual value	0x8125	★
U00.38	Running linear velocity	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	★
U00.41	AI3 sampling value	-10.00V～10.00V	Actual value	0x8129	★
U00.43	Present fault code	0～100	Actual value	0x812B	★
U00.44	Total power-on time	0h～65535h	Actual value	0x812C	★
U00.45	Total running time	0h～65535h	Actual value	0x812D	★
U00.46	Motor total electricity consumption data higher digit	0kW.h～59999kW.h	Actual value	0x812E	★
U00.47	Motor total electricity consumption data lower digit	0.0kW.h～999.9kW.h	Actual value	0x812F	★
U00.48	This time of running electricity consumption data higher digit	0kW.h～59999kW.h	Actual value	0x8130	★
U00.49	This time of running electricity consumption data lower digit	0.0kW.h～999.9kW.h	Actual value	0x8131	★

Parameter	Description	Setting Range	Default	Register	Flag
U01 Fault History Data					
U01.00	The last fault code	1: Overcurrent in acceleration 2: Overcurrent in deceleration 3: Overcurrent in constant speed 4: Overvoltage in acceleration 5: Overvoltage in deceleration 6: Overvoltage in constant speed 7: Inverter undervoltage 8: Current detection fault 9: System interference fault 10: Module protection fault 11: Motor tuning fault 12: Contactor actuation fault 13: External terminal fault 14: Inverter overheat 15: Motor overheat 16: Inverter overload 17: Motor overload 18: Inverter input phase loss 19: Inverter output phase loss 20: Inverter output load loss 21: Inverter SC to ground 22: EEPROM read/writ fault 23: Communication overtime 24: Power-on time arrival 25: Running time arrival 26: PID reference loss 27: PID feedback loss 28: Speed over-deviation 29: Motor over-speed 30: Encoder fault 31~36: Reserved 37: Speed estimation error 38: Reserved 39: Paramter copy error	Actual value	0x8200	★
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	★

Parameter	Description	Setting Range	Default	Register	Flag
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 at the last fault	0x00～0x7F	Actual value	0x8206	★
U01.07	Output terminal status at the last fault	0x00～0x7F	Actual value	0x8207	★
U01.08	Inverter status at the last fault	0x00～0x2F	Actual value	0x8208	★
U01.09	Heatsink temperature at the last fault	0.0℃～120.0℃	Actual value	0x8209	★
U01.10	Total running time until the last fault	0.0h～6553.5h	Actual value	0x820A	★
U01.11	Second to last fault code	同 U01.00	Actual value	0x820B	★
U01.12	Given frequency at second to last fault	0.00Hz～300.00Hz	Actual value	0x820C	★
U01.13	Output frequency at second to last fault	0.00Hz～300.00Hz	Actual value	0x820D	★
U01.14	Output current at second to last fault	0.0A～6000.0A	Actual value	0x820E	★
U01.15	DC bus voltage at second to last fault	0V～2000V	Actual value	0x820F	★
U01.16	Output voltage at second to last fault	0V～2000V	Actual value	0x8210	★
U01.17	Input terminal status at second to last fault	0x00～0x7F	Actual value	0x8211	★

Parameter	Description	Setting Range	Default	Register	Flag
U01.18	Output terminal status at second to last fault	0x00～0x7F	Actual value	0x8212	★
U01.19	Inverter status at second to last fault	0x00～0x2F	Actual value	0x8213	★
U01.20	Heatsink temperature at second to last fault	0.0℃～120.0℃	Actual value	0x8214	★
U01.21	Total running time until second to last fault	0.0h～6553.5h	Actual value	0x8215	★
U01.22	Third from last fault code	Same as U01.00	Actual value	0x8216	★
U01.23	Given frequnecy at third from last fault	0.00Hz～300.00Hz	Actual value	0x8217	★
U01.24	Output frequency at third from last fault	0.00Hz～300.00Hz	Actual value	0x8218	★
U01.25	Output current at third from last fault	0.0A～6000.0A	Actual value	0x8219	★
U01.26	DC bus voltage at third from last fault	0V～2000V	Actual value	0x821A	★
U01.27	Output voltage at third from last fault	0V～2000V	Actual value	0x821B	★
U01.28	Input terminal status at third from last fault	0x00～0x7F	Actual value	0x821C	★
U01.29	Output terminal status at third from last fault	0x00～0x7F	Actual value	0x821D	★
U01.30	Inverter status at third from last fault	0x00～0x2F	Actual value	0x821E	★

Parameter	Description	Setting Range	Default	Register	Flag
U01.31	Heatsink temperature at third from last fault	0.0℃～120.0℃	Actual value	0x821F	★
U01.32	Total running time until third from last fault	0.0h～6553.5h	Actual value	0x8220	★
U01.33	Forth from last fault code	Same as U01.00	Actual value	0x8221	★
U01.34	Total running time until forth from last fault	0.0h～6553.5h	Actual value	0x8222	★
U02 VFD Information and Data					
U02.00	VFD rated power	0.0kW～6000.0kW	Depends on model	0x8300	★
U02.01	VFD rated voltage	0V～2000V	Depends on model	0x8301	★
U02.02	VFD rated current	0.0A～6000.0A	Depends on model	0x8302	★
U02.03	VFD software series	150 refers to IMD_E series	Actual value	0x8303	★
U02.04	VFD function version	1.00～99.99	Actual value	0x8304	★
U02.05	VFD performance version	1.00～99.99	Actual value	0x8305	★
U02.06	Year of production	2000～2999	Actual value	0x8306	★
U02.07	Month and date of production	01/01～12/31	Actual value	0x8307	★
U02.08	Customization series number	00～9999	Actual value	0x8308	★
U02.09	Customization non-standard version	00～9999	Actual value	0x8309	★
U02.10	Keypad software version	0.00～99.99	Actual value	0x830A	★

Chapter V: Detailed Introduction of Parameters

P00 group: Frequency reference setting parameters

P00.00	Main frequency reference digital setting	Range: 0.00Hz ~ Frequency upperlimit	Default: 50.00Hz
P00.01	Main frequency reference source selection	Range: 0～C	Default: 0

0: digital setting (P00.00) +Up/Down adjustment

1: analog input AI1

2: analog input AI2

3: analog input AI3

Analog AI1 input specification is 0~ 10V or 0~20mA, which can be selected by DIP switches on the control board. Analog AI2/AI3 input specification is 0~ 10V. The corresponding relationship between the analog input and the frequency reference value is defined by the P12 group of parameters.

4: Min [AI1, AI2]

Take the minimum value between AI1 and AI2 analog input as the frequency reference setting source; and the output frequency is limited by the upper and lower limits.

5: Max [AI1, AI2]

Take the maximum value between AI1 and AI2 analog input as the frequency reference setting source; and the output frequency is limited by the upper and lower limits.

6: Sub [AI1, AI2]

Take [AI1-AI2] as the frequency reference value; and the output frequency is limited by the upper and lower limits.

7: Add [AI1, AI2]

Take [AI1+AI2] as the frequency reference value; and the output frequency is limited by the upper and lower limits.

8: pulse setting by HDI

Take the high-speed pulse signal receiving from terminal X7/HDI as the frequency reference, the correspondence between HDI and frequency value is determined by P12.33~P12.36 function codes.

9: process PID

The result output by the process PID operation is used as the frequency reference source, please refer to the P40 group parameter function code for details.

A: simple PLC

The output controlled by simple PLC is used as the frequency setting source, please refer to the P42 group parameter function code for details.

B: keyboard potentiometer

The keyboard panel with a potentiometer is needed for frequency reference setting by this way.

C: no setting

The main frequency reference output is 0.

P00.02	Auxiliary frequency reference digital setting	Range: 0.00Hz ~ Frequency upperlimit	Default: 50.00Hz
P00.03	Auxiliary frequency reference source selection	Range: 0～B	Default: B

0: digital setting (P00.02)

1: analog input AI1

2: analog input AI2

3: analog input AI3

Analog AI1 input specification is 0~ 10V or 0~20mA, which can be selected by DIP switches on the control board. Analog AI2/AI3 input specification is 0~ 10V. The corresponding relationship between the analog input and the frequency reference value is defined by the P12 group of parameters.

4: Min [AI1, AI2]

Take the minimum value between AI1 and AI2 analog input as the frequency reference setting source; and the output frequency is limited by the upper and lower limits.

5: Max [AI1, AI2]

Take the maximum value between AI1 and AI2 analog input as the frequency reference setting source; and the output frequency is limited by the upper and lower limits.

6: Sub [AI1, AI2]

Take [AI1-AI2] as the frequency reference value; and the output frequency is limited by the upper and lower limits.

7: Add [AI1, AI2]

Take [AI1+AI2] as the frequency reference value; and the output frequency is limited by the upper and lower limits.

8: Pulse setting by HDI

Take the high-speed pulse signal receiving from terminal X7/HDI as the frequency reference, the correspondence between HDI and frequency value is determined by P12.33~P12.36 function codes.

9: Reserved

A: Reserved

B: No setting

P00.04	Main frequency reference coefficient	Range: 0.0%～200.0%	Default: 100.0%
P00.05	Auxiliary frequency reference coefficient	Range: 0.0%～200.0%	Default: 100.0%

Proportionally enlarge or reduce the output frequency value given by the main frequency and the auxiliary frequency channel

For example: the final output value of main frequency reference = main frequency setting × P00.04; the final output value of frequency auxiliary reference = frequency auxiliary setting × P00.05.

P00.06	Main and auxiliary frequency reference combination selection	Range: 0x00～0x34	Default: 00

Ones place: Frequency reference mode selection

0: Main frequency reference

The frequency reference is determined by P00.01 main frequency reference source, please refer to P00.01 parameter function code for details.

1: Main and auxiliary frequency setting calculation result

The frequency setting is determined by the calculation result of the main and auxiliary operation, and the main and auxiliary calculation method is determined by the tens-place setting value of this parameter.

2: Switching between main reference setting and auxiliary reference setting

The input terminal could be defined as function “No. 26: Frequency reference source switching (P00.06 ones-place)” to realize the swithcing between main reference and auxiliary reference value. When this terminal is disabled, the main frequency reference is adopted, otherwise the auxiliary reference is adopted.

3: Switching between main frequency setting and the calculation result of main and auxiliary

frequency setting

The input terminal could be defined as function “No. 26: Frequency reference source switching (P00.06 ones-place)” to realize the swithcing between main reference and the calculation result of main and auxiliary frequency setting. When this terminal is disabled, the MAIN frequency reference is adopted, otherwise the operation result of main and auxiliary reference is adopted.

4: Switching between auxiliary frequency setting and the calculation result of main and auxiliary frequency setting

The input terminal could be defined as function “No. 26: Frequency reference source switching (P00.06 ones-place)” to realize the swithcing between auxiliary reference and the calculation result of main and auxiliary frequency setting. When this terminal is disabled, the AUXILIARY frequency reference is adopted, otherwise the operation result of main and auxiliary reference is adopted.

Tens place: Calculation method of main and auxiliary frequency setting

0: Min [main, auxiliary]

Take the smaller one between absolute values of main reference and auxiliary reference as the frequency reference value; and the output frequency is limited by the upper and lower limits.

1: Max [main, auxiliary]

Take the larger one between absolute values of main reference and auxiliary reference as the frequency reference value; and the output frequency is limited by the upper and lower limits.

2: Sub [main, auxiliary]

Substracting the auxiliary reference value from the main reference value, take the result of it as final frequency reference; and the output frequency is limited by the upper and lower limits.

3: Add [main, auxiliary]

Adding the auxiliary reference value to the main reference value, take the result of it as final frequency reference; and the output frequency is limited by the upper and lower limits.

P00.07	Max. frequency	Range: 10.00Hz～300.00Hz	Default: 50.00Hz
P00.08	Frequency upper limit	Range: Freq. lower limit ~Max. frequency	Default: 50.00Hz
P00.09	Frequency lower limit	Range: 0.00Hz ~Freq. upper limit	Default: 0.00Hz

Maximum frequency refers to the highest frequency that the variable frequency drive allows to output.

Frequency upper limit: the allowable highest running frequency that user set according to the actual process technique requirement.

Frequency lower limit: the allowable lowest frequency output that user set according to the actual process technique requirement.

P00.10	Frequency jumping point 1	Range: 0.00Hz ~ Freq. upper limit	Default: 0.00Hz
P00.11	Jumping range 1	Range: 0.00Hz～30.00Hz	Default: 0.00Hz
P00.12	Frequency jumping point 2	Range: 0.00Hz ~ Freq. upper limit	Default: 0.00Hz
P00.13	Jumping range 2	Range: 0.00Hz～30.00Hz	Default: 0.00Hz
P00.14	Frequency jumping point 3	Range: 0.00Hz ~ Freq. upper limit	Default: 0.00Hz
P00.15	Jumping volume 3	Range: 0.00Hz～30.00Hz	Default: 0.00Hz

The mechanical resonance points of the load can be effectively avoided by setting the frequency jumpping points; when the parameter setting value is 0, the frequency jumpping point function is disabled. When the setting frequency of the variable frequency drive is within the jumping volumn of the jump point, it shall be adjusted to the pper or lower bound of the jumping poin frequencyt automatically according to the acceleration and deceleration status.

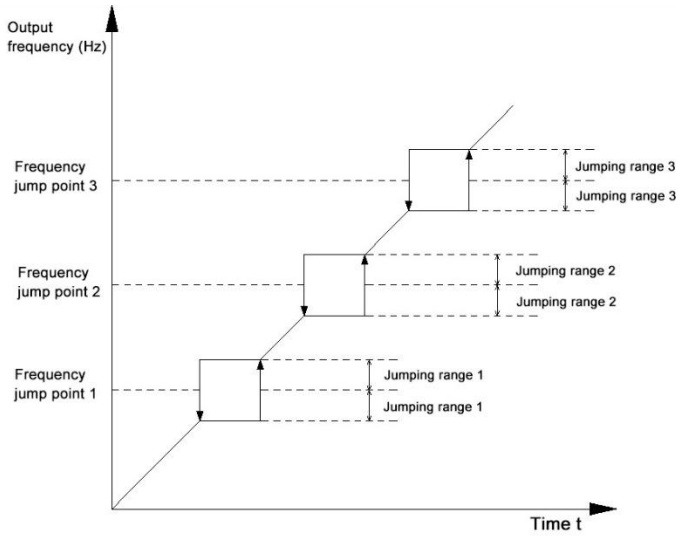


Figure 5-1 Frequency jumpping schematic diagram

P00.16	Jog frequency setting	Range: 0.00Hz~ Freq. upper limit	Default: 5.00Hz

This parameter is to set the running frequency of jogging. The Acc./Dec. time of jogging is determined by P02.09 and P02.10.

P01 group: Start and Stop Control Parameters

P01.00	Run command source selection	Range: 0～3	Default: 0

Select the input channel for the variable frequency drive control commands which include start, stop, forward, reverse, and jogging.

0: Keypad command mode

The running command is controlled by the "Start" and "Stop" buttons on the keyboard panel. The "MON" light on the keyboard is on.

1: Terminal command mode

The running command is controlled by the discrete input terminal functions FWD, REV, FJOG, RJOG, etc. The "MON" light on the keyboard is off.

2: Communication command mode

Control the start, stop, forward running, reverse running, and jogging of the drive through communication, please refer to Appendix A for related communication operations. The "MON" light on the keyboard flashes.

3: Multi-step command mode

Control the running commands of the drive by input terminal functions “Multi-step terminal 1 ~ Multi-step terminal 4”

P01.01	Run command source bonds with frequency reference setting	Range: 0x000～0xBBB	Default: 000

This parameter is to bond a specific frequency reference channel to a specific run command mode and thus facilitates the synchronous switching of run command mode and frequency source channel.

Ones place: Frequency reference setting bonded to Keypad run command mode

0: digital setting (P00.00) +Up/Down adjustment

1: analog input AI1

2: analog input AI2

3: analog input AI3

4: Min [AI1, AI2]

5: Max [AI1, AI2]

6: Sub [AI1, AI2]

7: Add [AI1, AI2]

8: pulse setting by HDI

9: process PID

A: simple PLC

B: no bonding

Tens palce: Frequency reference setting bonded to Terminal run command mode

Hundreds place: Frequency reference setting bonded to Communication run command mode

Setting range of tens place and hundreds place is the same as that of ones-place. For detailed explanation of frequency reference setting channels, refer to P00.01 funciton codes

P01.02	Running direction selection	Range: 0～1	Default: 0

It is used for changing the rotating direction of the motor when the keyboard controls the running commands. Terminal control and communication control are not controlled by this parameter.

0: Forward running

1: Reverse running

P01.03	Reverse running control	Range: 0～1	Default: 0

For some applications, the reverse rotation of the motor is not allowed. This function code is used to forbid the reverse rotation of the motor. When the actual rotating direction of the motor is opposite to what is required, you may exchange the cables of any two output phases of inverter to make the positive direction of the equipment consistent with the inverter's output direction.

0: Reverse allowed

1: Reverse forbidden

P01.04	FWD/REV rotation dead-zone time	Range: 0.0s～3600.0s	Default: 0.0s

It is used for setting the transition time of the variable frequency drive with 0.00Hz output when the

it turns from forward to reverse or from reverse to forward.

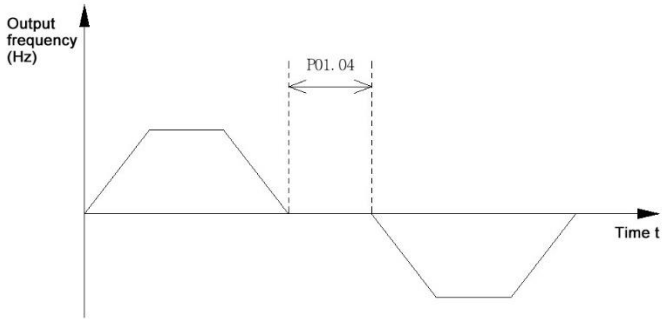


Figure 5-2 FWD/REV rotation dead-zone time schematic diagram

P01.05	Start mode selection	Range: 0～1	Default: 0

0: start from starting frequency

When the variable frequency drive starts running from the stop status, it is starts directly from the starting frequency set by P01.06 and maintains this frequency for a period of time set in P01.07. And then it accelerates to the preset frequency according to chosen Acc./Dec. time and mode.

In this starting mode, if the setting value of P01.09 is not 0, function of DC braking is firstly performed before it starts from the starting frequency.

1: Flying start (Software)

The motor rotation speed is firslty detected and then the drive starts smoothly from the detected speed. It is suitable for starting the equipment where the motor is still rotating with large inertia load.

2: Flying start (Hardware)

This mode requires assembling an extension card into the drive. The motor rotation speed is firslty detected and then the drive starts smoothly from the detected speed. It is suitable for starting the equipment where the motor is still rotating with large inertia load.

P01.06	Starting frequency	Range: 0.00Hz ~ frequency upper limit	Default: 0.50Hz
P01.07	Starting frequency holding time	Range: 0.0s～3600.0s	Default: 0.0s

In order to ensure enough motor torque at starting, please set a suitable starting frequency. The

starting frequency holding time helps establishing sufficient magnetic flux during the motor starting process. The starting frequency holding time is not included in the acceleration time.

P01.08	Start stage DC brake current /pre-excitation current	Range: 0.0%～100.0%	Default: 50.0%
P01.09	Start stage DC brake time /pre-excitation time	Range: 0.00s～30.00s	Default: 0.00s

When the setting value of P01.09 is greater than 0.00s, and the “start from starting frequency” mode is selected, the variable frequency drive performs DC braking firstly, and then it starts from the starting frequency. The DC braking current is determined by P01.08 whose value is the percentage level relative to the rated current of the variable frequency drive.

P01.10	Stop mode selection	Range: 0～1	Default: 0

0: Stop by deceleration

Once the VFD receives the stop command, it starts process of “stop by decleration” according to the preset deceleration time. In this stop mode, if the value of P01.13 is greater than 0.00s, when the output frequency decelerates and gets lower than P01.11, it enters stop-stage DC braking status and maintains this braking state for a period of time set in P01. 12. When DC braking is completed, it stops.

1: Freewheeled stop

After receiving the stop command, the variable frequency drive immediately blocks the output, and the motor freewheels by mechanical inertia until stops.

P01.11	Stop stage DC brake activation frequency	Range: 0.00Hz~ Freq. upper limit	Default: 0.50Hz
P01.12	Stop stage DC brake current	Range: 0.0%～100.0%	Default: 50.0%
P01.13	Stop stage DC brake time	Range: 0.00s～30.00s	Default: 0.00s

For the function description of P01.11 and P01.12, please refer to introduction of P01.10 when it is set as “Stop by deceleration”

P01.12 Stop stage DC brake current is the percentage level relative to the rated current of the variable frequency drive.

P02 group: Acceleration(Acc.) and Deceleration(Dec.) Parameters

P02.00	Acc. time 1	Range: 0.1s～3600.0s	Default: Depends on model

P02.01	Dec. time 1	Range: 0.1s～3600.0s	Default: Depends on model
P02.02	Acc. time 2	Range: 0.1s～3600.0s	Default: Depends on model
P02.03	Dec. time 2	Range: 0.1s～3600.0s	Default: Depends on model
P02.04	Acc. time 3	Range: 0.1s～3600.0s	Default: Depends on model
P02.05	Dec. time 3	Range: 0.1s～3600.0s	Default: Depends on model
P02.06	Acc. time 4	Range: 0.1s～3600.0s	Default: Depends on model
P02.07	Dec. time 4	Range: 0.1s～3600.0s	Default: Depends on model

Acceleration time: The time it takes to speed up from 0Hz to maximum frequency (P00.07).

Deceleration time: The time it takes to slow down from maximum frequency (P00.07) to 0Hz.

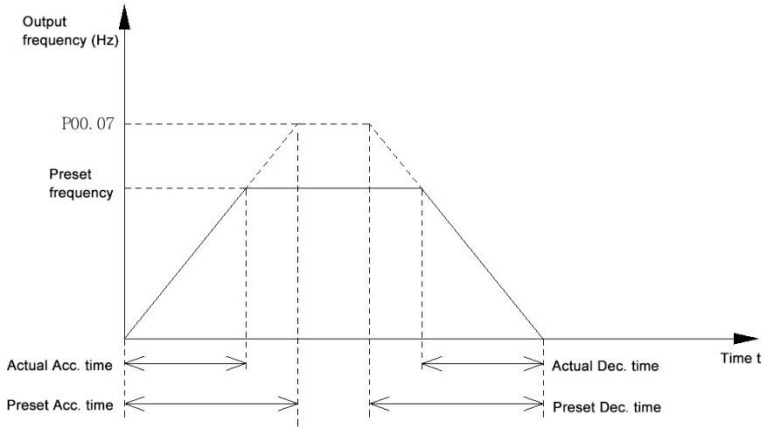


Figure 5-3 Acceleration/deceleration time schematic diagram

4 groups of acceleration and deceleration time are selected through digital input terminals defined as “Acc./Dec. time seletion 1” and “Acc./Dec. time seletion 2”. Please refer to the P10 group function code for specific usage instruction.

P02.08	Emergency stop Dec. time	Range: 0.1s～3600.0s	Default: Depends on

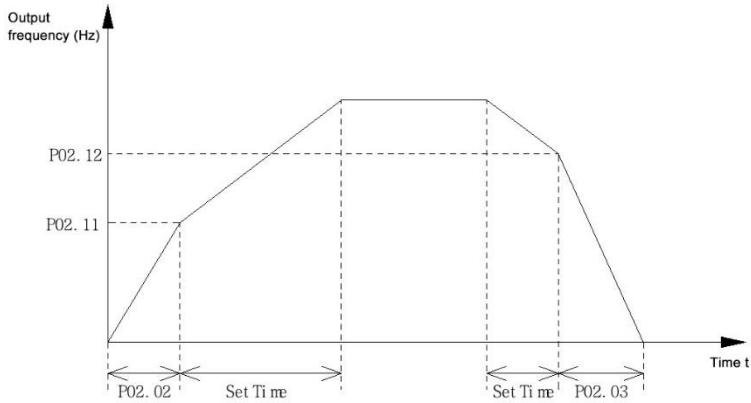
When the drive receives the emergency stop command, it decelerates and stops according to the deceleration time defined in P02.08. The emergency stop command is realized by the digital input terminal function “Emergency stop”.

P02.09	Jog Acc. time	Range: 0.1s～3600.0s	Default: Depends on
P02.10	Jog Dec. time	Range: 0.1s～3600.0s	Default: Depends on

When the drive is jogging, it accelerates or decelerates according to the time set here.

P02.11	Polyline Acc. time switching frequency	Range: 0.00Hz~ Freq. upper limit	Default: 0.00Hz
P02.12	Polyline Dec. time switching frequency	Range: 0.00Hz~ Freq. upper limit	Default: 0.00Hz

In acceleration stage, when the output frequency is less than the setting value of P02.11, acceleration time switches to P02.02; in deceleration stage, when the output frequency is less than P02.12, deceleration time switches to P02.03. When P02.11 and P02.12 are set to 0, the polyline acceleration and deceleration time switching is invalid.



Figture 5-4 Polyline acceleration and deceleration time switching schematic diagram

P02.13	Acc./Dec. curve selection	Range: 0~1	0

0: Straight line acceleration or deceleration

Output frequency rises/drops by constant slope rate

1: Curve line acceleration or deceleration

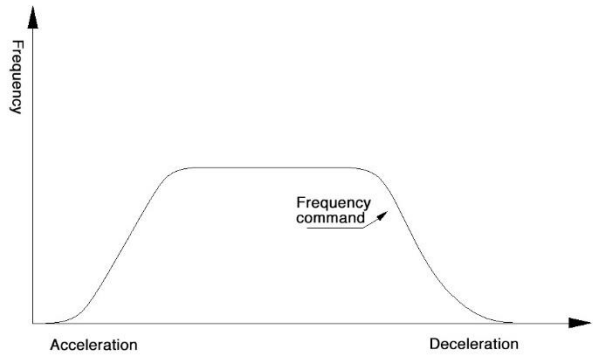
Adding a curve section at the beginning and ending phase of acceleration and deceleration could improve the smoothness of start and stop. It helps to prevent from the load shock which usually happens in transportation equipment.

The characteristics of the curve at the acceleration stage and deceleration stage could be set independently. And the starting and ending curvature as well as the middle section slop of acceleration or deceleration could be set independently.

P02.14~P02.16 is for acceleration curve setting; P02.17~P02.19 is for deceleration curve setting.

P02.14	Acc. curve starting curvature	Range: 0%~200%	50%
P02.15	Acc. curve ending curvature	Range: 0%~200%	50%
P02.16	Acc. middle slope	Range: 0%~200%	0%
P02.17	Dec. curve starting curvature	Range: 0%~200%	50%
P02.18	Dec. curve ending curvature	Range: 0%~200%	50%
P02.19	Dec. middle slope	Range: 0%~200%	0%

When the curve acceleration or deceleration is selected, the frequency arrival time is determined by the setting of P02.14~P02.19.



P03 group: Vector Control Parameters

P03.00	Speed/Torque control selection	Range: 0x00～0x13	Default: 00

Ones place: Vector control selection

0: speed control;

1: torque control

The speed control mode and torque control mode can be switched or inhibited through the ones place of this parameter or by digital input terminal function "46: Speed/Torque control switching" and "47: Torque control forbidden". When running in the torque control mode, No-PG vector control (SVC) or With-PG vector control (VC) shall be selected in P63.08 function code.

Tens place: Generative power limit

0: invalid;

1: full time limit;

2: constant speed limit;

3: deceleration limit

This parameter is to set the output torque limit when the motor works in the power generation mode. Invalid means output torque is automatically limited by the drive's maximum torque.

Full-time limit means that the torque is limited by the preset values in accelerating, decelerating, and constant speed.

Constant speed limit means that the output torque is limited by the preset value only when the drive runs at constant speed.

Deceleration speed limit means that the output torque is limited by the preset value only when the drive runs in deceleration stage.

P03.01	Speed loop high speed proportional gain	Range: 0.00s～30.00s	Default: 2.00s
P03.02	Speed loop high speed Integration time	Range: 0.001s～5.000s	Default: 0.200s
P03.03	Speed loop low speed proportional gain	Range: 0.00s～30.00s	Default: 2.00s
P03.04	Speed loop low speed integration time	Range: 0.001s～5.000s	Default: 0.200s
P03.05	Speed loop PI switching frequency 1	Range: 0.00Hz～P03.06	Default: 5.00Hz
P03.06	Speed loop PI switching frequency 2	Range: P03.05~ Freq. upper limit	Default: 10.00Hz
P03.07	Speed feedback filtering time	Range: 0.0ms～1000.0ms	Default: 15.0ms

Increasing the proportional gain and reducing the integration time can speed up the dynamic response of the speed loop, but too large proportional gain or too small integration time may cause system oscillation. When the running frequency is less than the setting value of P03.05, the PI parameters of the speed loop are P03.03 and P03.04; when the running frequency is greater than the setting value of P03.06, the PI parameters of the speed loop are P03.01 and P03.02.

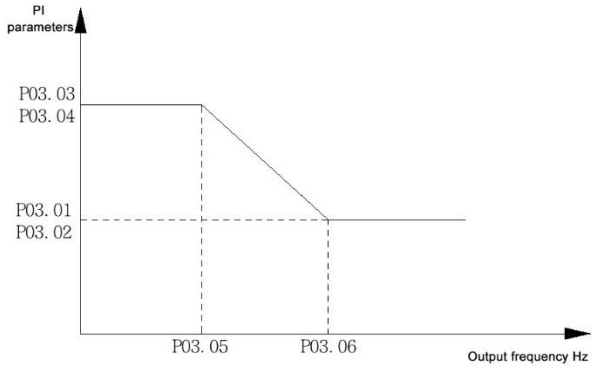


Figure 5-5 speed loop PI parameters schematic diagram

It is recommended to fine-tune the PI parameters of the speed loop on the basis of the factory default values; improper setting of the PI parameters of the speed loop may cause system oscillation, or even overshoot in speed regulating, overcurrent, and overvoltage faults of the variable frequency drive.

The speed feedback filtering time is adjusted to improve the speed stability of the motor. Increase the filtering time, the dynamic response is weakened; and vice versa.

P03.08	Motoring torque channel selection	Range: 0x00～0x99	Default: 90
P03.09	Motoring torque digital setting	Range: -200.0%～200.0%	Default: 150.0%

P3.08 **Ones place:** torque control channel selection

P3.08 **Tens place:** speed control motoring torque upper limit

0: digital setting P03.09

1: analog input AI1

2: analog input AI2

3: analog input AI3

4: Min [AI1, AI2]

5: Max [AI1, AI2]

6: Sub [AI1, AI2]

7: Add [AI1, AI2]

8: pulse setting by HDI

9: maximum torque of variable frequency drive

The ones place of P03.08 defines the motoring torque reference channel under torque control mode; while its tens place defines the upper limit of motoring torque under speed control mode.

The P03.09 setting value is the percentage level ralative to rated torque of the drive.

P03.10	Generative torque channel selection	Range: 0x00～0x99	Default: 99
P03.11	Generative torque digital setting	Range: -200.0%～200.0%	Default: 150.0%

P03.10 Ones place: torque control channel selection

P03.10 Tens place: speed control generating torque upper limit

0: digital setting P03.11

1: analog input AI1

2: analog input AI2

3: analog input AI3

4: Min [AI1, AI2]

5: Max [AI1, AI2]

6: Sub [AI1, AI2]

7: Add [AI1, AI2]

8: pulse setting by HDI

9: maximum torque of variable frequency drive

The ones place of P03.10 defines the generative torque reference channel under torque control mode; while its tens place defines the upper limit of generative torque under speed control mode.

The P03.11 setting value is the percentage level ralative to rated torque of the drive.

P03.12	Torque control frequency limiting channel	Range: 0x00～0x88	Default: 00
P03.13	Torque control forward frequency limit digital setting	Range: 0.00Hz ~ Max. frequency	Default: 50.00Hz
P03.14	Torque control reverse frequency limit digital setting	Range: 0.00Hz ~Max. frequency	Default: 50.00Hz

P03.12 **Ones place:** Forward frequency limit channel

P03.12 **Tens place:** Reverse frequency limit channel

0: digital setting P03.13(Forward limit) /P03.14(Reverse limit)

1: analog input AI1

2: analog input AI2

3: analog input AI3

4: Min [AI1, AI2]

5: Max [AI1, AI2]

6: Sub [AI1, AI2]

7: Add [AI1, AI2]

8: pulse setting by HDI

This function is to set the maximum frequency of forward running or reverse running under torque control mode. if the load torque is less than the motor output torque, the motor continues accelerating faster and faster. In order to prevent runaway accidents, the maximum speed of the motor under torque control must be limited.

P03.15	Torque control frequency limit increment	Range: 0.00Hz ~Max. frequency	Default: 0.00Hz

This value is the increment of the frequency amplitude during torque control, the actual frequency limiting value under torque control is the preset limit value plus the value of P03.15; and the final output is limited by the maximum frequency of the variable frequency drive.

P03.16	Proportional gain of excitation current tuning	Range: 0～60000	Default: 2000
P03.17	Integral gain of excitation current tuning	Range: 0～60000	Default: 1000
P03.18	Proportional gain of torque current tuning	Range: 0～60000	Default: 2000
P03.19	Integral gain of torque current tuning	Range: 0～60000	Default: 1000

The excitation current and torque current tuning parameters work for current loop adjusting under vector control mode. After auto-tune operation is performed to the motor, two sets of parameters are automatically calculated. Generally speaking, they do not need to be modified. If the PI setting of the current loop is too large, the current may oscillate and the torque may fluctuate greatly.

P03.20	Driving torque rising filter time	Range: 0.0s～6000.0s	Default: 0.3s
P03.21	Driving torque descending filter time	Range: 0.0s～6000.0s	Default: 0.3s

In the torque control mode, when the load torque is very different from the motor output torque, the change rate of the motor output speed is very fast, which may cause excessive shock to the motor output side. By setting the filtering time of P03.20 and P03.21, the motor output speed can be changed smoothly and thus reduce the mechanical shock.

P03.22	Torque limitation coefficient in weak magnetic area	Range: 0.0%～200.0%	Default: 100.0%

This parameter takes effect only when the motor is running above the rated frequency. When the motor runs in weak magnetic area, if the acceleration time is too long, the value of P03.22 could be reduced appropriately.

P03.23	Power limitation coefficient in generating state	Range: 0.0%～200.0%	Default: 100.0%

This parameter is to set the limiting coefficient of the output power when the drive is working in generating mode.

P03.24	Frequnecy deviaton of torque control	Range: 0.00Hz～10.00Hz	Default: 0.00Hz

This is to set the frequency deviation value for activating the current regulator under torque control mode.

P03.25	Current loop parameters adjustment	Range: 0x0000～0xFFFF	Default: 0x0000

This is for adjustment of motor current loop parameters Kp and Ki under vector control mode.

Ones place: Excitation current Kp

The default value is automatically calculated; ones-place value increases and Kp decreases.

Tens place: Excitation current Ki

The default value is automatically calculated; tens-place value increases and Ki decreases.

Hundreds place: Torque current Kp

The default value is automatically calculated; hundreds-place value increases and Kp decreases.

Thousands place: Torque current Ki

The default value is automatically calculated; thousands-place value increases and Ki decreases

P04 group: Scalar Control Parameters

P04.00	V/F curve setting	Range: 0～7	Default: 0

0: straight line V/F

When running below the rated frequency, the output frequency is linearly related to the output voltage. It is suitable for general mechanical transmission occasions, such as machine tools, large inertia fans, centrifuges, etc.

1: multi-segment V/F

The multi-segment V/F curve is generally set by the user according to the motor load characteristics. The setting function codes include P04.01~P04.08. The variable frequency drive automatically limits the upper and lower limit of V/F setting value of each point to prevent mistake setting.

2: 1.2 power

3: 1.4 power

4: 1.6 power

5: 1.8 power

6: 2.0 power

It is suitable for variable torque loads.

7: V/F separation

The output frequency and output voltage of the variable frequencydrive can be controlled independently. It is suitable for the occasion where the drive is used as a variable frequency power supply. Refer to P04.13~P04.15 for specific parameters setting.

P04.01	V/F frequency F0	Range: 0.00Hz～P04.03	Default: 0.00Hz
P04.02	V/F voltage V0	Range: 0.0%～P04.04	Default: 0.0%
P04.03	V/F frequency F1	Range: P04.01～P04.05	Default: 0.00Hz
P04.04	V/F voltage V1	Range: P04.02～P04.06	Default: 0.0%
P04.05	V/F frequency F2	Range: P04.03～P04.07	Default: 0.00Hz
P04.06	V/F voltage V2	Range: P04.04～P04.08	Default: 0.0%
P04.07	V/F frequency F3	Range: P04.05～P63.03	Default: 50.00Hz
P04.08	V/F voltage V3	Range: P04.06～100.0%	Default: 100.0%

The multi-segment V/F curve should be properly set according to the characteristics of the motor and the load. Improper setting may cause the increased output current, or even burn the motor seriously.

For specific multi-segment V/F curve settings, please refer to the following figure.

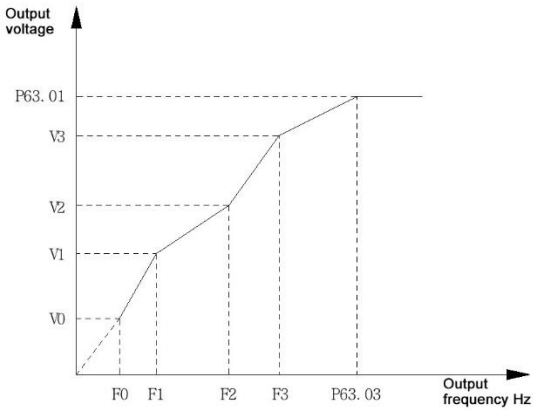


Figure 5-6 Multi-segment V/F curve shchematic diagram

P04.09	Torque boost	Range: 0.0%～30.0%	Default: 0.0%

The torque boost function is only valid during scalar control. Increasing the torque boost value can improve the output torque capability of the motor at low frequency. The torque boost value shall be set appropriately according to the actual load characteristic. If the setting value is too large, it would cause excessive current surge at startup. When the torque boost is set to 0.0%, automatic torque boost is adopted.

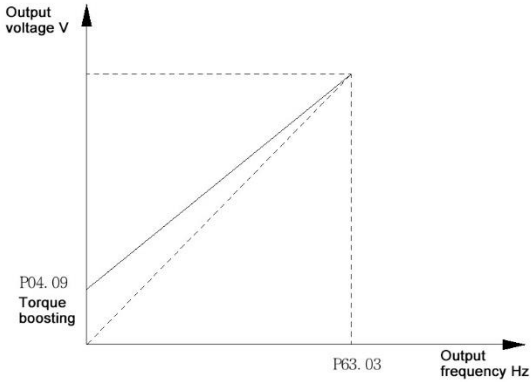


Figure 5-7 Torque boosting schematic diagram

P04.10	Droop control volume	Range: 0.00Hz～10.00Hz	Default: 0.00Hz

When multiple inverters together drive the same load, the load amount that each drive takes might be different. By setting this parameter, different drives would get automatic load allocation proportionally. This function is only applicable to scalar control mode

P04.11	V/F oscillation suppression gain 1	Range: 0～1024	Default: 160
P04.12	V/F oscillation suppression gain 2	Range: 0～1024	Default: 160

By reasonably setting the oscillation suppression parameters, the oscillation of the motor speed and current can be effectively suppressed. This value could be gradually adjusted based on factory default value if the current or speed fluctuation occurs, especially when the motor is running with no-load or light-load. Don't set this parameter too large or too small. This set of parameters is only valid in scalar control mode.

P04.13	V/F separation mode voltage reference channel	Range: 0～5	Default: 0

0: P04.14 digital setting

Set the voltage output value of V/F seperation mode in P04.14. It is percentage level relative to motor rated voltage.

1: analog input AI1

2: analog input AI2

3: analog input AI3

Voltage output value in V/F separation mode is determined by analog input terminal AI1/AI2/AI3. The maximum analog input corresponds to motor rated voltage.

4: process PID output

Voltage output value in V/F separation mode is determined by PID operation output. Refer to P40 group of parameters for PID setting.

5: process PID output +AI1

Voltage output value in V/F separation mode is determined by the sum of PID output and AI1 output.

P04.14	V/F separation voltage digital setting	Range: 0.0%～100.0%	Default: 160

When P04.13=0, the voltage in V/F separation mode is determined by P04.14 setting value.

P04.15	V/F separation voltage slope time	Range: 0.00s～600.00s	Default: 0.01s

This is to set the voltage variation time in V/F separation mode. It refers to the time that voltage changes from 0 to motor rated voltage or reversely from motor rated voltage to 0.

P10 group: Digital input terminal X

P10.00	X1 function selection	Range: 0～63	Default: 1
P10.01	X2 function selection	Range: 0～63	Default: 2
P10.02	X3 function selection	Range: 0～63	Default: 16
P10.03	X4 function selection	Range: 0～63	Default: 17
P10.04	X5 function selection	Range: 0～63	Default: 18
P10.05	X6 function selection	Range: 0～63	Default: 0
P10.06	X7/HDI function selection	Range: 0～63	Default: 0
P10.08	AI1 function selection	Range: 0～63	Default: 0
P10.09	AI2 function selection	Range: 0～63	Default: 0
P10.10	AI3 function selection	Range: 0～63	Default: 0

00: no function

Please set the not used terminals to “no function” to prevent malfunction of the terminal.

01: Forward running (FWD)

02: Reverse running (REV)

03: Forward jogging (FJOG)

04: Reverse jogging (RJOG)

Table 5-1 Jog commands configuration

Commands	K1	K2
Forward Jog	ON	OFF
Reverse Jog	OFF	ON
Stop	OFF	OFF
Stop	ON	ON

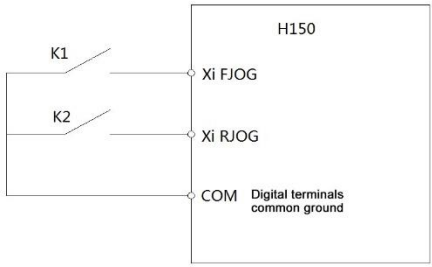


Figure 5-8 Jog commands schematic diagram

05: 3-wire running control

The above 01~05 function only works in Terminal Command Mode (P01.00=1). As for 3-wires running please check P10.11 function code description.

06: Freewheeled stop

When the terminal set as “Freewheeled stop” is ON, the drive freewheels until stop.

07: Emergency stop

When the terminal set as “Emergency stop” is ON, the drive stops by decerleration according to deceleration time set in P02.08.

08: External stop

When the terminal set as “External stop” is ON, the drive stops according to preset stop mode.

09: Run forbidden

When the terminal set as “Run forbidden” function is ON, the drive refuses any start command and keeps stop state.

10: Run pause

If the terminal set as “Run pause” is ON when the drive is running, the drive keeps running at zero frequency until the “Run pause” terminal is OFF. After that the running resumes.

11: External fault input

When the terminal of “External fault input” in ON, the drive indicates Er.EtE fault.

12: Fault reset (RESET)

When the inverter is in fault state, it could be reset by the terminal set as “Fault Reset” function. It works the same as the fault reset method by Stop key on keypad.

13: Terminal Up

14: Terminal Down

When frequency reference channel “digital setting (P00.00) +Up/Down adjustment” is selected, the terminal up/down function could increaes/decrease the frequency setting.

15: Up/Down clearance (Terminal, keypad)

Clear the Up/Down frequency adjustments set by terminal and keypad.

16: Multi-step terminal 1

17: Multi-step terminal 2

18: Multi-step terminal 3

19: Multi-step terminal 4

By combinedly setting 4 multi-step terminals, up to 16 steps of speed control could be achieved. Multi-step function is set in P41.00~P41.14 and detailed configuration of terminals is shown as the table below.

Table 5-2 Multi-step frequeny setting

Preset frequency	Multi-step terminal 1	Multi-step terminal 2	Multi-step terminal 3	Multi-step terminal 4
P00.00	OFF	OFF	OFF	OFF
P41.00	ON	OFF	OFF	OFF
P41.01	OFF	ON	OFF	OFF
P41.02	ON	ON	OFF	OFF
P41.03	OFF	OFF	ON	OFF
P41.04	ON	OFF	ON	OFF
P41.05	OFF	ON	ON	OFF
P41.06	ON	ON	ON	OFF
P41.07	OFF	OFF	OFF	ON
P41.08	ON	OFF	OFF	ON
P41.09	OFF	ON	OFF	ON
P41.10	ON	ON	OFF	ON
P41.11	OFF	OFF	ON	ON
P41.12	ON	OFF	ON	ON
P41.13	OFF	ON	ON	ON
P41.14	ON	ON	ON	ON

20: Acc./Dec. time selection terminal 1

21: Acc./Dec. time selection terminal 2

By combinedly using 2 terminals of Acc./Dec. time selection, up to 4 pairs of acceleration and deceleration time could be set

Table 5-3 Acc./Dec. time selection

Acc./Dec. time	Acc./Dec. time selection terminal 1	Acc./Dec. time selection terminal 2
P02.00、P02.01	OFF	OFF
P02.02、P02.03	ON	OFF
P02.04、P02.05	OFF	ON
P02.06、P02.07	ON	ON

22: Acc./Dec. forbbiden

When the terminal of “Acc./Dec. forbbiden” function is ON, the inverter maintains the output frequency unchanged.

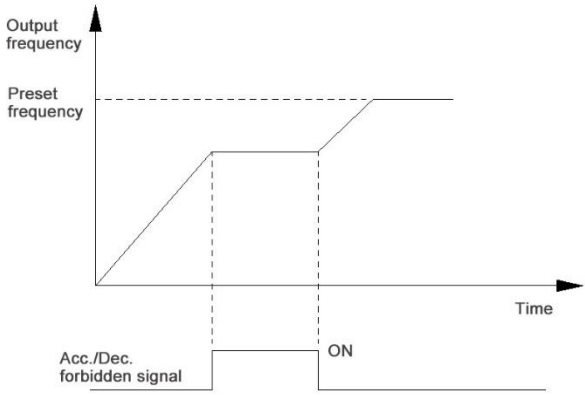


Figure 5-9 Schematic diagram of Acceleration/Deceleration forbidden

23: Switching to Keypad control command

When the terminal of this function is ON, the run command is switched to keypad control mode.

24: Switching to terminal control command

When the terminal of this function is ON, the run command is switched terminal control mode.

25: Switching to communication control command

When the terminal of this function is ON, the run command is switched to communication control mode.

26: Frequency reference source switching (P00.06 ones-place)

When this terminal is ON, the frequency reference channel is switched according to ones-place setting of P00.06.

27: Main frequency reference switch to frequency digital setting

When this terminal function is enabled, the main frequency reference is switched to P00.00 digital setting value.

28: Auxiliary frequency reference switch to frequency digital setting

When this terminal function is enabled, the auxiliary frequency reference is switched to P00.02 digital setting value.

29: Stop stage DC brake+ Stop command

When this terminal function is enabled, the inverter starts the process of “stop by deceleration”.

When the output frequency is lower than P01.11 value (Stop stage DC brake activation frequency), the drive enters DC braking state.

30: Stop stage DC brake

When the drive receives the stop command and at the same time when this terminal function is active, it performs DC braking when the output frequency is lower than P01.11 value (Stop stage DC brake activation frequency).

31: DC brake upon start command

When the drive receives the start command and at the same time if this terminal function is active, the drive firslty do the DC braking and then starts from the preset starting frequency.

32: Pulse input (only X7/HDI supports high speed)

Take the high speed pulse input signal as the frequency reference. For the corresponding relationship of high speed pulse and frequency reference value, refer to P12.33~P12.36 function codes instruction.

33: Count input

This terminal function is to realize the counnting technique through intput signal. Please see P43.00~P43.01 parameter description.

34: Count clearance

Clear the data generated by count input function.

35: Length counting

It is suitable for occasion where length calculation is required. For specific length calculation and setting, please refer to P43.02~P43.04 parameter description.

36: Length clearance

Clear the calculated length value of the length counting.

37: PID reaction direction

When this terminal function is active, the PID reaction direction is opposite to direction set in P40.12.

38: PID parameters switching

When P40.09=2, and at the same time if the terminal of this function is enabled, PID control switches to sencond group of PID parameters P40.06~P40.08. When this terminal function is disabled, PID parameters P40.03~P40.05 are restored.

39: PID operation pause

When the terminal of “PID operation pause” is ON, PID regulating pauses and the drive maintains

the current PID output. When this terminal is OFF, the PID control is resumed.

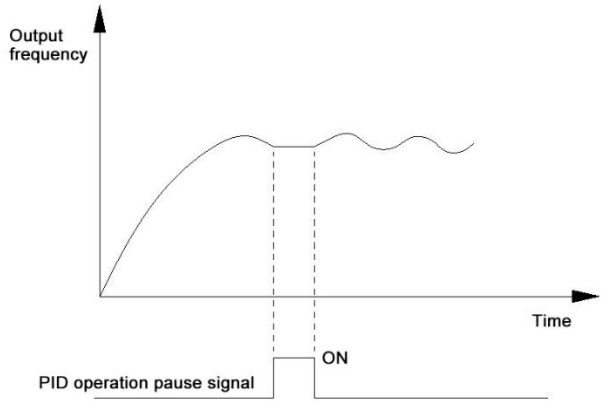


Figure 5-10 Schematic diagram of PID pause

40: PID integration pause

When the terminal is enabled, the PID integrator stops working and maintains the present value; when the terminal is disabled, the PID integrator resumes working of integration.

41: PLC memory clearance

Then the terminal is activated, simple PLC status is reset to initial state.

42: PLC running disabled

When the terminal is activated, PLC running status is cleared and the drive output 0Hz frequency; when the terminal is off, the PLC running restarts from the beginning.

43: PLC running pause

When the terminal is enabled, PLC running status is memorized and the drive outputs 0Hz frequency; while the terminal is off, the PLC resumes working from the memorized stage.

44~45: Reserved

46: Speed/Torque control switching

By on/off of this terminal, the torque control mode and speed control mode is switched under vector control mode.

47: Torque control forbidden

The drive is prohibited to work in torque mode.

P10.11	Terminal control run mode selection	Range: 0～3	Default: 0

0: two-wire run mode 1

1: two-wire run mode 2

Table 5-4 Terminal configuration of two-wire run mode

Commands	two-wire run mode 1		two-wire run mode 2	
	K1	K2	K1	K2
FWD running	ON	OFF	ON	OFF
REV running	OFF	ON	ON	ON
Stop	OFF	OFF	OFF	OFF
Stop	ON	ON	OFF	ON

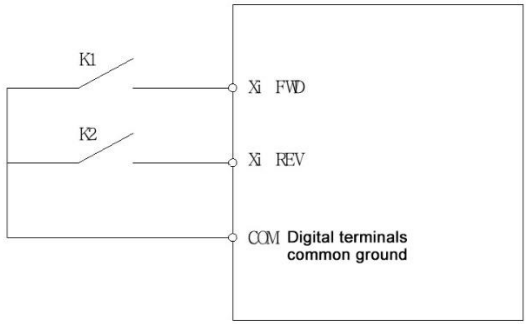


Figure 5-11 Schematic diagram of two-wire run mode

2: three-wire run mode 1

3: three-wire run mode 2

Table 5-5 Terminal configuration of 3-wire run mode

Commands	three-wire run mode 1			three-wire run mode 2		
	SB2	SB3	SB1	SB2	SB3	SB1
FWD running	RISE	-	ON	RISE	OFF	ON
REV running	-	RISE	ON	RISE	ON	ON
Stop	-	-	OFF	-	-	OFF
Stop	-	-	OFF	-	-	OFF

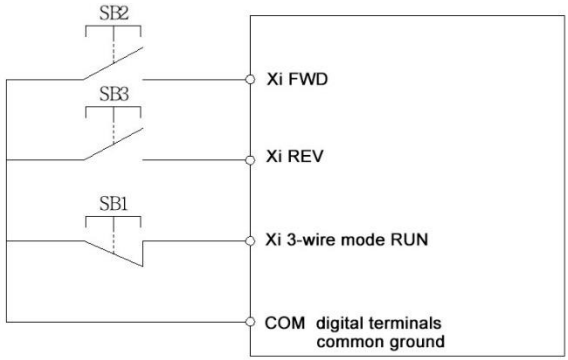


Table 5-12 Schematic diagram of three-wire run mode

Note: “RISE” refers to rising edge; “-” refers to any status.

P10.12	Input terminal action logic setting	Range: 0x000～0x7FF	Default: 000

Ones place: Bit0~Bit3;

Tens place: Bit4~Bit6;

Hundreds place: Bit8~Bit11

Each bit represents logic of one input terminal. The data from low bit to high bit represents X1~AI2 respectively.

0: Positive logic. When the terminal is live with current flow, the terminal is ON.

1: Negative logic. When the terminal has no current flow, the terminal is ON.

P10.13	Input terminal filtering time	Range: 0.000s～2.000s	Default: 0.010s

Increasing the setting value of P10.13 can effectively prevent the malfunction of the input terminal. But too large setting value may cause the terminal response delay.

P10.14	X1 conduction delay	Range: 0.0s～3600.0s	Default: 0.0s
P10.15	X1 disconnection delay	Range: 0.0s～3600.0s	Default: 0.0s
P10.16	X2 conduction delay	Range: 0.0s～3600.0s	Default: 0.0s
P10.17	X2 disconnection delay	Range: 0.0s～3600.0s	Default: 0.0s

By setting the two sets of function codes, the X1 and X2 terminal electric connection and disconnection delay is realized. This function makes terminal input signal response delaying adjustable.

P10.18	Terminal detection mode	Range: 0x000～0x7FF	Default: 000

Ones place: Bit0~Bit3: X1~X4

Tens place: Bit4~Bit6: X5~X7

Hundreds place: Bit8~Bit11: AI1~AI2

Each bit represents detection mode of one terminal. From low digit to high digit it is X1~AI2 respectively.

0: Level triggering

The input terminal level trigger signal is detected.

1: Edge triggering

The input terminal edge trigger signal is detected.

P10.19	Virtual terminal input enabling	Range: 0x000～0x7FF	Default: 0x000
P10.20	Virtual terminal input setting	Range: 0x000～0x7FF	Default: 0x000

In communication control, the virtual terminal function is used to control the X1 terminal. For example, firstly enable the virtual terminal function on X1 by setting P10.19=0x001, and then enable the terminal by setting P10.20=0x001. When P10.20=0x000, the virtual terminal X1 is disabled.

P11 group: Digital Y/R output

P11.00	Y1 function selection	Range: 0～33	Default: 0
P11.01	Y2 function selection	Range: 0～33	Default: 0
P11.02	R1 relay function selection	Range: 0～33	Default: 19
P11.03	R2 relay function selection	Range: 0～33	Default: 0

00: No output function

The output terminal has no function.

01: Running

The terminal outputs the valid signal when the drive is running.

02: Running forward

The terminal outputs the valid signal when the drive is running forward.

03: Running in reverse

The terminal outputs the valid signal when the drive is running reversedly.

04: Inverter ready to work

The terminal outputs the valid signal when the drive is powered up and there is no fault indication.

05: Zero frequency running (Stop state ON)

The terminal output is active when the drive outputs 0Hz, stop state included.

06: Zero frequency running (Stop state OFF)

The terminal output is active when the drive outputs 0Hz, stop state excluded, i.e. the terminal has no output when the drive is in stop state.

07: Frequency arrival (FAR)

When the output frequency of the drive is within the preset range (frequency setting±F11.19), the termial output is active.

08: Frequency detection FDT1

When the output frequency of the drive is higher than FDT1 upper limit, the terminal output is active; and when the frequency gets lower than FDT1 lower limit, the terminal output is disabled. Refer to P11.13~P11.15 for FDT1 setting.

09: Frequency detection FDT2

When the output frequency of the drive is higher than FDT2 upper limit, the terminal output is active; and when the frequency gets lower than FDT2 lower limit, the terminal output is disabled. Refer to P11.16~P11.18 for FDT2 setting.

10: Frequency uppper limitation

When the output frequency reaches the upper limit frequency P00.08, the valid signal is output.

11: Frequency lower limitation

When the output frequency reaches the lower limit frequency P00.09, the valid signal is output.

12: Torque limitation

In speed control mode, when the output torque reaches the motoring torque limit or generative torque limit value, the terminal output signal is active.

13: Speed limitation

In torque control mode, when the output frequency reaches the forward or reverse frequency limit value, the terminal output signal is active.

14: X1 terminal state

15: X2 terminal state

The terminal outputs the X1 or X2 terminal status. When X1 or X2 terminal is active, the valid signal is output.

16: Zero current detection

When the output current of the variable frequency drive is less than the zero current detection level and the duration is greater than the zero current detection time, a valid signal is output. For details, please refer to P11.22~P11.23 function codes.

17: Inverter DC braking

When the variable frequency drive is in DC braking, the terminal output is active

18: Inverter under-voltage

When the drive is in under-voltage status, the terminal output is active.

19: Inverter fault output

20: Inverter alarm output

When the drive is in fault or gets alarm, the terminal output is active.

21: Inverter overload alarm

When the drive gets overload pre-alarm fault or overload alarming, the terminnal output is active.

22: Inverter overheat alarm

When the drive gets overheat alarm, the terminal output is active.

23: Motor overload alarm

When the drive gets the motor overload fault or alarm, the terminal output is active.

24: Motor overheat alarm

When the motor temperature reaches the overheat detection level of P30.02, the terminal output is active. It only works when motor thermal detection is enabled.

25: PLC cycle completed

When one cycle of PLC running is completed, the terminal outputs a pulse signal lasting 500ms.

26: PLC stage completed

When each stage of PLC is completed, the terminal outputs a pulse signal lasting 500ms.

27: Reserved

28: Total power-on time arrival

When the total power-on time reaches the preset value, the terminal output active signal. The total power-on time is saved in power failure.

29: Total running time arrival

When the total running time reaches the preset value, the terminal outputs active signal. The total running time is saved in power failure.

30: Preset count number arrival

31: Specified count number arrival

Refer to P43.00~P43.01 instructions.

32: Preset length arrival

Refer to P43.02~P43.04 instructions.

33: Reserved

P11.04	Y1 output connection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.05	Y1 output disconnection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.06	Y2 output connection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.07	Y2 output disconnection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.08	R1 output connection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.09	R1 output disconnection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.10	R2 output connection delay	Range: 0.0s～3600.0s	Default: 0.0s
P11.11	R2 output disconnection delay	Range: 0.0s～3600.0s	Default: 0.0s

The 4 pairs of function codes are used to set Y1, Y2, R1, R2 output's connecton and disconnection response delay time. When the terminal status changes, the indication signal would not be output immediately but after the preset delay time.

P11.12	Output terminal action logic	Range: 0x0～0xF	Default: 0

Each bit represents logic option of one output terminal. The data from low digit to high digit corresponds to Y1, Y2, R1, R2 respectively.

0: Positive logic. When ther terminal has active current flow, it is ON(Active).

1: Negative logic. When the terminal has no current flow, it is ON(Active).

P11.13	FDT1 detection mode	Range: 0～1	Default: 0

0: Detect by running freq.

The FDT1 detected value is determined by the frequency reference value after Acc./Dec.

1: Detect by output frequency

The FDT1 detected value is determined by the actual output frequency.

P11.14	FDT1 upper limit	Range: P11.15~Maximum frequency	Default: 2.50Hz

P11.15	FDT1 lower limit	Range: 0.00Hz～P11.14	Default: 2.00Hz

Judge the drive is working within FDT1 range or not according to selected detection mode P11.13. When the output terminal is set as “frequency detection FDT1”, and if at the same time the drive is running within this FDT1 range, the terminal outputs valid signal.

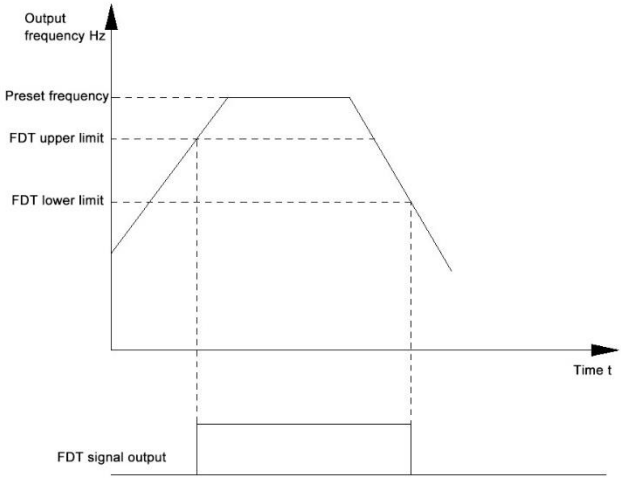


Figure 5-13 Schematic diagram of FDT working

P11.16	FDT2 detection mode	Range: 0～1	Default: 0
P11.17	FDT2 upper limit	Range: P11.18~Maximum frequency	Default: 2.50Hz
P11.18	FDT2 lower limit	Range: 0.00Hz～P11.17	Default: 2.00Hz

For FDT2 setting, refers to FDT1 function description.

P11.19	Frequency arrival (FAR) detection width	Range: 0.00Hz~Maximum frequency	Default: 2.50Hz

It is used for detecting the deviation between the output frequency and the preset frequency; when the deviation between the output frequency and the preset frequency is within the range set here, and if at the same time the output terminal is set as "frequency arrival (FAR)" function, the terminal outputs valid signal.

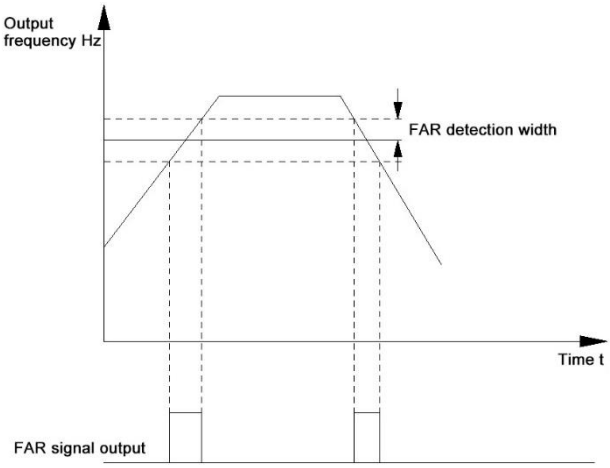


Figure 5-14 Schematic diagram of Frequency Arrival (FAR) function

P11.20	Zero frequency detection	Range: 0.00Hz～最大频率	Default: 0.50Hz
P11.21	Zero frequency hysteresis	Range: 0.00Hz～最大频率	Default: 0.00Hz

Reserved.

P11.22	Zero current detection level	Range: 0.0%～50.0%	Default: 5.0%
P11.23	Zero current detection time	Range: 0.00s～50.00s	Default: 0.50s

When the output terminal is set as "zero current detection" function, if the drive is in running status and its output current gets lower than value set in P11.22 and lasts this status over a duration time set in P11.23, the terminal outputs valid signal.

The zero current detection level is a percentage relative to the rated current of the variable frequency drive.

P12 group: Analog AI and High Speed Pulse HDI Input

P12.00	AI analog curve selection	Range: 0x000～0x333	Default: 000

Ones place: AI1 characteristic curve selection

0: No curve correction

1: curve 1 (2 points)

Set AI curve by parameters P12.01~P12.04.

2: curve 2 (4 points)

Set AI curve by parameters P12.05～P12.12.

3: curve 3 (4 points)

Set AI curve by parameters P12.13～P12.20

Tens place: AI2 characteristic curve selection

Hundreds place: AI3 characteristic curve selection

Refer to ones-place AI1 instruction for details.

Analog input AI1 can select 0~10V voltage input or 0~20mA current input (Current or voltage input is determined by setting of DIP switches on control board). When current input is chosen, 2mA input corresponds to 1V voltage input, and 20mA corresponds to 10V.

Analog input AI2/AI3 could only receive 0~10V voltage input

P12.01	Curve1 Max. input voltage	Range: P12.03～10.00V	Default: 10.00V
P12.02	Curve1 Max. input relative level	Range: -100.0%～100.0%	Default: 100.0%
P12.03	Curve1 Min. input voltage	Range: -10.00V～P12.01	Default: 0.00V
P12.04	Curve1 Min. input relative level	Range: -100.0%～100.0%	Default: 0.0%

Typical setting of curve1 is shown as below.

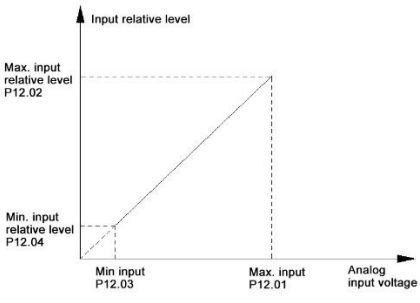


Figure 5-15 Curve 1 setting example 1

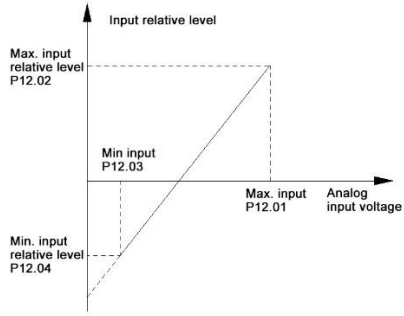


Figure 5-16 Curve 1 setting example 2

P12.05	Curve2 Max. input voltage	Range: P12.07～10.00V	Default: 10.00V
P12.06	Curve2 Max. input relative	Range: -100.0%～100.0%	Default: 100.0%

	level		
P12.07	Curve2 Inflection point 2 input voltage	Range: P12.09～P12.05	Default: 0.00V
P12.08	Curve2 inflection point2 input relative level	Range: -100.0%～100.0%	Default: 0.0%
P12.09	Curve2 Inflection point 1 input voltage	Range: P12.11～P12.07	Default: 0.00V
P12.10	Curve2 Inflection point1 input relative level	Range: -100.0%～100.0%	Default: 0.0%
P12.11	Curve2 Min. input voltage	Range: -10.00V～P12.09	Default: 0.00V
P12.12	Curve2 Min. input relative level	Range: -100.0%～100.0%	Default: 0.0%

The curve 2 and curve 3 are 4-point polylines, and the setting method is similar to curve 1. Refer to the following figure for settings:

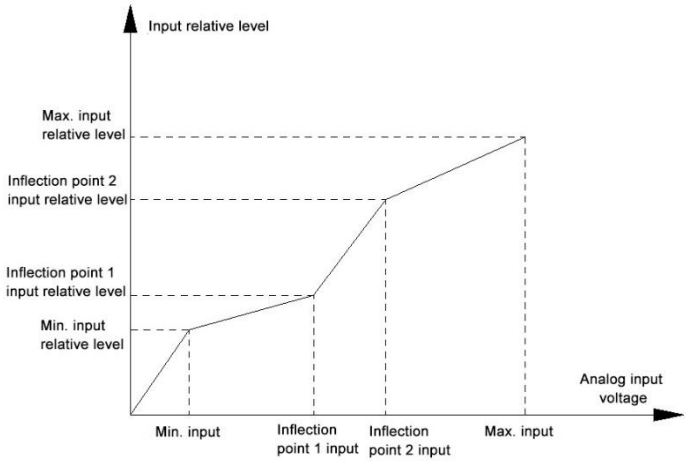


Figure 5-17 Schematic diagram of Curve 2/3 setting

P12.13	Curve3 Max. input voltage	Range: P12.15～10.00V	Default: 10.00V
P12.14	Curve3 Max. input relative level	Range: -100.0%～100.0%	Default: 100.0%
P12.15	Curve3 Inflection point 2 input voltage	Range: P12.17～P12.13	Default: 0.00V
P12.16	Curve3 Inflection point2 input relative level	Range: -100.0%～100.0%	Default: 0.0%
P12.17	Curve3 Inflection point 1 input voltage	Range: P12.19～P12.15	Default: 0.00V
P12.18	Curve3 Inflection point1 input	Range: -100.0%～100.0%	Default: 0.0%

	relative level		
P12.19	Curve 3 Min. input voltage	Range: -10.00V～P12.17	Default: 0.00V
P12.20	Curve 3 Min. input relative level value	Range: -100.0%～100.0%	Default: 0.0%

Curve 3 setting method is the same as Curve 2

P12.21	AI1 input offset	Range: -100.0%～100.0%	Default: 0.0%
P12.22	AI1 input gain	Range: -2.000～2.000	Default: 1.000
P12.23	AI1 input filtering time	Range: 0.000s～10.000s	Default: 0.050s
P12.24	AI2 input offset	Range: -100.0%～100.0%	Default: 0.0%
P12.25	AI2 input gain	Range: -2.000～2.000	Default: 1.000
P12.26	AI2 input filtering time	Range: 0.000s～10.000s	Default: 0.050s
P12.27	AI3 input offset	Range: -100.0%～100.0%	Default: 0.0%
P12.28	AI3 input gain	Range: -2.000～2.000	Default: 1.000
P12.29	AI3 input filtering time	Range: 0.000s～10.000s	Default: 0.050s

The effect achieved by the analog input offset and gain setting is the same as that of curve 1.

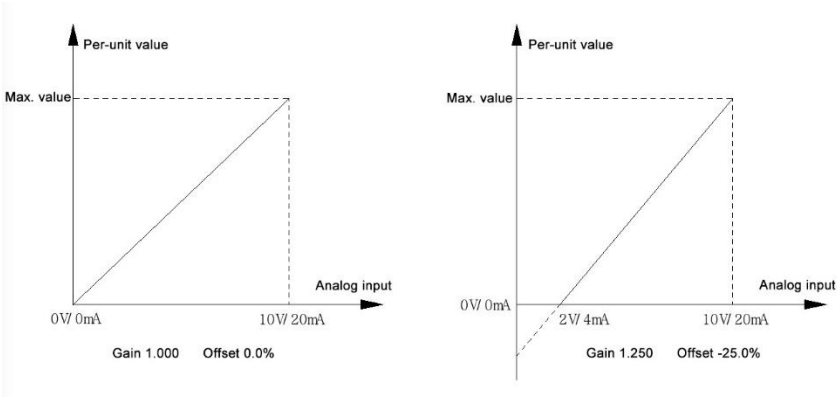


Figure 5-18 AI gain and offset setting schematic diagram

P12.23, P12.26, P12.29 analog inputs filtering time is to perform the filtering operation to AI1, AI2, and AI3 input signals. So that the input signal is smooth without distortion, and the anti-interference ability of the analog input is improved; but too long filtering time will cause analog input response delay.

P12.33	HDI Max. input frequency	Range: P12.35～100.00kHz	Default: 10.00kHz
P12.34	HDI Max. input corresponding level	Range: -100.0%～100.0%	Default: 100.0%

P12.35	HDI Min. input frequency	Range: 0.00kHz～P12.33	Default: 0.00kHz
P12.36	HDI Min. input corresponding level	Range: -100.0%～100.0%	Default: 0.0%
P12.37	HDI input filtering time	Range: 0.000s～1.000s	Default: 0.001s

When X7/HDI is used as high-speed pulse input, this collection of parameters defines the corresponding relationship between the input pulse frequency and the setting frequency output.

P12.37 defines the filtering time of X7/HDI terminal. Longer filtering time means stronger anti-interference ability but slower response; shorter filtering time means faster response but weaker anti-interference capability.

P13 group: Analog output AO and High Speed Pulse output HDO

P13.00	AO1 output function selection	Range: 0～14	Default: 2
P13.01	AO2 output function selection	Range: 0～14	Default: 1
P13.02	HDO output function selection	Range: 0～14	Default: 0

AO1 and AO2 are analog output terminals. HDO is used as a high-speed pulse output terminal. When P13.02 is set to a non-zero value and at the same time P11.00 is set to 0, Y1/HDO is used as a high-speed pulse output terminal.

Analog output AO1 and AO2 can select 0~0V or 0~20mA output (current or voltage output is determined by setting of DIP switches on the control board).

The analog output and pulse output function definition and output measuring range are shown in the following table.

Function setting	Output selection	Analog output range	High speed pulse output range
0	no output	No output	No output
1	Preset frequency	Maximum frequency corresponds to 10V/20mA	Maximum frequency corresponds to P13.09
2	Output frequency	Maximum frequency corresponds to 10V/20mA	Maximum frequency corresponds to P13.09
3	Output current	2 times of rated current of the drive corresponds to 10V/20mA	2 times of rated current of the drive corresponds to P13.09
4	Output torque (absolute value)	2 times of rated torque of the motor corresponds to 10V/20mA	2 times of rated torque of the motor corresponds to P13.09
5	Output voltage	2 times of rated voltage of the motor corresponds to 10V/20mA	2 times of rated voltage of the motor corresponds to P13.09

6	Bus voltage	1000V corresponds to 10V/20mA	1000V corresponds to P13.09
7	Output power	2 times of rated power of the drive corresponds to 10V/20mA	2 times of rated power of the drive corresponds to P13.09
8	AI1 input	AI1 10V input corresponds to 10V/20mA	AI1 10V input corresponds to P13.09
9	AI2 input	AI2 10V input corresponds to 10V/20mA	AI2 10V input corresponds to P13.09
10	AI3 input	AI3 10V input corresponds to 10V/20mA	AI3 10V input corresponds to P13.09
11	pulse output	100kHz corresponds to 10V/20mA	100kHz corresponds to P13.09
12	motor current	2 times of rated current of the motor corresponds to 10V/20mA	2 times of rated current of the motor corresponds to P13.09
13	output torque (relative value)	2 times of rated torque of the motor corresponds to 10V/20mA	2 times of rated torque of the motor corresponds to P13.09
14	torque command	2 times of rated torque of the motor corresponds to 10V/20mA	2 times of rated torque of the motor corresponds to P13.09

P13.03	AO1 output offset	Range: -100.0%～100.0%	Default: 0.0%
P13.04	AO1 output gain	Range: -2.000～2.000	Default: 1.000
P13.05	AO1 output filtering time	Range: 0.000s～10.000s	Default: 0.000s
P13.06	AO2 output offset	Range: -100.0%～100.0%	Default: 0.0%
P13.07	AO2 output gain	Range: -2.000～2.000	Default: 1.000
P13.08	AO2 output filtering time	Range: 0.000s～10.000s	Default: 0.000s

The default output is 0- 10V or 0-20mA. If the range of the analog output needs to be adjusted, it could be set by the above 2 pairs of parameters. The following figure shows the setting for typical industrial application.

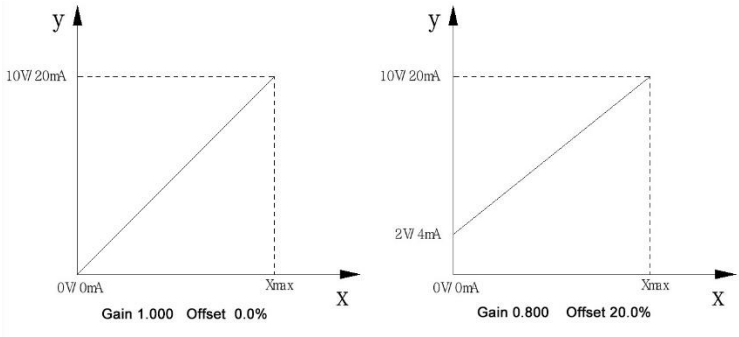


Figure 5-19 AO output schematic diagram

When the output signal fluctuates due to environmental interference, the filtering time can be increased appropriately to filter the output signal.

P13.09	HDO maximum output pulse frequency	Range: 0.01kHz～100.00kHz	Default: 10.00kHz

Define the maximum output frequency when the Y1/HDO is used as high speed pulse output terminal.

P13.10	HDO output zero point selection	Range: 0～1	Default: 0

0: starts from 0

No center point. HDO output 0~P13.09 corresponds to 0~Max. measuring range of chosen function

1: starts from center point (P13.09)/2.

Set P13.09/2 as the center point. P13.09/2～P13.09 corresponds to 0~Positive Max. measuring range of chosen function; while 0~P13.09 corresponds to Negative Max. measuring range~0

P13.11	HDO output filtering time	Range: 0.000s～10.000s	Default: 0.000s

This is to set the filtering time of HDO high speed pulse output, which means that the longer the filtering time the slower the pulse frequency changes, while the shorter the filtering time the faster the pulse frequency changes.

P20 group: Operation panel (keypad) Setting Parameters

P20.00	Password setting	Range: 00000～65535	Default: 00000

Password setting: When this parameter value is set to non-00000 and confirmed by OK key, the password is set and effective. To get into parameter groups for checking or modification, the correct password should be input from the next time.

Password clearing: Input the correct password to enter P20.00 and set it to 00000 again, confirm it by Ok key. The password is removed.

Password change: Input the correct password to enter P20.00 and set it to new password, confirm it by Ok key. The new password is set and effective.

P20.01	LCD brightness	Range: 10%～100%	Default: 80%
P20.02	LCD language	Range: 0～1	Default: 0

These two parameters are only effective for the LCD keyboard. P20.01 is used to set the LCD brightness, P20.02 is used for LCD display language selection. Only Chinese is available right now.

P20.03	Function parameters modification protection	Range: 0～1	Default: 0

0: All function codes are allowed to be modified

The setting value of all parameter codes in P group could be modified.

1: Only P20.00 and P20.03 are allowed to be modified

Only the values of P20.00 and P20.03 could be modified. Modification of the other parameters in P group is prohibited to prevent mistake operation.

P20.04	Function code initialization	Range: 0～3	Default: 0

0: no operation

1: Reset to factory default (Except motor parameters)

2: Reset to factory default (Including motor parameters)

3: Clear fault history record

When this parameter is set to non-0, its value automatically restores to 0 after initialization is done.

P20.05	Copy of Parameters	Range: 0～3	Default: 0

0: No operation

1: Parameters upload

Upload the parameter setting in control board to keypad

2: Parameters download (except motor parameters)

Download the parameter setting saved in keypad to control board; this download option does not include the motor parameters.

3: Parameters download (including motor parameters)

Download the parameter setting saved in keypad to control board; this download option includes the motor parameters.

Note: Make sure the parameter setting has been uploaded to keypad before you use the download function. It is not allowed to use download function when the keypad has no uploaded parameter setting.

P20.06	Keypad lock function	Range: 0～3	Default: 0

0: no lock

All keys on keypad could be pressed for operation.

1: all keys locked

All keys on keypad are locked. Keypad indicates “Loc1” if any key is pressed.

2: keys locked except Loc/Rem

Except Loc/Rem, other keys on keypad are locked. Keypad indicates “Loc2” if any key other than Loc/Rem is pressed.

3: keys locked except Start/Stop

Except Start/Stop, other keys on keypad are locked. Keypad indicates “Loc3” if any key other than Start/Stop is pressed.

P20.08	Loc/Rem key function selection	Range: 0～4	Default: 0

0: no function

1: Run command source switching

The run command mode will be switched by this sequence: Keypad command →Terminal command →Communication command →Multi-step terminal command

2: Jog forward

3: Jog reverse

Control the forward or reverse jogging of the drive under keypad command mode. The jogging frequency and acceleration/deceleration time are determined by P00.16, P02.09 and P02.10.

4: FWD/REV running switching

This is used to switch the motor running direction in keypad command mode.

P20.09	▲/▼ keys and Up/Dn terminal regulation setting	Range: 0x0000～0x1111	Default: 1011

Ones place: Action at stop
0: Up/Dn value clearance at stop
1: Up/Dn value maintained at stop

Tens place: Action at power failure
0: Up/Dn value clearance at power failure
1: Up/Dn value maintained at power failure

Hundreds place: Up/Dn tuning rate selection
0: Automatic rate
1: User-defined rate
2: Up/Dn invalid for frequency setting

Thousands place: PID digital setting value Up/Down
0: Forbidden
1: Allowed

P20.10	User-defined Up/Down tuning rate	Range: 0.00Hz/s～10.00Hz/s	Default: 1.00Hz/s

When the P20.09 hundreds place setting value is 1, the keypad ▲/▼ and terminal Up/Dn changing rate is set by P20.10.

P21 group: Display Setting Parameters

Refer to parameter list for detailed table of displayed parameter setting.

P23 group: Communication Free Mapping Configuration Parameters

P23.00	Source ID0	Range: 0x0000～0xFFFF	Default: 0000
P23.01	Mapping ID0	Range: 0x0000～0xFFFF	Default: 0000
P23.02	Source ID1	Range: 0x0000～0xFFFF	Default: 0000
P23.03	Mapping ID1	Range: 0x0000～0xFFFF	Default: 0000
P23.04	Source ID2	Range: 0x0000～0xFFFF	Default: 0000
P23.05	Mapping ID2	Range: 0x0000～0xFFFF	Default: 0000
P23.06	Source ID3	Range: 0x0000～0xFFFF	Default: 0000

P23.07	Mapping ID3	Range: 0x0000～0xFFFF	Default: 0000
P23.08	Source ID4	Range: 0x0000～0xFFFF	Default: 0000
P23.09	Mapping ID4	Range: 0x0000～0xFFFF	Default: 0000
P23.10	Source ID5	Range: 0x0000～0xFFFF	Default: 0000
P23.11	Mapping ID5	Range: 0x0000～0xFFFF	Default: 0000
P23.12	Source ID6	Range: 0x0000～0xFFFF	Default: 0000
P23.13	Mapping ID6	Range: 0x0000～0xFFFF	Default: 0000
P23.14	Source ID7	Range: 0x0000～0xFFFF	Default: 0000
P23.15	Mapping ID7	Range: 0x0000～0xFFFF	Default: 0000
P23.16	Source ID8	Range: 0x0000～0xFFFF	Default: 0000
P23.17	Mapping ID8	Range: 0x0000～0xFFFF	Default: 0000
P23.18	Source ID9	Range: 0x0000～0xFFFF	Default: 0000
P23.19	Mapping ID9	Range: 0x0000～0xFFFF	Default: 0000
P23.20	Source ID10	Range: 0x0000～0xFFFF	Default: 0000
P23.21	Mapping ID10	Range: 0x0000～0xFFFF	Default: 0000
P23.22	Source ID11	Range: 0x0000～0xFFFF	Default: 0000
P23.23	Mapping ID11	Range: 0x0000～0xFFFF	Default: 0000
P23.24	Source ID12	Range: 0x0000～0xFFFF	Default: 0000
P23.25	Mapping ID12	Range: 0x0000～0xFFFF	Default: 0000
P23.26	Source ID13	Range: 0x0000～0xFFFF	Default: 0000
P23.27	Mapping ID13	Range: 0x0000～0xFFFF	Default: 0000
P23.28	Source ID14	Range: 0x0000～0xFFFF	Default: 0000
P23.29	Mapping ID14	Range: 0x0000～0xFFFF	Default: 0000

Source ID is the upper controller host address, and the mapping ID is the corresponding function code register of the drive. Every 2 parameters form a pair, such as P23.00/P23.01 which shall not be mixed up. After the mapping setting, please set P50.11=0010.

P30 group: Fault and Protection Parameters

P30.00	Cooling fan control	Range: 0～2	Default: 0

0: Automatic control

When the temperature of the radiator is detected to be higher than 42°C, the cooling fan starts to work. When the temperature is lower than 40°C and lasts for 30 seconds, the fan stops working.

1: Working right after power-on

After the variable frequency drive is powered up, the fan runs immediately

2: Stop working immediately after inverter stop

When the variable frequency drive is running, the fan runs with automatic control and it stops working after the inverter stops.

P30.01	Motor thermal protection selection	Range: 0x000～0x111	Default: 000

Ones place: motor thermal protection

0: forbidden.

The motor thermal protection is disabled.

1: enabled.

The motor thermal proteciton is enabled.

Tens place: sensor type

0: temperature sensor PT100

1: temperature sensor PT1000

Choose the sensor type of motor thermal protection.

P30.02	Motor overheat detection	Range: 0.0℃～200.0℃	Default: 85.0℃

When the ones place of P30.01 is set to 1, and at the same time if the temperature detected by the sensor is greater than value of P30.02, the variable frequency drive reports a motor overheat fault.

P30.03	Inverter overload pre-alarm detection selection	Range: 0x000～0x111	Default: 000

Ones place: Overload pre-alarm detection selection

0: always check during running

The overload pre-alarm detection is always effectivethe if the drive is running.

1: delection at constant speed operation only

The overload pre-alarm detection is only effective when the drive runs with constant speed, i.e. it is not detected during acceleration or deceleration process.

Tens place: Overload pre-alarm detection level selection

0: detection level is relative to rated current of motor

This setting is to determin that P30.04 level value is relative to motor's rated current. If the output

current reaches the overload pre-alarm level and lasts for the time set in P30.05, the drive gets overload pre-alarm fault.

1: detection level is relative to rated current of variable frequency drive

This setting is to determin that P30.04 level value is relative to inverter's rated current. If the output current reaches the overload pre-alarm level and lasts for the time set in P30.05, the drive gets overload pre-alarm fault.

Hundreds place: Overload pre-alarm protection validation

0: The overload pre-alarm deteciton is disabled.

1: The overload pre-alarm detction is enabled.

P30.04	Detection level of overload pre-alarm	Range: 20.0%～200.0%	Default: 160.0%
P30.05	Overload pre-alarm detection time	Range: 0.0s～60.0s	Default: 5.0s

P30.04 is used to set the current detection value of overload pre-alarm. Whether the detected percentage value is relative to the rated current of the motor or the rated current of the variable frequency drive depends on the tens setting value of P30.03.

P30.05 is used for setting the detection time of overload pre-alarm. When the actual output current is greater than the setting value of P30.04 and the duration is over the time set in P30.05, the drive reports an overload pre-alarm fault.

P30.06	Inverter output side load loss detection	Range: 0～4	Default: 0

0: Inverter output side load loss detection invalid

1: Always detect during runing (Continue running)

The detection is always effective when the drive is running. If load loss is detected, the drive indicates Er.LLd and continue running.

2: Only detect during constant speed (continue running)

The detection is effective when the drive is running with constant speed. If load loss is detected, the drive indicates Er.LLd and continue running.

3: Always detect during runing (freewheeled stop)

The detection is always effective when the drive is running. If load loss is detected, the drive indicates

Er.LLd and then freewheels until stop.

4: Only detect during constant speed (freewheeled stop)

The detection is effective when the drive is running with constant speed. If load loss is detected, the drive indicates Er.LLd and then freewheels until stop.

P30.07	Inverter output side load loss detection level	Range: 0.0%～100.0%	Default: 30.0%
P30.08	Inverter output side load loss detection time	Range: 0.0s～3600.0s	Default: 1.0s

P30.07 is to used to set the detected current level of load loss fault, the percentage level is relative to the rated currrent of the drive.

P30.08 is to used to set the duration of detected level for load loss error. If the detected current level is lower than P30.07 and lasts over the time set in P30.08, the drive gets load loss error.

P30.09	Automatic reset time(s)	Range: 0～100	Default: 0
P30.10	Automatic reset interval	Range: 0.1s～100.0s	Default: 1.0s

After a fault occurs during the running process of the drive, the drive automatically resets the fault after waiting the time set in P30.10; When the reset times reached the number set in P30.09, the drive would not reset the fault automatically. When P30.09 is set to 0, automatical reset is prohibited.

P30.11	Fault relay action selection	Range: 0x00～0x11	Default: 00

Ones place: action during automatic reset

0: Active

1: No action

This is to set the fault relay actuation works or not during automatical reset.

Tens place: action during undervoltage

0: Active

1: No action

This is to set the fault relay actuation works or not when the drive in under-voltage status.

P30.12	Option of enhanced protections	Range: 0x000～0x111	Default: 101

Ones place: output phase loss detection

0: disabled

1: enabled

Chosse the drive output phase loss detection works or not.

Tens place: input phase loss detection

0: disabled

1: enabled

Chosse the drive input phase loss detection works or not.

Hundreds place: motor overload detection

0: disabled

1: enabled

Chosse the motor overload protection works or not.

P30.13	Fault history record saving mode	Range: 0～1	Default: 1

It is used to set the way of the fault information data saving when the variable frequency drive gets power failure. It is not recommended to modify this parameter.

0: fault history reset at power failure

1: fault history saved at power failure

P30.14	Fault protection action selector1	Range: 0x0000～0x1111	Default: 1111
P30.15	Fault protection action selector2	Range: 0x0000～0x1111	Default: 1111

These two selectors are to set whether the drive continues running or enters freewheeled stop when specific types of fault occurs. Check the parameter list for specific fault types.

P40 group: Process PID Control Parameters

Process PID control carries out the proportional, integral, and differential operations based on the difference between the feedback signal and the target signal of the controlled object, which is a commonly used method in industrial process control. Choose PID control output as the frequency setting to form a

closed-loop control system. Generally, it is suitable for applicatoins such as constant pressure water supply and constant tension control.

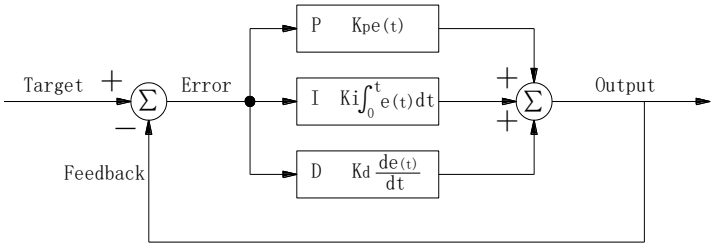


Figure 5-20 PID control schematic diagram

- Proportional control Kp: once the deviation between the feedback quantity and the target quantity occurs, the proportional gain Kp will act immediately, so that the feedback quantity changes in the direction of reducing the deviation. The larger Kp, the faster the system response, but too large Kp may cause system oscillation.
- Integral control Ti: it is mainly used for eliminating the static deviation. The integral control depends on the length of the integral time; the longer the integral time, the weaker the integral action and the slower the system response; the shorter the integral time, the stronger the integral action and the faster the system response.
- Differential control Td: it is mainly used for reflecting the change rate of deviation. A correction amount is introduced before the deviation signal changes, so the response speed of the system is quickened; the longer the differential time, the stronger the effect, and the shorter the differential time, the weaker the effect.

P40.00	PID reference setting channel selection	Range: 0～8	Default: 0

0: digital setting in P40.01

1: setting by analog input AI1

2: setting by analog input AI2

3: setting by analog input AI3

4: Min[AI1,AI2]

5: Max[AI1,AI2]

6: Sub[AI1,AI2]

7: Add[AI1,AI2]

8: Setting by pulse input HDI

This parameter is used to choose the reference channel of PID target quantity

P40.01	PID digital setting value	Range: 0.0%～100.0%	Default: 50.0%

When P40.00 is set to 0, the PID target quantity is set by P40.01.

P40.02	PID feedback channel selection	Range: 0～8	Default: 1

0: Constant zero feedback

1: feedback by analog input AI1

2: feedback by analog input AI2

3: feedback by analog input AI3

4: Min[AI1,AI2]

5: Max[AI1,AI2]

6: Sub[AI1,AI2]

7: Add[AI1,AI2]

8：feedback by pulse input HDI

This parameter is to choose the feedback channel.

P40.03	Proportional gain Kp1	Range: 0.0～100.0	Default: 50.0
P40.04	Integral time Ti1	Range: 0.000s～50.000s	Default: 0.500s
P40.05	Differential time Td1	Range: 0.000s～50.000s	Default: 0.000s
P40.06	Proportional gain Kp2	Range: 0.0～100.0	Default: 50.0
P40.07	Integral time Ti2	Range: 0.000s～50.000s	Default: 0.500s
P40.08	Differential time Td2	Range: 0.000s～50.000s	Default: 0.000s

Refer to the PID control instruction for the usage of the two groups of Kp, Ti, Td parameters. For general applications, PI adjustment is enough. Improper use of differential control can easily cause system oscillation.

P40.09	PID parameters switching	Range: 0～2	Default: 0

	method		

0: use Kp1、Ki1 and Kd1 only (no switching)

1: Switching according to input deviation value

When the difference between target and feedback is larger than P40.10, PID operation switches to P40.06~P40.08; while the deviation is smaller than P40.10, PID control returns to P40.03~P40.05.

2: Switching by terminal

When the input terminal set as “PID parameters switching” is activated, PID switches to P40.06~P40.08; when this terminal is off, PID operation gets back to P40.03~P40.05

P40.10	Input deviation value for PID switching	Range: 0.0%～100.0%	Default: 20.0%

The deviation benchmark value when PID parameters are automatically switched.

P40.11	PID regulating selection	Range: 0x00～0x11	Default: 11

Ones place: Output frequency

0: shall be same as preset running direction

When the PID regulated output frequency is inconsistent with the preset running direction, the PID output is forced to be 0.

1: could be reversed to preset running direction

When the PID adjustment output frequency is opposite to the preset running direction, the PID outputs as usual.

Tens place: Integral mode

0: Integral regulating continues when it reaches uppler/lower limit

When the PID adjustment reaches the upper or lower limit, the integrator continues accumulation. In this way, it takes quite long time to get out of integral saturation status.

1: Integral regulating stops when it reaches uppler/lower limit

When the PID adjustment reaches the upper or lower limit, the integrator stops accumulating, and in this way, the integral saturation status can be quickly exited.

P40.12	PID positive and negative effect	Range: 0～1	Default: 0

0: Positive effect

When the feedback is lower than the target, the output frequency rises.

1: Negative effect

When the feedback is lower than the target, the output frequency drops.

P40.13	PID giving filtering time	Range: 0.00s～10.00s	Default: 0.00s
P40.14	PID feedback filtering time	Range: 0.00s～10.00s	Default: 0.00s
P40.15	PID output filtering time	Range: 0.00s～10.00s	Default: 0.00s

Increasing the filtering time can improve the anti-interference ability of the system; but it will bring about a decrease in the system response capability.

P40.16	Sampling period	Range: 0.001s～50.000s	Default: 0.002s

It is a cycle period for sampling the feedback signal and doing the calculation. The longer the sampling period, the slower the system response.

P40.17	Deviation tolerance	Range: 0.0%～100.0%	Default: 0.0%

When the deviation between the feedback quantity and the target quantity is less than this value, the PID stops adjusting. When it is larger than this value, the PID regulating works. This function helps to balance the stability and accuracy of the system.

P40.18	Differential amplitude limit	Range: 0.0%～100.0%	Default: 0.5%

Limiting the amplitude of PID differential adjustment helps to improve the stability of the differential operator.

P40.19	PID initial value	Range: 0.0%～100.0%	Default: 0.0%
P40.20	PID initial value holding time	Range: 0.0s～3600.0s	Default: 0.0s

When the variable frequency drive starts running, it outputs frequency of initial value firstly, and after holding it for a period of time set in P40.20, PID adjustment starts to take control.

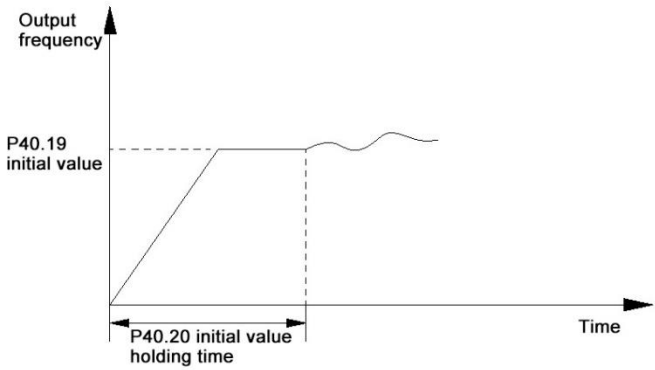


Figure 5-21 PID initial value schematic diagram

P40.21	PID operation output maximum value	Range: 0.0%～100.0%	Default: 100.0%

Limit the maximum value of PID regulated output.

P40.22	PID reverse output cutoff frequency	Range: 0.00Hz~Maximum frequency	Default: 0.00Hz

Limit the maximum frequency when the PID regulated output direction is opposite to the preset running command.

P40.23	PID operator selection at stop state	Range: 0～1	Default: 0

0: PID stops regulating at stop state

1: PID keeps working at stop state

This is to choose whether the PID regulating continues when the drive is in stop state.

P40.24	PID reference loss detection level	Range: 0.0%～100.0%	Default: 0.0%
P40.25	PID reference loss detection time	Range: 0.00s～30.00s	Default: 1.00s

When the PID reference is less than the setting value of P40.24 and the duration is greater than the value of P40.25, the variable frequency drive will have freewheeled stop or emergency stop according to setting of P40.28.

P40.26	PID feedback loss detection level	Range: 0.0%～100.0%	Default: 0.0%
P40.27	PID feedback loss detection time	Range: 0.00s～30.00s	Default: 1.00s

When the PID feedback value is less than the value of P40.26 and the duration is greater than the value of P40.27, the variable frequency drive will have freewheeled stop or emergency stop according to setting of P40.28.

P40.28	PID signal loss stop mode	Range: 0～1	Default: 0

0: Freewheeled stop

1: Emergency stop

P40.29	Zero frequency upper threshold	Range: P40.30～上限频率	Default: 0.00Hz
P40.30	Zero frequency lower threshold	Range: 0.00Hz～P40.29	Default: 0.00Hz

If P40.31=0 (Waking up by frequency threshold), when PID regulated output frequency≥P40.29, and its duration is longer than the time set in P40.35, the variable frequency drive starts to run with PID regulated output frequency; when the run frequency≤P40.30, and its duration is longer than the value of P40.33, the variable frequency drive stops running and outputs zero frequency.

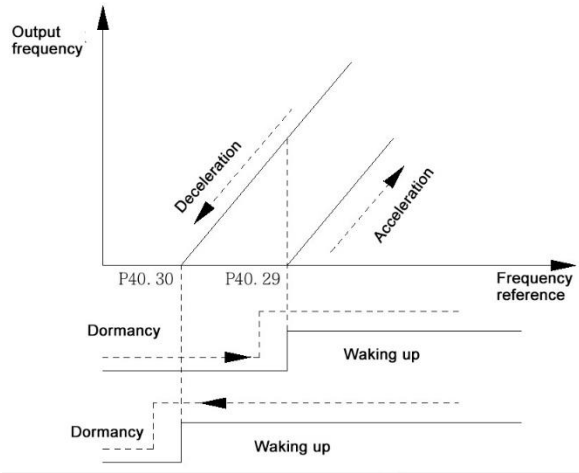


Figure 5-22 Schematic diagram of zero frequency running upper and lower threshold

P40.31	Dormancy waking up mode	Range: 0～1	Default: 0

0: Waking up by frequency threshold

The drive gets into dormancy or wakes up based on PID output frequency.

1: Waking up by pressure threshold

The drive gets into dormancy or wakes up based on detected pressure level.

P40.32	Dormancy pressure detection value	Range: P40.34～P40.37	Default: 1000

If P40.31=1, when the feedback pressure ≥P40.32, and lasts over the time set in P40.33, the drive enters dormancy.

P40.33	Dormancy detection delay	Range: 0.00s～30.00s	Default: 1.00s

The delay time the drive takes to enter the dormancy state.

P40.34	Waking up pressure value	Range: 0～P40.32	Default: 0

If P40.31=1, when feedback pressure≤P40.34, and the duration is over the time set in P40.35, the variable frequency drive wakes up from dormancy.

P40.35	Waking up detection delay	Range: 0.00s～30.00s	Default: 0.50s

The delay time the drive takes to wake up from dormancy state.

P40.37	PID reference and feedback pressure measuring range	Range: 0～10000	Default: 1000

Set the measuring range of the pressure sensor.

P41 group: Multi-step Frequency Parameters

P41.00	Multi-step digital setting 1	Range: P00.09～P00.08	Default: 0.00Hz
P41.01	Multi-step digital setting 2	Range: P00.09～P00.08	Default: 0.00Hz
P41.02	Multi-step digital setting 3	Range: P00.09～P00.08	Default: 0.00Hz
P41.03	Multi-step digital setting 4	Range: P00.09～P00.08	Default: 0.00Hz
P41.04	Multi-step digital setting 5	Range: P00.09～P00.08	Default: 0.00Hz
P41.05	Multi-step digital setting 6	Range: P00.09～P00.08	Default: 0.00Hz
P41.06	Multi-step digital setting 7	Range: P00.09～P00.08	Default: 0.00Hz
P41.07	Multi-step digital setting 8	Range: P00.09～P00.08	Default: 0.00Hz
P41.08	Multi-step digital setting 9	Range: P00.09～P00.08	Default: 0.00Hz
P41.09	Multi-step digital setting 10	Range: P00.09～P00.08	Default: 0.00Hz

P41.10	Multi-step digital setting 11	Range: P00.09～P00.08	Default: 0.00Hz
P41.11	Multi-step digital setting 12	Range: P00.09～P00.08	Default: 0.00Hz
P41.12	Multi-step digital setting 13	Range: P00.09～P00.08	Default: 0.00Hz
P41.13	Multi-step digital setting 14	Range: P00.09～P00.08	Default: 0.00Hz
P41.14	Multi-step digital setting 15	Range: P00.09～P00.08	Default: 0.00Hz

Up to 16 steps of frequency could be switched by using different combinations of Multi-step terminals 1~4. Please refer to the section of introduction for digital terminals for the specific setting method.

P41.15	Multi-step frequency 1 setting channel	Range: 0～9	Default: 0

0: Digital setting P41.00

1: Analog input AI1

2: Analog input AI2

3: Analog input AI3

4: Min[AI1,AI2]

5: Max[AI1,AI2]

6: Sub[AI1,AI2]

7: Add[AI1,AI2]

8: Pulse setting by HDI

9: Process PID

This parameter is to set the step-1 frequency reference channel.

P42 group: Simple PLC

The simple PLC function is to realize the automatic switching of actual running conditions of the variable frequency drive according to the preset stage frequency and stage time so as to meet the production techniques requirement. Its control flow diagram is as below.

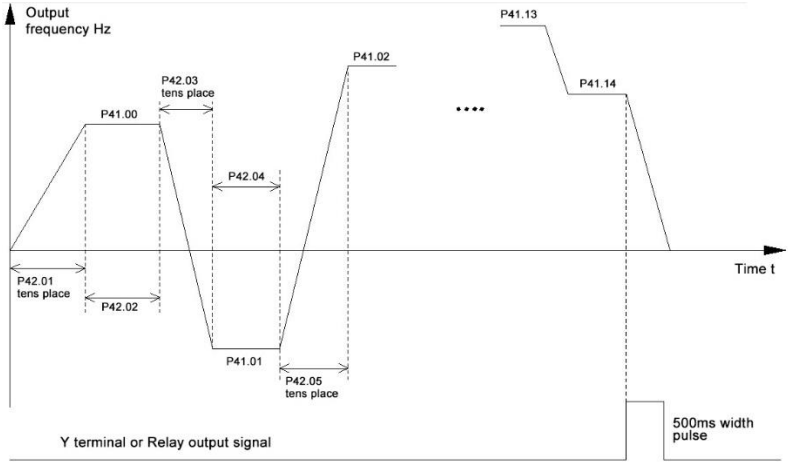


Figure 5-23 Simple PLC running schematic diagram

P42.00	Simple PLC operation mode selection	Range: 0x0000～0x1111	Default: 0000

Ones place: Simple PLC running mode

0: Run a single cycle and stop

The variable frequency drive stops automatically when one cycle of PLC operation is completed. It would not start until a new run command is given.

1: Run a single cycle and maintain final value

When one cycle of PLC operatoin is completed, the drive continues running with the final stage frequency until stop command is given.

2: Continuous cycle running

When one cycle of PLC operation is completed, the drive automatically starts from the first stage of a new cycle until stop command is given.

Tens place: Simple PLC starting mode

0: Start from stage-1

The drive does not memorize the current running stage when it stops and would run from the first stage when restarting.

1: Start from frequency of the interrupted stage

The drive memorizes the current running stage when it stops and would start again from this memorized stage where it stopped.

Hundreds place: Simple PLC saving options at power failure

0: Reset at power failure

The drive does not memorize the current running stage when it gets power failure and would restart from the first stage when it is powered up again.

1: Saved at power failure

The drive memorizes the current running stage when it gets power failure and would restart from this memorized stage where it stopped when it is powered up again.

Thousands place: Simple PLC time unit

0: Second (s)

1: Minute (min)

This place is to set the running time unit of PLC stages.

P42.01	PLC stage 1 setting	Range: 0x00～0x13	Default: 00

Ones place: Stage running direction of simple PLC

0: Forward

1: Reverse

This is to define the running direction of PLC stage-1

Tens place: Stage Acc./Dec. time of simple PLC

0: Acc./Dec. time 1

1: Acc./Dec. time 2

2: Acc./Dec. time 3

3: Acc./Dec. time 4

This is to choose the PLC stage-1 Acc./Dec. time

P42.02	Stage 1 running time	Range: 0.0～3276.7	Default: 0.0

This parameter is used to set the running time of PLC stage-1, time unit is determined in P42.00 thousands place setting. PLC stage-1 running frequency is determined by P41.00 value, and PLC stage-2 frequency is determined by P41.02, and on the analogy of this PLC stage-15 frequency is determined by P41.14.

P42.03	PLC stage 2 setting	Range: 0x00～0x13	Default: 00
P42.04	Stage 2 running time	Range: 0.0～3276.7	Default: 0.0
P42.05	PLC stage 3 setting	Range: 0x00～0x13	Default: 00
P42.06	Stage 3 running time	Range: 0.0～3276.7	Default: 0.0
P42.07	PLC stage 4 setting	Range: 0x00～0x13	Default: 00
P42.08	Stage 4 running time	Range: 0.0～3276.7	Default: 0.0
P42.09	PLC stage 5 setting	Range: 0x00～0x13	Default: 00
P42.10	Stage 5 running time	Range: 0.0～3276.7	Default: 0.0
P42.11	PLC stage 6 setting	Range: 0x00～0x13	Default: 00
P42.12	Stage 6 running time	Range: 0.0～3276.7	Default: 0.0
P42.13	PLC stage 7 setting	Range: 0x00～0x13	Default: 00
P42.14	Stage 7 running time	Range: 0.0～3276.7	Default: 0.0
P42.15	PLC stage 8 setting	Range: 0x00～0x13	Default: 00
P42.16	Stage 8 running time	Range: 0.0～3276.7	Default: 0.0
P42.17	PLC stage 9 setting	Range: 0x00～0x13	Default: 00
P42.18	Stage 9 running time	Range: 0.0～3276.7	Default: 0.0
P42.19	PLC stage 10 setting	Range: 0x00～0x13	Default: 00
P42.20	Stage 10 running time	Range: 0.0～3276.7	Default: 0.0
P42.21	PLC stage 11 setting	Range: 0x00～0x13	Default: 00
P42.22	Stage 11 running time	Range: 0.0～3276.7	Default: 0.0
P42.23	PLC stage 12 setting	Range: 0x00～0x13	Default: 00
P42.24	Stage 12 running time	Range: 0.0～3276.7	Default: 0.0
P42.25	PLC stage 13 setting	Range: 0x00～0x13	Default: 00
P42.26	Stage 13 running time	Range: 0.0～3276.7	Default: 0.0

P42.27	PLC stage 14 setting	Range: 0x00～0x13	Default: 00
P42.28	Stage 14 running time	Range: 0.0～3276.7	Default: 0.0
P42.29	PLC stage 15 setting	Range: 0x00～0x13	Default: 00
P42.30	Stage 15 running time	Range: 0.0～3276.7	Default: 0.0

The PLC stage2~stage15 setting method is the same as that of stage-1. Please refer to the stage-1 instruction for details.

P43 group: Fixed length control and Linear Velocity Parameters

P43.00	Preset count number	Range: 1～65535	Default: 1000
P43.01	Specified count number	Range: 1～P43.00	Default: 1000

This parameter, assisted with digital input and output terminals setting, is able to realize the number count function of terminal X and the count number arrival output of terminal Y.

P43.02	Length arrival action selection	Range: 0x0000～0x1111	Default: 0000

Ones place: Length arrival

0: Continue running

1: Stop

Tens palce: Length unit

0: meter

1: 10 meters

Hundreds place: Length clearance at stop state

0: clearance disabled

1: clearance enabled

P43.03	Preset length	Range: 0m～65535m	Default: 0m

When the detected length reaches the preset length value of P43.03, the digital output terminal set as “Preset length arrival” output valid signal and the drive would act by the way set in ones place of P43.02.

P43.04	Pulse number per meter	Range: 0.1～6553.5	Default: 1000.0

Set the pulse number that corresponds to one meter for length calculation.

P43.05	Linear velocity display coefficient	Range: 0.0%～1000.0%	Default: 0.0%

This is to set the adjustment coefficient for linear velocity display.

P50 group: Modbus Communication Parameters

The drive supports general Modbus protocol, refer to Appendix A for detailed protocol content.

P50.00	Local address	Range: 0～247	Default: 1

Set the local communication address, 0 stands for broadcast address, the address range for normal communication is 1~247.

P50.01	Communication baud rate	Range: 0x10～0x55	Default: 31

Ones place: terminal port communicatio baud rate

Tens place: Keypad port communication baud rate

0：4800bps

1：9600bps

2：19200bps

3：38400bps

4：57600bps

5：115200bps

P50.02	Data format	Range: 0x00～0x55	Default: 00

Ones place:

Terminal port data format

Tens place:

Keyboard port 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	Local response delay	Range: 0.000s～60.000s	Default: 0.000s

Delay time for answering the host in communication.

P50.04	Overtime detection time	Range: 0.0s～600.0s	Default: 0.0s

It is used for communication timeout detection, 0.0s: mean no detection

P50.05	Communication error response masking selection	Range: 0x00～0x11	Default: 00

Ones place: terminal port error response masking(screening)

Tens place: keypad port error response masking(screening)

0: Masking valid

1: Masking invalid

P50.06	Master-slave mode selection and follower function setting	Range: 0x0000～0x1122	Default: 0000

Ones place: Terminal port communication master/follower selection

0: Operate stand-alone

1: Operate as Master

2: Operate as Slave

Tens place: Terminal port communication operation address

0: P00.00

1: P40.01

P50.07	Master data operation time interval	Range: 0.010s～1.000s	Default: 0.050s

When the drive is used as a master, this is to define the interval of data sending.

P50.08	Slave received data proportional coefficient	Range: 0.00～10.00	Default: 1.00

When the drive is used as a slave, the received data is scaled by the proportion set here before being written to the operation address (P00.00 or P40.01).

P50.11	Communication special functions	Range: 0x0000～0x3111	Default: 0000 0

Ones place:

0: communication written parameters are not saved.

1: communication written parameters are saved.

Tens place:

0: Register mapping function disabled

1: Register mapping function enabled

P60 group: Motor Control Parameters

P60.00	Carrier frequency	Range: 1.0kHz～16.0kHz	Default: Depends on

Carrier frequency's influences on the drive and motor running mainly include temperature rise, motor wear, interference, leakage current, etc.

High carrier frequency: more temperature rising of the drive, higher output leakage current, and more interference to the external devices; while the motor mechanical deterioration is smaller, motor temperature rising as well as the motor noise also smaller.

Low carrier frequency: smaller temperatuer rising of the drive, enhanced output current harmonics, lower output leakage current and reduced interference to the external devices. But the motor wear increases and noise gets higher.

P60.01	Carrier frequency adjustment setting	Range: 111	Default: 000

Ones place: Random carrier frequency. Only used in asynchronous motor scalar control. Noise is relatively large.

0: Random carrier frequency disabled

1: Random carrier frequency enabled

Tens place: Carrier frequency varying with temperature

0: carrier frequency varying temperature

1: Preset carrier frequency

Hundreds place: Carrier frequency automatic switching according to running frequency

0: carrier frequency switching enabled.

1: carrier frequency switching disabled

P60.02	Pulse width modulation mode	Range: 0～1	Default: 0

0: three phase modulation

1: automatic switching

P60.03	DPWM switching frequency	Range: 5.00Hz~ Max. frequency	Default: 8.00Hz

When P60.02=1, and the output frequency of the variable frequency drive is greater than the setting value of P60.03, the pulse width modulation mode is automatically switched.

P60.04	Magnetic flux brake selection	Range: 0～1	Default: 1

0: disabled

1: enabled

When the magnetic flux braking function is enabled, the motor deceleration time could be shortened and thus realize the effect of faster motor deceleration.

P60.05	Energy consumption brake selection	Range: 0～1	Default: 0

0: disabled

1: enabled

Where braking resistor is used together with the drive for fast stop, the energy consumption brake function shall be chosen.

P60.06	Energy consumption brake activation voltage	Range: 650V～750V	Default: 720V

It is used when P60.05=1. When the DC bus voltage rises to this value, the braking unit is activated and the extra energy brought by the higher voltage in the bus could be consumed in the form of heating through the braking resistor.

P60.07	overvoltage suppression speed adjusting	Range: 0～1	Default: 1

0: disabled

1: enabled

The overvoltage suppression speed adjusting function is to detect the bus voltage and compare it with the value set in P60.08. When the bus voltage exceeds the setting value, the variable frequency drive automatically adjusts the output frequency to maintain the stability of the bus voltage. When the variable frequency drive works with overvoltage suppression speed adjusting, the actual deceleration time is longer than the setting time.

P60.08	Activation voltage for oV suppression speed adjusting	Range: 100.0%～150.0%	Default: 135.0%

The value of activation voltage for overvoltage suppression is the percentage level relative to the drive's rated DC bus voltage.

P60.09	speed adjusting to counter undervoltage	Range: 0～1	Default: 1

0: disabled

1: enabled

The function of speed adjusting to counter undervoltage is that when the bus voltage drops instantaneously, the variable frequency drive reduces the motor speed by reducing the output frequency, and the inertial energy of the load is fed back to the bus side in generating form to maintain the stability of the bus voltage of the variable frequency drive.

P60.10	Activation voltage for undervoltage counter speed adjusting	Range: 50.0%～95.0%	Default: 85.0%

The value of activation voltage for undervoltage counter is a percentage level relative to the rated DC bus voltage of the drive.

P60.11	Current limit action selection	Range: 0～1	Default: 1

0: disabled

1: enabled

If the output current exceeds the current limiting value set by P60.12, the variable frequency drive starts to reduce the output frequency until the output current is less than the setting current limit value, and then continues to accelerate to the target frequency. When the drive enters the current limit status, it causes the actual acceleration and deceleration time to be extended, but it can effectively prevent the drive from overcurrent fault.

P60.12	Current limit level	Range: 20.0%～200.0%	Default: 160.0%

The current limit level setting value is a percentage level relative to the rated current of the variable frequency drive.

P60.13	Slip compensation gain	Range: 0.0%～300.0%	Default: 100.0%

When the load increases, it causes the motor speed to decrease. By setting an appropriate slip compensation gain value, it helps to maintain the motor speed stable in case of load fluctuation or heavy load.

P60.14	Frequency resolution selection	Range: 0～1	Default: 0

0: 0.01Hz

User to choose this based on application demand, the maximum frequency P00.07 could be set 300Hz and below

1: 0.1Hz

User to choose this based on application demand, the maximum frequency P00.07 could be set 0Hz~1500Hz.

P61 group: Encoder Parameters

P61.00	Speed feedback encoder type	Range: 0～3	Default: 0

0: wire-sharing photoelectric encoder

1: Position type photoelectric encoder

2: Resolver encoder

The encoder type for speed feedback is set in this parameter.

P61.01	Encoder resolution	Range: 0～10000	Default: 1024

When with-PG vector control (VC) is selected, the resolution of the motor speed feedback encoder must be set correctly, otherwise the motor cannot run properly.

P61.02	Electric angle offset	Range: 0.00° ～359.99°	Default: 0.00°

The initial angle of the encoder installation position, it is recognized by motor tuning; this determines the angle of the encoder installation origin relative to the magnetic pole.

P61.03	Encoder signal phase sequence	Range: 0～1	Default: 0

0: Normal, i.e. Phase-A is leading phase-B in forward running

1: Reverse, i.e. Phase-B is leading phase-A in forward running

P61.04	Numerator of electronic gear ratio	Range: 1～65535	Default: 1000
P61.05	Denominator of electronic gear ratio	Range: 1～65535	Default: 1000

This is to set the transmission ratio between encoder installation shaft and motor shaft.

P61.06	Resolver pole pairs number	Range: 1～32	Default: 1

Set how many pole pairs does the resolver encoder have.

P61.07	Sine signal offset	Range: 1～65535	Default: 0
P61.08	Cosine signal offset	Range: 1～65535	Default: 0
P61.09	Sine signal gain	Range: 1～8192	Default: 4096
P61.10	Cosine signal gain	Range: 1～8192	Default: 4096

P61.11	Overspeed detection level	Range: 0.0%～120.0%	Default: 120.0%
P61.12	Overspeed detection time	Range: 0.00s～20.00s	Default: 0.00s

When the encoder measured speed is larger than the overspeed detection level set in P61.11 and the duration is longer than Overspeed detection time, the drive reports overspeed error. The overspeed detection value is present frequency setting * Overspeed detection level

P61.13	Over-deviation detection level	Range: 10.0%～50.0%	Default: 10.0%
P61.14	Over-deviation detection time	Range: 0.00s～20.00s	Default: 0.00s

When the encoder measured speed is larger than the over-deviation detection value and the duration is longer than Over deviation detection time, the drive reports over-deviation error. The over-deviation

detection actual value is present frequency setting * Over-deviation detection level

P61.15	Off-line detection time	Range: 0.0s～8.0s	Default: 0.0s

When the encoder speed measuring is enabled, if there is no encoder signal could be detected over a period of time set in P61.15, the drive reports Encoder error.

P62 group: Motor Characteristics Parameters

P62.00	Asynchronous motor stator resistance	Range: 0.001Ω～65.000Ω	Default: Depends on model
P62.01	Asynchronous motor rotor resistance	Range: 0.001Ω～65.000Ω	Default: Depends on model
P62.02	Asynchronous motor leakage inductance	Range: 0.01mH～650.00mH	Default: Depends on model
P62.03	Asynchronous motor mutual inductance	Range: 0.01mH～650.00mH	Default: Depends on model
P62.04	Asynchronous motor no-load current	Range: 0.1A～P63.02	Default: Depends on model
P62.05	Asynchronous motor stator resistance high level	Range: 0～65535	Default: Depends on model
P62.06	Asynchronous motor rotor resistance high level	Range: 0～65535	Default: Depends on model
P62.07	Asynchronous motor leakage inductance high level	Range: 0～65535	Default: Depends on model
P62.08	Asynchronous motor mutual inductance high level	Range: 0～65535	Default: Depends on model

The above group is characteristic parameters of asynchronous motors, whose default values are automatically set according to the drive's power rating. These characteristic parameters could be also recognized automatically by static or dynamic motor tuning. They could be also provided by the motor manufacturer.

P62.09	Synchronous motor stator resistance	Range: 0.001Ω～65.000Ω	Default: Depends on model
P62.10	Synchronous motor direct axis inductance	Range: 0.01mH～650.00mH	Default: Depends on model
P62.11	Synchronous motor quadrature axis inductance	Range: 0.01mH～650.00mH	Default: Depends on model
P62.12	Synchronous motor counter EMF	Range: 0.1V～2000.0V	Default: Depends on model

P62.13	Synchronous motor stator resistance high level	Range: 0～65535	Default: Depends on model
P62.14	Synchronous motor direct axis inductance high level	Range: 0～65535	Default: Depends on model
P62.15	Synchronous motor quadrature axis inductance high level	Range: 0～65535	Default: Depends on model

This group is characteristic parameters of synchronous motor. The default values are set automatically in software according to the drive's power rating. The static or dynamic motor tunning function could also identify these characteristics and automatically set the value to each parameter. They could be also provided by the motor manufacturer.

P62.16	Synchronous motor field-weakening mode	Range: 0～2	Default: 0
P62.17	Synchronous motor field-weakening gain	Range: 0.0%～100.0%	Default: 10.0%

0: no field-weakening function

The synchronous motor does not perform the field-weakening function. In this mode, the synchronous motor shall run within rated speed and the motor running current is small.

1: Automatic regulating mode

The higher the speed, the larger the field-weakening current. When it reaches the motor rated current, the speed could not increase any longer. When faster speeding up is needed in field-weakening, the gain value could be increased appropriately.

2: Direct calculation mode

P62.18	Synchronous motor initial angle detection mode	Range: 0～2	Default: 1
P62.19	Synchronous motor initial angle detection current	Range: 30.0%～100.0%	Default: 100.0%

0: Detection disabled

1: Detection in each time of run

2: Detection in first time of run after powered up

The initial angle detection is normally used in No-PG vector control(SVC). Its advantage is that the motor would not run reversely at starting, but the motor gets some noise in the process of this detection.

P62.20	Synchronous motor Max. torque/current ratio	Range: 0～1	Default: 0

Ones place: Maximum torque/current ratio

0: Disabled

1: Enabled

When the PM synchronous motor of salient pole type is used, by setting P62.20=1 the drive is enabled to output lower current at the same load.

Tens place: Reserved

Hundreds place: Reserved

Thousands place: Synchronous motor current loop adjustment

0: Current decoupling mode 1

1: Current decoupling mode 2

P62.21	Synchronous motor salient pole ratio adjusting gain	Range: 50.0%～500.0%	Default: 100.0%
P62.22	Synchronous motor inductance detection current	Range: 30.0%～120.0%	Default: 80.0%

This is to set the curren level when the synchronous motor direct axis and quadrature axis inductance values are identified in motor tuning.

P62.23	Synchronous motor running excitation current	Range: 0.0%～P62.24	Default: 0.0%
P62.24	Synchronous motor low speed excitation current	Range: P62.23～120.0%	Default: 30.0%
P62.25	Synchronous motor low speed switching frequency	Range: 0.0%～100.0%	Default: 20.0%

This is to set the synchronous motor running excitation current, low speed running excitation current and low speed switching frequency.

P63 group: Motor Nameplate Parameters

P63.00	Motor rated power	Range: 0.2kW～6000.0kW	Default: Depends on
P63.01	Motor rated voltage	Range: 1V～480V	Default: Depends on

P63.02	Motor rated current	Range: 0.1A～6000.0A	Default: Depends on
P63.03	Motor rated frequency	Range: 10.00Hz～300.00Hz	Default: Depends on
P63.04	Motor rated rotary speed	Range: 1～65535 rpm	Default: Depends on
P63.05	Motor pole number	Range: 2～80	Default: Depends on

Please input the correct motor rated values according to the motor nameplate, otherwise the motor might run with under performance or even run abnormally.

P63.06	Motor type	Range: 0～1	Default: 0

0: Asynchronous motor

1: PM synchronous motor

P63.07	Motor parameters autotune	Range: 0～2	Default: 0

0: No autotune

1: Static autotune

It is used when the motor load could not be removed. After correct motor rated values setting, set P63.07=1, press Start key on keypad, the motor starts the process of autotuning. When the tuning is completed, the P63.07 value restores to 0. The static autotuning could identify all motor parameters to ensure the vector control performance.

2: Dynamic autotune

It is used when the motor load is allowed to be removed. After correct motor rated values setting, set P63.07=2, press Start key on keypad, the motor starts the process of autotuning. When the tuning is completed, the P63.07 value restores to 0. The dynamic autotuning could identify all motor parameters to ensure the vector control performance. When dynamic tuning is chosen, the motor shaft is rotating during the tuning process. Please stay away from the rotating shaft of the motor.

P63.08	Motor control mode	Range: 0～2	Default: 0

0: Advanced scalar control

It is suitable to sites where the load control performance requierment is not high or in case of one drive controls multiple motors.

1: No-PG vector control (SVC)

It refers to open-loop vector control, which is suitable to high perfomrance control application sites

where motor encoder is not installed or not available. One drive could only control one motor.

2: With-PG vector control (VC)

It refers to closed-loop vector control. Appropriate encoder matched with the PG card should be installed to the motor. It is suitable for high precision speed control or torque control application sites. One drive could control only one motor.

Chapter VI Fault Diagnosis and Countermeasures

6.1 Fault list and countermeasures

The variable frequency drive may encounter the following fault types during use. Please refer to the countermeasures list for simple problems troubleshooting.

Fault S.N.	Fault code	Fault description	Causes	Countermeasures
1	Er.oc1	Over-current in acceleration	Torque boosting value too large in scalar control mode	Reduce the torque boosting value
			Starting frequency too high	Reduce the starting frequency
			Acceleration time too short	Prolong acceleration time
			Incorrect motor parameters	Set motor parameters correctively according to motor nameplate.
			Load too heavy	Reduce the load
			Restart the rotating motor	Reduce current limit value or use flying start mode
			Output phase to phase or phase to ground SC	Check motor wiring and impedance from output to the ground
			Improper V/F curve in scalar control mode.	Set V/F curve correctly
2	Er.oc2	Over-current in deceleration	Deceleration time too short	Extend deceleration time
			Braking unit and braking resistor not installed	Add braking unit and braking resistor to the drive
3	Er.oc3	Over-current in constant speed running	Drive power rating too small	Choose variable frequency drive with enough power rating.
			Power grid voltage is low	Check power grid voltage
			Load too heavy	Reduce the load
4	Er.ou1	Over-voltage in acceleration	Input voltage abnormal	Check power grid voltage
			Acceleration time too short	Prolong acceleration time
			Load inertia too large	Use energy comsumption braking
5	Er.ou2	Over-voltage in deceleration	Deceleration time too short	Extend deceleration time
			Input voltage abnormal	Check power grid voltage
			Load inertia too large	Use energy comsumption braking
6	Er.ou3	Over-voltage in constant speed running	Input voltage abnormal	Check power grid voltage
			Load fluctuates too much	Check the load

Fault S.N.	Fault code	Fault description	Causes	Countermeasures
7	Er.Lu1	The drive has under-voltage	Input voltage not within the allowable range	Adjust the input voltage within normal rated range.
			Momentary power failure	Reset the fault
			DC bus voltage abnormal	Request technical support
			Rectifier bridge and charging resistor (buffer) abnormal	Request technical support
			Driving board abnormal	Request technical support
			Control board abnormal	Request technical support
8	Er.Cur	Current sensing error	Abnormal connection of control board and driving board	Check the flat cable, unplug and plug in again
			Control board current sensing circuit abnormal	Request technical support
			Driving board current sensing circuilt abnormal	Request technical support
			Current sensor damaged	Request technical support
			SMPS damaged	Request technical support
9	Er.CPU	System interference fault	Severe external interference signal	Request technical support
10	Er.FAL	Fault of Module protection	Output phase to phase SC or phase to ground SC	Check motor wiring and impedance from output to the ground
			Over-voltage or over-current	Follow measures of over-voltage or over-current
			Loose connection of control board cable	Unplug and plug in the control board cable again
			Inverting module direct passing	Request technical support
			Control board abnormal	Request technical support
			SMPS damaged	Request technical support
11	Er.tun	Motor autotune error	Motor parameters not set or wrongly set	Set motor parameters correctly
			Wrong motor wiring	Check motor wiring
12	Er.CCL	Relay actuation fault	Power grid input voltage abnormal	Check power grid voltage
			Contactor damaged	Request technical support
			Buffer resistor damaged	Request technical support
			SMPS abnormal	Request technical support

Fault S.N.	Fault code	Fault description	Causes	Countermeasures
13	Er.EtE	External terminal fault	Multi-function terminal X of external fault has valid input signal	Reset the fault
			Terminal X of external fault is activated by reversing action logic of I/O terminals	Reset the fault
14	Er.oH1	Drive overheat	Ambient temperature too high	Reduce environment temperature
			Fan damaged	Replace the fan
			Air passage blocked	Clear the air passage of the fan
			Temperature detection abnormal	Request technical support
			Inverting module damaged	Request technical support
15	Er.oH2	Motor overheat	Ambient temperature too high	Reduce environment temperature
			Motor heat dissipation is abnormal or the load is too heavy.	Check the motor heat dissipation conditions or reduce the motor load
			Temperature sensing circuit damaged	Request technical support
16	Er.oL1	Drive overload	Input voltage too low	Check the power grid voltage
			Rush restart of the drive when the motor is still running fast	Wait until the motor stop before restarting
			Too heavy load for long time	Shorten the overload time or reduce the load
			Acc./Dec. time too short	Prolong the Acc./Dec. time
			V/F curve ratio setting too high	Adjust V/F curve setting and torque boosting value
			Drive power rating too small	Change to proper power rating drive
17	Er.oL2	Motor overload	Input voltage too low	Check the power grid voltage
			Motor rotating stuck or sudden and severe change of the load	Prevent the motor from being stuck, Avoid sudden and severe change of the load
			Normal motor long time running at low speed with heavy load	Replace with variable frequency motor or increase the running frequency
			Preset motor overload protection time too short	Raise the motor overload protection detection time

Fault S.N.	Fault code	Fault description	Causes	Countermeasures
			V/F curve ratio setting too high	Adjust V/F curve setting and torque boosting value
			DC braking current setting too high	Set the DC braking current level lower
18	Er.ILF	Drive input phase loss	3 phase input power supply abnormal	Check and remove the problem of external wiring
			Driving board abnormal	Request technical support
			Control board abnormal	Request technical support
19	Er.oLF	Drive output phase loss	Drive output side wiring abnormal	Check and remove the problem of external wiring
			Motor 3 phases imbalance	Check the motor or replace the motor
			Driving board abnormal	Request technical support
			Inverting module abnormal	Request technical support
20	Er.LLd	Drive output load loss	Drive running current less tan P30.07	Check whether the load breaks off or if the P30.07 and P30.08 setting is not suitable for the actual running conditions.
21	Er.GdF	Drive to ground SC	Output wiring short circuit to the ground	Check motor wiring and impedance from output to the ground
			Motor insulation abnormal	Check the motor
			Inverting module abnormal	Request technical support
			Leakage current from the output to the ground is too much.	Request technical support
22	Er.EEP	EEPROM writing/reading error	EEPROM writing/reading gets problem	Request technical support
23	Er.Sci	Communication overtime fault	Incorrect setting of communication baud rate	Set correct baud rate
			Communication port disconnection	Reconnect the communication port cable
			Upper controller is not working	Make the upper controller working
			Drive communication parameters wrongly set	Use correct setting
			Interference too much on site	Check peripheral equipment or seek technical support

Fault S.N.	Fault code	Fault description	Causes	Countermeasures
24	Er.tPA	Total power-on time arrival	The accumulated power-on time has reached the preset value	Request technical support
25	Er.trA	Total running time arrival	The accumulated running time has reached the preset value	Request technical support
26	Er.rEF	PID reference loss in running	PID reference channel abnormal	Check the PID reference channel
			P40.24 parameter setting improper	Use correct setting
27	Er.FbL	PID feedback loss in running	PID feedback channel abnormal	Check the PID feedback channel
			P40.26 parameter setting improper	Use correct setting
28	Er.oEP	Speed deviation too large	Speed over-deviation value setting too small	Set the speed over-deviation value correctly
			Load fluctuates too much	Stabilize the load
29	Er.oSP	Motor over-speed	Over-speed value setting too small	Set the over-speed value correctly
			Load fluctuates too much	Stabilize the load
30	Er.Enc	Encoder error	Encoder connection wrong	Change encoder wiring
			Encoder no signal output	Check the encoder functioning and power supply condition
			Encoder cable disconnected	Repair the connection
			Function code setting abnormal	Check and apply correct encoder parameter setting
37	Er.SEF	Speed evaluation fault	Motor unrecognized or parameter incorrect	Do the motor autotune operation again.
39	Er.Cpy	Parameter copy error	Parameter upload/download abnormal	Request technical support
			No parameter saved in keypad for download	Request technical support

Chapter VII Routine Care and Maintenance

7.1 Daily Care

Due to the influence of environment temperature, humidity, dust and vibration, the internal components of the frequency variable frequency drive will be aged, and it will result in the potential fault of the drive or reducing the service life of the variable frequency drive. Therefore, it is necessary to carry out daily and regular maintenance and care of the variable frequency drive.

Daily inspection item:

1) Whether the motor running sound changes abnormally;
2) Whether there is vibration when the motor is running;
3) Whether the installation environment of the variable frequency drive has changed;
4) Whether the cooling fan of the variable frequency drive is working normally;
5) Whether the variable frequency drive gets overheat;

Daily cleaning:

1) The variable frequency drive shall always be kept clean.
2) Dust on the surface of the variable frequency drive, especially metal powder, shall be removed effectively to prevent it from entering the variable frequency drive.
3) Effectively remove oil stains from the cooling fan of the variable frequency drive.

7.2 Routine inspection item

1) Check the air passage of the fan and clean it regularly;
2) Check whether the screws are loose;
3) Check whether the drive is corroded;
4) Check whether there is electrical arcing trace on terminals wiring
5) Main circuit loop insulation test

Reminder: when measuring insulation resistance with a megohmmeter (please use a DC 500V megohmmeter), the variable frequency drive shall be disconnected from the main circuit loop. Do not test the insulation of the control circuit loop with an insulation resistance meter. High voltage withstanding test is not necessary (it was completed in exit factory testing).

Chapter VIII Specifications and Model Selection

8.1 IMD_E Series Technical Specifications and Installation Dimensions

8.1.1 Technical Specifications

Table 8-1 IMD_E series variable frequency drive model numbers and specifications

Item		Specifications															
IMDXXXU43E		1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Adapted motor power (kW)		1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Input rated current		4.6	6.3	11.4	16.7	21.9	32.2	41.3	49.5	59.0	57.0	69.0	89.0	106	139.0	164	196
Output rated current		3.8	5.1	9.0	13.0	17.0	24.0	32.0	37.0	45.0	60.0	75.0	90.0	110	150	180	210
Output	Output voltage	Three phase 0V ~ Rated input voltage															
	Max. output frequency	300.00Hz (Adjustable by parameter)															
	Carrier frequency	1.0kHz～16.0kHz (Automatic adjusted to load characteristics)															
	Overload capacity	160% 60 seconds, 180% 10 seconds, 200% 0.5 second. (Relative to rated current)															
High freq. leakage current measure	DC reactor	Optional external device											Optional inbuilt device				
Brake	Braking unit	Standard Inbuilt											Optional inbuilt				
Power supply	Rated voltage & Freq.	AC： 3phase 360V～460V 50Hz/60Hz															
	Voltage fluctuation	Allowable fluctuation: -15%～10%; Actual allowable span: AC 323V～528V															
	Freq. fluctuation	Allowable frequency fluctuation range: ±5%															
	Power capacity (kVA)	5.0	6.7	12	17.5	22.8	33.4	42.8	45	54	52	63	81	97	127	150	179

Item		Specifications															
IMDXXXU43E		132	160	185	200	220	250	280	315	355	400	450	500	560	630	710	
Adapted motor power (kW)		132	160	185	200	220	250	280	315	355	400	450	500	560	630	710	
Input rated current		240	287	326	365	410	441	495	565	617	687	782	835	920	1050	1180	
Output rated current		260	305	350	377	426	465	520	585	650	725	810	900	1020	1100	1300	
Output	Output voltage	Three phase 0V ~ Rated input voltage															
	Max. output frequency	300.00Hz (Adjustable by parameter)															
	Carrier frequency	1.0kHz～16.0kHz (Automatic adjusted to load characteristics)				0kHz～8.0kHz (Automatic adjusted to load characteristics)											
	Overload capacity	150% 60 seconds, 180% 10 seconds, 200% 0.5 second. (Relative to rated current)															
High freq. leakage current measure	DC reactor	Optoinal Inbuilt	Standard inbuilt DC reactor (315kW~450kW standard external device)P														
Brake	Braking unit	Optional inbuilt	Optional External devices														
Power supply	Rated voltage & Freq.	AC： 3phase 360V～460V 50Hz/60Hz															
	Voltage fluctuation	Allowable fluctuation: -15%～10%; Actual allowable span: AC 323V～528V															
	Freq. fluctuation	Allowable frequency fluctuation range: ±5%															
	Power capacity (kVA)	220	263	304	334	375	404	453	517	565	629	716	769	861	969	1092	

*1: The more rigorous selection method is that the rated output current of the variable frequency drive shall be larger than the rated current of the motor or the maximum load current.

Table 8-2 IMD_E series variable frequency drive technical specifications

Item		Technical Specifications	
Basic Function	Input frequency resolution	Digital setting: 0.01Hz Analog setting: Maximum speed ×0.025%	
	Control mode	Advanced scalar control No-PG vector control (SVC) With-PG vector control (VC)	
	Starting torque	SVC：0.25Hz 150% VC: 0.00Hz 180%	
	Speed regulation range	SVC：1:200	VC：1:1000
	Speed stabilization precision	SVC：±0.5%	VC：±0.2%
	Torque control precision	SVC：±5% (for frequency above 5Hz)	VC：±3% (for frequency above 5Hz)
	Torque repeat input precision	≤0.5% of motor rated torque	
	Torque response time	SVC：≤10ms (motor rated torque)	VC：≤5ms(motor rated torque)
	Torque boosting	Automatic torque boosting; Manually set torque boosting 0.1%~30.0%	
	V/F curve	Straight line, multiple power curve, multiple points curve, V/F separation	
	Acc./Dec. curve	Straight line, polyline, S curve	
	DC brake	DC braking activation frequency: 0.00~300.00Hz; DC braking current: constant torque load 0.0~120.0%, variable torque load 0.0~90.0%; DC braking time: 0.0~30.0s; (Fast DC brake activation without the need of waiting time)	
	Jog control	Jog run frequency range: 0.00Hz~50.00Hz Jog Acc./Dec. time range: 0.0s~3600.0s	
	Process closed loop PID	Process closed-loop control could be realized conveniently.	
	Simple PLC, Multi-step command	Achieve up to 16 steps of frequency control by simple PLC setting or by X terminals	
	Voltage automatic adjusting	When the power grid voltage fluctuates, the output voltage can be automatically kept stable.	
	OC and OV speed adjusting	The current and voltage during operation are automatically limited to prevent the drive from frequent over-current and over-voltage tripping.	
	Automatic fast current limit	Minimize over-current fault possibility and thus ensure the normal operation of the drive.	

Item		Technical Specifications
	Torque limit and control	"Excavator" feature automatically limits the torque during operation to prevent the drive from frequent over-current tripping. Torque control is realzied under vector control mode.
Unique Function	Motentary power loss ride-through	In case of instantaneous power failure, the drive will continue running for a short period of time by compensating the drop voltage with energy feedbacked from the load.
	Fast current limit	Avoid frequent over-current fault of the drive
	Timing	Realize preset timing control of the drive
	Motor thermal protection	Convenient motor temperature detection could be realized by external sensors.
	Parameter copy	Parameters upload and download enable the fast parameter duplicating from one drive to other drives.
	Dual-port Modbus	The double ports support Modbus protocol to realize simple networking function.
	Drive-to-ground SC detection right after powered up	Drive-to-ground short circuilt detection is automatically done when the drive is powered up.
	Meganetic flux brake	By using magnetic flux brake function, faster deceleration and stop can be realized.
Running	Running command	Keyboard command, terminal command, communication command can be switched in a variety of ways.
	Main speed reference	12 types of main speed reference channels can be switched by different ways
	Auxiliary speed reference	9 kinds of auxiliary speed command channels enable flexible auxiliary speed fine adjustment or speed combination.
	Input terminal	● 7 digital X terminals, 1 supports high speed pulse input ● 3 AI terminals, 1 support 0~10V only, 2 supports both 0~10V and 0~20mA
	Output terminal	● 2 relay ouputs ● 2 transistor outputs, only 1 supports high speed pulse output ● 2 AO terminals, 1 supports 0~10V only, 1 supports both 0~10V and 0~20mA
sHuman machine interface	LED display	LED operation keypad
	LCD display	LCD operation keypad
	Keys lock	All keys or partial keys could be locked by setting to avoid mistake operation from the keypad.
	Emergency Stop by keypad	Realize emergency stop from keypad Stop key no matter what command mode is used, reducing the risk of mistake operation.

Item		Technical Specifications
Protection	SC	Output side phase to phase SC protection; output side phase to ground SC protection
	Over-current	For the purpose of protection, the drive stops when the output current is over 2.2 times of its rated current.
	Over-voltage	For the purpose of protection, the drive stops when the main loop DC bus voltage is higher than 800V.
	Undervoltage	For the purpose of protection, the drive stops when the main loop DC bus voltage is less than 320V.
	Overload	The drive stops when the output current lasts 150% for 60 seconds.
	Overheat protection	It is the IGBT module overheat protection
	Phase loss	3 phase input phase loss and output phase loss protection
Environment	Applicable environment	Installed indoor; not exposed to direct sunlight; free of dust, corrosive gas, flammable gas, oil mist, water vapor, water droplets and salt, etc.
	Altitude	Derating is not required below 1000m; derating 1% for every 100m higher above 1000m; and the highest altitude for using the drive shall not be more than 3000m.
	Ambient temperature	-10～+40℃; Derating use in span of 40～50℃, derating 1.5% for every 1℃ higher.
	Humidity	5～95%, no condensation
	Vibration	Less than 5.9 m/s^2
	Storage temperature	-40～+70℃

`8.1.2 Outlines and installation dimensions

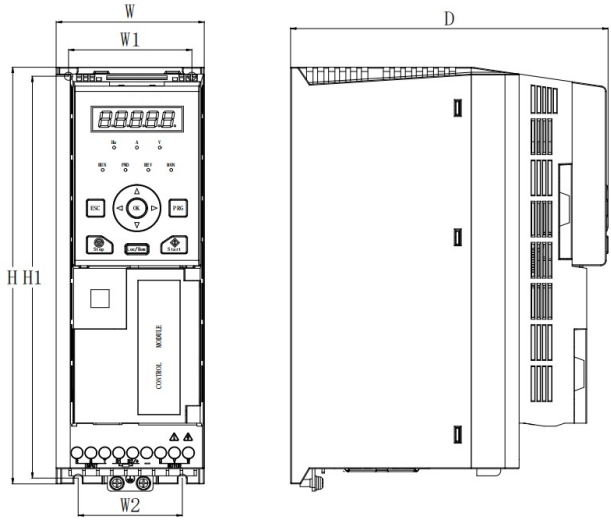


Figure 8-1 IMD552U43E and below installation dimensions

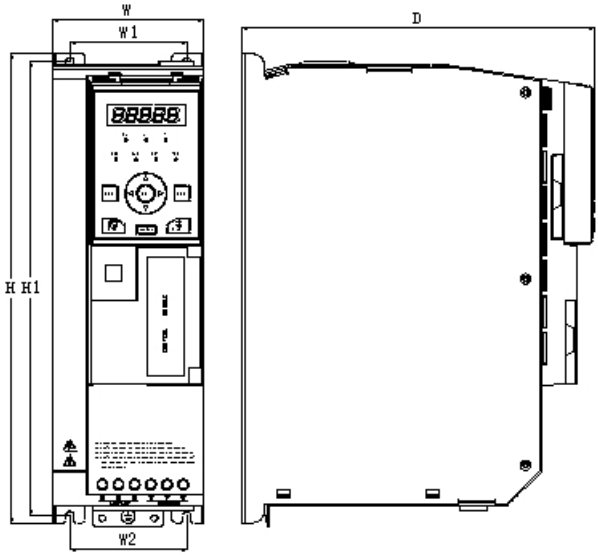


Figure 8-2 IMD752U43E～IMD153U43E installation dimensions

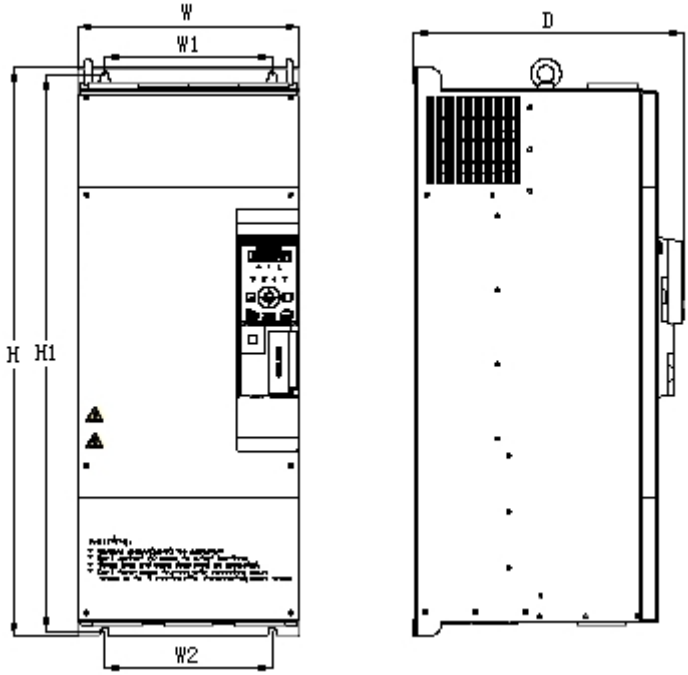


Figure 8-3 IMD183U43E～IMD303U43E installation dimensions

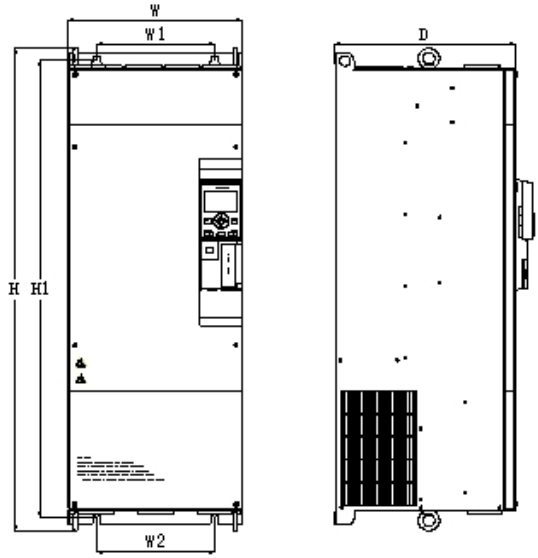


Figure 8-4 IMD373U43E～IMD204U43E installation dimensions

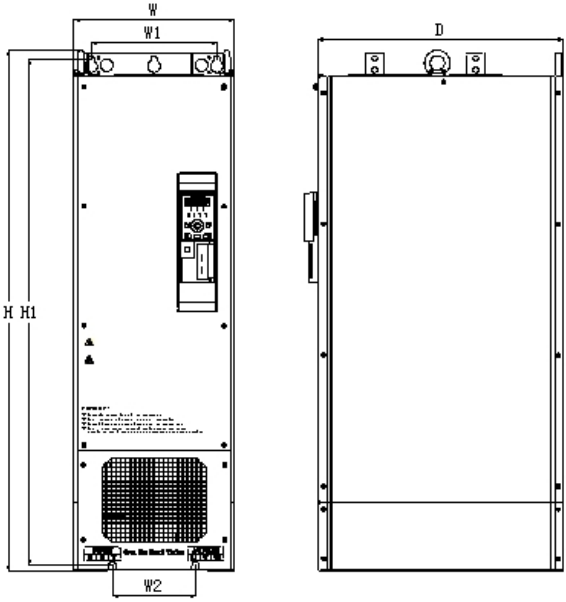


Figure 8-5 IMD224U43E～IMD404U43E installation dimensions

Table 8-3 IMD_E installation dimensions (G type model)

Drive model	Outlines and installation dimensions (mm)						
	W	H	D	W1	W2	H1	Installation hole diameter
IMD152U43E	81	237	173	67.5	57	224.5	4.5
IMD222U43E							
IMD302U43E							
IMD402U43E							
IMD552U43E							
IMD752U43E	95	297	222	73.5	73.5	287.5	6
IMD113U43E							
IMD153U43E							
IMD183U43E	185	440	249	140	140	427.5	7
IMD223U43E							
IMD303U43E							
IMD373U43E	239	604.5	269.5	180	148.5	580	9.5
IMD453U43E							
IMD553U43E	265	690	323	200	200	674	9.5
IMD753U43E							
IMD903U43E	295	833.5	338.5	200	200	810	12
IMD114U43E							
IMD134U43E							
IMD164U43E	399	950	407	265	265	926.5	14
IMD184U43E							
IMD204U43E							
IMD224U43E	339	1104.5	498	265	175	1081.5	14
IMD254U43E							
IMD284U43E							
IMD314U43E	660	989.5 (optional base 350)	392	600	550	962 (optional base 350)	14
IMD354U43E							
IMD404U43E							
IMD454U43E							
IMD504U43E	850	1600	600	-	-	-	16
IMD564U43E							
IMD634U43E							
IMD714U43E							

8.1.3 Operation keypad outlines and keypad holder dimensions

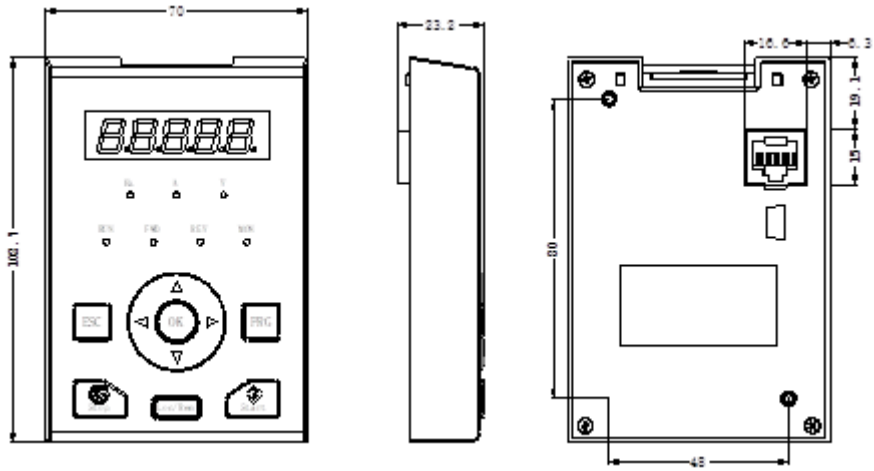


Figure 8-6 Keypad outlines dimensions

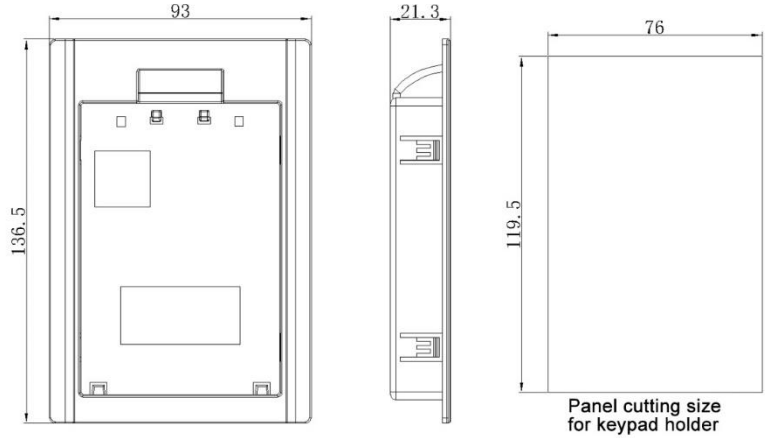


Figure 8-7 Keypad holder dimensions

8.2 Optional parts specifications

8.2.1 Peripheral devices selection guide

Table 8-5 Peripheral devices

Drive model	Circuit Breaker (A)	Contactor (A)
IMD152U43E	10	9
IMD222U43E	16	12
IMD302U43E		
IMD402U43E	20	18
IMD552U43E	32	32
IMD752U43E	32	32
IMD113U43E	50	50
IMD153U43E	63	50
IMD183U43E	80	65
IMD223U43E	100	80
IMD303U43E	125	95
IMD373U43E	160	125
IMD453U43E	200	150
IMD553U43E	225	185
IMD753U43E	250	225
IMD903U43E	315	265

Drive model	Circuit Breaker (A)	Contactor (A)
IMD114U43E	350	330
IMD134U43E	400	400
IMD164U43E	500	400
IMD184U43E	500	500
IMD204U43E	630	500
IMD224U43E	630	630
IMD254U43E	800	630
IMD284U43E	800	800
IMD314U43E	800	800
IMD354U43E	1000	800
IMD404U43E	1250	1000
IMD454U43E	1250	1000
IMD504U43E	1600	1250
IMD564U43E	1600	1250
IMD634U43E	2000	1600
IMD714U43E	2000	1600

8.2.2 Braking Resistor Selection Table

Drive model	Braking resistor			Braking unit
	Standard Power	Standard resistance	Minimum resistance	
IMD152U43E	260W	400Ω	100Ω	Standard built-in
IMD222U43E	320W	250Ω	100Ω	
IMD402U43E	800W	150Ω	66.7Ω	
IMD552U43E	1600W	100Ω	40Ω	
IMD752U43E	1600W	75Ω	40Ω	
IMD113U43E	2000W	50Ω	25Ω	
IMD153U43E	2000W	40Ω	25Ω	
IMD183U43E	4800W	32Ω	20Ω	
IMD223U43E	4800W	27.2Ω	20Ω	
IMD303U43E	6000W	20Ω	14Ω	
IMD373U43E	9600W (Total power)	15Ω (Total resistance)	12Ω	Optional built-in
IMD453U43E	9600W (Total power)	15Ω (Total resistance)	12Ω	
IMD553U43E	15000W (Total power)	12Ω (Total resistance)	10Ω	
IMD753U43E	20000W (Total power)	8Ω (Total resistance)	5Ω	
IMD903U43E	28800W (Total power)	5Ω (Total resistance)	4Ω	
IMD114U43E	30000W (Total power)	5Ω (Total resistance)	4Ω	
IMD134U43E	35000W (Total power)	5Ω	4Ω	

Appendix A

Modbus Communication Protocol

1. Supported protocol

Support Modbus protocol, RTU format and ASCII code format; broadcast address is 0, follower address setting range is 1~247; address 248~255 is reserved.

2. Interface method

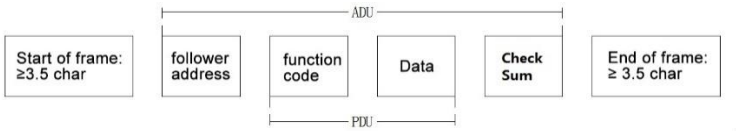
RS485: Asynchronous half-duplex; Lsb(least significant bit) has priority of sending; the higher byte precedes the lower byte.

3. Protocol format

The ADU (Application Data Unit) check is the CRC16 check sum of the first three parts of the ADU obtained by exchanging high and low byte.

If the operation request fails, PDU (Protocol Data Unit) responses with Error code or Abnormal code. The Error code is equal to Function code+0x80. While the Abnormal code indicates the specific cause of the error.

The RTU data frame format is as follows:



Abnormal code is listed below.

Abnormal code	Abnormal code description	Abnormal code	Abnormal code description
0x01	Invalid function code	0x18	Information frame error
0x02	Invalid register	0x20	Parameter modification fobbiden
0x03	Data error	0x21	Parameter modification during running fobbiden
0x04	Slave operation fails	0x22	Parameter protected by password

4. Function illustration

◆ Function 0x03 reading parameter from multiple registers

Frame data	Data length (bytes)	Range
Request:		
Follower address	1	0～247
Function code	1	0x03
Register start address	2	0x0000～0xFFFF
Number of registers	2	0x0001～0x0010
Check Sum	2	0x0000～0xFFFF
Response:		
Follower address	1	0～247
Function code	1	0x03
Number of read bytes	1	2* number of registers
Read content	2*number of registers	0x0000～0xFFFF
Check Sum	2	0x0000～0xFFFF

◆ Function 0x06(Save) or 0x41(Not save) writes a single register parameter

Frame data	Data length (bytes)	Range
Request:		
Follower address	1	0～247
Function code	1	0x06
Register address	2	0x0000～0xFFFF
Register content	2	0x0000～0xFFFF
Check Sum	2	0x0000～0xFFFF
Response:		
Follower address	1	0～247
Function code	1	0x06
Register address	2	0x0000～0xFFFF
Register content	2	0x0000～0xFFFF
Check Sum	2	0x0000～0xFFFF

◆ Function 0x10(Save) or 0x42(Not save) writes multiple registers

Frame data	Data length (bytes)	Range
Request:		
Follower address	1	0～247
Function code	1	0x10
Register start address	2	0x0000～0xFFFF
Number of registers	2	0x0001～0x0010
Register content bytes number	1	2* number of registers
Register content	2* number of registers	0x0000～0xFFFF

Check Sum	2	0x0000～0xFFFF
Response:		
Follower address	1	0～247
Function code	1	0x10
Register start address	2	0x0000～0xFFFF
Number of registers	2	0x0002～0x0020
Check Sum	2	0x0000～0xFFFF

5. Variable frequency drive register distribution

Refer to the parameter list for exact address of each function code.

6. Variable frequency drive control command word (0x8000) bit description

Control command word (bit)	Description	Control command word (bit)	Description
bit0	0: No operation 1: Run command valid	bit5	0: Stop at fault disabled 1: Stop at fault enabled
bit1	0: Forward Run 1: Reversed Run	bit6	0: Jog forward disabled 1: Jog forward enabled
bit2	0: Stop by deceleration disabled 1: Stop by deceleration enabled	bit7	0: Jog reverse disabled 1: Jog reverse enabled
bit3	0: emergency stop disabled 1: emergency stop enabled	bit8	0: Fault reset command invalid 1: Fault reset command valid
bit4	0: Freewheeled stop disabled 1: Freewheeled stop enabled	bit9～bit15	Reserved

7. Modbus communication examples

Read Drive-#1 preset frequency, and the responded preset frequency is 50.00Hz

	Add.	Function Code	Register add.	Number of register	Number of content bytes	Register content	Check Sum
Requst	0x01	0x03	0x0000	0x0001	Null	Null	0x840A
Respond	0x01	0x03	Null	Null	0x02	0x1388	0xB512

Start the Drive-#1 to run forwardly

	Add.	Function Code	Register add.	Register content	Check Sum

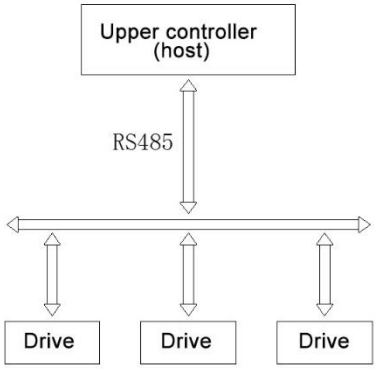
Request	0x01	0x06	0x8000	0x0001	0x61CA
Respond	0x01	0x06	0x8000	0x0001	0x61CA

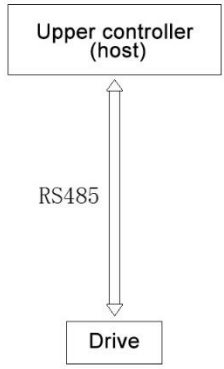
8. CRC16 function

```
unsigned int   crc16（unsigned char *data，unsigned char length）
{
  int i，crc_result=0xffff；
  while（length--）
  {
    crc_result^=*data++；
    for（i=0；i<8；i++）
    {
      if（crc_result&0x01）
      crc_result=（crc_result>>1）^0xa001；
      else
      crc_result=crc_result>>1；
     }
  }
  return （crc_result=（ （crc_result&0xff）<<8）|（crc_result>>8） ）；//交换高低字节
}
```

9. Establishment of communication networking

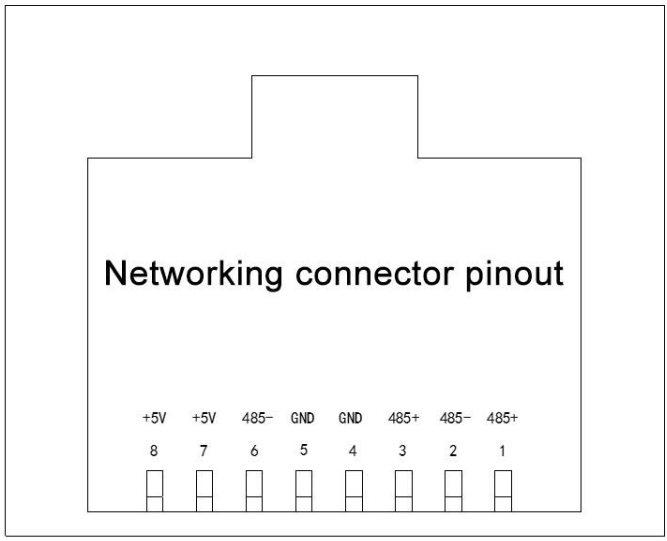
There are 2 types of networking, i.e. Single host/multiple slave and single host/single slave.





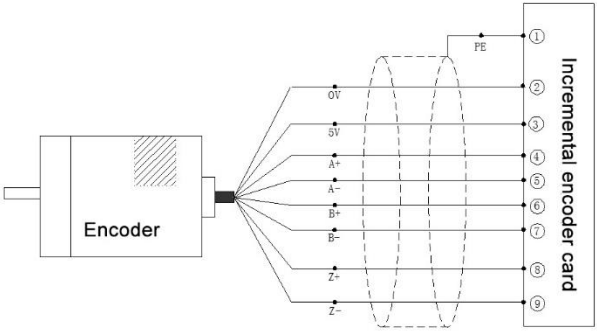
Appendix B

1. Networking connector pinout



Appendix C

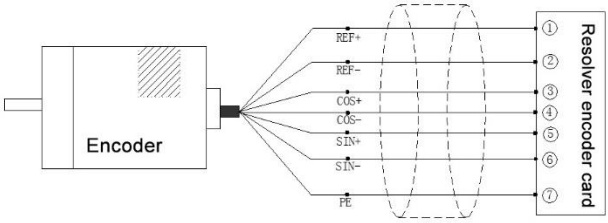
1、HW-PG-ABZ Wiring



Incremental encoder card
HW-PG-ABZ

Wiring Instruction		
1	PE	Earthing signal
2	0V	GND
3	5V	Encoder power supply
4	A+	channel output signal A+
5	A-	channel output signal A-
6	B+	channel output signal B+
7	B-	channel output signal B-
8	Z+	channel output signal Z+
9	Z-	channel output signal Z-

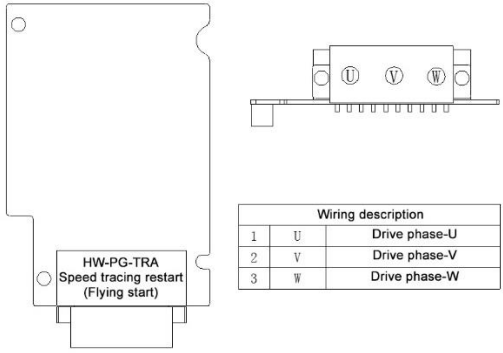
2、HW-PG-RB Wiring



Resolver encoder card
HW-PG-RB

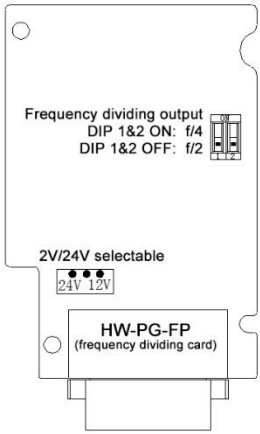
Wiring Instruction		
1	REF+	Resolver excitation +
2	REF-	Resolver excitation -
3	COS+	Resolver feedback COS +
4	COS-	Resolver feedback COS -
5	SIN+	Resolver feedback SIN +
6	SIN-	Resolver feedback SIN -
7	PE	Shielded cable grounding

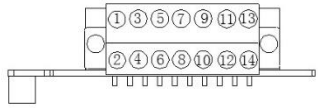
3、HW-PG-TRA Wiring



Wiring description		
1	U	Drive phase-U
2	V	Drive phase-V
3	W	Drive phase-W

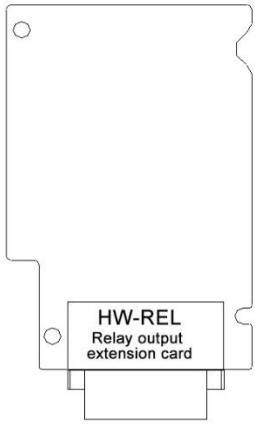
4、HW-PG-FP Wiring

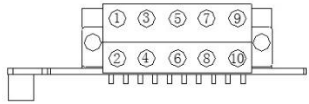




Wiring Instruction		
1	PE	Earthing signal
2	0V	GND
3	12V	Frequency divider card power
4	5V	Frequency divider card power
5	A+	Encoder signal input, Maximum responding 300kHz
6	A−	
7	B+	
8	B−	
9	Z+	
10	Z−	
11	OUTA	Frequency dividing output A
12	OUTB	Frequency dividing output B
13	0V	GND
14	NC	NULL

5、HW-REL Wiring





Wiring Instruction		
1	R1A	Relay output R1A
2	R1B	Relay output R1B
3	R2A	Relay output R2A
4	R2B	Relay output R2B
5	R3A	Relay output R3A
6	R3B	Relay output R3B
7	R4A	Relay output R4A
8	R4B	Relay output R4B
9	R5A	Relay output R5A
10	R5B	Relay output R5B