HV500/505W Series Frequency Inverter User Manual

HNC Electric Limited

Preface

Thank you for purchasing HV500 Vector Control AC Drive developed by **HNC ELECTRIC LIMITED**. The HV500 series AC drive is a general-purpose high-performance vector control AC drive, which is widely used for simple fan and pump driving, and automatic controlling in specific industry equipment of Textile,Stone sawing machine,Air compressor,Spindle servo drive ,Crane,Veneer peeling machine,line cutting machine,oil-fields and wire drawing machine. It can also provide all-in-one solution for the application of ball crusher,injection molding machine and intelligent motor.

This manual describes the notes and guidance of selection, installation, parameter setting, field debugging, fault diagnostics and daily maintenance. Read and understand the user manual before use and forward the manual to the end user.

Notes
● The drawings in the user manual are sometimes shown without covers or protective guards.Remember to install the covers and protective guards according to the user manual, then perform operations in accordance with the instructions. ● The drawings in the manual are shown for description only and may not match the product that you purchased. ● The instructions are subject to change without notice, due to product upgrade and the efforts to increase the accuracy and convenience of the user manual. ● Contact our agents or customer service center if you need to purchase this user manual. ● Contact our customer service center if you have problems during the use.

Easy Operation Instruction

Notes: All the examples below are base on factory setting.

Example 1: Start/stop the AC drive and set frequency by Keypad.

Operating steps:

1.1) Configure the following parameters according to the motor nameplate and actual requirements.

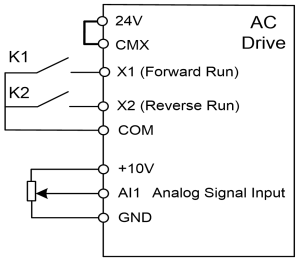
Function Code	Name	Unit	Function Code	Name	Unit
b0.04	Acceleration time 1	Sec	**b0.08**	Rated motor current	A
b0.05	Deceleration time 1	Sec	**b0.09**	Rated motor frequency	Hz
b0.06	Rated motor power	KW	**b0.10**	Rated motor speed	RPM
b0.07	Rated motor voltage	V	**b2.01**	Digital setting frequency	Hz

1.2) Start/stop the AC drive by pressing the RUN/STOP key on the keypad.

Example 2: Start/stop the AC drive by digital input (X terminals) and set frequency through analog input signals.

Operating steps:

2.1) Terminal X1 controls forward running, X2 controls reverse running, and AI1 signal set the running frequency.Please configure the wiring refer the following diagram.



2.2) Configure the following parameters base on the wiring mode.

Function Code	Name	Value	Meaning
b0.11	Command sources selection	1	Commands from X terminals.
b2.00	Main frequency source A selection	1	Frequency from AI1.
C0.01	The function of terminal X1	3 (default)	Forward run
C0.02	The function of terminal X2	4	Reverse run

2.3) Configure the following parameters according to the motor nameplate and actual requirements.

Function Code	Name	Unit	Function Code	Name	Unit
b0.04	Acceleration time 1	Sec	**b0.08**	Rated motor current	A
b0.05	Deceleration time 1	Sec	**b0.09**	Rated motor frequency	Hz
b0.06	Rated motor power	KW	**b0.10**	Rated motor speed	RPM
b0.07	Rated motor voltage	V			

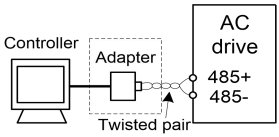
2.4) Set running frequency by adjusting the signal level of AI1.

2.5) The AC drive will run forward when the switch K1 is closed, and run reverse when the K2 is closed. If the K1 and K2 are both in closed or open status, the AC drive will stop.

Example 3: Start/stop the AC drive and set frequency through communication (Modbus RTU protocol, RS485 interface)

Operating steps:

3.1) Connect the control device to the AC drive directly if it supports RS485 interface. Otherwise, please add an communication adapter box.



3.2) Configure the following communication related parameters.

Function Code	Name	Value	Meaning
b0.11	Command sources selection	2	Commands from the communication.
L0.00	Communication baud rate	1 (default)	9600 bps
L0.01	Data format	1 (default)	No check, 8-N-2 data format
L0.02	Slave address	1 (default)	

3.3) Configure the following parameters according to the motor nameplate and actual requirements..

Function Code	Name	Unit	Function Code	Name	Unit
b0.04	Acceleration time 1	Sec	**b0.08**	Rated motor current	A
b0.05	Deceleration time 1	Sec	**b0.09**	Rated motor frequency	Hz
b0.06	Rated motor power	KW	**b0.10**	Rated motor speed	RPM
b0.07	Rated motor voltage	V			

3.4) Set the running frequency of the AC drive (salve address is 1) to 25 Hz by writing the data to the register 0x6400 with the communication function code 0x06.

Frame	Address	Function Code	Register Address		Register Content		Check Sum	
Request	0x01	0x06	0x64	0x00	0x13	0x88	0x9B	0xAC
Response	0x01	0x06	0x64	0x00	0x13	0x88	0x9B	0xAC

Remarks: 0x1388 corresponds to 5000 in decimal, which means 50 percents as communication setting value. When the communication setting value is used for reference frequency, the base value is **b0.00**(Max frequency,default 50Hz).

3.5) Run the AC drive (slave address is 1) forward by writing the data to the register 0x6401 with the communication function code 0x06.

Frame	Address	Function Code	Register Address		Register Content		Check Sum	
Request	0x01	0x06	0x64	0x01	0x00	0x01	0x06	0xAC
Response	0x01	0x06	0x64	0x01	0x00	0x01	0x06	0xAC

3.6) Stop the AC drive (slave address is 1) by writing the data to the register 0x6401 with the communication function code 0x06.

Frame	Address	Function Code	Register Address		Register Content		Check Sum	
Request	0x01	0x06	0x64	0x01	0x00	0x06	0x47	0x38
Response	0x01	0x06	0x64	0x01	0x00	0x01	0x47	0x38

Remarks: 0x6401 command function

Address	Command Function
6401H (b0.11 = 2)	0001: Forward run
	0002: Reverse run
	0003: Forward JOG
	0004: Reverse JOG
	0005: Coasting stop
	0006: Deceleration stop
	0007: Fault reset

Catalog

Chapter 1 Safety Information and Precautions

Safety definition:

In this user manual, the notices are graded based on the degree of danger:

DANGER indicates that failure to comply with the notice will result in severe personal injury or even death.

WARNING indicates that failure to comply with the notice will result in personal injury or property damage.

Read this user manual carefully so that you can have a thorough understanding of the product. Installation, debugging and maintenance must be performed in accordance with the content of this chapter. There will assume no liability or responsibility for any injury and loss due to improper operation.

1.1 Safety Information and Precautions

Before installation

DANGER
● Do not install the equipment if you find water seepage, component missing or damage upon unpacking. ● Do not install the equipment if the packing list does not conform to the product you received.

DANGER
● Handle the equipment with care during transportation to prevent damage to the equipment. ● Do not use the equipment with damaged or missing components. Failure to comply will result in personal injury. ● Do not touch the components in the equipment. Failure to comply will result in static electricity damage.

During installation

DANGER
● Install the equipment on incombustible objects such as metal and keep it away from combustible materials. ● Do not install the equipment in the environment with combustible gas. Failure to comply will result in a fire. ● Do not loosen the fixed screws of the components, especially the screws with red marks.

WARNING

- ❖ Do not drop wire end or screw into the AC drive. Failure to comply will result in the damage to the AC drive.
- ❖ Install the AC drive in places free of vibration and direct sunlight.
- ❖ When two AC drives are laid in the same cabinet, please arrange the installation positions properly to ensure the cooling effect.

At wiring

DANGER

- Wiring must be performed only by qualified personnel under instructions described in this user manual.
- Failure to comply may result in unexpected accidents.
- A circuit breaker must be used to isolate the power supply and the AC drive. Failure to comply may result in a fire.
- Ensure that the power supply is cut off before wiring. Failure to comply may result in the electric shock.
- Tie the AC drive to ground properly by standard (earthing resistance less than 10 Ohms). Failure to comply may result in the electric shock.
- Do not control the run or stop of the AC drive by turning on or off the input power supply.

DANGER

- Pay attention to marks of the wiring terminals. Never connect the power cables to the output terminals (U,V,W) of the AC drive. Failure to comply will result in damage to the AC drive.
- Ensure that the wiring conforms to EMC requirements and the safety standard of the region. Please refer to proposals of the user manual when considering the diameter of the wire. Failure to comply will result in accidents.
- Never connect the braking resistor between DC bus terminals (+) and (-).Failure to comply will result in a fire.

Before power-on

WARNING

- ❖ Check that following requirements are met:
- ❖ The voltage class of the power supply is consistent with the rated one of the AC drive.
- ❖ The input terminals (R, S, T) and output terminals (U, V, W) are properly connected.
- ❖ No short-circuit exists in the peripheral circuit.
- ❖ The wiring is secured.
- ❖ Failure to comply will result in the damage to the AC drive.
- ❖ Do not perform the voltage resistance test on any part of the AC drive because such test has been done in the factory. Failure to comply will result in accidents.

DANGER

- Cover the AC drive properly before power-on to prevent electric shock.
- The wiring of peripheral devices must be connected properly under instructions described in this user manual. Failure to comply will result in accidents.

After power-on

DANGER

- Do not open the AC drive cover after power-on. Failure to comply will result in electric shock.
- Do not touch the AC drive and circuits of peripherals when use wet hands. Failure to comply will result in electric shock.
- Do not touch any I/O terminal of the AC drive. Failure to comply may result in electric shock.
- Ensure that the motor and mechanical devices can bear high-speed rotating when the run frequency is bigger than the Rated motor frequency.

During operation

DANGER

- Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt.
- Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the AC drive.
- Avoid objects falling into the AC drive during operation. Failure to comply will result in the damage to the AC drive.

During maintenance

DANGER

- Do not repair or maintain the AC drive at power-on. Failure to comply will result in electric shock.
- After the AC drive is powered off, the basic waiting time must be ten minutes. Then repairing or maintenance the AC drive can be performed when the DC bus voltage (between P+ and P-) is lower than 36V. Failure to comply will result in personal injury due to the residual voltage in the capacitor.
- Repairing or maintenance of the AC drive can be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the AC drive.
- Set and check parameters again after the AC drive is replaced. All plug-in components must be plugged or removed only after power is off.

1.2 General Precautions

◆ **Ground Connection**

The incorrect earthing may cause personal injury, death or equipment failure, and increase the electromagnetic interference.

The correct earthing the AC drive, motor or other devices can guarantee the safety of the operator in any case and reduce the electromagnetic radiation and interference.

If the leakage current of the AC drive is greater than AC 3.5mA or DC 10mA , connecting a fixed protection earthing cable is needed.

Earthing terminals of several AC drives can not be connected in series.

Only when the conduct interface dimension of the cable shielding layer conforms to safety regulations, the cable can be used for earthing.

◆ **Motor insulation test**

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor winding from damaging the AC drive. During the insulation test, the motor must be disconnected from the AC drive. A 500-V mega-Ohm meter is recommended for the test and the insulation resistance must not be less than 5M Ohms.

◆ **Thermal protection of the motor**

If the rated capacity of the motor selected does not match that of the AC drive, especially when the rated power of the AC drive is greater than that of the motor, please adjust the motor protection parameters on the operation panel of the AC drive or install a thermal relay in the motor for protection.

◆ **Running at over 50 Hz**

This series AC drive can provide output frequency of 0~600Hz(0~3000Hz for CDE500B type). If the AC drive needs to run at higher frequency than base frequency(50Hz or 60 Hz), the capability of the mechanical device must be considered.

◆ **Vibration of mechanical device**

The AC drive may encounter mechanical resonance points at some output frequencies, which can be avoided by setting skip frequencies on the keypad.

◆ **The heat and noise of the motor**

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the temperature rise of the motor, noise and vibration will be increase slightly compared with power frequency operation.

◆ **Voltage-sensitive devices or capacitors for improving power factor on the output side of the AC drive**

Because the output of the AC drive is PWM wave, please do not install capacitors for improving power factor or lightning protection voltage-sensitive resistors on the output side of the AC drive. Otherwise, the AC drive may suffer transient fault trip or being damaged.

◆ **Contactors at the I/O terminal of the AC drive**

When one contactor is installed between the input side of the AC drive and the power supply, the AC drive should not be started or stopped by switching the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour for frequent charge and discharge will shorten the service life of the capacitor inside the AC drive. When one contactor is installed between the output side of the AC drive and the motor, do not turn on or off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.

◆ **Leakage protector**

Because of the existence of distributed capacitors to ground, when the AC drive runs with high-speed switching action, high frequency leakage current will be generated, which will lead to the malfunction of the leakage current protection circuit. When encounter this problem, in addition to reduce the carrier frequency appropriately and shorten the lead, the leakage protector should be chosen correctly. Please pay attention to the following two points:

a. The leakage protector should be arranged on the input side of the AC side. It is appropriate for the leakage protector to be arranged after the air switch (no fuse breaker).

b. The leakage protection devices should choose the types which are not sensitive to high level harmonic or special ones for the AC drive (sensitivity is above 30mA). If common leakage protectors should be chosen, the type that the sensitivity is above 100mA and the action time above 0.1s is preferred.

◆ **When external voltage is out of the range of the rated voltage**

The AC drive must not be used outside the allowable voltage range specified by the user manual. Otherwise, components inside the AC drive may be damaged.

If required, the corresponding voltage step-up or step-down device should be chosen.

◆ **Prohibition three-phase input changed into two-phase input**

When three-phase input changed into two-phase input, the voltage ripple of the DC bus and the current ripple will increase, and the ripple will shorten the service life of capacitors in the main circuit and make the work performance of the AC drive worse. So, the user should not change three-phase input into two-phase input. If it is necessary to use a two-phase power supply, the protection of input phase loss should be canceled, at the same time, the action of derating the AC drive should be considered. Of course, the maximum value of derating the AC drive should not be larger than 60 percent of the rated power.

◆ **Surge suppressor**

The AC drive has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when inductive loads around the AC drive are switched on or off. If inductive loads generate a very high surge voltage, a surge suppressor is used for the inductive load.

◆ **Altitude and derating**

1. In places where the altitude is above 1000 meters and the cooling effect reduces due to thin air, it is necessary to de-rate the AC drive. The ratio of derating the AC drive is 1 percent for every increase of 100 meters.
2. In places where the ambient temperature exceeds 40℃, it is necessary to de-rate the AC drive. The ratio of derating the AC drive is 3 percent for every increase of 1 ℃.
3. When the setting carrier frequency is bigger than the fault value, it is necessary to de-rate the AC drive. The ratio of derating the AC drive is 4 percent for every increase of 1K Hz.

◆ **Disposal**

The electrolytic capacitors on main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

◆ **Adaptable motor**

1. The standard adaptable motor is the four-pole squirrel-cage asynchronous motor. Please configure related parameter according to the type and the nameplate of the motor.
2. Because the cooling fan and the rotor shaft of the non-variable-frequency motor are coaxial, the cooling effect will reduce when the speed decelerates. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.
3. Standard motor parameters have been configured inside the AC drive. It is necessary to perform motor auto-tuning or modify fault values based on the actual condition. Otherwise, the running result and protection performance will be affected.
4. The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is disconnected from the tested parts.
5. When the distance between the AC drive and the motor is too long, the insulation withstand voltage must be considered.

◆ **Lubrication of mechanical device**

The mechanical devices such as reduction boxes and gears which need to be lubricated, may cause damage after a long time low speed running due to bad lubrication.Please conform the mechanical devices is OK before starting the AC drive.

◆ **Regenerative load**

For the application which have energy regeneration such as lifting, the AC drive often stops due to over voltage protection and a appropriate brake component needs to be considered.

The specific constant voltage energy saving AC drives (CDE500J type) can save the brake component and avoid over voltage protection for the application with energy regeneration,like sawing machine,oil pumping machines,etc.

Chapter 2 Product Information

2.1 HV500 Technical Specifications

Table 2- 1 Technical Specifications

Item		Specifications
Basic Performance	Rated Input	Single-phase: 220V; Three-phase : 220V/380~440V/460~480V/600~690V/1140V; Frequency: 50/60Hz
	Input voltage range	Voltage fluctuation: -15%～10%; Imbalance factor: less than 3%; Voltage frequency: 47～63Hz
	Control mode	VF control; Open-loop vector control; Close-loop vector control
	Frequency resolution	Digital setting: 0.01Hz; Analog setting: 0.5% × maximum frequency
	Maximum output	V/F control: 3200Hz; Vector control: 300Hz
	Speed range	VF control: 1:60; Vector control: 1:100
	Carrier frequency	1.0~16.0kHz(Model dependent). The carrier frequency can be automatically adjusted based on features of the load.
	Start torque	0.5Hz/150%*rated motor torque
	Overload capacity	G type: 150% rated current for 60s,180% rated current for 3s L type: 120% rated current for 60s
Basic Function	Run mode	Keypad; Control terminals (two-line, three-line);Serial communication (RS485).The user can perform switch-over between these sources in various ways.
	V/F curve	Straight line type; Multiple point type; N-power type
	Ramp curve	Straight line or S curve; Four ramp times (range: 0.1s to 6000.0s)
	Torque boost	Automatic torque boost
	Speed trace	All types have the function of the speed trace.
	Motor braking	DC braking; Energy consumption braking; Magnetic braking
	DC braking	Braking frequency: 0.00Hz to Maximum frequency; Braking time: 0.0s to 100.0s; Braking current: 0.0% to 100.0%*Rated motor current
	Magnetic braking	For occasions which have the request of fast stop or regenerative loads, the function of magnetic braking can be used. The function can avoid frequent protection due to over voltage.
	CBC current limiting	The function of CBC current limiting is to minimize the fault of over current and keep the normal running of the AC drive.
	Overcurrent and overvoltage control	The function is to restrict the current and voltage automatically during running and avoid the frequent fault protection of over current and over voltage.

Item		Specifications
Special Functions	The delay time of terminals	The user can set the delay time for digital input terminals, digital output terminals and relays.The time range is 0.0s to 3000.0s.
	JOG Control	Control mode: keypad, terminals and serial communication. Frequency: 0.00Hz to Maximum frequency; Ramp time: 0.1 to 6000.0s
	Multiple speed and simple PLC	Based on built-in PLC or digital input terminals, realize the running of sixteen segments speed.
	Two PID inside the parameters	As common PID, the closed-loop system of process control can be realized easily.
	Fixed length and count	The AC drive can count the pulse signal of 0 to 100K Hz and realize the control of count reaching by using digital output terminals.The drive can also convert the count into length for display and control.
	Spinning and swing frequency	The fixed swing magnitude, fixed mutations and fixed periodic output can be achieved at arbitrary frequency.
	Timing control	Time range: 0 to 65000 hours. The timing control can stop the AC drive.
	Power loss ride through	When the power loss ride through happens, by decreasing the running frequency, the feedback energy of the load can compensate the voltage drop of the DC bus. As a result, the AC drive can keep running for a short time.
Peripheral terminals	Reference power	10V/30mA. Usually, it is used for the power supply of analog input signals.
	Control power	24V/200mA.Usually, it is used for the power supply of digital input and output terminals.
	Analog input	Two analog input terminals, which have two types of voltage input and current input. Every input terminal can support three types input signals: 0 to 10V, 0 to 20mA and -10V to 10V. These two analog input terminals are programmable.
	Analog output	Two analog output terminals, which have two types of voltage output and current output. Every output terminal can support two types output signals: 0 to 10V and 0 to 20mA. These two analog output terminals are programmable.
	Digital input	Six multi function digital input terminals are compatible with active PNP or NPN input mode. Among these six input terminals, the X6 terminal can be chosen as high-speed pulse input terminal and the range of the high-speed pulse is 0 to 100KHz. At the same time, the X6 terminal is programmable.
	Digital output	There are two open collect output terminals. Among them, Y2 terminal can be chosen as high-speed pulse output. These two output terminals are programmable.There are two relay output terminals.

Item		Specifications
Protection function	Common types	Input and output phase loss protection,under voltage protection, over voltage protection,over current protection,over heat protection, over load protection,short-circuit protection, module fault, external fault, self-defining fault.
Environment	Installation location	Indoor, free from direct sunlight, dust,drip, salt, oil smoke, water vapor, combustible gas and corrosive gas.
	Altitude	If the altitude is equal or lower than 1000 meters, the AC drive can be used normally. If the altitude is higher than 1000 meters, it is necessary to de-rate the AC drive. The ratio of derating the AC drive is 1 percent for every increase of 100 meters. If the altitude is higher than 3000 meters, please contact our agents.
	Temperature	-10℃ to +40℃. If the ambient temperature is 40℃ to 50℃, please keep good ventilation and take the action of derating: The ratio of derating the AC drive is 3 percent for every increase of 1℃.
	Humidity	Less than 95%RH, without condensing.
	Vibration	Less than 0.6g
	Storage temperature	－25℃～＋65℃

2.2 HV500 Designation Rules

HV500-7R5 G 3

Inverter Series

No.	Adaptation
R75	0.75kW
7R5	7.5kW
011	11kW
018	18.5kW
110	110kW
400	400kW

No.	Voltage
1	Single-phase 220V
2	Three-phase 220V
3	Three-phase 380~440V
4	Three-phase 460~480V
6	Three-phase 600~690V

No.	Inverter Type
G	General type
P	Fan pump type

Figure 2- 1 Designation Rules

Remarks:

1) Designation only has the main specification of the AC drive.
2) As for the configuration information of the brake unit and DC reactor, please refer to Sector 2.4 ‘HV500 Model and technical parameters’.
3) As for the construction size, please refer to Sector 2.5 ‘HV500 appearance and dimensions’.
4) The single phase 220V and three phase 220V AC drive only has G type,and the ‘G’ is omitted in the designation, such as “HV500-R75G1”.

2.3 HV500 Nameplate

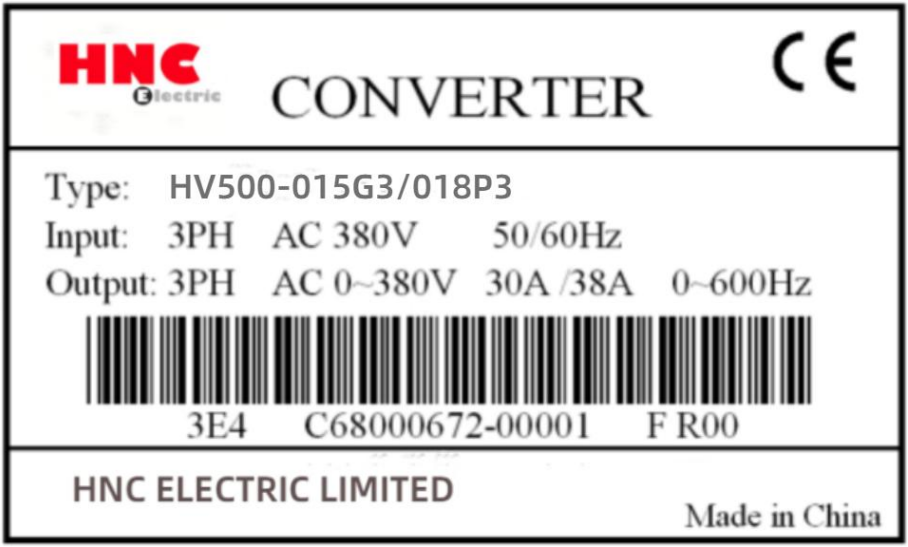


Figure 2- 2 Nameplate

2.4 HV500 Model and Technical Parameters

2.4.1 General Series

1) Single-phase 220V AC input

Table 2- 2 HV500-G1 class model and technical parameters

AC drive model **HV500-**	Power capacity （KVA）	Input current （A）	Output current （A）	DC reactor	Brake unit	Keypad
R75G1	1.5	8.2	4	Not installed	Built-in (Optional)	LED (Standard)
1R5G1	3	14	7			
2R2G1	4	23	9.6			

Remarks:

1) The models in the table above do not have input phase loss protection.

2) The models in the table above are single and wall-mounted type.

2) Three-phase 220V AC input

Table 2- 3 HV500-G2 class model and technical parameters

AC drive model **HV500-**	Power capacity （KVA）	Input current （A）	Output current （A）	DC reactor	Brake unit	Keypad
R75G2	1.5	6	4	Not installed	Built-in (Optional)	LED (Standard)
1R5G2	3	9	7			
2R2G2	4	11	9.6			
004G2	8.9	14.6	13			
5R5G2	17	26	25		Built-in (Standard)	
7R5G2	21	35	32			

Remarks:

1) The models in the table above do not have input phase loss protection.

2) The models in the table above are single and wall-mounted type.

3) Three-phase 380~440V AC input

Table 2- 4 HV500-G3/P3 class model and technical parameters

AC drive model **HV500-**	Power capacity （KVA）	Input current （A）	Output current （A）	Brake unit	DC reactor	Keypad
1R5G3/2R2P3	3.0/4.0	5.0/5.8	3.8/5.5	Built-in (Standard)	Not installed	LED (Standard)
2R2G3/004P3	4.0/5.9	5.8/10.5	5.5/9			
004G3/5R5P3	5.9/8.9	10.5/14.6	9/13			
5R5G3/7R5P3	8.9/11	14.6/18	13/17			
7R5G3/011P3	11/17	18/26	17/25			
011G3/015P3	17/21	26/31.2	25/30			LED+LCD (Standard)
015G3/018P3	21/24	31.2/39.2	30/38			
018G3/022P3	24/30	39.2/46.5	38/45			
022G3/030P3	30/40	46.5/62	45/60			
030G3/037P3	40/57	62/78	60/76			
037G3/045P3	57/69	78/93	76/91	External (Optional)	External (Optional)	
045G3/055P3	69/85	93/114.5	91/112			

055G3/075P3	85/114	114.5/153.5	112/150			
075G3/093P3	114/134	153.5/180	150/176			
093G3/110P3	134/160	180/214	176/210			
110G3/132P3	160/192	214/256	210/253			
132G3/160P3	192/231	256/307	253/304			
160G3/185P3	231/240	307/360	304/350			
185G3/200P3	240/250	360/385	350/377			
200G3/220P3	250/276	385/425	377/415			
220G3/250P3	276/335	425/479	415/465			
250G3/280P3	335/375	479/535	465/520			
280G3/315P3	375/420	535/600	520/585			
315G3/355P3	420/475	600/674	585/650			
355G3/400P3	475/535	674/750	650/720			
400G3/450P3	535/600	750/850	720/820			
450G3/500P3	600/670	850/930	820/890			
500G3/560P3	670/750	930/1055	890/1000			
560G3/630P3	750/840	1055/1155	1000/1120			
630G3/710P3	840/947	1155/1310	1120/1270			
710G3/800P3	947/1067	1310/1475	1270/1430			
800G3/850P3	1067/1133	1475/1575	1430/1520			
900G3/1000P3	1200/1334	1668/1850	1610/1790			
1000G3	1334	1850	1790			

Built-in (Standard)

Remarks:

1) The models of 7R5G3/011P3 and below do not have input phase loss protection.

2) The models of 132G3/160P3 and below are single and wall-mounted type,160G3/185P3 and above are single and cabinet type.

4) Three-phase 460~480V AC input

Table 2- 5 HV500-G4/P4 class model and technical parameters

AC drive model **HV500-**	Power capacity （KVA）	Input current （A）	Output current （A）	Brake unit	DC reactor	Keypad
1R5G4/2R2P4	3.0/4.0	4.75/5.5	3.6/5.3	Built-in (Standard)	Not installed	LED (Standard)
2R2G4/004P4	4.0/5.9	5.5/10	5.3/8.6			
004G4/5R5P4	5.9/8.9	10/13.9	8.6/12.4			
5R5G4/7R5P4	8.9/11	13.9/17.1	12.4/16.2			
7R5G4/011P4	11/17	17.1/25	16.2/24			
011G4/015P4	17/21	25/29.6	24/28.5			LED+LCD (Standard)
015G4/018P4	21/24	29.6/37.2	28.5/35			
018G4/022P4	24/30	37.2/44	35/43			
022G4/030P4	30/40	44/59	43/57			
030G4/037P4	40/57	59/74	57/72			
037G4/045P4	57/69	74/88	72/87	External (Optional)	External (Optional)	
045G4/055P4	69/85	88/109	87/107			
055G4/075P4	85/114	109/146	107/143			
075G4/093P4	114/134	146/171	143/167			
093G4/110P4	134/160	171/203	167/200			
110G4/132P4	160/192	203/243	200/241			
132G4/160P4	192/231	243/292	241/289			
160G4/185P4	231/240	292/342	289/333		Built-in (Standard)	
185G4/200P4	240/250	342/366	333/360			
200G4/220P4	250/276	366/404	360/395			
220G4/250P4	276/335	404/455	395/442			
250G4/280P4	335/375	455/508	442/494			
280G4/315P4	375/420	508/570	494/556			
315G4/355P4	420/475	570/640	556/618			
355G4/400P4	475/535	640/713	618/684			
400G4/450P4	535/600	713/807	684/779			
450G4/500P4	600/670	807/884	779/846			
500G4/560P4	670/750	884/1002	846/950			
560G4/630P4	750/840	1002/1097	950/1064			
630G4/710P4	840/947	1097/1245	1064/1207			
710G4/800P4	947/1067	1245/1401	1207/1359			
800G4/850P4	1067/1133	1401/1496	1359/1444			
900G4/1000P4	1200/1334	1585/1758	1444/1701			
1000G4	1334	1758	1701			

Remarks:

1) The models of 7R5G4/011P4 and below do not have input phase loss protection.

2) The models of 132G4/160P4 and below are single and wall-mounted type,160G4/185P4 and above are single and cabinet type.

5) Three-phase 600~690V AC input

Table 2- 6 HV500-G6/P6 class model and technical parameters

AC drive model **HV500-**	Power capacity （KVA）	Input current （A）	Output current （A）	Brake unit	DC reactor	Keypad
018G6/022P6	28/36	24/30	22/28	Built-in (Standard)	External (Optional)	LED+LCD (Standard)
022G6/030P6	36/48	30/40	28/35			
030G6/037P6	48/60	40/50	35/45			
037G6/045P6	60/66	50/55	45/52	External (Optional)		
045G6/055P6	66/79	55/66	52/63			
055G6/075P6	79/108	66/90	63/86			
075G6/093P6	108/122	90/102	86/98			
093G6/110P6	122/150	102/125	98/121			
110G6/132P6	150/190	125/158	121/150			
132G6/160P6	190/220	158/185	150/175			
160G6/185P6	220/250	185/205	175/198			
185G6/200P6	250/276	205/230	198/218			
200G6/220P6	276/300	230/250	218/240			
220G6/250P6	300/340	250/284	240/270			
250G6/280P6	340/384	284/320	270/305			
280G6/315P6	384/440	320/368	305/350			
315G6/355P6	440/480	368/400	350/380			
355G6/400P6	480/540	400/450	380/430			
400G6/450P6	540/588	450/490	430/465			
450G6/500P6	588/684	490/570	465/540		Built-in (Standard)	
500G6/560P6	684/756	570/630	540/600			
560G6/630P6	756/850	630/715	600/680			
630G6/710P6	850/938	715/788	680/750			
710G6/800P6	938/1062	788/893	750/850			
800G6/850P6	1062/1124	893/945	850/900			
900G6/1000P6	1200/1325	1009/1113	960/1060			
1000G6	1200/1325	1009/1113	960/1060			

Remarks:

1) The models of 400G6/450P6 and below are single and wall-mounted type,450G6/500P6 and above are single and cabinet type.

2) For the models of 110G6/132P6~400G6/450P6, the base used for DC reactor installation is optional.

2.4.2 HV505W Series(IP54 level)

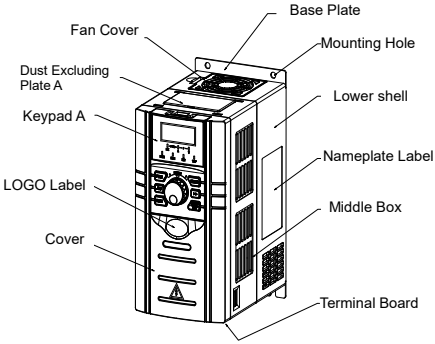
Table 2- 7 HV505W IP54 level model and technical parameters (three phase 380~440V AC input)

AC drive model HV**505W-**	Power capacity （kVA）	Input current （A）	Output current （A）	Brake unit	DC reactor	Keypad
1R5G3/2R2P3	3.0/4.0	5.0/5.8	3.8/5.5	Built-in (Standard)		Standard IP54 LED Keypad
2R2G3/004P3	4.0/5.9	5.8/10.5	5.5/9			
004G3/5R5P3	5.9/8.9	10.5/14.6	9/13			
5R5G3/7R5P3	8.9/11	14.6/18	13/17			
7R5G3/011P3	11/16.4	18/25	17/24			
011G3/015P3	16.4/21	25/31.2	24/30			
015G3/018P3	21/24	31.2/39.2	30/38			
018G3/022P3	24/30	39.2/46.5	38/45			
022G3/030P3	30/40	46.5/62	45/60			
030G3/037P3	40/57	62/78	60/76			
037G3/045P3	57/69	78/93	76/91	External (Optional)	/	
045G3/055P3	69/85	93/114.5	91/112			
055G3/075P3	85/114	114.5/153.5	112/150			
075G3/093P3	114/134	153.5/180	150/176			
093G3/110P3	134/160	180/214	176/210			
110G3/132P3	160/192	214/256	210/253			
132G3/160P3	192/231	256/307	253/304			
160G3/185P3	231/240	307/360	304/350			
185G3/200P3	240/250	360/385	350/377			
200G3/220P3	250/276	385/425	377/415			
220G3/250P3	276/335	425/479	415/465			
250G3/280P3	335/375	479/535	465/520			
280G3/315P3	375/420	535/600	520/585			
315G3/355P3	420/475	600/674	585/650			
355G3/400P3	475/535	674/785	650/720			
400G3/450P3	535/600	785/850	720/820			

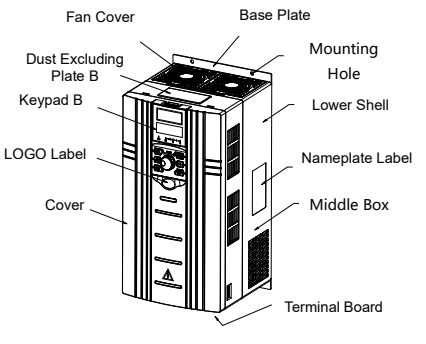
2.5 HV500 Appearance and Dimensions

2.5.1 General Series

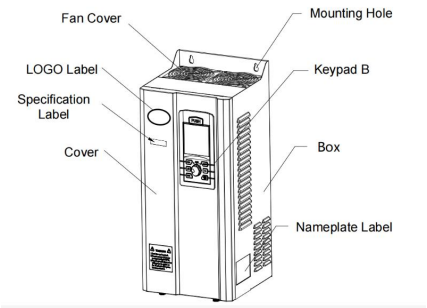
2.5.1.1 Wall-mounted Type Appearance



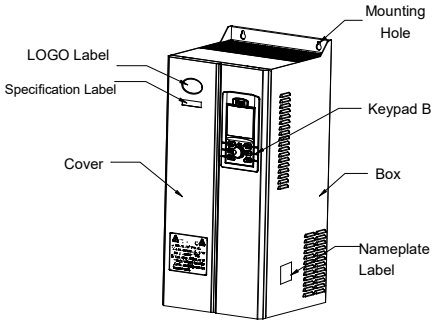
W01（plastic housing）



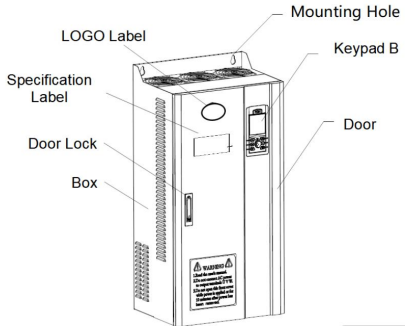
W02（plastic housing）



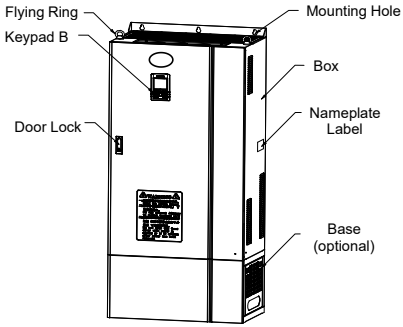
W03（sheet metal housing）



W04（sheet metal housing）

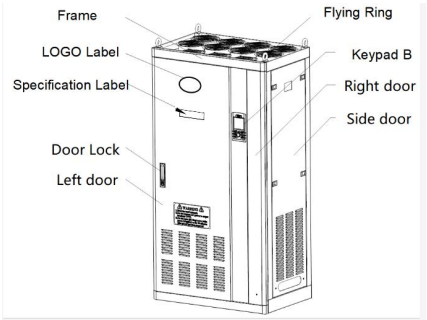


W05（sheet metal housing）

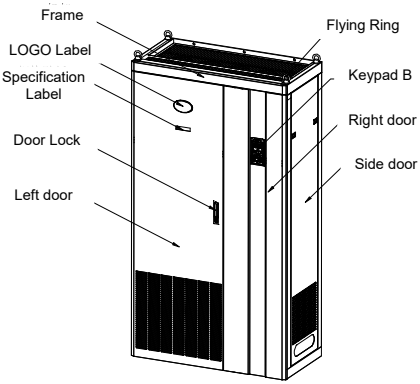


W06（sheet metal housing）

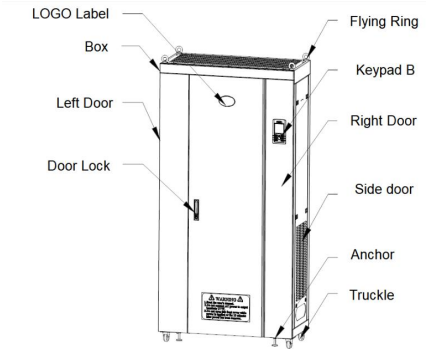
2.5.1.2 Cabinet Type Appearance



WG01（sheet metal housing）

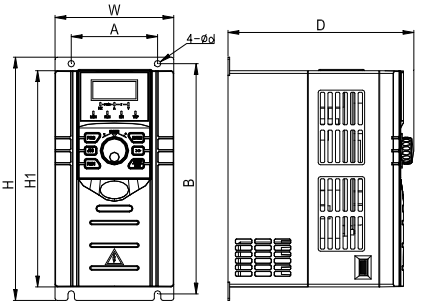


WG02（sheet metal housing）

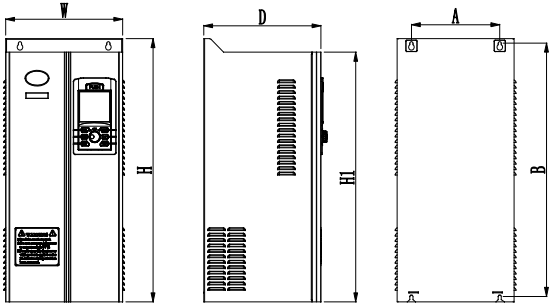


WG03（sheet metal housing）

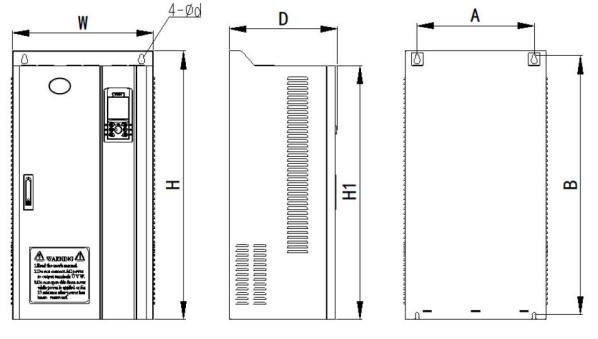
2.5.1.3 Wall-mounted Type Dimensional Drawing



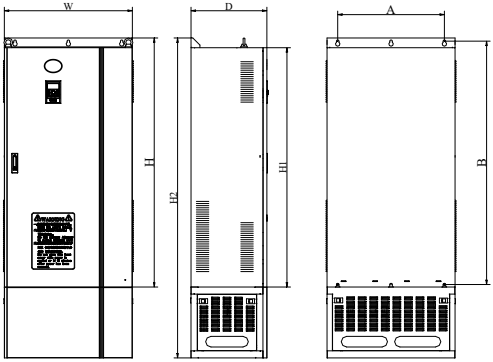
C01



C02

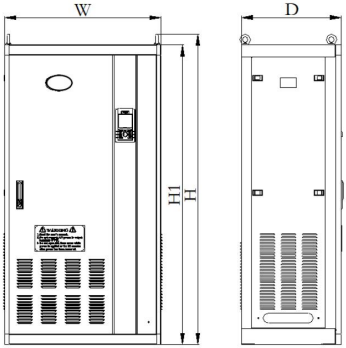


C03

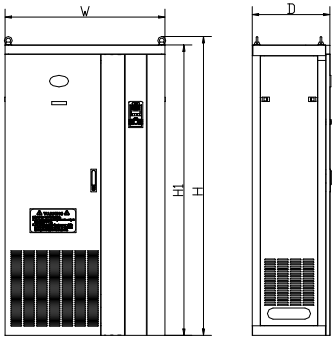


C04

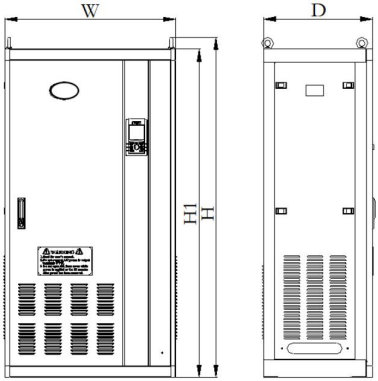
2.5.1.4 Cabinet Type Dimensional Drawing



CG01



CG02



CG03

Table 2- 8 HV500 series AC drive dimensions

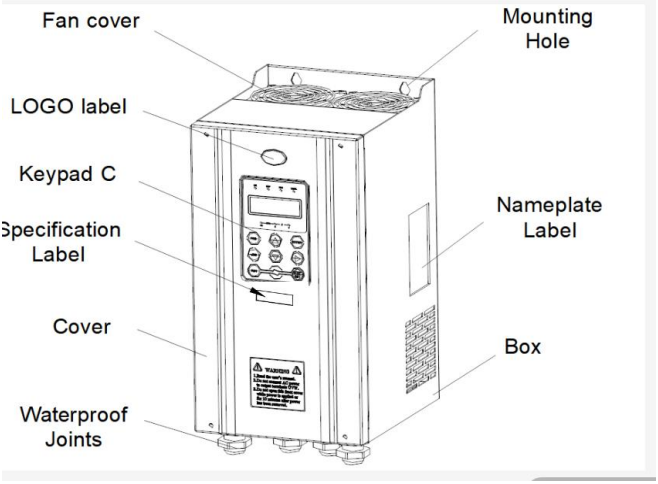
Appearance	AC drive model HV500-	Physical dimension (mm)				Installation dimension (mm)			Dimensional drawing
		H	H1	W	D	A	B	Aperture	
Single phase 220V AC input									
W01	R75G1	225	200	110	170	80	213	Φ5	**C01**
	1R5G1								
	2R2G1								
Three phase 220V AC input									
W01	R75G2	225	200	110	170	80	213	Φ5	**C01**
	1R5G2								
	2R2G2								
	004G2	265	240	130	190	91	253	Φ5	
W02	5R5G2	312	282	155	201	110	298	Φ6	
	7R5G2	390	360	205	211	150	376	Φ6	
Three phase 380~440V AC input									
W01	1R5G3/2R2P3	225	200	110	170	80	213	Φ5	**C01**
	2R2G3/004P3								
	004G3/5R5P3	265	240	130	190	91	253	Φ5	
	5R5G3/7R5P3								
	7R5G3/011P3	312	282	155	201	110	298	Φ6	
W02	011G3/015P3	390	360	205	211	150	376	Φ6	
	015G3/018P3								
W03	018G3/022P3	480	450	250	243	180	460	Φ7	**C02**
	022G3/030P3								
	030G3/037P3	530	500	280	243	210	510	Φ7	
	037G3/045P3	605	570	310	298	240	585	Φ9.5	
	045G3/055P3								
	055G3/075P3	660	625	340	323	260	640	Φ9.5	
W05	075G3/093P3	745	700	380	348	300	715	Φ12	**C03**
	093G3/110P3								
	110G3/132P3	835	790	480	368	400	805	Φ12	
	132G3/160P3								
WG01	160G3/185P3	1360	1300	600	460	/	/	/	**CG01**
	185G3/200P3								
	200G3/220P3								
	220G3/250P3	1460	1400	680	480	/	/	/	
	250G3/280P3								
	280G3/315P3								
	315G3/355P3	1560	1500	780	500	/	/	/	
	355G3/400P3								

Appearance	AC drive model HV500-	Physical dimension (mm)				Installation dimension (mm)			Dimensional drawing
		H	H1	W	D	A	B	Aperture	
WG01	400G3/450P3	1660	1600	840	520	/	/	/	**CG01**
	450G3/500P3								
WG02	500G3/560P3	1760	1700	1000	560	/	/	/	**CG02**
	560G3/630P3								
	630G3/710P3	2060	2000	1200	620	/	/	/	
	710G3/800P3								
	800G3/850P3	2160	2100	1250	635	/	/	/	
	900G3/1000P3	2260	2200	1500	650	/	/	/	
	1000G3								
Three phase 460~480V AC input									
W01	1R5G4/2R2P4	225	200	110	170	80	213	Φ5	**C01**
	2R2G4/004P4								
	004G4/5R5P4	265	240	130	190	91	253	Φ5	
	5R5G4/7R5P4								
	7R5G4/011P4	312	282	155	201	110	298	Φ6	
W02	011G4/015P4	390	360	205	211	150	376	Φ6	
	015G4/018P4								
W03	018G4/022P4	480	450	250	243	180	460	Φ7	**C02**
	022G4/030P4								
	030G4/037P4	530	500	280	243	210	510	Φ7	
	037G4/045P4	605	570	310	298	240	585	Φ9.5	
	045G4/055P4								
	055G4/075P4	660	625	340	323	260	640	Φ9.5	
W05	075G4/093P4	745	700	380	348	300	715	Φ12	**C03**
	093G4/110P4								
	110G4/132P4	835	790	480	368	400	805	Φ12	
	132G4/160P4								
WG01	160G4/185P4	1360	1300	600	460	/	/	/	**CG01**
	185G4/200P4								
	200G4/220P4								
	220G4/250P4	1460	1400	680	480	/	/	/	
	250G4/280P4								
	280G4/315P4								
	315G4/355P4	1560	1500	780	500	/	/	/	
	355G4/400P4								
	400G4/450P4	1660	1600	840	520	/	/	/	
	450G4/500P4								

Appearance	AC drive model HV500-	Physical dimension (mm)				Installation dimension (mm)			Dimensional drawing
		H	H1	W	D	A	B	Aperture	
WG02	500G4/560P4	1760	1700	1000	560	/	/	/	**CG02**
	560G4/630P4								
	630G4/710P4								
	710G4/800P4	2060	2000	1200	620	/	/	/	
	800G4/850P4	2160	2100	1250	635	/	/	/	
	900G4/1000P4	2260	2200	1500	650	/	/	/	
	1000G4								
Three Phase 600~690V AC input									
W04	018G6/022P6	582	552	265	265	200	560	Φ7	**C02**
	022G6/030P6								
	030G6/037P6								
	037G6/045P6	760	720	330	320	200	733	Φ9	
	045G6/055P6								
	055G6/075P6								
	075G6/093P6								
	093G6/110P6								
W06 H2: (Wall-mounted+base)	110G6/132P6	1030	980/ H2: 1350	480	352	320	998	Φ12	**C04**
	132G6/160P6								
	160G6/185P6								
	185G6/200P6	1210	1160/ H2: 1590	640	400	420	1178	Φ12	
	200G6/220P6								
	220G6/250P6								
	250G6/280P6								
	280G6/315P6								
	315G6/355P6	1405	1350/ H2: 1805	720	426	600	1373	Φ14	
	355G6/400P6								
	400G6/450P6								
WG03	450G6/500P6	1870	2020	1000	500	/	/	/	**CG03**
	500G6/560P6								
	560G6/630P6								
	630G6/710P6								
	710G6/800P6								
	800G6/850P6	2222	2304	1250	630	/	/	/	
	900G6/1000P6								
	1000G6								

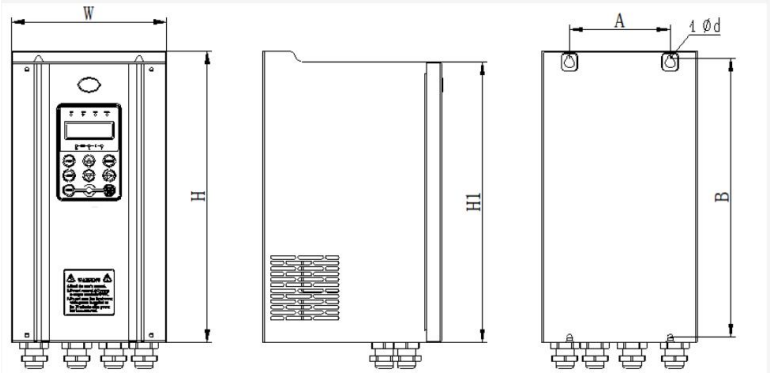
2.5.3 HV505W Series(IP54 level)

2.5.3.1 HV505W Appearance



WP54A

2.5.3.2 HV505W Dimensional Drawing



CP54A

Table 2- 9 HV505W series AC drive dimensions

Appearance	Model **HV505W-**	Dimensions（mm）				Installation size（mm）			Drawing
		H	H1	W	D	A	B	Aperture	
WP54A	1R5G3/2R2P3	225	219	125	170	90	212	Φ5	**CP54A**
	2R2G3/004P3								
	004G3/5R5P3								
	5R5G3/7R5P3	285	270	160	190	91	271	Φ5	
	7R5G3/011P3								
	011G3/015P3	317	305	170	195	110	303	Φ6	
	015G3/018P3	410	390	225	210	150	396	Φ6	
	018G3/022P3								
	022G3/030P3	485	455	260	235	180	465	Φ7	
	030G3/037P3								
	037G3/045P3	500	465	280	251	180	480	Φ7	
	045G3/055P3								
	055G3/075P3	605	570	310	280	240	585	Φ9.5	
	075G3/093P3	745	700	380	348	300	715	Φ12	
	093G3/110P3								
	110G3/132P3								
	132G3/160P3	835	790	480	368	400	805	Φ12	
	160G3/185P3								
	185G3/200P3	1040	1000	550	350	360	1011	Φ12	
	200G3/220P3								
	220G3/250P3								
	250G3/280P3	1045	1005	680	381	510	1016	Φ12	
	280G3/315P3								
	315G3/355P3								
	355G3/400P3	1120	1080	800	396	550	1091	Φ12	
	400G3/450P3								

2.6 Keypad Physical Dimensions

2.6.1 Keypad A

Model: KEYA. Pure LED display, four bit. The physical appearance and dimensions are shown in the following figure.

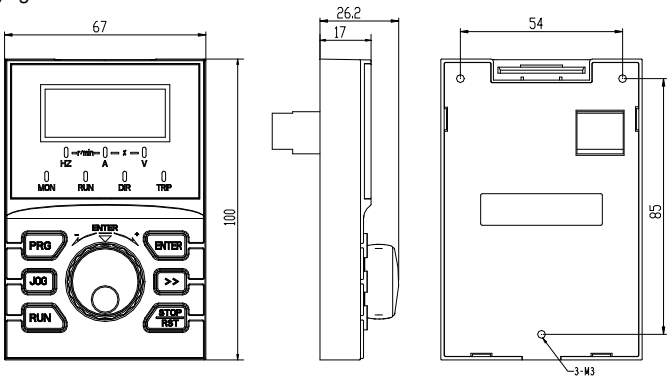


Figure 2- 3 KEYA

2.6.2 Keypad A Foundation

The foundation of keypad A is used together with keypad A for sheet metal housing or wall-mounting installation. The physical appearance and dimensions of the foundation are shown in the following figure.

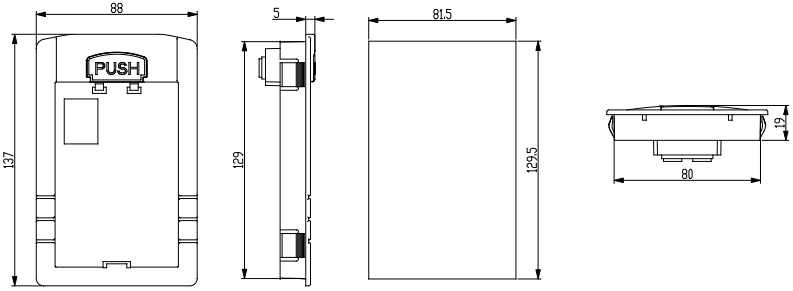


Figure 2- 4 The foundation of KEYA

2.6.3 Keypad B

Model: KEYB. Four bit LED and LCD screen display. The physical appearance and dimensions are shown in the following figure.

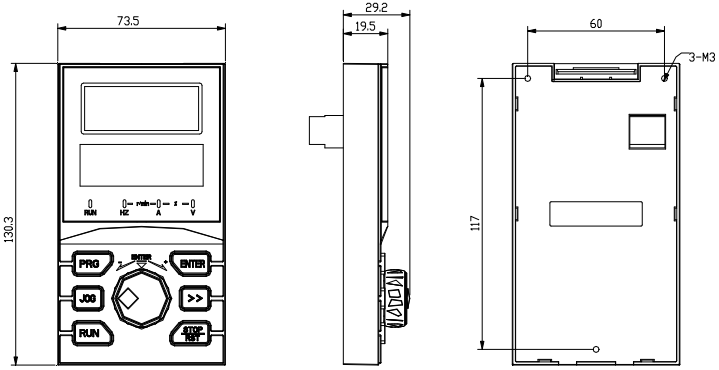


Figure 2- 5 KEYB

2.6.4 Keypad B Foundation

The foundation of keypad B is used together with keypad B for sheet metal housing or wall-mounting installation. The physical appearance and dimensions of the foundation are shown in the following figure.

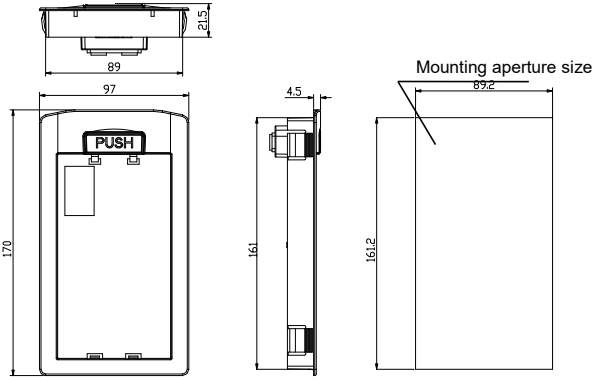


Figure 2- 6 The foundation of KEYB

2.6.5 Keypad C（IP54）

Model: KEYC. Pure LED display, five bit. The physical appearance and dimensions are shown in the following figure.

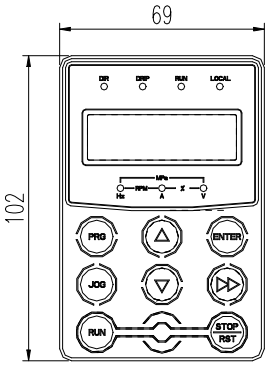


Figure 2- 7 KYEC

2.6.6 Dust Excluding Plate A

Used for the AC drive of W01 type appearance. Standard configuration is only one plate.Optional for the requirements of both sides. The physical appearance and dimensions are shown in the following figure.

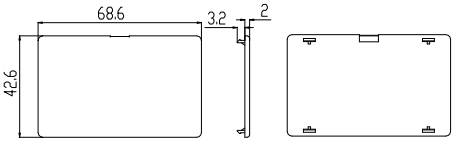


Figure 2- 8 Dust excluding plate A

2.6.7 Dust Excluding Plate B

Used for the AC drive of W02 type appearance. Standard configuration is only one plate.Optional for the requirements of both sides. The physical appearance and dimensions are shown in the following figure.

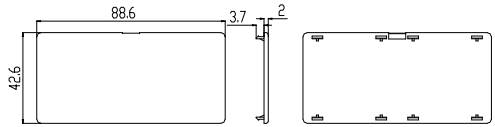


Figure 2- 9 Dust excluding plate B

2.7 Selection Suggestion of AC Drive

When select the AC drive, following conditions such as the technical requirements of the AC drive,the application fields of the AC drive and the characteristics of the load should be explicit. At the same time, the adaptable motor,output voltage and rated output current should be considered comprehensively. As a result, the type and the running mode can be selected.

The fundamental principle is that the rated load current of the motor can not exceed the rated current of the AC drive. Generally, the user can select the matching capacity of the motor according to the user manual and compare the Rated motor current with the one of the AC drive. If doing so, the overload capacity of the AC drive is significant for the start and brake process.

If there is transient overload during the running, the load speed will vary according to the transient overload. And if the request for the accuracy of the speed is strict, please consider enlarging the power of the AC drive.

Fans and water pumps: the requirement for overload is not strict. Because the torque of the load is proportional to the square of the speed, the load is light when the speed is low (Here, roots blower is not included); and because these loads have no restrict requirements for the accuracy of the speed, the VF mode of square torque can be selected.

Constant torque loads: most loads have the characteristics of constant torque, but they have not restrict requirements for the accuracy of the speed and the dynamic performance. The application fields are as extruder, blender, conveyor belt, transport vehicle in the plant and the translational mechanism of the crane. In this instance, the V/F running mode of constant torque can be selected.

Controlled objectives which have requirements of certain dynamic and static indexes: these loads have the requirements for hard mechanical characteristics at low speed, so that the specification of dynamic and static indexes can match the productive technology. In this instance, the VF control or vector control can be selected.

2.8 Recommendation of Brake Resistance Selection

Table 2- 10 Brake resistance selection table of HV500 series

AC drive voltage &power classes	Recommended power（kW）	Recommended resistance（Ω）	Brake Unit
Three phase(single phase) 220V AC input			
R75G1/G2	0.15	≥ 100	Built-in (Optional)
1R5G1/G2		≥ 75	
2R2G1/G2	0.25	≥ 56	
004G2	0.4	≥ 47	
5R5G2	0.8	≥ 22	Built-in (Standard)
7R5G2	1	≥ 16	
Three phase 380~440V AC input			
1R5G3/2R2P3	0.45	≥ 150	Built-in (Standard)
2R2G3/004P3	0.6	≥ 120	
004G3/5R5P3	0.7	≥ 100	

5R5G3/7R5P3	0.8	≥ 80	
7R5G3/011P3	1	≥ 65	
011G3/015P3	1.5	≥ 43	
015G3/018P3	2.0	≥ 32	
018G3/022P3	2.5	≥ 30	
022G3/030P3	3	≥ 24	
030G3/037P3	3.7	≥ 16	
037G3/045P3	5	≥ 14	External (Optional) 60A
045G3/055P3			
055G3/075P3	7	≥ 10	External (Optional) 80A
075G3/093P3	8.5	≥ 8	External (Optional) 150A
093G3/110P3	14	≥ 5	External (Optional) 150A
110G3/132P3			
132G3/160P3			
160G3/185P3	20	≥ 3.5	External (Optional) 350A
185G3/200P3			
200G3/220P3	28	≥ 2.5	
220G3/250P3			
250G3/280P3	35	≥ 2.2	External (Optional) 350A
280G3/315P3			
315G3/355P3			
355G3/400P3	28 × 2	≥ 2.5 × 2	External (Optional) 350A × 2
400G3/450P3			
450G3/500P3			
500G3/560P3	28 × 3	≥ 2.5 × 3	External (Optional) 350A × 3
560G3/630P3			
630G3/710P3			
710G3/800P3	35 × 3	≥ 2.2 × 3	External (Optional) 350A × 3
800G3/850P3	35 × 4	≥ 2.5 × 4	External (Optional) 350A × 4
900G3/1000P3			
1000G3			
Three phase 460~480V AC input			
1R5G4/2R2P4	0.45	≥ 200	Built-in (Standard)
2R2G4/004P4	0.6	≥ 150	
004G4/5R5P4	0.7	≥ 120	
5R5G4/7R5P4	0.8	≥ 100	
7R5G4/011P4	1	≥ 75	
011G4/015P4	1.5	≥ 51	
015G4/018P4	2.0	≥ 39	

018G4/022P4	2.5	≥ 36	
022G4/030P4	3	≥ 29	
030G4/037P4	3.7	≥ 20	
037G4/045P4	5	≥ 18	External (Optional) 60A
045G4/055P4			
055G4/075P4	7	≥ 12	External (Optional) 80A
075G4/093P4	8.5	≥ 10	External (Optional) 150A
093G4/110P4	14	≥ 6	External (Optional) 150A
110G4/132P4			
132G4/160P4			
160G4/185P4	20	≥ 4.3	External (Optional) 350A
185G4/200P4			
200G4/220P4	28	≥ 2.5	
220G4/250P4			
250G4/280P4	35	≥ 2.7	External (Optional) 350A
280G4/315P4			
315G4/355P4			
355G4/400P4	28 × 2	≥ 3 × 2	External (Optional) 350A × 2
400G4/450P4			
450G4/500P4			
500G4/560P4	28 × 3	≥ 3 × 3	External (Optional) 350A × 3
560G4/630P4			
630G4/710P4			
710G4/800P4	35 × 3	≥ 2.7 × 3	External (Optional) 350A × 3
800G4/850P4	35 × 4	≥ 3 × 4	External (Optional) 350A × 4
900G4/1000P4			
1000G4			

Remarks:

1) Voltage and power classes is the only consideration in brake resistance selection.
2) " × " means there needs several groups of braking units and resistance to be used in parallel.
3) If external brake unit is needed, please refer to the related user manual of brake unit.

The data in the above table is only for reference. The user can select different resistance and power of the resistor based on actual needs (here, the resistance should not be less than the recommended value in the table, and the power of the resistor can be higher than the recommended value in the table). The brake resistance can be determined by the regenerative power of the motor in the actual system and is also related to the inertia of the system,deceleration time and potential energy load. The user can select the brake resistance based on the actual needs.

For systems with high inertia,rapid deceleration time and frequent braking, the brake resistor with high power and small resistance should be selected.

Selection of the Resistance

The consumption of the regenerative energy of the motor is almost entirely on the braking resistance.

According to the formula U×U/R=Pb, the user can calculate the resistance of the braking resistor.

In the formula, U------braking voltage of the system during the constant status (different systems have different brake voltage. As for 380VAC system, usually the braking voltage is 700V).

Pb------braking power.

Selection of the Power

In theory, the power of the braking resistor should be consistent with the braking power. But considering actual conditions, the derating is 70 percent.

The formula is 0.7×Pr=Pb×D.

Pr refers to the power of the braking resistor.

D refers to the braking frequency (percentage of the regenerative process to the whole process),the selection of the braking frequency can be as follows based on the experience:

Elevator load is 20% to 30%; Winding load is 20% to 30%

Centrifuge load is 50% to 60%; Intermittent braking load is 5%;

Ordinary load is 10% (10% is enough for the ordinary load).

Chapter 3 Mechanical and Electrical Installation

3.1 Mechanical Installation

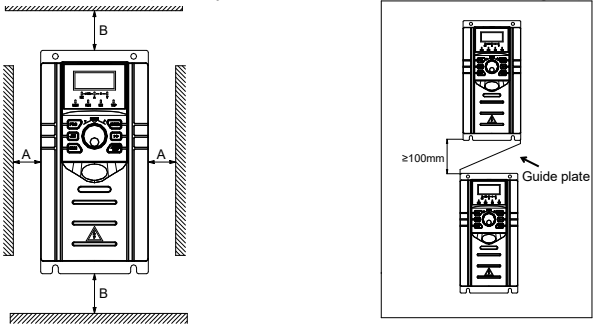
3.1.1 Requirements of Installation Environment

Item	Requirements	Item	
1	Good ventilation.	5	Free from direct sunlight.
2	Ambient temperature: -10℃～40℃.	6	Free from combustible, corrosive gas and liquid.
3	Free from high temperature, humidity (less than 95%RH), no rainwater or other liquid drip.	7	Free from dust, oil dirt, floating fiber and metal powder.
4	Free from combustible objects, such as woods.	8	The installation base is stable with no vibration.
		9	Free from magnetic interference.

3.1.2 Installation Direction and Clearance

To ensure the heat dissipation of the product, please install the product vertically according to the following figure and never invert the installation.

When the installation is in the cabinet, try to use the mode of side-by-side installation. At the same time, to facilitate the heat dissipation, you should ensure that there is enough space around.



Single unit mode Up and down mode

Figure 3- 1 CDE500 installation diagram

Table 3- 1 The dimension size of the installation clearance

AC drive power class （kW）	Installation size（mm）	
	A	B
≤ 15	≥ 30	≥ 100
18.5～30	≥ 50	≥ 200
≥ 37		≥ 300

Remarks during the mechanical installation:

1) Please install the AC drive vertically. If there are several AC drives in the cabinet, try to use the mode of side-by-side installation. When the cooling space can be guaranteed, please consider the cooling requirements of other components.
2) As for the installation clearance, please refer to Table 3-1.
3) For occasions which have upper and lower installation, please refer to Figure 3-1 and install the insulation guidance plate.
4) Please use the installation holder which contains incombustible materials.
5) For occasions which have metal powder, it is suggested that the heat sink is installed outside the cabinet.

3.1.3 Removal and Installation of the Keypad and Cover

3.1.3.1 Keypad A Removal and Installation

Removal: As shown on the following left figure,please press down the buckle refer to the direction of Arrow 1.Then uplift the keypad refer to the direction of Arrow 2. And the removal is completed.

Installation: As shown on the following right figure, please incline the keypad slightly towards the cover or the joint of the bottom side refer to the direction of Arrow 1. Then press down the keypad refer to the direction of Arrow 2 until hear a snap. And the installation is completed.

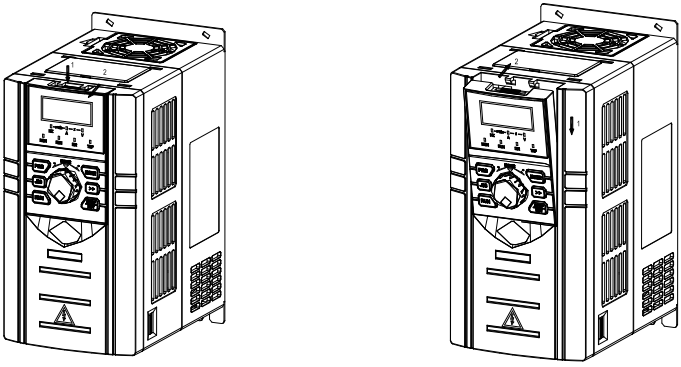


Figure 3- 2 Keypad A removal & installation

3.1.3.2 Keypad B Removal and Installation

Removal: As shown on the following left figure,please press down the buckle refer to the direction of Arrow 1.Then uplift the keypad refer to the direction of Arrow 2. And the removal is completed.

Installation: As shown on the following right figure, please incline the keypad slightly towards the cover or the joint of the bottom side refer to the direction of Arrow 1. Then press down the keypad refer to the direction of Arrow 2 until hear a snap. And the installation is completed.

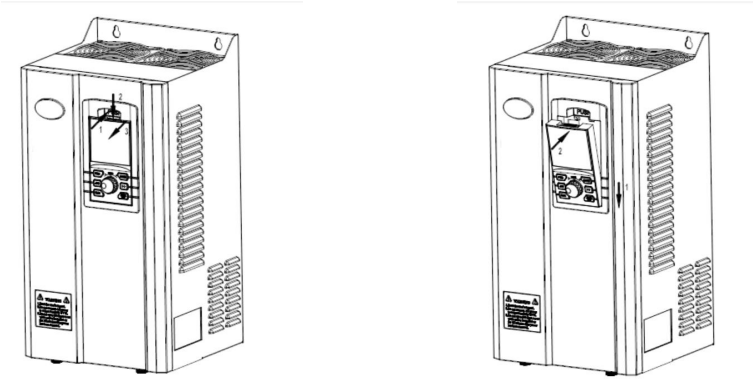


Figure 3- 3 Keypad B removal & installation

3.1.3.3 The Cover Removal and Installation of W01~02 Type Appearance

Remarks: Keypad A must be removed first, and installed after the installation of the wiring and cover is completed.

Removal: As shown on the following left figure. Hand on the left and right sides of the shell, then follow the direction of the arrow 1 and press down the buckle of the cover. After the cover bounces upwards automatically, press down the bottom side of the cover by the thumb, then uplift the cover towards the direction of the arrow 2. And the removal of the cover is completed.

Installation: As shown on the following right figure. After the wiring is completed, follow the direction of the arrow 1 and press down the upper part of the cover into the two bayonets of the shell. Then follow the direction of the arrow 2 and press down the cover. When the click is heard, it shows that the cover is connected in place and the installation is completed.

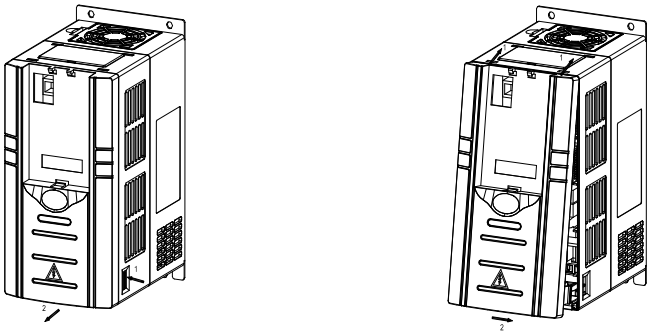


Figure 3- 4 Cover removal & installation of the wall-mounted plastic housing AC drive

3.1.3.4 The Cover Removal and Installation of W03~04 Type Appearance

Remarks: Keypad B must be removed first, and installed after the installation of the wiring and cover is completed.

Removal: As shown on the following left figure. Unscrew two mounting screws at the shown position of the arrow 1 under the cover. Raise the cover according to the direction of the arrow 2 and push out the cover according to the direction of the arrow 3. As a result, the removal of the cover is complete.

Installation: As shown on the following right figure. Aim at the AC drive and put the cover into it. Press the cover down according to the direction of the arrow 1.Then press the cover down according to the direction of the arrow 2, tighten the two mounting screws according to the arrow 3. As a result, the installation of the cover is complete.

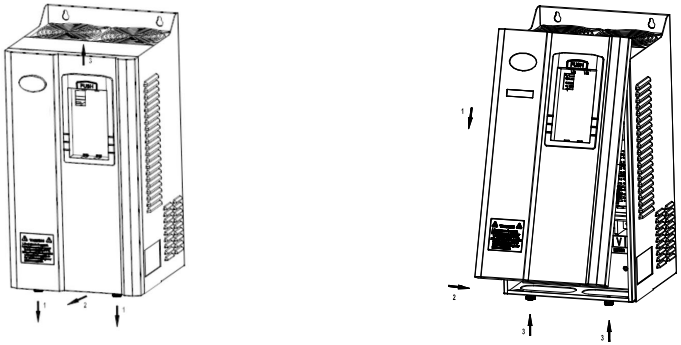


Figure 3- 5 Cover removal & installation of the wall-mounted sheet metal housing AC drive

3.1.3.5 The Door Open and Close of W05~06 Type Appearance

Open: As shown on the following left figure. After unlock the key, press down the button of the door key according to the shown position of the arrow 1. Hold the buckle of the door key and turn it to the horizontal position anticlockwise.Pull the door open according to the shown direction of the arrow 2. And the door is open.

Close: As shown on the following right figure.Hold the buckle of the door key and turn it to the horizontal position. Close the door according to the shown direction of the arrow 1. Press the door down.Turn the buckle of the door key to the shown position of the arrow 2 clockwise, then press it down. When the click occurs, the buckle is put into place.Lock the key and draw it out. And the door is closed.

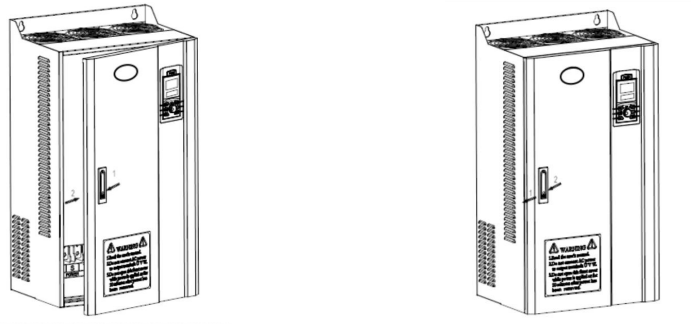


Figure 3- 6 Door open & close of the wall-mounted sheet metal housing AC drive

3.1.3.6 The Front Door Open and Close of WG01 & W502 Type Appearance

Open: As shown on the following left figure. After unlock the key, press down the button of the door key according to the shown direction of the arrow 1. Hold the bouncing buckle of the door key and turn it to the horizontal position anticlockwise.

Pull the left door open according to the shown direction of the arrow 2, then open the right door according to the shown direction of the arrow 3. The open of the door is complete.

Close: As shown on the following right figure.Close the right door according to the shown direction of the arrow 1. Hold the buckle of the door key and turn it to the horizontal position.

Close the left door according to the shown direction of the arrow 2 and press it down. Then turn the buckle of the door key to the shown position of the arrow 3 clockwise and press it down.

When the click occurs, the buckle of the door key is put into place. Lock the key and draw it out. The close of the door is complete.

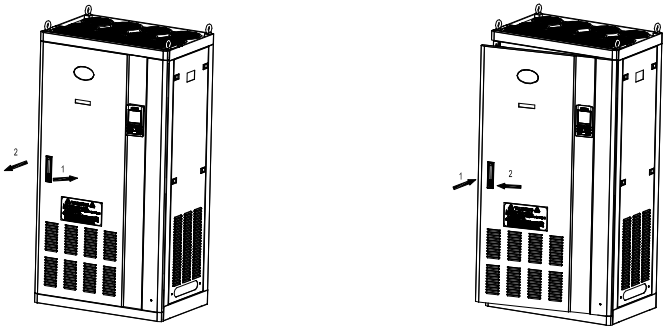


Figure 3- 7 The front door open & close of the single door cabinet AC drive

3.1.3.7 The Front Door Open and Close of WG02 Type Appearance

Open: As shown on the following left figure. After unlock the key, press down the button of the door key according to the shown position of the arrow 1. Hold the buckle of the door key and turn it to the horizontal position clockwise.Pull the left door according to the shown direction of the arrow 2. Then open the right door refer to the arrow 3.And the door is open.

Close: As shown on the following right figure.Close the right door refer to the arrow 1.Hold the buckle of the door key and turn it to the horizontal position. Close the left door according to the shown direction of the arrow 2. Press the door down.Turn the buckle of the door key to the shown position of the arrow 3 anticlockwise, then press it down. When the click occurs, the buckle is put into place.Lock the key and draw it out. And the door is closed.

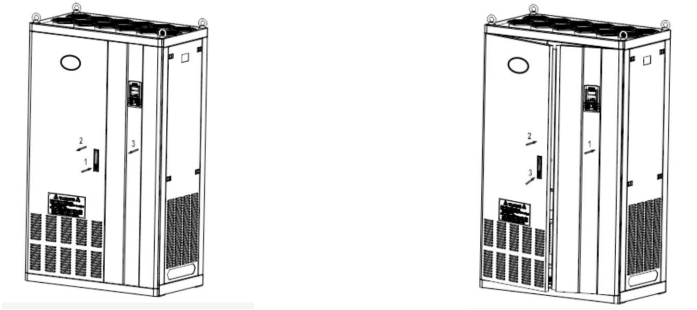


Figure 3- 8 Front door open & close of the double door cabinet AC drive

3.1.3.8 The Front Door Open and Close of WG03~04 Type Appearance

Open: As shown on the following left figure. After unlock the key, press down the button of the door key according to the shown position of the arrow 1. Hold the buckle of the door key and turn it to the horizontal position anticlockwise.Pull the right door according to the shown direction of the arrow 2. Then open the left door refer to the arrow 3.And the door is open.

Close: As shown on the following right figure.Close the left door refer to the arrow 1.Hold the buckle of the door key and turn it to the horizontal position. Close the right door according to the shown direction of the arrow 2. Press the door down.Turn the buckle of the door key to the shown position of the arrow 3 clockwise, then press it down. When the click occurs, the buckle is put into place.Lock the key and draw it out. And the door is closed.

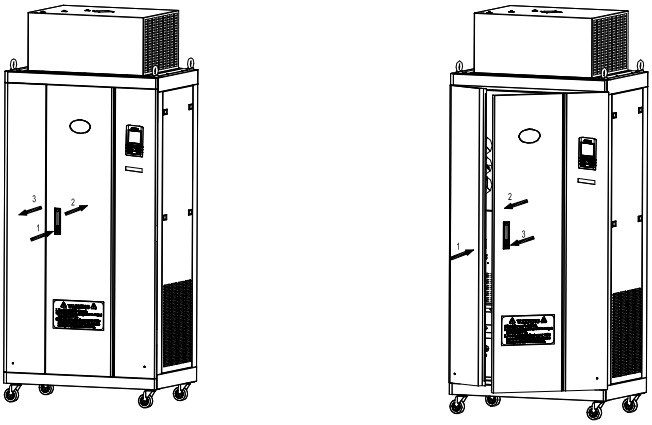


Figure 3- 9 The front door open & close of single door cabinet AC drive with wheels

3.1.3.9 The Cover Removal and Installation of WP54A Type Appearance

Note: *The keypad and the cover of CDE505 series AC drive are integrated. Please pay attention to the keypad connection line in the cover removal and installation.*

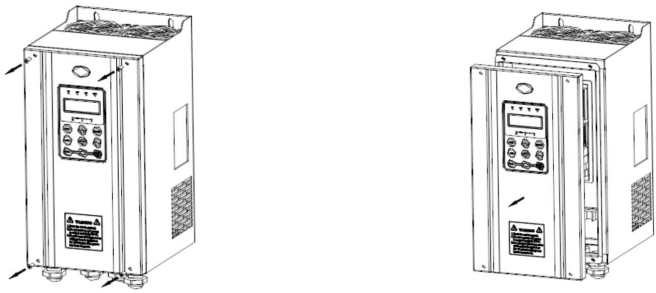


Figure 3- 10 Cover removal of IP54 level AC drive

Removal:

Unscrew the 4 mounting screws shown on the left figure above.

Gently lift the cover as shown on the right figure above.

Make sure the keypad line is disconnected. Then remove the cover.

Figure 3- 11 Cover installation of IP54 level AC drive

Installation:

Connect the keypad line.

Gently close the cover as shown on the left figure above.

Tighten the 4 mounting screws shown on the right figure above.

3.2 Electrical Installation

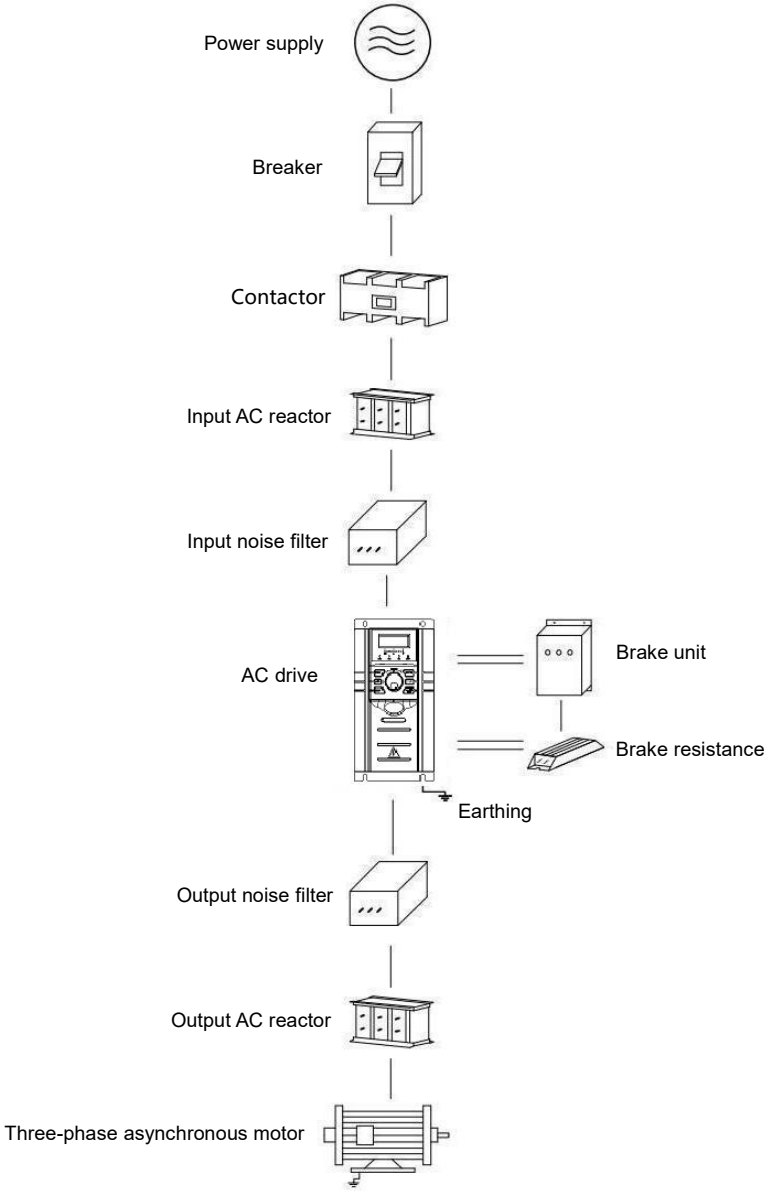


Figure 3- 12 Connection diagram of peripheral devices

3.2.1 Instructions of Peripheral Electrical Components

Table 3- 2 Instructions of peripheral electrical components of HV500 AC drive

Name	Installation Position	Function Description
Breaker	The front end of the input circuit	The power system can be protected when the short circuit happens.
Contactor	Between the breaker and the AC drive	Start and stop the AC drive.Neither start and stop the AC drive frequently by switching the contactor on and off (less than twice per minute) nor use it to directly start the AC drive.
Input AC reactor	Input side of the AC drive	1) Improve the power factor of the input side. 2) Eliminate the higher harmonics of the input side effectively and prevent other devices from being damaged due to the distortion of the voltage waveform. 3) Eliminate the input current unbalance due to the unbalance between the power phases.
Input Noise filter	Input side of the AC drive	1) Reduce the external conduction and radiation interference of the AC drive. 2) Decrease the interference flowing from the AC drive to the power system.
DC reactor	Between the terminal P+ and terminal P1 of the AC drive	1) Improve the power factor of the input side. 2) Eliminate the higher harmonics of the input side effectively and decrease the external conduction and radiation interference.
Output AC reactor	Close to the output side of the AC drive	The output sides of the AC drive generally have much higher harmonics. When the motor is far from the AC drive, there is much distributed capacitance in the circuit. Certain harmonics may cause resonance in the circuit and bring about the following two impacts: 1) Degrade the motor insulation performance and damage the motor in the long run. 2) Generate large leakage current and cause frequent AC drive protection trips.

3.2.2 Selection Guidance of Peripheral Electrical Components

Note: Voltage and power classes is the only consideration in peripheral electrical parts selection.

Table 3- 3 Recommended peripheral electrical parts selection guidance of the HV500 series AC drive

AC drive voltage & power classes	Breaker MCCB (A)	Contactor (A)	Input wire (mm^2)	Output wire (mm^2)	Ground wire (mm^2)	Control wire (mm^2)
Single phase 220V AC input						
R75G1	16	10	1.5	1.5	≥ 1.5	1
1R5G1	20	16	4	1.5	≥ 4	
2R2G1	32	20		2.5		
Three phase 220V AC input						
R75G2	16	10	1.5	1.5	≥ 1.5	1
1R5G2	20	16				
2R2G2	32	20	2.5	2.5	≥ 2.5	
004G2	32	25	4	4	≥ 4	1
5R5G2	63	40				
7R5G2	63	40	6	6	≥ 6	

AC drive voltage & power classes	Breaker MCCB （A）	Contactor （A）	Input wire （mm^2）	Output wire （mm^2）	Ground wire （mm^2）	Control wire （mm^2）
Three phase 380~440V AC input						
1R5G3/2R2P3	16	10	2.5	2.5	≥ 2.5	1
2R2G3/004P3	16	10				
004G3/5R5P3	25	16	4	4	≥ 4	
5R5G3/7R5P3	32	25				
7R5G3/011P3	40	32				
011G3/015P3	63	40				
015G3/018P3	63	40	6	6	≥ 6	
018G3/022P3	100	63				
022G3/030P3	100	63	10	10	≥ 10	
030G3/037P3	125	100	16	16	≥ 16	
037G3/045P3	160	100				
045G3/055P3	200	125	25	25		
055G3/075P3	200	160	35	35		
075G3/093P3	250	160	50	50	≥ 25	
093G3/110P3	250	200	70	70	≥ 35	
110G3/132P3	350	350				
132G3/160P3	400	400	95	95	≥ 50	
160G3/185P3	500	400	120	120	≥ 60	
185G3/200P3	600	600	150	150	≥ 75	
200G3/220P3	600	600	185	185	≥ 95	
220G3/250P3	600	600	120*2	120*2	≥ 120	
250G3/280P3	800	600				
280G3/315P3	800	800	150*2	150*2	≥ 150	
315G3/355P3	800	800				
355G3/400P3	1000	1000	185*2	185*2	≥ 185	
400G3/450P3	1000	1000				
450G3/500P3	1250	1250	150*3	150*3	≥ 200	
500G3/560P3	1600	1600				
560G3/630P3	1600	1600				
630G3/710P3	1600	1600	185*3	185*3		
710G3/800P3	2000	2000				
800G3/850P3	2500	2500	150*4	150*4		
900G3/1000P3	2500	2500	185*4	185*4		
1000G3	2500	2500				
Three phase 460~480V AC input						
1R5G4/2R2P4	16	10	2.5	2.5	≥ 2.5	1
2R2G4/004P4	16	10				

AC drive voltage & power classes	Breaker MCCB （A）	Contactor （A）	Input wire （mm^2）	Output wire （mm^2）	Ground wire （mm^2）	Control wire （mm^2）
004G4/5R5P4	25	16	4	4	≥ 4	1
5R5G4/7R5P4	32	25				
7R5G4/011P4	40	32				
011G4/015P4	63	40				
015G4/018P4	63	40	6	6	≥ 6	
018G4/022P4	100	63				
022G4/030P4	100	63	10	10	≥ 10	
030G4/037P4	125	100	16	10	≥ 16	
037G4/045P4	160	100	16	16		
045G4/055P4	200	125	25	25		
055G4/075P4	200	125	35	25		
075G4/093P4	250	160	50	35	≥ 25	
093G4/110P4	250	160	70	35	≥ 35	
110G4/132P4	350	350	120	120	≥ 60	
132G4/160P4	400	400	150	150	≥ 75	
160G4/185P4	500	400	185	185	≥ 95	
185G4/200P4	600	600	150*2	150*2	≥ 150	
200G4/220P4	600	600				
220G4/250P4	600	600				
250G4/280P4	800	600	185*2	185*2	≥ 185	
280G4/315P4	800	800				
315G4/355P4	800	800	150*3	150*3	≥ 200	
355G4/400P4	800	800				
400G4/450P4	1000	1000				
450G4/500P4	1000	1000	185*3	185*3		
500G4/560P4	1250	1250				
560G4/630P4	1600	1600				
630G4/710P4	1600	1600				
710G4/800P4	2000	2000				
800G4/850P4	2000	2000	185*4	185*4		
900G4/1000P4	2500	2500				
1000G4	2500	2500				
Three phase 600~690V AC input						
018G6/022P6	40	25	4	4	≥ 4	1
022G6/030P6	40	40	6	6	≥ 6	
030G6/037P6	63	40	8	8	≥ 8	
037G6/045P6	63	50	10	10	≥ 10	
045G6/055P6	100	63				

AC drive voltage & power classes	Breaker MCCB （A）	Contactor （A）	Input wire （mm^2）	Output wire （mm^2）	Ground wire （mm^2）	Control wire （mm^2）
055G6/075P6	125	100	16	16	≥ 16	1
075G6/093P6	125	125	25	25		
093G6/110P6	160	125	35	35		
110G6/132P6	200	160	50	50	≥ 25	
132G6/160P6	200	160				
160G6/185P6	250	200	70	70	≥ 35	
185G6/200P6	250	250				
200G6/220P6	350	350	120	120	≥ 60	
220G6/250P6	350	350	150	150	≥ 75	
250G6/280P6	350	350				
280G6/315P6	400	400	185	185	≥ 95	
315G6/355P6	500	500				
355G6/400P6	600	600	240	240	≥ 120	
400G6/450P6	600	600				
450G6/500P6	800	800	300	300	≥ 150	
500G6/560P6	800	800				
560G6/630P6	1000	1000	350	350	≥ 175	
630G6/710P6	1000	1000				
710G6/800P6	1250	1250				
800G6/850P6	1250	1250	150*3	150*3	≥ 225	
900G6/1000P6	1600	1600	185*3	185*3	≥ 260	
1000G6	1600	1600	185*3	185*3	≥ 260	

3.2.3 Terminals Wiring Diagram of the AC drive

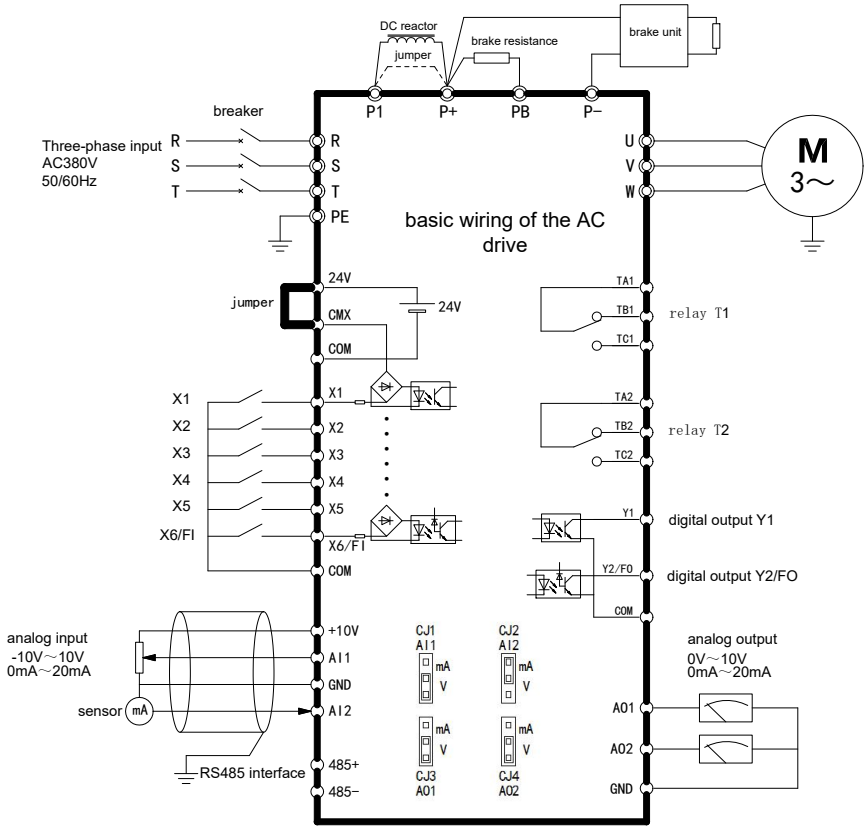


Figure 3- 13 The wiring diagram of HV500 Vector Control AC drive

Remarks:

1) Terminal '◎' represents terminals of the main circuit and '○' represents terminals of the control loop.

2) The AC drive and the motor should be reliably connected to the ground.

3) If the motor and AC drive can not be connected to the ground. Please connect the ground terminal of the motor to the PE terminal of the AC drive.

4) Default setting: 24V short to CMX, AI2 jumper is 'mA', AI1/AO1/AO2 jumper is 'V'.

3.2.4 Power Terminals of the Main Circuit

Danger

- When wiring, ensure that the power switch is off. Otherwise, you may get electric shock.
- The wiring personnel should be one professional. Otherwise, the equipment or personal body may be damaged.
- The connection to the ground should be reliable. Otherwise, it may result in an electric shock or a fire.
- Ensure that the rated value of the power supply is consistent with the one of the AC drive. Otherwise, the AC drive may be damaged.
- Ensure that the rated capacity of the motor matches the one of the AC drive. Otherwise, it may result in the damage to the motor or the protection of the AC drive.
- Do not connect the power supply to U,V,W terminals. Otherwise, it may result in the damage to the AC drive.
- Do not connect the braking resistance to P+ and P- terminals of the DC bus directly. Otherwise, it may result in a fire alarm.

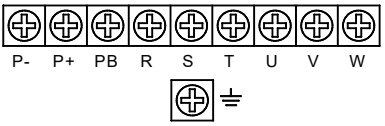


Figure 3- 14
HV500-R75G2～1R5G2,R75G1～1R5G1
HV505W-1R5G3/2R2P3 ~004G3/5R5P3
HV500-1R5G3(4)/2R2P3(4)~2R2G3(4)/004P3(4)

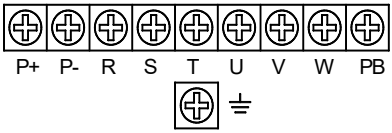


Figure 3- 15
HV500-2R2G2～7R5G2, 2R2G1
HV505W-5R5G3/7R5P3～018G3/022P3
HV500-004G3(4)/5R5P3(4)～015G3(4)/018P3(4)

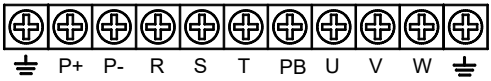


Figure 3- 16
HV505W-022G3/030P3~030G3/045P3; HV500-018G3(4)/022P3(4)～030G3/037P3(4)

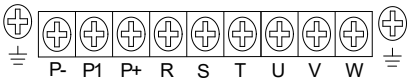


Figure 3- 17
HV505W-037G3/045P3～045G3/075P3(Wall-mounted)

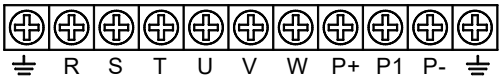


Figure 3- 18
HV505W-055G3/075P3～220G3(Wall-mounted); HV500-037G3(4)/045P3(4)～132G3(4)/160P3(4)

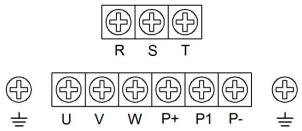


Figure 3- 19

HV505W-250G3/280P3～400G3/450P3(Wall-mounted)

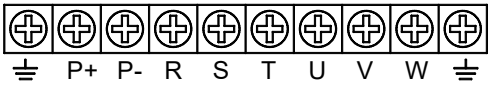


Figure 3- 20 HV500-160G3(4) /185P3(4)～560G3(4)/630P3(4)

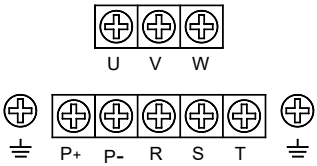


Figure 3- 21

HV500-630G3(4)/710P3(4)～710G3(4)/800P3(4)

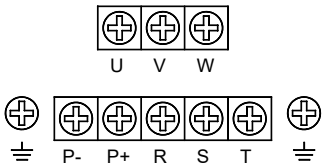


Figure 3- 22

HV500-800G3(4)/850P3(4)～1000G3(4)

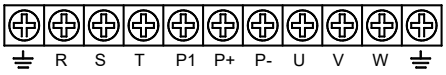


Figure 3-23 HV500-018G6/022P6～030G6/037P6

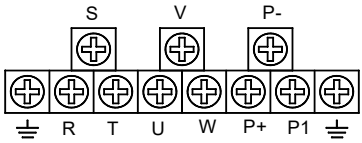


Figure 3- 24 HV500-037G6/045P6～093G6/110P6

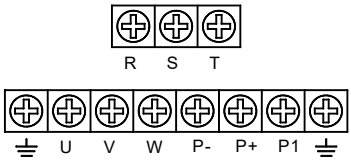


Figure 3- 25 HV500-110G6/132P6～400G6/450P6

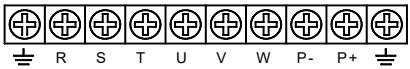


Figure 3- 26 HV500-450G6/500P6～710G6/800P6

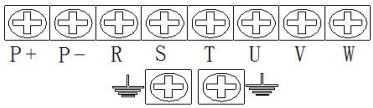


Figure 3- 27 HV500-800G6/900P6～1000G6

Table 3- 4 Main circuit terminals instruction of the AC drive

Terminal Sign	Name	Description
R,S,T	Three-phase input terminals of the power supply	Connecting points of the three-phase AC input power
P+,P-	The positive and negative terminals of the DC bus	Input point of the common DC bus
P+,PB	Connecting terminals of the braking resistance	Connecting points of the braking resistance
P1,P+	Connecting terminals of the external reactor	Connecting points of external reactor
U,V,W	Output terminals of the AC drive	Connect the three-phase motor
⏚	Earthing terminal	Earthing terminal

Remarks:

A. Input power supply R,S,T

Connect R,S,T to the input sides of the AC drive. The phase sequence is not needed.

B. P+,P- terminals of the DC bus

Terminal (+) and (-) of the DC bus have residual voltage after the power is switched off.After the indicator of the charge goes off and the residual voltage is less than 36V, you can touch the terminals (+) and (-) of the DC bus. Otherwise, it may result in an electric shock.The cable length of the braking unit should not be longer than 10 meters. Use twisted pair wire or pair wires for parallel connection.

C. P+,PB terminals of the braking resistance

As for the types which have braking unit inside the machine, the connecting terminals of the braking resistance can be valid.The selection of the braking resistance should be consistent with the recommended values and the cable length should be less than 5 meters. Otherwise, it may result in the damage to the AC drive.Do not connect the braking resistance to the DC bus directly. Otherwise, it may result in the damage to the AC drive or a fire.

D. P1,P+ Connecting terminals P1,P+ of the external reactor

Before connect the external reactor to the AC drive, the jumper between P1 and P+ terminal should be removed.

E. U,V,W Output U,V,W of the AC drive

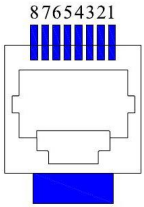
Do not connect the capacitor or surge absorber to the output terminals of the AC drive.Otherwise, it may result in the frequent protection or the damage to the AC drive.When the cable length of the motor is too long, it can result in the electric resonance due to the distributed capacity. Thus it will result in the damage to the insulation of the motor or generating big leakage current. As a result, it can trip the over current protection of the AC drive.If the cable length of the motor is longer than 100 meters, the AC output reactor should be installed.

F. Earthing terminals ⏚

Connect to the ground reliably. The resistance of the earthing line should be less than 0.1Ω. Otherwise, it may result in the malfunction of the device or even the damage to the device.Do not connect the earthing terminal ⏚ to the neutral wire of the power supply.

3.2.5 Control Terminals and Wiring Description

3.2.5.1 Terminal Arrangement of the Control Circuit



Pin 1: not used
Pin 2: +15V
Pin 3: +15V
Pin 4: 485-
Pin 5: 485+
Pin 6: GND
Pin 7: GND
Pin 8: not used

Figure 3- 28 Pin definition of keypad interface

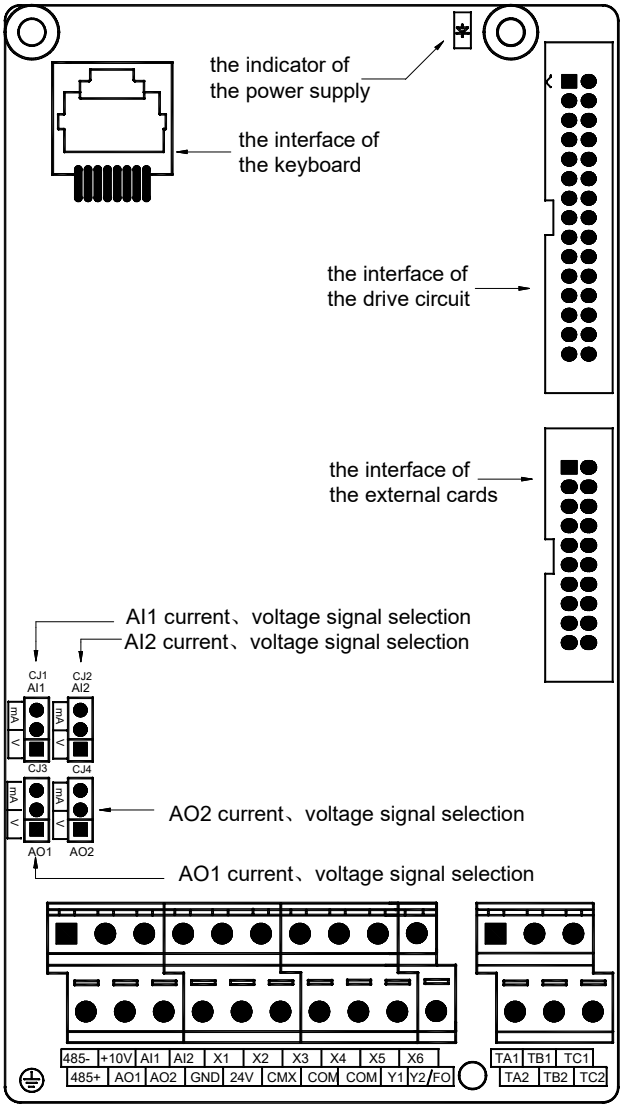


Figure 3- 29 Terminal arrangement of the control board

***Note**:*

Default setting: 24V short to CMX, AI2 jumper is 'mA', AI1/AO1/AO2 jumper is 'V'

3.2.5.2 Function Description of the Terminals on Control Board

Table 3- 5 Function description of the terminals on control board

Type	Sign	Name	Function Description
Power Supply	+10V (~GND)	10V Reference Power Supply	10V/30mA,usually is used for the power supply of the analog signal.
	24V (~COM)	24VOutput Power Supply	24V/200mA,usually is used for the power supply of the digital signal.
Analog Input	AI1 (~GND)	Analog Input Terminal 1	Input range: -10V～10V/0～20mA,decided by the jumper. Input resistance: 120KΩ (voltage input), 250Ω (current input). Jumper CJ1 on the control board is used for AI1 and jumper CJ2 on the control board is used for AI2.
	AI2 (~GND)	Analog Input Terminal 2	
Analog Output	AO1 (~GND)	Analog Output Terminal 1	Voltage Input range: 0～10V; load≤10mA. Current Input range: 0～20mA; load≤500Ω. The output signal can be used for the voltage or current type. Jumper CJ3 on the control board is used for AO1 and jumper CJ4 on the control board is used for AO2.
	AO2 (~GND)	Analog Output Terminal 2	
Digital Input	X1	Digital Input Terminal 1	1) Optical coupling isolation, compatible with dual polarity input. 2) Input resistance: 4.7KΩ. 3) Input voltage range: 9～30V. 4) X6/FI can be used for common digital input terminal and be compatible with high-speed pulse (0～100KHz) input.
	X2	Digital Input Terminal 2	
	X3	Digital Input Terminal 3	
	X4	Digital Input Terminal 4	
	X5	Digital Input Terminal 5	
	X6/FI	Digital Input Terminal 6&high-speed pulse input terminal	
	CMX	The common port of X terminals	Connect the terminal to 24V by the jumper when leave the factory. When X1～X6 is drove by external signals, the jumper between CMX and 24V should be removed. At the same time, the CMX and external power supply should be connected.
Digital Output	Y1 (~COM)	Digital output terminal 1	1) Optical coupling isolation, open collector output. 2) Output voltage and current: 24VDC, ≤50mA. Running frequency: < 500Hz. Y2/FO can be used for common digital output terminal, at the same time, it can also be used for high-speed pulse (0～100KHz) output.
	Y2/FO (~COM)	Digital output terminal 2 & high-speed pulse output terminal	
Relay Output	TB1(~TA1)	T1 normally close terminal	1) TA1 is used for the common port the relay T1 and TA2 is used for the common one of the relay T2. 2) Contactor driving ability: AC 250V,3A,COSΦ=0.4；DC 30V,1A.
	TC1(~TA1)	T1 normally open terminal	
	TB2(~TA2)	T2 normally close terminal	
	TC2(~TA2)	T2 normally open terminal	
Communication	485+	The positive terminal of RS485 differential signal	RS485 communication between the upper machine and the AC drive.
	485-	The negative terminal of RS485 differential signal	
Shielding	⏚	Shielding earthing	Connect it to shielding earthing of the signal cable.
Auxiliary interface	J4	The interface of the external cards	20 terminals, which are used for connecting the external cards with special functions.

3.2.5.3 Wiring Description of the Terminals on Control Board

Wiring description of the analog input terminals

The shielded cable is needed cause weak analog voltage signal is easily interfered.

Usually, the length of the cable should be less than 20 meters. For occasions that some analog signals suffer severe interference, filter capacitors or ferrite magnetic core should be installed at the analog signal source. As shown in the following diagrams.

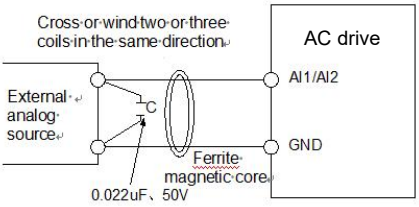


Figure 3- 30 Wiring diagram 1 of analog input

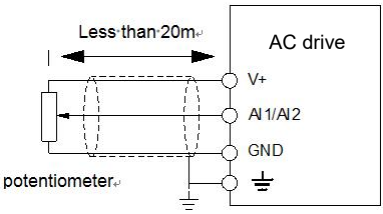


Figure 3- 31 Wiring diagram 2 of analog input

Digital Input Terminal

Generally, the length of the shielding cable should be no longer than 20 m. When the active driving is adopted, necessary filtering measures should be taken to prevent the interference to the power supply. It is recommended to use the contact control mode. The connection is valid for the positive logic and the disconnect is valid for the negative logic.

Wiring of digital input terminals

（Ⅰ）The stem nodes connection mode of common cathode

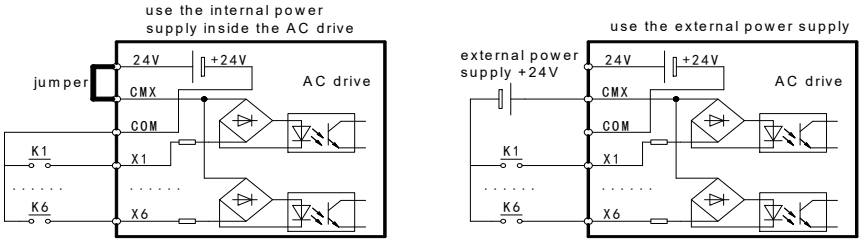


Figure 3- 32 The stem nodes connection mode of common cathode

This is the most common connection mode. If the external power supply is used, the jumper between 24V and CMX should be removed. Then connect the anode of the external power supply to CMX and connect the ground of the external power supply to the common terminal of the digital terminals. Here, do not connect the ground of the external power supply to COM by using the jumper.

（Ⅱ）The stem nodes connection mode of common anode

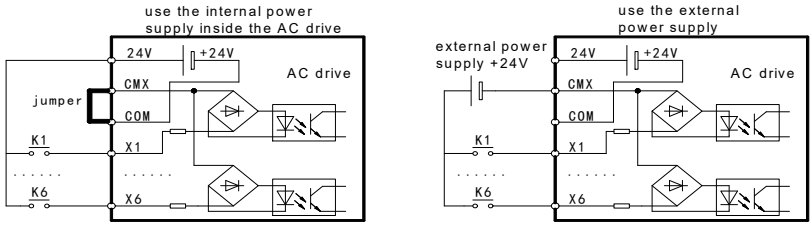


Figure 3- 33 The stem nodes connection mode of common anode

The jumper between 24V and CMX should be removed. After that, connect CMX to COM. If the external power supply is put into use, connect the ground of the external power supply to CMX. Here, do not connect the ground of the external power supply to COM by using the jumper.

（Ⅲ）Source wiring mode

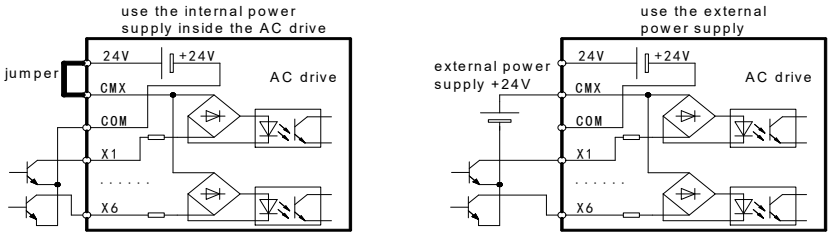


Figure 3- 34 Source wiring mode

If the external power supply is used, the jumper between 24V and CMX should be removed. After that, connect the anode of the external power supply to CMX. Here, do not connect the ground of the external power supply to COM.

（Ⅳ）Sink wiring mode

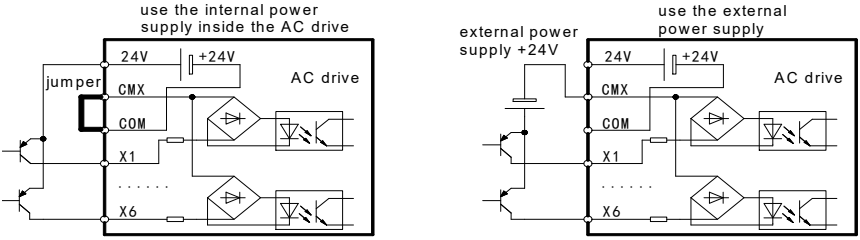


Figure 3- 35 Sink wiring mode

The jumper between 24V and CMX should be removed. Connect 24V to the common terminal of the external controller. At the same time, connect CMX and COM to the ground of the external power supply. If the external power supply is used, the jumper between 24V and CMX should be removed. Connect the ground of the external power supply to CMX. Here, do not connect the ground of the external power supply to COM by using the jumper.

Chapter 4 Operation,Display and Application

4.1 Keypad Interface

Figure 4- 1 LED Keypad (Keypad A)

Figure 4- 2 LED and LCD display Keypad (Keypad B)

4.2 Keypad Indicators

Table 4- 1 Keypad indicators description of HV500 series AC drive

Indicator		designation	implication
Units indicators	Hz	Frequency Indicator	Current display parameter units is Hertz.
	A	Current Indicator	Current display parameter units is Ampere.
	V	Voltage Indicator	Current display parameter units is Volt.
	Hz + A	Speed Indicator	Current display parameter units is Round Per Minute.
	A + V	Percentage Indicator	Current display parameter units is Percentage.
	Hz + V	MPa Indicator	Current display parameter units is Mega Pascal.
Status indicators	MON*	Command source Indicator	OFF: Keypad control; ON: Terminal control FLASH: Communication control
	RUN	Run/Stop Indicator	ON: Run state; OFF: Stop state FLASH: Deceleration state
	DIR*	Direction Indicator	OFF: Forward direction ON: Reverse direction
	TRIP*	Fault state Indicator	AC drive being alarm or fault state

Note: *Mark '*' means for LED keypad (Keypad A) only.*

4.3 Function of the Keypad Key

Table 4- 2 Function of the Keypad Key on HV500 series AC drive

Key	Name	Function
PRG	Programming/ Return	1) Eenter level 1 menu. 2) Cancel or exit a certain menu.
ENTER	Enter	1. Enter the menu level by level. 2. Confirm the parameter setting.
JOG	JOG	JOG running control of keypad control source.
>>	Shift	1. Select the displayed parameters in turn. 2. Select the digit to be modified when modifying parameters.
▷▷ (IP54 series)		
RUN	RUN	Start the AC drive.
STOP/RST	Stop/Reset	1. Stop the AC drive. 2. Reset the fault state.
	Increase/ Decrease & Enter	1. Increase/decrease the modifying digit. 2. Change the value of the reference decided by parameter **C0.18**. 3. The same as Enter key when press.
△▽ (IP54 series)		

4.4 Keypad Display

LED screen can only display 4 digits. If the parameter value is more than 4 digits, the display method is shown in the table below.

***Note:** If the parameter can be modified, each digit can be switched by **SHIFT** key.*

Table 4- 3 Five digits shown method of LED screen

Actual value	Display value	After press the SHIFT key
12345	1234.	2345
1234.5	1234	234.5
123.45	123.4	23.45
12.345	12.34	2.345
0.1234	0.123	1234
0.0034	0.003	0034
0.0004	0.000	0004

Common LDE display sign.

Table 4- 4 Common LDE display sign

Sign	Meaning
8.8.8.8.	AC drive is in initialization after power on. LCD screen shows non character.
dEFt	Being restoring default settings of the parameters. LCD screen will show 'Restoring default setting'.
Load	Being uploading the parameters. LCD screen will show 'Uploading'.Please wait for a few minutes.
Copy	Being downloading the parameters. LCD screen will show 'Downloading'.Please wait for a few minutes.
TUNE	The motor parameters is being auto-tuning. LCD screen will show 'Motor Auto-tuning'. Please wait for a few minutes.
P.SEt	User password is set successfully.
P.CLr	User password is cleared successfully.

Tips:

The Keypad with LCD screen can display two monitor parameters at the same time.

- LCD screen can display 2 lines of characters.
- Move the cursor to first line on LCD screen, press **SHIFT** key to select the first monitor parameter.
- Press **ENTER** key the move the cursor the second line,press **SHIFT** key to select the second monitor parameter.

4.5 Menu Introduction

Three level menu:

Level 1 : like **—b2—**, function code group, the group name will display on the LCD screen.

Level 2 : like **b2.01**, function code, the function code name will display on the LCD screen.

Level 3 : like **50.00**, function code setting value, the value range will display on the LCD screen.

Enter menu, the blinking digit can be modified by rotating the Rotary knob, and can be switched to another digit by pressing **SHIFT** key

Return to Level 2 menu from Level 3 by pressing **PRG** or **ENTER**.

- Pressing **Enter** key will save the parameter value, and go to the next parameter in Level 2 menu.
- Pressing **PRG** key will not save the parameter value, and just return to current parameter in Level 2 menu.

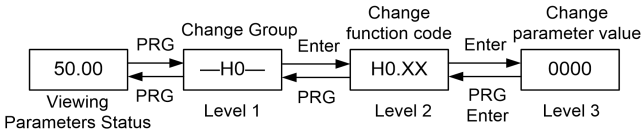


Figure 4- 3 The three-level menu operation procedure

In Level 3 menu, the digit to be modified change from low digit to high digit when use **SHIFT** key. When the parameter reaches maximum or minimum value,it can't be increased or decreased.

In Level 3 menu, if the parameter has no blinking digit, it means that the parameter cannot be modified. This may cause by:

1) This is a read-only parameter,such as the monitor parameters.
2) This parameter cannot be modified in the running state,such as the motor related parameters.

4.6 Monitor Parameters

After power on the AC drive , monitor parameters can be displayed through **SHIFT** key. And the parameters H0.01, H0.02, and H0.03 determine which monitor parameter can be displayed. Total of 24 monitor parameters can be displayed in running state. Total of 13 monitor parameters can be displayed in stop state.

Steps of select monitor parameters.

- Choose the parameters to be displayed.
- Sum the value of every parameter bit
- .Set the summation value to the related parameter.

For example,if the Running frequency, Bus voltage, and Pulses Count value need to be displayed, H0.03 shall be set to the summation value of 32773(1+4+32768 = 32773).

The LCD keypad will show the meaning of parameters on LCD screen if the AC drive has no fault. Change to the second line of LCD screen by press **Enter**, and an additional displayed parameter can be chose.

The LCD keypad will show the meaning of fault code on LCD screen. Such as the LCD screen will display “Current detection fault ” when LED display “**Er22**”.

When observing the monitor parameters, value of the reference determined by **C0.18** can also be changed by adjusting the rotary knob.And the keypad interface will return to show monitor parameters again 3 seconds after the adjustment.

The keypad interface will return to show monitor parameters automatically if there is no key pressing action in 1 minute.

4.7 Parameters Upload and Download

Parameters upload and download is a function of parameters backup and copy.It is convenient for user configuring the parameters among AC drives.

Set H0.04 to 3 will begin uploading the parameters value to the keypad. And the LCD screen will show ‘Loading’ simultaneously.

Set H0.04 to 4 will begin downloading the parameters value to the control board. And the LCD screen will show ‘Downloading’ simultaneously.

Keypad will not respond any key press in whole upload or download process.After upload or download is completed,the keypad will automatically return to normal display.And the value of function code H0.04 will changed to 0.

Download action will be invalid if there is no data in keypad.

4.8 Password and Parameter Setting

The AC drive provides the user password protection function.

When **H0.00** is set to a non-zero value, the value is the user password. Set **H0.00** to the same value for the 2 time in a row,and the password will be set successfully.Meanwhile, the LED will display 'P.SEt' and the LCD screen will display 'Setting password succeed'.The user password will be active if there is no keypad operation in 5 minutes.

If a long line '----' displays on the LED screen when you press **PRG**, 'Please enter the password' may show on the LCD screen, and then the correct user password needs to be entered.Otherwise you will see non parameter.The user password will be active again if there is no keypad operation 5 minutes after entering the correct password.

Set **H0.00** to zero for the 2 time in a row,and the password will be cleared.Meanwhile, the LED will display 'P.CLr' and the LCD screen will display 'Clear password succeed'.

Example 1: Set the user password of H0.00 to "0003"(digit with underline means it's in an edit state).

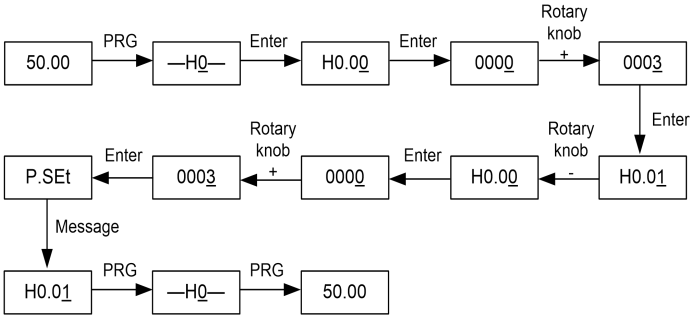


Figure 4- 4 Set user password example

Example 2: Set parameter value from "50.00" to "100.00"(digit with underline means it's in an edit state)..

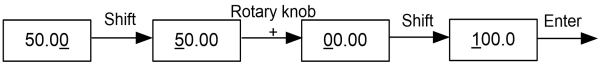


Figure 4- 5 Parameter edit example 1

Example 3: Set parameter value from "100.00" to "1.00"(digit with underline means it's in an edit state).

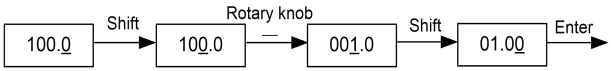


Figure 4- 6 Parameter edit example 2

4.9 User Defined Parameters

Please refer to the parameters description of group P0.

4.10 Non-basic Menu Display

Two non-basic menu is determined by H0.05, as shown in the table below.

Table 4- 5 Menu display types

H0.05	Menu display type
0	Basic menu. Displayed all parameters.
1	User-defined parameters. Display group P0 only.
2	Non factory setting parameters. Display the parameters which have been modified.

For example

A. Steps of changing menu type from basic to user-defined.

1. Set **H0.05**=1.
2. Return Level 0 menu by pressing **PRG** key.
3. Press **PRG** again,and the keypad will go into user-defined parameters display model.

B. Steps of going back to basic menu form user-defined.

1. Find and set **H0.05**=0.
2. Return Level 0 menu by pressing **PRG** key;
3. Press **PRG** again,and the keypad will go into basic parameters display model.

Chapter 5 Parameter List Table

The symbols in the parameter list table are described as follows:

"①": The parameter cannot be modified when the AC drive is in the running state.

Classification	Function Code	Description
Group A Monitor and Diagnostics	**A0**	Monitor
	A1	Fault & Diagnostics
Group b Basic Running Parameters	**b0**	Basic Parameters
	b1	Run & Stop Logic
	b2	Frequency Source
Group C Input and Output Terminals	**C0**	Digital Input
	C1	Digital Output
	C2	Analog Input
	C3	Analog Output
	C4	Pulse Input/Output
	C5	Virtual Digital Input/Output
Group d Motor Control	**d0**	Motor Control
	d1	Motor Parameters
	d2	Speed Control
	d3	Torque Control
	d5	Motor 2 Parameters
	d6	Motor 2 Speed Control
Group E Expanding Application Functions	**E0**	JOG
	E1	Skip Frequency
	E2	Multi-Reference
	E3	Simple PLC
	E4	Acc & Dec Time
	E5	PID
	E6	Multi-Pump Control
	E7	Swing Frequency
	E8	Droop Control
	E9	Power Loss Ride Through
	EA	External Brake
	Eb	Supervision
Group F Protection and Reset	**F0**	Protection
	F1	Auto Reset
Group H System Parameters and Analog Calibration	**H0**	System Parameters
	H1	AI/AO Calibration
Group L Communication Setting	**L0**	Communication Setting
	L1	Point-point Communication
	L2	Encoder Setting
Group P User-defined and Debug Parameters	**P0**	User-defined Parameters
	P1	Debug Parameters

Parameter List Table

A0 Monitor

Function Code	Name	Range	Default	Step	Description
A0.00	Running frequency	0.00~b0.00	0.00	0.01Hz	
A0.01	Setting frequency	0.00~b0.00	0.00	0.01Hz	
A0.02	DC bus voltage	0.0~3000.0	0.0	0.1V	
A0.03	Output voltage	0~1500	0	1V	
A0.04	Output current	0.00~655.35	0.00	0.01A	Fraction point decided by AC drive type
A0.05	Output torque	-300.0~300.0	0.0	0.1%	Unit is percentage. Base value is motor rated torque
A0.06	Output power	0.0~2000.0	0.0	0.1kw	AC drive output active power
A0.07	Motor speed	0~65535	0	1RPM	
A0.08	Main frequency A	0.00~b0.00	0.00	0.01Hz	
A0.09	Auxiliary frequency B	0.00~b0.00	0.00	0.01Hz	
A0.10	AC drive status word	0~65535	0	1	
Bit0: ready Bit1: running Bit2: fault Bit3: warning	Bit4: running direction Bit6/Bit5: control source Bit7: run Enable Bit8: bypass	Bit9: frequency reached Bit11/Bit10: Acc/Dec status Bit12: JOG running	Bit13: auto tuning Bit14: Zero speed Bit15: RSERVED		
A0.11	AI1 Voltage	-10.00~10.00	0.00	0.01V	Current signal needs to be changed as voltage signal. 0mA equals to 0V, 20mA equals to10V.
A0.12	AI2 Voltage	-10.00~10.00	0.00	0.01V	
A0.13	AI3 Voltage	-10.00~10.00	0.00	0.01V	
A0.14	AO1 voltage	0.00~10.00	0.00	0.01V	
A0.15	AO2 voltage	0.00~10.00	0.00	0.01V	
A0.16	X terminals status word	0~1023	0	1	
One bit corresponds one terminal status: 0: inactive 1: active Bit0: X1 (1) Bit2: X3 (4) Bit4: X5 (16) Bit6: X7（64） Bit8: X9（256） Bit1: X2 (2) Bit3: X4 (8) Bit5: X6 (32) Bit7: X8（128） Bit9: X10（512）					
A0.17	Y terminals status word	0~511	0	1	
One bit corresponds one terminal status: 0: inactive 1: active Bit0: Y1（1） Bit2: Y3（4） Bit4: T2（16） Bit6: T4（64） Bit8: T6（256） Bit1: Y2（2） Bit3: T1（8） Bit5: T3（32） Bit7: T5（128）					

Function Code	Name	Range	Default	Step	Description
A0.18	FI frequency	0.00~100.00	0.00	0.01kHz	Display the X6/FI frequency
A0.19	FO frequency	0.00~100.00	0.00	0.01kHz	Display the Y2/FO high speed pulse output frequency
A0.20	PID reference	0.0~100.0	0.0	0.1%	Its unit and decimal are depended on engineering unit.
A0.21	PID feedback	0.0~100.0	0.0	0.1%	
A0.22	PID deviation	-100.0~100.0	0.0	0.1%	
A0.23	PID output	-100.0~100.0	0.0	0.1%	
A0.24	PLC stage	0~15	0	1	
A0.25	Pulse counter	0~65535	0	1	
A0.26	Actual length	0~65535	0	1m	Dividing the number of pulses by E7.08.
A0.27	Linear speed	0.0~6553.5	0.0	0.1m/Min	This parameter shows the linear speed and its unit is m/Min
A0.28	Remaining time	0.0~6553.5	0.0	0.1Min	This parameters will show the remaining time when the timing function is enabled.
A0.29	Swing center frequency	0.00~b0.00	0.00	0.01Hz	It is decided by the current frequency source. And it shows the center frequency of swing frequency function.
A0.30	Load speed	0~65535	0	1	Output frequency multiplied by **H0.08**.
A0.31	Feedback speed	0~b0.00	0.00	0.01Hz	Showing the actual output frequency.
A0.32	Multi pump status word	0000~4444	0000	1	This parameter is used to indicate the status of each motor in multi-pump operation process.

0: in interlock or not used 2: wait for switching 4: connect to AC drive

1: ready 3: connect to power grid

Unit's digit:: 1# pump status **Hundred's digit::** 3# pump status

Ten's digit:: 2# pump status **Thousand's digit:** 4# pump status

Function Code	Name	Range	Default	Step	Description
A0.33	Encoder detection speed	-320.00~320.00	0.00	0.01Hz	indicate the motor speed from Encoder detection
A0.34	Z pulse counter	0~65535	0	1	
A0.35	Resolver position	0~4095	0	1	
A0.36	Reference voltage for V/f separation	0~b0.07	0	1V	
A0.37	Output voltage for V/f separation	0~b0.07	0	1V	
A0.38	Target torque	-300.0~300.0	0.0	0.1%	Target torque which is used in torque control mode
A0.39	Upper torque limit	0.0~300.0	0.0	0.1%	The max allowable torque in vector control mode
A0.40	Communication setting	-100.00~100.00	0.00	0.01%	Display the value located in 0x6400 sent by communication.
A0.41	Point-to-point send data	-100.00~100.00	0.00	0.01%	Indicate the data sent from master in point to point control mode
A0.42	Point-to-point receive data	-100.00~100.00	0.00	0.01%	Indicate the data received by slave in point to point control mode
A0.52	Power on time	0~65535	0	1Min	Current power on time, its unit is Min
A0.53	Running time	0.0~6553.5	0.0	0.1Min	Current running time, its unit is 0.1Min
A0.54	Accumulative power-on day	0~9999	0	1Day	
A0.55	Accumulative power-on hour	0.00~23.99	0.00	0.01h	
A0.56	Accumulative running day	0~9999	0	1Day	
A0.57	Accumulative running hour	0.00~23.99	0.00	0.01h	
A0.58	Accumulative power consumption	0~65535	0	1kwh	

Function Code	Name	Range	Default	Step	Description
A0.59	Motor temperature	0.0~300.0	0.0	0.1℃	This value is from PT100/PT1000 optional card.
A0.60	Inverter module temperature	-40.0~125.0	0.0	0.1℃	
A0.61	Rectifier module temperature	-40.0~125.0	0.0	0.1℃	

A1 Fault & Diagnostics

Function Code	Name	Range	Default	Step	Description
A1.00	1st(latest) fault type	0~54	0	1	

0: No fault
1: Hardware over voltage during acceleration
2: Hardware over voltage during deceleration
3: Hardware over voltage during constant speed
4: Software over voltage during acceleration
5: Software over voltage during deceleration
6: Software over voltage during constant speed
7: Under voltage
8: Hardware over current during acceleration
9: Hardware over current during deceleration
10: Hardware over current during constant speed
11: Software over current during acceleration
12: Software over current during deceleration
13: Software over current during constant speed
14: IGBT saturation trip during acceleration
15: IGBT saturation trip during deceleration
16: IGBT saturation trip during constant speed
17: Heatsink of rectifier overheat
18: Heatsink of inverter overheat
19: Input phase loss
20: Output phase loss
21: Soft-startup resistor fault
22: Current detection fault
23: CBC fault
24: AC drive over load
25: Motor overload
26: Motor underload
27: Motor overheat
28: Motor shortcircuit to ground fault
29: External fault
30: Keypad communication fault
31: RS485 communication fault
32: Optional card communication fault
33: Optional card connection fault
34: Auto tune fault
35: PID feedback over range
36: EEPROM R/W fault
37: Parameter setting fault
38: Accumulative power-on time reached
39: Accumulative running time reached
40: Motor switchover during running status
41: Too large speed deviation
42: Motor over-speed
43: Flux pole detection fail
44: UVW signal feedback fault
45: Encoder fault
46: User-defined fault 1
47: User-defined fault 2
48: Motor in current stall status
49: Motor in voltage stall status
50: Motor in frequency drop status as DC bus voltage drop
51: System fault
52: Interlock warning during multi-pump operation
53: Soft start current limiting resistor overload
54: Sleep status

Function Code	Name	Range	Default	Step	Description
A1.01	Output frequency upon 1st(latest) fault	0.00~b0.00	0.00	0.01Hz	Same As A0.00
A1.02	Output current upon1st(latest) fault	0.00~655.35	0.00	0.01A	Same As A0.04
A1.03	DC bus voltage upon1st(latest) fault	0.0~6553.5	0.0	0.1V	Same As A0.02
A1.04	X terminals status word upon 1st(latest) fault	0~1023	0	1	Same As A0.16
A1.05	Y terminals status word upon 1st(latest) fault	0~511	0	1	Same As A0.17
A1.06	AC drive status word upon 1st(latest) fault	0~65535	0	1	Same As A0.10
A1.07	Inverter module temperature upon 1st(latest) fault	-40.0~125.0	0.0	0.1℃	Same As A0.60
A1.08	Power-on time upon 1st(latest) fault	0~65535	0	1Min	Same As A0.52
A1.09	Running time upon 1st(latest) fault	0.0~6553.5	0.0	0.1Min	Same As A0.53
A1.10	Accumulative running day upon 1st(latest) fault	0~9999	0	1Day	Same As A0.56
A1.11	Accumulative running hour upon 1st (latest) fault	0.00~23.99	0.00	0.01h	Same As A0.57
A1.12	2nd fault type	0~54	0	1	Same As A1.00~A1.11
A1.13	Output frequency upon 2nd fault	0.00~b0.00	0.00	0.01Hz	
A1.14	Output current upon 2nd fault	0.00~655.35	0.00	0.01A	
A1.15	DC bus voltage upon 2nd fault	0.0~6553.5	0.0	0.1V	
A1.16	X terminals status word upon 2nd fault	0~1023	0	1	
A1.17	Y terminals status word upon 2nd fault	0~511	0	1	
A1.18	AC drive status word upon 2nd fault	0~65535	0	1	
A1.19	Inverter module temperature upon 2nd fault	-40.0~125.0	0.0	0.1℃	
A1.20	Power-on time upon 2nd fault	0~65535	0	1Min	
A1.21	Running time upon 2nd fault	0.0~6553.5	0.0	0.1Min	

Function Code	Name	Range	Default	Step	Description
A1.22	Accumulative running day upon 2nd fault	0~9999	0	1Day	
A1.23	Accumulative running hour upon 2nd fault	0.00~23.99	0.00	0.01h	
A1.24	3rd fault type	0~54	0	1	Same As A1.00~A1.11
A1.25	Output frequency upon 3rd fault	0.00~b0.00	0.00	0.01Hz	
A1.26	Output current upon 3rd fault	0.00~655.35	0.00	0.01A	
A1.27	DC bus voltage upon 3rd fault	0.0~6553.5	0.0	0.1V	
A1.28	X terminals status word upon 3rd fault	0~1023	0	1	
A1.29	Y terminals status word upon 3rd fault	0~511	0	1	
A1.30	AC drive status word upon 3rd fault	0~65535	0	1	
A1.31	Inverter module temperature upon 3rd fault	-40.0~125.0	0.0	0.1℃	
A1.32	Power-on time upon 3rd fault	0~65535	0	1Min	
A1.33	Running time upon 3rd fault	0.0~6553.5	0.0	0.1Min	
A1.34	Accumulative running day upon 3rd fault	0~9999	0	1Day	
A1.35	Accumulative running hour upon 3rd fault	0.00~23.99	0.00	0.01h	

b0 Basic Parameters

Function Code	Name	Range	Default	Step	Description
b0.00①	Max frequency	30.00~600.00	50.00	0.01Hz	This parameter define the Max allowable output frequency.
b0.01①	Source of Upper limit frequency	0~5	0	1	
0: b0.02	1: AI1	2: AI2	3: AI3	4: X6/FI	5: Communication
b0.02	Digital setting of upper limit frequency	b0.03~b0.00	50.00	0.01Hz	
b0.03	Lower limit frequency	0.00~b0.02	0.00	0.01Hz	
b0.04	Acceleration time 1	0.1~6000.0	Module dependent	0.1Sec	
b0.05	Deceleration time 1	0.1~6000.0	Module dependent	0.1Sec	

Function Code	Name	Range	Default	Step	Description
b0.06①	Motor rated power	0.1~999.9	Module dependent	0.1kw	
b0.07①	Motor rated voltage	1~2000	Module dependent	1V	
b0.08①	Motor rated current	0.01~655.35		0.01A	
b0.09①	Motor rated frequency	10.00~b0.00	50.00	0.01Hz	
b0.10①	Motor rated speed	1~65535	1460	1RPM	
b0.11	Command Source	0~2	0	1	
0: Keypad 1: I/O terminal 2: Communication					
b0.12①	Application setting	0~13	0	1	
0: General 1: PID application 2: Constant pressure water supply of one AC drive with two pumps 3~13: Reserved					

b1 Run & Stop logic

Function Code	Name	Range	Default	Step	Description
b1.00①	Acceleration/Deceleration mode	0~1	0	1	0: Linear 1: S Curve
b1.01①	Time proportion of S-curve start segment	0.0~(100.0-b1.02)	30.0	0.1%	
b1.02①	Time proportion of S-curve end segment	0.0~(100.0-b1.01)	30.0	0.1%	
b1.03	Startup frequency	0.00~50.00	0.00	0.01Hz	
b1.04①	Startup frequency holding time	0.0~100.0	0.0	0.1Sec	
b1.05	Start mode	0~1	0	1	
0: Ramp start from startup frequency 1: Flying start					
b1.06①	Flying start mode	0~2	0	1	
0: From frequency at stop 1: From zero speed 2: From maximum frequency					
b1.07①	Flying start current	50.0~200.0	90.0	0.1%	The current limit value of flying start process
b1.08	flying start speed	1~100	5	1	
b1.09①	V/f coefficient for flying start	30.0~100.0	100.0	0.1%	
b1.10	Stop mode	0~1	0	1	0: Ramp stop 1: Coasting stop
b1.11①	Start DC brake current	0~100	20	1%	
b1.12①	Start DC brake time	0.0~100.0	0.0	0.1Sec	
b1.13	Initial frequency of stop DC brake	0.00~b0.00	0.00	0.01Hz	

Function Code	Name	Range	Default	Step	Description
b1.14	Stop DC brake waiting time	0.0~100.0	0.0	0.1Sec	
b1.15	Stop DC brake current	0~100	20	1%	
b1.16	Stop DC brake time	0.0~100.0	0.0	0.1Sec	
b1.17	Running mode when running frequency lower than frequency lower limit	0~3	0	1	
0: Run at frequency lower limit 2: Stop 1: Run at zero speed 3: Stop, restart when setting frequency higher than lower limit					
b1.18	Running direction	0~1	0	1	0: Same direction 1: Reverse direction
It is used to set the motor direction which is consistent with the reference frequency or not, whatever the control source is.					
b1.19	Forward/Reverse rotation dead-zone time	0.0~3000.0	0.0	0.1Sec	
b1.20	Reverse prohibition	0~1	0	1	0: Reverse enabled 1: Reverse disabled
b1.21	Stop key function	0~1	1	1	
0: STOP/RESET key enabled only in operation keypad control 1: STOP/RESET key enabled in any operation mode					
b1.22	Startup protection	0~1	1	1	0: No 1: Yes
If this parameter is set to 1, even the start command is active, the AC drive will be not response to the start command. Users should cancel the start command firstly, then send the start command again to run the AC drive.					
b1.23	Dynamic brake use ratio	0~100	100	1%	
The larger the value of this parameter is, the larger braking duty will be. 0% means disable dynamic brake function.					
b1.24	Dynamic brake voltage	Module dependent	Module dependent	0.1V	
b1.25①	Multi function of JOG key	0~2	0	1	For function selection of JOG key on Keypad.
0: JOG 1:Forward/Reverse switching 2:Command source switching					

b2 Frequency Source

Function Code	Name	Range	Default	Step	Description
b2.00①	Main frequency source A	0~8	0	1	
0: b2.01+UP/DOWN 2: AI2 4: X6/FI 6: PLC 8: Communication 1: AI1 3: AI3 5: PID 7: Multi-Reference					

Code	Name	Range	Default	Step	Description
b2.01	Preset Frequency	0.00~b0.00	50.00	0.01Hz	
b2.02①	Auxiliary frequency source B	0~8	0	1	Same As b2.00
b2.03	Range of auxiliary frequency source B	0~100	100	1%	
b2.04	Offset frequency for A and B operation	0.00~b0.00	0.00	0.01Hz	
b2.05	Frequency source selection	00~34	00	1	

Unit's digit (Frequency source selection)

0: Main frequency source A
1: A and B operation (operation relationship determined by ten's digit)
2: Switchover between A and B
3: Switchover between A and "A and B operation"
4: Switchover between B and "A and B operation"

Ten's digit (A and B operation relationship)

0: A+B 1: A-B 2: min{A,B} 3: max{A,B}

b2.06	Binding command source to frequency source	000~999	000	1	

Unit's digit (Binding the frequency source together with Keypad control source)

0: No binding 2: AI1 4: AI3 6: Multi-reference 8: PID
1: b2.01+UP/DOWN 3: AI2 5: X6/FI 7: PLC 9: Communication

Ten's digit (Binding the frequency source together with Terminal control source)

Hundred's digit (Binding the frequency source together with Communication control source)

b2.07①	Frequency resolution	1~2	2	1	1: 0.1Hz 2: 0.01Hz

All the parameters with 'Hz' unit will change following b2.07. Such as b0.09(50.00Hz) will change to 500.0Hz when set b2.07 from 1 to 2.

C0 Digital Input

Function Code	Name	Range	Default	Step	Description
C0.00	X terminals filter time	0.000~1.000	0.010	0.001Sec	
C0.01①	X1 function	0~58	3	1	

0: No function
1: Forward JOG(FJOG)
2: Reverse JOG(RJOG)
3: Forward RUN (FWD)
4: Reverse RUN (REV)
5: Three-line control
6: RUN pause
7: Coast to stop
8: External STOP terminal 1
9: External STOP terminal 2
10: Emergency Stop
11: Immediate DC braking
12: Deceleration DC braking
13: Terminal UP
14: Terminal DOWN
15: UP and DOWN setting clear (terminal, operation panel)
16: Multi-reference terminal 1
17: Multi-reference terminal 2
18: Multi-reference terminal 3
19: Multi-reference terminal 4
20: Terminal 1 for Acceleration /deceleration time selection
21: Terminal 2 for Acceleration /deceleration time selection
22: Acceleration/Deceleration prohibited
23: Fault reset
24: Normally open (NO) input of external fault

Function Code	Name	Range	Default	Step	Description
25: Normally closed (NC) input of external fault 26: Frequency modification forbidden 27: Force main frequency source A to b2.01+UP/DOWN 28: Force auxiliary frequency source B to b2.01+UP/DOWN 29: Frequency source switchover 30: Motor 1/2 switchover 31: Pulse input (enabled only for X6/FI) 32: Command source switchover terminal 1		33: Command source switchover terminal 2 34: Speed control/torque control Switchover 35: Torque control prohibited 36: PLC status reset 37: Reverse PID action direction 38: PID pause 39: PID integral pause 40: PID parameter switchover 41: force PID wakeup 42: Counter input 43: Counter reset 44: length Count input 45: Length reset		46: Swing pause 47: Current running time reset 48: Motor 1# interlock input 49: Motor 2# interlock input 50: Motor 3# interlock input 51: Motor 4# interlock input 52: User-Defined fault 1 input 53: User-Defined fault 2 input 54: static auto tune 55: rotational auto tune 56: Force main frequency source A to PID 57: Force main frequency source A to PLC 58: Fire mode input	
C0.02①	X2 function	0~58	23	1	Same As C0.01
C0.03①	X3 function	0~58	0	1	
C0.04①	X4 function	0~58	0	1	
C0.05①	X5 function	0~58	0	1	
C0.06①	X6 function	0~58	0	1	
C0.07①	X7 function	0~58	0	1	
C0.08①	X8 function	0~58	0	1	
C0.09①	X9 function	0~58	0	1	
C0.10①	X10 function	0~58	0	1	
C0.11	X1~X4 active mode	0000~1111	0000	1	
0: Closed is active 1: Open is active **Unit's digit:** X1 **Ten's digit:** X2 **Hundred's digit:** X3 **Thousand's digit:** X4					
C0.12	X5~X8 active mode	0000~1111	0000	1	
0: Closed is active 1: Open is active **Unit's digit:** X5 **Ten's digit:** X6 **Hundred's digit:** X7 **Thousand's digit:** X8					
C0.13	X9~X10 active mode	00~11	00	1	
0: Closed is active 1: Open is active **Unit's digit:** X9 **Ten's digit:** X10					
C0.14	X1 delay time	0.0~3000.0	0.0	0.1Sec	
C0.15	X2 delay time	0.0~3000.0	0.0	0.1Sec	
C0.16	X3 delay time	0.0~3000.0	0.0	0.1Sec	

Function Code	Name	Range	Default	Step	Description
C0.17①	I/O command mode	0~3	0	1	
0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2					
C0.18	UP/DOWN adjustment selection	0~2	0	1	
0: Frequency reference 1: Torque reference 2: PID reference					
C0.19	UP/DOWN adjustment memory	00~11	11	1	
Unit's digit: retentive at stop 0: No 1: Yes **Ten's digit: retentive at power down** 0: No 1: Yes					
C0.20	Terminal UP/DOWN ramp rate	0.01~100.00	20.00	0.01%	

C1 Digital Output

Function Code	Name	Range	Default	Step	Description
C1.00	Y2/FO output mode selection	0~1	0	1	0: Pulse output(FO) 1: Switch signal output(Y2)
C1.01	Y1 function	0~45	3	1	

0: No output	15: Motor overload pre-warning	28: Current 1 reached
1: Under voltage	16: AC drive overload pre-warning	29: Current 2 reached
2: ready for run		30: Under load
3: running	17: inverter module temperature reached	31: AI1 input limit exceeded
4: Zero-speed running 1 (no output at stop)	18: Motor Over heat pre-warning	32: Timing reached
5: Zero-speed running 2 (having output at stop)	19: Zero current status	33: PLC cycle complete
6: Reverse running	20: Set count value reached	34: Current limit exceeded
7: Frequency reached	21: Designated count value reached	35: Communication setting
8: Frequency upper limit reached	22: Length reached	36: AI1>AI2
9: Frequency lower limit reached (no output at stop)	23: Accumulative power-on time reached	37: PID feedback Limit exceeded
10: FDT1 detection output	24: Accumulative running time reached	38: PID sleep status indication
11: FDT2 detection output		39: Frequency Limited
12: Torque limited	25: Current running time reached	40: Motor 1# Control output
13: Fault output(AC drive stop)	26: Frequency 1 reached	41: Motor 2# Control output
14: Warning output (continue running)	27: Frequency 2 reached	42: Motor 3# Control output
		43: Motor 4# Control output
		44: External brake control
		45: Simple brake control

Function Code	Name	Range	Default	Step	Description
C1.02	Y2 function	0~45	7	1	Same As C1.01
C1.03	Y3 function	0~45	0	1	
C1.04	T1 function	0~45	13	1	
C1.05	T2 function	0~45	0	1	
C1.06	T3 function	0~45	0	1	
C1.07	T4 function	0~45	0	1	
C1.08	T5 function	0~45	0	1	
C1.09	T6 function	0~45	0	1	
C1.10	Y terminals active state logic	000~111	000	1	0: positive logic 1: Negative logic
Unit's digit: Y1		**Ten's digit:** Y2		**Hundred's digit:** Y3	
C1.11	T1~T4 active state logic	0000~1111	0000	1	0: positive logic 1: Negative logic
Unit's digit: T1		**Ten's digit:** T2	**Hundred's digit:** T3		**Thousand's digit:** T4
C1.12	T5~T6 active state logic	00~11	00	1	0: positive logic 1: Negative logic
Unit's digit: T5		**Ten's digit:** T6			
C1.13	Y1 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.14	Y2 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.15	Y3 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.16	T1 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.17	T2 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.18	T3 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.19	T4 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.20	T5 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.21	T6 output delay time	0.0~3000.0	0.0	0.1Sec	
C1.22	Interval of Y1 output active state	0.0~600.0	0.0	0.1Sec	
C1.23	Interval of Y2 output active state	0.0~600.0	0.0	0.1Sec	
C1.24	Interval of T1 output active state	0.0~600.0	0.0	0.1Sec	
C1.25	Interval of T2 output active state	0.0~600.0	0.0	0.1Sec	

C2 Analog Input

Function Code	Name	Range	Default	Step	Description
C2.00	AI1 filter time	0.00~10.00	0.10	0.01Sec	
C2.01	AI2 filter time	0.00~10.00	0.10	0.01Sec	
C2.02	AI3 filter time	0.00~10.00	0.10	0.01Sec	
C2.03	AI curve selection	111~333	321	1	
1: AI curve 1(C2.04~07) 2: AI curve 2(C2.08~11) 3: AI curve 3(C2.12~15) **Unit's digit:** AI1 **Ten's digit:** AI2 **Hundred's digit:** AI3					
C2.04	AI curve 1 minimum input	-10.00~C2.06	0.00	0.01V	
C2.05	Corresponding setting of AI curve 1 minimum input	-100.0~100.0	0.0	0.1%	
C2.06	AI curve 1 maximum input	C2.04~10.00	10.00	0.01V	
C2.07	Corresponding setting of AI curve 1 maximum input	-100.0~100.0	100.0	0.1%	
C2.08	AI curve 2 minimum input	-10.00~C2.10	0.00	0.01V	
C2.09	Corresponding setting of AI curve 2 minimum input	-100.0~100.0	0.0	0.1%	
C2.10	AI curve 2 maximum input	C2.08~10.00	10.00	0.01V	
C2.11	Corresponding setting of AI curve 2 maximum input	-100.0~100.0	100.0	0.1%	
C2.12	AI curve 3 minimum input	-10.00~C2.14	0.00	0.01V	
C2.13	Corresponding setting of AI curve 3 minimum input	-100.0~100.0	0.0	0.1%	
C2.14	AI curve 3 maximum input	C2.12~10.00	10.00	0.01V	
C2.15	Corresponding setting of AI curve 3 maximum input	-100.0~100.0	100.0	0.1%	
C2.16	Jump point of AI1 input corresponding setting	-100.0~100.0	0.0	0.1%	
C2.17	Jump amplitude of AI1 input corresponding setting	0.0~100.0	0.5	0.1%	
C2.18	Jump point of AI2 input corresponding setting	-100.0~100.0	0.0	0.1%	
C2.19	Jump amplitude of AI2 input corresponding setting	0.0~100.0	0.5	0.1%	
C2.20	Jump point of AI3 input corresponding setting	-100.0~100.0	0.0	0.1%	
C2.21	Jump amplitude of AI3 input corresponding setting	0.0~100.0	0.5	0.1%	

Function Code	Name	Range	Default	Step	Description
C2.22	Setting for AI less than minimum input	000~111	000	1	
0: corresponding to minimum setting 1: 0.0% **Unit's digit:** AI1 **Ten's digit:** AI2 **Hundred's digit:** AI3					

C3 Analog Output

Function Code	Name	Range	Default	Step	Description
C3.00	AO1 filter time	0.00~10.00	0.00	0.01Sec	
C3.01	AO2 filter time	0.00~10.00	0.00	0.01Sec	
C3.02	AO1 function	0~17	1	1	
0: Set frequency 1: Running frequency 2: Output current 3: Output voltage 4: Output power 5: Output torque 6: AI1 7: AI2 8: AI3 9: Pulse input(from X6/FI) 10: Target torque 11: PID setting 12: PID feedback 13: PID output 14: Actual length 15: Count value 16: Communication setting 17: Feedback speed					
C3.03	AO2 function	0~17	2	1	Same As C3.02
C3.04	AO curve selection	11~22	21	1	
1: AO curve 1 (C3.05~08) 2: AO curve 2 (C3.09~12) **Unit's digit:** AO1 **Ten's digit:** AO2					
C3.05	AO curve 1 minimum output	0.00~10.00	0.00	0.01V	
C3.06	Corresponding setting of AO curve 1 minimum output	0.0~C3.08	0.0	0.1%	
C3.07	AO curve 1 maximum output	0.00~10.00	10.00	0.01V	
C3.08	Corresponding setting of AO curve 1 maximum output	C3.06~100.0	100.0	0.1%	
C3.09	AO curve 2 minimum output	0.00~10.00	0.00	0.01V	
C3.10	Corresponding setting of AO curve 2 minimum output	0.0~C3.12	0.0	0.1%	
C3.11	AO curve 2 maximum output	0.00~10.00	10.00	0.01V	
C3.12	Corresponding setting of AO curve 2 maximum output	C3.10~100.0	100.0	0.1%	

C4 Pulse Input/Output

Function Code	Name	Range	Default	Step	Description
C4.00	FI filter time	0.00~10.00	0.10	0.01Sec	
C4.01	FI minimum input	0.00~C4.03	0.00	0.01kHz	
C4.02	Corresponding setting of FI minimum input	-100.0~100.0	0.0	0.1%	
C4.03	FI maximum input	C4.01~100.00	50.00	0.01kHz	
C4.04	Corresponding setting of FI maximum input	-100.0~100.0	100.0	0.1%	
C4.05	FO filter time	0.00~10.00	0.00	0.01Sec	
C4.06	FO function	0~17	1	1	Same As C3.02
C4.07	FO output minimum frequency	0.00~100.00	0.00	0.01kHz	
C4.08	Corresponding setting of FO output minimum frequency	0.0~C4.10	0.0	0.1%	
C4.09	FO output maximum frequency	0.00~100.00	50.00	0.01kHz	
C4.10	Corresponding setting of FO output maximum frequency	C4.08~100.0	100.0	0.1%	

C5 Virtual Digital Input/Output

Function Code	Name	Range	Default	Step	Description
C5.00①	VX1 function	0~58	0	1	Same As C0.01
C5.01①	VX2 function	0~58	0	1	
C5.02①	VX3 function	0~58	0	1	
C5.03①	VX4 function	0~58	0	1	
C5.04	VX active state mode selection	0000~4444	1111	1	
0: Set by VYn 1: Set by C5.05 2: Set by AI1 3: Set by AI2 4: Set by AI3 **Unit's digit:** VX1 **Ten's digit:** VX2 **Hundred's digit:** VX3 **Thousand's digit:** VX4					
C5.05	Digital setting of VX active state	0000~1111	0000	1	0: Active 1: Inactive
Unit's digit: VX1 **Ten's digit:** VX2 **Hundred's digit:** VX3 **Thousand's digit:** VX4					
C5.06①	Active mode for AI as VX input	000~111	000	1	0: High is active 1: Low is active
Unit's digit: AI1 **Ten's digit:** AI2 **Hundred's digit:** AI3					
C5.07①	Active mode for AI as VX input	C5.08~8.00	6.70	0.01V	
C5.08①	Active mode for AI as VX input	1.00~C5.07	3.20	0.01V	

Function Code	Name	Range	Default	Step	Description
C5.09①	VY1 function	0~45	0	1	Same As C1.01
C5.10①	VY2 function	0~45	0	1	Same As C1.01
C5.11①	VY3 function	0~45	0	1	Same As C1.01
C5.12①	VY4 function	0~45	0	1	Same As C1.01
C5.13	VY1 output delay time	0.0~3600.0	0.0	0.1Sec	
C5.14	VY2 output delay time	0.0~3600.0	0.0	0.1Sec	
C5.15	VY3 output delay time	0.0~3600.0	0.0	0.1Sec	
C5.16	VY4 output delay time	0.0~3600.0	0.0	0.1Sec	
C5.17	VY terminal active state logic	0000~1111	0000	1	0: Positive logic 1: Negative logic
Unit's digit: VY1 **Ten's digit:** VY2 **Hundred's digit:** VY3 **Thousand's digit:** VY4					

d0 Motor Control

Function Code	Name	Range	Default	Step	Description
d0.00①	Motor control mode	0~2	0	1	
0: V/f 1: Open loop vector control 2: Close loop vector control					
d0.01	Carrier frequency	Module dependent	Module dependent	0.1kHz	
d0.02	Carrier frequency adjustment with temperature	0~1	1	1	0: Enabled 1: Disabled
d0.03	Random PWM depth	0~10	0	1	
Random PWM can decrease motor noise without increasing carrier frequency. The bigger , the wider spectrum. 0: disable random PWM 1~10: setting the depth of random PWM					
d0.04	DPWM switchover frequency upper limit	0.00~b0.00	50.00	0.01Hz	
If the output frequency is higher than this Value + 3Hz, the DPWM modulation mode is adopted, or else continuous method is adopted.					
d0.05	PWM Modulation mode	0~1	0	1	
0: Asynchronous modulation 1: Synchronous modulation					
d0.06	Torque boost	0.0~20.0	Module dependent	0.1%	0.0%: auto torque boost > 0.0%: customized torque boost
d0.07①	Cut-off frequency of torque boost	0.00~b0.00	37.00	0.01Hz	

Function Code	Name	Range	Default	Step	Description
d0.08	V/f slip compensation gain	0.0~100.0	0.0	0.1%	
d0.09	V/F over-excitation gain	0~250	64	1	
d0.10	V/F oscillation suppression gain	0~500	Module dependent	1	
d0.11	Overcurrent stall gain	0~300	Module dependent	1	
d0.12	Overcurrent stall protective current	30~200	150	1%	
Reference value is the motor rated current. Note: "d0.12 * the motor rated current" generally can not be greater than "d0.32 *the AC drive rated current of G type".					
d0.13	Overvoltage stall gain	0~300	Module dependent	1	
d0.14	Overvoltage stall protective voltage	Module dependent	Module dependent	0.1V	
d0.15	Stall control mode	00~11	00	1	
Unit's digit: Under voltage control enable 0: Disabled 1: Enabled		**Ten's digit:** Overvoltage and overcurrent stall control	0:Auto limit of acceleration and deceleration step 1:Operating frequency automatic control		
d0.16①	V/f curve selection	0~9	0	1	
0: Linear V/F 2: 1.2-power V/F 4: 1.6-power V/F 6: Square V/F 8: V/F half separation 1: Multi-point V/F 3: 1.4-power V/F 5: 1.8-power V/F 7: V/F complete separation 9: Flux Optimization					
d0.17①	Multi- point V/f zero frequency voltage	0.0~40.0	1.5	0.1%	
d0.18①	Multi- point V/f frequency 1	0.00~d0.20	3.00	0.01Hz	
d0.19①	Multi- point V/f voltage 1	0.0~100.0	8.0	0.1%	
d0.20①	Multi- point V/f frequency 2	d0.18~d0.22	25.00	0.01Hz	
d0.21①	Multi- point V/f voltage 2	0.0~100.0	55.0	0.1%	
d0.22①	Multi- point V/f frequency 3	d0.20~b0.09	50.00	0.01Hz	
d0.23①	Multi- point V/f voltage 3	0.0~100.0	100.0	0.1%	
d0.24	Voltage source for V/f separation	0~8	0	1	
0: d0.25 1: AI1 2: AI2 3: AI3 4: X6/FI 5: PID 6: PLC 7: Multi-Reference 8: Communication					
d0.25	Voltage digital setting for V/f separation	0~b0.07	0	1V	
d0.26	Voltage ramp time of V/f separation	0.0~1000.0	0.0	0.1Sec	
d0.31	CBC current control	0~1	1	1	
d0.32	CBC current limit	0.50~2.20	2.00	0.01	
d0.33	CBC current control delay time	10~9999	500	1mSec	
d0.34	Energy saving coefficient	50.0~100.0	65.0	0.1%	
Voltage coefficient of the weak magnetic when output torque below 5%.Set too low may lead to motor stall.					

d1 Motor Parameters

Function Code	Name	Range	Default	Step	Description
d1.01①	Motor stator resistance	Module dependent	Module dependent	0.001ohm	
d1.02①	Motor rotor resistance	Module dependent	Module dependent	0.001ohm	
d1.03①	Motor leakage inductance	Module dependent	Module dependent	0.01mH	
d1.04①	Motor mutual inductance	Module dependent	Module dependent	0.1mH	
d1.05①	Motor No-load current	Module dependent	Module dependent	0.01A	
d1.06①	Motor weaken flux coefficient 1	0.000~1.000	0.400	0.001	Flux weakening coefficient at 20% flux current
d1.07①	Motor weaken flux coefficient 2	0.000~1.000	0.700	0.001	Flux weakening coefficient at 50% flux current
d1.08①	Motor weaken flux coefficient 3	0.000~1.000	1.000	0.001	Flux weakening coefficient at 80% flux current
d1.15①	Auto tune	0~2	0	1	
0: No action		1: Static auto tune		2: rotational auto tune	

d2 Speed Control

Function Code	Name	Range	Default	Step	Description
d2.00	ASR proportional gain Kp1	1~100	30	1	
d2.01	ASR integration time Ti1	0.01~10.00	0.50	0.01Sec	
d2.02	ASR proportional gain Kp2	1~100	20	1	
d2.03	ASR integration time Ti2	0.01~10.00	1.00	0.01Sec	
d2.04	Low speed switchover frequency	0.00~d2.05	5.00	0.01Hz	
d2.05	High speed switchover frequency	d2.04~b0.00	10.00	0.01Hz	
d2.06	ASR integration attribute	0~1	0	1	
0: Integral separated inactive			1: Integral separated active		
d2.07	Vector control slip gain	50~120	100	1%	
d2.08	ASR filter time	0~1023	0	1	

Function Code	Name	Range	Default	Step	Description
d2.09	Upper torque limit Source of forward motoring	0~7	0	1	
0: d2.10 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication			6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d2.10	Preset upper torque limit of forward motoring	0.0~300.0	150.0	0.1%	
d2.11	Upper torque limit Source of reverse motoring	0~7	0	1	
0: d2.12 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication			6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d2.12	Preset upper torque limit of reverse motoring	0.0~300.0	150.0	0.1%	
d2.13	Upper torque limit Source of forward generating	0~7	0	1	
0: d2.14 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication			6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d2.14	Preset upper torque limit of forward generating	0.0~300.0	150.0	0.1%	
d2.15	Upper torque limit Source of reverse generating	0~7	0	1	
0: d2.16 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication			6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d2.16	Preset upper torque limit of reverse generating	0.0~300.0	150.0	0.1%	
d2.17	proportional gain of flux current loop	0~30000	2000	1	
d2.18	integration time of flux current loop	0~30000	800	1	
d2.19	proportional gain of torque current loop	0~30000	2000	1	
d2.20	integration time of torque current loop	0~30000	400	1	
d2.21①	Vector control optimization mode	000~111	110	1	0: Disabled 1: Enabled
Unit's digit : Loop control optimization		**Ten's digit**: Angle estimation optimization		**Hundred's digit**: Low frequency torque optimization	

d3 Torque Control

Function Code	Name	Range	Default	Step	Description
d3.00①	Speed/Torque control selection	0~1	0	1	0: Speed Control 1: Torque Control
d3.01①	Torque reference source	0~7	0	1	
0: d3.02+UP/DOWN 1: AI1	2: AI2 3: AI3		4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d3.02	Digital setting of torque reference	-300.0~300.0	150.0	0.1%	
d3.03①	Torque compensation source	0~7	0	1	
0: d3.04 1: AI1	2: AI2 3: AI3		4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d3.04	Digital setting of torque compensation	-300.0~300.0	0.0	0.1%	
d3.05①	Speed limit mode	0~5	0	1	
0: Minimum frequency to maximum frequency 1: Minimum frequency to running frequency 2: Negative running frequency to positive running frequency					3: Running frequency to maximum frequency 4: Running frequency + windows 5: 0Hz to output frequency
d3.06①	maximum frequency source	0~7	0	1	
0: d3.07 1: AI1	2: AI2 3: AI3		4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d3.07	Digital setting of Maximum frequency	-b0.00~b0.00	50.00	0.01Hz	
d3.08①	Minimum frequency source	0~7	0	1	
0: d3.09 1: AI1	2: AI2 3: AI3		4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）
d3.09	Digital setting of minimum frequency	-b0.00~b0.00	-50.00	0.01Hz	
d3.10	Window positive error	0.00~50.00	5.00	0.01Hz	
d3.11	Window negative error	-50.00~0.00	-5.00	0.01Hz	
d3.12	Static torque compensation	0.0~100.0	0.0	0.1%	

Function Code	Name	Range	Default	Step	Description
d3.13	Dynamic torque compensation	0.0~100.0	0.0	0.1%	
d3.14	Inertia torque compensation	0.0~100.0	0.0	0.1%	
d3.15	Torque acceleration time	0.00~650.00	2.00	0.01Sec	
d3.16	Torque deceleration time	0.00~650.00	2.00	0.01Sec	
d3.17	Maximum torque reference	-300.0~300.0	150.0	0.1%	
d3.18	Minimum torque reference	-300.0~300.0	-150.0	0.1%	
d3.17~d3.18 is the limit of torque reference under torque control mode,and is also the maximum setting value when AI, FI and Communication input.					

d5 Motor 2 Parameters

Function Code	Name	Range	Default	Step	Description
d5.00①	Motor 1/2 selection	0~1	0	1	0: Motor 1 1: Motor 2
d5.01①	Motor 2 control mode	0~2	0	1	
0: V/f	1: Open loop vector control			2: Close loop vector control	
d5.03①	Motor 2 rated power	0.1~999.9	Module dependent	0.1kw	
d5.04①	Motor 2 rated voltage	1~2000		1V	
d5.05①	Motor 2 rated current	0.01~655.35		0.01A	
d5.06①	Motor 2 rated frequency	10.00~b0.00		0.01Hz	
d5.07①	Motor 2 rated speed	1~65535		1RPM	
d5.08①	Motor 2 stator resistance	Module dependent	Module dependent	0.001ohm	
d5.09①	Motor 2 rotor resistance			0.001ohm	
d5.10①	Motor 2 leakage inductance			0.01mH	
d5.11①	Motor 2 mutual inductance			0.1mH	
d5.12①	Motor 2 No-load current			0.01A	
d5.13①	Motor 2 weaken flux coefficient 1	0.000~1.000	1.000	0.001	Flux weakening coefficient at 20% flux current

Function Code	Name	Range	Default	Step	Description
d5.14①	Motor 2 weaken flux coefficient 2	0.000~1.000	1.000	0.001	Flux weakening coefficient at 50% flux current
d5.15①	Motor 2 weaken flux coefficient 3	0.000~1.000	1.000	0.001	Flux weakening coefficient at 80% flux current
d5.22①	Motor 2 auto tune	0~2	0	1	
0: No action 1: Static auto tune 2: rotational auto tune					

d6 Motor 2 Speed Control

Function Code	Name	Range	Default	Step	Description
d6.00	Motor 2 ASR proportional gain Kp1	1~100	30	1	
d6.01	Motor 2 ASR integration time Ti1	0.01~10.00	0.50	0.01Sec	
d6.02	Motor 2 ASR proportional gain Kp2	1~100	20	1	
d6.03	Motor 2 ASR integration time Ti2	0.01~10.00	1.00	0.01Sec	
d6.04	Motor 2 Low speed switchover frequency	0.00~d6.05	5.00	0.01Hz	
d6.05	Motor 2 High speed switchover frequency	d6.04~b0.00	10.00	0.01Hz	
d6.06	Motor 2 ASR integration attribute	0~1	0	1	Same As d2.06
d6.07	Motor 2 Vector control slip gain	50~200	100	1%	
d6.08	Motor 2 ASR filter time	0~1023	0	1	
d6.09	Motor 2 Upper torque limit Source of forward motoring	0~7	0	1	
0: d6.10 2: AI2 4: X6/FI 6: MIN（AI1,AI2） 1: AI1 3: AI3 5: Communication 7: MAX（AI1,AI2）					
d6.10	Motor 2 Preset upper torque limit of forward motoring	0.0~300.0	150.0	0.1%	

Function Code	Name	Range	Default	Step	Description
d6.11	Motor 2 Upper torque limit Source of reverse motoring	0~7	0	1	
0: d6.12 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）	
d6.12	Motor 2 Preset upper torque limit of reverse motoring	0.0~300.0	150.0	0.1%	
d6.13	Motor 2 Upper torque limit Source of forward generating	0~7	0	1	
0: d6.14 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）	
d6.14	Motor 2 Preset upper torque limit of forward generating	0.0~300.0	150.0	0.1%	
d6.15	Motor 2 Upper torque limit Source of reverse generating	0~7	0	1	
0: d6.16 1: AI1	2: AI2 3: AI3	4: X6/FI 5: Communication		6: MIN（AI1,AI2） 7: MAX（AI1,AI2）	
d6.16	Motor 2 Preset upper torque limit of reverse generating	0.0~300.0	150.0	0.1%	
d6.17	Motor 2 proportional gain of flux current loop	0~30000	2000	1	
d6.18	Motor 2 integration time of flux current loop	0~30000	800	1	
d6.19	Motor 2 proportional gain of torque current loop	0~30000	2000	1	
d6.20	Motor 2 integration time of torque current loop	0~30000	400	1	

E0 JOG

Function Code	Name	Range	Default	Step	Description
E0.00	JOG frequency	0.00~b0.00	5.00	0.01Hz	
E0.01	JOG acceleration time	0.1~6000.0	10.0	0.1Sec	
E0.02	JOG deceleration time	0.1~6000.0	10.0	0.1Sec	
E0.03	JOG stop mode	0~1	0	1	0: Ramp stop 1: Coasting stop
E0.04	JOG preferred	0~1	0	1	
When set E0.04 to 1,the AC drive will response the JOG command of current control source immediately even if in running state.And the JOG command form other control source will be ignored. 0: Inactive 1: Active					

E1 Skip Frequency

Function Code	Name	Range	Default	Step	Description
E1.00	Skip frequency 1 High limit	**E1.01~b0.00**	0.00	0.01Hz	
E1.01	Skip frequency 1 Low limit	0.00~**E1.00**	0.00	0.01Hz	
E1.02	Skip frequency 2 High limit	**E1.03~b0.00**	0.00	0.01Hz	
E1.03	Skip frequency 2 Low limit	0.00~**E1.02**	0.00	0.01Hz	

E2 Multi-Reference

Function Code	Name	Range	Default	Step	Description
E2.00	Reference 0 source	0~6	0	1	
0: E2.01	1: b2.01+UP/DOWN	2: AI1	3: AI2	4: AI3	5: X6/FI 6: PID
E2.01	Reference 0	-b0.00~b0.00	0.00	0.01Hz	
E2.02	Reference 1	-b0.00~b0.00	0.00	0.01Hz	
E2.03	Reference 2	-b0.00~b0.00	0.00	0.01Hz	
E2.04	Reference 3	-b0.00~b0.00	0.00	0.01Hz	
E2.05	Reference 4	-b0.00~b0.00	0.00	0.01Hz	
E2.06	Reference 5	-b0.00~b0.00	0.00	0.01Hz	
E2.07	Reference 6	-b0.00~b0.00	0.00	0.01Hz	
E2.08	Reference 7	-b0.00~b0.00	0.00	0.01Hz	
E2.09	Reference 8	-b0.00~b0.00	0.00	0.01Hz	
E2.10	Reference 9	-b0.00~b0.00	0.00	0.01Hz	
E2.11	Reference 10	-b0.00~b0.00	0.00	0.01Hz	
E2.12	Reference 11	-b0.00~b0.00	0.00	0.01Hz	
E2.13	Reference 12	-b0.00~b0.00	0.00	0.01Hz	
E2.14	Reference 13	-b0.00~b0.00	0.00	0.01Hz	
E2.15	Reference 14	-b0.00~b0.00	0.00	0.01Hz	
E2.16	Reference 15	-b0.00~b0.00	0.00	0.01Hz	

E3 Simple PLC

Function Code	Name	Range	Default	Step	Description
E3.00	Simple PLC running mode	0~2	0	1	
0: Stop after the AC drive running one cycle 1: Keep final values after the AC drive running one cycle			2: Repeat after the AC drive running one cycle		
E3.01	Simple PLC retentive selection	00~11	00	1	
Unit's digit (Retentive upon power failure) 0: No 1: Yes **Ten's digit (Retentive upon stop)** 0: No 1: Yes					
E3.02	Time unit of simple PLC running	0~1	0	1	0: Sec (second) 1: h (hour)
E3.03	Running time of simple PLC reference 0	0.0~6553.5	0.0	0.1Sec	
E3.04	Acc/dec time of simple PLC reference 0	0~3	0	1	
0: Acceleration/deceleration time 1 1: Acceleration/deceleration time 2		2: Acceleration/deceleration time 3 3: Acceleration/deceleration time 4			
E3.05	Running time of simple PLC reference 1	0.0~6553.5	0.0	0.1Sec	
E3.06	Acc/dec time of simple PLC reference 1	0~3	0	1	Same As E3.04
E3.07	Running time of simple PLC reference 2	0.0~6553.5	0.0	0.1Sec	
E3.08	Acc/dec time of simple PLC reference 2	0~3	0	1	Same As E3.04
E3.09	Running time of simple PLC reference 3	0.0~6553.5	0.0	0.1Sec	
E3.10	Acc/dec time of simple PLC reference 3	0~3	0	1	Same As E3.04
E3.11	Running time of simple PLC reference 4	0.0~6553.5	0.0	0.1Sec	
E3.12	Acc/dec time of simple PLC reference 4	0~3	0	1	Same As E3.04
E3.13	Running time of simple PLC reference 5	0.0~6553.5	0.0	0.1Sec	
E3.14	Acc/dec time of simple PLC reference 5	0~3	0	1	Same As E3.04
E3.15	Running time of simple PLC reference 6	0.0~6553.5	0.0	0.1Sec	
E3.16	Acc/dec time of simple PLC reference 6	0~3	0	1	Same As E3.04
E3.17	Running time of simple PLC reference 7	0.0~6553.5	0.0	0.1Sec	
E3.18	Acc/dec time of simple PLC reference 7	0~3	0	1	Same As E3.04
E3.19	Running time of simple PLC reference 8	0.0~6553.5	0.0	0.1Sec	
E3.20	Acc/dec time of simple PLC reference 8	0~3	0	1	Same As E3.04
E3.21	Running time of simple PLC reference 9	0.0~6553.5	0.0	0.1Sec	
E3.22	Acc/dec time of simple PLC reference 9	0~3	0	1	Same As E3.04
E3.23	Running time of simple PLC reference 10	0.0~6553.5	0.0	0.1Sec	
E3.24	Acc/dec time of simple PLC reference 10	0~3	0	1	Same As E3.04
E3.25	Running time of simple PLC reference 11	0.0~6553.5	0.0	0.1Sec	
E3.26	Acc/dec time of simple PLC reference 11	0~3	0	1	Same As E3.04

Function Code	Name	Range	Default	Step	Description
E3.27	Running time of simple PLC reference 12	0.0~6553.5	0.0	0.1Sec	
E3.28	Acc/dec time of simple PLC reference 12	0~3	0	1	Same As E3.04
E3.29	Running time of simple PLC reference 13	0.0~6553.5	0.0	0.1Sec	
E3.30	Acc/dec time of simple PLC reference 13	0~3	0	1	Same As E3.04
E3.31	Running time of simple PLC reference 14	0.0~6553.5	0.0	0.1Sec	
E3.32	Acc/dec time of simple PLC reference 14	0~3	0	1	Same As E3.04
E3.33	Running time of simple PLC reference 15	0.0~6553.5	0.0	0.1Sec	
E3.34	Acc/dec time of simple PLC reference 15	0~3	0	1	Same As E3.04

E4 Acc & Dec Time

Function Code	Name	Range	Default	Step	Description
E4.00	acceleration time 2	0.1~6000.0	Module dependent	0.1Sec	
E4.01	deceleration time 2	0.1~6000.0		0.1Sec	
E4.02	acceleration time 3	0.1~6000.0	Module dependent	0.1Sec	
E4.03	deceleration time 3	0.1~6000.0	Module dependent	0.1Sec	
E4.04	acceleration time 4	0.1~6000.0	Module dependent	0.1Sec	
E4.05	deceleration time 4	0.1~6000.0	Module dependent	0.1Sec	
E4.06	Frequency switchover point between acceleration time 1&2	0.00~b0.00	0.00	0.01Hz	
E4.07	Frequency switchover point between deceleration time 1&2	0.00~b0.00	0.00	0.01Hz	
E4.08ⓘ	Acceleration/ Deceleration time unit	0~2	1	1	0: 1 Sec 1: 0.1 Sec 2: 0.01 Sec
E4.09ⓘ	Reference frequency of Acceleration/ Deceleration time	0~2	0	1	Acceleration/ Deceleration time is defined as the time between 0Hz to E4.09
0: Max frequency(b0.00) 1: Current setting frequency 2: 100Hz					

E5 PID

Function Code	Name	Range	Default	Step	Description
E5.00①	PID engineering unit	0~5	0	1	
0:Percentage(%) 1:Pressure(MPa) 2:Centigrade(℃) 3:Kilowatt(kW) 4:Kilowatt hour(kWh) 5:Flow(m^3/h)					
E5.01	PID engineering unit resolution	0~3	1	1	
0: No decimal 1: One decimal 2: Two decimals 3: Three decimals					
E5.02	Maximum setting of PID engineering unit	**E5.03** ~6553.5	100.0	0.1%	Unit/Decimal depends on **E5.00**/**E5.01**. First set **E5.02**, then set **E5.03**.
E5.03	Minimum setting of PID engineering unit	0.0~**E5.02**	0.0	0.1%	
E5.04	PID setting source	0~6	0	1	
0: **E5.05**+UP/DOWN 1: AI1 2: AI2 3: AI3 4: X6/FI 5: Multi-Reference 6: Communication					
E5.05	PID digital setting	**E5.03~E5.02**	50.0	0.1%	Unit/Decimal depends on **E5.00/E5.01**.
E5.06	PID setting changing time	0.00~99.99	0.00	0.01Sec	
E5.07	PID feedback source	0~8	0	1	
0: AI1 2: AI3 4: X6/FI 6: MAX(|AI1|,|AI2|) 8: Communication 1: AI2 3: AI1-AI2 5: AI1+AI2 7: MIN(|AI1|,|AI2|)					
E5.08	PID feedback filter time	0.00~60.00	0.00	0.01Sec	
E5.09	PID proportion gain Kp1	0.0~999.9	100.0	0.1%	
E5.10	PID integral time Ti1	0.01~99.99	1.00	0.01Sec	
E5.11	PID differential time Td1	0.000~9.999	0.000	0.001Sec	
E5.12	PID proportion gain Kp2	0.0~999.9	50.0	0.1	
E5.13	PID integral time Ti2	0.01~99.99	2.00	0.01	
E5.14	PID differential time Td2	0.000~9.999	0.000	0.001	
E5.15	PID parameter switchover condition	0~2	0	1	
0: No switchover 1: Switchover via X terminals 2: Automatic switchover based on deviation					
E5.16	PID parameter switchover deviation 1	**E5.03~E5.17**	20.0	0.1%	Unit/Decimal depends on **E5.00/E5.01**.
E5.17	PID parameter switchover deviation 2	**E5.16~E5.02**	80.0	0.1%	
E5.18	PID output initial value	0.0~100.0	0.0	0.1%	
E5.19	PID output initial value holding time	0.00~600.00	0.00	0.01Sec	
E5.20	PID output filter time	0.00~60.00	0.00	0.01Sec	
E5.21①	PID action direction	0~1	0	1	0:Positive 1:Negative
E5.22	PID differential limit	0.0~100.0	0.5	0.1%	
E5.23	Maximum deviation between two PID outputs in forward direction	0.00~99.99	1.00	0.01%	
E5.24	Maximum deviation between two PID outputs in reverse direction	0.00~99.99	1.00	0.01%	

Function Code	Name	Range	Default	Step	Description
E5.25	Cut-off frequency of PID reverse rotation	0.00~b0.00	0.00	0.01Hz	
E5.26	PID deviation limit	0.0~100.0	0.5	0.1%	Base on PID setting value
E5.27	PID deviation limit delay time	0.0~320.0	0.0	0.1Sec	
E5.28	PID integral property	00~11	00	1	
Unit's digit (Integral separated) 0: Inactive 1: Active **Ten's digit (Whether to stop integral operation when the output reaches the limit)** 0: Continue integral operation 1: Stop integral operation					
E5.29	PID operation at stop	0~1	1	1	
0: No PID operation at stop 1: PID operation at stop					
E5.30	PID feedback detection enable	0~1	0	1	0: Disabled 1: Enabled
E5.31	Minimum frequency of PID feedback detection	0.00~b0.00	5.00	0.01Hz	
E5.32	Waiting time of PID feedback detection	0.0~600.0	0.0	0.1Sec	
E5.33	Upper limit of PID feedback detection	**E5.03~E5.02**	100.0	0.1%	Unit/Decimal depends on **E5.00/E5.01**.
E5.34	Lower limit of PID feedback detection	**E5.03~E5.02**	0.0	0.1%	
E5.35	Detection time of PID feedback detection	0.0~600.0	0.0	0.1Sec	
E5.36	wake up level	0.0~200.0	0.0	0.1	Unit/Range depends on **E5.44**.
E5.37	wake up delay time	0.0~6500.0	0.0	0.1Sec	
E5.38	Sleep mode	0~1	0	1	
0: Based on output frequency 1: Based on PID feedback					
E5.39	Sleep level	0.0~200	0.0	0.1	Unit/Range depends on **E5.44**.
E5.40	Sleep frequency	0.00~b0.00	0.00	0.01Hz	
E5.41	Sleep delay time	0.0~6500.0	0.0	0.1Sec	0 means no sleep function.
E5.42	PID setting high limit	0.0~100.0	100.0	0.1%	PID setting value limit of internal operation.
E5.43	PID setting low limit	0.0~100.0	0.0	0.1%	
E5.44①	Base value selection of PID sleep and wake up threshold	0~1	0	1	
The Unit/Range of **E5.36** and **E5.39** is determined by **E5.44**. 0:Unit is Percentage (%),base value is PID setting and range is 0.0~200.0%. 1:Unit is the same as PID engineering unit(**E5.04**),range is **E5.03~E5.02.**					

E6 Multi-Pump Control

Function Code	Name	Range	Default	Step	Description
E6.00①	Multi-pump control mode	0~4	0	1	
This series AC drive support multi pump control modes. Each of them is apply to different application area with specific configuration and operation logic. 0: Inactive 1: Frequency pump fixed, No auto change 3: Frequency pump circulation, No auto change 2: Frequency pump fixed, Support auto change 4: Frequency pump circulation, Support auto change					
E6.01	Number of motors	1~4	1	1	
E6.02	Reference step 1	0.0~100.0	0.0	0.1%	
Active if one auxiliary motor at lease is running.Its base value is current PID reference.					
E6.03	Reference step 2	0.0~100.0	0.0	0.1%	
Active if two auxiliary motors at lease are running.Its base value is current PID reference.					
E6.04	Reference step 3	0.0~100.0	0.0	0.1%	
Active if Three auxiliary motors at lease are running.Its base value is current PID reference.					
E6.05	interlock functions	00~11	00	1	
Interlock function is used to indicate whether each motor is connected to multi pump control logic or not. **Unit's digit: interlock enable** 0: disabled 1: enabled **Ten's digit: interlcok mode** 0: decided by X terminals 1: decided by E6.06					
E6.06	Digital setting of motor interlock	0000~1111	0000	1	
0: Not connected to multi-pump system 1: Connected to multi-pump system **Unit's digit:** Motor 1# **Ten's digit:** Motor 2# **Hundred's digit:**Motor 3# **Thousand's digit:**Motor 4#					
E6.07	Auto-change interval	0.1~6000.0	48.0	0.1h	
E6.08	Auto-change frequency limit	0.00~b0.00	45.00	0.01Hz	
E6.09	Auto-change motor limit	1~3	1	1	
E6.10	Add pump frequency 1	0.00~b0.00	48.00	0.01Hz	
E6.11	Reduce pump frequency 1	0.00~E6.10	25.00	0.01Hz	
E6.12	Add pump frequency 2	0.00~b0.00	48.00	0.01Hz	
E6.13	Reduce pump frequency 2	0.00~E6.12	25.00	0.01Hz	
E6.14	Add pump frequency 3	0.00~b0.00	48.00	0.01Hz	
E6.15	Reduce pump frequency 3	0.00~E6.14	25.00	0.01Hz	
E6.16	Add pump delay time	0.0~3600.0	5.0	0.1Sec	
E6.17	Dec pump delay time	0.0~3600.0	3.0	0.1Sec	
E6.18	Electromagnetic switch delay time	0.00~10.00	0.20	0.01Sec	
E6.19	Switch over frequency from AC drive to grid	0.00~b0.00	50.00	0.01Hz	

E7 Swing Frequency

Function Code	Name	Range	Default	Step	Description
E7.00	Swing frequency setting mode	0~1	0	1	0: reference to setting frequency 1: reference to max frequency
E7.01	Swing frequency amplitude	0.0~100.0	0.0	0.1%	
E7.02	Skip frequency amplitude	0.0~50.0	0.0	0.1%	
E7.03	Swing frequency cycle	0.1~3000.0	10.0	0.1Sec	
E7.04	Triangular wave rising time coefficient	0.1~99.9	50.0	0.1%	
E7.05	Set count value	E7.06~65535	1000	1	
E7.06	Designated count value	1~E7.05	1000	1	
E7.07	Set length	0~65535	1000	1m	
E7.08	Number of pulses per meter	0.1~6553.5	100.0	0.1	

E8 Droop Control

Function Code	Name	Range	Default	Step	Description
E8.00	Droop control	0.00~10.00	0.00	0.01Hz	
E8.01	Droop control filter time	0.00~60.00	0.00	0.01Sec	

E9 Power Loss Ride Through

Function Code	Name	Range	Default	Step	Description
E9.00	Action selection at power loss ride through	0~1	0	1	0: Disabled 1: Enabled
E9.01	Action judging voltage at power loss ride through	40.0~150.0	80.0	0.1%	
E9.02	Action pause judging voltage at power loss ride through	60.0~150.0	100.0	0.1%	
E9.03	Voltage rally judging time at power loss ride through	0.00~50.00	0.50	0.01 Sec	

EA External Brake

Function Code	Name	Range	Default	Step	Description
EA.00①	External brake control enable	0~1	0	1	0: Inactive 1: active
EA.01①	External brake off frequency limit	0.00~10.00	2.50	0.01Hz	
EA.02①	External brake off current limit	0.0~180.0	110.0	0.1%	
EA.03①	External brake off delay time	0.00~10.00	0.50	0.01Sec	
EA.04①	Acceleration pause time for external brake off	0.00~10.00	1.00	0.01Sec	
EA.05①	External brake on frequency limit	0.00~10.00	2.00	0.01Hz	
EA.06①	External brake on waiting time	0.00~10.00	0.00	0.01Sec	
EA.07①	Stop delay time after external brake on	0.00~10.00	1.00	0.01Sec	

Eb Supervision

Function Code	Name	Range	Default	Step	Description
Eb.00①	Timing function	0~1	0	1	0: Inactive 1: Active
Eb.01①	Timing duration source	0~3	0	1	
0: Eb.02	1: AI1		2: AI2		3: AI3
Eb.02①	Timing duration	0.0~6500.0	0.0	0.1Min	
Eb.03①	Current running time reached threshold	0.0~6500.0	0.0	0.1Min	
Eb.04	Accumulative power-on time(day) threshold	0~9999	0	1Day	
Eb.05	Accumulative power-on time(hour) threshold	0.00~23.99	0.00	0.01h	
Eb.06	Accumulative running time(day) threshold	0~9999	0	1Day	
Eb.07	Accumulative running time(hour) threshold	0.00~23.99	0.00	0.01h	
Eb.08	Detection range of frequency reached	0.0~100.0	0.2	0.1%	
Eb.09	Any frequency reaching detection value 1	0.00~b0.00	50.00	0.01Hz	
Eb.10	Any frequency reaching detection amplitude 1	0.0~100.0	0.0	0.1%	

Function Code	Name	Range	Default	Step	Description
Eb.11	Any frequency reaching detection value 2	0.00~b0.00	50.00	0.01Hz	
Eb.12	Any frequency reaching detection amplitude 2	0.0~100.0	0.0	0.1%	
Eb.13	frequency detection threshold 1 (FDT1)	0.00~b0.00	50.00	0.01Hz	
Eb.14	Frequency detection hysteresis 1 (FDT hysteresis 1)	0.0~100.0	5.0	0.1%	
Eb.15	frequency detection threshold 2 (FDT2)	0.00~b0.00	50.00	0.01Hz	
Eb.16	Frequency detection hysteresis 2 (FDT hysteresis 2)	0.0~100.0	5.0	0.1%	
Eb.17	Zero current detection level	0.0~300.0	5.0	0.1%	100% is motor rated current
Eb.18	Zero current detection delay time	0.01~600.00	0.10	0.01Sec	
Eb.19	Output overcurrent threshold	0.0~300.0	200.0	0.1%	100% is motor rated current
Eb.20	Output overcurrent detection delay time	0.00~600.00	0.00	0.01Sec	
Eb.21	Any current reaching 1	0.0~300.0	100.0	0.1%	100% is motor rated current
Eb.22	Any current reaching 1 amplitude	0.0~300.0	0.0	0.1%	
Eb.23	Any current reaching 2	0.0~300.0	100.0	0.1%	100% is motor rated current
Eb.24	Any current reaching 2 amplitude	0.0~300.0	0.0	0.1%	
Eb.25	AI1 input voltage lower limit	0.00~Eb.26	3.70	0.01V	
Eb.26	AI1 input voltage upper limit	Eb.25~10.00	7.20	0.01V	
Eb.27	Module temperature threshold	-40.0~125.0	80.0	0.1℃	
Eb.28	Simple brake frequency	0.00~**b0.00**	2.00	0.01Hz	
Eb.29	Simple brake time	0.0~3000.0	0.0	0.1Sec	
Set **Eb.29** to a nonzero value will enable simple brake function.					

F0 Protection

Function Code	Name	Range	Default	Step	Description
F0.00	Under voltage threshold	Module dependent	Module dependent	0.1V	
F0.01①	Over voltage threshold	Module dependent	Module dependent	0.1V	
F0.02	Input phase loss protection	0~1	1	1	0: Disabled 1: Enabled
F0.03	Output phase loss protection	0~1	1	1	0: Disabled 1: Enabled
F0.04	Short-circuit to ground upon power-on	0~1	0	1	0: Disabled 1: Enabled
F0.05	AC drive over load protection gain	0.30~3.00	1.00	0.01	
F0.06	Motor overload protection	0~1	1	1	0: Disabled 1: Enabled
F0.07	Motor overload protection gain	0.20~10.00	1.00	0.01	
F0.08	Motor overload warning coefficient	50~100	80	1%	
F0.09	Under load protection	0~1	0	1	0: Disabled 1: Enabled
F0.10	Detection level of Under load	0.0~100.0	40.0	0.1%	
F0.11	Detection time of Under load	0.0~60.0	1.0	0.1Sec	
F0.12	Motor temperature sensor type	0~2	0	1	0: No sensor 1: PT100 2: PT1000
F0.13	Motor overheat protection threshold	0.0~200.0	120.0	0.1℃	
F0.14	Motor overheat warning threshold	0.0~200.0	100.0	0.1℃	
F0.15	Over-speed detection value	0.0~50.0	20.0	0.1%	
F0.16	Over-speed detection time	0.0~60.0	5.0	0.1Sec	
F0.17	Detection value of too large speed deviation	0.0~50.0	20.0	0.1%	
F0.18	Detection time of too large speed deviation	0.0~60.0	1.0	0.1Sec	
F0.19	Fault protection action selection 1	0000~2222	0000	1	

Unit's digit: input phase loss

0: Coasting stop 1: stop by stop mode 2: continue running

Ten's digit: output phase loss（same as unit's digit）

Hundred's digit: AC drive overload（same as unit's digit）

Thousand's digit: Motor overload（same as unit's digit）

Function Code	Name	Range	Default	Step	Description
F0.20	Fault protection action selection 2	0000~2222	0000	1	
Unit's digit: motor underload 0: Coasting stop 2: Jump to 8% motor rated frequency, resume to 1: Stop by stop mode setting frequency when underload is inactive. **Ten's digit:** Motor overheat（same as F0.19 unit's digit） **Hundred's digit:** external fault（same as F0.19 unit's digit） **Thousand's digit:** RS485 communication fault（same as F0.19 unit's digit）					
F0.21	Fault protection action selection 3	0000~2222	0000	1	
Unit's digit: Optional card communication fault（same as F0.19 unit's digit） **Ten's digit:** PID feedback over limit（same as F0.19 unit's digit） **Hundred's digit:** Accumulated power on time reached fault（same as F0.19 unit's digit） **Thousand's digit:** Accumulated running time reached fault（same as F0.19 unit's digit）					
F0.22	Fault protection action selection 4	0000~2222	0000	1	
Unit's digit: Too large speed deviation（same as unit's digit） **Ten's digit:** motor over speed（same as unit's digit） **Hundred's digit:** flux postion detection failt（same as unit's digit） **Thousand's digit:** UVW signals feedback fault（same as unit's digit）					
F0.23	Fault protection action selection 5	0000~2222	0000	1	
Unit's digit: Encoder fault 0: Coasting stop 2: Swtichover to V/f, and continue running 1: Switchover to V/f, and stop by stop mode **Ten's digit:** User-defined fault 1（same as unit's digit） **Hundred's digit:** User-defined fault 2（same as unit's digit） **Thousand's digit:** Multi pump interlock fault（same as unit's digit）					
F0.24	Frequency selection for continuing to run upon fault	0~4	0	1	
0: Current running frequency 3: Lower limit frequency 1: Setting frequency 4: Backup frequency upon abnormality 2: Upper limit frequency					
F0.25	Backup frequency upon abnormality	0.0~100.0	100.0	0.1%	
F0.26	Fire mode enable	0~1	0	1	0: Disabled 1: Enabled
F0.27	Fire mode frequency	0.00~b0.00	50.00	0.01Hz	
F0.28	Fire mode PID setting increase	0.0~200.0	10.0	0.1%	

F1 Auto Reset

Code	Name	Range	Default	Step	Description
F1.00	Fault auto reset times	0~30	0	1	
F1.01	Time interval of fault auto reset	0.1~100.0	1.0	0.1Sec	
F1.02	DO action during fault auto reset	00~11	00	1	
Unit's digit: Fault indication terminals 0: No action during fault reset process 1: Action during fault reset **Ten's digit:** restart after automatic fault reset 0: Not auto restart 1: having auto restart					

H0 System Parameters

Code	Name	Range	Default	Step	Description
H0.00	User password	0000~9999	0000	1	
H0.01	LED display running parameters 1	0~65535	31	1	
Bit0: Running frequency(1) Bit6: Output power(64) Bit11: Y terminals status(2048) Bit1: Setting frequency(2) Bit7: AI1 voltage(128) Bit12: PLC stage(4096) Bit2: Dc-link voltage(4) Bit8: AI2 voltage(256) Bit13: PID setting(8192) Bit3: Output current(8) Bit9: AI3 voltage(512) Bit14: PID feedback(16384) Bit4: Output voltage(16) Bit10: X terminals status(1024) Bit15: Count value(32768) Bit5: Output torque(32)					
H0.02	LED display running parameters 2	0~2047	0	1	
Bit0: FI input frequency(1) Bit4: remaining running time(16) Bit8:Feedback speed(256) Bit1: Linear speed(2) Bit5: Main frequency A (32) Bit9:motor speed(512) Bit2: Load speed(4) Bit7: FO output frequency(128) Bit10:Multi-Pump Control status words(1024) Bit3: Actual length(8)					
H0.03	LED display stop parameters	1~65535	3	1	
Bit0: Setting frequency(1) Bit5: AI2 voltage(32) Bit10: PLC stage(1024) Bit1: Dc-link voltage(2) Bit6: AI3 voltage(64) Bit11: Pulse input frequency(2048) Bit2: X terminals status(4) Bit7: FI input frequency(128) Bit12: actual length(4096) Bit3: Y terminals status(8) Bit8: PID setting(256) Bit13～Bit15: reserve Bit4: AI1 voltage(16) Bit9: PID feedback(512)					
H0.04①	Parameter initial option	0~4	0	1	
0: No Operation 1: Restore to factory default value, not include motor parameters 2: Restore to factory default value, including motor parameters 3: Parameter upload to keypad 4: Parameter download from keypad					
H0.05	Menu display selection	0~2	0	1	
0: Display all parameters 1: Display user-defined parameters 2: Display non factory setting parameters					

Code	Name	Range	Default	Step	Description
H0.06	Function code lock	0~1	0	1	0:Disabled 1:Enabled
H0.07	Accumulative power on time lock password	0~9999	0	1	
H0.08	Load speed display coefficient	0.001~9.999	0.300	0.001	
H0.09	Load speed display decimal digits	0~3	1	1	
H0.10①	G/L setting	0~1	0	1	0: G type 1: L type
H0.11①	Fan control	0~2	0	1	
0: Automatic run 1: Run after power on 2: Temperature control					
H0.12	Dead zone compensation mode selection	0~3	2	1	
0: No compensation 2: Trapezoid compensation 1: Rectangle compensation 3: Trapezoid at Low frequency and rectangle at high frequency					
H0.13①	Dead zone compensation size	1~2048	1024	1	
H0.14①	Angle size when current across zero	1~3640	Module dependent	1	
H0.15①	Dead zone compensation filter cut off frequency 1	0.10~300.00	50.00	0.01Hz	
H0.16①	Dead zone compensation filter cut off frequency 2	0.10~300.00	200.00	0.01Hz	
H0.17①	Dead zone compensation switchover frequency 1	0.10~H0.18	5.00	0.01Hz	
H0.18①	Dead zone compensation switchover frequency 2	H0.17~b0.00	50.00	0.01Hz	
H0.19①	Optional card selection	0~11	0	1	
0: no optional card 1: IO1(Y3,T3~T6 of normally open) 2: IO2(AI3,Y3, X7~X10) 3: IO3(X7~X10,T3~T4 of normally open) 4: IO4(PT100, PT1000) 5: PG1(ABZ differential type,optional 5V/12V) 6: PG2(ABZ OC & Push-pull type,optional 5V/12V/24V) 7: COM1(RS485+Modbus RTU,AI3,Y3,X7~X8) 8: COM2(Profibus) 9: COM3(CANopen) 10: COM4(GPRS) 11: COM5(Modbus TCP)					
H0.20	Product series	0~999	Module dependent Factory setting	1	
H0.21	Function firmware version	0.00~99.99		0.01	
H0.22	Algorithm firmware version	0.00~99.99		0.01	
H0.23	Keypad firmware version	0.00~99.99		0.01	
H0.24	Product series number higher bits	0~65535			
H0.25	Product series number lower bits	0~65535			
H0.26	OTP version	0.00~99.99			

H1 AI/AO Calibration

Function Code	Name	Range	Default	Step	Description
H1.00	AI1 actual voltage 1	0.500~4.000	Factory setting	0.001V	
H1.01	AI1 display voltage 1	0.500~4.000	Factory setting	0.001V	
H1.02	AI1 actual voltage 2	6.000~9.999	Factory setting	0.001V	
H1.03	AI1 display voltage 2	6.000~9.999	Factory setting	0.001V	
H1.04	AI2 actual voltage 1	0.500~4.000	Factory setting	0.001V	
H1.05	AI2 display voltage 1	0.500~4.000	Factory setting	0.001V	
H1.06	AI2 actual voltage 2	6.000~9.999	Factory setting	0.001V	
H1.07	AI2 display voltage 2	6.000~9.999	Factory setting	0.001V	
H1.08	AI3 actual voltage 1	0.500~4.000	Factory setting	0.001V	
H1.09	AI3 display voltage 1	0.500~4.000	Factory setting	0.001V	
H1.10	AI3 actual voltage 2	6.000~9.999	Factory setting	0.001V	
H1.11	AI3 display voltage 2	6.000~9.999	Factory setting	0.001V	
H1.12	AO1 display voltage 1	0.500~4.000	Factory setting	0.001V	
H1.13	AO1 actual voltage 1	0.500~4.000	Factory setting	0.001V	
H1.14	AO1 display voltage 2	6.000~9.999	Factory setting	0.001V	
H1.15	AO1 actual voltage 2	6.000~9.999	Factory setting	0.001V	
H1.16	AO2 display voltage 1	0.500~4.000	Factory setting	0.001V	
H1.17	AO2 actual voltage 1	0.500~4.000	Factory setting	0.001V	
H1.18	AO2 display voltage 2	6.000~9.999	Factory setting	0.001V	
H1.19	AO2 actual voltage 2	6.000~9.999	Factory setting	0.001V	

L0 Communication Setting

Function Code	Name	Range	Default	Step	Description
L0.00	Baud rate	0~4	1	1	
0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps 4: 57600 bps					
L0.01	Data format	0~3	0	1	
0: No check, data format <8,N,1> 1: No check, data format <8,N,2> 2: Even parity check, data format <8,E,1> 3: Odd parity check, data format <8,O,1>					
L0.02	Slave address	1~247	1	1	
L0.03	Response delay	0~20	2	1mSec	
L0.04	Communication timeout detection time	0.0~60.0	0.0	0.1Sec	Zero means no timeout detection.

L1 Point-point Communication

Function Code	Name	Range	Default	Step	Description
L1.00①	Master and slave selection	0~1	1	1	0: Master 1: Slave
L1.01①	Send data selection of master	0~3	0	1	0: Torque reference 1: Running frequency 2: Setting frequency 3: Feedback frequency
L1.02①	Point-point communication enable	0~1	0	1	0: Disabled 1: Enabled
L1.03①	Usage of data received by slave	00~11	00	1	
Unit's digit: Data usage of slave 0: as torque reference 1: as frequency reference **Ten's digit:** Whether to follow the master commands 0: No 1: Yes					
L1.04	Gain of received data	-9.99~10.00	1.00	0.01	
L1.05	Zero offset of received data	-99.9~100.0	0.0	0.1%	

L2 Encoder Setting

Function Code	Name	Range	Default	Step	Description
L2.00①	Encoder type	0~4	0	1	
0: ABZ incremental Encoder 2: Rotational resolver 4: Wire-saving UVW Encoder 1: UVW incremental Encoder 3: Sine and cosine Encoder					
L2.01①	Encoder pulse per revolution	1~65535	1024	1	
L2.02①	A/B phase sequence of ABC incremental Encoder	0~1	0	1	0: Positive 1: Negative
L2.03①	Z pulse initial angle of ABZ incremental Encoder	0.0~359.9	0.0	0.1deg	
L2.04①	Encoder installation angle	0.0~359.9	0.0	0.1deg	
L2.05①	UVW phase sequence of UVW Encoder	0~1	0	1	0: Positive 1: Negative
L2.06①	UVW Encoder angle offset	0.0~359.9	0.0	0.1deg	
L2.07①	poles of resolver	1~65535	1	1	
L2.08①	Encoder wire-break fault detection time	0.0~10.0	0.0	0.1Sec	
L2.09①	Motor 2 Encoder type	0~4	0	1	Same As L2.00

Function Code	Name	Range	Default	Step	Description
L2.10①	Motor 2 Encoder pulse per revolution	1~65535	1024	1	
L2.11①	Motor 2 A/B phase sequence of ABC incremental Encoder	0~1	0	1	Same As L2.02
L2.12①	Motor 2 Z pulse initial angle of ABZ incremental Encoder	0.0~359.9	0.0	0.1deg	
L2.13①	Motor 2 Encoder installation angle	0.0~359.9	0.0	0.1deg	
L2.14①	Motor 2 UVW phase sequence of UVW Encoder	0~1	0	1	Same As L2.05
L2.15①	Motor 2 UVW Encoder angle offset	0.0~359.9	0.0	0.1deg	
L2.16①	Motor 2 poles of resolver	1~65535	1	1	
L2.17①	Motor 2 Encoder wire-break fault detection time	0.0~10.0	0.0	0.1Sec	

P0 User-defined Parameters

Function Code	Name	Range	Default	Step	Description
P0.0i (i=0,1,2,3, ...,14)	User-defined Parameter i (i=0,1,2,3,.....,14)	A0.00~ P1.15	A0.0j (j=0,1,2,3,.....,14)	1	Users can add the frequently used parameters into user-defined group to access them quickly
P0.15	User-defined Parameter 15	H0.05~ H0.05	H0.05	1	

P1 Debug Parameters

Function Code	Name	Range	Default	Step	Description
P1.00~ P1.15	Debug parameter i (i=0,1,2,3,.....,15)	0~65535	0	1	Reserved for factory debug, user don't change them unless receive guidance from factory engineers suggestions.

P2 Factory Parameters

Function Code	Name	Range	Default	Step	Description
P2.00	Factory password	0~9999	0	1	

Chapter 6 Parameters Description

Group A0: Monitor

Parameters in A0 group are used to facilitate the user to view the drive state, all of these parameters are read only, users can't modify them. When using the keypad to view these parameters, the keypad will refresh these values.

A0.00	Range: 0.00~**b0.00**	Default: 0.00
Running frequency	Unit: Hz It displays the absolute value of running frequency.	
A0.01	Range: 0.00~**b0.00**	Default: 0.00
Setting frequency	Unit: Hz It displays the absolute value of set frequency.	
A0.02	Range: 0.0~3000.0	Default: 0.0
DC bus voltage	Unit: V It displays the drive's bus voltage.	
A0.03	Range: 0~1500	Default: 0
Output voltage	Unit: V It displays the drive's output voltage in the running state.	
A0.04	Range: 0.00~655.35	Default: 0.00
Output current	Unit: A It displays the drive's output current in the running state. 0.01A(drive Power ≤ 55kW) 0.1A(drive Power ≥ 75kW)	
A0.05	Range: -300.0~300.0	Default: 0.0
Output torque	Unit: % It displays the drive's output torque in the running state, the reference item is rated motor torque.	
A0.06	Range: 0.1~2000.0	Default: 0.0
Output power	Unit: kW It displays the drive's output power in the running state.	
A0.07	Range: 0~65535	Default: 0
Motor speed	Unit: RPM It displays the motor's rotate speed in the running state.	

A0.08 Range: 0.00~**b0.00** Default: 0.00

Main frequency A Unit: Hz

It displays the setting of main frequency A.

A0.09 Range: 0.00~**b0.00** Default: 0.00

Auxiliary frequency B Unit: Hz

It displays the setting of auxiliary frequency B.

A0.10 Range: 0~65535 Default: 0

AC drive status word It displays the drive status. The means of every bit is below:

Bits	0	1
Bit 0	No ready	Ready
Bit 1	Stop	Running
Bit 2	No fault	Fault
Bit 3	No warning	Warning
Bit 4	Forward	Reverse
Bit 5	00: Keypad control	01: Terminal control
Bit 6	10: Communication control	11: Invalid value
Bit 7	No signal of run enable	Received a signal of run enable
Bit 8	Drive control	Bypass control
Bit 9	Running frequency have not reached setting frequency	Running frequency have reached setting frequency
Bit 10	00: Constant speed	01: Accelerate speed
Bit 11	10: Decelerate speed	11: Invalid value
Bit 12	Common mode	JOG mode
Bit 13	Not in tuning	In tuning
Bit 14	No zero-speed output	Zero-speed output
Bit 15	Reserve	

A0.11 Range: -10.00~10.00 Default: 0.00

AI1 voltage Unit: V

It display AI1 voltage. If the AI1 is analog current input mode then system will convert current value to voltage value.

0mA equal to 0V, 20mA equal to 10V.

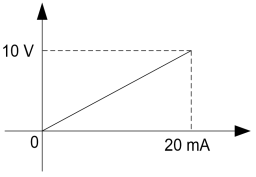


Figure 6- 1 Analog current mode convert to analog voltage mode

A0.12 Range: -10.00~10.00 Default: 0.00
AI2 voltage Unit: V
It display AI2 voltage, the covert mode same as **A0.11**.

A0.13 Range: -10.00~10.00 Default: 0.00
AI3 voltage Unit: V
It display AI3 voltage, the covert mode same as **A0.11**.

A0.14 Range: 0.00~10.00 Default: 0.00
AO1 voltage Unit: V
It display AO1 voltage, the covert mode same as **A0.11**.

A0.15 Range: 0.00~10.00 Default: 0.00
AO2 voltage Unit: V
It display AO2 voltage, the covert mode same as **A0.11**.

A0.16 Range: 0~1023 Default: 0
X terminals status word Each bit corresponds to a **X** terminal status.
0: Disable 1: Enable
Bit0: X1（1） Bit1: X2（2） Bit2: X3（4） Bit3: X4（8） Bit4: X5（16）
Bit5: X6（32） Bit6: X7（64） Bit7: X8（128） Bit8: X9（256） Bit9: X10（512）
For example: A0.16 = 55, The number of 55 is consist of (32+16+4+2+1), So the status of X6,X5,X3,X2 and X1 are validated.

A0.17 Range: 0~511 Default: 0
Y terminals status word Each bit corresponds to a **Y** terminal status.
0: Disable 1: Enable
Bit0: Y1（1） Bit1: Y2（2） Bit2: Y3（4） Bit3: T1（8） Bit4: T2（16）
Bit5: T3（32） Bit6: T4（64） Bit7: T5（128） Bit8: T6（256）
For example: A0.17 = 29, The number of 29 is consist of (16+8+4+1), So the status of T2,T1,Y3 and Y1 are validated.

A0.18 Range: 0.00~100.00 Default: 0.00
FI frequency Unit: kHz
It displays X6/FI high speed pulse input frequency.

A0.19 Range: 0.00~100.00 Default: 0.00
FO frequency Unit: kHz
It displays Y2/FO high speed pulse output frequency.

A0.20 Range: 0.0~100.0 Default: 0.0

PID setting Unit: %, the unit is equal to engineering unit.

They display the PID setting value. System use the unit of percent in PID internal calculation. For better of display the PID setting value, system will convert the value to engineering unit value. The decimal place will decided by **E5.01**.

For example:

E5.01(decimal place of engineering unit) = 1(1 decimal place)

E5.00(engineering unit) = 1(select MPa)

E5.03(Minimum setting of PID engineering unit) = 0.0

E5.02(Maximum setting of PID engineering unit) = 6.0

When setting target value is 60% in PID internal calculation, then

A0.20 = （E5.02 - E5.03） * 60.0% + E5.03 = 3.6 Mpa

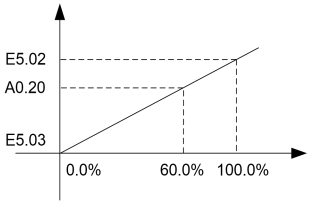


Figure 6- 2 The relationship of PID setting and engineering unit

A0.21 Range: 0.0~100.0 Default: 0.0

PID feedback Unit: %, the unit is equal to engineering unit.

It displays PID feedback value, the method of get PID feedback value is same as **A0.20.**

A0.22 Range: -100.0~100.0 Default: 0.0

PID deviation Unit: %

It displays the value of PID setting decrease PID feedback.

A0.23 Range: -100.0~100.0 Default: 0.0

PID output Unit: %

It displays PID actual output value.

A0.24 Range: 0~15 Default: 0

PLC stage It displays PLC current run stage.

A0.25 Range: 0~65535 Default: 0

Pulse counter It displays the pulse counter of X terminal. When the function of X terminal is set to 42(set counter value) or 44(length counter value), the sample counter value is displayed by this parameter. If the input pulse frequency is very fast, please select the X6/FI terminal.

A0.26 Actual length

Range: 0~65535 Default: 0

Unit: m

It display value of **A0.25** divide to **E7.08**, it is used for fixed length control.

A0.27 Linear speed

Range: 0.0~6553.5 Default: 0.0

Unit: m/Min

It displays value of sample number at every minute divide to **E7.08**.

A0.28 Remaining running time

Range: 0.0~6553.5 Default: 0.0

Unit: Min

It displays the remaining running time when the timing operation is enabled. For details on timing operation, refer to **Eb.00** to **Eb.02**.

A0.29 Swing center frequency

Range: 0.00~**b0.00** Default: 0.00

Unit: Hz

For details on timing operation, refer to parameters in group E7.

A0.30 Load speed

Range: 0~65535 Default: 0

It display the output frequency multiply by H0.08, the min unit is decided by H0.09.

For example, in place of machine tool, the drive is not trail the equipment indirectly, it connect with a variable machine at first. Set the value of H0.08 suitably, customs could use keypad to watch the actual rotational speed of the machine.

A0.31 Feedback speed

Range: -**b0.00~b0.00** Default: 0.00

Unit: Hz

It displays the actual output frequency of the drive.

A0.32 Multi-pump status word

Range: 0000~4444 Default: 0000

It displays the status of each in Multi-pump control mode.

0:in interlock or not used 1: ready 2: wait for change

3: connect to power grid 4: connect to AC drive

Unit's digit: 1# pump status

Ten's digit: 2# pump status

Hundred's digit: 3# pump status

Thousand's digit: 4# pump status

A0.33 Encoder detection speed

Range: -320.00~320.00 Default: 0.00

Unit: Hz

It displays the motor running frequency measured by the encoder.

A0.34 **Phase z counting**	Range: 0~65535 It displays the phase Z counting of the current ABZ or UVW encoder. The value increases or decreases by 1 every time the encoder rotates one revolution forwardly or reversely.	Default: 0
A0.35 **Resolver position**	Range: 0~4095 It displays the current resolver position.	Default: 0
A0.36 **Reference voltage for V/F separation**	Range: 0~**b0.07** Unit: V They display the Reference output voltage in the V/F separation state.	Default: 0
A0.37 **Output voltage for V/F separation**	Range: 0~**b0.07** Unit: V They display the actual output voltage in the V/F separation state.	Default: 0
A0.38 **Target torque**	Range: -300.0~300.0 Unit: % It displays the current torque upper limit.	Default: 0.0
A0.39 **Upper torque limit**	Range: 0.0~300.0 Unit: % It displays the current setting torque upper limit	Default: 0.0
A0.40 **Communication setting**	Range: -100.00~100.00 Unit: % It displays the data written by means of the communication address 0x6400.	Default: 0.00
A0.41 **Point-to-point send data**	Range: -100.0~100.0 Unit: % It displays the data send by master in master-slave communication mode.	Default: 0.0
A0.42 **Point-to-point receive data**	Range: -100.0~100.0 Unit: % It displays the data received by slave in master-slave communication mode.	Default: 0.0
A0.52 **Power-on time**	Range: 0~65535 Unit: Min It is used to display the current power-on time of the drive, the unit is 1 minute.	Default: 0

A0.53 Running time
Range: 0.0~6553.5 Default: 0.0
Unit: Min
It is used to display the current running time of the drive, the unit is 0.1 minute.

A0.54 Accumulative power-on day
Range: 0~9999 Default: 0
Unit: Day
It is used to display the accumulative power-on day of the drive since the delivery. It add **A0.55** is equal to the total accumulative power-on time.

A0.55 Accumulative power-on hour
Range: 0.00~23.99 Default: 0.00
Unit: h
It is used to display the accumulative power-on hour of the drive since the delivery. It add **A0.54** is equal to the total accumulative power-on time.

A0.56 Accumulative running day
Range: 0~9999 Default: 0
Unit: Day
It is used to display the accumulative running day of the drive. It add **A0.57** is equal to the total accumulative running time.

A0.57 Accumulative running hour
Range: 0.00~23.99 Default: 0.00
Unit: h
It is used to display the accumulative running hour of the drive. It add **A0.56** is equal to the total accumulative running time.

A0.58 Accumulative power consumption
Range: 0~65535 Default: 0
Unit: kWh
It is used to display the accumulative power consumption of the drive until now.

A0.59 Motor temperature
Range: 0.0~300.0 Default: 0.0
Unit: ℃
The signal of the motor temperature can be sampled by PT100/PT1000 optional card. If the PT100/PT1000 optional card not be inserted, motor temperature will be display the default value(0.0℃).

A0.60 Inverter module temperature
Range: -40.0~125.0 Default: 0.0
Unit: ℃
It is used to display the IGBT temperature of the inverter module.

A0.61 Rectifier module temperature
Range: -40.0~125.0 Default: 0.0
Unit: ℃
It is used to display the rectifier bridge temperature.

Group A1: Fault & Diagnostic

A1.00 Range: 0~54 Default: 0

Latest fault type It display the fault type upon latest fault.

The characters of “Er” and fault code are displayed in LED.

The relationship of fault code and fault type are described in the following table, the detail about the alarm and run mode are in **Chapter 7.**

Table 6- 1 The corresponding table of Fault type and fault code

Fault code	Fault type	Fault code	Fault type
0	No fault		
1	Hardware over voltage during acceleration	28	Motor short circuit to ground fault
2	Hardware over voltage during deceleration	29	External fault
3	Hardware over voltage during constant speed	30	Keypad communication fault
4	Software over voltage during acceleration	31	RS485 communication fault
5	Software over voltage during deceleration	32	Optional card communication fault
6	Software over voltage during constant speed	33	Optional card connection fault
7	Under voltage	34	Auto tune fault
8	Hardware over current during acceleration	35	PID feedback over range
9	Hardware over current during deceleration	36	EEPROM R/W fault
10	Hardware over current during constant speed	37	Parameter setting fault
11	Software over current during acceleration	38	Accumulative power-on time reached
12	Software over current during deceleration	39	Accumulative running time reached
13	Software over current during constant speed	40	Motor switchover during running status.
14	IGBT saturation trip during acceleration	41	Too large speed deviation
15	IGBT saturation trip during deceleration	42	Motor over speed
16	IGBT saturation trip during constant speed	43	Flux pole detection fault
17	Heatsink of rectifier overheat	44	UVW signal feedback fault
18	Heatsink of inverter overheat	45	Encoder fault
19	Input phase loss	46	User-defined fault 1
20	Output phase loss	47	User-defined fault 2
21	Soft startup relay fault	48	Motor in current stall status
22	Current detection fault	49	Motor in voltage stall status
23	CBC fault	50	Motor in frequency drop status as dc-link voltage drop
24	VFD overload	51	System fault
25	Motor overload	52	Interlock warning during multi-pump operation mode
26	Motor under load	53	Soft startup resistor overload
27	Motor overheat	54	Sleep status

A1.01 **Output frequency upon latest fault**	Range: 0.00~**b0.00** Unit: Hz Same as **A0.00**	Default: 0.00
A1.02 **Output current upon latest fault**	Range: 0.00~655.35 Unit: A Same as **A0.04**	Default: 0.00
A1.03 **Dc-link voltage upon latest fault**	Range: 0.0~6553.5 Unit: V Same as **A0.02**	Default: 0.0
A1.04 **X terminals state upon latest fault**	Range: 0~1023 Same as **A0.16**	Default: 0
A1.05 **Y terminals state upon latest fault**	Range: 0~511 Same as **A0.17**	Default: 0
A1.06 **VFD state upon latest fault**	Range: 0~65535 Same as **A0.10**	Default: 0
A1.07 **Inverter temperature upon latest fault**	Range: -40.0~125.0 Unit: ℃ Same as **A0.60**	Default: 0.0
A1.08 **Power-on time upon latest fault**	Range: 0~65535 Unit: Min Same as **A0.52**	Default: 0
A1.09 **Running time upon latest fault**	Range: 0.0~6553.5 Unit: Min Same as **A0.53**	Default: 0.0
A1.10 **Accumulative running day upon latest fault**	Range: 0~9999 Unit: Day Total accumulative running time upon latest fault is A1.10+A1.11	Default: 0
A1.11 **Accumulative**	Range: 0.00~23.99 Unit: h	Default: 0.00

running hour upon latest fault	Total accumulative running time upon latest fault is A1.10+A1.11

The parameters of **A1.12~A1.23** are the penultimate fault record, the mean of these parameters same as **A1.00~A1.11**

The parameters of **A1.24~A1.35** are the third fault record, the mean of these parameters same as **A1.00~A1.11**

Group b0: Basic Parameters

b0.00① **Maximum frequency**

Range: 30.00~600.00 Default: 50.00

Unit: Hz

The parameter define the Max allowable output frequency. it is the reference of some frequency setting, but also the acceleration and deceleration time. Please set up suitable value in the actual application filed.

b0.01① **Source of Upper limit frequency**

Range: 0~5 Default: 0

Please select suitable value according to the actual demand.

0: **b0.02** 1: AI1 2: AI2

3: AI3 4: X6/FI 5: Communication setting

b0.02 Digital setting of upper limit frequency

Range: **b0.03~b0.00** Default: 50.00

Unit: Hz

The upper limit frequency is used to set the maximum allowable output frequency, its value should be less than or equal to the maximum frequency. When setting frequency is higher than the upper limit frequency, drive will run in the upper limit frequency.

b0.03 Lower limit frequency

Range: 0.00~**b0.02** Default: 0.00H

Unit: Hz

The lower limit frequency is used to set the allowable minimum frequency of the motor running, its value should be less than or equal to the upper limit frequency. When setting frequency less than the lower limit of frequency converter, the run mode according to the b1.17.

Note: the parameters of max frequency, upper limit frequency and lower limit frequency should be set based on the motor. The relationship of these parameters is max frequency ≥upper limit frequency≥lower limit frequency.

b0.04 Acceleration time 1

Range: 0.1~6000.0 Default: Model dependent

Unit: Sec

Acceleration time indicates the time required by the drive to accelerate

from 0 Hz to **E4.09**, please see the T1 in the following figure.

b0.05 Deceleration time 1

Range: 0.1~6000.0 Default: Model dependent

Unit: Sec

Deceleration time indicates the time required by the drive to decelerate from **E4.09** to 0 Hz, please see the T2 in the following figure.

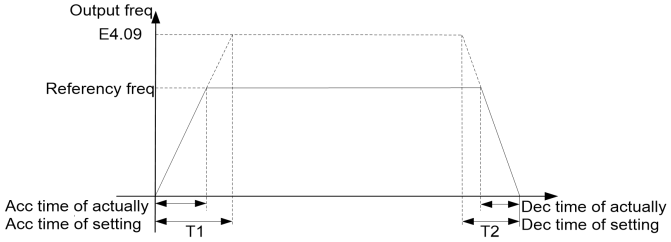


Figure 6- 3 Acc/Dec time map

b0.06① **Motor rated power**

Range: 0.1~999.9 Default: Model dependent

Unit: kW

The default value of motor rated power is the same with AC drive rated power(G type).

For example:

If the AC drive type is 4T-3R7G/5R5L, then the default value of motor rated power is 3.7kW.

If the AC drive type is 4T-5R5G/7R5L, then the default value of motor rated power is 5.5kW.

b0.07① **Motor rated voltage**

Range: 1~2000 Default: Model dependent

Unit: V

The default value of motor rated voltage and AC drive voltage level are consistent.

b0.08① **Motor rated current**

Range:

0.01~655.35(Drive power ≤ 55kW) Default: Model dependent

0.1~6553.5(Drive power ≥ 75kW)

Unit: A

The default value of motor rated current matches with motor rated power. When you modified b0.06(motor rated power), motor rated current default value will be changed.

b0.09① **Motor rated frequency**

Range: 10.00~**b0.00** Default: 50.00

Unit: Hz

Please set according to the motor nameplate data.

b0.10① **Motor rated speed**

Range: 1~65535 Default: 1460

Unit: RPM

The default value of this parameter is estimated based on the motor which have four poles.

Please set according to the motor nameplate data.

Note: both the VF and vector control, in order to ensure the control performance, please be sure to follow the actual motor nameplate data set the correct values of b0.06~b0.10 parameters.

b0.11 Command source

Range: 0~2 Default: 0

The parameter is used to select command source. Run Command includes: start, stop, forward, reverse, JOG and so on.

0: keypad control

These keys of “RUN”, “JOG”, “STOP/RST” are used to control drive run.

If the keypad is command source then the light of “MON” on the keypad keep off state always.

1: I/O terminal control

System control drive run, stop, forward, reverse, forward JOG, reverse JOG and so on by configure the X terminal functions. control mode can be two line or three line, about detail please see the parameter of **C0.17**.

If the terminal is command source then the light of “MON” on the keypad keep bright state always.

3: communication

PC send run command to drive by RS485 field bus.

If the terminal is command source then the light of “MON” on the keypad keep flashing state.

Note: the command source of keypad, terminal and communication can be switched each other by the x terminal function of number 32(the command source switching terminal 1) and number 33(the command source switching terminal 2).

b0.12① **Application setting**

Range: 0~13 Default: 0

0: General

1: PID application

2: Constant pressure water supply of one AC drive with two pumps

3~13: Reserved

Code	Name	Setting value when b0.12= 1	Setting value when b0.12= 2
b0.03	Lower limit frequency	20.00Hz	20.00Hz
b0.11	Command source	1: I/O terminal	1: I/O terminal
b1.20	Reverse prohibition	1: Reverse disabled	1: Reverse disabled
b2.00	Main frequency source A	5: PID	5: PID

C0.03	X3 function	-	48: Motor 1# interlock input
C0.04	X4 function	-	49: Motor 2# interlock input
C0.18	UP/DOWN adjustment selection	2: PID reference	2: PID reference
C1.04	T1 function	-	40: Motor 1# control output
C1.05	T2 function	38: PID sleep status indication	41: Motor 2# control output
C2.04	AI curve1 minimum input	2.00V	2.00V
E5.00①	PID engineering unit	1: Pressure(MPa)	1: Pressure(MPa)
E5.01	PID engineering unit resolution	2: Two decimals	2: Two decimals
E5.02	Maximum setting of PID engineering unit	1.00 MPa	1.00 MPa
E5.05	PID digital setting	0.50 MPa	0.50 MPa
E5.26	PID deviation limit	1.0%	1.0%
E5.36	Wake up level	50.0%	50.0%
E5.37	Wake up delay time	1.0 Sec	1.0 Sec
E5.40	Sleep frequency	22.00 Hz	22.00 Hz
E5.41	Sleep delay time	1.0 Sec	1.0 Sec
E6.00	Multi-pump control mode	-	4: Frequency pump circulation,Support auto change
E6.01	Number of motors	-	2
E6.05	Interlock functions	-	01: Interlock enabled,decided by X terminals
H0.01	LED display running parameters 1	24715(1+2+8+128+8192+16384)	24715(1+2+8+128+8192+16384)
H0.02	LED display running parameters 2	-	1024
H0.03	LED display stop parameters	787(1+2+16+256+512)	787(1+2+16+256+512)

Group b1: Run & Stop Logic

b1.00① Range: 0~1 Default: 0

Acceleration /Deceleration mode

It is used to set the frequency change mode during the drive start and stop process

0: Linear

The output frequency increases or decreases in linear mode, please see the following figure.

1: S curve

Use S curve mode at the beginning and the ending period of acceleration and deceleration can make the process more smooth. It could protect the load from impact. Please see the following figure.

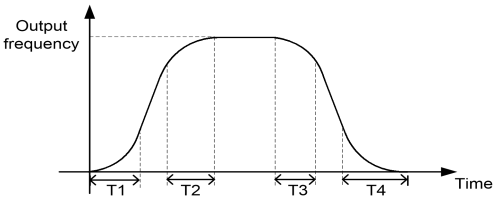


Figure 6- 4 S curve acc/dec

b1.01 and b1.02 set the proportion of S curve on the beginning section and the ending section of acceleration and deceleration period. Please see the figure above, T1, T3 and T2, T4. At the beginning of section(T1, T3) and end of section(T2, T4), slope of acceleration and deceleration is gradually changing; Within the time of middle segment(T1-T2 and T3-T4), the slope of the output frequency change remains unchanged. that is, linear acceleration/deceleration.

For example: if set the current acceleration time is acceleration time 1(b0.04) and the current deceleration time is deceleration 1(b0.05), then:

T1 = b0.04 * b1.01 T2 = b0.04 * b1.02

T3 = b0.05 * b1.01 T4 = b0.05 * b1.02

b1.01① Range: 0.0~（100.0 - **b1.02**） Default: 30.0

Time proportion of S-curve start segment

Unit: %

These parameter define the time proportions of the start segment of S-curve acceleration/deceleration.

b1.02① Range: 0.0~（100.0 - **b1.01**） Default: 30.0

Time proportion of S-curve end segment

Unit: %

These parameter define the time proportions of the end segment of S-curve acceleration/deceleration.

b1.03 Startup frequency

Range: 0.00~50.00 Default: 0.00

Unit: Hz

Start frequency is the initial frequency of drive from stop to start. It not restricted by lower frequency limit. If setting frequency less than startup frequency, the drive will run with the frequency of zero.

b1.04① **Startup frequency holding time**

Range: 0.0~100.0 Default: 0.0

Unit: s

When startup, drive will run and use the frequency of b1.03, it will holding the frequency base on b1.04 then accelerate to setting frequency.

Note:

- If the set target frequency is lower than the startup frequency, the drive will not start.
- During switchover between forward rotation and reverse rotation, the startup frequency holding time is disabled.
- The holding time is not included in the acceleration time.
- The holding time is included in the running time of PLC.

b1.05 Start mode

Range: 0~1 Default: 0

0: Ramp start from startup frequency

It is applicable to small-inertia load. DC braking before the start is applicable to drive of load such as elevator and crane.

Startup frequency is applicable to drive with burst start under start torque, such as cement mixer.

1: Rotational speed tracking start

It is applicable to large-inertia load. If the load motor is still rotating due to the inertia when the drive starts, this mode is used to prevent start overcurrent.

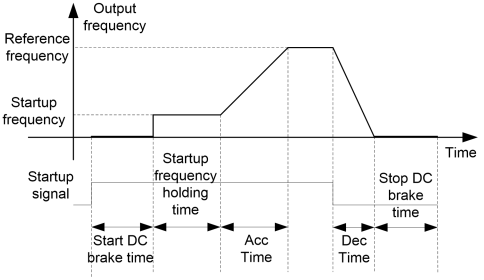


Figure 6- 5 startup frequency

b1.06① Range: 0~2 Default: 0

Flying start mode

To complete the rotational speed tracking process within the shortest time, select the proper mode in which the drive tracks the motor rotational speed.

0: From frequency at stop

It is the commonly selected mode

1: From zero frequency

It is applicable to restart after a long time of power failure.

2: From maximum frequency

It is applicable to the power-generating load.

b1.07① Range: 50.0~200.0 Default: 90.0

Flying start current

Unit: %

It is used to setting the output current when drive in speed tracking. It is not be changed commonly.

b1.08 Range: 1~100 Default: 5

Flying start speed

The larger the value is, the faster the tracking is. However, too large value may cause unreliable tracking.

b1.09① Range: 30.0~100.0 Default: 100.0

V/f coefficient for flying start

Unit: %

When drive is tracking the motor speed, v/f curve will multiply by the parameter. it could restrain the output current and improve the reliability of speed tracking.

b1.10 Range: 0~1 Default: 0

Stop mode

0: Ramp stop

After the stop command is enabled, the drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

1: Coasting stop

After the stop command is enabled, the drive immediately stops the output. The motor will coast to stop based on the mechanical inertia.

b1.11① Range: 0~100 Default: 20

Start DC brake current

Unit: %

This parameter specifies the output current at DC braking when drive is starting. it is a percentage relative to the base value, the base value is motor rate current. If the parameter value is bigger than drive rate current then the output brake current will be limited by drive rate current. The brake current larger, the greater the brake torque.

b1.12① Range: 0.0~100.0 Default: 0.0
Start DC brake time
Unit: Sec
This parameter specifies DC brake time when drive startup. If the startup DC braking time is 0, the drive starts directly without DC braking.

b1.13 Range: 0.00~**b0.00** Default: 0.00
Initial frequency of stop DC brake
Unit: Hz
During the process of decelerating to stop, the drive starts DC braking when the running frequency is lower than the value set in F6-11.

b1.14 Range: 0.0~100.0 Default: 0.0
Stop DC brake waiting time
Unit: s
When the running frequency decreases to the initial frequency of stop DC braking, the drive stops output for a certain period and then starts DC braking. This prevents faults such as overcurrent caused due to DC braking at high speed. About the detail please see figure below.

b1.15 Range: 0~100 Default: 20
Stop DC brake current
Unit: %
This parameter specifies the output current at DC braking when drive is stopping. it is a percentage relative to the base value, the base value is motor rate current. If the parameter value is bigger than drive rate current then the output brake current will be limited by drive rate current.

b1.16 Range: 0.0~100.0 Default: 0.0
Stop DC brake time
Unit: s
This parameter specifies the holding time of DC braking. If it is set to 0, DC braking is invalid.

In deceleration stopping(**b1.10** set to 0), if the output frequency is reduced to the set value of **b1.13**, then drive enter DC brake process. At first, the drive output close PWM(the close PWM time is determined by **b1.14**), and then drive enter the DC brake mode. The brake current is determined by **b1.15**, the duration is determined by **b1.16**. If **b1.16** is set to 0, then stop DC brake is invalid, drive will stop according to time. Specific braking process is shown in the following figure.

Note:

1. The appropriate stop DC brake waiting time could decrease the fault when motor is running with high speed and start DC braking.

2. The larger the braking current is, the greater the braking torque greater, but too much braking current and long braking time may damage the motor and drive.

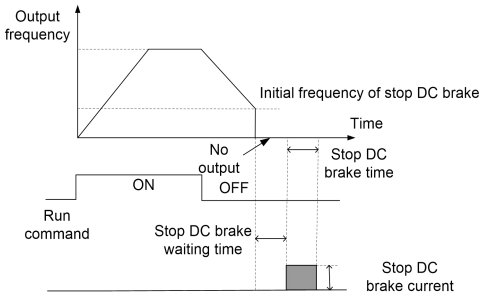


Figure 6- 6 Stop DC brake

b1.17 Range: 0~3 Default: 0

Running mode when running frequency lower than frequency lower limit

The parameter determined drive action when setting frequency lower than frequency lower limit.

0: Run at frequency lower limit

1: Run at zero speed

2: Stop

3: Stop,restart when setting frequency higher than lower limit.

b1.18 Range: 0~1 Default: 0

Keypad direction

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. It is valid whatever the command source is.

0: Same direction 1: Reverse direction

b1.19 Forward/Reverse rotation dead-zone time

Range: 0.0~3000.0 Default: 0.0

Unit: s

It is used to set the time when the output is 0Hz at transition of the drive forward rotation and reverse rotation, as shown in the following figure.

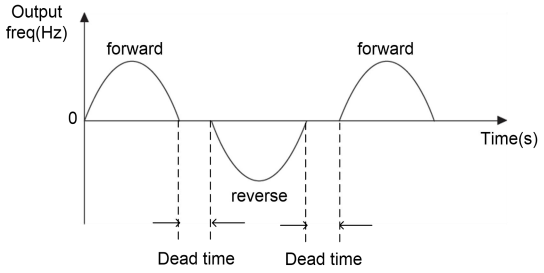


Figure 6- 7 Forward/reverse rotation dead-zone time

b1.20 Reverse control

Range: 0~1 Default: 0

0: Enabled

1: Disabled

It is used to set whether the drive allows reverse rotation. In the applications where reverse rotation is prohibited, set this parameter to 1.

b1.21 Stop key function

Range: 0~1 Default: 1

STOP/RST key stop effective selection of functional mode.

0: STOP/RST key enabled only in keypad control

1: STOP/RST key enabled in any operation mode

Because the key of STOP/RST is multiplexed, when the key is used to reset fault, it is enabled always.

b1.22 Startup protection

Range: 0~1 Default: 1

0: No 1: Yes

This parameter is used to set whether to enable the safety protection. If it is set to 1, the drive does not respond to the run command valid upon drive power-on (for example, an input terminal is ON before power-on). The drive responds only after the run command is canceled and becomes valid again.

In addition, the drive does not respond to the run command valid upon fault reset of the drive. The run protection can be disabled only after the run command is canceled.

In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

b1.23 Dynamic brake use ratio

Range: 0~100 Default: 100

Unit: %

The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the drive bus voltage during the braking process. If it is set to 0, dynamic brake is invalid.d0.13 needs to be set as 0 before using the dynamic brake function.

b1.24 Dynamic brake voltage

Range: Model dependent Default: Model dependent

Unit: V

Different drive voltage grade have different range and default value, please see the table below:

Table 6- 2 the relation of drive voltage grade with dynamic brake voltage

Volt Grade	Default	Min	Max
Single-phase 220V	360V	330V	380V
Three-phase 220V	360V	330V	380V
Three-phase 380~440V	700V	630V	770V
Three-phase 460~480V	750V	660V	870V
Three-phase 600~690V	1100V	1050V	1150V
Three-phase 1140V	2100V	1900V	2300V

Note: In actual application, you can combine dynamic braking, flux braking and overvoltage stall control to optimize braking effect.

For example:

- Set V/F over-excitation gain(d0.09) to 77 then make the over excitation become to 1.2 times of standard when drive in decelerating.It can increase the excitation and increase the braking capacity.
- Set overvoltage stall protective voltage(d0.14) to 720V.
- Set overvoltage stall gain(d0.13) to 10.
- Set Dynamic brake voltage(b1.24) to 700V.
- Set dynamic brake use ratio to 50%, you can modify the value according to actual power consumption on braking resistor.

It not only cat meet the requirements of rapid deceleration but also can avoid overvoltage in the rapid decelerating.

b1.25① **Multi function of JOG key**

Range: 0~1 Default: 1

For function selection of JOG key on Keypad.

0: JOG 1:Forward/Reverse switching 2:Command source switching

Group b2: Frequency Source

b2.00① **Main frequency source A**

Range: 0~8 Default: 0

It is used to select the setting channel of the main frequency A. You can set the main frequency in the following 9 channels:

0: Digital setting **b2.01**+UP/DOWN

The initial value of the set frequency is the value of **b2.01**(Preset frequency). You can change the set frequency by turn the knob or X input terminal UP/DOWN function. When the drive is powered on again after power off or start again after stop, the set frequency is memorized or not determined by **C0.19**.

1: AI1

2: AI2

3: AI3

The frequency is set by analog input. The AC drive control board provides two analog input (AI) terminals (AI1, AI2). Another AI terminal (AI3) is provided by the I/O extension card. AI1 and AI2 can select voltage mode(-10v~10v) or current mode(0~20mA) by CJ1 and CJ2(on control board). The corresponding relationship between the analog input value and the setting frequency please see the group **C2**.

4: X6/FI

The frequency is set by X6/FI terminal. You should set the function to 31 for X6 terminal. The corresponding relationship between pulse input frequency and setting frequency please see the parameters description between **C4.00** to **C4.04**.

5: PID

The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control. When applying PID as the frequency source, you need to set parameters of PID function in group **E5**.

6: PLC

When PLC mode is used as the frequency source, the running frequency of the drive can be switched over among the 16 frequency references. You can set the holding time and acceleration/deceleration time of the 16 frequency references. For details, refer to the descriptions of Group **E3**.

7: Multi-reference

In multi-reference mode, combinations of different DI terminal states correspond to different set frequencies. The AC drive supports a maximum of 16 speeds implemented by 16 state combinations of four DI terminals (allocated with functions 16 to 19) from **E2.01** to **E2.16**. Multi-reference is prioritized.

8: Communication setting

PC can set the value of Main frequency source A through the standard RS485 port. The detail please see chapter 8(MODBUS communication protocol).

b2.01 Preset Frequency

Range: 0.00~**b0.00** Default: 50.00

Unit: Hz

If the frequency source is digital setting, the value of this parameter is the initial frequency of drive.

b2.02① **Auxiliary frequency source B**

Range: 0~8 Default: 0

The same as **b2.00**.

Note:

1. The main frequency source A and auxiliary frequency source B must not be set to same value.
2. If frequency source selection is set to main frequency source A and auxiliary frequency source B operation relationship(The Unit's digit of b2.05 set to 1,3 or 4), the 100% of AI1, AI2 and pulse input corresponding to the maximum frequency(b0.00).

b2.03 Range of auxiliary frequency source B

Range: 0~100 Default: 100

Unit: %

If frequency source selection is set to main frequency source A and auxiliary frequency source B operation relationship(The Unit's digit of b2.05 set to 1,3 or 4), the parameter is used to set the range of auxiliary frequency source B, the base value is max frequency.

b2.04 Offset frequency for A and B operation

Range: 0.00~**b0.00** Default: 0.00

Unit: Hz

If frequency source selection is set to main frequency source A and auxiliary frequency source B operation relationship(The Unit's digit of b2.05 set to 1,3 or 4), The final frequency is obtained by adding the frequency offset set in this parameter to the A and B operation result.

b2.05 Range: 00~34 Default: 00

Frequency source selection

Unit's digit: Frequency source selection

0: Main frequency source A.

1: A and B operation

The result of A and B operate as the aim frequency, the operate relationship determined by ten's digit of the parameter.

2: Switchover between A and B

Switchover between main frequency source A and auxiliary frequency source B. If X terminal function of 29 is invalid then the main frequency source A as the aim frequency. If X terminal function of 29 is valid then the auxiliary frequency source B as the aim frequency.

3: Switchover between A and "A and B operation"

Switchover between main frequency source A and the result of “main frequency source A and auxiliary frequency source B” operation. If X terminal function of 29 is invalid then the main frequency source A as the aim frequency. If X terminal function of 29 is valid then the result of “main frequency source A and auxiliary frequency source B” operation as the aim frequency.

4: Switchover between B and "A and B operation"

Switchover between main frequency source B and the result of “main frequency source A and auxiliary frequency source B” operation. If X terminal function of 29 is invalid then the main frequency source B as the aim frequency. If X terminal function of 29 is valid then the result of “main frequency source A and auxiliary frequency source B” operation as the aim frequency.

Ten's digit: A and B operation relationship

0: A+B

The operation method is main frequency source A add auxiliary frequency source B.

1: A-B

The operation method is main frequency source A subtract auxiliary frequency source B.

2: min{A,B}

The operation method is get the minimum value between main frequency source A and auxiliary frequency source B.

3: max{A,B}

The operation method is get the maximum value between main frequency source A and auxiliary frequency source B.

b2.06 Binding command source to frequency source

Range: 000~999 Default: 000

It is used to bind the three running command sources with the nine frequency sources, facilitating to implement synchronous switchover.

Unit's digit: Binding the frequency source together with Keypad control source

0: No binding

1: Frequency source by digital setting **b2.01**+UP/DOWN

2: AI1

3: AI2

4: AI3

5: Pulse setting (DI5)

6: Multi-reference

7: Simple PLC

8: PID

9: Communication setting

Ten's digit: Binding the frequency source together with Terminal control source

0–9, same as unit's digit

Hundred's digit: Binding the frequency source together with Communication control source

0–9, same as unit's digit

Note:

- Different running command sources can be bound to the same frequency source.
- if a command source has a bound frequency source, the frequency source set in b2.00 to b2.05 no longer takes effect when the command source is effective.

b2.07① **Frequency resolution**

Range: 1~2 Default: 2

It is used to set the resolution of all frequency-related parameters.

1: Minimum unit is 0.1 Hz

2: Minimum unit is 0.01 Hz

If the resolution is 0.1 Hz, the AC drive can output up to 3000.0 Hz(CDE500B type). If the resolution is 0.01 Hz, the AC drive can output up to 600.00 Hz.

Note: Modifying this parameter will make the decimal places of all frequency-related parameters change and corresponding frequency values change(pay attention to the rated motor frequency specially, b0.09 will change from 50.00Hz to 500.0Hz when set b2.07 from 1 to 2).Please confirm again after the operation of motor, otherwise it may cause personal and property losses.

Group C0: Digital Input

C0.00 Range: 0.000~1.000 Default value: 0.010

X terminals filter time

Unit: Sec

X1~X10（X6/FI act as common terminal usage）sample filter time setting. Appropriate to adjustment the filter time can increase the terminal input signal ability of anti-interference, prevent the miss-operation; but with the slow response time.

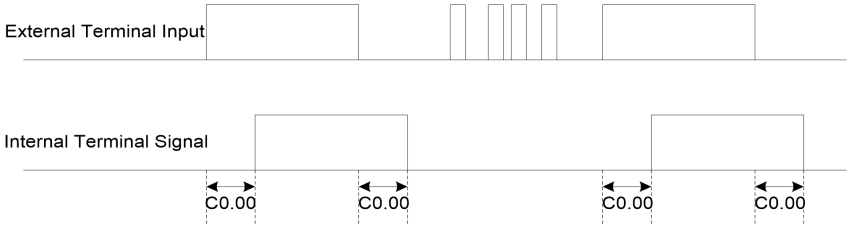


Figure 6- 8 Digital input filter time.

C0.01① Range: 0~58 Default: 3

X1 Function

Set the X1 terminal of the corresponding function, a detailed explanation see the table below.

Table 6- 3 Functions of digit input

Setting	Function	Description
0	No function	When no function assigned to terminal, set to 0 can prevent miss-operation
1	Forward JOG(FJOG)	FJOG or RJOG through the terminal, JOG status depended on **E0.00**(JOG frequency),**E0.01**(JOG acceleration time), **E0.02**(JOG deceleration time),**E0.03**(JOG stop mode).
2	Reverse JOG(RJOG)	
3	Forward RUN(FWD)	When the run source is DI(**b0.11** = 1),The run command of AC drive is depended on these terminals. A detailed explanation of usage refer to C0.17(Terminal command mode).
4	Reverse RUN(REV)	
5	Three-line control	
6	Run pause	When the AC drive in the process of operation, the X terminal configuration for this function effectively, the AC drive deceleration stop, at the same time keep the relevant operation parameters. Once the X terminal is invalid, the AC drive resumed operation.
7	Coast to stop	When the configuration for X terminal for this function effectively, the AC drive output immediately blockade and enter to the stop state. The stop mode is depended to b1.10.
8	External STOP terminal 1	When the command source is keypad(b0.11), and the configuration for this function is effective. The AC drive will stop according to the stop mode configuration. This is equal to keypad stop.

Setting	Function	Description
9	External STOP terminal 2	Under any control mode(b0.11 is an arbitrary value), the configuration of this function can make the AC drive stopped according to the stop mode. This deceleration time is fixed for E4.05(deceleration time 4).
10	Emergency Stop	When the configuration for X terminal for this function is effective, the AC drive will stop use the shortest possible stop time. The current arrives to the upper limit when stop in process, the bus voltage arrives to the voltage point for the over voltage control. This function is used to satisfy the system is in a state of emergency occasion, and need to quickly stop.
11	Immediate DC braking	When the configuration for X terminal for this function is effective, the AC drive immediately into DC braking state; The AC drive resumes to operation when the terminal is invalid, and accelerate to the setting frequency according to the setting acceleration time. **Note:** When the motor is running under high frequency, immediately switch into DC braking may cause the over current fault.
12	Deceleration DC braking	When the configuration for X terminal for this function is effective, the AC drive begin to slow down. When the output frequency is reduced to b1.13(Stop DC braking initial frequency), start to execute stop DC brake.
13	Terminal UP	Through the X terminal configuration for this function, can achieve the increment and decrement of specific variables. Specific variables by C0.18(UP/DOWN adjustment of choice) decision. Adjust the speed by C0.20(terminal UP/DOWN change rate) decision.
14	Terminal DOWN	
15	UP/DOWN setting clear (terminal, operation panel)	Through the X terminal configuration for this function, you can clear the adjustment of terminal UP/DOWN or keypad knob, so the settings back to the corresponding digital set value.
16	Multi-reference terminal 1	Through the multi speed terminal 1~4, can combined up to 16 section of frequency selection set, please refer to table below this table. When any X terminal selects multi speed function and effective. The frequency source forced to multi speed.
17	Multi-reference terminal 2	
18	Multi-reference terminal 3	
19	Multi-reference terminal 4	

<table>
<tr><th>Setting</th><th>Function</th><th>Description</th></tr>
<tr><td>20</td><td>Terminal 1 for Acceleration /decelerat-ion time selection</td><td rowspan="2">Through the X terminal configuration of these two functions, combination of up to 4 kinds of acceleration and deceleration time, as shown in the following table.
<table>
<tr><th>Acceleration and deceleration time selection 2</th><th>Acceleration and deceleration time selection 1</th><th>Actual acceleration and deceleration time</th></tr>
<tr><td>OFF</td><td>OFF</td><td>Acc/Dec time 1（b0.04,b0.05）</td></tr>
<tr><td>OFF</td><td>ON</td><td>Acc/Dec time 2（E4.00,E4.01）</td></tr>
<tr><td>ON</td><td>OFF</td><td>Acc/Dec time 3（E4.02,E4.03）</td></tr>
<tr><td>ON</td><td>ON</td><td>Acc/Dec time 4（E4.04,E4.05）</td></tr>
</table>
Note: You can change the Acc/Dec time when running.</td></tr>
<tr><td>21</td><td>Terminal 2 for Acceleration /decelerat-ion time selection</td></tr>
<tr><td>22</td><td>Acceleration /Decelera-tion prohibited</td><td>The function is effective to maintain the current AC drive output frequency, no longer in response to a change of frequency setting, but when receive a stop command, the AC drive can response the normal deceleration stop, and don’t response to the terminal function.</td></tr>
<tr><td>23</td><td>Fault reset</td><td>When a fault occurs , you can reset fault through this terminal function. The same as keypad key STOP/RST.</td></tr>
<tr><td>24</td><td>Normally open (NO) input of external fault</td><td rowspan="2">A external fault signal can enter through the terminal, this is convenient for fault monitoring and protection of external equipment. If set to 24, when the terminal state is valid, the AC drive display the external fault according to the fault protection operation mode for fault treatment; If set to 25, when the terminal state is invalid, the AC drive display the external fault according to the fault protection operation mode for fault treatment.</td></tr>
<tr><td>25</td><td>Normally closed (NC) input of external fault</td></tr>
<tr><td>26</td><td>Frequency modification forbidden</td><td>When this terminal function effectively, regardless of whether the set frequency is modified, the AC drive never refresh the current set frequency; When the terminal function invalid, the AC drive refresh the set frequency in real time.</td></tr>
<tr><td>27</td><td>Force main frequency source A to b2.01+UP/DOWN</td><td>When this terminal function effectively, force switch the frequency source A to 0: Digital set b2.01+UP/DOWN. When the terminal is invalid, the frequency A is decided by the parameter b2.00.</td></tr>
<tr><td>28</td><td>Force auxiliary frequency source B to b2.01+UP/DOWN</td><td>When this terminal function effectively, force switch the auxiliary frequency source B to 0: Digital set b2.01+UP/DOWN. When the terminal is invalid, the frequency B is decided by the parameter b2.00.</td></tr>
<tr><td>29</td><td>Frequency source switchover</td><td>When the unit of b2.05(frequency given way) set to 2, 3 or 4, by configuring this function, X terminal can switch between different frequency setting mode: When set to 2, can switch between A and B. When set to 3, can switch between A and the result of A,B operation. When set to 4, can switch between B and the result of A,B operation.</td></tr>
</table>

<table>
<tr><th>Setting</th><th>Function</th><th>Description</th></tr>
<tr><td>30</td><td>Motor 1/2 swtichover</td><td>The configuration of this function can select the current load motor. When the terminal is invalid, select the motor 1;When the terminal is valid, select the motor 2.</td></tr>
<tr><td>31</td><td>Pulse input(enabled only for X6/FI)</td><td>Only X6 terminal effective.When X6 selects this function, the pulse signal can be received act as the given frequency or count.</td></tr>
<tr><td>32</td><td>Command source switchover terminal 1</td><td rowspan="2">When the setting of b0.11(command source selection) is effective, through the configuration of these two functions, can realize the switching between different command source.
Such as X1 selects the “command source switching terminal 1” and X2 selects the “command source switching terminal 2”. So:
● When X1 and X2 has the same state, the command source is the value of b0.11
● When the X1 is valid and X2 is invalid, the command source is the next setpoint of b0.11
● When the X1 is invalid and X2 is valid, the command source is the previous setpoint of b0.11
● The range of b0.11 is 0~2, the next of 0 is 1, the previous of 0 is 2;the next of 1 is 2 and the previous of 1 is 0; the next of 2 is 0, the previous of 2 is 1.
Table 6- 4 The truth table of command source switch terminals 1/2
<table><tr><th>b0.11 Setpoint</th><th>Command source switch terminal 2</th><th>Command source switch terminal 1</th><th>Actual invalid command source</th></tr><tr><td>0（Keypad control）</td><td>OFF</td><td>OFF</td><td>Keypad control</td></tr><tr><td>0（Keypad control）</td><td>OFF</td><td>ON</td><td>Terminal control</td></tr><tr><td>0（Keypad control）</td><td>ON</td><td>OFF</td><td>Communication control</td></tr><tr><td>0（Keypad control）</td><td>ON</td><td>ON</td><td>Keypad control</td></tr><tr><td>1（Terminal control）</td><td>OFF</td><td>OFF</td><td>Terminal control</td></tr><tr><td>1（Terminal control）</td><td>OFF</td><td>ON</td><td>Communication control</td></tr><tr><td>1（Terminal control）</td><td>ON</td><td>OFF</td><td>Keypad control</td></tr><tr><td>1（Terminal control）</td><td>ON</td><td>ON</td><td>Terminal control</td></tr><tr><td>2（Communication control）</td><td>OFF</td><td>OFF</td><td>Communication control</td></tr><tr><td>2（Communication control）</td><td>OFF</td><td>ON</td><td>Keypad control</td></tr><tr><td>2（Communication control）</td><td>ON</td><td>OFF</td><td>Terminal control</td></tr><tr><td>2（Communication control）</td><td>ON</td><td>ON</td><td>Communication control</td></tr></table></td></tr>
<tr><td>33</td><td>Command source switchover terminal 2</td></tr>
</table>

Setting	Function	Description
34	Speed control/torque control switchover	Through the configuration of this function, can realize the switch over speed control and torque control. Only the vector control support torque control.
35	Torque control prohibited	If the configuration of this function is effective, the AC drive force to speed control.
36	PLC status reset	If the configuration of this function is effective, pause the PLC running process, resume to the original state, if run again, from the original state. The PLC related parameter configuration is not be changed.
37	Reverse PID action direction	The combination of this terminal function and E5.21(PID output characteristic), can choose PID output characteristic direction. When the terminal is valid, the output direction is same as E5.21, when the terminal is invalid, the output direction is opposite to E5.21
38	PID pause	If the configuration of this function is effective, PID stop adjustment, the output frequency of the AC drive maintains the current state; When the terminal is invalid, PID resume to adjustment.
39	PID integral pause	If the configuration of this function is effective, the PID integrator stops accumulating, keep the current constant; When the terminal is invalid, PID resume to integrator.
40	PID parameter switchover	When **E5.15**(PID parameter switching conditions) is set to 1(according to the X terminal of switching), through the X terminal's function configuration, can switch between the two sets of PID parameters. ● When X terminal is invalid, the PID parameter use set one (**E5.09~E5.11**). ● When X terminal is valid, the PID parameter use set two(**E5.12~E5.14**).
41	PID wakeup mandatory	PID wake up conditions generally depended by E5.36(wake-up threshold setting) and**E5.37**(wake-up delay time). PID forced wake up function refers to whether or not PID wake up conditions are satisfied, as long as X terminal is valid, PID will exit the dormant state
42	Counter input	Through the configuration of the input count pulse function. When the frequency is high, you must use the X6/FI. A0.25(pulse count value) do display the current input count pulse. With the E7.05(set count value) and E7.06(specified count) and Y terminal function(20: set count arrive, 21: specify count arrive), you can realize the "Set count reach" and "Specify count reach" control.
43	Counter reset	Through the configuration of this function, you can clear the current value A0.25(Pulse count value).

Setting	Function	Description
44	length Count input	Through the configuration of the pulse length count function, AC drive can calculate the actual length for fixed length control. The current length value can be saved when power off. When the frequency is high, you must use the X6/FI. Please refer to the E7.07(set length) and E7.08(pulse number per meter) parameters' instruction.
45	Length reset	Through the configuration of this function, you can clear the calculated value of A0.26
46	Swing pause	Through the configuration of this function, is the X terminal is effective, the AC drive use A0.29(swing-frequency center frequency) to run.
47	Current running time reset	If the configuration of this function is effective, the A0.53(current run time) will be clear. With the Eb.03(current operating time limit) and Y terminal function(25:the current running time arrive). You can realize the "Current running time reach" control.
48	Motor 1# interlock input	Under multi-pump control, when the set value of E6.05(Motor interlock enable) is 01(interlock enable, the join of motor decided by X terminal), When the corresponding X terminal of motor receive s a effective signal, the AC drive will take the motor into multi-pump control logic, otherwise, always treat this motor not join the system.
49	Motor 2# interlock input	
50	Motor 3# interlock input	
51	Motor 4# interlock input	
52	User-Defined fault 1 input	If the configuration of these two functions are effective, the AC drive will respectively prompt "Er46" and "Er47", and running based on the F0.23(Fault protection option 5).
53	User-Defined fault 2 input	
54	static auto tune	Under standby mode, when the configuration of X terminal for this function change from invalid to effective, the AC drive start static parameter identification.
55	rotational auto tune	Under standby mode, when the configuration of X terminal for this function change from invalid to effective, the AC drive start gyrate parameter identification.
56	Force main frequency source A to PID	When configuration of this function and X terminal is effective, the AC drive mandatory use PID as current main frequency source A.
57	Force main frequency source A to PLC	When configuration of this function and X terminal is effective, the AC drive mandatory use PLC as current main frequency source A.
58	Fire mode input	When configuration of this function and X terminal is effective, the AC drive force into fire mode operation.

Note:

1. The priority of frequency source is Fire mode >JOG >Frequency bind >Force to PID >Force to PLC >Force to digit set >Multi speed >Configuration of main and auxiliary frequency source parameter configuration.
2. The enforcement action of frequency source through the terminal, equals to modify b2.00(Main frequency source option A) as corresponding value. For example,b2.00 = 0(Main frequency source option A), it's equal to modify b2.00 = 5(PID) when a X terminal with the configuration of function 56 is effective.

Table 6- 5 Multi-reference configuration choice

Multi-reference terminal 4	Multi-reference terminal 3	Multi-reference terminal 2	Multi-reference terminal 1	Setting frequency
OFF	OFF	OFF	OFF	Multi-reference 0（E2.01）
OFF	OFF	OFF	ON	Multi-reference 1（E2.02）
OFF	OFF	ON	OFF	Multi-reference 2（E2.03）
OFF	OFF	ON	ON	Multi-reference 3（E2.04）
OFF	ON	OFF	OFF	Multi-reference 4（E2.05）
OFF	ON	OFF	ON	Multi-reference 5（E2.06）
OFF	ON	ON	OFF	Multi-reference 6（E2.07）
OFF	ON	ON	ON	Multi-reference 7（E2.08）
ON	OFF	OFF	OFF	Multi-reference 8（E2.09）
ON	OFF	OFF	ON	Multi-reference 9（E2.10）
ON	OFF	ON	OFF	Multi-reference 10（E2.11）
ON	OFF	ON	ON	Multi-reference 11（E2.12）
ON	ON	OFF	OFF	Multi-reference 12（E2.13）
ON	ON	OFF	ON	Multi-reference 13（E2.14）
ON	ON	ON	OFF	Multi-reference 14（E2.15）
ON	ON	ON	ON	Multi-reference 15（E2.16）

C0.02① Range: 0~58 Default: 23
X2 function Same as **C0.01**.

C0.03① Range: 0~58 Default: 0
X3 function Same as **C0.01**.

C0.04① Range: 0~58 Default: 0
X4 function Same as **C0.01**.

C0.05① Range: 0~58 Default: 0
X5 function Same as **C0.01**.

C0.06①	Range: 0~58	Default: 0
X6 function	Same as **C0.01**.	
C0.07①	Range: 0~58	Default: 0
X7 function	Same as **C0.01**.	
C0.08①	Range: 0~58	Default: 0
X8 function	Same as **C0.01**.	
C0.09①	Range: 0~58	Default: 0
X9 function	Same as **C0.01**.	
C0.10①	Range: 0~58	Default: 0
X10 function	Same as **C0.01**.	
C0.11	Range: 0000~1111	Default: 0000
X1~X4 terminal logic	Used to define X1~X4 terminal logically valid state, Set according to LED bits(unit,tens,hundreds,thousands): Unit corresponding to X1,Tens corresponding to X2,Hundreds corresponding to X3,Thousands corresponding to X4. The definition for each bit: 0: Closed effective. If the 24V connect to CMX, when the terminal and COM short connection indicate effectively. 1: Disconnect effective. If the 24V connect to CMX, when the terminal and COM disconnected indicate effectively.	
C0.12	Range: 0000~1111	Default: 0000
X5~X8 terminal logic	Used to define X5~X8 terminal logically valid state, Set according to LED bits(unit,tens,hundreds,thousands): Unit corresponding to X5, Tens corresponding to X6, Hundreds corresponding to X7, Thousands corresponding to X8.	
C0.13	Range: 00~11	Default: 00
X9~X10 terminal logic	Used to define X9~X10 terminal logically valid state, Set according to LED bits(unit,tens,hundreds,thousands): Unit corresponding to X9,Tens corresponding to X10, Each bit definition is same as C0.11	
C0.14	Range: 0.0~3000.0	Default: 0.0
X1 terminal delay time	Unit: Sec Delayed response time to set the X1 terminal of the input signal	

C0.15	Range: 0.0~3000.0	Default: 0.0
X2 terminal delay time	Unit: Sec Delayed response time to set the X2 terminal of the input signal	
C0.16	Range: 0.0~3000.0	Default: 0.0
X3 terminal delay time	Unit: Sec Delayed response time to set the X3 terminal of the input signal	

Through the **C0.14~C0.16** three parameters, you can set the X1~X3 terminal input signal response delay time, and further enhance the three switch input terminal of the antijamming ability.

Note:

- The state changes of terminal include two kinds of situations."From the broken open to closed "and "From the closed to broken open".
- Exactly the terminal delay time can be used with C0.00(terminal filter time) at the same time, X1,X2 and X3 terminal signal first passes through the filter, and then delay the time setting, and then the AC drive takes action.
- X terminals except X1,X2,X3 haven't the delay timing function.
- All X terminals(include virtual and logic output),shall be functional exclusion.

C0.17①	Range: 0~3	Default: 0
Terminal command mode	Exactly the run command given by terminals have four different ways. 0: Two lines 1 ● "Forward run"terminal input forward run command. ● "Reverse run"terminal input reverse run command. 1: Two lines 2 ● "Forward run"terminal input run stop command. ● "Reverse run"terminal input run direction. 2: Three lines 1 ● "Forward run"terminal input forward run command. ● "Reverse run"terminal input reverse run command. ● "Three lines run enable"terminal input run enable. 3: Three lines 2 ● "Forward run"terminal control the AC drive run and stop. ● "Reverse run"terminal decides the direction. ● "Three lines run enable"terminal control run enable. **Note:** Terminal command mode is invalid for JOG.	

Take X1, X2 and X3 three switch input terminal to explain the four ways defined by C0.17. X1, X2 and X3 can be any three X terminals in actual use.

Example 1: Two lines 1.

Terminal X1 controls forward run, and X2 controls reverse run. The parameters' configuration show as following table.

Table 6- 6 Two lines 1 parameters' configuration

Parameter	Setting
C0.17(Terminal command mode)	0（Two lines 1）
C0.01（X1 terminal function）	3（Run forward）
C0.02（X2 terminal function）	4（Run reverse）

The wiring is shown in the following figure. Among them:

When K1 closed, the AC drive run forward:

When K2 closed, the AC drive run reverse:

When K1 and K2 have the same status, the AC drive stopped:

Both X1,X2 are level active.

K2	K1	Run command
0	0	Stop
1	1	Stop
0	1	Run forward
1	0	Run reverse

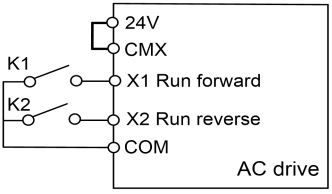


Figure 6- 9 Two lines 1

Example 2: Two lines 2.

Terminal X1 controls run and stop,terminal X2 controls run direction. The parameters' configuration show as following table.

Table 6- 7 Two lines 2 parameters' configuration

Parameter	Setting
C0.17（Terminal command mode）	1（Two lines 2）
C0.01（X1 terminal function）	3（Run forward）
C0.02（X2 terminal function）	4（Run reverse）

Although the configuration of C0.01 and C0.02 are the same, but they have different meaning between two line type 2 and two line type 1.

The wiring is shown in the following figure. Among them:

If K1 closed, K2 broken open the AC drive run forward, K2 closed the AC drive run reverse; If K1 broken open, the AC drive stop running. Both X1 and X2 are level effective.

K2	K1	Run command
0	0	Stop
1	0	Stop
0	1	Forward
1	1	Reverse

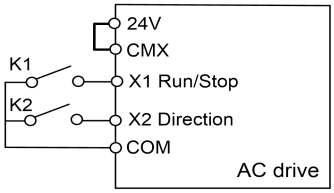


Figure 6- 10 Two lines 2

Example 3: Three lines 1.

X1 controls forward run, X2 controls reverse run,X3is run enable. The parameters' configuration is shown as the table below.

Table 6- 8 Three lines 1 parameters' configuration

Parameter	Setting value
C0.17（Terminal command mode）	2（Three lines 1）
C0.01（X1 terminal function）	3（Forward run）
C0.02（X2 terminal function）	4（Reverse run）
C0.03（X3 terminal function）	5（Three lines run control）

By the"forward run" terminal controls the AC drive run forward,"reverse run" terminal controls the AC drive run reverse,"Three lines run enable"terminal controls the AC drive stop.

The wiring is shown below in the following figure. Among them:

For normal starting and running, the SB3 button must remain closed;

If the SB3 button is closed, press the SB1 button the AC drive is run forward, press the SB2 button, the AC drive is run reversed;

At the moment of SB3 broken open, the AC drive shutdown;

X1 and X2 receives invalid command at the moment of rising edge in closing action, it is pulse trigger effective.

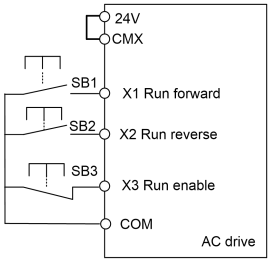


Figure 6- 11 Three lines 1

Example 4: Three lines 2.

X1 determines whether to run,X2 determines run direction,X3 determines run enable. The parameters' configuration is shown as the table below..

Table 6- 9 Three lines 2 parameters' configuration

Parameters	Setting value
C0.17（Terminal command mode）	3（Three lines 2）
C0.01（X1 terminal function）	3（Run forward）
C0.02（X2 terminal function）	4（Run reverse）
C0.03（X3 terminal function）	5（Three lines run control）

The wiring is shown in the following figure. Among them:

For normal starting and running, the SB2 button must remain closed;

When the SB2 button in the closed state, press the SB1 button, the AC drive start to run;

If K is broken open, the AC drive run forward, else run reverse;

At the moment of SB2 button broken open, the AC drive stopped;

The command received by X1 is effective at the rising edge in closing action;

X2 is the level effective.

K	Run direction
0	Forward
1	Reverse

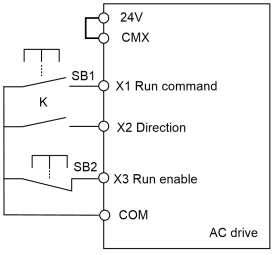


Figure 6- 12 Three lines 2

C0.18 UP/DOWN Regulation chose

Range: 0~2 Default: 0

0: Frequency reference

When b2.00(Frequency source A selection) or b2.02(Auxiliary frequency source B selection) is set to 0(digital setting b2.01 + UP/DOWN set), terminal UP/DOWN and keypad regulation will be superposed to b2.01, the superposition of the results will be the given of main frequency source A or auxiliary frequency source B.

1: Torque reference

2: PID reference

When E5.04(PID set mode) is set to 0 (digital setting E5.05 + UP/DOWN), terminal UP/DOWN and keypad regulation will be superposed to E5.05, the superposition of the results will be used as PID reference.

C0.19 UP/DOWN adjustment memory

Range: 00~11 Default: 11

Units: Retentive at stop

Tens: Retentive at power down

0: No 1: Yes

C0.20 Terminal UP/DOWN ramp rate

Range: 0.01~100.00 Default: 1.00

Unit: %

Define terminal UP/DOWN and keypad button regulation change rate. Larger values change more quickly.

UP/DOWN regulation will be added to the reference setting set by C0.18.

Group C1: Digital Output

C1.00 Y2/FO output choice

Range: 0~1 Default: 0

0: Pulse output(FO)

1: Switch signal output(Y2)

When set to 0, Y2 terminal act as high speed pulse output(maximum output frequency is 100KHz), its function is decided by C4.06(FO output function).

When set to 1, Y2 terminal act as an open collector output, its function is decided by C1.02.

C1.01 Y1 function

Range: 0~45 Default: 3

The definition of the digital output terminals Y1 function selection, refer to the table below.

Table 6- 10 Switch input and output function table

Setting	Function	Description
0	No output	The output terminal is invalid, and not output signal.
1	Under voltage	When the bus voltage is below the under voltage level, the terminal output “ON” signal, and LED display “Er07”.
2	Ready for run	The AC drive is waiting for operation or has been running and without any fault, the terminal output “ON” signal.
3	Running	The AC drive output “ON” signal when running and output “OFF” signal when stop.
4	Zero-speed running 1 (no output at stop)	The AC drive is in the running state and the output frequency is 0HZ, the output signal is “ON”.
5	Zero-speed running 2 (having output at stop)	As long as the AC drive output frequency is 0HZ, no matter whether the AC drive running or stop, the terminal stall output “ON” signal.
6	Reverse running	When the AC drive in running reverse mode, the terminal output “ON” signal.
7	Frequency reached	When the D-value of output frequency and set frequency is less than Eb.08(Frequency reaches the detection width), the terminal output “ON” signal.
8	Frequency upper limit reached	When the AC drive output frequency reaches the upper limit frequency, the terminal output ON signal.
9	Frequency lower limit Reached (no output at stop)	When the output frequency decelerate to the lower limit frequency, the terminal output ON signal. The terminal still output OFF signal when stop.
10	FDT1 detection output	Reference to Eb.13(FDT1 detection value) and Eb.14(FDT1 detection lag value) parameters description.
11	FDT2 detection output	Reference to Eb.15(FDT5 detection value) and Eb.16(FDT2 detection lag value) parameters description.
12	Torque limited	In the speed control mode, if the output torque reaches to the torque limit value, then the terminal output ON signal.
13	Fault output(VFD stop)	When the AC drive shutdown due to a fault, the terminal output ON signal.
14	Warning output (continue running)	The AC drive has warning and continue running, then the terminal output ON signal.
15	Motor overload pre-warning	When the output current exceeds the cumulative of overload inverse time curve and F0.08(Motor overload warning coefficient), the terminal output ON signal. See details about F0.08.
16	VFD overload prewarning	The terminal output ON signal when the AC drive into the overload inverse time calculation.

Setting	Function	Description
17	Module temperature reached	When the A0.60(AC drive temperature) is greater than or equal to Eb.27(Module temperature reaches the set value), the terminal output ON signal.
18	Motor Over heat pre-warning	When A0.59(The temperature of the motor) is greater than or equal to F0.14(Motor overheat warning threshold), the terminal output ON signal.
19	Zero current status	When the AC drive output current is less than Eb.17(Zero current detection level), and duration is reached to Eb.18(Zero current detection delay time) set value, the terminal output ON signal
20	Set count value reached	Please refer to the E7.05(Set count value) parameters.
21	Designated count value reached	Please refer to the E7.06(Designated count value) parameters.
22	Length reached	Please refer to the E7.07(Set length) parameters.
23	Accumulative power-on time reached	When A0.54(Accumulative power on time(day)) + A0.55(Accumulative power on time(hour)) equals to Eb.04(Accumulative power-on time(day) threshold) + Eb.05(Accumulative power-on time(hour) threshold), the terminal output ON signal. If Eb.04(Accumulative power-on time(day) threshold) is set to 0, the cumulative power on timing function is disabled, and output OFF signal.
24	Accumulative running time reached	When A0.56(Accumulative running time(day)) + A0.57(Accumulative running time(hour)) equals to Eb.06(Accumulative running time(day) threshold) + Eb.07(Accumulative running time(hour) threshold), the terminal output ON signal. If Eb.06(Accumulative running time(day) threshold) is set to 0, the cumulative power on timing function is disabled, and output OFF signal.
25	Current running time reached	When **A0.53**（Running time）reaches to the set value of **Eb.03**（Current running time reached） the terminal output ON signal
26	Frequency 1 reached	Reference to **Eb.09**（Any frequency reaching detection value 1） and **Eb.10**（Any frequency reaching detection amplitude 1） parameter's description
27	Frequency 2 reached	Reference to **Eb.11**（Any frequency reaching detection value 2） and **Eb.12**（Any frequency reaching detection amplitude 2） parameter's description
28	Current 1 reached	Reference to **Eb.21**（Any current reaching 1） and **Eb.22**（Any current reaching 1 amplitude） parameter's description
29	Current 2 reached	Reference to **Eb.23**（Any current reaching 2） and **Eb.24**（Any current reaching 2 amplitude） parameter's description
30	Underload	Reference to **F0.09**（Under load protection） and **F0.10**（Detection level of under load） parameter's description

Setting	Function	Description
31	AI1 input limit exceeded	When the input voltage of AI1 is less than Eb.25(AI1 input voltage lower limit), or greater than Eb.26(AI1 input voltage upper limit), the terminal output ON signal.
32	Timing reached	Reference to **Eb.00**（Timing function）,**Eb.01**（Timing duration source）and **Eb.02**（Timing duration） parameters' description.
33	PLC cycle complete	When the PLC completes a run cycle, the terminal output a 250ms width ON signal.
34	Current limit exceeded	Reference to **Eb.19**(Output over current threshold),**Eb.20**(Output over current detection delay time) parameters' description.
35	Communication setting	The terminal output state is set by communication, please reference to chapter eight.
36	AI1>AI2	When the value of AI1 is bigger than AI2, the terminal output ON signal, otherwise output OFF signal.
37	PID feedback Limit exceeded	Please reference to the PID feedback measurement relevant parameters description E5.30~E5.35
38	PID sleep status indication	The terminal output ON signal when the PID in dormant sate. Please reference to dormancy logic parameters description E5.38~E5.41
39	Frequency limited	When the AC drive set reference frequency exceeds the upper limit frequency or below the lower limit frequency, and the output reaches to the upper limit or lower limit frequency point, the terminal output ON signal.
40	Motor 1# control output	Used to control motors ' switching in multi-pump system. More detailed explanation, please reference to the description of group E6(Multi pump control).
41	Motor 2# control output	
42	Motor 3# control output	
43	Motor 4# control output	
44	External brake control	Please reference to the parameters' description of group EA.
45	Simple brake control	Please reference to the parameters' description of Eb.28~Eb.29.

C1.02 Range: 0~45 Default: 7
Y2 Function Defines the functions of terminal Y2, same as C1.01.

C1.03 Range: 0~45 Default: 0
Y3 Function Defines the functions of terminal Y3, same as C1.01.

C1.04 Range: 0~45 Default: 13
T1 Function Defines the functions of rely T1, same as C1.01.

C1.05 Range: 0~45 Default: 0
T2 Function Defines the functions of rely T2, same as C1.01.

C1.06 Range: 0~45 Default: 0
T3 Function Defines the functions of rely T3, same as C1.01.

C1.07 Range: 0~45 Default: 0
T4 Function Defines the functions of rely T4, same as C1.01.

C1.08 Range: 0~45 Default: 0
T5 Function Defines the functions of rely T5, same as C1.01.

C1.09 Range: 0~45 Default: 0
T6 Function Defines the functions of rely T6, same as C1.01.

C1.10 Range: 000~111 Default: 000
Y terminals valid state logic 0: Positive logic; When valid output ON signal, when invalid output OFF signal.
1: Negative logic; When valid output OFF signal, when invalid output ON signal.
Unit: Y1 **Tens:** Y2**Hundreds:** Y3

C1.11 Range: 0000~1111 Default: 0000
T1~T4 terminals valid state logic Define the relays T1~T4 valid state, same as C1.10.
Unit: T1 **Tens:** T2 **Hundreds:** T3 **Thousands:** T4

C1.12 Range: 00~11 Default: 00
T5~T6 terminals valid sate logic Define the relays T5~T6 valid state, same as C1.10.
Unit: T5 **Tens:** T6

Note:

0: Positive logic said digital output terminal and the common end(COM) connected state. Connect means ON state, disconnect means OFF state.

1: Positive logic said digital output terminal and the common end(COM) connected state. Connect means OFF state, disconnect means ON state.

C1.13 Range: 0.0~3000.0 Default: 0.0
Y1 output delay time Unit: Sec
Define the output delay time of output switch terminal Y1.
Represents the delay time of output function state changes to the actual output changes, this is can increase the stability of the output signal, as the following figure shown.

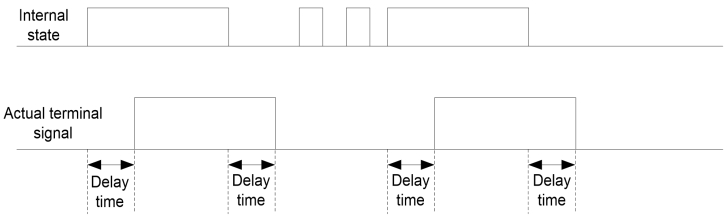


Figure 6- 13 digital output terminals output delay time diagram.

C1.14 Range: 0.0~3000.0 Default: 0.0
Y2 output delay time Unit: Sec
Define the output delay time of output switch terminal Y2.

C1.15 Range: 0.0~3000.0 Default: 0.0
Y3 output delay time Unit: Sec
Define the output delay time of output switch terminal Y3.

C1.16 Range: 0.0~3000.0 Default: 0.0
T1 output delay time Unit: Sec
Define the output delay time of relay T1.

C1.17 Range: 0.0~3000.0 Default: 0.0
T2 output delay time Unit: Sec
Define the output delay time of relay T2.

C1.18 Range: 0.0~3000.0 Default: 0.0
T3 output delay time Unit: Sec
Define the output delay time of relay T3.

C1.19 Range: 0.0~3000.0 Default: 0.0
T4 output delay time Unit: Sec
Define the output delay time of relay T4.

C1.20 Range: 0.0~3000.0 Default: 0.0
T5 output delay time Unit: Sec
Define the output delay time of relay T5.

C1.21 Range: 0.0~3000.0 Default: 0.0
T6 output delay time Unit: Sec
Define the output delay time of relay T6.

C1.22	Range: 0.0~600.0	Default: 0.0
Interval of Y1 output active state	Unit: Sec Define the digital output terminal Y1 output effective sate holdoff time..	
C1.23	Range: 0.0~600.0	Default: 0.0
Interval of Y2 output active state	Unit: Sec Define the digital output terminal Y2 output effective sate holdoff time.	
C1.24	Range: 0.0~600.0	Default: 0.0
Interval of T1 output active state	Unit: Sec Define the relay T1 output effective sate holdoff time.	
C1.25	Range: 0.0~600.0	Default: 0.0
Interval of T2 output active state	Unit: Sec Define the relay T2 output effective sate holdoff time.	

In some occasions, when the digital output terminals' state is effective, hopes that the output state of the terminal is time length adjustable, and not only a level signal. The holdoff time of terminal's effective state is only available after the output delay time.

Note: When the holdoff time of terminal's effective sate set to 0, equivalent cancel the terminal's effective state.

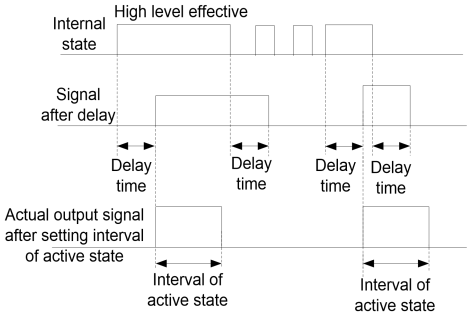


Figure 6- 14 The effective signal holdoff time of digital output terminal

Group C2: Analog Input

C2.00	Range: 0.00~10.00	Default: 0.10
AI1 filter time	Unit: Sec Define the filter time of analog input signal AI1, to filter processing. Properly increasing this value can enhance the anti-interference ability of analog input, but will weaken the sensitivity.	

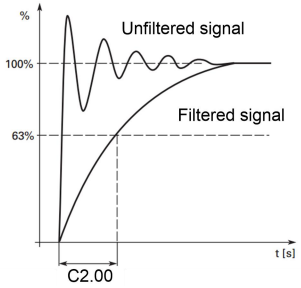


Figure 6- 15 figure of AI signal filter

C2.01 **AI2 filter time**	Range: 0.00~10.00 Unit: Sec Define the filter time of AI2 signal, to filter processing.	Default: 0.10
C2.02 **AI3 filter time**	Range: 0.00~10.00 Unit: Sec Define the filter time of AI3 signal, to filter processing.	Default: 0.10
C2.03 **AI curve selection**	Range: 111~333 Analog input size and the corresponding relationship between the setting value, can be defined by a specific curve. Enter to this parameter, can do the curve selection of AI1,AI2 through the LED's unit and tens bits. 1: AI curve 1（Two points, reference to **C2.04**～**C2.07**） 2: AI curve 2（Two points, reference to **C2.08**～**C2.11**） 3: AI curve 3（Two points, reference to **C2.12**～**C2.15**） **Unit's digit:** AI1 **Tens's digit:** AI2 **Hundred's digit:** AI3	Default: 321
C2.04 **AI curve 1 minimum input**	Range: -10.00~**C2.06** Unit: V AI curve 1 minimum input signal.	Default: 0.00
C2.05 **Corresponding setting of AI curve 1 minimum input**	Range: -100.0~100.0 Unit: % The relationship between AI curve 1 minimum input signal and the percentage of set value.	Default: 0.0
C2.06 **AI curve 1 maximal input**	Range: C2.04~10.00 Unit: V AI curve 1 maximal input signal	Default: 10.00

C2.07	Range: -100.0~100.0	Default: 100.0
Corresponding setting of AI curve 1 maximal input	Unit: % The relationship between AI curve 1 maximal input signal and the percentage of set value.	
C2.08	Range: -10.00~C2.10	Default: 0.00
AI curve 2 minimum input	Unit: V AI curve 2 minimum input signal	
C2.09	Range: -100.0~100.0	Default: 0.0
Corresponding setting of AI curve 2 minimum input	Unit: % The relationship between AI curve 2 minimum input signal and the percentage of set value.	
C2.10	Range: C2.08~10.00	Default: 10.00
AI curve 2 maximal input	Unit: V AI curve 2 maximal input signal	
C2.11	Range: -100.0~100.0	Default: 100.0
Corresponding setting of AI curve 2 maximal input	Unit: % The relationship between AI curve 2 maximal input signal and the percentage of set value.	

Both curve 1 and curve 2 are two point curves.

AI1,AI2 can select -10~10V voltage input or 0~20mA current input through jumper terminal CJ1 and CJ2 on the control board.

When chose the 0~20mA current input, 0mA corresponding to the 0V, and 20mA corresponding to 10V.

Example:

- The maximum frequency of b0.00 = 50.00 HZ
- The frequency selection method of b2.05 = 00
  (Chose main frequency source A as output)
- The Main frequency source A selection b2.00 = 1
  (Main frequency source A select AI1)
- The analog input AI curve selection C2.03 = 321(AI1 choice AI curve 1)
- The minimal input of AI curve 1 C2.04 = 0.00V
- The corresponding setting of AI curve 1 minimal input C2.05 = 0.0%
- The maximal input of AI curve 1 C2.06 = 10.00V
- The corresponding setting of AI curve 1 maximal input C2.07 = 100.0%
- When AI1 = 4V, the output frequency of this time is: 50.00*（4.00/10.00） = 20.00Hz

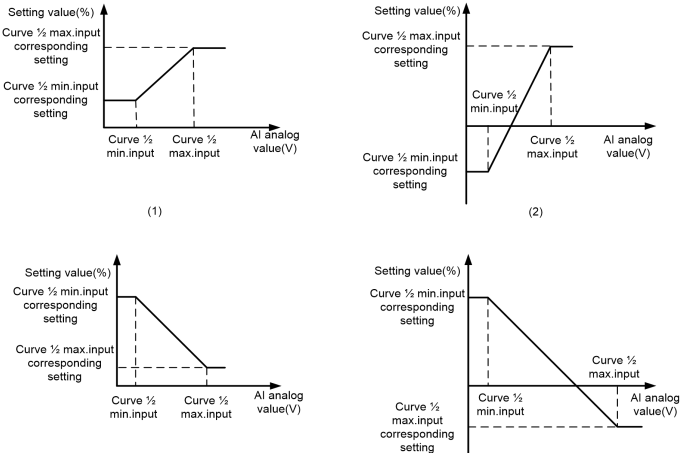


Figure 6- 16 AI curve 1/2 normal setting

C2.12 AI curve 3 minimum input

Range: -10.00~**C2.14** Default: 0.00

Unit: V

AI curve 3minimal input signal size

C2.13 Corresponding setting of AI curve 3 minimum input

Range: -100.0~100.0 Default: 0.0

Unit: %

The relationship between AI curve 3 minimum input signal and the percentage of set value.

C2.14 AI curve 3 maximal input

Range: **C2.12**~10.00 Default: 10.00

Unit: V

AI curve 3 maximal input signal size.

C2.15 Corresponding setting of AI curve 3 maximal input

Range: -100.0%~100.0% Default: 100.0

Unit: %

The relationship between AI curve 3 maximal input signal and the percentage of set value.

C2.16 Jump point of AI1 input corresponding setting

Range: -100.0~100.0 Default: 0.0

Unit: %

Jump point of AI1 input corresponding setting.

C2.17 Jump amplitude of AI1 input corresponding setting	Range: 0.0~100.0 Unit: % Jump amplitude of AI1 input corresponding setting	Default: 0.5
C2.18 Jump point of AI2 input corresponding setting	Range: -100.0~100.0 Unit: % Jump point of AI2 input corresponding setting.	Default: 0.0
C2.19 Jump amplitude of AI2 input corresponding setting	Range: 0.0~100.0 Unit: % Jump amplitude of AI2 input corresponding setting	Default: 0.5
C2.20 Jump point of AI3 input corresponding setting	Range: -100.0~100.0 Unit: % Jump point of AI3 input corresponding setting.	Default: 0.0
C2.21 Jump amplitude of AI3 input corresponding setting	Range: 0.0~100.0 Unit: % Jump amplitude of AI3 input corresponding setting	Default: 0.5

Jump range includes lower and upper limit, defined as following:

Jump lower limit = Jump point – Jump amplitude

Jump upper limit = Jump point + Jump amplitude

When the analog input in the jump range, setting frequency will be fixed at the jump point.

Example:

Set C2.16(AI1 jump point) equal to 50.0%,C2.17(AI1 jump amplitude) equal to 10.0%. So if corresponding percentage of AI input through the curve conversion is 40.0%~60.0%, always judged to be 50.0%

C2.22 Setting for AI less than minimum input	Range: 000~111 Used to configure the setting when AI signal is less than the minimum input. The Unit and Tens of this parameter is corresponding to AI1 and AI2 respectively. The definition of each value are as follows: 0: Corresponding to the minimum input setting; When the AI signal is	Default: 000

lower than the minimum input, the corresponding setting is decided by the minimum input corresponding setting(C2.05,C2.09).

1: 0.0%； When the AI signal is lower than the minimum input, the corresponding setting is 0%.

Unit's digit: AI1 **Ten's digit:** AI2 **Hundred's digit:** AI3

Note:

- When the analog input greater than the maximum analog input(C2.06,C2.10), the corresponding setting is decided by the maximal input corresponding setting.
- When the analog input below the minimum input, the corresponding parameter setting determined by C2.22.

Group C3: Analog Output

C3.00 Range: 0.00~10.00 Default: 0.00

AO1 filter time Unit: Sec

The parameter is used to set the software filter time of AO1. If the analog output is liable to interference, increase the value of this parameter to stabilize the detected analog output. However, increase of the AO filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

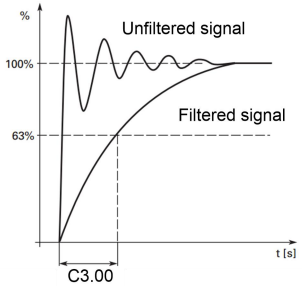


Figure 6- 17 Analog output 1 filter

C3.01 Range: 0.00~10.00 Default: 0.00

AO2 filter time Unit: Sec

Same as **C3.00**.

C3.02 Range: 0~17 Default: 1

AO1 function The parameter defined the AO1 function,as the table below.

C3.03 Range: 0~17 Default: 2

AO2 function The parameter defined the AO2 function,as the table below.

AO1 and AO2 can select 0~10V voltage mode or 0~20mA current mode by the terminal CJ3 and CJ4 which on control board.

Table 6- 11 Relation table of analog value and pulse output

Value	Function	Range
0	Setting frequency	0~Max frequency(b0.00)
1	Running frequency	0~Max frequency(b0.00)
2	Output current	0~2 times motor rated current
3	Output voltage	0~1.2 times motor rated voltage
4	Output power	0~2 times motor rated power
5	Output torque	0~2 times motor rated torque
6	AI1	0V~10V（or 0~20mA）
7	AI2	0V~10V（or 0~20mA）
8	AI3	0V~10V（or 0~20mA）
9	X6/FI	0.00kHz~100.00kHz
10	Target torque	0~2 times motor rated torque
11	PID setting	0.0%~100.0%
12	PID feedback	0.0%~100.0%
13	PID output	0.0%~100.0%
14	Actual length	0~Sett length(E7.07)
15	Count value	0~Set count value(E7.05)
16	Communication setting	0.0%~100.0%
17	Feedback frequency	0~Max frequency(b0.00)

C3.04 AO curve selection

Range: 11~22 Default: 21

AO curve specified the relationship between the output percentage and analog output signal.

Provide two AO curves. Parameters' edit according to digit

1: AO curve 1(Two points,Refer to **C3.05**～**C3.08**)

2: AO curve 2(Four points,Refer to **C3.09**～**C3.12**)

Unit's digit: AO1 **Ten's digit:** AO2

C3.05 AO curve 1 minimum output

Range: 0.00~10.00 Default: 0.00

Unit: V

Define AO curve 1 minimum output value. When chose the 0~20mA current input, 0mA corresponding to the 0V, and 20mA corresponding to 10V.

C3.06 Corresponding setting of AO curve 1 minimum output

Range: 0.0~**C3.08** Default: 0.0

Unit: %

The relationship between AO curve 1 minimum input signal and the percentage of set value.

C3.07
AO curve 1 maximum output

Range: 0.00~10.00 Default: 10.00
Unit: V
AO curve 1 maximal input signal.

C3.08
Corresponding setting of AO curve 1 maximum output

Range: **C3.06**~100.0 Default: 100.0
Unit: %
The relationship between AO curve 1 maximal input signal and the percentage of set value.

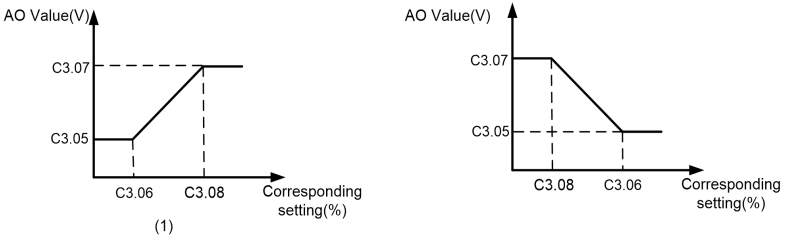


Figure 6- 18 AO curve 1

Example:

- Analog output AO1 output function selection C3.02 = 1(Running frequency)
- Max frequency b0.00 = 50.00 Hz
- AO curve selection C3.04 = 21 (AO1 curve selection 1)
- AO curve 1 minimum output C3.05 = 1.00V
- AO curve 1 minimum output corresponding setting C3.06 = 5%
- AO curve 1 maximal output C3.07 = 9.00V
- AO curve 1 maximal output corresponding setting C3.08 = 80%
- If output frequency is 20Hz,so corresponding voltage is:
  4.73V = {（20Hz - 50Hz*5%）/（50Hz*80% - 50Hz*5%）}*（9.00V - 1.00V）+1.00V

C3.09
AO curve 2 minimum output

Range: 0.00~10.00 Default: 0.00
Unit: V
Define AO curve 2 minimum output value. When chose the 0~20mA current input, 0mA corresponding to the 0V, and 20mA corresponding to 10V.

C3.10
Corresponding setting of AO curve 2 minimum output

Range: 0.0~**C3.12** Default: 0.0
Unit: %
The relationship between AO curve 1 minimum input signal and the percentage of set value.

C3.11
AO curve 2 maximum output

Range: 0.00~10.00 Default: 10.00
Unit: V
Define AO curve 2 maximal output value. When chose the 0~20mA current input, 0mA corresponding to the 0V, and 20mA corresponding to 10V.

C3.12
Corresponding setting of AO curve 2 maximum output

Range: **C3.10**~100.0 Default: 100.0
Unit: %
The relationship between AO curve 2 maximal input signal and the percentage of set value.

Group C4: Pulse Input/Output

When the parameter of C0.06 set to 31, the pulse input function is enabled. The curve relationship can be set by parameters **C4.00~C4.04**. The maximum pulse input signal is 100KHz, the percent reference is maximum frequency(**b0.00**).

C4.00
FI filter time

Range: 0.00~10.00 Default: 0.10
Unit: Sec
The parameter is used to set the software filter time of FI. If the pulse input signal is liable to interference, increase the value of this parameter to stabilize the pulse input.

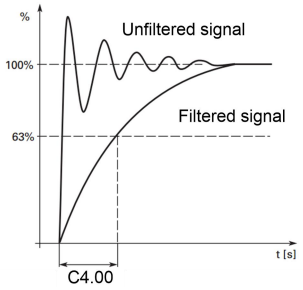


Figure 6- 19 Pulse input filter

C4.01
FI minimum input

Range: 0.00~**C4.03** Default: 0.00
Unit: kHz
If the pulse input lower **C4.01** then it will be limited by **C4.01**.

C4.02 Corresponding setting of FI minimum input
Range: -100.0~100.0 Default: 0.0
Unit: %
The percent of corresponding to pulse minimum input frequency.

C4.03 FI maximum input
Range: **C4.01**~100.00 Default: 50.00
Unit: kHz
If the pulse input higher **C4.03** then it will be limited by **C4.03**.

C4.04 Corresponding setting of FI maximum input
Range: -100.0~100.0 Default: 100.0
Unit: %
The percent of corresponding to pulse maximum input frequency.

C4.05 FO filter time
Range: 0.00~10.00 Default: 0.10
Unit: Sec
If the parameter of **C4.05** is non-zero then the pulse output function is enabled. Increase the value of this parameter to stabilize pulse output.

C4.06 FO function
Range: 0~17 Default: 1
When **C1.00** set to 0, the pulse output function is enabled, the functions description please see the parameter description of **C3.02**.

C4.07 FO output minimum frequency
Range: 0.00~100.00 Default: 0.00
Unit: kHz
Set the minimum pulse output pulse.

C4.08 Corresponding setting of FO output minimum frequency
Range: 0.0~**C4.10** Default: 0.0
Unit: %
The percent of corresponding to pulse minimum output frequency.

C4.09 FO output maximum frequency
Range: 0.00~100.00 Default: 50.00
Unit: kHz
Set the maximum pulse output pulse.

C4.10 Corresponding setting of FO output maximum frequency
Range: **C4.08**~100.0 Default: 100.0
Unit: %
The percent of corresponding to pulse maximum output frequency.

Group C5：Virtual Digital Input/Output

Virtual terminals can be useful in some applications such as input terminal signal is determined by output terminal.

User can connect the virtual outputs with virtual inputs without actual wires. The usage method is similar with actual terminal.

C5.00① Range: 0~58 Default: 0
VX1 function Same As C0.01. Refer to Tab6-C1.

C5.01① Range: 0~58 Default: 0
VX2 function Same As C0.01. Refer to Tab6-C1.

C5.02① Range: 0~58 Default: 0
VX3 function Same As C0.01. Refer to Tab6-C1.

C5.03① Range: 0~58 Default: 0
VX4 function Same As C0.01. Refer to Tab6-C1.

C5.04 Range: 0000~4444 Default: 1111
VX active state mode selection
This defines signal source for virtual digital input.
0: VYn 1: **C5.05**
- VYn=1,VXn function is active. 2: AI1
- VYn=0, VXn function is inactive. 3: AI2
- n = 1~4 4: AI3

Unit's digit: VX1 **Hundred's digit:** VX3
Ten's digit: VX2 **Thousand's digit:** VX4

C5.05 Range: 0000~1111 Default: 0000
Digital setting of VX active state
When **C5.04** = 1,VX1~VX4 input status are determined by C5.05.
0: active 1: inactive
Unit's digit: VX1 **Hundred's digit:** VX3
Ten's digit: VX2 **Thousand's digit:** VX4

C5.06① Range: 000~111 Default: 000
Active mode for AI as VX input
When **C5.04** select AI as the input for VX, AI level defines as high level if AI voltage is greater than the setting of **C5.07**, AI level defines as low level if AI voltage is less than the setting of **C5.08**.
This parameter defines the active status is high level or low level.
0: high level
1: low level
Unit's digit: AI1 Ten's digit: AI2 Hundred's digit: AI3

C5.07① Range: **C5.08**~8.00 Default: 6.70 Unit: V
AI high level threshold This defines the threshold voltage that AI treated as high level should be greater than.

C5.08① Range: 1.00~**C5.07** Default: 3.20 Unit: V
AI low level threshold This defines the threshold voltage that AI treated as low level should be less than.

C5.09① Range: 0~45 Default: 0
VY1 function There are 4 virtual digital output terminals for the AC drive.
The usage method is similar with actual terminal.
0: Corresponding to the status of X1
>0: Same as Y (digital output) terminal usage, refer to C1.01.

C5.10① Range: 0~45 Default: 0
VY2 function 0: Corresponding to the status of X2
>0: Same as Y (digital output) terminal usage, refer to C1.01.

C5.11① Range: 0~45 Default: 0
VY3 function 0: Corresponding to the status of X3
>0: Same as Y (digital output) terminal usage, refer to C1.01.

C5.12① Range: 0~45 Default: 0
VY4 function 0: Corresponding to the status of X4
>0: Same as Y (digital output) terminal usage, refer to C1.01.

C5.13 Range: 0.0~3600.0 Default: 0.0 Unit: Sec
VY1 output delay time This defines the delay time of VY1 output. Refer to C1.13.

C5.14 Range: 0.0~3600.0 Default: 0.0 Unit: Sec
VY2 output delay time This defines the delay time of VY2 output. Refer to C1.13.

C5.15 Range: 0.0~3600.0 Default: 0.0 Unit: Sec
VY3 output delay time This defines the delay time of VY3 output. Refer to C1.13.

C5.16 Range: 0.0~3600.0 Default: 0.0 Unit: Sec
VY4 output delay time This defines the delay time of VY4 output. Refer to C1.13.

C5.17 Range: 0000~1111 Default: 0000
VY terminal active state logic 0: Positive logic. VY output ON signal when it is active. VY output OFF signal when it is inactive.
1: Negative logic. VY output OFF signal when it is active. VY output ON signal when it is inactive.
Unit's digit: VY1 **Ten's digit:** VY2
Hundred's digit: VY3 **Thousand's digit:** VY4

Group d0: Motor Control

d0.00① Range: 0 ~ 2 Default: 0

Motor control mode

0: V/f

Constant Volt/Hertz proportion control. It is applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

1: Open loop vector control（SVC）

It is applicable to high-performance speed control or torque control applications without speed encoder. One AC drive can operate only one motor.

2: Closed loop vector control（VC）

It is applicable to high-accuracy speed control or torque control applications with speed encoder. One AC drive can operate only one motor. An encoder and a PG card must be installed and setting correctly in group L2.

Note:

- If vector control is selected, motor auto-tuning must be performed before first running. Motor parameters which calculated from auto-tuning shall be store in Group d1.
- If vector control is selected, the rated power between AC drive and motor cannot mismatched too much. Otherwise, the performance could be decreased.
- Motor control mode (d0.00) is used for motor 1, please refer Group d5 to set for motor 2 when motor 2 is used.

d0.01 Range: 1.0 ~ 16.0 Default: Model dependent

Carrier frequency

Unit: kHz

The default value of carrier frequency is depended on AC drive hardware, as shown in the table below. It is no need to change this parameter in common usage. If the set carrier frequency is higher than default setting, you need to de-rate the AC drive.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines. However, the AC drive has an increase in power loss, temperature rise and interference.

Table 6- 12 default carrier frequency and range

Volt Grade	Power Grade	carrier frequency Range
Single-phase 220V Three-phase 220V Three-phase 380~440V Three-phase 460~480V	≤ 2.2KW	1.0kHz - 12.0kHz
	3.7~5.5KW	1.0kHz - 12.0kHz
	7.5~15KW	1.0kHz - 10.0kHz
	≥ 18.5KW	1.0kHz - 8.0kHz
Three-phase 600~690V	≤ 200KW	1.0kHz - 3.0kHz
	≥ 220KW	1.0kHz - 2.0kHz
Three-phase 1140V	All grades	1.0kHz - 1.0kHz

Note:

When AC drive running in SVC or VC mode, carrier frequency shall be limit between 2kHz to 8kHz automatically.

d0.02 Carrier frequency adjustment with temperature

Range: 0 ~ 1 Default: 1

0: disable

1: enable

It is used to set whether the carrier frequency is adjusted based on the temperature. When this parameter is set to enable, it can be reduce the overheat alarms.

d0.03 Random PWM depth

Range: 0 ~ 10 Default: 0

0: Disable random PWM

>0: setting the depth of random PWM

Random PWM function is enable when this parameter is greater than 0. It can help to reduce the motor noise.

d0.04 DPWM switchover frequency upper limit

Range: 0.00 ~ Max frequency(b0.00) Default: 50.00

If the output frequency is higher than this Value + 3Hz, the DPWM modulation mode is adopted, or else continuous method is adopted.

d0.05 PWM Modulation mode

Range: 0 ~ 1 Default: 0

0: asynchronous modulation

1: synchronous modulation

d0.06
Torque boost

Range: 0 ~ 30% Default: Model dependent

0: auto torque boost

>0: fixed torque boost

When this parameter is set to 0, output voltage shall be adjust automatically based on the changing of the load.

When this parameter is greater than 0, the value that output voltage increase shall be depend on this setting.

d0.07①
Cut-off frequency of torque boost

Range: 0.00 ~（b0.00） Default: 37.00

Unit: Hz

This parameters determine the range that torque boost is valid.

d0.08
V/f slip compensation gain

Range: 0.0% ~ 100.0% Default: 0.0%

Setting this parameter can help to compensate the motor speed change in case of load change. When this parameter is set to 100%, it means rated motor slip shall be used for compensation under rated load. The rated motor slip is calculated from rated motor frequency and rated motor speed. Therefore, correct motor parameter setting is required.

d0.09
V/F over-excitation gain

Range: 0 ~ 250 Default: 64

It can increase flux current to exhaust the regenerating energy. It can shorten the actual decelerating time when motor is running in regenerating mode during deceleration. Set this parameter to 0 in case of situations that brake resister is used or DC voltage will not rise during motor deceleration.

d0.10
V/F oscillation suppression gain

Range: 0 ~ 100 Default: Model dependent

When motor is oscillating, adjusting this parameter can help to improve motor stability. It may influence V/F control performance when it set too

d0.11
Overcurrent stall gain

Range: 0 ~ 100 Default: Module dependent

0: Overcurrent stall function

> 0: Enable overcurrent stall function

When the load is heavy or accelerating / decelerating time is too short, output current exceeds the setting of d0.12, overcurrent stall function shall adjust output frequency to avoid over current trip. After output current declines, output frequency shall resume to reference frequency. Generally, the larger gain the better over current suppression result will be. At the same time, larger gain may cause oscillation.

d0.12 Overcurrent stall protective current

Range: 30% ~ 200% Default: 150%

It used to determine the point that overcurrent stall function is active. The based value is rated motor current.

Note: "d0.12 * the motor rated current" generally can not be greater than "d0.32 *the AC drive rated current of G type".

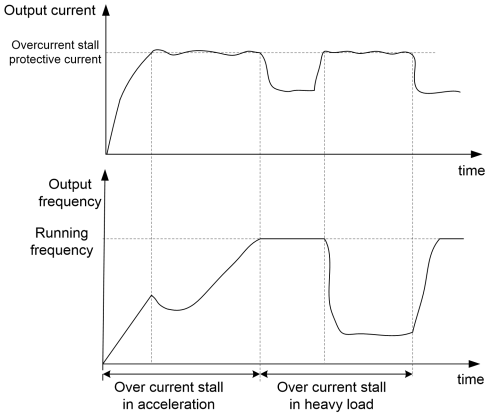


Figure 6- 20 Overcurrent stall function

d0.13 Overvoltage stall gain

Range: 0 ~ 100 Default: Module dependent

0: Disable overvoltage stall function

> 0: enable overvoltage stall function

When motor rotor speed is greater than synchrony frequency, motor running in regenerating mode. In this situation, the DC voltage of AC drive will rise and cause over voltage trip. To avoid this situation, overvoltage stall function shall adjust output frequency when DC voltage exceeds the setting of d0.14. The larger gain the better over voltage suppression result will be. The actual decelerating time may not accurate with small gain. Set this parameter to 0 when brake resister is used or accurate decelerating time is required applications.

d0.14 Overvoltage stall protective voltage

Range: Model dependent Default: Model dependent

The voltage point that over voltage control function is active. The default value of this parameter refer to table6-D2.

Table 6- 13 the default value and range of overvoltage stall protective voltage

Volt Grade	default	Range
Single-phase 220V	350 V	330V - 380V
Three-phase 220V	350 V	330V - 380V
Three-phase 380~440V	680 V	630V - 770V
Three-phase 460~480V	750 V	660V - 870V
Three-phase 600~690V	1100 V	1050V - 1150V
Three-phase 1140V	2100 V	1900V - 2300V

d0.15 Stall control mode

Range: 00 ~ 11 Default: 00

If the utility supply voltage declines, the output frequency will decrease to maintain a constant motor V/f relation. In some applications the motor is required to operate at the desired set speed, regardless of supply line voltage variations. In this situation, the under voltage control is disable, the frequency will not decrease as the utility supply voltage decreases. This could lead to under exciting the motor, resulting in a large increase in motor current during under voltage conditions.

Unit's digit: Under voltage control enable 0: Disabled 1: Enabled

Ten's digit: Overvoltage and overcurrent stall control

0:Auto limit of acceleration and deceleration step

1:Operating frequency automatic control

d0.16① V/f curve selection

Range: 0 ~ 9 Default: 0

Voltage / frequency curve selection.

0: linear

The voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the motor rated frequency where the rated voltage is supplied to the motor. Linear V/f curve should be used in constant torque applications.

1: multi-point V/f

User can program multi-point V/f based on the needs of application. See Fig.6-D2

2: 1.2-power V/F

3: 1.4-power V/F

4: 1.6-power V/F

5: 1.8-power V/F

6: squared V/f

Squared V/f curve can be used in applications where torque demand of the load is proportional to the square of the speed, e.g in centrifugal fans and pumps.

7: V/f complete separation

Output frequency and output voltage are independent. Output frequency is from frequency source, and output voltage is set by d0.21. This V/f curve can be used in applications such as induction heating, inverse power supply and torque motor control.

8: V/f half separation

The output voltage is determined by the voltage calculated from linear V/f and the setting of d0.21.

$$V_o = \frac{f_o}{f_{rated}} V_{rated} * d0.21$$

V_o: output voltage f_o: output frequency

V_{rated}: motor rated voltage f_{rated}: motor rated frequency

9: Flux Optimization

It is recommended that the motor keeps running with light or no load.

d0.17① **Multi-point V/f zero frequency voltage**	Range: 0.00 ~ 40.0 Unit: % Multi-point V/f V0	Default: 1.5
d0.18① **Multi-point V/f frequency 1**	Range: 0.00 ~ d0.20 Unit: Hz Multi-point V/f f1	Default: 3.00
d0.19① **Multi- point V/f voltage 1**	Range: 0.0 ~ 100.0 Unit: % Multi-point V/f V1	Default: 8.0
d0.20① **Multi-point V/f frequency 2**	Range: d0.18 ~ d0.22 Unit: Hz Multi-point V/f f2	Default: 25.00
d0.21① **Multi- point V/f voltage 2**	Range: 0.0 ~ 100.0 Unit: % Multi-point V/f V2	Default: 55.0
d0.22① **Multi-point V/f Frequency 3**	Range: d0.20 ~ b0.09 Unit: Hz Multi-point V/f f3	Default: 50.00

d0.23① **Multi- point V/f voltage 3**

Range: 0.0 ~ 100.0 Default: 100.0

Unit: %

Multi-point V/f V3

When **V/f curve selection (d0.16)** is set to 1, output voltage characteristic is determined by the settings of d0.17 ~ d0.23. 100% of voltage indicates motor rated voltage. See Fig6-D2

Note:

- Multi-point V/f curve's setting must based on motor and load characteristic. Inappropriate setting may cause motor damaged.
- If motor 1 is active, 100% of voltage indicates motor 1 rated voltage.
- If motor 2 is active, 100% of voltage indicates motor 2 rated voltage.
- The relationship between voltages and frequencies is: V1＜V2＜V3,F1＜F2＜F3.

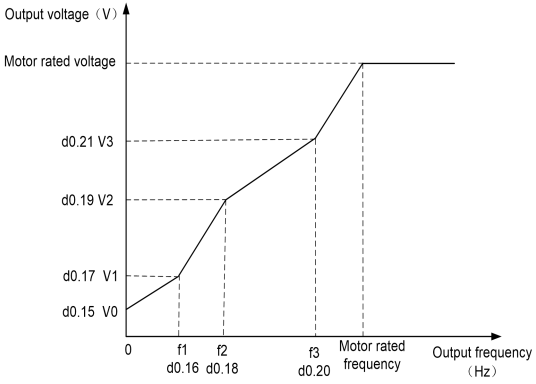


Figure 6- 21 multi-point V/f curve

d0.24 Voltage source for V/f separation

Range: 0 ~ 8 Default: 0

This parameter is valid when d0.14 is set to 7.

0: d0.25 1: AI1 2: AI2 3: AI3（optional card） 4: X6/FI

5: PID. The output voltage is generated based on PID closed loop.

6: PLC. The voltage source is from simple PLC mode.

7: Multi-Reference. The voltage source is from multi-reference.

8: Communication

The output voltage is set by the host computer by means of communication.

Note:

- 100.0% of the setting in each mode corresponds to the rated motor except d0.25.
- If a negative percentage is set, its absolute value is used instead.

The voltage source for V/F separation is set in the same way as the frequency source.

d0.25 Voltage digital setting for V/f separation

Range: 0 ~（b0.07） Default: 0

Unit: V

Voltage digital setting for V/f separation.

d0.26 Voltage ramp time of V/f separation

Range: 0.0 ~ 1000.0 Default: 0.0

Unit: Sec

This defines the time required for voltage to change from 0 to rated voltage or change from rated voltage to 0.See Fig6-D3

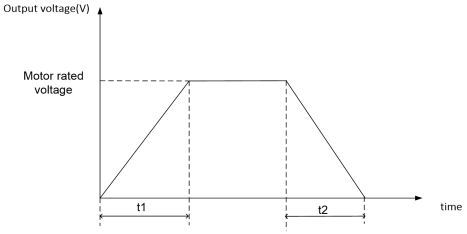


Figure 6- 22 V/F separation Voltage ramp time curve

d0.31 CBC current control

Range: 0 ~ 1 Default: 1

Unit: 1

0: Disable 1: Enable

Cycle by cycle tripping for current limiting operation.

d0.32 CBC current limit

Range: 0.50 ~ 2.20 Default: 2.00

Unit: 0.01

This defines the CBC current limit point that CBC current control function is active. 1.00 of the setting corresponds to AC drive rated current.

d0.33 CBC current control delay time

Range: 10 ~ 9999 Default: 500

Unit: mSec

This defines the time that CBC current control is allowed to run when it is active. If CBC current control running exceeds this setting time, a CBC trip will occurred.

Caution: Increasing d0.33 must decrease d0.32 as the same time. Otherwise, hardware of AC drive could be damaged with large running current.

d0.34 Energy saving coefficient

Range: 50.0~100.0 Default: 65.0

Unit: %

Voltage coefficient of the weak magnetic when output torque below 5%.Set too low may lead to motor stall.

Group d1: Motor Parameters

d1.01① **motor stator resistance**	Range: 0.001 ~ 65.535（drive power<=55kW） 0.0001 ~ 6.5535（drive power >55kW） Unit: Ω asynchronous motor stator resistance.	Default: Model dependent
d1.02① **motor rotor resistance**	Range: 0.001 ~ 65.535（drive power <=55kW） 0.0001 ~ 6.5535（drive power >55kW） Unit: Ω asynchronous motor rotor resistance..	Default: Model dependent
d1.03① **motor leakage inductance**	Range: 0.01 ~ 655.35（drive power <=55kW） 0.001 ~ 65.535（drive power >55kW） Unit: mH asynchronous motor leakage inductance.	Default: Model dependent
d1.04① **motor mutual inductance**	Range: 0.1 ~ 6553.5（drive power <=55kW） 0.01 ~ 655.35（drive power >55kW） Unit: mH asynchronous motor mutual inductance	Default: Model dependent
d1.05① **motor no-load current**	Range: 0.01 ~ motor rated current （b0.08）（drive power <=55kW） 0.1 ~ b0.08（drive power >55kW） Unit: A asynchronous motor no-load current.	Default: Model dependent
d1.06① **Motor weaken flux coefficient 1**	Range: 0.000 ~ 1.000 The flux coefficient corresponds to 20% of flux current.	Default: 0.400
d1.07① **Motor weaken flux coefficient 2**	Range: 0.000 ~ 1.000 The flux coefficient corresponds to 50% of flux current.	Default: 0.700
d1.08① **Motor weaken flux coefficient 3**	Range: 0.000 ~ 1.000 The flux coefficient corresponds to 80% of flux current.	Default: 1.000

Note:

- Parameters of d1.01~1.05 will be used when motor type is set as asynchronous motor.
- Please edit parameters of d1.01~d1.05 if you got the parameters of asynchronous motor.
- Parameters of d1.01~1.05 can be get from running No-load dynamic auto-tune.
- After running static auto-tune, only d1.01~1.03 can be got.
- Parameters of d1.01~1.05 will be refreshed to default values after changing rated motor power or voltage.

d1.15[Φ] Range: 0 ~ 2 Default: 0

Auto tune

AC drive can calculate and store motor parameters automatically through auto-tune function. To get better performance, running auto-tune before first usage is strong recommended.

0: invalid

1: static auto-tune

It is applied to applications that the motor cannot be disconnected from the load. Set d1.15 to 1, then press the running key, static auto-tune will be running. d1.15 will resume to 0 after auto-tune automatically.

2: rotational auto-tune(No-load)

The motor must be disconnected from the load when running No-load dynamic auto-tune. Set d1.15 to 2, then press the running key, static auto-tune will be running. d1.15 will resume to 0 after auto-tune automatically. Please set appropriate accelerating/decelerating time (accelerating time 4, decelerating time 4), otherwise, over current or over voltage fault may be occurred. Generally, the larger rated motor power the longer accelerating/decelerating time is needed.

Note:

- Make sure the motor is static before running auto-tune.
- “TUNE”will be displayed in keypad when auto-tune is running. After auto-tune, “TUNE”will be disappeared.
- Motor parameters will be updated after auto-tune.
- There are two methods to start auto-tune:
  A: After setting d1.15 to 1 or 2, send a run command.
  B: Run auto-tune directly through the digital terminal which is configured as function 54 or 55.

Group d2: Speed Control

d2.00 **ASR proportional gain Kp1**	Range: 1 ~ 100 Speed control loop proportional gain (Kp1) in low speed situation.	Default: 30
d2.01 **ASR integration time Ti1**	Range: 0.01 ~ 10.00 Unit: Sec Speed control loop proportional integral time (Ti1) in low speed situation.	Default: 0.50
d2.02 **ASR proportional gain Kp2**	Range: 1 ~ 100 Speed control loop proportional gain (Kp2) in high speed situation.	Default: 20
d2.03 **ASR integration time Ti2**	Range: 0.01 ~ 10.00 Unit: Sec Speed control loop proportional integral time (Ti2) in high speed situation.	Default: 1.00
d2.04 **Low speed switchover frequency**	Range: 0.00 ~ d2.05 Unit: Hz switchover frequency1	Default: 5.00
d2.05 **High speed switchover frequency**	Range: d2.04 ~b0.00 Unit: Hz switchover frequency2	Default: 10.00

The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed loop controller.

- The larger proportional gain (Kp) the faster response will be. However, system may be unstable when Kp is too large.
- The less integral time (Ki) the faster response will be. However, system may be unstable when Ti is too small.
- If the running frequency is less than or equal to "Switchover frequency 1" (d2.04), the speed loop controller parameters are d2.00 and d2.01.
- If the running frequency is equal to or greater than "Switchover frequency 2" (d2.05), the speed loop controller parameters are d2.02 and d2.03.
- If the running frequency is between d2.04 and d2.05, the speed loop PI parameters

- are obtained from the linear switchover between the two groups of controller parameters, as shown in Fig6-D4.

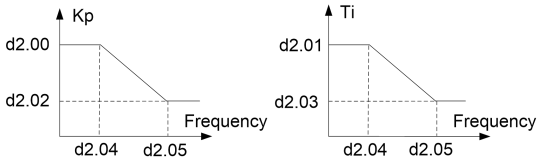


Figure 6- 23 Relationship between running frequencies and speed loop Kp & Ti

Note: Improper controller parameter setting may cause overvoltage or over current trip.

d2.06 ASR integration attribute

Range: 0 ~ 1 Default: 0

0: integral separation is invalid

1: integral separation is valid

If this parameter set to 1, integration of speed loop controller is valid only when speed error is small. Therefore, speed overshot or oscillation can be avoided when the Ti is small.

d2.07 Vector control slip gain

Range: 50 ~ 120 Default: 100

Unit: %

Setting this parameter properly can improve system performance.

d2.08 ASR filter time

Range: 0 ~ 1023 Default: 0

It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

d2.09 Upper torque limit Source of forward motoring

Range: 0 ~ 7 Default: 0

0: d2.10

1: AI1

2: AI2

3: AI3

4: X6/FI

5: Communication

6: MIN（AI1,AI2）

7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is running forward in motoring mode. More information, see d2.10.

d2.10 Preset upper torque limit of forward motoring

Range: 0.0 ~ 300.0 Default: 150.0

Unit: %

When d2.09 is set to 0, this parameter is used as upper torque limit when the motor is running forward in motoring mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d2.10, and 100% of the value of d2.10 corresponds to the motor rated torque.

d2.11 Upper torque limit Source of reverse motoring

Range: 0 ~ 7 Default: 0

0: d2.10
1: AI1
2: AI2
3: AI3
4: X6/FI
5: Communication
6: MIN（AI1,AI2）
7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is running reverse in motoring mode. More information, see d2.12.

d2.12 Preset upper torque limit of reverse motoring

Range: 0.0 ~ 300.0% Default: 150.0%

Unit: %

When d2.11 is set to 0, this parameter is used as upper torque limit when the motor is running reverse in motoring mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d2.12, and 100% of the value of d2.12 corresponds to the motor rated torque.

d2.13 Upper torque limit source of forward generating

Range: 0 ~ 7 Default: 0

0: d2.10
1: AI1
2: AI2
3: AI3
4: X6/FI
5: Communication
6: MIN（AI1,AI2）
7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is running forward in generating mode. More information, see d2.14.

d2.14 Preset upper torque limit of forward generating

Range: 0.0 ~ 300.0 Default: 150.0

Unit: %

When d2.13 is set to 0, this parameter is used as upper torque limit when the motor is running forward in generating mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d2.14, and 100% of the value of d2.14 corresponds to the motor rated torque.

d2.15 Upper torque limit source of reverse generating

Range: 0 ~ 7 Default: 0

0: d2.10
1: AI1
2: AI2
3: AI3
4: X6/FI
5: Communication
6: MIN（AI1,AI2）
7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is reverse forward in generating mode. More information, see d2.16.

d2.16 Preset upper torque limit of reverse generating

Range: 0.0 ~ 300.0 Default: 150.0

Unit: %

When d2.15 is set to 0, this parameter is used as upper torque limit when the motor is running reverse in generating mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d2.16, and 100% of the value of d2.16 corresponds to the motor rated torque.

There are four motor running modes based on directions of speed and torque. See 6-D5.

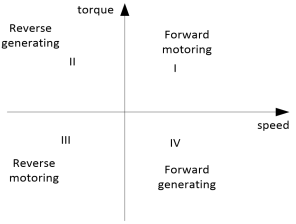


Figure 6- 24 Four motor running modes

d2.17 Proportional gain of flux current loop	Range: 0 ~ 60000 Proportional gain of flux current loop.	Default: 2000
d2.18 Integration time of flux current loop	Range: 0 ~ 60000 Integration time of flux current loop.	Default: 800
d2.19 Proportional gain of torque current loop	Range: 0 ~ 60000 Proportional gain of torque current loop.	Default: 2000
d2.20 Integration time of torque current loop	Range: 0 ~ 60000 Integration time of torque current loop.	Default: 400

Note: The system dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the current loop controller. Improper controller parameter setting may cause overvoltage or over current trip.

d2.21® **Vector control optimization mode**	Range: 000 ~ 111 0: Disable 1: Enable **Unit's digit:** Loop control optimization **Ten's digit:** Angle estimation optimization **Hundred's digit:** Low frequency torque optimization	Default: 110

Group d3：Torque Control

d3.00① **Speed/Torque control selection**

Range: 0 ~ 1 Default: 0

It is used to select motor control mode in vector control.

0: Speed Control 1: Torque Control

If one of the input digital terminals is set to function 35 (torque control forbidden), speed control will be active when the terminal is active regardless the setting of d3.00.

If one of the input digital terminals is set to function 34 (speed/torque control switch), the actual control mode will be different with the setting of d3.00 when the terminal is active.

d3.01① **Torque reference source**

Range: 0 ~ 7 Default: 0

0: d3.02+UP/DOWN
1: AI1
2: AI2
3: AI3
4: X6/FI
5: Communication
6: MIN（AI1,AI2）
7: MAX（AI1,AI2）

When this parameter is set to 0, the torque reference can be setting through terminal up/down adjustment function or up/down key when C0.18 is set to 1. When this parameter is set to none 0, 100% of the setting corresponds to the value of d3.02.

d3.02 Digital setting of torque reference

Range: -300.0 ~ 300.0 Default: 50.0

Unit: %

Digital setting of torque reference. 100% of the setting corresponds to the rated motor torque.

d3.03① **Torque compensation source**

Range: 0 ~ 7 Default: 0

0: d3.04
1: AI1
2: AI2
3: AI3
4: X6/FI
5: Communication
6: MIN（AI1,AI2）
7: MAX（AI1,AI2）

User can choose a suitable source as torque reference compensation according to actual application.

d3.04
Digital setting of torque compensation

Range: -300.0 ~ 300.0 Default: 0.0

Unit: %

Digital setting of torque compensation. 100% of the setting corresponds to the rated motor torque.

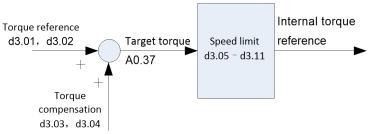


Figure 6- 25 torque reference for torque control

d3.05Φ
Speed limit mode

Range: 0 ~ 5 Default: 0

Speed limit mode selection for torque control.

0: Minimum frequency to maximum frequency

1: Minimum frequency to running frequency

2: Negative running frequency to positive running frequency

3: Running frequency to maximum frequency

4: Running frequency + windows

5: 0Hz to output frequency

In torque control, motor rotor speed should be limit within suitable range to avoid that the speed is out of control. When rotor speed is within the setting range, torque control is active. Otherwise, speed control will be active when speed is out of the setting range.

d3.06Φ
Maximum frequency source

Range: 0 ~ 7 Default: 0

maximum frequency source:

0: d3.07

1: AI1

2: AI2

3: AI3

4: X6/FI

5: Communication

6: MIN（AI1,AI2）

7: MAX（AI1,AI2）

When this parameter is set to 0, maximum frequency is set by d3.07.

When this parameter is set to none 0, 100% of the setting corresponds to the value of d3.07.

d3.07 **Digital setting of Maximum frequency**	Range: -b0.00 ~b0.00 Unit: Hz Digital setting of maximum frequency.	Default: 50.00
d3.08[①] **Minimum frequency source**	Range: 0 ~ 7 0: d3.09 1: AI1 2: AI2 3: AI3 4: X6/FI 5: Communication 6: MIN（AI1,AI2） 7: MAX（AI1,AI2） When this parameter is set to 0, minimum frequency is set by d3.09. When this parameter is set to none 0, 100% of the setting corresponds to the value of d3.09.	Default: 0
d3.09 **Digital setting of minimum frequency**	Range: -（b0.00） ~（b0.00） Unit: Hz Digital setting of minimum frequency.	Default: -50.00
d3.10 **Window positive error**	Range: 0.00 ~ 50.00 Unit: Hz When d3.05 is equal to 4, this parameter is valid.	Default: 5.00
d3.11 **Window negative error**	Range: -50.00 ~ 000.00 Unit: Hz When d3.05 is equal to 4, this parameter is valid.	Default: -5.00

When d3.05 is set to 0 (Minimum frequency to maximum frequency), speed limit mode is shown by Fig6-D7:

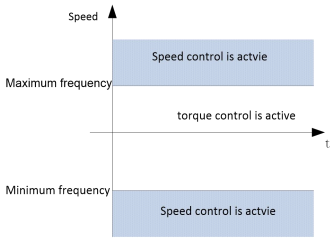


Figure 6- 26 d3.05=0 Minimum frequency to maximum frequency

When d3.05 is set to 1 (Minimum frequency to running frequency), speed limit mode is shown by Fig6-D8:

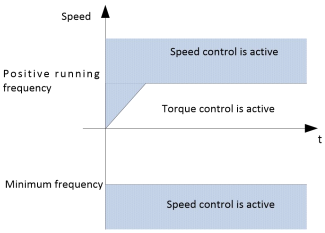


Figure 6- 27 d3.05=1 Minimum frequency to running frequency

When d3.05 is set to 2 (Negative running frequency to positive running frequency), speed limit mode is shown by Fig6-D9:

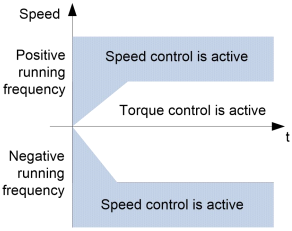


Figure 6- 28 d3.05=2 Negative running frequency to positive running frequency

When d3.05 is set to 3 (Running frequency to maximum frequency), speed limit mode is shown by Fig6-D10:

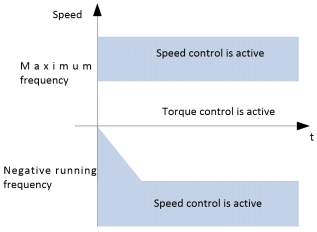


Figure 6- 29 d3.05=3 Running frequency to maximum frequency

When d3.05 is set to 4 (Running frequency + windows), speed limit mode is shown by Fig6-D11:

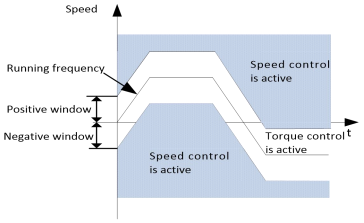


Figure 6- 30 d3.05=4 Running frequency + windows

When d3.05 is set to 5 (0Hz to running frequency), speed limit mode is shown byFig6-D12:

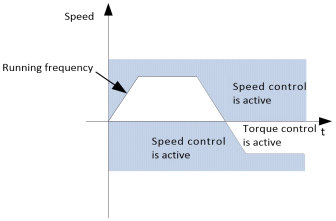


Figure 6- 31 d3.05=5 0Hz to running frequency

d3.12 Static torque compensation

Range: 0.0 ~ 100.0 Default: 0.0

Unit: %

To overcome the static friction, static torque compensation is helpful. 100% of the setting corresponds to rated motor torque.

d3.13 Dynamic torque compensation

Range: 0.0 ~ 100.0 Default: 0.0

Unit: %

To overcome the dynamic friction, dynamic torque compensation is helpful. 100% of the setting corresponds to rated motor torque.

d3.14 Inertia torque compensation

Range: 0.0 ~ 100.0 Default: 0.0

Unit: %

To overcome the system inertia, inertia torque compensation is helpful. 100% of the setting corresponds to rated motor torque.

d3.15 Torque acceleration time

Range: 0.00 ~ 650.00 Default: 2.00

Unit: Sec

This defines the time required for actual torque reference to change from

0 to rated motor torque.

d3.16 Torque deceleration time

Range: 0.00 ~ 650.00 Default: 2.00

Unit: Sec

This defines the time required for actual torque reference to change from 0 to rated motor torque.

d3.17 Maximum torque reference

Range: -300.0~300.0 Default: 150.0

Unit: %

d3.17~d3.18 is the limit of torque reference under torque control mode,and is also the maximum setting value when AI, FI and Communication input.

d3.18 Minimum torque reference

Range: -300.0~300.0 Default: 150.0

Unit: %

Refer to d3.17 description.

Group d5: Motor 2 Parameters

The AC drive can store two groups of motor parameters. User can switch the desired motor to run with the related motor parameters. The defines and usage is the same as motor 1. More detail information, refer to b0, d1,d2.

d5.00① Motor 1/2 selection

Range: 0 ~ 1 Default: 0

0: motor 1

Selecting motor 1 as the running motor. Motor 1 related parameters and control parameters can be set in group b0, d1,d2.

1: motor 2

Selecting motor 2 as the running motor. Motor 2 related parameters and control parameters can be set in group d5, d6.

If one the input terminal has configured with function 30, motor 1/2 selection is determined by the terminal status regardless setting of d5.00.

d5.01① Motor 2 control mode

Range: 0 ~ 2 Default: 0

0: V/f 1: Open loop vector control 2: Close loop vector control

d5.03 Motor 2 rated power

Range: 0.1 ~ 999.9 Default: Model dependent

Unit: kW

motor 2 rated power

d5.04① **Motor 2 rated voltage**	Range: 1 ~ 2000 Unit: V motor 2 rated voltage	Default: Model dependent
d5.05① **Motor 2 rated current**	Range: 0. 01 ~ 655.35（drive power<=55kW） 0. 1 ~ 6553.5（drive power >55kW） Unit: A motor 2 rated current	Default: Model dependent
d5.06① **Motor 2 rated frequency**	Range: 10.00 ~ b0.00 Unit: Hz motor 2 rated frequency	Default: Model dependent
d5.07① **Motor 2 rated speed**	Range: 1 ~ 65535 Unit: RPM motor 2 rated speed	Default: Model dependent
d5.08① **Motor 2 rotor resistance**	Range: 0.001 ~ 65.535（drive power <=55kW） 0.0001 ~ 6.5535（drive power >55kW） Unit: Ω asynchronous motor 2 rotor resistance.	Default: Model dependent
d5.09① **Motor 2 stator resistance**	Range: 0.001 ~ 65.535（drive power <=55kW） 0.0001 ~ 6.5535（drive power >55kW） Unit: Ω asynchronous motor 2 stator resistance.	Default: Model dependent
d5.10① **Motor 2 leakage inductance**	Range: 0.01 ~ 655.35（drive power <=55kW） 0.001 ~ 65.535（drive power >55kW） Unit: mH asynchronous motor 2 leakage inductance.	Default: Model dependent
d5.11① **Motor 2 mutual inductance**	Range: 0.1 ~ 6553.5（drive power <=55kW） 0.01 ~ 655.35（drive power >55kW） Unit: mH asynchronous motor 2 mutual inductance	Default: Model dependent

d5.12① **Motor 2 no-load current**	Range: 0.01 ~ motor rated current （b0.08）（drive power <=55kW） Unit: A asynchronous motor no-load 2 current.	Default: Model dependent
d5.13① **Motor 2 weaken flux coefficient 1**	Range: 0.000 ~ 1.000 The flux coefficient corresponds to 20% of flux current.	Default: 0.400
d5.14① **Motor 2 weaken flux coefficient 2**	Range: 0.000 ~ 1.000 The flux coefficient corresponds to 50% of flux current.	Default: 0.700
d5.15① **Motor 2 weaken flux coefficient 3**	Range: 0.000 ~ 1.000 The flux coefficient corresponds to 80% of flux current.	Default: 1.000
d5.22① **motor 2 auto tune**	Range: 0 ~ 2 0: No action 1: Static auto tune 2: rotational auto tune	Default: 0

Group d6: Motor 2 Speed Control

The AC drive can store two groups of speed control parameters. Group d2 is for motor 1 and group d6 is for motor 2. The defines and usage is the same as motor 1. More detail information, refer to d2.

d6.00 **Motor 2 ASR proportional gain Kp1**	Range: 1 ~ 100 Speed control loop proportional gain (Kp1) in low speed situation.	Default: 30
d6.01 **Motor 2 ASR integration time Ti1**	Range: 0.01 ~ 10.00 Unit: Sec Speed control loop proportional integral time (Ti1) in low speed situation.	Default: 0.50
d6.02 **Motor 2 ASR proportional gain Kp2**	Range: 1 ~ 100 Speed control loop proportional gain (Kp2) in high speed situation.	Default: 20
d6.03 **Motor 2 ASR integration time Ti2**	Range: 0.01 ~ 10.00 Unit: Sec Speed control loop proportional integral time (Ti2) in high speed situation.	Default: 1.00

d6.04 Motor 2 Low speed switchover frequency

Range: 0.00 ~ switchover frequency2（d2.05） Default: 5.00
Unit: Hz
switchover frequency1

d6.05 Motor 2 High speed switchover frequency

Range: Switchover Frequency 1 （d2.04） ~ Max Frequency（b0.00） Default: 10.00
Unit: Hz
switchover frequency2

d6.06 Motor 2 ASR integration attribute

Range: 0 ~ 1 Default: 0
0: integral separation is invalid
1: integral separation is valid
If this parameter set to 1, integration of speed loop controller is valid only when speed error is small. Therefore, speed overshot or oscillation can be avoided when the Ti is small.

d6.07 Motor 2 Vector control slip gain

Range: 50 ~ 120 Default: 100
Unit: %
Setting this parameter properly can improve system performance.

d6.08 Motor 2 ASR filter time

Range: 0 ~ 1023 Default: 0
It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

d6.09 Motor 2 Upper torque limit Source of forward motoring

Range: 0 ~ 7 Default: 0

0: d2.10	2: AI2	4: X6/FI	6: MIN（AI1,AI2）
1: AI1	3: AI3	5: Communication	7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is running forward in motoring mode. More information, see d6.10.

d6.10 Motor 2 Preset upper torque limit of forward motoring

Range: 0.0 ~ 200.0 Default: 150.0
Unit: %
When d6.09 is set to 0, this parameter is used as upper torque limit when the motor is running forward in motoring mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d6.10, and 100% of the value of d6.10 corresponds to the motor rated torque.

d6.11 Motor 2 Upper torque limit Source of reverse motoring

Range: 0 ~ 7 Default: 0

0: d2.10 2: AI2 4: X6/FI 6: MIN（AI1,AI2）

1: AI1 3: AI3 5: Communication 7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is running reverse in motoring mode. More information, see d6.12.

d6.12 Motor 2 Preset upper torque limit of reverse motoring

Range: 0.0 ~ 200.0% Default: 150.0%

Unit: %

When d6.11 is set to 0, this parameter is used as upper torque limit when the motor is running reverse in motoring mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d6.12, and 100% of the value of d6.12 corresponds to the motor rated torque.

d6.13 Motor 2 Upper torque limit source of forward generating

Range: 0 ~ 7 Default: 0

0: d2.10 2: AI2 4: X6/FI 6: MIN（AI1,AI2）

1: AI1 3: AI3 5: Communication 7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is running forward in generating mode. More information, see d6.14.

d6.14 Motor 2 Preset upper torque limit of forward generating

Range: 0.0 ~ 200.0 Default: 150.0

Unit: %

When d6.13 is set to 0, this parameter is used as upper torque limit when the motor is running forward in generating mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d6.14, and 100% of the value of d6.14 corresponds to the motor rated torque.

d6.15 Motor 2 Upper torque limit source of reverse generating

Range: 0 ~ 7 Default: 0

0: d2.10 2: AI2 4: X6/FI 6: MIN（AI1,AI2）

1: AI1 3: AI3 5: Communication 7: MAX（AI1,AI2）

This parameter allows user to select the desired source as upper torque to limit the motor output torque when the motor is reverse forward in generating mode. More information, see d6.16.

d6.16 Motor 2 Preset upper torque limit of reverse generating

Range: 0.0 ~ 200.0 Default: 150.0

Unit: %

When d6.15 is set to 0, this parameter is used as upper torque limit when the motor is running reverse in generating mode. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of d6.16, and 100% of the value of d6.16 corresponds to the motor rated torque.

d6.17 **Motor 2 Proportional gain of flux current loop**	Range: 0 ~ 60000 Proportional gain of flux current loop.	Default: 2000
d6.18 **Motor 2 Integration time of flux current loop**	Range: 0 ~ 60000 Integration time of flux current loop.	Default: 800
d6.19 **Motor 2 Proportional gain of torque current loop**	Range: 0 ~ 60000 Proportional gain of torque current loop.	Default: 2000
d6.20 **Motor 2 Integration time of torque current loop**	Range: 0 ~ 60000 Integration time of torque current loop.	Default: 400

Group E0: JOG

JOG function is useful and convenient for equipment debugging,it can make the AC drive working at any output frequency temporarily.

E0.00 **JOG frequency**	Range: 0.00~**b0.00** Unit: Hz	Default: 5.00
E0.01 **JOG acceleration time**	Range: 0.1~6000.0 Unit: Sec The time JOG running from 0Hz to **b0.00**(Max frequency).	Default: 10.0
E0.02 **JOG deceleration time**	Range: 0.1~6000.0 Unit: Sec The time JOG running from **b0.00**(Max frequency) to 0Hz.	Default: 10.0

These parameters are used to define the set frequency and acceleration/deceleration time of the AC drive when JOG running.

The JOG command can be sent from Keypad,Terminal and Communication.

The startup mode is "Ramp start from startup frequency" (**b1.05** = 0) and the stop mode is depending on **E0.03** during JOG running.

E0.03	Range: 0~1	Default: 0
JOG stop mode	0: Ramp stop 1: Coasting stop	
E0.04	Range: 0~1	Default: 0
JOG preferred	When set E0.04 to 1,the AC drive will response the JOG command of current control source immediately even if in running state.And the JOG command form other control source will be ignored. 0: Disabled 1: Enabled	

Group E1: Skip Frequency

If the set frequency is within the frequency jump range, the actual running frequency is the skip frequency close to the set frequency. Setting the skip frequency helps to avoid the mechanical resonance point of the load.

The AC drive supports two skip frequencies. If both are set to 0, the skip frequency function is disabled.

E1.00	Range: **E1.01~b0.00**	Default: 0.00
Skip frequency 1 high limit	Unit: Hz As shown in the following figure.	
E1.01	Range: **0.00~E1.00**	Default: 0.00
Skip frequency 1 low limit	Unit: Hz As shown in the following figure.	
E1.02	Range: **E1.03~b0.00**	Default: 0.00
Skip frequency 2 high limit	Unit: Hz As shown in the following figure.	
E1.03	Range: **0.00~E1.02**	Default: 0.00
Skip frequency 2 low limit	Unit: Hz As shown in the following figure.	

Note: The AC drive can output in the skip frequency range during acceleration and deceleration process.

The principle of the skip frequencies is shown in the following figure.

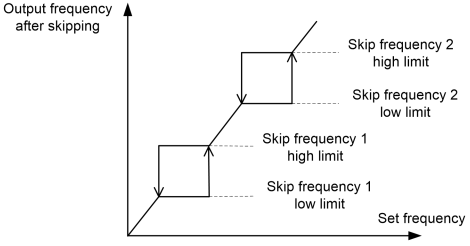


Figure 6- 32 Principle of the skip frequency

Group E2: Multi-Reference

The AC drive multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID.

The multi-reference is frequency value and ranges from **-b0.00** to **b0.00**.

As frequency source, it does not require conversion.As others, it needs to be changed to a percentage relative to **b0.00**(Max frequency).

Multi-reference can be switched over based on different states of X terminals. For details, see the descriptions of **Group C0**.

E2.00	Range: 0~6 Default: 0
Reference 0 source	0: Set by **E2.01** 1: Set by **b2.01**,modified via UP/DOWN 2: AI1 3: AI2 4: AI3 5: X6/FI 6: PID It determines the setting channel of reference 0. You can perform convenient switchover between the setting channels. When multi-reference or simple PLC is used as frequency source, the switchover between two frequency sources can be realized easily.
E2.01	Range: **-b0.00~b0.00** Default: 0.00
Reference 0	Unit: Hz Multi-reference 0 set frequency.

The descriptions of **Reference 1** to **Reference 15** are the same with **Reference 0**(**E2.01**).

E2.02	**Reference 1**
E2.03	**Reference 2**
E2.04	**Reference 3**
E2.05	**Reference 4**
E2.06	**Reference 5**
E2.07	**Reference 6**
E2.08	**Reference 7**
E2.09	**Reference 8**
E2.10	**Reference 9**
E2.11	**Reference 10**
E2.12	**Reference 11**
E2.13	**Reference 12**
E2.14	**Reference 13**
E2.15	**Reference 14**
E2.16	**Reference 15**

Group E3: Simple PLC

Simple PLC can complete simple combination of multi-reference.

E3.00 Range: 0~2 Default: 0

Simple PLC running mode

Simple PLC can be either the frequency source or V/F separated voltage source.When simple PLC is used as the frequency source, whether parameter values of **E2.01** to **E2.16** are positive or negative determines the running direction. If the parameter values are negative, it indicates that the AC drive runs in reverse direction.

0: Stop after the AC drive runs one cycle

The AC drive stops after running one cycle, and will not start up until receiving another command.

1: Keep final values after the AC drive runs one cycle

The AC drive keeps the final running frequency and direction after running one cycle.

2: Repeat after the AC drive runs one cycle

The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

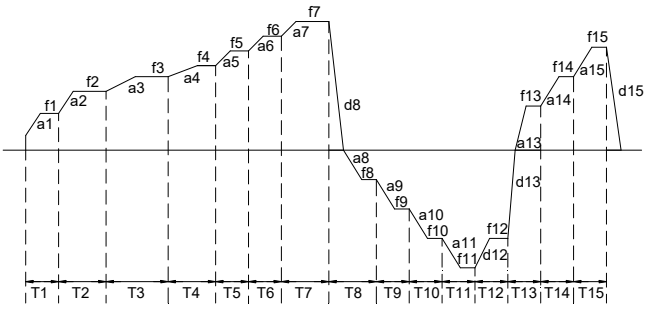


Figure 6- 33 Simple PLC when used as frequency source

E3.01 Range: 00~11 Default: 00

Simple PLC retentive selection

Unit's digit (Retentive upon power failure)

Ten's digit (Retentive upon stop)

0: No 1: Yes

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue running from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue running from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

E3.02 Range: 0~1 Default: 0
Time unit of simple PLC running
Setting the time unit for simple PLC running.
0: s (second) 1: h (hour)

E3.03 Range: 0.0~6553.5 Default: 0.0
Running time of simple PLC reference 0
Unit: Sec(h)
Setting the time for simple PLC reference 0 running.

E3.04 Range: 0~3 Default: 0
Acceleration/ deceleration time of simple PLC reference 0
0: Acceleration/deceleration time 1(As **b0.04**,**b0.05**)
1: Acceleration/deceleration time 2(As **E4.00**,**E4.01**)
2: Acceleration/deceleration time 3(As **E4.02**,**E4.03**)
3: Acceleration/deceleration time 4(As **E4.04**,**E4.05**)

The parameter descriptions of simple PLC **Reference 1** to **15** are the same with **Reference 0**(**E3.03** and **E3.04**).

E3.05	**Running time of simple PLC reference 1**	**E3.21**	**Running time of simple PLC reference 9**
E3.06	**Acceleration/deceleration time of simple PLC reference 1**	**E3.22**	**Acceleration/deceleration time of simple PLC reference 9**
E3.07	**Running time of simple PLC reference 2**	**E3.23**	**Running time of simple PLC reference 10**
E3.08	**Acceleration/deceleration time of simple PLC reference 2**	**E3.24**	**Acceleration/deceleration time of simple PLC reference 10**
E3.09	**Running time of simple PLC reference 3**	**E3.25**	**Running time of simple PLC reference 11**
E3.10	**Acceleration/deceleration time of simple PLC reference 3**	**E3.26**	**Acceleration/deceleration time of simple PLC reference 11**
E3.11	**Running time of simple PLC reference 4**	**E3.27**	**Running time of simple PLC reference 12**
E3.12	**Acceleration/deceleration time of simple PLC reference 4**	**E3.28**	**Acceleration/deceleration time of simple PLC reference 12**
E3.13	**Running time of simple PLC reference 5**	**E3.29**	**Running time of simple PLC reference 13**
E3.14	**Acceleration/deceleration time of simple PLC reference 5**	**E3.30**	**Acceleration/deceleration time of simple PLC reference 13**
E3.15	**Running time of simple PLC reference 6**	**E3.31**	**Running time of simple PLC reference 14**
E3.16	**Acceleration/deceleration time of simple PLC reference 6**	**E3.32**	**Acceleration/deceleration time of simple PLC reference 14**
E3.17	**Running time of simple PLC reference 7**	**E3.33**	**Running time of simple PLC reference 15**
E3.18	**Acceleration/deceleration time of simple PLC reference 7**	**E3.34**	**Acceleration/deceleration time of simple PLC reference 15**
E3.19	**Running time of simple PLC reference 8**		
E3.20	**Acceleration/deceleration time of simple PLC reference 8**		

Group E4: Acc & Dec time

The AC drive provides a total of four groups of acceleration/deceleration time, that is the following three groups and the group defined by **b0.04** and **b0.05**. Definitions of four groups are completely the same,see the descriptions of **b0.04** and **b0.05**.You can switch over between the four groups of acceleration/deceleration time through different state combinations of X terminals. For more details, see the function No.20 and No.21 descriptions of **C0.01**.

The descriptions of **E4.00~E4.05** are the same with **b0.04~b0.05**,ranges from 0.1 to 6000.0 seconds,defaults to model dependent.

E4.00	**Acceleration time 2**	**E4.02**	**Acceleration time 3**	**E4.04**	**Acceleration time 4**
E4.01	**Deceleration time 2**	**E4.03**	**Deceleration time 3**	**E4.05**	**Deceleration time 4**

E4.06 Range: 0.00~**b0.00** Default: 0.00
Frequency switchover point between acceleration time 1&2 Unit: Hz
See the following figure.

E4.07 Range: 0.00~**b0.00** Default: 0.00
Frequency switchover point between deceleration time 1&2 Unit: Hz
See the following figure.

The AC drive can switchover automatically between Acceleration/Deceleration time 1 and 2 with no X terminal signal when setting proper **E4.06** or **E4.07**.In acceleration process,the time 2 will be used when output frequency is lower than **E4.06**,otherwise time 1 will be used.In deceleration process,the time 1 will be used when output frequency is higher than **E4.07**,otherwise time 2 will be used.

If any X terminal is set as 20~21 function (Acceleration/Deceleration time select),the actual acceleration/deceleration time will be determined by X terminal states.

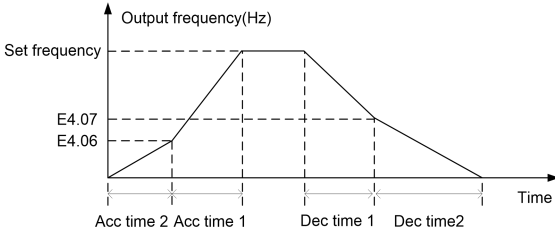


Figure 6- 34 Acceleration/Deceleration time 1/2 switching

E4.08① Range: 0~2 Default: 1
Unit of Acceleration/ Deceleration time 0: 1s (second) 1: 0.1s 2: 0.01s
Available for acceleration/deceleration time 1 to 4.

E4.09① Range: 0~2 Default: 1
Reference frequency of Acceleration/ Deceleration time 0: Max frequency(b0.00) 1: Current setting frequency 2: 100Hz
Acc/Dec time is defined as the running time needed between 0Hz to E4.09

Group E5: PID

E5.00④ Range: 0~1 Default: 0

PID engineering unit

This parameter determines the unit of PID regulator.

0: Percentage(%) 1: Pressure(MPa)

The following parameters' unit is determined by **E5.00**.

- **E5.05**(PID digital setting)
- **E5.03**(Minimum setting of PID engineering unit)
- **E5.02**(Maximum setting of PID engineering unit)
- **E5.16**(PID parameter switchover deviation 1)
- **E5.17**(PID parameter switchover deviation 2)
- **E5.26**(PID deviation limit)
- **E5.33**(Upper limit of PID feedback detection)
- **E5.34**(Lower limit of PID feedback detection)
- **E5.36**(Wake up level)
- **E5.39**(Sleep level)
- **A0.20**(PID reference)
- **A0.21**(PID feedback)

Note: The above 12 parameters' unit will change immediately according to **E5.00**.

E5.01 Range: 0~3 Default: 1

PID engineering unit resolution

0: No decimal 1: One decimal 2: Two decimal 3: Three decimal

This parameter determined the resolution of the following parameter:

- **E5.05**(PID digital setting)
- **E5.03**(Minimum setting of PID engineering unit)
- **E5.02**(Maximum setting of PID engineering unit)
- **E5.16**(PID parameter Switchover deviation 1)
- **E5.17**(PID parameter switchover deviation 2)
- **E5.26**(PID deviation limit)
- **E5.33**(Upper limit of PID feedback detection)
- **E5.34**(Lower limit of PID feedback detection)
- **E5.36**(Wake up level)
- **E5.39**(Sleep level)
- **A0.20**(PID reference)
- **A0.21**(PID feedback)

Note: The resolution of above 12 parameters will change immediately according to **E5.01**.

The PID engineering unit is convenient for customer using.Different engineering unit will be converted to percentage in the AC drive PID regulator.The percentage value of final PID setting and feedback will be again converted to the real value with engineering unit,and then shown to customers.

E5.03 equals to 0% in PID regulator,and **E5.02** equals to 100%.That two points (**E5.03**,0.0%) and (**E5.02**,100.0%) determine a conversion line between the value with engineering unit and percentage,as shown in the following figure.

Example 1:

- E5.00(Engineering unit)= 1(MPa)
- E5.01(PID engineering unit resolution)= 3(Three decimals)
- E5.03(Minimum setting of PID engineering unit)= 0.000(MPa)
- E5.02(Maximum setting of PID engineering unit)= 8.000(MPa)
- E5.05(PID digital setting)= 3.040(Mpa)
- E5.04(PID setting source)= 0(E5.05+UP/DOWN)

The final PID setting with percentage as unit is:

(E5.05-E5.03)/(E5.02-E5.03)*100% = 38.0%

A0.20(PID reference) is the final PID setting with engineering unit,its value is:

3.040 MPa = 38.0% * (E5.02-E5.03) + E5.03

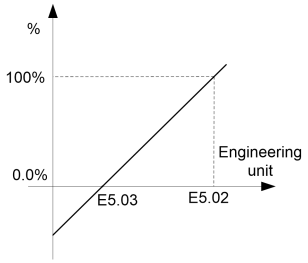


Figure 6- 35 The relationship between the value with engineering unit and the percentage value in AC drive PID regulator

Example 2:

- E5.00(Engineering unit)= 1(MPa)
- E5.01(PID engineering unit resolution)= 3(Three decimals)
- E5.03(Minimum setting of PID engineering unit)= 0.000(MPa)
- E5.02(Maximum setting of PID engineering unit)= 8.000(MPa)
- E5.07(PID feedback source)= 0(AI1)
- The max measure range of external equipment is 8 MPa,which equals to 16 mA of AI signal.
- C2.03(AI curve selection)= 321(set AI1 to AI curve 1)
- C2.06(AI curve 1 maximum input)= 8.00V
- C2.07(Corresponding setting of AI curve 1 maximum input)= 100.0%
- Suppose the AI current is 10mA

Then PID feedback with percentage unit is: (10mA-0mA)/(16mA-0mA) * 100% = 62.5%

A0.21(PID feedback) is the final PID feedback with engineering unit,its value is:

5.000(MPa) = 62.5% * (E5.02-E5.03) + E5.03

E5.02 Range: **E5.03**~6553.5 Default: 100.0
Maximum setting of PID engineering unit
Unit: %
The unit and resolution will be changed according to **E5.00** and **E5.01**.
E5.02 corresponds to 0% in AC drive,and affects the following parameters:
- **A0.20**(PID reference)
- **A0.21**(PID feedback)

E5.03 Range: 0.0~**E5.02** Default: 0.0
Minimum setting of PID engineering unit
Unit: %
The unit and resolution will be changed according to **E5.00** and **E5.01**.
E5.03 corresponds to 0% in AC drive,and affects the following parameters:
- **A0.20**(PID reference)
- **A0.21**(PID feedback)

E5.04 Range: 0~6 Default: 0
PID setting source

0: **E5.05**+UP/DOWN	1: AI1	2: AI2	3: AI3
	4: X6/FI	5: Multi-Reference	6: Communication

E5.05 Range: **E5.03~E5.02** Default: 50.0
PID digital setting
Unit: %
This parameter is used for PID setting value when **E5.04** = 0.
The unit and resolution will be changed according to **E5.00** and **E5.01**.

E5.04 is used to select the channel of target process PID setting. The PID setting and feedback's unit will be changed based on engineering unit.And their value will be converted into relative value based on **E5.03** and **E5.02**.

The purpose of PID control is to make the PID setting and PID feedback equal.

E5.06 Range: 0.00~99.99 Default: 0.00
PID setting change time
Unit: Sec
The time for PID setting value changing from **E5.03** to **E5.02**.

E5.07 Range: 0~8 Default: 0
PID feedback source
This parameter is used for setting PID feedback source.

0: AI1	1: AI2	2: AI3	3: AI1-AI2	4: X6/FI
5: AI1+AI2	6: MAX(|AI1|, |AI2|)	7: MIN(|AI1|, |AI2|)	8: Communication	

E5.08 Range: 0.00~60.00 Default: 0.00
PID feedback filter time
Unit: Sec
This parameter determines the AC drive response speed of PID feedback.

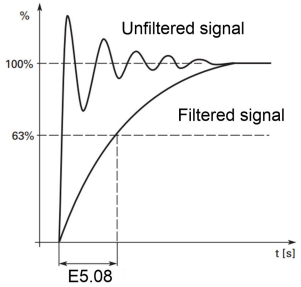


Figure 6- 36 PID feedback signal filtering

E5.09 PID proportional gain Kp1

Range: 0.0~999.9 Default: 100.0

Unit: %

It decides the regulating intensity of the PID regulator.

100% indicates the adjustment amplitude of output frequency is **b0.00**(Max frequency) in PID regulator when the deviation between PID feedback and PID setting is 100%.

0% means the PID regulator is a integral and differential controller.

Higher proportional gain can speed up the dynamic response.But too high proportional gain will easily cause a system oscillation.

E5.10 PID integral time Ti1

Range: 0.01~99.99 Default: 1.00

Unit: Sec

It decides the integral regulating intensity.The shorter the integral time is, the larger the regulating intensity is.

1.00 second means the PID output will change with a speed of 10.0%/Sec when the deviation between PID feedback and PID setting is 10%.

0.00 second means the PID regulator is a proportional and differential controller.

The integral control can reduce the static error.

Short integral time can speed up the dynamic response.But too short integral time will easily cause overshoot and system oscillation.

E5.11 PID differential time Td1

Range: 0.000~9.999 Default: 0.000

Unit: Sec

It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is.

1.000 second means the PID output will change 10.0% when the deviation between PID feedback and PID setting is 10%.

0.000 second means the PID regulator is a proportional and integral controller.

Differential control can forecast regulating intensity of the PID regulator on the deviation change,then make a quick response to improve the system dynamic performance.But it's easily interfered.

E5.12 Range: 0.0~999.9 Default: 50.0
PID proportional gain Kp2
Unit: %
Same with **E5.09**(PID proportional gain Kp1).

E5.13 Range: 0.01~99.99 Default: 2.00
PID integral time Ti2
Unit: Sec
Same with **E5.10**(PID integral time Ti1).

E5.14 Range: 0.000~9.999 Default: 0.000
PID differential time Td2
Unit: Sec
Same with **E5.11**(PID differential time Td1).

In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process.

The PID regulator has two groups of proportional gain,integral time and differential time.**E5.09~E5.11** is the first group parameters,and **E5.12~E5.14** is the second.

The switchover can be implemented via **E5.15**(PID parameter switchover condition).

E5.15 Range: 0~2 Default: 0
PID parameter switchover condition
Used for PID two groups parameters selection.
0:No switchover
Always use the first group parameters(**E5.09~E5.11**).
1:Switchover via X terminals
Use the first group parameters(**E5.09~E5.11**) when the X terminal is allocated with function No.40(PID parameter switchover) is valid,and the second(**E5.12~E5.14**) when X terminal is invalid.
2:Automatic switchover based on deviation
Automatic switchover according to **E5.16**(PID parameter switchover deviation 1)and **E5.17**(PID parameter switchover deviation 2).
Use the first group parameters(**E5.09~E5.11**) when the absolute value of the deviation between PID feedback and PID setting is smaller than than the value of **E5.16**,and the second when higher than **E5.17**.
If the absolute value of deviation is between **E5.16** and **E5.17**,PID regulator will use the linear interpolated value of two groups of parameters values,see the description of the following Figure.

E5.16 Range: **E5.03~E5.17** Default: 20.0
PID parameter switchover deviation 1
Unit: %
The unit and resolution will be changed according to **E5.00** and **E5.01**.
See the following figure.

E5.17
PID parameter switchover deviation 2

Range: **E5.16~E5.02** Default: 80.0
Unit: %
The unit and resolution will be changed according to **E5.00** and **E5.01**.
See the following figure.

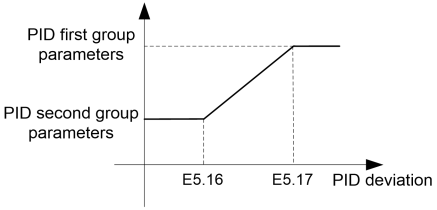


Figure 6- 37 The relationship between PID valid parameters and deviation

E5.18
PID output initial value

Range: 0.0~100.0 Default: 0.0
Unit: %
When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to **E5.18** and lasts the time set in **E5.19**.

E5.19
PID output initial value holding time

Range: 0.00~600.00 Default: 0.00
Unit: Sec
E5.18 is invalid if setting **E5.19** to 0.00 second.

E5.20
PID output filter time

Range: 0.00~60.00 Default: 0.00
Unit: Sec
The PID output signal will be filtered by a first order filter.This parameter determine the filter time.
Short filter time will speed up the response with low immunity,and long filter time will reduce the response speed with high immunity.

E5.21[Ⓓ]
PID action direction

Range: 0~1 Default: 0
0: Positive
The AC drive will increase output frequency when the PID feedback value is lower than PID setting value.
The AC drive will reduce output frequency when the PID feedback value is higher than PID setting value.
1: Negative
The AC drive will reduce output frequency when the PID feedback value is lower than PID setting value.
The AC drive will increase output frequency when the PID feedback value is higher than PID setting value.
See the following figure.

Table 6- 14 PID action direction selection

E5.21 (PID action direction)	X terminal function (Reverse PID action direction)	Final PID action direction
0(Positive)	OFF	Positive
0(Positive)	ON	Negative
1(Negative)	OFF	Negative
1(Negative)	ON	Positive

E5.22 PID differential limit

Range: 0.0~100.0 Default: 0.5

Unit: %

It is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.

E5.23 Maximum deviation between two PID outputs in forward direction

Range: 0.00~99.99 Default: 1.00

Unit: %

This function is used to limit the deviation between two PID outputs (2 ms per PID output) to suppress the rapid change of PID output and stabilize the running of the AC drive.

E5.23 and **E5.24** respectively correspond to the maximum absolute value of the output deviation in forward direction and in reverse direction.

E5.24 Maximum deviation between two PID outputs in reverse direction

Range: 0.00~99.99 Default: 1.00

Unit: %

Refer to E5.23.

E5.25 Cut-off frequency of PID reverse rotation

Range: 0.00~**b0.00** Default: 0.00

Unit: Hz

In some situations, only when the PID output frequency is a negative value (AC drive reverse rotation), PID setting and PID feedback can be equal. However, too high reverse rotation frequency is prohibited in some applications, and FA-08 is used to determine the reverse rotation frequency upper limit.

E5.26 PID deviation limit

Range: 0.0~100.0 Default: 0.0

Unit: %

Base on PID setting value.If the deviation between PID feedback and PID setting is smaller than the value of **E5.26**, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications. See the following figure.

E5.27
PID deviation limit delay time

Range: 0.0~320.0 Default: 0.0

Unit: Sec

See the following figure.

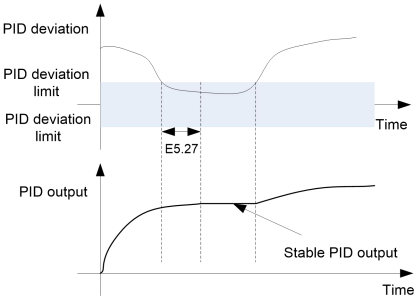


Figure 6- 38 PID deviation limit function

E5.28
PID integral property

Range: 00~11 Default: 00

Unit's digit (Integral separated)

0: Invalid 1: Valid

If it is set to valid, the PID integral operation stops when the DI allocated with function 39 "PID integral pause" is ON In this case, only proportional and differential operations take effect.

If it is set to invalid, integral separated remains invalid no matter whether the DI allocated with function 39 "PID integral pause" is ON or not.

Ten's digit (Whether to stop integral operation when the output reaches the limit)

0: Continue integral operation 1: Stop integral operation

If "Stop integral operation" is selected, the PID integral operation stops, which may help to reduce the PID overshoot.

E5.29
PID operation at stop

Range: 0~1 Default: 1

0: No PID operation at stop 1: PID operation at stop

It is used to select whether to continue PID operation in the state of stop. Generally, the PID operation stops when the AC drive stops.

E5.30
PID feedback detection enable

Range: 0~1 Default: 0

0: Disabled 1: Enabled

If "Disabled" is selected, the AC drive never detect whether PID feedback is lost.

E5.31 Minimum frequency of PID feedback detection

Range: 0.00~**b0.00** Default: 5.00

Unit: Hz

When the PID output frequency is smaller than **E5.31**,the AC drive will not detect whether PID feedback is lost even if **E5.30**=1.

E5.32 Waiting time of PID feedback detection

Range: 0.0~600.0 Default: 0.0

Unit: Sec

When **E5.30**=1 and the PID output frequency is higher than **E5.31** for the time **E5.32** set,the AC drive will detect whether PID feedback is lost .

E5.33 Upper limit of PID feedback detection

Range: **E5.03~E5.02** Default: 100.0

Unit: %. Unit/Decimal depends on **E5.00**/**E5.01**.

The AC drive will not report any error when the PID feedback is between **E5.34~E5.33**.Otherwise,when the lasting time exceeds E5.35, Er35 “PID feedback over range” will be reported.

E5.34 Lower limit of PID feedback detection

Range: **E5.03~E5.02** Default: 0.0

Unit: %.Unit/Decimal depends on **E5.00**/**E5.01**.

See the description of **E5.33**.

E5.35 Detection time of PID feedback detection

Range: 0.0~600.0 Default: 0.0

Unit: Sec

See the description of **E5.33**.

These parameters are used to judge whether PID feedback is lost..

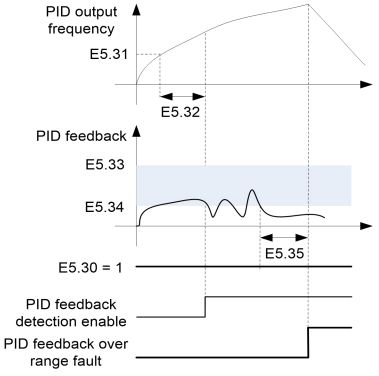


Figure 6- 39 PID feedback detection function

E5.36 Range: 0.0~200.0 Default: 0.0

Wake up level

Unit/Range depends on **E5.44**.When in sleep mode,if the feedback is smaller than the value **E5.36** set,and the lasting time exceeds **E5.37**,the AC drive will quit sleep mode.

E5.37 Range: 0.0~6500.0 Default: 0.0

Wake up delay time

Unit: Sec

See the description of **E5.36**.

E5.38 Range: 0~1 Default: 0

Sleep mode

0: Base on output frequency

The AC drive enters sleep mode when PID output frequency is smaller than **E5.40** and the lasting time exceeds **E5.41**.

1: Base on PID feedback

The AC drive enters sleep mode when PID feedback is higher than **E5.39** and the lasting time exceeds **E5.41**.

E5.39 Range: 0.0~200.0 Default: 0.0

Sleep level

Unit/Range depends on **E5.44**.See the description of **E5.38** and the following figure.

E5.40 Range: 0.00~**b0.00** Default: 0.00

Sleep frequency

Unit: Hz

See the description of **E5.38** and the following figure.

E5.41 Range: 0.0~6500.0 Default: 0.0

Sleep delay time

Unit: Sec

0 means no sleep function.See the description of **E5.38** and the following figure.

Here are two examples for two different PID sleep mode.

Example 1: E5.38 = 1(Base on PID feedback).

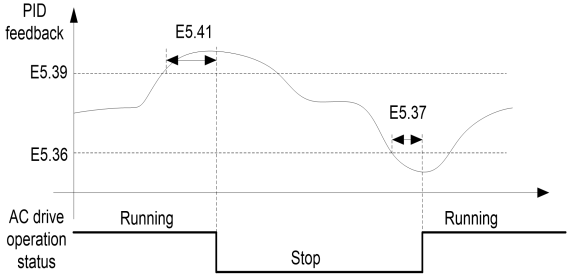


Figure 6- 40 Sleep base on PID feedback

Example 2: E5.38 = 0(Base on output frequency).

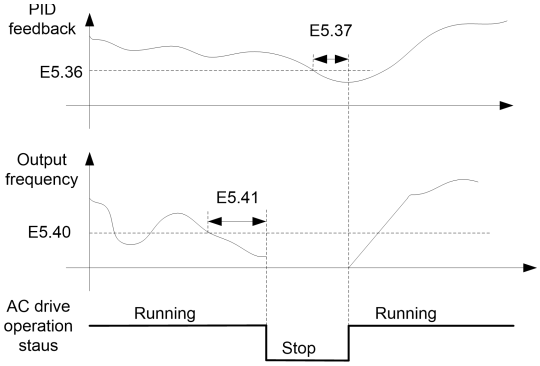


Figure 6- 41 Sleep base on output frequency

E5.42 Range: 0.0~100.0 Default: 100.0 Unit: %

PID setting high limit PID setting value higher limit of internal operation.

E5.43 Range: 0.0~100.0 Default: 0.0 Unit: %

PID setting low limit PID setting value lower limit of internal operation.

E5.44[Φ] Range: 0~1 Default: 0

Base value selection of PID sleep and wake up threshold

The Unit/Range of **E5.36** and **E5.39** is determined by **E5.44**.

0:Unit is Percentage (%),base value is PID setting and range is 0.0~200.0%.

1:Unit is the same as PID engineering unit(**E5.00**),range is **E5.03**~**E5.02**.

Group E6: Multi-Pump Control

Key points:

- Multi-pump control logic can control no more than 4 pumps when working together with PID regulator.
- AC drive can switch a pump to its output or power grid via a relay or Y terminal(controlling a external relay).
- A contact of the manual on/off switch (or protective device, such as a thermal relay, etc.) of each motor is wired to the interlock circuit. The logic will detect if a motor is unavailable and start the next available motor instead.
- Auto change function is used to make sure each pump takes the average load in the system.It will adjust the startup sequence to prevent pump rust caused by long time no used.The motor startup sequence will return to initial status when AC drive stops or re-power on.
- There are two ways for adding a pump.1)Directly connecting the auxiliary pumps to power grid(mode 1~2).2)The auxiliary pumps are softly started by AC drive first.Then it will be switch to power grid.AC drive will directly control another new speed-regulated pump(mode 3~4).
- If a motor can be connected to AC drive or power grid,the two switching contactors must be electric interlocked.
- The motor phase sequence must be validated before power on.Make sure the motor rotation direction under power grid is the same with connecting to AC drive.
- AC drive will enter sleep mode when meets the sleep conditions and there is only one speed-regulated pump running.

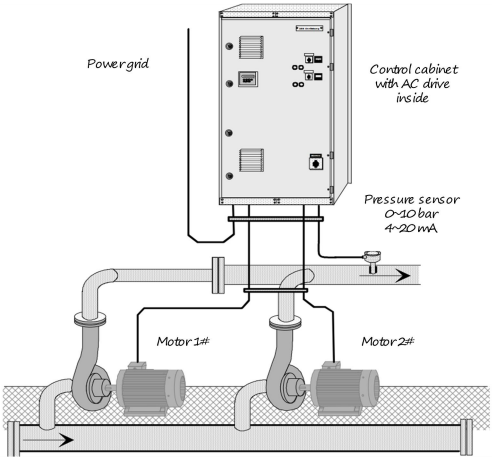


Figure 6- 42 Multi-pump control wiring diagram

E6.00[Φ] Range: 0~4 Default: 0

Multi-pump control mode

This series AC drive support multi-pump control modes.

Each of them is apply to different application area with different configuration and operation logic:

0:Inactive

The AC drive can only work at single pump control mode.

1:Frequency pump fixed,No auto change

The AC drive controls a specific adjustable speed motor,other auxiliary motors are all controlled via relays.

This mode needs to configurate the system as shown in the top figure of next page.

The auxiliary motor will be directly connected to power grid when adding a pump.

2:Frequency pump fixed,Support auto change

Base on mode 1,auxiliary motors can be auto changed.

3:Frequency pump circulation,No auto change

Any pump can be connected to power grid or directly controlled by AC drive in this mode.

This mode needs to configurate the system as shown in the bottom figure of next page.

The auxiliary motor will be softly start by AC drive when adding a pump.

4:Frequency pump circulation,Support auto change

Base on mode 3,all motors can be auto changed.

Table 6- 15 multi-pump control mode

Multi-pump control mode	Frequency pump	Auto change	Configuration
1	Fixed	Nonsupport	The top figure of next page.
2	Fixed	Support	
3	Unfixed	Nonsupport	The bottom figure of next page.
4	Unfixed	Support	

Parameter	Configuration	
C1.04 (T1 function)	40	Motor1# Control output
C1.05 (T2 function)	41	Motor2# Control output

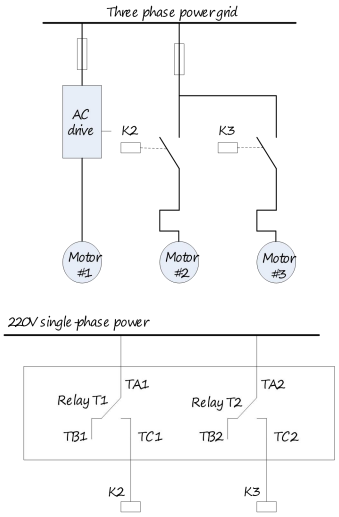


Figure 6- 43 Frequency pump fixed wiring configuration

Parameter	Configuration	
C1.04 (T1 function)	40	Motor1# Control output
C1.05 (T2 function)	41	Motor2# Control output
C1.06 (T3 function)	42	Motor2# Control output

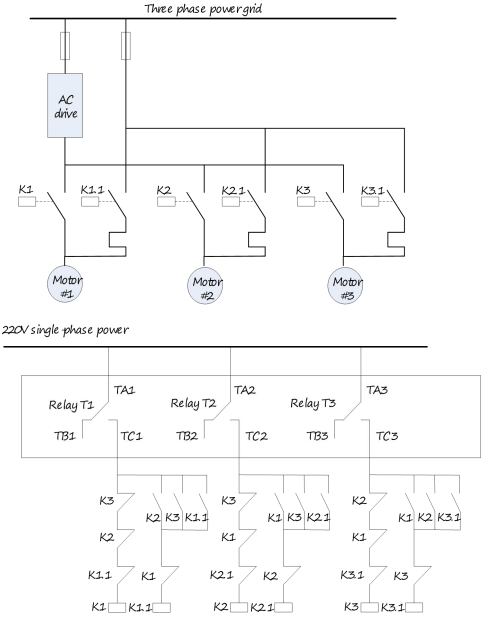


Figure 6- 44 Frequency pump circulation wiring configuration

Note: If necessary,please use Y terminals to control external relays in multi-pump configuration. Do not directly use Y terminals.

E6.01 Number of motors
Range: 1~4 Default: 1
Motor numbers of multi-pump control system.

E6.02 Reference step 1
Range: 0.0~100.0 Default: 0.0
Unit: %
Add a percentage increment(base on PID setting) to the initial PID setting value.
✓ Be valid when there is at least 1 auxiliary motor running.
Example: The AC drive controls 3 parallel pumps to supply water through pipeline.E5.05 sets the pipeline pressure.
When the water consumption is small,there is only frequency pump running.The auxiliary pumps will be added one by one as the water consumption increasing.
- Reference step is E6.02 when the first auxiliary pump starts.
- Reference step is the sum of E6.02 and E6.03 when the second auxiliary pump starts.
- Reference step is the sum of E6.02, E6.03and E6.04 when the third auxiliary pump starts.

E6.03 Reference step 2
Range: 0.0~100.0 Default: 0.0
Unit: %
See the parameter description of **E6.02**.
✓ Be valid when there is at least 2 auxiliary motor running.

E6.04 Reference step 3
Range: 0.0~100.0 Default: 0.0
Unit: %
See the parameter description of **E6.02**.
✓ Be valid when there is at least 3 auxiliary motor running.

E6.05 Interlock functions
Range: 00~11 Default: 00
Interlock function is used to indicate whether each motor is connected to multi-pump control logic or not.
Unit's digit: interlock enable
0:disabled 1:enabled
Ten's digit: interlock mode
0:decided by X terminals 1:decided by E6.06

Choose any of the following two connection mode for interlock circuit:

1） A contact of the manual on/off switch of each motor is wired to the interlock circuit. The logic will detect if a motor is unavailable and start the next available motor instead.

2） A contact of thermal relay (or other protective device) of each motor is wired to the interlock circuit. The logic will detect if a motor has fault and decide to stop it.

Examples of motor interlock in multi-pump control logic:

- Suppose the motor startup sequence is: 1 -> 2 -> 3 -> 4.
- If motor 3 is removed,then the motor startup sequence is: 1 -> 2 -> 4.
- Then if motor 3 is added again,it will be added to the last of startup sequence: 1 -> 2 -> 4 -> 3.
- If the multi-pump control system stops,or enters into sleep mode,the motor startup sequence will return to the initial status when system runs again: 1 -> 2 -> 3 -> 4.

E6.06 **Digital setting of Motor interlock**	Range: 0000~1111 0: Not connected to multi-pump system 1: Connected to multi-pump system **Unit's digit: Motor1#** **Ten's digit: Motor2#** **Hundred's digit: Motor3#** **Thousand's digit: Motor4#**	Default: 0000
E6.07 **Auto-change interval**	Range: 0.1~6000.0 Unit: h When the lasting time exceeds the set value of E6.07,AC drive will begin auto changing if idle motor numbers is no less than E6.09 and speed-regulated motor operation frequency is lower than E6.08. Auto change function is to make an average distribution of the total working time to each motor in multi-pump system.	Default: 48.0
E6.08 **Auto-change frequency limit**	Range: 0.00~**b0.00** Unit: Hz Auto-change function will be forbidden when AC drive output higher than the frequency E6.08 set.	Default: 45.00
E6.09 **Auto-change Motor limit**	Range: 1~3 See the parameter description of **E6.07**.	Default: 1
E6.10 **Add pump frequency 1**	Range: 0.00~**b0.00** Unit: Hz The frequency to add the first auxiliary pump(controlled via a Y/T terminal with No.41 function “Motor 2# Control output”).	Default: 48.00

The first auxiliary pump startup conditions:

- No auxiliary pump is running.
- AC drive output frequency is higher than E6.10+1Hz,and the lasting time exceeds **E6.16**.

After the first auxiliary pump startup:

- AC drive reduces output frequency by a step of (**E6.10**-**E6.11**).
- The reduced speed of speed-regulated motor gives a compensation to the increment from auxiliary pump startup.See the description of Figure below.

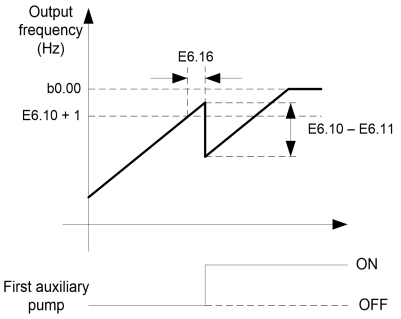


Figure 6- 45 Schematic diagram of adding pump logic

E6.11 Reduce pump frequency 1

Range: 0.00~**E6.10** Default: 25.00

Unit: Hz

The frequency to remove the first auxiliary pump(controlled via a Y/T terminal with No.41 function “Motor 2# Control output”).

The first auxiliary pump stop conditions:

- Only one auxiliary pump is running.
- AC drive output frequency is lower than E6.11-1Hz,and the lasting time exceeds **E6.17**.

After the first auxiliary pump stop:

- AC drive increases output frequency by a step of (**E6.10**-**E6.11**).
- The increased speed of speed-regulated motor gives a compensation to the decrement from auxiliary pump stop.See the description of Figure below.

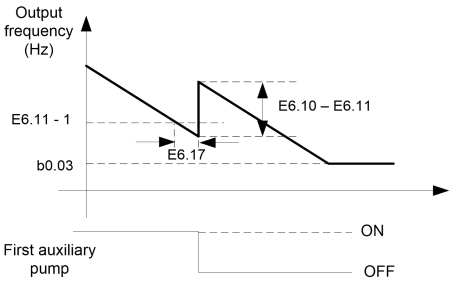


Figure 6- 46 Schematic diagram of removing pump logic

E6.12 Range: 0.00~**b0.00** Default: 48.00

Add pump frequency 2 Unit: Hz

The frequency to add the second auxiliary pump(controlled via a Y/T terminal with No.42 function “Motor 3# Control output”).

The second auxiliary pump startup conditions:

- Only one auxiliary pump is running.
- AC drive output frequency is higher than E6.12+1Hz,and the lasting time exceeds **E6.16**.

E6.13 Range: 0.00~**E6.12** Default: 25.00

Reduce pump frequency 2 Unit: Hz

The frequency to remove the second auxiliary pump(controlled via a Y/T terminal with No.42 function “Motor 3# Control output”).

The second auxiliary pump stop conditions:

- Two auxiliary pump are running.
- AC drive output frequency is lower than E6.13-1Hz,and the lasting time exceeds **E6.17**.

E6.14 Range: 0.00~**b0.00** Default: 48.00

Add pump frequency 3 Unit: Hz

The frequency to add the third auxiliary pump(controlled via a Y/T terminal with No.43 function “Motor 4# Control output”).

The third auxiliary pump startup conditions:

- Two auxiliary pump are running.
- AC drive output frequency is higher than E6.14+1Hz,and the lasting time exceeds **E6.16**.

E6.15	Range: 0.00~**E6.14**	Default: 25.00
Reduce pump frequency 3	Unit: Hz The frequency to remove the third auxiliary pump(controlled via a Y/T terminal with No.43 function “Motor 4# Control output”). The third auxiliary pump stop conditions: ➢ Three auxiliary pump are running. ➢ AC drive output frequency is lower than E6.15-1Hz,and the lasting time exceeds **E6.17**.	
E6.16	Range: 0.0~3600.0	Default: 5.0
Add pump delay time	Unit: Sec The delay time of starting auxiliary motor.	
E6.17	Range: 0.0~3600.0	Default: 3.0
Dec pump delay time	Unit: Sec The delay time of removing auxiliary motor.	
E6.18	Range: 0.00~10.00	Default: 0.20
Electromagnetic Switch delay time	Unit: Sec Define the delay time of electromagnetic switch action.	
E6.19	Range: 0.00~**b0.00**	Default: 50.00
Switchover frequency from AC Drive to grid	Unit: Hz Define the motor switchover frequency from AC drive to power grid.	

Multi-pump control mode 1:

- Pump adding logic

  The speed-regulated pump starts after running AC drive.When the speed-regulated pump operation frequency is higher than “Add pump frequency 1+1Hz”,and the lasting time exceeds “Add pump delay time”,motor 2# will be connected to power grid.Meanwhile,AC drive reduces output frequency by a step of (add pump frequency 1 - reduce pump frequency 1).

- Pump removing logic

  The speed-regulated pump operation frequency is lower than “Reduce pump frequency 1 - 1Hz”,and the lasting time exceeds “Dec pump delay time”,motor 2# will be removed from power grid.Meanwhile,AC drive increases output frequency by a step of (add pump frequency 1 - reduce pump frequency 1).

Multi-pump control mode 2:

- Pump adding logic

  The same with mode 1.

- Pump removing logic

  The same with mode 1.

- Auto change logic
  - Suppose current auxiliary pump startup sequence is 2->3->4.
  - speed-regulated motor and motor 2# are running,and the conditions is suitable for auto change..
  - Muli-pump control logic will switch auxiliary pump to the system by the sequence: 3->4->2.
  - First AC drive cuts off the connection of Motor 2#.
  - Then AC drive swith Motor 3# to the system directly.
  - And so on.

Multi-pump control mode 3:

- Pump adding logic
  - First all pumps are in stop mode.
  - When received running command,AC drive start Motor 1# after the time set by E6.18.
  - AC drive will stop by coasting mode and disconnect motor 1# if whole system can not meet the demand.Then motor 2# will be started by AC drive.After the time set by E6.18,motor 1# will be connected to power grid.
  - If the whole system still can not meet the demand,AC drive will stop by coasting mode and disconnect motor 2# .Then motor 3# will be started by AC drive.After the time set by E6.18,motor 2# will be connected to power grid.
  - And so on.
- Pump removing logic
  - Current speed-regulated motor is motor 3#.
  - Suppose two auxiliary motors are running,and the system supply is more than actual demand.
  - If AC drive output decreases to lower than “Reduce pump frequency 2 - 1”,and lasts for “Dec pump delay time”,Motor 1# will be disconnected from power grid.Then AC drive will increase output frequency by a step of (Add pump frequency 2 - Reduce pump frequency 2).
  - Moter 2# removing logic is similar with motor 1#.

Multi-pump control mode 4:

- Pump adding logic

  The same with mode 3.

- Pump removing logic

  The same with mode 3.

- Auto change logic
  - Suppose current auxiliary pump startup sequence is 1->2->3->4.
  - Motor 1# and 2# are in running,and motor 2# is speed-regulated motor.
  - AC drive will stop by coasting mode when meets the auto change conditions.
  - And motor 2# contactor will be disconnected.
  - Motor 3# is chosen as the next speed-regulated motor.
  - Motor 3# contactor will be closed by multi-pump control logic.And the motor will be directly connected to AC drive output.
  - After the time set by E6.18,AC drive will start motor 3# from zero frequency according to PID regulator.
  - Then motor 2# contactor will be closed.And motor 2# is connected to power grid.
  - Finally motor 1# contactor will be disconnected.And motor 1# stop working.
  - Multi-pump control logic will make sure the total numbers of operating motor is the same before and after auto change.

Group E7: Swing Frequency

The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

The swing frequency function indicates that the output frequency of the AC drive swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the following figure.

The swing amplitude is set in **E7.00** and **E7.01**. When **E7.01** is set to 0, the swing amplitude is 0 and the swing frequency does not take effect.

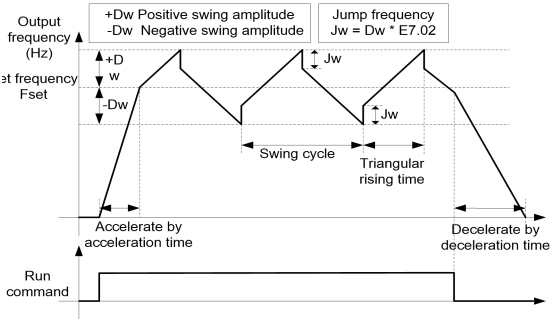


Figure 6- 47 Swing frequency control diagram

E7.00 Swing frequency setting mode

Range: 0~1 Default: 0

0: relative to setting frequency

It is variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency).

Swing amplitude frequency Dw = current set frequency * **E7.01**

1: relative to max frequency

It is fixed swing amplitude system. The swing amplitude is fixed.

Swing amplitude frequency Dw = Max frequency(**b0.00**)* **E7.01**

E7.01 Swing frequency amplitude

Range: 0.0~100.0 Default: 0.0

Unit: %

0 means the swing frequency does not take effect.Method of calculation please see the parameter description of **E7.00**.

The swing frequency is limited by the frequency upper limit **b0.02** and frequency lower limit **b0.03**.

E7.02 Skip frequency amplitude

Range: 0.0~50.0 Default: 0.0

Unit: %

The percentage of skip frequency amplitude to swing frequency amplitude.

Skip frequency Jw = Swing amplitude frequency Dw * **E7.02**.

E7.03 Swing frequency cycle

Range: 0.1~3000.0 Default: 10.0

Unit: Sec

The time of a complete swing frequency cycle.

E7.04 Triangular wave rising time coefficient

Range: 0.1~99.9 Default: 50.0

Unit: %

The time percentage of triangular wave rising time to **E7.03** (Swing frequency cycle).

Triangular wave rising time = **E7.03** (Swing frequency cycle) x **E7.04** (Triangular wave rising time coefficient)

Triangular wave falling time = **E7.03** (Swing frequency cycle) x (1 – **E7.04** Triangular wave rising time coefficient)

E7.05 Set count value

Range: **E7.06**~65535 Default: 1000

The count value needs to be collected by X terminal. Allocate the corresponding X terminal with function 42 (Counter input) in applications. If the pulse frequency is high, X6/FI must be used.

When the count value A0.25(Pulse counter) reaches E7.05(the set count value), the Y terminal allocated with function 20 (Set count value reached) becomes ON. Then the counter stops counting.

E7.06	Range: 1~**E7.05**	Default: 1000
Designated count value	When the counting value reaches E7.06 (the designated counting value), the Y terminal allocated with function 21 (Designated count value reached) becomes ON. Then the counter continues to count until the set count value is reached. E7.06 should be equal to or smaller than E7.05.	

Example:

E7.05(Set count value)= 7, E7.06(Designated count value)= 3, C0.01(X1function)= 42(Counter input), C0.02(X2 function)= 43(Counter reset), C1.01(Y1function)= 21(Designated count value reached), C1.02(Y2 function)= 20(Set count value reached).

So,Y1 will become ON when the third pulse inputs X1.Y2 will become ON when the seventh pulse inputs X1.Y1 and Y2 will return to OFF status when X2 becomes effective.

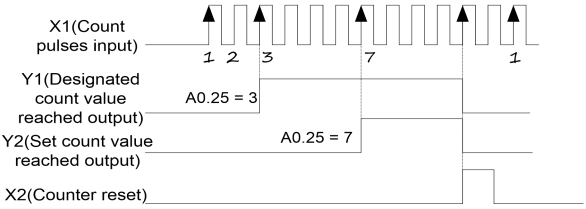


Figure 6- 48 Reaching the set count value and designated count value diagram

E7.07	Range: 0~65535	Default: 1000
Set length	Unit: m Allocate corresponding X terminal with function 44 (Length count input) in applications. If the pulse frequency is high, X6/FI must be used. The length information is collected by X terminals. **A0.26** (Actual length) is calculated by dividing the number of pulses(collected from the X terminal) by **E7.08** (Number of pulses each meter). When the actual length **A0.26** exceeds the set length in **E7.07**, the Y terminal allocated with function 22 (Length reached) becomes ON. During the fixed length control, the length reset operation can be performed via the X terminal allocated with function 45(Length reset).	
E7.08	Range: 0.1~6553.5	Default: 100.0
Number of Pulses per meter	See the parameter description of **E7.07**.	

Group E8: Droop Control

The drooping function enables speed drop as a function of load. It is used for balancing the workload allocation when multiple motors are used to drive the same load.

The output frequency of the AC drives decreases as the load increases.

You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

Please see the description of Figure below.

E8.00 Droop control

Range: 0.00~10.00 Default: 0.00

Unit: Hz

This parameter sets the droop frequency when motor is loader with its nominal torque. The drooping function is disabled when setting E8.00=0.

E8.01 Droop control filter time

Range: 0.00~60.00 Default: 0.00

Unit: Sec

Decrease the value of E8.01 when the drooping function has a slow reaction.If there is a system oscillation or overshoot,please increase the value of E8.01.

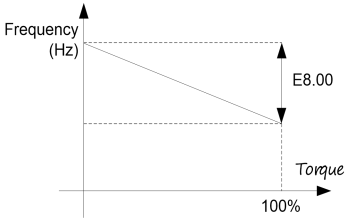


Figure 6- 49 The drooping function diagram

Group E9: Power Loss Ride Through

Upon power loss ride through or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function enables the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously.

Upon power loss ride through or sudden voltage dip, the AC drive decelerates. Once the bus voltage resumes to normal, the AC drive accelerates to the set frequency. If the bus voltage remains normal for the time exceeding the value set in E9.03, it is considered that the bus voltage resumes to normal.

E9.00 Range: 0~1 Default: 0
Action selection at power loss ride through
0: Disabled
1: Enabled

E9.01 Range: 40.0~150.0 Default: 80.0
Action judging voltage at power loss ride through
Unit: %
The AC drive begins to decelerate when the DC bus voltage is lower than E9.01.This is a relative value, and the base value is shown in the following table.

Table 6- 16 The base value of E9.01 under different input voltage level

Input voltage level	Base value	Input voltage level	Base value
Single-phase 220V	311V	Three-phase 460~480V	670V
Three-phase 220V	311V	Three-phase 600~690V	975V
Three-phase 380~440V	537V	Three-phase 1140V	1600V

E9.02 Range: 60.0~150.0 Default: 100.0
Action pause judging voltage at power loss ride through
Unit: %
See the description of Figure below.

E9.03 Range: 0.00~50.00 Default: 0.50
Voltage rally judging time at power loss ride through
Unit: Sec
See the description of Figure below.

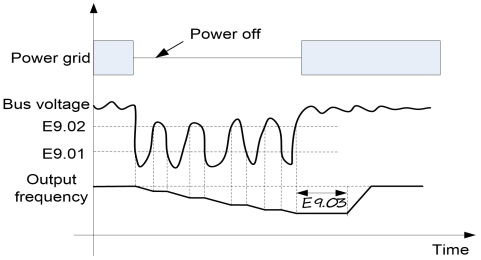


Figure 6- 50 Power loss ride through diagram(E9.00 = 1)

Group EA: External Brake

EA.00[◎] Range: 0~1 Default: 0

External brake enable

0: Inactive

1: Active

See the description of Figure below.

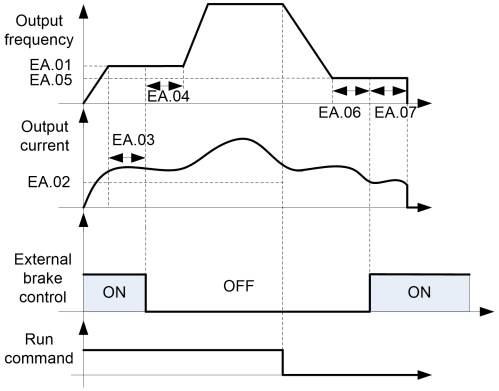


Figure 6- 51 External brake control schematic diagram

1. The AC drive begins to output when receives a start command.
2. If the output current is higher than EA.02 and the output frequency reaches EA.01,the Y terminal allocated with function No.44"External brake control" becomes OFF when the lasting time exceeds EA.03.
3. Then the AC drive keeps running at the frequency of EA.01,and begins to accelerate to set frequency when the lasting time reaches the value set by EA.04.
4. When there is a stop command,the AC drive decelerates to run at the frequency of EA.05.
5. The Y terminal allocated with function No.44"External brake control" becomes ON after the time set by EA.06.
6. The AC drive goes to stop mode after the delay time set by EA.07.

EA.01[◎] Range: 0.00~10.00 Default: 2.50

External brake off frequency limit

Unit: Hz

The Y terminal allocated with function No.44"External brake control" becomes OFF when the AC drive output frequency reaches EA.01.

Please set this parameter according to the motor rated slip frequency.

EA.02① **External brake off current limit**

Range: 0.0~180.0 Default: 110.0

Unit: %

The output current needs to be higher than EA.02 when the AC drive begins to accelerate from the frequency of EA.01.

Base value is motor rated current.

EA.03① **External brake off delay time**

Range: 0.00~10.00 Default: 0.50

Unit: Sec

If the output current is higher than EA.02 and the output frequency reaches EA.01,the Y terminal allocated with function No.44 "External brake control" becomes OFF when the lasting time exceeds EA.03.

EA.04① **Acceleration pause time for external brake off**

Range: 0.00~10.00 Default: 1.00

Unit: Sec

The AC drive stops accelerating for the time set by EA.04 when the Y terminal allocated with function No.44"External brake control" becomes OFF.Then it begins to accelerate.

Please set this parameter to suitable value according to the release time of mechanical brake.

EA.05① **External brake on frequency limit**

Range: 0.00~10.00 Default: 2.00

Unit: Hz

When received a stop command,the AC drive decelerates to run at the frequency of EA.05,and then the Y terminal allocated with function No.44 "External brake control" becomes OFF after the time set by EA.06.

EA.06① **External brake on waiting time**

Range: 0.00~10.00 Default: 0.00

Unit: Sec

See the parameter description of EA.05.

EA.07① **Stop delay time after external brake on**

Range: 0.00~10.00 Default: 1.00

Unit: Sec

The AC drive goes to stop mode after the delay time set by EA.07 when the Y terminal allocated with function No.44"External brake control" becomes ON.This action is used to make sure that the mechanical brake completely pulls.

Group Eb: Supervision

Eb.00① **Timing function**

Range: 0~1 Default: 0

0: Inactive 1: Active

If the timing function is active,the AC drive begins to time after received a start commend.And the Y terminal allocated with function NO.32 "Timing reached" becomes ON when the timing duration reaches the value set by Eb.02.

Timing duration source is decided by Eb.01.

The rest of timing duration can be watched by A0.28.

Eb.01① **Timing duration source**

Range: 0~3 Default: 0

0: **Eb.02** 1: AI1 2: AI2 3: AI3

The base value is Eb.02 when choose analog input as timing duration source.

Eb.02① **Timing duration**

Range: 0.0~6500.0 Default: 0.0

Unit: Min

This is timing duration when **Eb.01** is set to 0.

100% analog input equals to Eb.02 when Eb.01 is set to 1~3.

Eb.03① **Current running time reached**

Range: 0.0~6500.0 Default: 0.0

Unit: Min

The Y terminal allocated with function No.25 "Current running time reached" becomes ON when the AC drive current running time reaches the value set by Eb.03.

Eb.04 Accumulative power-on time(day) threshold

Range: 0~9999 Default: 0

Unit: Day

This parameter is with the use of Eb.05.

The AC drive accumulative power-on time is made up of Eb.04 and Eb.05.

1) Suppose that **Eb.04** = 128 and **Eb.05** = 12.30,then the total accumulative power-on time is 128 days 12 hours and 18 minutes.

2) The accumulative power-on time reached function is disabled when simultaneously setting Eb.04 and Eb.05 to 0.

The Y terminal allocated with function NO.23 "Accumulative power-on time reached" becomes ON when accumulative power-on time(**A0.54**+**A0.55**) reaches the set value(**Eb.04**+**Eb.05**).And the AC drive will act as the hundred's digit setting of F0.21.

Eb.05 Accumulative power-on time(hour) threshold

Range: 0.00~23.99 Default: 0.00

Unit: h

See the parameter description of Eb.04.

Eb.06 Accumulative running time(day) threshold

Range: 0~9999 Default: 0

Unit: Day

This parameter is with the use of Eb.07.

The AC drive accumulative running time is made up of Eb.06 and Eb.07.

3) Suppose that **Eb.06** = 25 and **Eb.07** = 10.55,then the total accumulative running time is 25 days 10 hours and 33 minutes.

4) The accumulative running time reached function is disabled when simultaneously setting Eb.06 and Eb.07 to 0.

The Y terminal allocated with function NO.24 ”Accumulative running time reached” becomes ON when accumulative running time(**A0.56**+**A0.57**) reaches the set value(**Eb.06**+**Eb.07**).And the AC drive will act as the thousand’s digit setting of F0.21.

Eb.07 Accumulative running time(hour) threshold

Range: 0.00~23.99 Default: 0.00

Unit: h

See the parameter description of **Eb.06**.

Eb.08 Detection range Of frequency reached

Range: 0.0~100.0 Default: 0.2

Unit: %

If the AC drive running frequency is within the certain range of the set frequency, the Y terminal allocated with function No.7 “Frequency reached” becomes ON.

This parameter is used to set the range within which the output frequency is detected to reach the set frequency. The value of this parameter is a percentage relative to **b0.00**(Max frequency). The detection range of frequency reached is shown in the following figure.

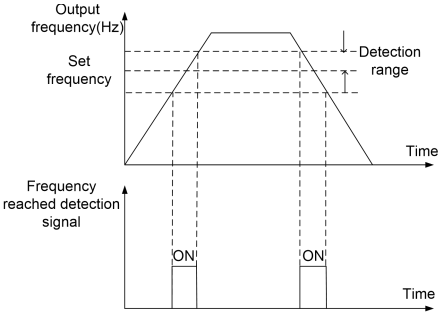


Figure 6- 52 Detection diagram of frequency reached

Eb.09 Any frequency reaching detection value 1

Range: 0.00~**b0.00** Default: 50.00

Unit: Hz

If the output frequency of the AC drive is within the positive and negative amplitudes of Eb.09, the Y terminal allocated with function No.26 “Frequency 1 reached” becomes ON.See the description of Figure below.

Eb.10 Any frequency reaching detection amplitude 1

Range: 0.0~100.0 Default: 0.0

Unit: %

The base value is **b0.00**(Max frequency).
See the description of Figure below.

Eb.11 Any frequency reaching detection value 2

Range: 0.00~**b0.00** Default: 50.00

Unit: Hz

If the output frequency of the AC drive is within the positive and negative amplitudes of Eb.11, the Y terminal allocated with function No.27 “Frequency 2 reached” becomes ON.See the description of Figure below.

Eb.12 Any frequency reaching detection amplitude 2

Range: 0.0~100.0 Default: 0.0

Unit: %

The base value is **b0.00**(Max frequency).
See the description of Figure below.

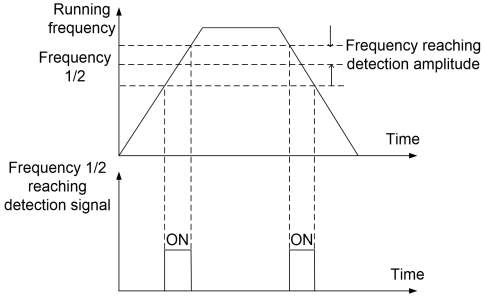


Figure 6- 53 Any frequency 1/2 reaching detection function diagram

Eb.13 Frequency detection threshold 1 (FDT1)

Range: 0.00~**b0.00** Default: 50.00

Unit: Hz

If the running frequency is higher than the value of Eb.13,the Y terminal allocated with function No.10 “FDT1 detection output” becomes ON. If the running frequency is lower than value of **Eb.13***(1-**Eb.14**), the Y terminal goes OFF.See the description of Figure below.

Eb.14 Frequency detection Hysteresis 1 (FDT hysteresis1)

Range: 0.0~100.0 Default: 5.0

Unit: %

This is a percentage of the hysteresis frequency to **Eb.13**.
See the parameter description of **Eb.13**.

Eb.15 Frequency detection threshold 2 (FDT2)

Range: 0.00~**b0.00** Default: 50.00

Unit: Hz

If the running frequency is higher than the value of Eb.15,the Y terminal allocated with function No.11 “FDT2 detection output” becomes ON. If the running frequency is lower than value of **Eb.15***(1-**Eb.16**), the Y terminal goes OFF.See the description of Figure below.

Eb.16 Frequency detection hysteresis2 (FDT hysteresis2)

Range: 0.0~100.0 Default: 5.0

Unit: %

This is a percentage of the hysteresis frequency to **Eb.15**.
See the parameter description of **Eb.15**.

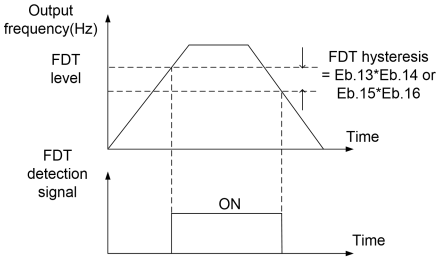


Figure 6- 54 FDT detection function diagram

Eb.17 Zero current detection level

Range: 0.0~300.0 Default: 5.0

Unit: %

This is a relative value to motor rated current.
If the output current of the AC drive is equal to or less than **Eb.17***b0.08(motor rated current) and the duration exceeds **Eb.18** ,the Y terminal allocated with function No.19 “Zero current status” becomes ON. The zero current detection is shown in the following figure.

Eb.18 Zero current detection delay time

Range: 0.01~600.00 Default: 0.10

Unit: Sec

Please see the description of the following figure.

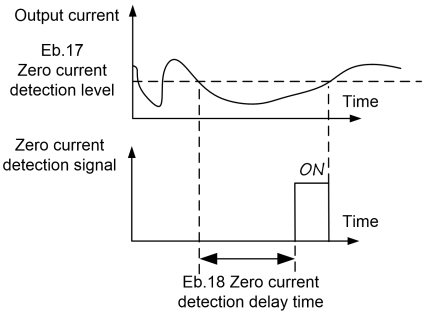


Figure 6- 55 Zero current detection diagram

Eb.19 Output over current threshold

Range: 0.0~300.0 Default: 200.0

Unit: %

This is a relative value to **b0.08**(motor rated current).

If the output current of the AC drive is equal to or higher than **Eb.19*b0.08** and the duration exceeds **Eb.20**,the Y terminal allocated with function No.34 “Current limit exceeded” becomes ON. The output over current detection function is shown in the following figure.

Eb.20 Output over current detection delay time

Range: 0.00~600.00 Default: 0.00

Unit: Sec

Please see the description of the following figure.

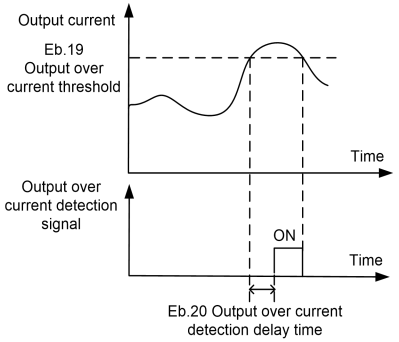


Figure 6- 56 Output over current detection diagram

Eb.21 Any current reaching 1

Range: 0.0~300.0 Default: 100.0

Unit: %

This is a relative value to **b0.08**(motor rated current).

If the output current of the AC drive is within the positive and negative amplitudes of **Eb.21*b0.08**, the Y terminal allocated with function No.28 “Current 1 reached” becomes ON.

The any current detection function is shown in the following figure.

Eb.22 Range: 0.0~300.0 Default: 0.0
Any current reaching 1 amplitude
Unit: %
This is a relative value to **b0.08**(motor rated current).
Please see the description of the following figure.

Eb.23 Range: 0.0~300.0 Default: 100.0
Any current reaching 2
Unit: %
This is a relative value to **b0.08**(motor rated current).
If the output current of the AC drive is within the positive and negative amplitudes of **Eb.23*b0.08**, the Y terminal allocated with function No.29 "Current 2 reached" becomes ON.
The any current detection function is shown in the following figure.

Eb.24 Range: 0.0~300.0 Default: 0.0
Any current reaching 2 amplitude
Unit: %
This is a relative value to **b0.08**(motor rated current).
Please see the description of the following figure.

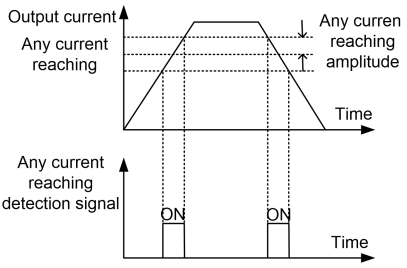


Figure 6- 57 Any current reaching detection diagram

Eb.25 Range: 0.00~**Eb.26** Default: 3.70
AI1 input voltage lower limit
Unit: V
Eb.25 and **Eb.26** are used to set the limits of the AI1 input voltage to provide protection on the AC drive. When the AI1 input is smaller than the value of **Eb.25** or larger than the value of **Eb.26**,the Y terminal allocated with function No.31 "AI1 input limit exceeded" becomes ON.

Eb.26 Range: **Eb.25**~10.00 Default: 7.20
AI1 input voltage upper limit
Unit: V
Please see the parameter description of **Eb.25**.

Note: 1mA equals to 0.5V when AI1 input signal is current type.

Eb.27 Range: - 40.0~125.0 Default: 80.0
Module temperature threshold
Unit: ℃
When the AC drive module heatsink temperature of the AC drive reaches the value of this parameter,the Y terminal allocated with function No.17 "AC drive module temperature reached" becomes ON.

Eb.28 Range: 0.00~**b0.00** Default: 2.00
Simple brake frequency Unit: Hz
In the process of stopping,Y/T terminal assigned with function '45: Simple brake control' will be ON for the time **Eb.29** set when the AC drive output frequency is lower than **Eb.28**.

Eb.29 Range: 0.0~3000.0 Default: 0.0
Simple brake time Unit: Sec
Set **Eb.29** to a nonzero value will enable simple brake function.

Group F0: Protection

F0.00 Range: Model dependent Default: Model dependent
Under voltage threshold It is used to set the undervoltage threshold for the drive. The default value and range of different classes are list in the following table.

Table 6- 17 Undervoltage threshold in different voltage class

Voltage Class(V)	Default(V)	Range(V)	Voltage Class(V)	Default(V)	Range(V)
Single-phase 220	200	180 - 280	Three-phase 460~480	450	350 - 600
Three-phase 220	200	180 - 280	Three-phase 600~690	650	500 - 800
Three-phase 380~440	350	280 - 550	Three-phase 1140	1350	1100 - 1500

F0.01[①] Range: Model dependent Default: Model dependent
Over voltage threshold It is used to set the overvoltage threshold for the drive. The default value and range of different classes are list in the following table.

Table 6- 18 Overvoltage threshold in different voltage class

Voltage Class(V)	Default(V)	Range(V)	Voltage Class(V)	Default(V)	Range(V)
Single-phase 220	380	360 - 410	Three-phase 460~480	880	660 - 900
Three-phase 220	380	360 - 410	Three-phase 600~690	1200	1100 - 1300
Three-phase 380~440	780	630 - 800	Three-phase 1140	2400	2300 - 2500

F0.02 Range: 0~1 Default: 1
Input phase loss protection 0: Disable If input phase loss then drive will not perform protecting action.
1: Enable If input phase loss then drive will perform protecting action according to F0.19(Unit's digit).
Note: This protection is valid only in the AC drives which power are larger

or equal than 11KW(G type).

F0.03 Output phase loss protection

Range: 0~1 Default: 1

0: Disable If out phase loss then drive will not perform protecting action.

1: Enable If input phase loss then drive will perform protecting action according to F0.19(Ten's digit).

F0.04 Short-circuit to ground upon power-on

Range: 0~1 Default: 0

0: Disable 1: Enable

It is used to determine whether to check the motor is short-circuited to ground at power-on of the drive. If this function is enabled, the drive's UVW will output voltage for a while after power-on for check motor insulation.

F0.05 AC drive over load protection gain

Range: 0.30~3.00 Default: 1.00

When the carrier frequency or the ambient temperature is low, the drive overload capacity will enhance, increasing this parameter properly can improve the drive overload ability.

F0.06 Motor overload protection

Range: 0~1 Default: 1

0: Disable 1: Enable

If the motor overload protection function is enabled, protecting action will be performed when motor current and duration exceed the threshold. The characteristic curve of the motor overload protection is shown in figure below. Protecting action is depended on the setting of F0.19(Thousand's digit).

F0.07 Motor overload protection gain

Range: 0.20~10.00 Default: 1.00

It is defined the motor overload protection gain, the detail as shown in figure below.

The user can adjust the motor overload current and time by set the parameter of **F0.07**, 100% corresponds to motor current.

For example:

If F0.07 = 1.00 and the overload gain is 120%, then:

T_120 = （120% - 115%）*（80 - 40）/（125% - 115%） + 40 = 60(Minutes)

Assume that overload gain is 120% and 30 minutes motor overload time is expected, then:

the overload time of 30 minutes is firmed between 123% to 135% When F0.07 = 1.00 as the figure below,so the allowed overload gain is:

129% =（30 - 15）*（135% - 125%）/（15 - 40）+135%

Then the motor overload protection gain of F0.07 = 120%/129% = 0.93

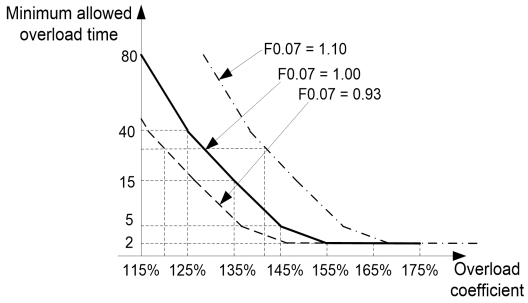


Figure 6- 58 the inverse time-lag curve

F0.08 Range: 50~100 Default: 80

Motor overload warning coefficient

Unit: %

This function is used to generate a warning signal to the control system via DO before motor overload protection. The larger the value is, the less advanced the pre-warning will be.

To generate this warning signal, a DO terminal can be configured as function 15 (motor overload pre-warning).

F0.09 Range: 0~1 Default: 0

Under load protection

0: Disable 1: Enable

If the under load protection function is enabled, when the motor current is less than the detection level (**F0.10*b0.08**) and the lasting time exceeds the detection time (**F0.11**), protecting action will perform corresponding to the setting of F0.20(unit's digit).

F0.10 Range: 0.0~100.0 Default: 40.0

Detection level of Under load

Unit: %

It defines the detection level of under load.

F0.11 Range: 0.0~60.0 Default: 1.0

Detection time of Under load

Unit: Sec

It defines the detection time of under load.

F0.12 Range: 0~2 Default: 0

Motor temperature Sensor type

It is used to select the type of motor temperature sensor.

0: No temperature sensor 1: PT100 2: PT1000

The signal of the motor temperature sensor needs to be connected to the optional PT100/PT1000 extension card.

F0.13 Range: 0.0~200.0 Default: 120.0

Motor overheat

Unit: ℃

protection threshold	If the motor temperature(**A0.59**) exceeds the value of motor overheat protection threshold, the AC drive reports an alarm and performs protecting action according to F0.20(Ten's digit).
F0.14 Motor overheat warning threshold	Range: 0.0~200.0 Default: 100.0 Unit: ℃ If the motor temperature exceeds the value of motor overheat warning threshold, the DO terminal allocated with function 18 (Motor overheat warning) will output ON signal.
F0.15 Over-speed detection value	Range: 0.0~50.0 Default: 20.0 Unit: % This function is valid only when the AC drive runs in the VC mode.
F0.16 Over-speed detection time	Range: 0.0~60.0 Default: 5.0 Unit: Sec If the over-speed detection time is 0.0s, the over-speed detection function is disabled.
F0.17 Detection value of too large speed deviation	Range: 0.0~50.0 Default: 20.0 Unit: % This function is valid only when the AC drive runs in the VC mode.
F0.18 Detection time of too large speed deviation	Range: 0.0~60.0 Default: 1.0 Unit: Sec If Detection time of too large speed deviation is 0.0s, this function is disabled.
F0.19 Fault protection action selection 1	Range: 0000~2222 Default: 0000 **Unit's digit: Power input phase loss** 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run **Ten's digit: Power output phase loss** Same as unit's digit **Hundred's digit: Drive overload** Same as unit's digit **Thousand's digit: Motor overload** Same as unit's digit
F0.20 Fault protection action selection 2	Range: 0000~2222 Default: 0000 **Unit's digit: Under load** 0: Coast to stop

1: Stop according to the stop mode
2: Continue to run at 8% of rated motor frequency and resume to the set frequency if the load recovers

Ten's digit: Motor overheat
Same as unit's digit in **F0.19**
Hundred's digit: External Fault
Same as unit's digit in **F0.19**
Thousand's digit: RS485 communication fault
Same as unit's digit in **F0.19**

F0.21 Fault protection action selection 3

Range: 0000~2222 Default: 0000

Unit's digit: Optional card communication fault
Same as unit's digit in **F0.19**
Ten's digit: PID feedback over range
Same as unit's digit in **F0.19**
Hundred's digit: Accumulative power-on time reached
Same as unit's digit in **F0.19**
Thousand's digit: Accumulative running time reached
Same as unit's digit in **F0.19**

F0.22 Fault protection action selection 4

Range: 0000~2222 Default: 0000

Unit's digit: Too large speed deviation
Same as unit's digit in **F0.19**
Ten's digit: Motor over speed
Same as unit's digit in **F0.19**
Hundred's digit: Flux pole detection fault
Same as unit's digit in **F0.19**
Thousand's digit: UVW signal feedback fault
Same as unit's digit in **F0.19**

F0.23 Fault protection action selection 5

Range: 0000~2222 Default: 0000

Unit's digit: Encoder fault
0: Coast to stop
1: Switch over to V/F control, stop according to the stop mode
2: Switch over to V/F control, continue running

Ten's digit: User-defined fault 1
Same as unit's digit in **F0.19**
Hundred's digit: User-defined fault 2
Same as unit's digit in **F0.19**
Thousand's digit: Interlock warning during multi-pump operation mode
Same as unit's digit in **F0.19**

F0.24
Frequency selection for continuing to run upon fault

Range: 0~4 Default: 0

If a fault occurs during the running of the AC drive and the handling of fault is set to "Continue to run", the AC drive displays “AL”+fault code and continues to run with the frequency set in **F0.24**.

0: Current running frequency
1: Setting frequency
2: Frequency upper limit
3: Frequency lower limit
4: Backup frequency upon abnormality(F0.25)

F0.25
Backup frequency upon abnormality

Range: 0.0~100.0 Default: 100.0

Unit: %

The setting of **F0.25** is a percentage relative to the maximum frequency (**b0.00**).

F0.26
Fire mode enable

Range: 0~1 Default: 0

0: Disable 1: Enable

If the fire mode is enabled, the X terminal set the function 58 and the X terminal is valid, then drive enter fire mode control. If the frequency source is PID then system increases a value of **F0.28** to PID setting, otherwise drive run with the frequency of **F0.27**.

If drive is in fire mode control, system displays fire mode alarm code and any other fault or alarm code will not be displayed. If the fault source is from hardware(for example: overvoltage, overcurrent and so on) then drive will be stop, once these hardware faults disappeared drive will resume to fire mode control and run with the frequency of **F0.27**.

In fire mode the start and stop command is valid.

If drive receive a fire mode signal in stop status then drive will not run automatically..

F0.27
Fire mode frequency

Range: 0.00~**b0.00** Default: 50.00

Unit: Hz

It is used to set the aim frequency when drive is in fire mode control. More details please see the description of parameter **F0.26**.

F0.28
Fire mode PID setting increase

Range: 0.0~200.0 Default: 10.0

Unit: %

It is used to set the PID setting increase when drive is in fire mode control. More details please see the description of parameter **F0.26**.

Group F1: Auto Reset

AC drive will auto reset after passing the time of **F1.01** when the fault happened.

If set F1.00 to 0 then the auto reset function invalid.

After the times of auto reset exceeds to **F1.00**, the AC drive will remain in the fault state. The user can press STOP/RST key or X terminal(function 23) to reset the fault and clear the accumulative time of auto reset.

F1.00
Fault auto reset times

Range: 0~30 Default: 0

This defines the maximum times for auto reset. After trying this setting times and the drive still fail to run, the AC drive will remain in the fault state.

F1.01
Time interval of fault auto reset

Range: 0.1~100.0 Default: 1.0

Unit: Sec

It is used to set the waiting time from the alarm of the AC drive to fault auto reset.

F1.02
DO action during fault auto reset

Range: 00~11 Default: 00

The unit's digit of **F1.02** is used to decide whether the DO acts(function 13) during the fault auto reset if the fault auto reset function is selected.

The ten's digit of **F1.02** is used to decide whether auto restart after the fault is reset.

Unit's digit: Fault indication terminals

0: No action during fault reset process

1: Action during fault reset

Ten's digit: Restart after automatic fault reset

0: Not auto restart

1: having auto restart

Group H0: System Parameters

H0.00
User password

Range: 0000~9999 Default: 0000

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters.

You can set the user password successfully when you set the same value(none zero) two times to **H0.00**. If the user password has been set successfully then the LED will display “P.Set”.

If you want to clear the user password then set zero the **H0.00** two times. If you clear the user password successfully then the LED will display “P.CLr”.

H0.01
LED display running parameters 1

Range: 0~65535 Default: 31

In the stop or running state, you can press shift key on the keypad to display monitor parameters. Whether parameters are displayed is determined by the binary bits of values converted from the values of **H0.01~H0.03** in the decimal format.

Bit0: running freq(1) Bit1: setting freq(2) Bit2: Dc-link voltage(4)
Bit3: output current(8) Bit4: output voltage(16) Bit5: output torque(32)
Bit6: output power(64) Bit7: AI1 voltage(128) Bit8: AI2 voltage(256)
Bit9: AI3 voltage(512) Bit10: X terminal status(1024)
Bit11: Y terminal status(2048) Bit12: PLC stage(4096) Bit13: PID setting(8192)
Bit14: PID feedback(16384) Bit15: count value(32768)

H0.02
LED display running parameters 2

Range: 0~2047 Default: 0

Bit0: FI input freq(1)
Bit1: Linear speed(2)
Bit2: Load speed(4)
Bit3: Length value(8)
Bit4: Remaining running time(16)
Bit5: Main frequency A display(32)
Bit6: Auxiliary frequency B display(64)
Bit7: FO output freq(128)
Bit8: Feedback freq(256)
Bit9: motor speed (512)
Bit10: Multi-Pump Control status words(1024)

H0.03
LED display stop parameters

Range: 0~65535 Default: 3

Bit0: setting freq(1) Bit1: Dc-link voltage(2) Bit2: X terminal status(4)
Bit3: Y terminal status(8) Bit4: AI1 voltage(16) Bit5: AI2 voltage(32)
Bit6: AI3 voltage(64) Bit7: FI input freq(128) Bit8: PID feedback(256)
Bit9: PID feedback(512) Bit10: PLC stage(1024) Bit11: pulse count(2048)
Bit12: Length value(4096) Bit13～Bit15: reverse

For example:

- Determine the parameters to be displayed as below:

H0.01(LED display running parameters 1)	H0.02(LED display running parameters 2)
Bit0: running freq(Hz) (1)	Bit0: FI input freq(kHz) (1)
Bit2: Dc-link voltage(V) (4)	Bit2: load speed (4)
Bit3: output current(A) (8)	
Bit4: output voltage(V) (16)	
Bit6: output power(kW) (64)	

- Set the binary data:
  - H0.01 : 0000 0000 0101 1101B
  - H0.02 : 0000 0000 0000 0101B
- Convert the binary data to decimal data:
  - H0.01 should be set to 93 (1+4+8+16+64 = 93)
  - H0.02 should be set to 5 (1+4 = 5)

H0.04④ **Parameter initial option**

Range: 0~4 Default: 0

0: No Operation

1: Restore to factory default value, not include motor parameters

2: Restore to factory default value, include motor parameters

3: Parameter upload to keypad

4: Parameter download from keypad

H0.05 Menu display selection

Range: 0~2 Default: 0

0: Display all parameter.

1: Display user-defined parameters.More details please see the **P0** group description.

2: Display non factory setting parameters.

H0.06 Function code lock

Range: 0~1 Default: 0

0: Disabled All writable parameters can be modified.

1: Enabled Only the parameter of **H0.06** can be modified.

H0.07 Accumulative power on time lock password

Range: 0000~9999 Default: 0000

You can set the locking password successfully when you set the same value(none zero) two times to **H0.07**. If the locking password has been set successfully then the LED will display “P.Set”.

If you want to clear the locking password then set zero the **H0.07** two times. If you clear the lock password successfully then the LED will display “P.CLr”.

If system has been set the locking password, You must input locking password when you want to modify the parameter of **Eb.04** or **Eb.05**.

If system set the lock password and the Accumulative power on time has reached then drive will display system fault(Er51), at this time, you should contact with distributor or technical service.

H0.08
Load speed display coefficient

Range: 0.001~9.999 Default: 0.300

This parameter is used to adjust the relationship between the running frequency or setting frequency of the AC drive and the load speed.

- When drive is running, **A0.30** = **A0.00*H0.08**
- When drive is running, **A0.30** = **A0.01*H0.08**
- The fraction points of **A0.30** is decided by **H0.09**.

For example: set A0.00=40.1Hz, H0.08=0.300, 40.1*0.3*10=120 then

- ✧ If H0.09 = 0 then A0.30 = 120
- ✧ If H0.09 = 1 then A0.30 = 12.0
- ✧ If H0.09 = 2 then A0.30 = 1.20
- ✧ If H0.09 = 3 then A0.30 = 0.120

H0.09
Load speed display decimal digits

Range: 0~3 Default: 1

0: 0 decimal place 1: 1 decimal place
2: 2 decimal places 3: 3 decimal places

H0.10[①]
G/L setting

Range: 0~1 Default: 0

0: G type

AC Drive allows 1min/10min overload running at 150% rated current of the heavy load mode.

1: L type

Drive allows 1min/10min overload running at 110% rated current of the light load mode.

If set the parameter of **H0.10** to 1, the motor parameters will be changed to match the L type motor.

Set parameter **H0.04** to 2, the parameter of **H0.10** will be restored to default value.

H0.11[①]
Fan control

Range: 0~2 Default: 0

0: Automatic run

The fan will run continuously when the AC drive is running.

When the AC drive is in stop state,the fan will run if heatsink's temperature higher than 45 ℃, and stop if lower than 40 ℃.

1: Run after power on

2: Temperature

When power on, the fan will just run for one minute,and then change to run according to the heatsink temperature——run if heatsink's temperature higher than 45 ℃, and stop if lower than 40 ℃.

H0.12 **Dead zone compensation mode selection**	Range: 0~3 0: No compensation 1: Rectangle compensation 2: Trapezoid compensation 3: Trapezoid at Low frequency and rectangle at high frequency	Default: 2
H0.13Ⓓ **Dead zone compensation size**	Range: 1~2048 It is used to increase or decrease the dead zone compensation based on the default dead compensation value.	Default: 1024
H0.14Ⓓ **Angle size when current across zero**	Range: 1~3640 It is used to set the angle size when current across zero, the 3640 equivalent to 20 degrees.	Default: Model dependent
H0.15Ⓓ **Dead zone compensation filter cut off frequency 1**	Range: 0.10~300.00 Unit: Hz To improve the precision of the output voltage, current sample harmonic needs to be filtered. The parameter is used to set the filter frequency when drive in different output frequency.	Default: 50.00
H0.16Ⓓ **Dead zone compensation filter cut off frequency 2**	Range: 0.10~300.00 Unit: Hz Please see the following figure.	Default: 200.00
H0.17Ⓓ **Dead zone compensation switchover frequency 1**	Range: 0.10~**H0.18** Unit: Hz Please see the following figure.	Default: 5.00
H0.18Ⓓ **Dead zone compensation switchover frequency 2**	Range: **H0.17~b0.00** Unit: Hz Please see the following figure.	Default: 50.00

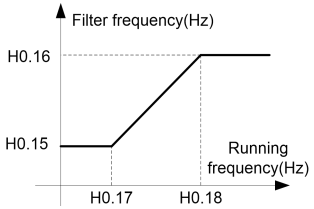


Figure 6- 59 the relations between running frequency and filter frequency

H0.19①	Range: 0~11	Default: 0
Optional card selection	Control board have a slot for optional card, when you to inset different board in the slot, you need to set proper value to **H0.19**. 0: no optional card 1: IO1(Y3,T3~T6 of normally open) 2: IO2(AI3,Y3, X7~X10) 3: IO3(X7~X10,T3~T4 of normally open) 4: IO4(PT100, PT1000) 5: PG1(ABZ differential type,optional 5V/12V) 6: PG2(ABZ OC & Push-pull type,optional 5V/12V/24V) 7: COM1(RS485+Modbus RTU,AI3,Y3,X7~X8) 8: COM2(Profibus) 9: COM3(CANopen) 10: COM4(GPRS) 11: COM5(Modbus TCP)	
H0.20	Range: 000~999	Default: Model dependent
Product series	AC drive product series, the parameter is read only.	
H0.21	Range: 0.00~99.99	Default: Factory setting
Function firmware version	Function software version of control board, the parameter is read only.	
H0.22	Range: 0.00~99.99	Default: Factory setting
Algorithm firmware version	Algorithm software version of control board, the parameter is read only.	
H0.23	Range: 0.00~99.99	Default: Factory setting
keypad firmware version	Software version of keypad, the parameter is read only.	
H0.24	Range: 0~65535	Default: Factory setting
Product series number higher bits	Read only.	

H0.25 Product series number lower bits	Range: 0~65535 Read only.	Default: Factory setting
H0.26 OTP version	Range: 0.00~99.99 Read only.	Default: Factory setting

Group H1: AI/AO Calibration

These parameters of **H1.00~H1.11** are used to calibrate analog inputs, they have been calibrated upon delivery. Generally, you need not perform calibration in the common applications.

The actual voltage indicates the actual input voltage value measured by instruments such as the multi-meter.

The display voltage is the drive calculated value which can be monitored from **A0.11~A0.13**.

During calibration, send two voltage values to each AI terminal, and save the measured values and displayed values to the function codes **H1.00~H1.11**, then the AC drive will automatically perform AI zero offset and gain calibration.

- **H1.00~H1.03** are used to calibrate AI1.
- **H1.04~H1.07** are used to calibrate AI2.
- **H1.08~H1.11** are used to calibrate AI3.
- When drive restore factory default value, **H1.00~H1.11** will be resumed to factory calibrated value.

H1.00 AI1 actual voltage 1	Range: 0.500~4.000 Unit: V It is used to input the AI1 measured voltage.	Default: Factory setting
H1.01 AI1 display voltage 1	Range: 0.500~4.000 Unit: V It is used to input the AI1 display voltage(**A0.11**).	Default: Factory setting
H1.02 AI1 actual voltage 2	Range: 6.000~9.999 Unit: V It is used to input the AI2 measured voltage.	Default: Factory setting
H1.03 AI1 display voltage 2	Range: 6.000~9.999 Unit: V It is used to input the AI1 display voltage(**A0.12**).	Default: Factory setting

The parameters used to calibrate AI2 and AI3 as below:

Function Code	Name	Function Code	Name
H1.04	**AI2 actual voltage 1**	**H1.08**	**AI3 actual voltage 1**

H1.05	**AI2 display voltage 1**	**H1.09**	**AI3 display voltage 1**
H1.06	**AI2 actual voltage 2**	**H1.10**	**AI3 actual voltage 2**
H1.07	**AI2 display voltage 2**	**H1.11**	**AI3 display voltage 2**

These parameters of **H1.12~H1.19** are used to calibrate analog outputs, they have been calibrated upon delivery. Generally, you need not perform correction in the common applications.

The actual voltage indicates the actual output voltage value measured by instruments such as the multi-meter.

The display voltage is the drive calculated value, please see these parameters of **A0.14~A0.15**.

During calibration, input two voltage values to each AO terminal, and save the measured values and displayed values to the function codes **H1.12~H1.19**, then the AC drive will calibrate AI zero offset and gain automatically.

- **H1.12~H1.15** are used to calibrate AO1.
- **H1.16~H1.19** are used to calibrate AO2.
- When drive restore factory default value, **H1.12~H1.19** will be resumed to factory calibrated value.

H1.12 Range: 0.500~4.000 Default: Factory setting
AO1 display voltage 1
Unit: V
It is used to input the AO1 display voltage(**A0.14**).

H1.13 Range: 0.500~4.000 Default: Factory setting
AO1 actual voltage 1
Unit: V
It is used to input the AO1 measured voltage.

H1.14 Range: 6.000~9.999 Default: Factory setting
AO1 display voltage 2
Unit: V
It is used to input the AO1 display voltage(**A0.15**).

H1.15 Range: 6.000~9.999 Default: Factory setting
AO1 actual voltage 2
Unit: V
It is used to input the AO2 measured voltage.

The parameters used to calibrate AO2 as below:

Function Code	Name
H1.16	**AO 2display voltage 1**
H1.17	**AO2 actual voltage 1**
H1.18	**AO2 display voltage 2**
H1.19	**AO2 actual voltage 2**

Group L0: Communication Setting

L0.00 Range: 0~4 Default: 1

Baud rate

Set the baud rate for RS485 communication.

0: 4800 bits/s

1: 9600 bits/s

2: 19200 bits/s

3: 38400 bits/s

4: 57600 bits/s

L0.01 Range: 0~3 Default: 1

Data format

Set the data format for RS485 communication.

0: 8 data bit, no check, 1 stop bit<8,N,1>

1: 8 data bit, no check, 2 stop bit <8,N,2>

2: 8 data bit, even parity check, 1 stop bit<8,E,1>

3: 8 data bit, odd parity check, 1 stop bit <8,O,1>

L0.02 Range: 1~247 Default: 1

Slave address

Set the drive communication address.

The slave address of zero is broadcast address, the address of 1~247 are usable.

L0.03 Range: 0~20 Default: 2

Response delay

Unit: mSec

The interval from receiving data to replying data to the master.

L0.04 Range: 0.0~60.0 Default: 0.0

Communication timeout detection

Unit: Sec

Set **L0.04** to zero, the communication timeout function is invalid.

Set **L0.04** to non-zero, if the interval time between twice communication exceed **L0.04**, the AC drive will display “Er31”(RS485 communication fault)

Group L1: Point-point Communication

L1.00[Φ] **Master and slave selection**	Range: 0~1 0: Master Drive send data to other external device as master. 1: Slave Drive receive data from other external device as slave. The received data is valid only when the conditions listed below are satisfied. 1)Command source is communication 3) **L1.02** = 1 2) Reference source is communication 4) Receive broadcast frame	Default: 1
L1.01[Φ] **Send data selection of master**	Range: 0~3 It is used to set send date type of master in P2P operation. 0: Torque reference, 100% corresponds to motor rated torque(**b0.00**). 1: Running frequency, 100% corresponds to max frequency(**b0.00**). 2: Setting frequency, 100% corresponds to max frequency(**b0.00**). 3: Feedback frequency, 100% corresponds to max frequency(**b0.00**).	Default: 0
L1.02[Φ] **Point-point communication enable**	Range: 0~1 0: Disable 1: Enable	Default: 0
L1.03[Φ] **Usage of data received by slave**	Range: 00~11 **Unit's digit: Data usage of slave** 0: As torque reference 1: As frequency reference **Ten's digit: Whether to follow the master commands** 0: No 1: Yes	Default: 00
L1.04 Gain of received data	Range: -9.99~10.00 It is used to set the Point-to-point receive data gain for slave.	Default: 1.00
L1.05 Zero offset of received data	Range: -99.9~100.0 Unit: % It is used to set the Point-to-point receive data offset for slave.	Default: 0.0

The parameter of **L1.04** and **L1.05** are used to calibrate the salve received data.

If **L1.04** is expressed by character ‘a’ and the **L1.05** is expressed by character ‘b’, the received data is expressed by character ‘x’, the result used by slave is expressed by character ‘y’, then y=a*x+b, the range of y is -100.00%~100.00%.

Group L2: Encoder Setting

If drive use motor 1 to do VC control then set the parameters of **L2.00~L2.08**; If drive use motor 2 to do VC control then set the parameters of **L2.09~L2.17**.

The function of **L2.00~L2.08** are same as **L2.09~L2.17**.

L2.00① **Encoder type**

Range: 0~4 Default: 0

0: ABZ incremental encoder
1: UVW incremental encoder
2: Rotational resolver encoder
3: Sine and cosine Encoder
4:Wire-saving UVW Encoder

L2.01① **Encoder pulse per revolution**

Range: 1~65535 Default: 1024

It is used to set the pulse number of per revolution, the parameter is valid only for ABZ incremental encoder and UVW incremental encoder.

You need to set the parameter properly, otherwise the motor will run abnormally when drive running in VC control.

L2.02① **A/B phase sequence of ABC incremental Encoder**

Range: 0~1 Default: 0

0: Positive 1: Negative

This parameter is valid only for ABZ incremental encoder(**L2.00** = 0) and is used to set the A/B phase sequence of the ABZ incremental encoder. It is valid for both asynchronous motor and synchronous motor. The A/B phase sequence can be obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no-load auto-tuning".

L2.03① **Z pulse initial angle of ABZ incremental Encoder**

Range: 0.0~359.9 Default: 0.0

Unit: deg

It is used to set the Z pulse initial angle of ABZ incremental encoder.

L2.04① **Encoder installation angle**

Range: 0.0~359.9 Default: 0.0

Unit: deg

It is used to set the encoder installation angle.

This parameter is applicable only to synchronous motor. It is valid for ABZ incremental encoder, UVW incremental encoder, resolver and wire-saving UVW encoder, but invalid for SIN/COS encoder.

L2.05① **UVW phase sequence of UVW Encoder**

Range: 0~1 Default: 0

0: Positive 1: Negative

L2.06① **UVW Encoder angle offset**	Range: 0.0~359.9 Unit: deg The parameter is used to set the angle offset of UVW encoder.	Default: 0.0
L2.07① **Poles of resolver**	Range: 1~65535 The parameter is used to set the poles of resolver.	Default: 1
L2.08① **Encoder wire-break fault detection time**	Range: 0.0~10.0 Unit: Sec 0.0: The encoder wire-break detection function is disabled. >0.0: The encoder wire-break detection function is enabled. If drive detect the PG wire is break and the maintain time exceeds the set value of **L2.08** then the fault of encoder fault(Er45) is displayed.	Default: 0.0
L2.09① **Motor 2 Encoder type**	Range: 0~4 0: ABZ incremental encoder 1: UVW incremental encoder 2: Rotational resolver encoder 3: Sine and cosine Encoder 4:Wire-saving UVW Encoder	Default: 0
L2.10① **Motor 2 Encoder pulse per revolution**	Range: 1~65535 It is used to set the encoder installation angle for motor 2.	Default: 1024
L2.11① **Motor 2 A/B phase sequence of ABC incremental Encoder**	Range: 0~1 0: Positive 1: Negative	Default: 0
L2.12① **Motor 2 Z pulse initial angle of ABZ incremental Encoder**	Range: 0.0~359.9 Unit: deg It is used to set the Z pulse initial angle of ABZ incremental encoder for motor 2.	Default: 0.0
L2.13① **Motor 2 Encoder installation angle**	Range: 0.0~359.9 Unit: deg It is used to set the encoder installation angle for motor 2.	Default: 0.0

L2.14① **Motor 2 UVW phase sequence of UVW Encoder**	Range: 0~1 0: Positive 1: Negative	Default: 0
L2.15① **Motor 2 UVW Encoder angle offset**	Range: 0.0~359.9 Unit: deg The parameter is used to set the angle offset of UVW encoder for motor 2.	Default: 0.0
L2.16① **Motor 2 poles of resolver**	Range: 1~65535 The parameter is used to set the poles of resolver for motor 2.	Default: 1
L2.17① **Motor 2 Encoder wire-break fault detection time**	Range: 0.0~10.0 Unit: Sec 0.0: The encoder wire-break detection function is disabled. >0.0: The encoder wire-break detection function is enabled.	Default: 0.0

Group P0: User-defined Parameters

In user-defined parameters Group, users can add some parameters to **P0** group for convenient view and set these parameters.

H0.05 = 1 Only display parameters that mapped by P0 group.

For example:

Set the value for P0 group parameters as below:

- H0.05 = 0(Display all parameters)
- P0.00 = b0.01
- P0.01 = b2.01
- P0.02 = L1.04
- H0.05 = 1(Only display user-defined parameters)
- Press Prg key return to Level 0
- Press Prg key again, you can use knob on the keypad view the three parameters as below:
  - b0.01
  - b2.01
  - L1.04

P0.00 **User-defined Parameter 0**	Range: **A0.00~P1.15** It is used to provide convenient for view and modify parameters.	Default: **A0.00**

The User-defined Parameters of 1~14 same as the User-defined Parameter 0(**P0.00)**, but they have different default value.

Code	Name	Default	Code	Name	Default
P0.01	**User-defined Parameter 1**	**A0.01**	**P0.08**	**User-defined Parameter 8**	**A0.08**
P0.02	**User-defined Parameter 2**	**A0.02**	**P0.09**	**User-defined Parameter 9**	**A0.09**
P0.03	**User-defined Parameter 3**	**A0.03**	**P0.10**	**User-defined Parameter 10**	**A0.10**
P0.04	**User-defined Parameter 4**	**A0.04**	**P0.11**	**User-defined Parameter 11**	**A0.11**
P0.05	**User-defined Parameter 5**	**A0.05**	**P0.12**	**User-defined Parameter 12**	**A0.12**
P0.06	**User-defined Parameter 6**	**A0.06**	**P0.13**	**User-defined Parameter 13**	**A0.13**
P0.07	**User-defined Parameter 7**	**A0.07**	**P0.14**	**User-defined Parameter 14**	**A0.14**

P0.15 Range: **H0.05~H0.05** Default: **H0.05**

User-defined Parameter 15 The parameter is map to **H0.05** always, it is used to modify the display mode for keypad.

Group P1: Debug Parameters

These parameters are used to debug for factory, users don't need to modify them generally.

P1.00 Range: 0~65535 Default: 0

Debug parameter 0 It is used to debug for factory, users don't need to modify them generally.

The debug parameters of 1~15 same as the debug parameter 0(**P1.00**).

Code	Name
P1.01	**Debug parameter 1**
P1.02	**Debug parameter 2**
P1.03	**Debug parameter 3**
P1.04	**Debug parameter 4**
P1.05	**Debug parameter 5**
P1.06	**Debug parameter 6**
P1.07	**Debug parameter 7**
P1.08	**Debug parameter 8**
P1.09	**Debug parameter 9**
P1.10	**Debug parameter 10**
P1.11	**Debug parameter 11**
P1.12	**Debug parameter 12**
P1.13	**Debug parameter 13**
P1.14	**Debug parameter 14**
P1.15	**Debug parameter 15**

Chapter 7 Fault Detection and Diagnostics

7.1 Faults and Solutions

If a fault or alarm happened, keypad will display the fault or alarm at once. Fault displays “Er”+fault code and the alarm displays “AL”+fault code. You can use the STOP/RST key or X terminal reset function to reset the fault or alarm.

These parameters of **A1.00～A1.35** are used to record the fault code and drive status of the recent three faults of the drive.

Table 7- 1 LED Fault and display

Display	Fault Name	Possible Causes	Solutions
Er01	Hardware over voltage during acceleration	The acceleration time is too short.	Increase the acceleration time.
		The inertia of the load is too large.	Enable dynamic brake.
		The output circuit is short circuited.	Check motor wiring and output to ground impedance.
		The input voltage is too high.	Adjust the voltage to normal range.
Er02	Hardware over voltage during deceleration	The deceleration time is too short.	Increase the deceleration time.
		The inertia of the load is too large.	Use dynamic brake.
		The output circuit is short circuited.	Check motor wiring and output to ground impedance.
		The input voltage is too high.	Adjust the voltage to normal range.
		the regulator parameters are improper In SVC control mode.	Set regulator parameters properly.
Er03	Hardware over voltage during constant speed	The motor parameters are improper.	Set regulator parameters properly.
		The load fluctuation is too big	Check the load.
		The input voltage is too high.	Adjust the voltage to normal range.
		The output circuit is short circuited.	Check motor wiring and output to ground impedance.
		the regulator parameters are improper In SVC control mode.	Set regulator parameters properly.
Er04	Software over voltage during acceleration	Motor to ground is short circuit.	Check motor wiring.
		The input voltage is too high.	Adjust the voltage to normal range.
		Start again quickly when motor in high speed rotating.	Start again when motor is stop.

Display	Fault Name	Possible Causes	Solutions
Er05	Software over voltage during deceleration	Motor to ground is short circuit.	Check motor wiring.
		The inertia of the load is too large.	Select the dynamic brake resistor properly.
Er06	Software over voltage during constant speed	Motor to ground is short circuit.	Check motor wiring.
		The input voltage is too high.	Adjust the voltage to normal range.
		The inertia of the load is too large.	Select the dynamic brake resistor properly.
Er07	Under voltage	The input voltage is too low.	Adjust the voltage to normal range.
		Internal power supply of drive is abnormal.	Contact with technical service.
Er08	Hardware over current during acceleration	The input voltage is too low.	Adjust the voltage to normal range.
Er09	Hardware over current during deceleration	The input voltage is too low.	Adjust the voltage to normal range.
		The inertia of the load is too large.	Select the dynamic brake resistor properly.
Er10	Hardware over current during constant speed	Load change suddenly when drive is running.	Lower the load mutation frequency and mutation range.
		The input voltage is too low.	Adjust the voltage to normal range.
Er11	Software over current during acceleration	The motor parameters are improper.	Set regulator parameters properly.
		Startup frequency is too high.	Decrease startup frequency.
		The deceleration time is too short.	Increase the deceleration time.
		The selected drive power grade is too small.	Select drive power grade properly.
Er12	Software over current during deceleration	The motor parameters are improper.	Set regulator parameters properly.
		The deceleration time is too short.	Increase the deceleration time.
		The selected drive power grade is too small.	Select drive power grade properly.
Er13	Software over current during constant speed	The motor parameters are improper.	Set regulator parameters properly.
		The selected drive power grade is too small.	Select drive power grade properly.

Display	Fault Name	Possible Causes	Solutions
Er14	IGBT saturation trip during acceleration	Motor to ground is short circuit.	Check motor wiring.
		The acceleration time is too short.	Increase the acceleration time.
		The fan is blocked or damaged.	Clean the air filter or Replace the damaged fan.
		The AC drive module is abnormal.	Contact with technical service.
		Switch power supply is damaged.	Contact with technical service.
		The control board is abnormal.	Contact with technical service.
		The ambient temperature is too high.	Cool down environment.
		The control board connection is loose.	Re-plug the connection line which on control board.
Er15	IGBT saturation trip during deceleration	The acceleration time is too short.	Increase the acceleration time.
		Motor to ground is short circuit.	Check motor wiring.
		The fan is blocked or damaged.	Clean the air filter or Replace the damaged fan.
		The AC drive module is abnormal.	Contact with technical service.
		Switch power supply is damaged.	Contact with technical service.
		The control board is abnormal.	Contact with technical service.
		The ambient temperature is too high.	Cool down environment.
		The control board connection is loose.	Re-plug the connection line which on control board.
Er16	IGBT saturation trip during constant speed	The input voltage is too low.	Adjust the voltage to normal range.
		Motor to ground is short circuit.	Check motor wiring.
		The fan is blocked or damaged.	Clean the air filter or Replace the damaged fan.
		The AC drive module is abnormal.	Contact with technical service.
		Switch power supply is damaged.	Contact with technical service.
		The control board is abnormal.	Contact with technical service.
		The ambient temperature is too high.	Cool down environment.
		The control board connection is loose.	Re-plug the connection line which on control board.

Display	Fault Name	Possible Causes	Solutions
Er17	Heatsink of rectifier overheat	The fan is blocked or damaged.	Clean the air filter or Replace the damaged fan.
		The ambient temperature is too high.	Cool down environment.
		The output phase to phase is short. The output circuited is short to the ground.	Rematch cable
		The cable connecting the control board and heatsink sensor is abnormal.	Check the cable connecting the control board and heatsink sensor.
		The Auxiliary power is damage or the drive power is under voltage	Contact with technical service.
		Drive overcurrent instantaneously.	Please see the overcurrent solutions.
Er18	Heatsink of inverter overheat	Same as Er17	Same as Er17
Er/AL19	Input phase loss	The input voltage of R, S and T have some losses.	Check the input voltage and the wiring.
Er/AL20	Output phase loss	The cable connecting the drive and the motor is abnormal.	Eliminate external faults.
		The output current of U, V, W are in unbalance status.	Check motor and cable.
		The parameters value about the SVC control are improper.	Set parameters value about the SVC control properly.
Er21	Soft startup relay fault	The contactor is abnormal.	Contact with technical service.
		The contactor feedback circuit is abnormal.	
		Buffer resistor is damaged.	
		Switch power supply is damaged.	
		The power supply is abnormal.	Check the power supply.
Er22	Current detection fault	The control board is faulty.	Contact with technical service.
		Switch power supply is damaged.	
		The HALL device is abnormal.	
		Leakage current is too large.	

Display	Fault Name	Possible Causes	Solutions
Er23	CBC fault	The load is too heavy.	Reduce the load
		Motor is stalling.	Check the motor and mechanical condition.
		The selected drive power grade is too small.	Select drive power grade properly.
Er/AL24	VFD overload	The input voltage is too low.	Adjust the voltage to normal range.
		Start again quickly when motor in high speed rotating.	Start again when motor is stop.
		The load is too heavy and the holding time is too long.	Decrease the overload time and decrease the load.
		The acceleration/deceleration time is too short.	Increase the acceleration/deceleration time.
		The V/F curve ratio is too high when drive in V/F control.	Set the parameters of V/F curve and torque boost properly.
		The selected drive power grade is too small.	Select drive power grade properly.
Er/AL25	Motor overload	The input voltage is too low.	Adjust the voltage to normal range.
		The DC brake current is set to high.	Decrease the value of DC brake current.
		Motor is stalling or load changed too large.	Check the load and set the parameter of torque boost properly.
		The drive power grade is not matched with motor power grade.	Select the suitable motor.
		The V/F curve ratio is too high when drive in V/F control.	Set the parameters of V/F curve and torque boost properly.
		The common motor running with lower speed, heavy load and long time.	Change a Frequency conversion motor or Increase the aim frequency.
Er/AL26	Motor under load	The AC drive running current is lower than F0.10.	Check that the load is disconnected.
			Set the parameter of F0.10 properly.

Display	Fault Name	Possible Causes	Solutions
Er/AL27	Motor overheat	The cabling of the temperature sensor becomes loose.	Check the temperature sensor cabling and eliminate the cabling fault.
		The motor temperature is too high.	Lower the carrier frequency or adopt other heat radiation measures.
Er28	Motor short circuit to ground fault	The motor is short circuited to the ground.	Replace the cable or motor.
Er/AL29	External fault	External fault signal is input via DI.	Check the DI input signal.
Er30	Keypad communication fault	The communication of keypad with drive is abnormal.	Check the line connecting the control board and the keypad.
Er/AL31	RS485 communication fault	The communication of RS485 field with drive is abnormal.	Check the line and the communication device.
Er/AL32	Optional card communication fault	The communication of optional card with external device is abnormal.	Check the line and the optional card.
Er33	Optional card connection fault	The communication of optional card with control board is abnormal.	Check the line and the optional card.
Er34	Auto tune fault	The cable connection of the motor are abnormal.	Check the cable connecting the drive and the motor.
		Tune when motor is rotating.	Tune when motor is stops.
		The motor parameters are not set according to the nameplate.	Set the motor parameters according to the nameplate properly.
Er/AL35	PID feedback over range	The PID feedback is higher than the setting of E5.33 or lower than the setting of E5.34.	Check the PID feedback signal or set E5.33 and E5.34 to a proper value.
		The parameters of PID are set incorrectly.	Set the PID parameters properly.
Er36	EEPROM R/W fault	EEPROM is damage.	Contact with technical service.
Er37	Parameter setting fault	Parameter R/W fault.	Press STOP/RST to reset the drive or Contact with technical service.

Display	Fault Name	Possible Causes	Solutions
Er/AL38	Accumulative power-on time reached	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
Er/AL39	Accumulative running time reached	The accumulative running time reaches the setting value.	Clear the record through the parameter initialization function.
Er40	Motor switchover during running status	Change the selection of the motor via terminal during running of the drive.	Perform motor switchover after the drive stops.
Er/AL41	Too large speed deviation	The encoder parameters are set incorrectly.	Set the encoder parameters properly.
		The motor auto-tuning is not performed.	Perform the motor auto-tuning.
		The motor over speed check parameters are set incorrectly.	Set the motor over speed check parameters correctly based on the actual situation.
Er/AL42	Motor over speed	The encoder parameters are set incorrectly.	Set the encoder parameters properly.
		The motor auto-tuning is not performed.	Perform the motor auto-tuning.
		The motor over speed check parameters are set incorrectly.	Set the motor over speed check parameters correctly based on the actual situation.
Er/AL43	Flux pole detection fault	The encoder signal is incorrectly.	Check encoder status.
Er/AL44	UVW signal feedback fault	The encoder signal is incorrectly.	Check encoder status.
Er/AL45	Encoder fault	The encoder type is incorrect.	Set the encoder type correctly based on the actual situation.
		The cable connection of the encoder is incorrect.	Eliminate external faults.
		The encoder is damaged.	Replace the damaged encoder.
		The PG card is abnormal.	Replace the abnormal PG card.

Display	Fault Name	Possible Causes	Solutions
Er/AL46	User-defined fault 1	The user-defined fault 1 signal is input via DI. User-defined fault 1 signal is input via virtual I/O.	Reset the operation.
Er/AL47	User-defined fault 2	The user-defined fault 2 signal is input via DI. User-defined fault 2 signal is input via virtual I/O.	Reset the operation.
AL48	Motor in current stall status	Motor is in current stall control.	Check whether the load current is exceed the overcurrent stall protective current.
AL49	Motor in voltage stall status	Motor is in voltage stall control.	Check whether the dc-link is exceed the overvoltage stall protective current.
AL50	Motor in frequency drop status as dc-link voltage drop	The dc-link is under voltage and Motor is in frequency drop.	Check whether the dc-link is lower than the under-voltage drop frequency point.
Er51	System fault	Trial expired.	Contact with factory.
Er/AL52	Interlock warning during multi-pump operation mode	The multi-pump control system occur interlock.	Check the logic of multi-pump control.
Er53	Soft startup resistor overload	The output circuit to ground is short.	Check the output circuit.
AL54	Sleep status	The drive is sleeping.	Check whether the drive should in sleeping.

7.2 Common Faults and Solutions

You may come across the following faults during the use of the drive. Refer to the following methods for simple fault analysis.

There is no display at power-on:

1) Check whether the drive input power voltage is consistent with drive rated voltage.
2) Check whether the Three phase bridge rectifier is normal.

Power air switch tripping at power-on

1) Check whether the motor or the motor cable is short circuited to the ground.
2) Check whether rectifier bridge is damage.

Motor not rotate when drive is running.

1) Check whether the output current of U, V, W are in unbalance status.
2) Check whether the motor is damage or stalling.
3) Check whether the motor parameters set proper value.

The display is normally at power-on but the power air switch tripping when the drive run.

1) Check whether the output module is short circuited to the ground.
2) Check whether the motor is short circuited to the ground.
3) If the power air switch tripped occasionally and between the motor with drive have long distance, then add AC reactor please.

Note:

- Please deal with the fault carefully. You should confirm the fault reasons and deal with the fault according to solutions above.
- If you can't solute the fault, please don't power on.
- If the device damaged or some problem you can't solute, please contact with distributor or technical service.

Chapter 8 Communication Protocol

The AC drive provides RS485 communication interface, for the master-slave communication with international standard MODBUS-RTU protocol. The user can through the PC/PLC PC to read and modify the function code, set the control command and the reference frequency converter, working status monitoring and fault information, to realize the centralized control.

8.1 Protocol Comment

The MODBUS protocol of the AC drive defines the transmission frame content and format to be used, including: host polling and broadcast frames, slave response frame format; the host frame includes: the slave address (or broadcast address), the command code, data and CRC check. Slave response frame is the same. If the error occurs in the received frame from the host, or can't complete the host required action, the slave machine will organize a fault frame as a response to feedback to the host.

8.2 Networking Mode

There are two kinds of configuration mode of the AC drive: single host / multi slave mode and single host / single slave mode.

8.3 Bus Structure

1. Interface mode

   RS485 interface, asynchronous, half duplex.

   Default data formats: 8-N-1 (8 data bits, no parity, 1 stop bit), 9600bps.

2. Communication mode

   From the set range is 1 ~ 247. 0, for broadcast communication.

   Each network have unique slave address, this is the foundation and guarantee of MODBUS communication.

   The frequency converter act as slave, point to point communication master-slave, host using the broadcast address to send frames, no response from the slave.

   From the slave's keypad or the means of communication, can be provided to change the address, baud rate and data format.

8.4 Protocol Format

The MODBUS protocol of the AC drive is RTU mode.

Figure 8-1 shows the frame format of RTU.

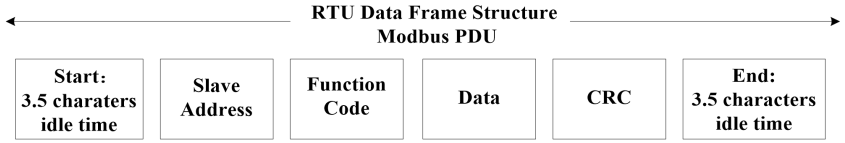


Figure 8- 1 RTU frame format

In RTU mode, each character format is as follows: 8 bits, 8 bits in each frame domain, containing two of sixteen hexadecimal characters (0 ~ 9, A ~ F); in order to distinguish clearly, the following sixteen hexadecimal data end with "H".

In RTU mode, the idle time between frames to follow the MODBUS internal agreement. MODBUS internal least frame agreed between idle as follows:

(1) The frame head and frame end is defined through the bus idle time is equal to or greater than 3.5 bytes of time.

(2) The frame after the start, the interval between characters must be less than 1.5 bytes of time, otherwise the new to receive characters will be considered as a new frame.

(3) Using CRC check mode, the high 8 bits and 8 bits low must swap before send.

(4) At least 3.5 bytes of free time to maintain between frames.

The standard structure of RTU frame:

Table 8- 1 RTU frame format

START（Frame head）	T1-T2-T3-T4（3.5 chars space time）
ADDR（slave address）	1～247（0 is broadcast address）
CMD（function code）	03H: read register 06H: write register
（DATA） DATA（0） … DATA（N-1）	2*N bytes data,this is the main comment of frame.
CRC LOW	CRC（16bits）
CRC HIGH	
END（Frame end）	T1-T2-T3-T4（3.5 chars space time）

8.5 Functions of Protocol

The main function of the MODBUS protocol is to read, write the AC drive function code parameters and non functional code parameters, different parameters determine different operation request. The AC drive MODBUS protocol support command code as shown in table 2.

Table 8- 2 Function code illustration

Function code（HEX）	Description
03H	Read AC drive function code or status word
06H	Change AC drive function code or control word

The AC drive function code parameters and non functional code parameters are mapped to Modbus read write registers. The read and write attribute and the range of function code parameters (maximum, minimum) observe the instructions of AC drive using manual. Non functional code parameters including the run command, running state, run / stop parameters and fault information.

Communication Address of Function Parameters of the AC Drive

- The converter function code parameters, control parameters and monitor parameters are mapped to Modbus read write registers.
- The function code parameter attribute and range can reference the user manual instructions follow the frequency converter.
- The group code of the function code mapped to high byte of Modbus register, and the internal group index mapped to low byte of Modbus register.
- The control parameters and monitor parameters are also function code group.

Function code group number and the mapping register address high byte correspondence are listed in the following table:

Table 8- 3 Group code and register's high byte convert table

Function code group	Register ID high	Function code group	Register ID high
A0	0x10	E4	0x27
A1	0x11	E5	0x28
b0	0x12	E6	0x29
b1	0x13	E7	0x2A
b2	0x14	E8	0x2B
C0	0x15	E9	0x2C
C1	0x16	EA	0x2D
C2	0x17	EB	0x2E
C3	0x18	F0	0x2F
C4	0x19	F1	0x30
C5	0x1A	H0	0x31
C6	0x1B	H1	0x32
d0	0x1C	L0	0x33
d1	0x1D	L1	0x34
d2	0x1E	L2	0x35
d3	0x1F	L3	0x36
d4	0x20	L4	0x37
d5	0x21	L5	0x38
d6	0x22	L6	0x39
E0	0x23	L7	0x3A
E1	0x24	P0	0x3B
E2	0x25	P1	0x3C
E3	0x26	P2	0x3D

Example:

The function code b0.11 reference to Modbus register ID 0x120B, and E0.03 reference to Modbus register 0x2303.

Note:

Under communication mode, user can change password use function code 06H to change parameter H0.00. If the response value is 8888H, indicate the password set successfully.

Communication Address of Non-Function Parameters of the AC Drive

1.Communication set value (Wirte-only)

Communication set value includes frequency source,upper source of torque,PID source,PID feedback etc.

Communication set value address is 6400H. The upper machine set the address value, the data range is -10000 ~ 10000, correspond to the given value for -100.00% ~ 100%.

2.Run command (Wirte-only)

Run command address	Usage
6401H (b0.11=2)	0001: Run forward
	0002: Run reverse
	0003: JOG forward
	0004: JOG reverse
	0005: Coasting stop
	0006: Deceleration stop
	0007: Fault reset

3.Run status (Read-only)

Run status address	Usage
6402H	0001: Run forward
	0002: Run reverse
	0003: Stop

4.DO output control (Wirte-only)

Do output address	Usage
6403H	BIT0: Y1 BIT1: Y2 BIT2: Y3 BIT3: T1 BIT4: T2 BIT5: T3 BIT6: T4 BIT7: T5 BIT8: T6

5.Pulse output control: (Write-only)

Command address	Command comment
6404H	0x0～0x7FFF corresponding to 0%～100%

6.Analog output AO1 control: (Write-only)

Command address	Command comment
6405H	0x0～0x7FFF corresponding to 0%～100%

7.Analog output AO2 control: (Write-only)

Command address	Command comment
6406H	0x0～0x7FFF corresponding to 0%～100%

8.AC drive fault description (Read-only)

AC drive error address	AC drive error info
6407H	0: No error
	1: Hardware accelerate over voltage
	2: Hardware decelerate over voltage
	3: Hardware constant speed over voltage
	4: Software accelerate over voltage
	5: Software decelerate over voltage
	6: Software constant speed over voltage
	7: Under voltage
	8: Hardware accelerate over current
	9: Hardware decelerate over current
	10: Hardware constant speed over current
	11: Software accelerate over current
	12: Software decelerate over current
	13: Software constant speed over current
	14: Module accelerate error
	15: Module decelerate error
	16: Module constant speed error
	17: Rectifier bridge over temperature
	18: Inverter bridge over temperature
	19: Input osting - phase

AC drive error address	AC drive error info
6407H	20: Output osting-phase
	21: Contactor error
	22: Current check error
	23: The cycle by cycle current limiting error
	24: AC drive overload
	25: Motor overload
	26: Motor offload
	27: Motor over temperature
	28: Short circuit to ground of motor
	29: External error
	30: Keypad communication error
	31: RS485 communication error
	32: Optional card communication error
	33: Optional card connection error
	34: Motor self-tuning error
	35: PID feedback out of range
	36: EEPROM read/write error
	37: Parameter set error
	38: Accumulative power up time error
	39: Accumulative run time error
	40: Switch motor error when run
	41: Speed offset too large
	42: Motor over speed
	43: Magnetic pole position check error
	44: UVW signal feedback error
	45: Encoder error
	46: Self define error 1
	47: Self define error 2
	48: Motor over current speed loss
	49: Motor over voltage speed loss
	50: Motor under voltage frequency reduction
	51: System error
	52: Multi-pump interlock warning
	53: Buffer resistance overload
	54: Dormancy warning

Communication Command Code

1. Communication read function code: 03H

Function code: 03H, read N word (Max value is 50)

Example: The slave address is 01H, start address is 2302H, read number is 2 word, the structure of the frame as following:

Master request frame:

ADR（Slave address）	01 H
CMD（Function code）	03 H
Register ID high	23 H
Register ID low	02 H
Register number high	00 H
Register number low	02 H
CRC low	6E H
CRC high	4F H

Slave response frame:

ADR（Slave address）	01 H
CMD（Function code）	03 H
Byte number	04 H
Register 0x2302H comment high byte	00 H
Register 0x2302H comment low byte	00 H
Register 0x2303H comment high byte	00 H
Register 0x2303H comment low byte	01 H
CRC low byte	3B H
CRC high byte	F3 H

Error response frame:

ADR（Slave address）	01 H
Error code(CMD+0x80)	83 H
Exception code	02 H: Invalid address 03 H: Read number over range 04 H: Parameter can’t be read 05 H: Frame length error
CRC low byte	LCRC H
CRC high byte	HCRC H

2. Communication write command: 06H or 44H

Function code: 06H or 44H, write one word, the function code 44H and 06H has the same structure, but 44H doesn't change the EEPROM value.

Example: Set the value to register ID 2302H, the slave address is 01H, the frame structure shows as following:

Master request frame:

ADR（Slave address）	01 H
CMD（Function code）	06 H
Register ID high byte	23 H
Register ID low byte	02 H
Register comment high byte	13 H
Register comment low byte	88 H
CRC low byte	2E H
CRC high byte	D8 H

Slave response frame:

ADR（Slave address）	01 H
CMD（Function code）	06 H
Register ID high byte	23 H
Register ID low byte	02 H
Register comment high byte	13 H
Register comment low byte	88 H
CRC low byte	2E H
CRC high byte	D8 H

Error response frame:

ADR（Slave address）	01 H
Error code (CMD+0x80)	86 H
Exception code	02 H: Invalid address 03 H: Read number over range 04 H: Parameter can't be write or write value out of range 05 H: Length Error of the Data Frame
CRC low byte	LCRC H
CRC high byte	HCRC H

3. Communication error code

If there is a communication error occurs, the master should response an error code, the error code value is “request function code ” + 0x80.

4. Communication error function code

When there is an error frame comes, the slave will give an exception code to indicate the error type. Such as error function code, or error value etc.

Error code	Function
01H	Invalid function code
02H	Invalid address
03H	Operate number over range
04H	Operation error
05H	Frame length error

5. CRC check

The RTU frame include a CRC check field. CRC used to check the correctness of the whole frame. It include two bytes filed. The master calculates the CRC and padding to the end of the frame, and the slave re-calculates it again. If the twice result isn’t the same, it indicates a transmit error.

We adapt an international standard CRC check method, when user program the CRC algorithm, can reference the following C procedure.

```
unsigned int crc_check(Uint16 len)
{
        unsigned int crc_value=0xffff;
        unsigned int i,j;

        for(j=0;j<len;j++)
        {
            crc_value^=data_buf[j];
            for(i=0;i<8;i++)
            {
                if(crc_value &0x0001)
                    crc_value=(crc_value>>1)^0xa001;
                else
                    crc_value=crc_value>>1;
            }
        }
        return (crc_value);
}
```

Chapter 9 Maintenance

9.1 Routine Repair and Maintenance

It is necessary to carry out the maintenance for avoiding the fault of the AC drive,keeping devices running normally and prolonging the service life of the AC drive. The content of maintenance is as the following table:

Routine Maintenance	Periodic Inspection	Checking objects	Content	Requirements
√		Run monitor parameters	Output current	Within the rated value
			Output voltage	Within the rated value
			Temperature	The temperature rise does not exceed 35 ℃.
√		Cooling and heat dissipation	Installation environment	The air duct is smooth and well-ventilated.
			Fans inside the AC drive	Normal operation and no abnormal noise.
√		Motor	Generate heat	Generating heat is normal.
			Noise	The noise is uniform.
	√	AC drive	Generate heat due to vibration	Stable vibration and rational temperature
			Noise	Normal noise
			Lead and terminals	Fixed screws without any sign of looseness.
√		Running environment	Temperature and humidity	-10℃～+40℃ 40℃～50℃ (Use by derating or forced cooling)
			Dust and dripping from water machine.	No dripping trace and no dust.
			Gas	No peculiar smell

Recommended instruments: electric voltage meter for input voltage; clamp ampere meter for current; rectifier voltage meter for output voltage.

9.2 The Inspection and Replacement of Vulnerable Components

Abrasion or degradation of performance will occur due to the long-time usage of components inside the AC drive. To ensure the stable and reliable operation of the AC drive, predictive maintenance of the AC drive must be employed periodically, if required, related parts must be replaced.

（1）Cooling Fans

The service life of cooling fans inside the AC drive is about 2 to 3 years. When bearings of cooling fans are abraded or fan blades are broken, replacement of fans must be considered.

（2）Electrolytic Capacitors

Under normal conditions, Electrolytic capacitors of the AC drive must be replaced once for every 4 to 5 years.

9.3 Storage and Warranty Agreement

Storage

For occasions which have high temperature,moisture,dust or metallic dust, the AC drive can not be stored. During storage, the ventilation must be guaranteed. The degradation of electrolytic capacitors will occur for long-time storage . The AC drive must be energized once for every two years and each lasting time must be no less than one hour. The input voltage must be increased slowly to the rated value by using the regulator.

Warranty Agreement

1. Free warranty only applies to the AC drive itself.
2. Reasonable repair expenses will be charged for the damages due to following causes:
   - ✓ Improper usage or repairing the AC drive without permission.
   - ✓ Fire,flood,abnormal voltage,thunder,earthquake,salt corrosion,air corrosion or other natural disaster.
   - ✓ The damage due to artificial falling or transportation.
   - ✓ Improper operation without following the user manual
   - ✓ The damage due to faults outside the AC drive.
3. If the AC drive has been used for more than the warranty life, reasonable repair fee will be charged.
4. The maintenance fee is charged according to the uniform standard of our company. If there is an agreement, the agreement has priority.

Chapter 10 Optional Cards

10.1 Relay Card（IO1）

IO1 is an optional card for relay and digital output .It needs to be used together with the vector control AC drives which is produced by our company.

- **Functional overview**
  - 4 relays outputs（T3~T6）
  - 1 digital output（Y3）
- **Pin description**

Table 10-1 Optional card IO1

Terminal Symbol	Description
T3-A	Relay 3 common port
T3-C	Relay 3 normally open port
T4-A	Relay 4 common port
T4-C	Relay 4 normally open port
T5-A	Relay 5 common port
T5-C	Relay 5 normally open port
T6-A	Relay 6 common port
T6-C	Relay 6 normally open port
Y3	Digital output terminal 3(open collect output)
COM	Digital output common port

Note: 1）T3~T6 has only normally open port.

2） T3~T6 and Y3 function is the same with Y/T terminal function of the control board.

- **Installation of the optional card**

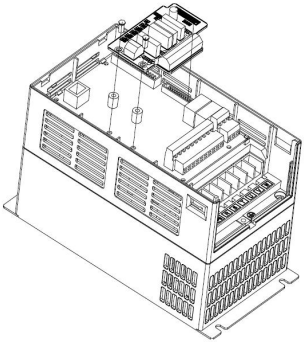


Figure 10- 1 Schematic diagram of the optional card installation

10.2 Multi-function IO Card（IO2）

IO2 is an optional card for analog input, digital input and digital output.It needs to be used together with the vector control AC drives which is produced by our company.

◆ **Functional overview**

- ❖ 1 analog input（AI3）
- ❖ 1 digital output（Y3）
- ❖ 4 digital inputs（X7~X10）
- ❖ 10V reference supply
- ❖ 24V supply for external use

◆ **Pin description**

Table 10-2 Optional card IO2

Terminal Symbol	Description
AI3	Analog input 3
GND	Ground of AI3 and +10V
+10V	10V reference supply
Y3	Digital output 3
COM	Ground of Y terminal and 24V
X7	Digital input 7
X8	Digital input 8
X9	Digital input 9
X10	Digital input 10
CMX1	X7~X10 common port
+24V	24V supply
COM	Ground of Y terminal and 24V

Note:

1）AI3 function is the same with the AI function of control board.

2）Y3 function is the same with Y terminal function of control board.

3）X7~X10 function is the same with X terminal function of control board.

4）+10V is the same with +10V terminal of control board.

5）24V is the same with 24V terminal of control board.

◆ **Installation of the optional card**

Please see the figure 10-1.

10.3 Multi-function IO Card（IO3）

IO3 is an optional card for digital input and relay output.It needs to be used together with the vector control AC drives which is produced by our company.

◆ **Functional overview**

- ❖ 4 digital inputs（X7~X10）
- ❖ 2 relay outputs（T3~T4）
- ❖ 24V supply for external use

◆ **Pin description**

Table 10-3 Optional card IO3

Terminal Symbol	Description
X7	Digital input 7
X8	Digital input 8
X9	Digital input 9
X10	Digital input10
CMX1	X7~X10 common port
+24V	24V supply
COM	Ground of 24V
T3-A	Relay 3 common port
T3-C	Relay 3 normally open port
T4-A	Relay 4 common port
T4-C	Relay 4 normally open port

Note:

1）X7~X10 function is the same with X terminal function of control board.

2）T3~T4 function is the same with T terminal function of control board.

3）24V is the same with 24V terminal of control board.

◆ **Installation of the optional card**

Please see the figure 10-1.

10.4 Temperature Sample Card（IO4）

IO4 is an optional card for PT100/PT1000 temperature sensor.It needs to be used together with the vector control AC drives which is produced by our company.

◆ **Functional overview**

- ❖ 3 groups wring terminals for PT100/PT1000
- ❖ 1 digital input（X7）

◆ **Pin description**

Table 10-4 Optional card IO4

Terminal Symbol	Description
R1+	1st group wring terminals for PT100/PT1000
Rm1	
R1-	
R2+	2nd group wring terminals for PT100/PT1000
Rm2	
R2-	
R3+	3rd group wring terminals for PT100/PT1000
Rm3	
R3-	
X7	Digital input 7 and its Ground
CMX1	

Note:

1） PT100/PT1000 needs to be connect between R+ and R- if it's two wire type.And another Rm needs to be connected when PT100/PT1000 is three wire type.

2） X7 function is the same with X terminal function of control board.Use external 24V source or 24V on control board to supply for X7.

◆ **Installation of the optional card**

Please see the figure 10-1.

10.5 Differential Encoder Card（PG1）

PG1 is an optional card for differential ABZ incremental encoder.It needs to be used together with the vector control AC drives which is produced by our company..

◆ **Functional overview**

- ❖ Input ports for A,B,Z differential signal
- ❖ Optional supply(5V,12V and 15V) for encoder

◆ **Pin description**

Table 10-5 Optional card PG1

Terminal Symbol	Description
A+	Encoder output signal A Positive
A-	Encoder output signal A Negative
B+	Encoder output signal B Positive
B-	Encoder output signal B Negative
Z+	Encoder output signal Z Positive
Z-	Encoder output signal Z Negative
Vdd	Encoder supply
COM	Supply ground

◆ **Installation of the optional card**

Please see the figure 10-1.

10.6 OC type Encoder Card（PG2）

PG2 is an optional card for OC type ABZ incremental encoder.It needs to be used together with the vector control AC drives which is produced by our company.

- **Functional overview**
  - Input ports for A,B,Z signal
  - Optional supply(5V,12V ,15V and 24V) for encoder
- **Pin description**

Table 10-6 Optional card PG2

Terminal Symbol	Description
A	Encoder output signal A
B	Encoder output signal B
Z	Encoder output signal Z
Vdd	Encoder supply
COM	Supply ground

- **Installation of the optional card**

Please see the figure 10-1.

10.7 Modbus+IO Card（COM1）

COM1 is a multi-function optional card for RS485 communication which is designed based on ModBus RTU protocol.It needs to be used together with the vector control AC drives which is produced by our company.

◆ **Functional overview**

- ❖ RS485 communication ports
- ❖ 1 analog input（AI3）
- ❖ 1 digital output（Y3）
- ❖ 2 digital inputs（X7~X8）
- ❖ 10V reference supply
- ❖ 24V supply for external use

◆ **Pin description**

Table 10-7 Optional card COM1

Terminal Symbol	Description
A	RS485 communication differential signal Positive
B	RS485 communication differential signal Negative
+10V	10V reference supply
GND	Ground of AI3 and +10V
AI3	Analog input 3
Y3	Digital output 3
COM	Ground of Y terminal and 24V
X7	Digital input 7
X8	Digital input 8
CMX1	X7~X8 common port
+24V	24V supply
COM	Ground of Y terminal and 24V

Note:

1）AI3 function is the same with the AI function of control board.

2）Y3 function is the same with Y terminal function of control board.

3）X7~X8 function is the same with X terminal function of control board.

4）+10V is the same with +10V terminal of control board.

5）24V is the same with 24V terminal of control board.

◆ **Installation of the optional card**

Please see the figure 10-1.

10.8 Profibus Card（COM2）

COM2 is a Profibus card designed based on Profibus fieldbus standard.It needs to be used together with the vector control AC drives which is produced by our company.

◆ **Functional overview**

- ❖ Connection ports for Profibus communication
- ❖ 5V isolated standard power supply

◆ **Pin description**

Table 10-8 Optional card COM2

Terminal Symbol	Description
A	Data cable Positive
B	Data cable Negative
RTS	Port of requesting for sending signal
+5V_ISO	5V isolated standard power supply
GND_ISO	Supply ground

◆ **Installation of the optional card**

Please see the figure 10-1.

10.9 CANopen Card（COM3）

COM3 is a specific optional card designed for CANopen communication.It needs to be used together with the vector control AC drives which is produced by our company.

◆ **Functional overview**

- ❖ Connection ports for CANopen communication
- ❖ 5V isolated standard power supply

◆ **Pin description**

Table 10-9 Optional card COM3

Terminal Symbol	Description
CANH	CAN communication Positive
CANL	CAN communication Negative
+5V_ISO	5V isolated standard power supply
GND_ISO	Supply ground

◆ **Installation of the optional card**

Please see the figure 10-1.

10.10 GPRS Optional Card(COM4)

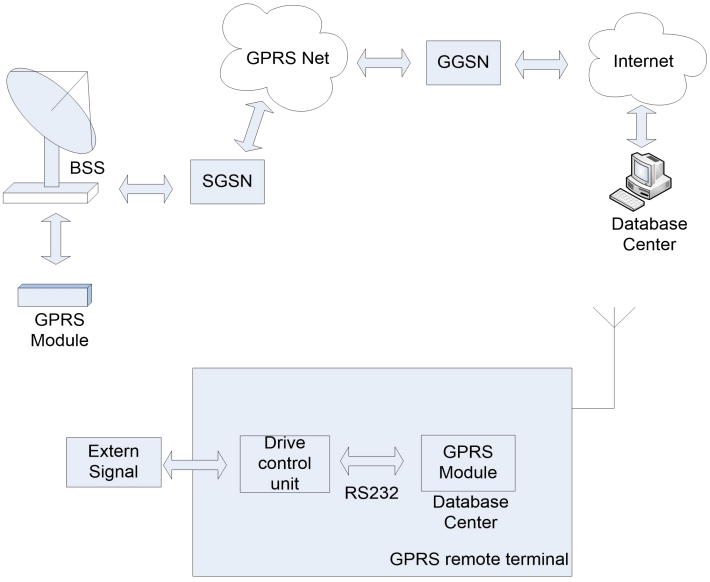
The optional card COM4 is used to communicate between drive and external device in GPRS mode. It only supports HV500 AC Drive.

◆ **Functions Description**

1. Communication principle

The work flow is below:

1) The GPRS optional card get data from drive through RS485 port.
2) The GPRS optional card Convert the data to match the TCP/IP data format.
3) The GPRS optional card Send the TCP/IP data package to GSM base station BSS.
4) The SGSN(the GPRS service node) package the TCP/IP data.
5) The SGSN Send data to doorway support node(GGSN) by GPRS net.
6) The doorway support node(GGSM) Send the data to internet data center.
   The internet data center can send data to GPRS or drive as master if the communication is established.



GPRS remote data sample and dealing with

2. The specialty of GPRS optional card

➢The GPRS optional card integrate the TCP/IP protocol stack, it support TCP/IP communication, the connect method with internet data center have static IP and dynamic domain.

➢Provide the serial bidirectional data conversion functions, it not only can convert the serial data package to TCP/IP data package for transmission, but also can convert the TCP/IP data package to serial data package, it known as "transparent transformation".

➢It will work to keep communicate always, it will auto-reconnection and auto-redialing if the communication is disconnect.

If there is no communication for a long time, drive will cut off the connection with the internet data center and auto-reconnect.

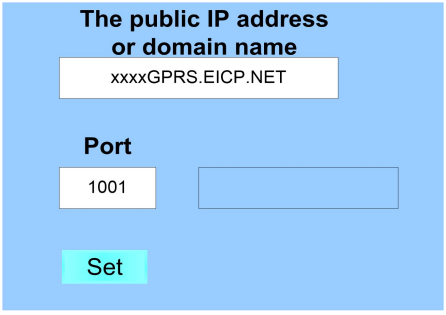
➢The parameter will be saved always.

The IP address, port and baudrate should be configured in different application.

These configuration will be saved in EEPROM.

3. GPRS Optional Card's Usage

1） You can set the data center address(the public IP address/domain name and the port) by PC for GPRS optional card.



- When you input the IP address/domain and the port and press the button of "Set", these configuration will be saved by drive.

2） GPRS optional card communicate with DSP by RS485

- GPRS optional card receive and send data with drive by RS485 port.
- The RS485 communication configuration can be modified by PC.

◆ **The optional card installation diagram**

Please see the figure 10-1.

10.11 Modbus TCP Card（COM5）

COM5 is a Modbus optional card based on TCP protocol, it can be compatible with full range of HV500 AC drives.

◆ **Function description**

Every device connected to an EtherNet network have two identifiers, a MAC address and an IP address. The MAC address is unique to the device and is hard coded(cannot be changed). The MAC address can be found on the label attached to the COM5 optional board.

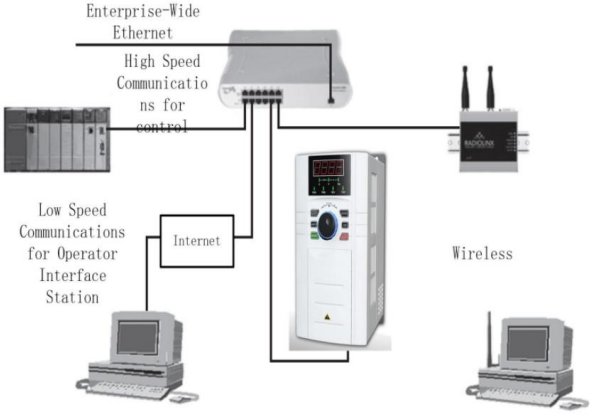
The COM5 board comes from the factory with a default IP address of 192.168.0.0. This address is convenient for testing your COM5 optional card. Our company will provide a host computer software drive Expert.exe to help users to establish communication between AC drive and external network.

COM5 Board Technical Data:

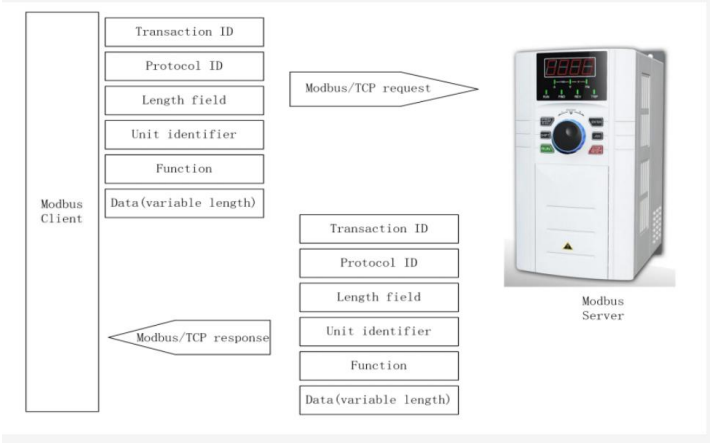
Interface	RJ-45
Transfer cable	Foiled CAT-5e
Speed	10/100 Mbps
Duplex	Half/Full 工
Protocol	Modbus TCP

EtherNet-based communications networks have become increasingly popular in industrial control and building automation. The advantages are as follows:

1. Speed
2. A board range of physical media and support hardware, such as optical fiber and wireless.
3. A well designed, layered software architecture known as a communications stack. This stack is known as the OSI/ISO seven-layer architecture.



The Modbus/TCP is a variant of the Modbus family. It is a manufacturer-independent protocol for monitoring and controlling automatic devices. The Modbus/TCP is a client server protocol. The client makes queries to the server by sending “request” messages. The server answers client queries with “response” messages.



The Modbus/TCP differs from the Modbus/RTU in its method of error checking. Transfer Control Protocol(TCP) already includes efficient error checking, so the Modubs/TCP does not include a separate CRC(error- checking) field. TCP also contains provisions for resending bad packets and fragmentation of long messages for proper fit in communication frames.

The slave address field of Modbus/RTU is the unit identifier field in Modbus/TCP, and it is used when one IP address acts as a common connection point, such as with a doorway, for several devices. Please reference Chapter 8.

◆ **The optional card installation diagram**

Please see the figure 10-1.

HNC Electric Limited
Product Warranty Card

<table>
<tr><td rowspan="3">Customer Information</td><td colspan="2">Company Address:</td></tr>
<tr><td rowspan="2">Company Name:

Zip code:</td><td>Contact person:</td></tr>
<tr><td>Telephone:</td></tr>
<tr><td rowspan="3">Product Information</td><td colspan="2">Product type:</td></tr>
<tr><td colspan="2">Body bar code:</td></tr>
<tr><td colspan="2">Name of agent:</td></tr>
<tr><td>Fault Information</td><td colspan="2">（Maintenance time and content）:

Maintenance Personnel:</td></tr>
</table>

Warranty Agreement

1. The warranty period of the product is 18 months (refer to the barcode on the equipment). During the warranty period, if the product fails or is damaged under the condition of normal use by following the instructions, HNC Electric will be responsible for free maintenance.

2. Within the warranty period, maintenance will be charged for the damages caused by the following reasons:

a. Improper use or repair/modification without prior permission

b. Fire, flood, abnormal voltage, other disasters and secondary disaster

c. Hardware damage caused by dropping or transportation after procurement

d. Improper operation

e. Trouble out of the equipment (for example, external device)

3. If there is any failure or damage to the product, please correctly fill out the Product Warranty Card in detail.

4. The maintenance fee is charged according to the latest Maintenance Price List of HNC Electric.

5. The Product Warranty Card is not re-issued. Please keep the card and present it to the maintenance personnel when asking for maintenance.

6. If there is any problem during the service, contact HNC Electric's agent or HNC Electric directly.

7. This agreement shall be interpreted by HNC Electric Limited.

Thanks for choosing HNC product.

Any technique support, please feel free to contact our support team

Tel: 86(20)84898493 Fax: 86(20)61082610

URL: www.hncelectric.com

Email: support@hncelectric.com