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# Preface

Thank you for using CV100 series Variable Frequency Drive made by Kinco Automation.

CV100 satisfies the high performance requirements by using a unique control method to achieve high torque, high accuracy and wide speed-adjusting range. Its anti-tripping function and capabilities of adapting to severe power network, temperature, humidity and dusty environment exceed those of similar product made by other companies, which improves the product's reliability noticeably; Without PG connector, strong speed control, flexible input/output terminal, pulse frequency setting, saving parameters at power outage and stop, frequency setting channel, master and slave frequency control and so on, all these satisfy various of high accuracy and complex drive command, at the same time we provide the OEM customer high integration total solution, it values highly in system cost saving and improving the system reliability.

CV100 can satisfy the customers' requirements on low noise and EMI by using optimized PWM technology and EMC design.

This manual provides information on installation, wiring, parameters setting, trouble-shooting, and daily maintenance. To ensure the correct installation and operation of CV100, please read this manual carefully before starting the drive and keep it in a proper place and to the right person.

## Unpacking Inspection Note

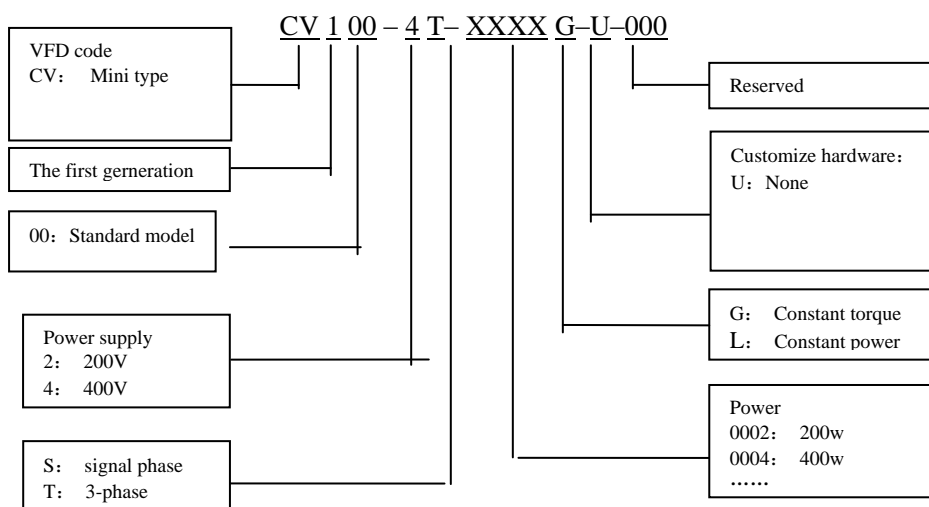
Upon unpacking, please check for:

- Any damage occurred during transportation;
- Check whether the rated values on the nameplate of the drive are in accordance with your order.

Our product is manufactured and packed at factory with great care. If there is any error, please contact us or distributors.

The user manual is subject to change without notifying the customers due to the continuous process of product improvements

VFD model rule



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# Chapter 1 Safety

## 1.1 Safety



Danger

Operations without following instructions can cause personal injury or death.



Attention

Operations without following instructions can cause personal injury or damage to product or other equipments

## 1.2 Notes for Installations



Danger

- Please install the drive on fire-retardant material like metal, or it may cause fire.
- Keep the drive away from combustible material and explosive gas, or it may cause fire.
- Only qualified personnel shall wire the drive, or it may cause electric shock.,
- Never wire the drive unless the input AC supply is totally disconnected, or it may cause electric shock.,
- The drive must be properly earthed to reduce electrical accident
- Install the cover before switching on the drive, to reduce the danger of electric shock and explosion.
- For drives that have been stored for longer than 2 years, increase its input voltage gradually before supplying full rated input voltage to it, in order to avoid electric shock and explosion
- Don't touch the live control terminals with bare hands
- Don't operate the drive with wet hands
- Perform the maintenance job after confirming that the charging LED is off or the DC Bus voltage is below 36V, or it may cause electric shock.,
- Only trained professionals can change the components, it is prohibited to leave wires or metal

parts inside the drive so as to avoid the risk of fire.

- Parameter settings of the control panel that has been changed must be revised, otherwise accidents may occur.
- The bare portions of the power cables must be bound with insulation tape



Attention

- Don't carry the drive by its cover. The cover can not support the weight of the drive and may drop.
- Please install the drive on a strong support, or the drive may fall off.
- Don't install the drive in places where water pipes may leak onto it.
- Don't allow screws, washers and other metal foreign matters to fall inside the drive, otherwise there is a danger of fire or damage;
- Don't operate the drive if parts are damaged or not complete, otherwise there is a danger of a fire or human injury;
- Don't install the drive under direct sunshine, otherwise it may be damaged;
- Don't short circuit +/-B1 and terminal (-), otherwise there is a danger of fire or the drive may be damaged.
- Cable lugs must be connected to main terminals firmly
- Don't apply supply voltage (AC 220V or higher) to control terminals except terminals R1a, R1b and R1c.
- B1 and B2 are used to connect the brake resistor, do not shortcut them, or the brake unit may be damaged

## 1.3 Notes for Using CV100

Pay attention to the following issues when using CV100.

### 1.3.1 About Motor and Load

Compared to the power frequency operation

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CV100 series drives are voltage type variable frequency drive. The output voltage is in PWM wave with some harmonics. Therefore, temperature rise, noise and vibration of motor are higher compared to the rated frequency.

#### **Low Speed operation with Constant Torque**

Driving a common motor at low speed for a long time, the drive's rated output torque will be reduced considering the deteriorating heat dissipation effect, so a special variable frequency motor is needed if operation at low speed with constant torque for a long term.

#### **Motor's over-temperature protecting threshold**

When the motor and driver are matched, the drive can protect the motor from over-temperature. If the rated capacity of the driven motor is not in compliance with the drive, be sure to adjust the protective threshold or take other protective measures so that the motor is properly protected.

#### **Operation above 50Hz**

When running the motor above 50Hz, there will be increase in vibration and noise. The rate at which the torque is available from the motor is inversely proportional to its increase in running speed. Ensure that the motor can still provide sufficient torque to the load.

#### **Lubrication of mechanical devices**

Over time, the lubricants in mechanical devices, such as gear box, geared motor, etc. when running at low speed, will deteriorate. Frequent maintenance is recommended.

#### **Braking Torque**

Braking torque is developed in the machine when the drive is hoisting a load down. The drive will trip when it cannot cope with dissipating the regenerative energy of the load. Therefore, a braking unit with proper parameters setting in the drive is required.

#### **The mechanical resonance point of load**

The drive system may encounter mechanical resonance with the load when operating within certain band of output frequency. Skip frequencies have been set to avoid it.

#### **Start and stop frequently**

The drive should be started and stopped via its control terminals. It is prohibited to start and stop the drive directly through input line contactors, which may damage the drive with frequent operations.

#### **Insulation of Motors**

Before using the drive, the insulation of the motors must be checked, especially, if it is used for the first time or if it has been stored for a long time. This is to reduce the risk of the Drive from being damaged by the poor insulation of the motor. Wiring diagram is shown in Fig. 1-1. Please use 500V insulation tester to measure the insulating resistance. It should not be less than 5MΩ.

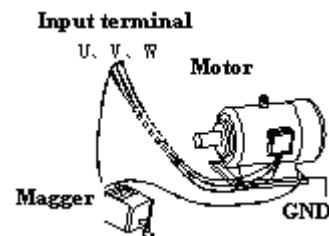


Fig. 1-1 checking the insulation of motor

### **1.3.2 About Variable Frequency Drive**

Varistors or Capacitors Used to Improve the Power Factor

Considering the drive output PWM pulse wave, please don't connect any varistor or capacitor to the output terminals of the drive, , otherwise tripping or damaging of components may occur; as shown in fig 1.2

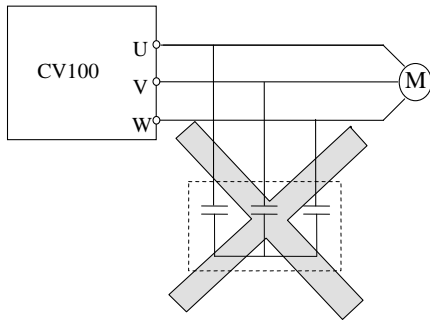


Fig. 1-2 Capacitors are prohibited to be used.

## 1.4 Disposing Unwanted Driver

When disposing the VFD, pay attention to the following issues:

The electrolytic capacitors in the driver may explode when they are burnt.

Poisonous gas may be generated when the plastic parts like front covers are burnt.

Please dispose the drive as industrial waste.

### Circuit breakers connected to the output of VFD

If circuit breaker or contactor needs to be connected between the drive and the motor, be sure to operate these circuit breakers or contactor when the drive has no output, to avoid damaging of the drive.

### Using VFD beyond the range of rated voltage

The drive is not suitable to be used out of the specified range of operation voltage. If needed, please use suitable voltage regulation device.

### Protection from lightning

There is lightningstrike overcurrent device inside the Drive which protects it against lightning.

### Derating due to altitude

Derating must be considered when the drive is installed at high altitude, greater than 1000m. This is because the cooling effect of drive is deteriorated due to the thin air, as shown in Fig.1-3 that indicates the relationship between the altitude and rated current of the driver.

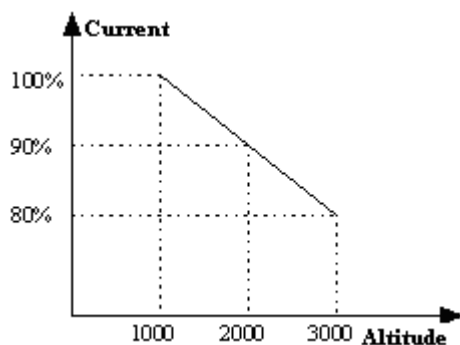


Fig. 1-3 Derating Drive's output current with altitude

## Chapter 2 Product introduction

In this chapter we introduce the basic product information of specifications, model, and structure and so on.

### 2.1 General specifications

Table 2-1 General specifications

| Item                    |                             | Description  |
|-------------------------|-----------------------------|--|
| Input                   | Rated voltage and frequency | 4T:3-phase,380V~440V AC; 50Hz/60Hz; 2S:Single-phase,200V~240V;50Hz/60Hz  |
|                         | Allowable voltage range     | 4T: 320V~460V AC; 2S:180V~260V;Voltage tolerance<3%; Frequency: $\pm 5\%$  |
| Output                  | Rated voltage               | 0~Rated input voltage  |
|                         | Frequency                   | 0Hz~400Hz(Customed 0Hz~1000Hz)   |
|                         | Overload capacity           | G type : 150% rated current for 1 minute, 180% rated current for 10 seconds;<br>L type :110% rated current for 1 minute, 150% rated current for 1 second |
| Control Characteristics | Control mode                | Vector control without PG, V/F control   |
|                         | Modulation mode             | Space vector PWM modulation  |
|                         | Starting torque             | 0.5Hz 150%rated torque (Vector control without PG)   |
|                         | Frequency accuracy          | Digital setting: Max frequency $\times \pm 0.01\%$ ; Analog setting: Max. frequency $\times \pm 0.2\%$   |
|                         | Frequency resolution        | Digital setting: 0.01Hz; Analog setting: Max frequency $\times 0.05\%$   |
|                         | Torque boost                | Manual torque boost :0%~30.0%  |
|                         | V/F pattern                 | 4 patters: 1 V/F curve mode set by user and 3 kinds of torque-derating modes (2.0 order, 1.7 order, and 1.2 order)                                       |
|                         | Acc/Dec curve               | Linear acceleration/deceleration, Four kinds of acceleration/deceleration time   |
|                         | Auto current limit          | Limit current during the operation automatically to prevent frequent overcurrent trip  |
| Customized function     | Jog                         | Range of jog frequency:0.00Hz~50.00Hz; Acc/Dec time of Jog operation:0.1~60.0s, Interval of Jog operation is also settable.                              |
|                         | Multiple speed operation    | Implement multiple speed operation by digital inputs   |
| Operation function      | Operation command           | Keypad setting, terminal setting, communication setting.   |
|                         | Frequency command setting   | Keypad setting, Analog input, Pulse input, Communication setting   |
|                         | Auxiliary frequency setting | Implement flexible auxiliary frequency trim and frequency synthesis.   |

|                     |                                  |  |
|---------------------|----------------------------------|--|
|                     | Pulse output                     | 0~100KHz pulse output.   |
|                     | Analog output                    | 1 channels analog output(0/4~20mA or 0/2~10V).   |
| Operation panel     | LED Display                      | Display setting frequency, output frequency , output voltage, output current and so on, about 20 parameters.   |
|                     | Parameters copy                  | Copy parameters by operation panel.  |
|                     | Keys lock and function selection | Lock part of keys or all the keys. Define the function of part of keys   |
| Protection function |                                  | Open phase protection (optional), overcurrent protection, overvoltage protection, undervoltage protection, overheat protection, overload protection and so on. |
| Environment         | Operating site                   | Indoor , installed in the environment free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, steam and drip.                               |
|                     | Altitude                         | Derated above 1000m, the rated output current shall be decreased by 10% for every rise of 1000m  |
|                     | Ambient temperature              | -10℃~40℃, derated at 40℃~ 50℃  |
|                     | Humidity                         | 5%~95%RH, non-condensing   |
|                     | Vibration                        | Less than 5.9m/s <sup>2</sup> (0.6g)   |
|                     | Storage temperature              | －40℃～＋70℃  |
| Structure           | Protection class                 | IP20   |
|                     | Cooling method                   | Air cooling, with fan control.   |
| Installation method |                                  | Wall-mounted   |
| Effeciency          |                                  | ≥90%   |

## 2.2 Introduction of product series

Table 2-1 Series of Kinco VFD

| Model of VFD   | Rated capacity (kVA) | Rated input current (A) | Rated output current (A) | Motor power (kW) |
|----------------|----------------------|-------------------------|--------------------------|------------------|
| CV100-2S-0002G | 0.5                  | 2.3                     | 1.3                      | 0.2              |
| CV100-2S-0004G | 1.0                  | 5.3                     | 2.5                      | 0.4              |
| CV100-2S-0007G | 1.5                  | 8.2                     | 4.0                      | 0.75             |
| CV100-4T-0007G | 1.5                  | 3.4                     | 2.3                      | 0.75             |
| CV100-4T-0015G | 3.0                  | 5.0                     | 3.7                      | 1.5              |
| CV100-4T-0022G | 4.0                  | 5.8                     | 5.5                      | 2.2              |

## 2.3 Structure of VFD

The structure of VFD is as following figure.



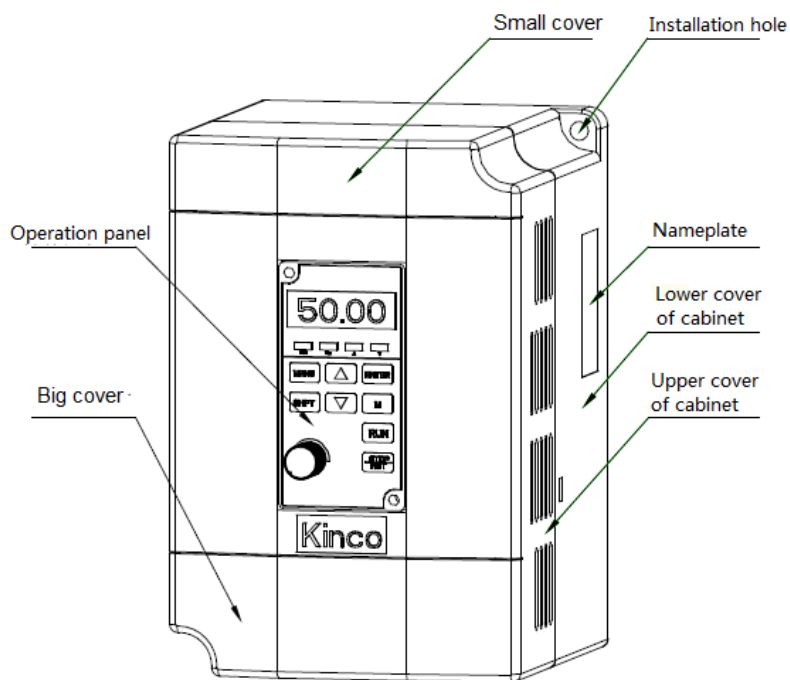


Fig.2-1 Structure chart of VFD

## 2.4 External dimension and weight

### 2.4.1 External dimension and weight

External dimension and weight is as following figure.

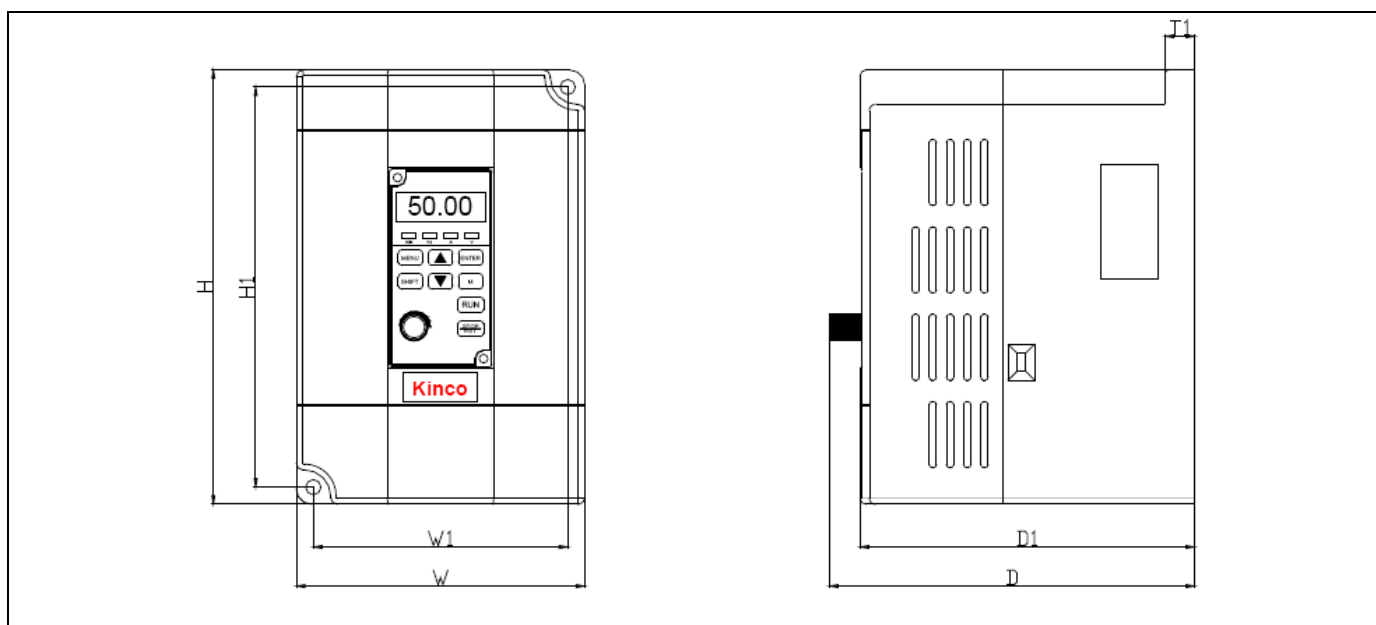


Fig 2-2 CV100-2S-0002G~ CV100-4T-0022G

Table 2-2 Mechanical parameters

| VFD model<br>(G: Constant torque load;<br>L: Draught fan and water pump load) | External dimension and (mm) |     |     |    |     |     |    |                      | Weight (kg) |
|---|-----------------------------|-----|-----|----|-----|-----|----|----------------------|-------------|
|   | W                           | H   | D   | W1 | H1  | D1  | T1 | Installation hole(d) |             |
| CV100-2S-0002G  | 85                          | 142 | 127 | 73 | 130 | 117 | 10 | 5                    | 1.5         |
| CV100-2S-0004G  |                             |     |     |    |     |     |    |                      |             |
| CV100-2S-0007G  |                             |     |     |    |     |     |    |                      |             |
| CV100-4T-0007G  | 101                         | 152 | 127 | 89 | 140 | 117 | 10 | 5                    | 1.7         |
| CV100-4T-0015G  |                             |     |     |    |     |     |    |                      |             |
| CV100-4T-0022G  |                             |     |     |    |     |     |    |                      |             |

## 2.4.2 Operation panel and installation box

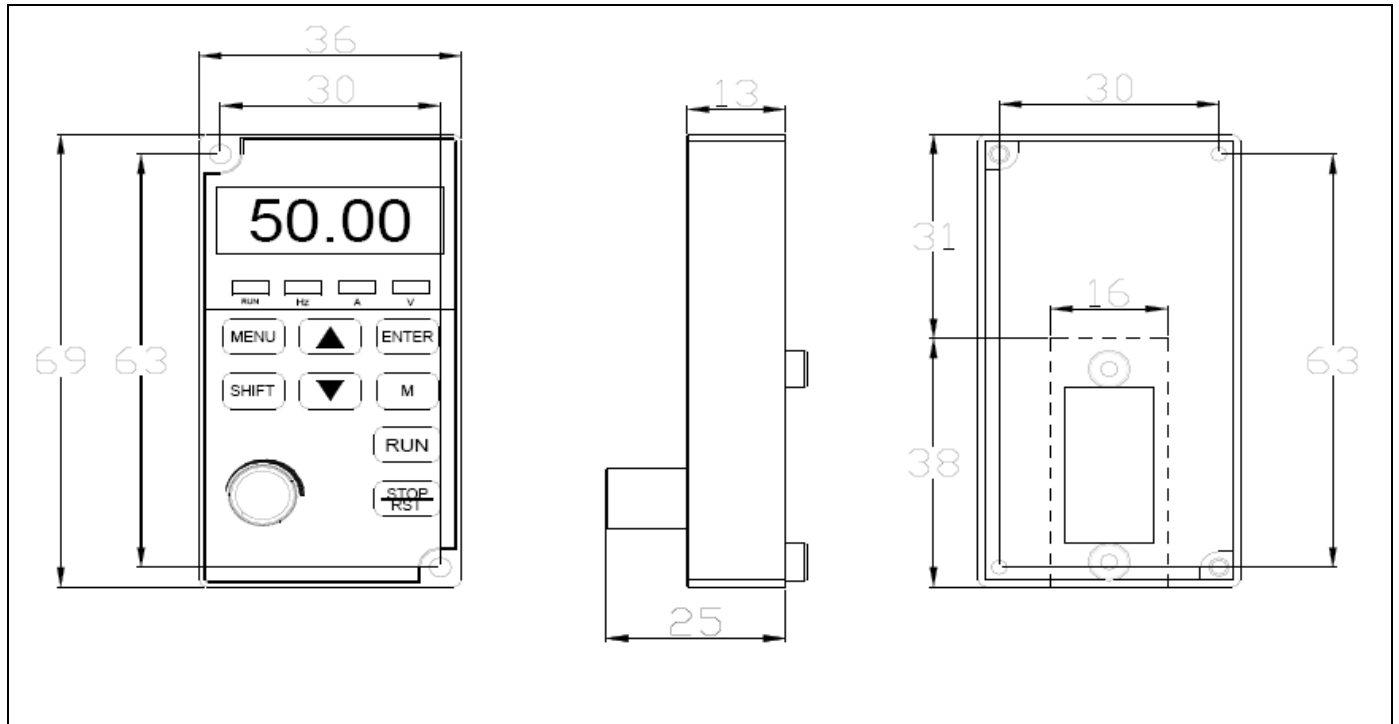


Fig 2-3 Operation panel dimension

## Chapter 3 Installation Environment

In this chapter we introduce the installation environment of VFD

Please mount the drive vertically inside a well-ventilated location.

When considering mounting environment, the following issues should be taken into account:

- Ambient temperature should be within the range of  $-10^{\circ}\text{C}$ ~ $40^{\circ}\text{C}$ . If the temperature is higher than  $40^{\circ}\text{C}$ , the drive should be derated and forced ventilation is required;
- Humidity should be lower than 95%, non-condensing
- Install in the location where vibration is less than  $5.9\text{m/s}^2$  (0.6G);
- Install in the location free of direct sunlight.
- Install in the location free of dust, metal powder.
- Install in the location free of corrosive gas or combustible gas.

If there are any special requirements for installation, please contact us for clarifications.

The requirements on mounting space and clearance are shown in Fig. 3-1 and Fig. 3-2.

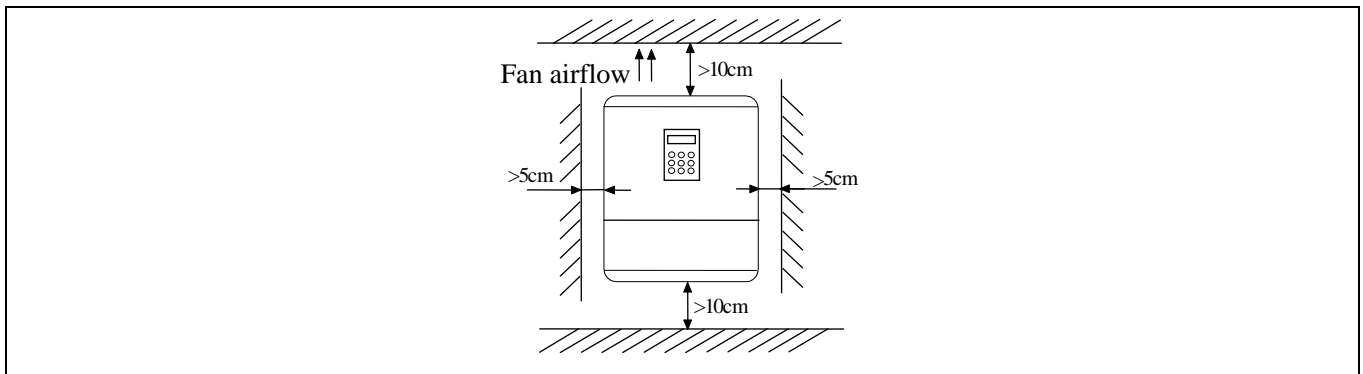


Fig 3-1 Installation interval (Power below 45kW)

Fig 3-2 Installation interval (Power above 55kW)

When two VFD are mounted one on top the other, an air flow diverting plate should be fixed in between them as shown in Fig. 3-3.

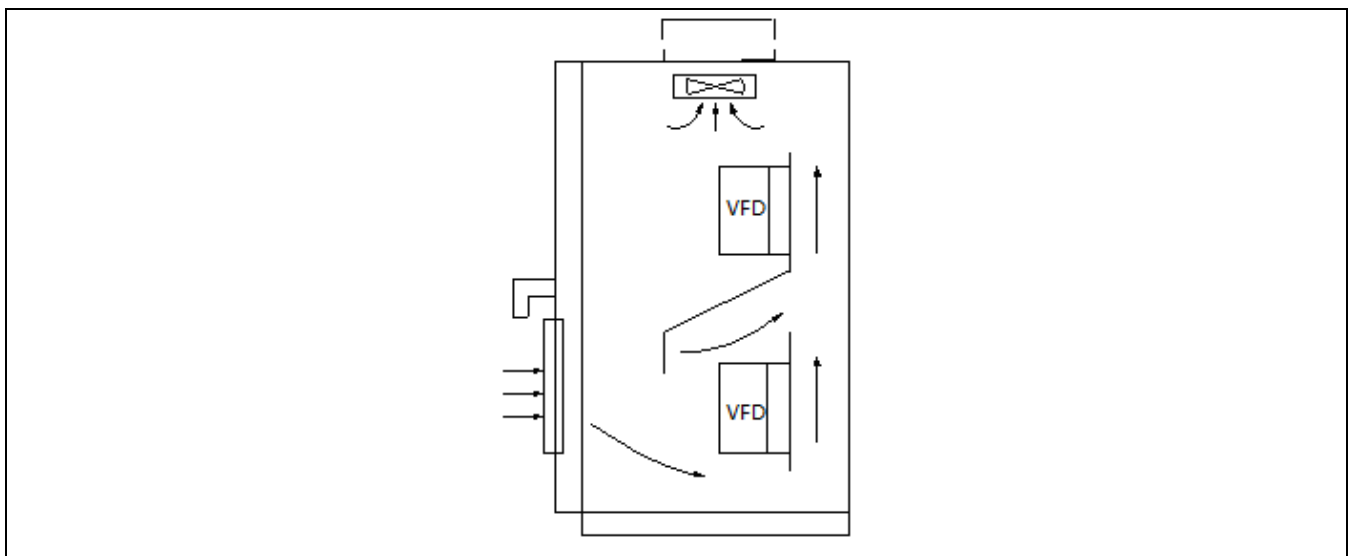


Fig 3-3 Installation of serial VFD

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## Chapter 4 Wiring Guide of VFD

In this chapter we introduce the wiring of VFD



**Danger**

- Wiring can only be done after the drive's AC power is disconnected, all the LEDs on the operation panel are off and waiting for at least 5 minutes. Then, you can remove the panel.
- Wiring job can only be done after confirming the charge indicator on the right bottom is off and the voltage between main circuit power terminals + and - is below DC36V.
- Wire connections can only be done by trained and authorized person
- Check the wiring carefully before connecting emergency stop or safety circuits.
- Check the drive's voltage level before supplying power to it, otherwise human injuries or equipment damage may happen.



**Attention**

- Check whether the Variable Speed Drive's rated input voltage is in compliant with the AC supply voltage before using.
- Dielectric strength test of the drive has been done in factory, so you need not do it again.
- Refer to chapter 2 on connected braking resistor or braking kit.
- It is prohibited to connect the AC supply cables to the drive's terminals U, V and W.
- Grounding cables should be copper cables with section area bigger than 3.5mm<sup>2</sup>, and the grounding resistance should be less than 10Ω.
- There is leakage current inside the drive. The total leakage current is greater than 3.5mA, depending on the usage conditions. To ensure safety, both the drive and the motor should be grounded, and a leakage current protector (RCD) should be installed. It is recommended to choose B type RCD and set the leakage current at 300mA.
- The drive should be connected to the AC supply via a circuit breaker or fuse to provide convenience to input over-current protection and maintainance.

### 4.1 Wiring and Configuration of Main circuit terminal

#### 4.1.1 Terminal Type of Main Loop's Input and Output

Terminal Type

Applicable Model: CV100-2S-0002G~CV100-4T-0022G

Top: 

|    |    |    |    |
|----|----|----|----|
| L1 | L2 | L3 | PE |
|----|----|----|----|

---

Bottom:

|   |   |   |      |    |
|---|---|---|------|----|
| U | V | W | +/B1 | B2 |
|---|---|---|------|----|

Table 4-1 Description of main loop terminal

| Terminal name | Function description               |
|---------------|------------------------------------|
| L1、L2         | Single phase 220VAC input terminal |
| L1、L2、L3      | 3-phase 380VAC input terminal      |
| +/B1、B2       | Braking resistor terminal          |
| U、V、W         | 3-phase AC output terminal         |
| PE            | Shield PE terminal                 |

#### 4.1.2 Wiring of VFD for Basic Operation

Applicable model: CV100-4T-0007G/0022G

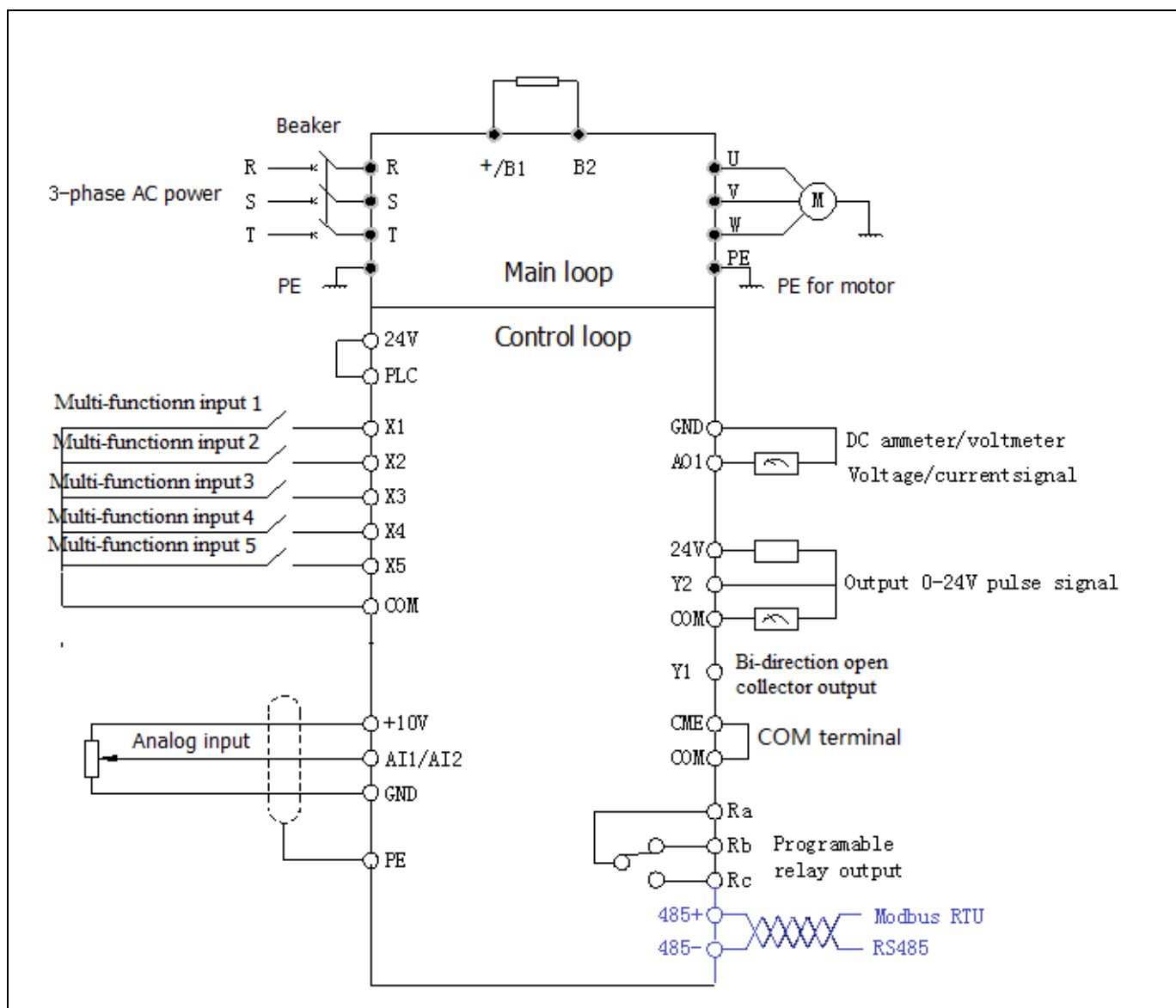


Fig.4-1 Basic wiring chart

## 4.2 Wiring and configuration of control circuit

### 4.2.1 Wiring of control circuit terminal.

Wire the terminals correctly before using the Drive. Refer to the table 4-2 for control circuit terminal function

Note

It is recommended to use cables bigger than 1mm<sup>2</sup> to connect to the terminals.

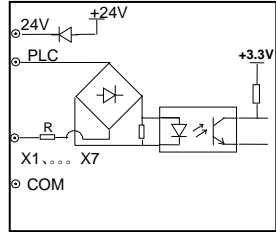
Arrangement of control circuit terminals is as follows

|    |    |    |     |     |      |    |    |    |    |    |    |    |     |     |     |     |    |
|----|----|----|-----|-----|------|----|----|----|----|----|----|----|-----|-----|-----|-----|----|
| RA | RB | RC | AI1 | AI2 | +10V | X1 | X2 | X3 | X4 | X5 | Y1 | Y2 | AO1 | PLC | 24V | COM | PE |
|----|----|----|-----|-----|------|----|----|----|----|----|----|----|-----|-----|-----|-----|----|

Fig.4-2 Arrangement of control terminals

Refer to table 4-2 for description of each terminal

Table 4-2 function list of each list

| Category                       | Terminals | Name                               | Function description  | Specification   |
|--------------------------------|-----------|------------------------------------|---|---|
| Shield                         | PE        | Shielded PE                        | PE terminal connected to shielding layer. Analog signal, 485 communication, motor power cable shield can be connected here  | Connected to circuit PE inside the drive  |
| Power supply                   | +10       | +10V Power supply                  | Provide +10V power supply   | Maximum output current is 5mA   |
| Analog input                   | AI1       | Signal-ended input AI1             | Can accept analog voltage/current input, jumper AI1 can select voltage or current input mode. (Reference ground: GND)   | Input voltage range: -10V~10V<br>( Input impedance 45KΩ )<br>Resolution: 1/4000   |
|                                | AI2       | Signal-ended input AI2             | Can accept analog voltage/current input, jumper AI2 can select voltage or current input mode. (Reference ground: GND)   | Input current range : 0mA~20mA, Resolution: 1/2000(Need jumper)   |
| Analog output                  | AO1       | Analog output 1                    | Providing analog voltage or current output, they are selected by the jumper AO1. The default setting is output voltage, refer to the function code A6.28(Reference ground: GND) | Voltage output range: 0V~10V<br>Current output range: 0/4~20mA  |
| Multi-function input terminal  | X1        | Multi-function input terminal 1    | Can be defined as multi-function digital input terminal.(Refer to the A6 group, from A6.00 to A6.04)  | Optocoupler isolation input<br>Input resistor: R=3.3kΩ<br>Maximum input frequency of X1~X3: 200Hz<br>Maximum input frequency of X4 and X5: 100kHz<br>Input voltage range: 20~30v<br> |
|                                | X2        | Multi-function input terminal 2    |   |   |
|                                | X3        | Multi-function input terminal 3    |   |   |
|                                | X4        | Multi-function input terminal 4    |   |   |
|                                | X5        | Multi-function input terminal 5    |   |   |
| Multi-function output terminal | Y1        | Bi-direction open-collector output | Can be defined as multi-function digital output terminal , refer to the A6.14 description (Com port: COM)   | Optocoupler isolation output<br>Maximum working voltage: 30v<br>Maximum output current: 50mA  |
|                                | Y2        | Open collector pulse terminal      | Can be defined as multi-function pulse signal output terminal , refer to the A6.25 description(Com port: COM)   | Maximum output frequency: 100kHz(Depend on the A6.26)   |

| Category                | Terminals | Name                             | Function description  | Specification   |
|-------------------------|-----------|----------------------------------|---|---|
| Power supply            | 24V       | + 24V power supply               | Providing +24V power  | Maximum output current: 200mA   |
| Common port             | PLC       | Multi-function input common port | Common port of Multi-function input (Short cut with 24V in default)                                 | Common port of X1~X5, PLC is isolated from 24V internally   |
|                         | COM       | Common port of 24V power supply  | Three common ports in all, cooperate with other terminals   |   |
| Relay output terminal 1 | Ra        | Relay output                     | Can be defined as multi-function relay output terminal(Refer to the A6.16 for function description) | R1a-R1b: Normally closed,<br>R1a-R1c: normally open   |
|                         | Rb        |                                  |   | Contact capacity :  |
|                         | Rc        |                                  |   | AC250V/2A (COSΦ=1)<br>AC250V/1A (COSΦ=0.4)<br>DC30V/1A<br>Input voltage of relay output terminal 's overvoltage class is overvoltage class II |

### Wiring of analog input

1) AI1, AI2 can be connected to analog voltage or current sigle-ended input. Voltage or current mode can be seleted by AI1and AI2. The wiring is as follows:

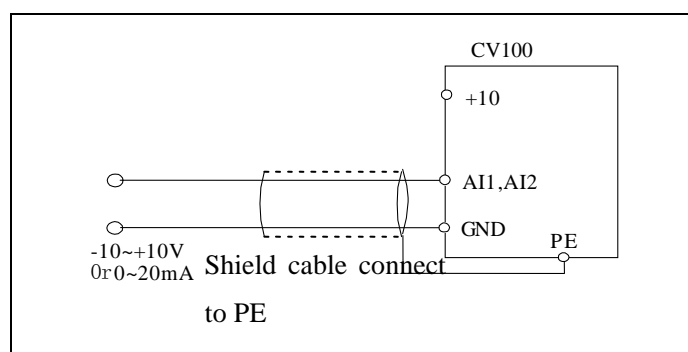


Fig 4-3 AI1, AI2 terminal wiring

### Wiring of analog output terminal

If the analog output terminals AO1 is connected to analog meters, then various kinds of physical values can be measured. The jumper can select current output (0~20mA) or voltage output (0~10V). The wiring is as follows:



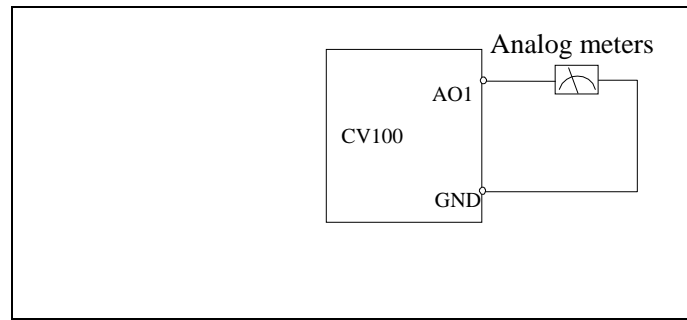


Fig.4-6 Wiring of analog output

Notes:

1. When using analog input, a common mode inductor can be installed between input signal and COM.
2. The analog input voltage is better under 15v.
3. Analog input and output signals are easily disturbed by noise, so shielded cables must be used to transmit these signals and the cable length should be as short as possible.
4. The analog output terminal can stand the voltage under 15v

#### Wirings of multiple function input terminal and operation terminal

CV100 multi-function input terminal uses a full-bridge rectifying circuit as shown in Fig.4-7. PLC is the common terminal of terminals X1~X5, The current flows through terminal PLC can be pulling current and the feeding current. Wiring of X1~X5 is flexible and the typical wiring are as follows:

1. Dry contacts method

1) Analog differential voltage input, the wiring is as in fig.4-7.

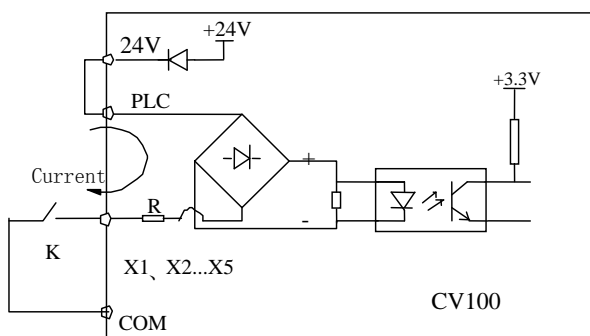


Fig.4-7 Wiring method of using the internal 24V power supply

2) If an external power supply is used (The power supply must satisfy the UL CLASS 2 standard and a 4A fuse is must between the power supply and terminal), the

wiring is as Fig.4-8 (Make sure the PLC and 24v terminal is disconnected)

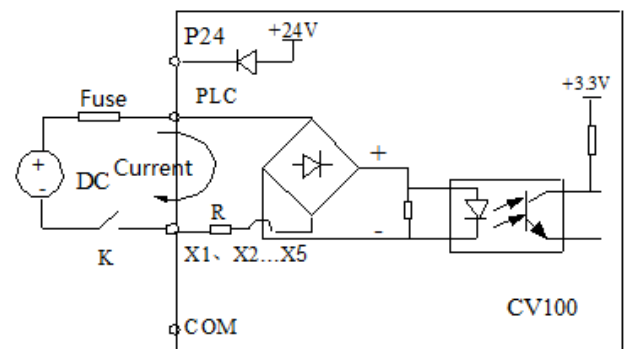
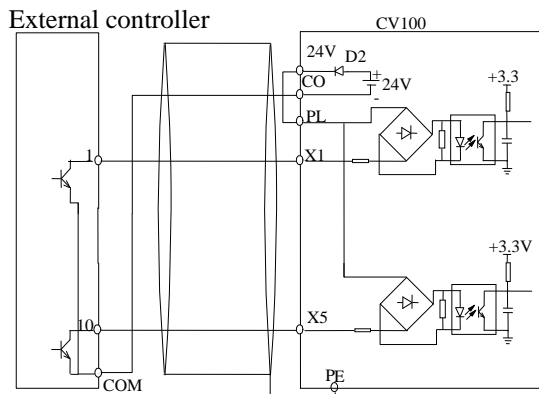


Fig.4-8 Wiring of external power supply

2. Source/drain connection method

1) Use internal +24V power supply and the external controller uses NPN transistors whose common emitter are connected, as shown in the fig.4-9

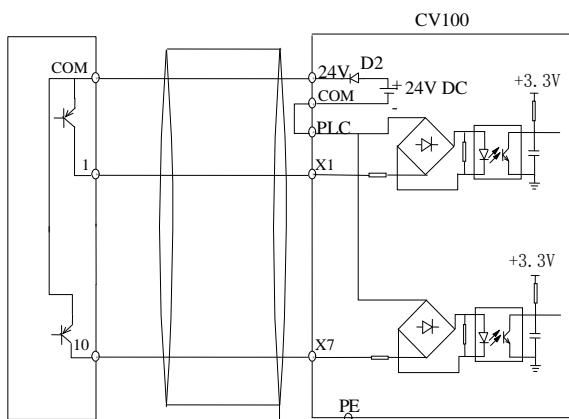


Shielded cable's end near the drive  
should be connected to the PE

Fig.4-9 Source connection of using the

external power supply

- 2) Use internal +24V power supply and the external controller uses PNP transistors whose common emitter are connected, as shown in the fig 4-10 (Make sure the PLC and 24v terminal is disconnected). The wiring is as shown in fig 4-10

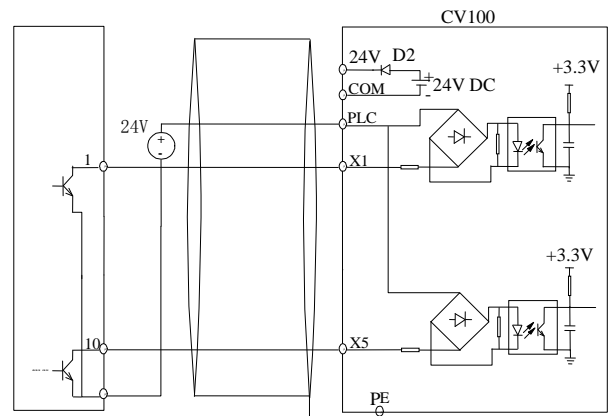


Shielded cable's end near the drive  
should be connected to the PE

Fig 4-10 Drain connection of using the

internal power supply

- 3) Source connection if using the external power supply (Make sure the PLC and 24v terminal is disconnected). As shown in the fig.4-11

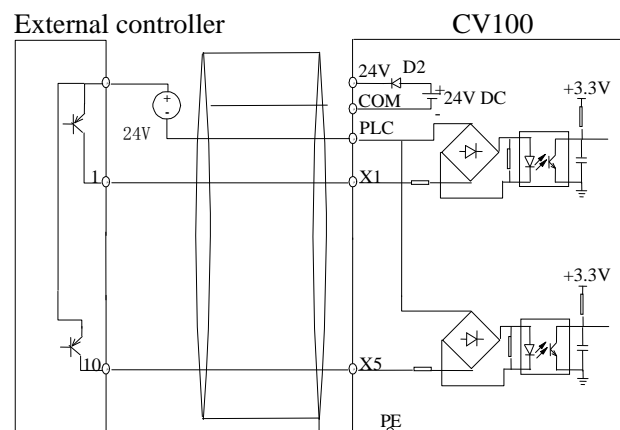


Shielded cable's end near the drive  
should be connected to the PE

Fig 4-11 Source connection if use the

external power supply

- 4) Drain connection if use the external power supply (Make sure the PLC and 24v terminal is disconnected). As shown in the fig 4-12



Shielded cable's end near the drive  
should be connected to the PE

Fig 4-12 Drain connection if using the

external power supply

### Multi-function output terminal wiring

1. Multi-function output terminal Y1, Y2 can use the internal 24 power supply, the wiring is as shown in Fig.4-13

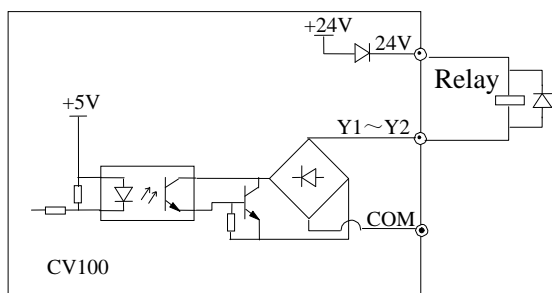


Fig 4-13 Wiring method 1 of multi-function output terminal

2. Multi-function output terminal Y1, Y2 can use the external 24 power supply too, the wiring is as shown in Fig.4-14.

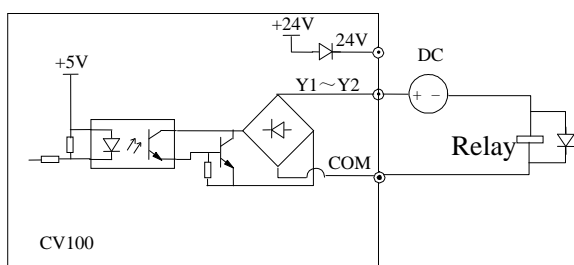


Fig 4-14 Wiring method 2 of multi-function output terminal

3. Y2 is also can be used as pulse output. If Y2 uses the internal 24v power supply. The wiring is shown in Fig.4-15.

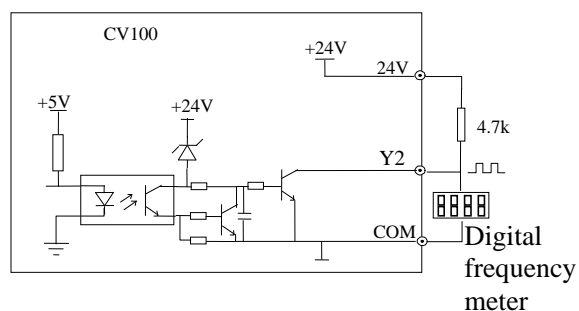


Fig 4-15 Wiring method 1 of output terminal Y2

4. When Y2 is used as a pulse output, it also can use the external power supply. The wiring is shown in Fig.4-16

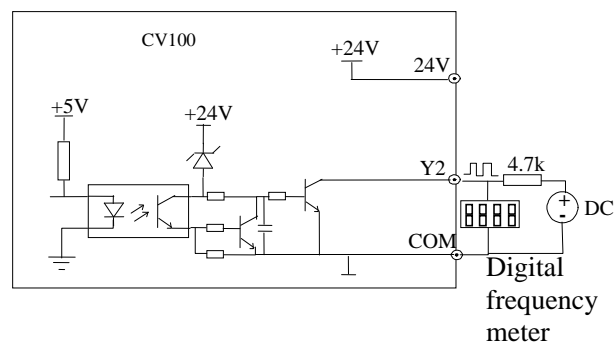


Fig.4-16 Wiring method 2 of output terminal Y2

### Wiring of relay output terminals Ra, Rb and Rc

If the drive drives an inductive load (such as electromagnetic relays and contactor), then a surge suppressing circuit should be added, such as RC snubbing circuit (Notice that the leakage current must be smaller than the holding current of the controlled relay or contactor) and varistor or a free-wheeling diode (Used in the DC electric-magnetic circuit and pay attention to the polarity when installing). Snubbing components should be as close to the coils of relay or contactor as possible.

### Note

1. Don't short circuit terminals 24V and COM, otherwise the control board may be damaged.
2. Please use multi-core shielded cable or multi-stranded cable(above 1mm) to connect the control terminals.
3. When using a shielded cable, the shielded layer's end that is nearer to the drive should be connected to PE.
4. The control cables should be as far away(at least 20cm) from the main circuits and high voltage cables as possible (including power supply cables, motor cables, relay cables and contactor cables and so on). The cables should be vertical to each other to reduce the disturbance to minimum.
5. The resistors R in Fig. 4-13 and Fig.4-14 should be removed for 24V input relays, and the resistance of R should be selected according the parameters of relay for non-24V relay.
6. Digital output terminal can not stand the voltage higher than 30V

## Chapter 5 Operation Instructions of Kinco VFD

In this chapter we introduce the necessary knowledge of Kinco VFD and related operations.

### 5.1 Using Operation Panel

#### 5.1.1 Operation panel appearance and keys' function description

Operation panel is used to setup the drive and display parameters, it is LED display . As shown in Fig.5-1

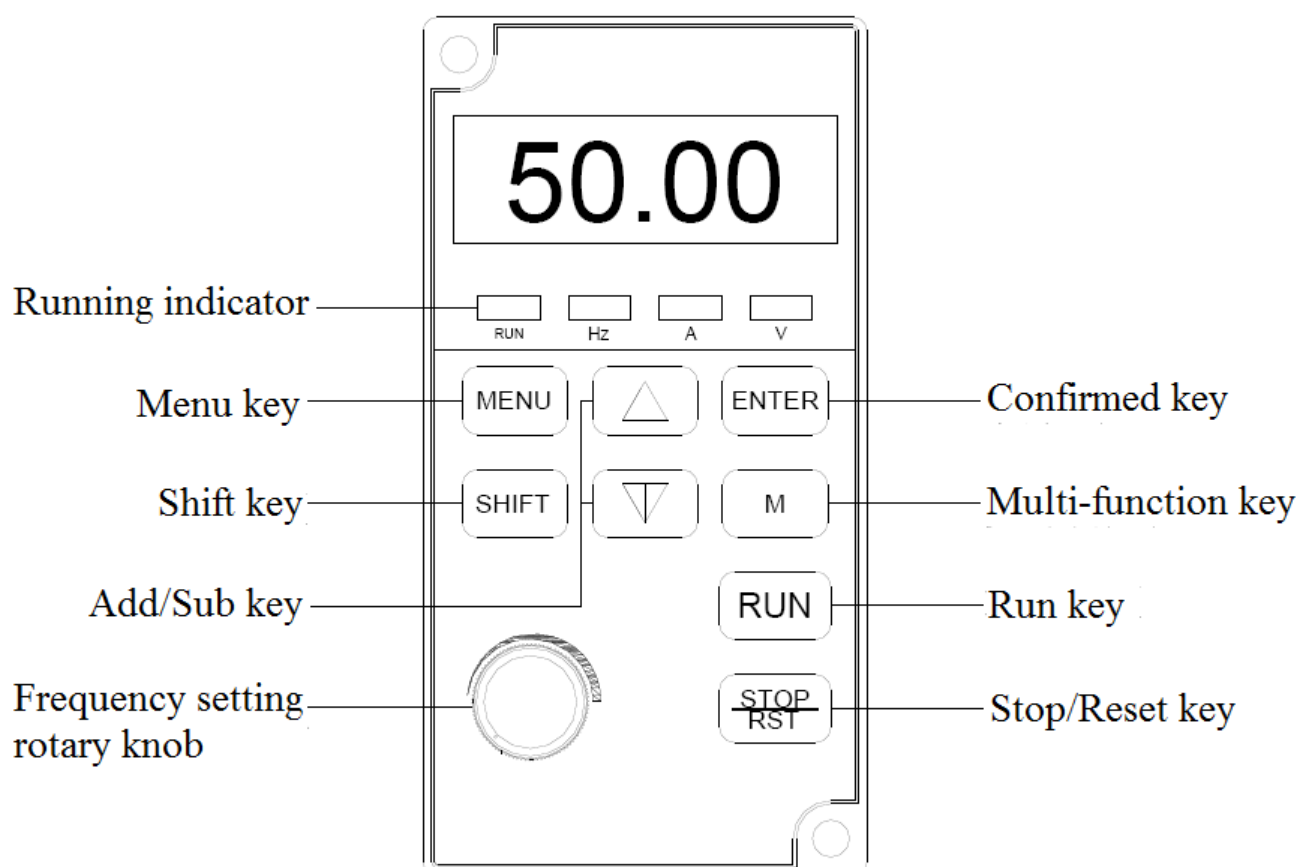


Fig.5-1 Illustration of operation panel

There are 9 keys on the operation panel and functions of each key are shown in Table 4-1.

Table 5-1 Function list of operation panel

| Key          | Name               | Function  |
|--------------|--------------------|---|
| <b>MENU</b>  | Program/ exit key  | Enter or exit programming status  |
| <b>ENTER</b> | Function/ data key | Enter next level menu or confirm data   |
| <b>△</b>     | Increase key       | Increase data or parameter  |
| <b>▽</b>     | Decrease key       | Decrease data or parameter  |
| <b>SHIFT</b> | Shift key          | In editing status, pressing this key select the Bit to be modified. In other status, this key is used to switch parameters. |
| <b>M</b>     | Multi-function key | Use the b4.02 to cofigure thw function of this key  |

| Key                | Name                          | Function  |
|--------------------|-------------------------------|---|
| <b>RUN</b>         | Run key                       | In panel control mode, press this key to run the drive. |
| <b>STOP/RST</b>    | Stop/reset key                | Press this key to stop or reset the drive.              |
| <b>Rotary knob</b> | Frequency setting rotary knob | Rotate it to set the frequency.                         |

### 5.1.2 Function Descriptions of LED and Indicators

The operation panel consists of a 4-digits eight segments LED display, 3 unit indicators and 1 status indicator as shown in Fig.5-1. The LED display can display the status parameters, function codes and error codes of the drive. 1 status indicator, its description is shown in table 5-2

Table 5-2

| Indicator              | Status | Current status of drive |
|------------------------|--------|-------------------------|
| Running indicator(RUN) | Off    | Stop                    |
|                        | On     | Running                 |

### 5.1.3 Display status of operation panel

CV100 operation panel can display the parameters in stopping status, running status, parameters editing status..

#### 1. Parameters displayed in stopping status

When the drive is in stop status, the operation panel displays the stopping status parameter. Pressing the **SHIFT** key can display different stop status parameters (Defined by function code b4.05)

#### 2. Parameters displayed in running status

When the drive receives operating command, it starts running and its panel will display the running status parameters, the **RUN** indicator turns on. The unit indicator display the unit of the parameter, by pressing the **SHIFT** key can display different operation parameters (Defined by function code b4.05)

#### 3. Parameters displayed in error status

When the drive detects a fault signal, the panel will display the flashing fault code..

Press the **SHIFT** key to display the stop status parameter and error code. By pressing the **STOP/RST**,

control terminal or communication command to reset the error. If the error still exists, then the panel keeps displaying the error code.

#### 4. Parameter editing status

When the drive is in stop, running or error state, press **MENU** can enter edit status (If password needed, please refer to description of A0.00). Edit state displays in 2-level menu, they are: function code group or function code number → function code parameter value. You can press **ENTER** to enter parameter displayed status. In function parameter displayed status, press **ENTER** to save the settings, and press **MENU** to exit the menu.

### 5.1.4 Panel Operation

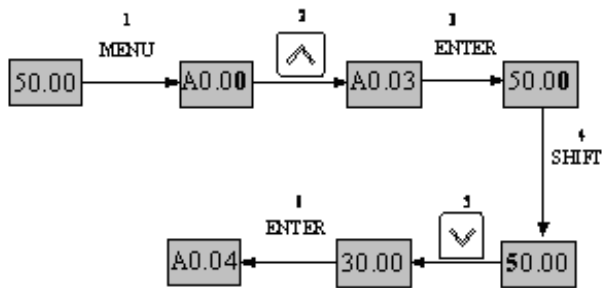
Various operations can be done on the operation panel, follows are 5 common examples. Refer to parameter list in chapter 9 for detail function code description.

#### **Example 1: Set parameters**

Example: Change the value in A0.03 from 50.00Hz to 30Hz

1. In the stop parameter displaying state, press **MENU** to enter the first level A0.00;
2. Press **△** to change A0.00 to A0.03;
3. Press **ENTER** to enter the second level menu
4. Press the **SHIFT** to change the marker to the highest bit
5. Press the **▽** to change the 50.00 to 30.00
6. Press the **ENTER** to confirm above change and back to the first level menu. Then the parameter is changed successfully.

The above operations are shown in following picture.



**Note: The number in bold font is the flashing bit**

Fig 5-2 Example of setting parameter

In function parameter displaying status, if there is no bit flashing. It means that this function code can not be changed, the possible reason are:

1. This function code is unchangeable parameter. Like actual detected parameter, operation log parameter and so on
2. This parameter can not be changed when operating; you need stop the VFD to edit the parameter
3. The parameters are protected. When the b4.02 is 1, function code can not be changed. It is to protect the VFD from wrong operatingon. If you want to edit this parameter, you need set function code b4.02 to 0.

#### **Example 2: Regulate the setting frequency**

Press the or rotary knob to change the setting frequency directly when power on VFD

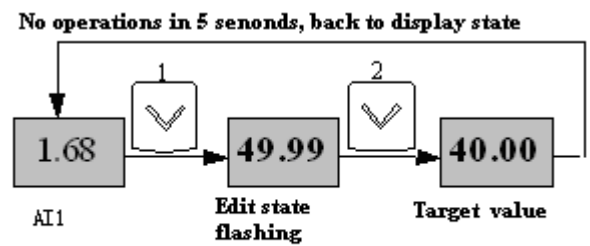
##### **Note:**

When the Operating Speed, Setting Speed, Operating Line Speed, and Setting Line Speed is displayed on the panel. Press or is to modify the value of Setting Speed and Setting Line Speed.

Example: changing the setting frequency from 50.00Hz to 40.00Hz.

After the VFD power on (in this example the LED is in voltage display status AI1), Press to modify the setting frequency (Holding can speed up the modification) from 50.00Hz to 40.00Hz. So the setting frequency is modified.

The above steps are as the following figure:



**Note: The number in bold font is the flashing bit**

Fig 5-3 Modify the setting frequency

After modification, if there are no operations in 5 seconds. The LED back to display the voltage, it is the display status before modification.

#### **Example 3: Set the password**

To protect parameters, the VFD provides the password protection function. The user needs to input the right password to edit the parameters if the VFD been set password. For some manufacturer parameters, the manufacturer password is needed.

##### **Note:**

Do not try to change the manufacturer parameters, if they are not set probably, the VFD may can not work or be damaged.

Function code A0.00 is to set user password. Refer to Chapter 6.1 A0 group for more information

Suppose the user's password is set as 1234, then the VFD is locked, and you can not do any operation to VFD. Then you can follow the following steps to unlock the VFD.

- 1 when the VFD is locked, press **MENU**. The LED enter the password display status: 0000;
- 2 Change 0000 to 1234;
- 3 Press **ENTER** to confirm. Then the LED displays A0.01. So the VFD is unlocked

##### **Note:**

After unlock the password, if there is no operation in 5 minutes, VFD will be locked again.

#### **Example 4: Lock the operation panel**

The b4.00 is used to lock the operation board. Refere to chapter 6.1 A0 group for more information

---

Example: Lock all the keys of the operation panel  
Under stop parameter displaying status.

- 1 press **MENU** to enter A.00
- 2 Press **△** to choose the function code b4.00
- 3 Press **ENTER** to enter the second level menu
- 4 Press **△** to change the hundreds place from 0 to 1
- 5 Press **ENTER** to confirm
- 6 Press **MENU** to back the stop parameter displaying status;
- 7 Press **ENTER** and hold, then press **MENU**, so the key board is locked

#### **Example 5: Unlock the keys of the operation panel**

When the operation panel is locked, follow the follow operations to unlock it:

Press the **ENTER** and hold , then press the **▽** three times

---

#### **Note:**

Whatever setting is in b4.00, after the VFD power on, the operation board is in unlock status.

---

## **5.2 Operation mode of VFD**

In the follow-up sections, you may encounter the terms describing the control, running and status of drive many times. Please read this section carefully. It will help you to understand and use the functions discussed in the follow chapters correctly.

### **5.2.1 Control mode of VFD**

It defines the physical channels by which drive receives operating commands like START, STOP, JOG and others, there are two channels:

- 1 Operation panel control: The drive is controlled by **RUN**, **STOP** and **M** keys on the operation panel;
- 2 Terminal control: The drive is controlled by terminals Xi、Xj and COM (2-wire mode), or by terminal Xk (3-wire mode);

The control modes can be selected by function code A0.04, multi-function input terminal (Function No. 15~17 are selected by A6.00~A6.04 )

---

#### **Note:**

Before you change the control mode, make sure that the mode suitable for the application. Wrong selection of control mode may cause damage to equipment or human injury!

---

### **5.2.2 Operating Status**

There are 3 operating status: stop, motor parameters auto-tuning, and operating.

1.Stop status: After the drive is switched on and initialized, if no operating command is accepted or the stop command is executed, then the drive in stop status.

2.Running status: The drive enters running status after it receives the operating command.

3.Motor parameters auto-tuning status: If there is an operating command after b0.11 is set to 1 or 2, the drive enters motor parameters auto-tuning status, and then enters stopping status after auto-tuning process finishes.

### **5.2.3 Control mode and operation mode of Kinco VFD**

#### **Control mode**

CV100 VFD has three control methods, it is set by A0.01:

0. Vector control without PG: it is vector control without speed sensor, need not to install the PG, at the same time it has very high control performance, it can control the speed and torque of motor accurately. It has the characteristics like low frequency with high torque and steady speed with high accuracy. It is often used in the applications that the V/F control mode can not satisfy, but requires high robustness.

1. Reserved

2. V/F control: It is used in the applications that do not require very high performance, such as one VFD controls multiple motors.

### Operation mode

Speed control: Control the speed of motor accurately, related function codes in group A5 should be set.

Torque control: Control the torque of motor accurately, related function codes in group A5 should be set.

### 5.2.4 The channels to set the VFD frequency

CV100 supports 5 kinds of operating modes in speed control mode which can be sequenced according to the priority: Jog>Close loop process operation>PLC operation>Multiple speed operation>simple operation.

It is shown as follows:

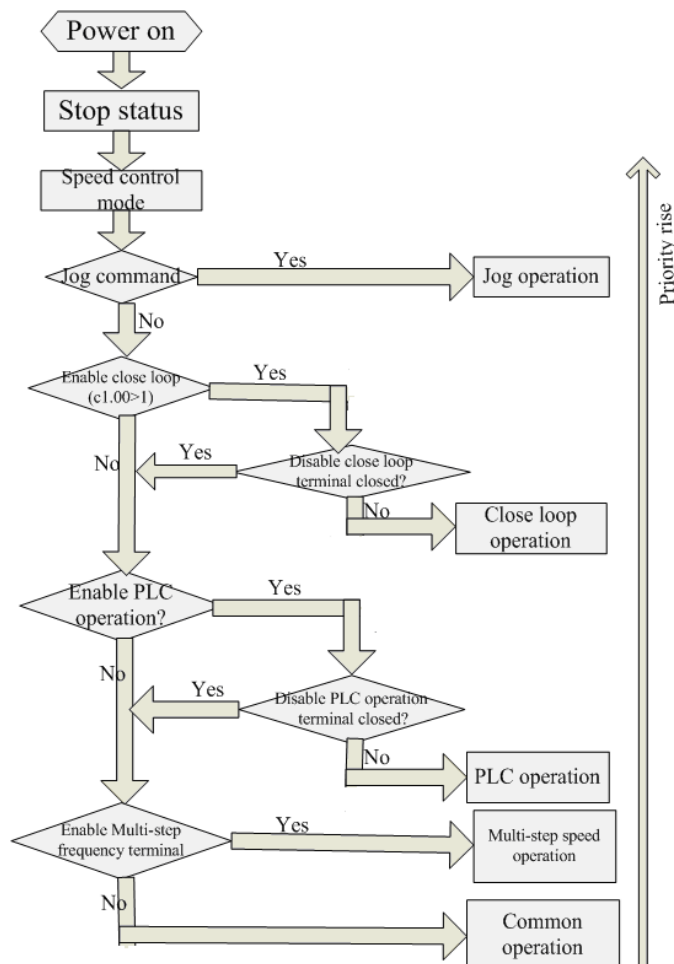


Fig 5-4 Operating mode in speed control mode

The three operating modes provide three basic frequency source. Two of them can use the auxiliary

frequency to stacking and adjusting (except Jog mode), the descriptions of each mode are as follows:

#### 1) JOG operation:

When the drive is in STOP state, and receives the JOG command (for example the **M** key on the panel is pressed), then the drive jogs at the JOG frequency (refer to A2.04 and A2.05)

#### 2) Close-loop process operation:

If the close-loop operating function is enabled (C1.00=1), the drive will select the close-loop operation mode, that is, it will perform closed-loop regulation according to the given and feedback value (refere to Group C1). This mode can be deactivated by the multi-function terminals, and switch to the lower priority mode.

#### 3) PLC operation

This function is customized, description is omitted.

#### 4) Multi-step (MS) speed operation:

Select Multiple frequency 1~15 (C0.00~C0.14) to start Multple speed operation by the ON/OFF combinations of the multi-function terminals (No.27, 28, 29 and 30 function). If all the terminals are "OFF", it is in simple operation.

### Note:

About the frequency setting channel under speed mode, please refer to the chapter 6 for detail information

## 5.3 Power on the Drive for the first time

### 5.3.1 Checking before power on

Please wire the drive correctly according to chapter 4

### 5.3.2 Operations when start up the first time

After checking the wiring and AC supply, switch on the circuit breaker of the drive to supply AC power to it. The drive's panel will display "8.8.8.8." at first, and then the contactor closes. If the LED displays the



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setting frequency,that is to say the initialization of the drive is completed.

Procedures of first-time start-up are as follows:

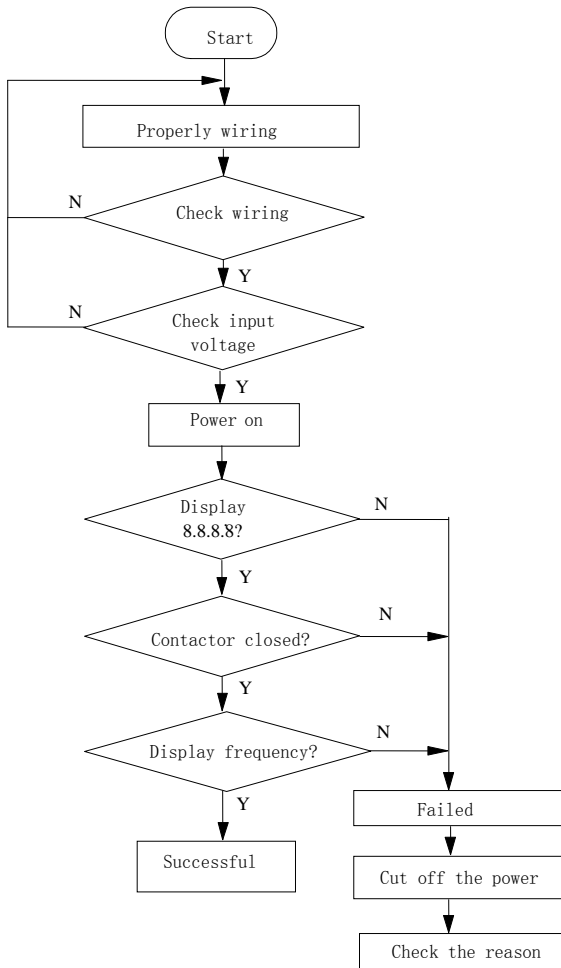


Fig.5-5 Procedures of first-time start-up

## Chapter 6 Parameter Introductions

Note

|               |                |       |               |
|---------------|----------------|-------|---------------|
| XXXX          | YYYYYYYY       | N1~N2 | <b>D</b>      |
| Parameter No. | Parameter Name | Range | Default value |

### 6.1 Group A0

|                     |                               |
|---------------------|-------------------------------|
| A0.00 User password | 00000~65535<br><b>【00000】</b> |
|---------------------|-------------------------------|

This function is used to prevent the irrelevant personnel from inquiring and changing the parameter as to protect the safety of the inverter parameters.

0000: No password protection.

Set password:

Input four digits as user password, and press **ENTER** key for confirmation. After 5 minutes without any other operation, the password will be effective automatically.

Change password:

Press **MENU** key to enter the password verification status. Input correct password and it enters parameter editing status. Select A0.00 (parameter A0.00 displayed as 00000). Input new password and press **ENTER** key for confirmation. After 5 minutes without any other operation, the password will be effective automatically.

**Note:**

Please safekeeping the user password.

|                    |                |
|--------------------|----------------|
| A0.01 Control mode | 0~2 <b>【0】</b> |
|--------------------|----------------|

0: Vector control without PG (Open loop vector control)

It is a vector control mode without speed sensor feedback. It is applicable to most applications.

1: Reserved

2: V/F control

It is used to control voltage/frequency constantly. It is applicable to most application, especially for the application of one drive driving multiple motors.

|   |                |
|---|----------------|
| A0.02 Main reference frequency selector | 0~4 <b>【0】</b> |
|---|----------------|

0: Digital setting.

The initial reference frequency is the value of A0.03.

It can be adjusted via **▲** and **▼** key, or via terminal UP/DOWN.

1: Set via AI1 terminal.

The reference frequency is set by analog input via terminal AI1 and the voltage range is -10V~10V. The relationship between voltage and reference frequency can be set in Group A3.

2: Set via AI2 terminal.

The reference frequency is set by analog input via terminal AI2 and the voltage range is -10V~10V. The relationship between voltage and reference frequency can be set in Group A3.

3: Reserved.

4: Set via DI terminal (PULSE)

The reference frequency is set by the pulse frequency in terminals X4 and X5. The relationship between pulse frequency and reference frequency can be set in Group A3.

|   |  |
|---|--|
| A0.03 Set the operating frequency in digital mode | Range: Lower limit of frequency ~upper limit of frequency <b>【50.00Hz】</b> |
|---|--|

When the reference frequency is set in digital mode (A0.02=0), this setting of this parameter is the drive's initial frequency value.

|   |                |
|---|----------------|
| A0.04 Methods of inputting operating commands | 0~2 <b>【1】</b> |
|---|----------------|

CV100 has two control modes.

0: Panel control: Input operating commands via panel. Start and stop the drive by pressing **RUN**, **STOP** and **M** on the panel.

1: Terminal control: Input operating commands via terminals.

Use external terminals Xi (Set function code A6.00~A6.04 to 1 and 2), **M** Forward, **M** Reverse to start and stop the drive.

2:Modbus communication.

|                             |                |
|-----------------------------|----------------|
| A0.05 Set running direction | 0~1 <b>【0】</b> |
|-----------------------------|----------------|

This function is active in panel control mode and serial port control mode, and inactive in terminal control mode.

0: Forward

1: Reverse

|                  |                              |
|------------------|------------------------------|
| A0.06 Acc time 1 | 0.0~6000.0s<br><b>【6.0s】</b> |
| A0.07 Dec time 1 | 0.0~6000.0s<br><b>【6.0s】</b> |

Default value of Acc/Dec time 1:

2KW or below:6.0S

30KW~45KW:20.0S

45KW or above:30.0S

Acc time is the time taken for the motor to accelerate from 0Hz to the maximum frequency (as set in A0.08).

Dec time is the time taken for the motor to decelerate from maximum frequency (A0.08) to 0Hz.

CV100 series VFD has defined 4 kinds of Acc/Dec time.(Here only Acc/Dec time 1 is defined, and Acc/Dec time 2~4 will be defined in A4.01~A4.06),and the Acc/Dec time 1~4 can be selected via the combination of multiple function input terminals,please refer to A6.00~A6.04.

|                                |  |
|--------------------------------|--|
| A0.08 Max. output frequency    | Max{50.00,A0.11 upper limit of frequency}~300.00Hz<br><b>【50.00】</b> |
| A0.09 Max. output voltage      | 0~480V <b>【VFD's rating values】</b>                                  |
| A0.10 Upper limit of frequency | A0.12~A0.09 <b>【50.00】</b>   |
| A0.11 Lower limit of frequency | 0.00~A0.11 <b>【00.00】</b>  |

|                                 |  |
|---------------------------------|--|
| A0.12 Basic operating frequency | 0.00~Max. output frequency<br>A0.08 <b>【50.00】</b> |
|---------------------------------|--|

Max output frequency is the highest permissible output frequency of the drive, as shown in Fig. 6-1 as  $F_{\max}$ ;

Max output voltage is the highest permissible output voltage of the drive, as shown in Fig. 6-1 as  $V_{\max}$

Upper limit of frequency is the highest permissible operating frequency of the user setting, as shown in Fig. 6-1 as  $F_H$ .

Lower limit of frequency is the lowest permissible operating frequency of the user setting,as shown in Fig.6-1 as  $F_L$ .

Basic operating frequency is the Min. frequency when the drive outputs the max voltage in V/F mode, as shown in Fig. 6-1 as  $F_b$

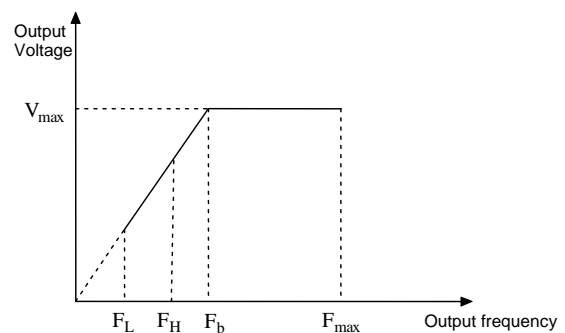


Fig.6-1 Characteristic parameters

Note:

1. Please set  $F_{\max}$ ,  $F_H$  and  $F_L$  carefully according to motor

Parameters and operating states.

2.  $F_H$  and  $F_L$  is invalid for JOG mode and auto tuning mode.

3. Besides the upper limit of frequency and lower limit of frequency,the drive is limited by the setting value of frequency of starting,starting frequency of DC braking and hopping frequency.

4. The Max. output frequency,upper limit frequency and lower limit frequency is as shown in Fig.6-1.

5. The upper/lower limit of frequency are used to limit the actual output frequency.If the preset frequency is higher than upper limit of frequency,then it will run in

upper limit of frequency.If the preset frequency is lower than the lower limit of frequency,then it will run in lower limit of frequency.If the preset frequency is lower than starting frequency,then it will run in 0Hz.

|                               |                  |
|-------------------------------|------------------|
| A0.13 Torque boost of motor 1 | 0.0~30.0% 【0.0%】 |
|-------------------------------|------------------|

In order to compensate the torque drop at low frequency, the drive can boost the voltage so as to boost the torque. If A0.13 is set to 0, auto torque boost is enabled and if A0.13 is set non-zero, manual torque boost is enabled, as shown in Fig. 6-2.

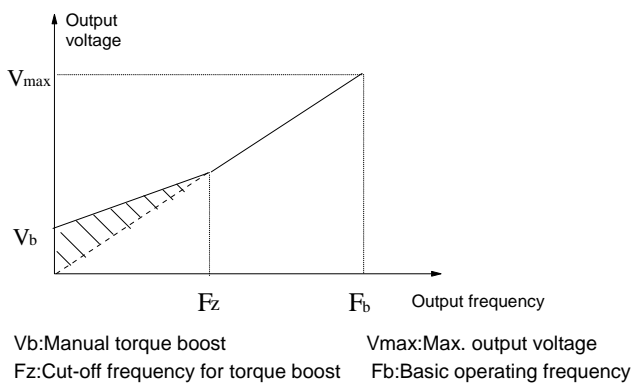


Fig.6-2 Torque boost(shadow area is the boostedvalue)

#### Note:

1. Wrong parameter setting can cause overheat or over-current protection of the motor.
2. Refer to b1.07 for definition of Fz.

## 6.2 Group A1

|                     |           |
|---------------------|-----------|
| A1.00 Starting mode | 0、1、2 【0】 |
|---------------------|-----------|

0. Start from the starting frequency

Start at the preset starting frequency (A1.01) within the holding time of starting frequency (A1.02).

1.Brake first and then start

Brake first(refer to A1.03 and A1.04), and then start in mode 0.

2.Speed tracking

#### Notes:

Starting mode 1 is suitable for starting the motor that is running forward or reverse with small inertia load when the drive stops. For the motor with big inertia load, it is not recommended to use starting mode 1.

|  |                            |
|--|----------------------------|
| A1.01 Starting frequency                 | 0.00 ~ 60.00Hz<br>【0.00Hz】 |
| A1.02 Holding time of starting frequency | 0.00~10.00s【0.00s】         |

Starting frequency is the initial frequency when the drive starts, as shown in Fig. 6-3 as F<sub>s</sub>.Holding time of starting frequency is the time during which the drive operates at the starting frequency, as shown in Fig. 6-3 as t<sub>1</sub>

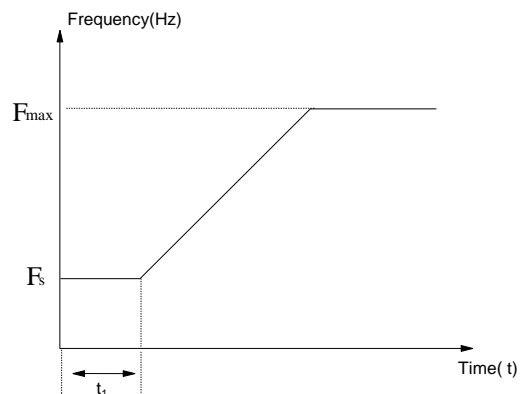


Fig.6-3 Starting frequency and starting time

#### Note:

Starting frequency is not restricted by the lower limit of frequency.

|   |                    |
|---|--------------------|
| A1.03 DC injection braking current at start | 0.0~100.0%【0.0%】   |
| A1.04 DC injection braking time at start    | 0.00~30.00s【0.00s】 |

A1.03 and A1.04 are only active when A1.00 is set to 1 (starting mode 1 is selected), as shown in Fig. 6-4.

DC injection braking current at start is a percentage value of drive's rated current. There is no DC injection

braking when the braking time is 0.0s.

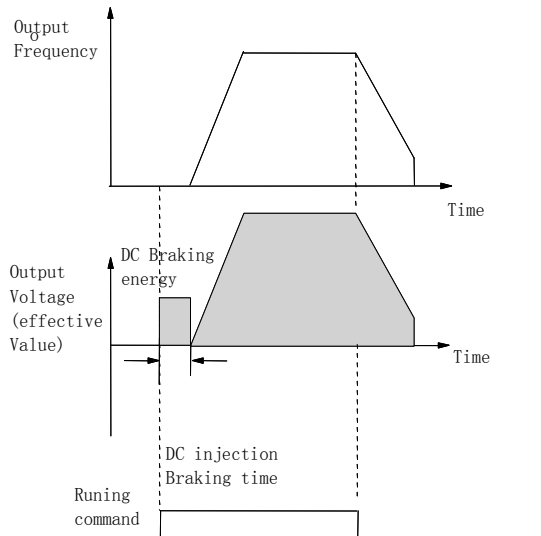


Fig.6-4 Starting mode 1

|                     |           |
|---------------------|-----------|
| A1.05 Stopping mode | 0、1、2 【0】 |
|---------------------|-----------|

0: Dec-to-stop

After receiving the stopping command, the drive reduces its output frequency according to the Dec time, and stops when the frequency decreases to 0.

1: Coast-to-stop

After receiving the stopping command, the drive stops outputting power immediately and the motor stops under the effects of mechanical inertia.

2: Dec-to-stop+DC injection braking

After receiving the STOP command, the drive reduces its output frequency according to the Dec time and starts DC injection braking when its output frequency reaches the initial frequency of braking process.

Refer to the introductions of A1.06~A1.09 for the functions of DC injection braking.

|  |                          |
|--|--------------------------|
| A1.06 DC injection braking initial frequency at stop | 0.00~60.00Hz<br>【0.00Hz】 |
| A1.07 Injection braking waiting time at stop         | 0.00~10.00s 【0.00s】      |
| A1.08 DC injection braking current at stop           | 0.0~100.0% 【0.0%】        |
| A1.09 DC injection braking time at stop              | 0.00~30.00s 【0.00s】      |

DC injection braking waiting time at stop: The duration from the time when operating frequency reaches the DC injection braking initial frequency(A1.06) to the time when the DC injection braking is applied.

The drive has no output during the waiting time. By setting waiting time, the current overshoot in the initial stage of braking can be reduced when the drive drives a high power motor.

DC injection braking current at stop is a percentage of drive's rated current. There is no DC injection braking when the braking time is 0.0s.

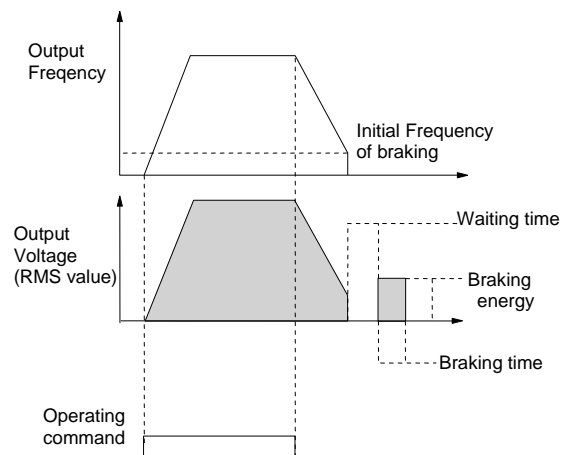


Fig.6-5 Dec-to-stop + DC injection braking

#### Note:

DC injection braking current at stop(A1.08) is a percentage value of drive's rated current.

|  |                  |
|--|------------------|
| A1.10 Restart after power failure                | 0、1 【0】          |
| A1.11 Delay time for restart after power failure | 0.0~10.0s 【0.0s】 |

A1.10 and A1.11 decide whether the drive starts automatically and the delay time for restart when the drive is switched off and then switched on in different control modes.

If A1.10 is set to 0, the drive will not run automatically after restarted.

If A1.10 is set to 1, when the drive is powered on after power failure, it will wait certain time defined by A1.11

and then start automatically depending on the current control mode and the drive's status before power failure. See Table 6-1.

Table 6-1 Restarting conditions

| Setting of A1.10 | Status before power off | Panel                   | Serial port | 3-wire modes 1 and 2 | 2-wire modes 1 and 2 |   |
|------------------|-------------------------|-------------------------|-------------|----------------------|----------------------|---|
|                  |                         | Without control command |             |                      | With                 |   |
| 0                | Stop                    | 0                       | 0           | 0                    | 0                    | 0 |
|                  | Run                     | 0                       | 0           | 0                    | 0                    | 0 |
| 1                | Stop                    | 0                       | 0           | 0                    | 0                    | 1 |
|                  | Run                     | 1                       | 1           | 1                    | 0                    | 1 |

Table 6-1 shows the drive's action under different conditions. "0" means the drive enter ready status and "1" means the drive start operation automatically.

**Note:**

- When using the panel or serial port or 3-wire mode 1 and 2 to start or stop the drive, the command signal is in pulse mode and there is no operating command when the drive is switched on.
- If there is a stopping command, the drive will stop first.
- When the function of restart after power failure is enabled, the drive will start on the fly after power on if it is not switched off totally (that is, the motor still runs and drive's LED displays "P.OFF"). It will start in the starting mode defined in A1.00 after power on if it is switched off totally (LED turns off).

|                                     |         |
|-------------------------------------|---------|
| A1.12 Anti-reverse running function | 0、1 【0】 |
|-------------------------------------|---------|

0: Disabled

1: Enabled

**Note:**

This function is effective in all control modes.

|   |                |
|---|----------------|
| A1.13 Delay time of run reverse/forward | 0~3600s 【0.0s】 |
|---|----------------|

The delay time is the transition time at zero frequency

when the drive switching its running direction as shown in Fig. 6-6 as  $t_1$ .

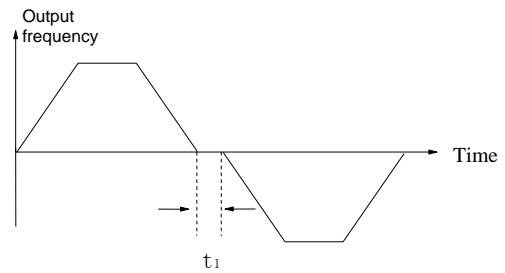


Fig.6-6 Delay time from reverse running to forward running or from forward running to reverse running

|  |         |
|--|---------|
| A1.14 Switch mode of run reverse/forward | 0、1 【0】 |
|--|---------|

0: Switch when pass 0Hz

1: Switch when pass starting frequency

|                                      |               |
|--------------------------------------|---------------|
| A1.15 Detecting frequency of stop    | 0.00~150.00Hz |
| A1.16 Action voltage of braking unit | 650~750 【700】 |
| A1.17 Dynamic braking                | 0、1 【0】       |

0: Dynamic braking is disabled

1: Dynamic braking is enabled

**Note:**

This parameter must be set correctly according to the actual conditions, otherwise the control performance may be affected.

|   |                    |
|---|--------------------|
| A1.18 Ratio of working time of braking unit to drive's total working time | 0.0~100.0% 【80.0%】 |
|---|--------------------|

This function is effective for the drive with built-in braking resistor.

**Note:**

Resistance and power of the braking resistor must be taken into consideration when setting this parameters.

## 6.3 Group A2

|  |         |
|--|---------|
| A2.00 Auxiliary reference frequency selector | 0~5 【0】 |
|--|---------|

0: No auxiliary reference frequency

Preset frequency only determined by main reference frequency, auxiliary reference frequency is 0Hz by default.

1: Set by AI1 terminal

The auxiliary frequency is set by AI1 terminal.

2: Set by AI2 terminal

The auxiliary frequency is set by AI2 terminal.

3: Reserved

4: Set by DI terminal(PULSE)

5: Set by output frequency of process PID.

|  |         |
|--|---------|
| A2.01 Main and auxiliary reference frequency calculation | 0~3 【0】 |
|--|---------|

0: "+"

Preset frequency=Main+auxiliary.

1: "-"

Preset frequency=Main-auxiliary.

2: MAX

Set the max. absolute value between Main and auxiliary reference frequency as preset frequency.

Set Main reference frequency as preset frequency when the polarity of auxiliary frequency is opposite to main frequency.

3: MIN

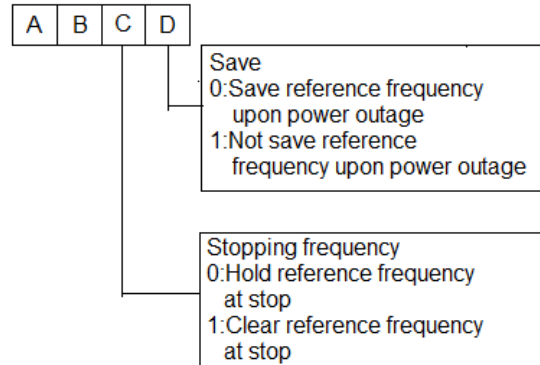
Set the min. absolute value between Main and auxiliary reference frequency as preset frequency.

Set preset frequency as 0Hz when the polarity of auxiliary frequency is opposite to main frequency.

|                  |                       |
|------------------|-----------------------|
| A2.02 UP/DN rate | 0.01~99.99Hz/s 【1.00】 |
|------------------|-----------------------|

A2.02 is used to define the change rate of reference frequency that is changed by terminal UP/DN or ▲/▼ key.

|                                |            |
|--------------------------------|------------|
| A2.03 UP/DN regulating control | 0~11H 【00】 |
|--------------------------------|------------|



### Note:

In this manual, there are many 

|   |   |   |   |
|---|---|---|---|
| A | B | C | D |
|---|---|---|---|

. Their meanings are as following:

A means the thousand's place of LED display.

B means the hundred's place of LED display.

C means the ten's place of LED display.

D means the unit's place of LED display.

|                               |                            |
|-------------------------------|----------------------------|
| A2.04 Jog operating frequency | 0.01 ~ 50.00Hz<br>【5.00Hz】 |
|-------------------------------|----------------------------|

A2.04 is used to set the jog operating frequency.

### Note:

Jog operation can be controlled by panel(M key), terminals.

|                                 |                  |
|---------------------------------|------------------|
| A2.05 Interval of Jog operation | 0.0~100.0s 【0.0】 |
|---------------------------------|------------------|

Interval of Jog operation (A2.05) is the interval from the time when the last Jog operation command is ended to the time when the next Jog operation command is executed.

The jog command sent during the interval will not be executed. If this command exists until the end of the interval, it will be executed.

|                                 |                       |
|---------------------------------|-----------------------|
| A2.06 Skip frequency 1          | 0.00~300.0Hz 【0.00Hz】 |
| A2.07 Range of skip frequency 1 | 0.00~30.00Hz 【0.00Hz】 |
| A2.08 Skip frequency 2          | 0.00~300.0Hz 【0.00Hz】 |
| A2.09 Range of skip frequency 2 | 0.00~30.00Hz 【0.00Hz】 |
| A2.10 Skip frequency 3          | 0.00~300.0Hz 【0.00Hz】 |
| A2.11 Range of skip frequency 3 | 0.00~30.00Hz 【0.00Hz】 |

A2.06~A2.11 define the output frequency that will cause

resonant with the load, which should be avoided.

Therefore, the drive will skip the above frequency as shown in Fig. 6-7. Up to 3 skip frequencies can be set.

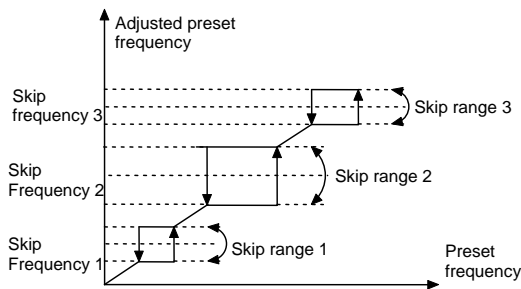


Fig.6-7 Skip frequency and skip range

## 6.4 Group A3

|  |                         |
|--|-------------------------|
| A3.00 Reference frequency curve selection                        | 0000~3333H 【0000】       |
| A3.01 Max reference of curve 1                                   | A3.03 ~ 110.0% 【100.0%】 |
| A3.02 Actual value corresponding to the Max reference of curve 1 | 0.0% ~ 100.0% 【100.0%】  |
| A3.03 Min reference of curve 1                                   | 0.0%~A3.01 【0.0%】       |
| A3.04 Actual value corresponding to the Min reference of curve 1 | 0.0% ~ 100.0% 【0.0%】    |
| A3.05 Max reference of curve 2                                   | A3.07 ~ 110.0% 【100.0%】 |

|  |                         |
|--|-------------------------|
| A3.06 Actual value corresponding to the Max reference of curve 2                       | 0.0% ~ 100.0% 【100.0%】  |
| A3.07 Min reference of curve 2   | 0.0%~A3.05【0.0%】        |
| A3.08 Actual value corresponding to the Min reference of curve 2                       | 0.0% ~ 100.0 % 【0.0%】   |
| A3.09 Max reference of curve 3   | A3.11 ~ 110.0% 【100.0%】 |
| A3.10 Actual value corresponding to the Max reference of curve 3                       | 0.0% ~ 100.0% 【100.0%】  |
| A3.11 Min reference of curve 3   | 0.0%~A3.09【0.0%】        |
| A3.12 Actual value corresponding to the Min reference of curve 3                       | 0.0% ~ 100.0 % 【0.0%】   |
| A3.13 Max reference of curve 4   | A3.15 ~ 110.0% 【100.0%】 |
| A3.14 Actual value corresponding to the Max reference of curve 4                       | 0.0% ~ 100.0% 【100.0%】  |
| A3.15 Reference of inflection point 2 of curve 4                                       | A3.17 ~ A3.13 【100.0%】  |
| A3.16 Actual value corresponding to the Min reference of inflection point 2 of curve 4 | 0.0% ~ 100.0% 【100.0%】  |
| A3.17 Reference of inflection point 1 of curve 4                                       | A3.19~A3.15【0.0%】       |
| A3.18 Actual value corresponding to the Min reference of inflection point 1 of curve 4 | 0.0% ~ 100.0% 【0.0%】    |
| A3.19 Min reference of curve 4   | 0.0%~A3.17【0.0%】        |
| A3.20 Actual value corresponding to the Min reference of curve 4                       | 0.0% ~ 100.0% 【0.0%】    |



Reference frequency signal is filtered and amplified, and then its relationship with the preset frequency is determined by Curve 1,2,3 or 4. Curve 1 is defined by A3.01 ~ A3.04. Curve 2 is defined by A3.05 ~ A3.08. Curve 3 is defined by A3.09~A3.12. Curve 4 is defined by A3.13~A3.20. Take preset frequency as example, positive and negative characteristics are shown in Fig.6-8. In Fig.6-8, the inflection points are set the same as the corresponding relationship of Min. or Max reference.

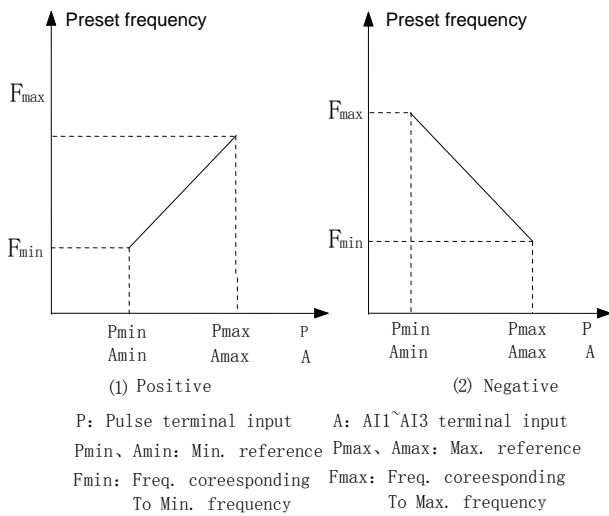


Fig.6-8 Freq. corresponding to Min. frequency

Analog input value(A) is a percentage without unit, and 100% corresponds to 10V or 20mA. Pulse frequency (P) is also a percentage without unit, and 100% corresponds to the Max pulse frequency defined by A6.10.

The time constant of the filter used by the reference selector is defined in Group A6.

A3.00 is used to select the analog input curve and pulse input curve, as shown in Fig.6-9.

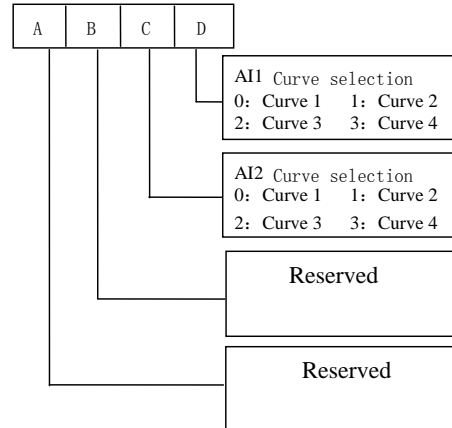


Fig.6-9 Frequency curve selection

For example, the requirements are:

1. Use the analog signal(AI1) input to set the reference frequency;
2. Input signal: 0V~10V;
3. 0.5V input signal corresponds to 50Hz reference frequency, and 4V input signal corresponds to 10Hz reference frequency, 6V input signal corresponds to 40Hz reference frequency, 10V input signal corresponds to 5Hz reference frequency.

According to the above requirements, the parameter settings are:

- 1)  $A0.02 = 1$ , select AI1 input to set the reference frequency.
- 3)  $A3.00 = 0003$ , select curve 4.
- 4)  $A0.08 = 50.0\text{kHz}$ , set the Max output frequency to 50 Hz.
- 5)  $A3.13 = 10 \div 10 \times 100\% = 100.0\%$ , set the percentage that the Max reference (10V) corresponds to 10V
- 6)  $A3.14 = 5.00\text{Hz} \div A0.08 \times 100\%$ , set the percentage that the max input signal corresponds to the reference frequency
- 7)  $A3.15 = 6 \div 10 \times 100\% = 60.0\%$ , the percentage that inflection2 reference(6V) of curve 4 corresponds to the 10V.
- 8)  $A3.16 = 40.00\text{Hz} \div A0.08 \times 100\%$ , set the percentage that inflection2 reference (6V) corresponds to the reference frequency.

9)  $A3.17 = 4 \div 10 \times 100\% = 40.0\%$ , the percentage that inflection1 reference (4V) of curve 4 corresponds to the 10V

10)  $A3.18 = 10.00\text{Hz} \div A0.08 \times 100\%$ , set the percentage that inflection1 reference (4V) of curve 4 corresponds to the reference frequency.

11)  $A3.19 = 0.5 \div 10 \times 100\% = 5.0\%$ , set the percentage that the Minimum reference(0.5V) of curve 4 corresponds to the 10V

12)  $A3.20 = 50.00\text{Hz} \div A0.08 \times 100\%$ , set the percentage that the minimum reference(0.5V) corresponds to the reference frequency.

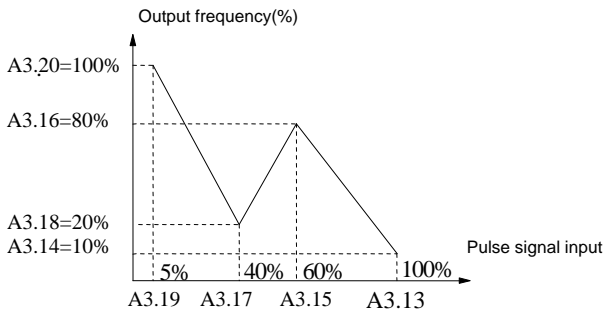


Fig.6-10 Pulse signal input 1

If there is no setting of inflection point in the 3rd requirement, means to change the requirement as 0.5V input signal corresponds to 50Hz reference frequency, and 10V input signal corresponds to 5Hz reference frequency. Then we can set the inflection point 1 the same as Min. reference ( $A3.17 = A3.19$ ,  $A3.18 = A3.20$ ) and inflection point 2 the same as Max. reference ( $A3.13 = A3.15$ ,  $A3.14 = A3.16$ ). As shown in Fig.6-11.

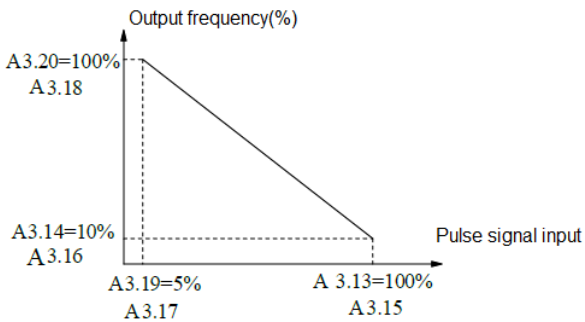


Fig.6-11 Pulse signal input 2

#### Note:

1. If user set the reference of inflection point 2 of curve 4 the same as Max. reference ( $A3.15 = A3.13$ ), then the drive will force  $A3.16 = A3.14$ , means the setting of inflection point 2 is invalid. If reference of inflection point 2 is the same as reference of inflection point 1 ( $A3.17 = A3.15$ ), then the drive will force  $A3.18 = A3.16$ , means the setting of inflection point is invalid. If reference of inflection point 1 is the same as Min. reference ( $A3.19 = A3.17$ ), then the drive will force  $A3.20 = A3.18$ , means the setting of Min. reference is invalid. The setting of curve 1 is in the same manner.

2. The range of the actual value that corresponds to the reference of curve 1, 2, 3 and 4 is  $0.0\% \sim 100.0\%$ , corresponds to torque is  $0.0\% \sim 300.0\%$ , and corresponds to frequency, its range is  $0.0\% \sim 100.0\%$ .

## 6.5 Group A4

|                    |                |
|--------------------|----------------|
| A4.00 Acc/Dec mode | 0~1 <b>【0】</b> |
|--------------------|----------------|

0: Linear Acc/Dec mode

Output frequency increases or decreases according to a constant rate, as shown in Fig. 6-12.

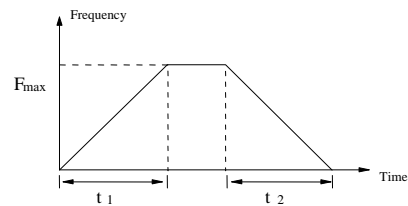


Fig.6-12 Linear Acc/Dec

1: Reserved.

|       |            |                           |
|-------|------------|---------------------------|
| A4.01 | Acc time 2 | 0.1~6000.0s <b>【6.0s】</b> |
| A4.02 | Dec time 2 | 0.1~6000.0s <b>【6.0s】</b> |
| A4.03 | Acc time 3 | 0.1~6000.0s <b>【6.0s】</b> |
| A4.04 | Dec time 3 | 0.1~6000.0s <b>【6.0s】</b> |
| A4.05 | Acc time 4 | 0.1~6000.0s <b>【6.0s】</b> |
| A4.06 | Dec time 4 | 0.1~6000.0s <b>【6.0s】</b> |

Acc time is the time taken for the motor to accelerate from 0Hz to the maximum frequency (as set in A0.08), see  $t_2$  in Fig.6-12. Dec time is the time taken for the motor to decelerate from maximum frequency (A0.08) to 0Hz, see  $t_2$  in Fig.6-12.

CV100 define three kinds of Acc/Dec time, and the drive's Acc/Dec time 1~4 can be selected by different combinations of control terminals, refer to the introductions of A6.00~A6.04 for the definitions of terminals used to select Acc/Dec time.

|                       |  |
|-----------------------|--|
| A4.07~A4.10: Reserved |  |
|-----------------------|--|

Reserved.

## 6.6 Group A5

|                                  |                        |
|----------------------------------|------------------------|
| A5.00:Reserved                   |                        |
| A5.01 ASR1-P                     | 0.1~200.0 【20.0】       |
| A5.02 ASR1-I                     | 0.000~10.000s 【0.200s】 |
| A5.03 ASR1 output filter         | 0~8 【0】                |
| A5.04 ASR2-P                     | 0.1~200.0 【20】         |
| A5.05 ASR2-I                     | 0.000~10.000s 【0.200s】 |
| A5.06 ASR2 output filter         | 0~8 【0】                |
| A5.07 ASR1/2 switching frequency | 0~100.0% 【10.0Hz】      |

The parameters A5.00~A5.07 are only valid for vector control mode.

Under vector control mode, it can change the speed response character of vector control through adjusting the proportional gain P and integral time I for speed regulator.

1. The structure of speed regulator (ASR) is shown in Fig.6-13. In the figure,  $K_p$  is proportional gain P.  $T_i$  is integral time I.

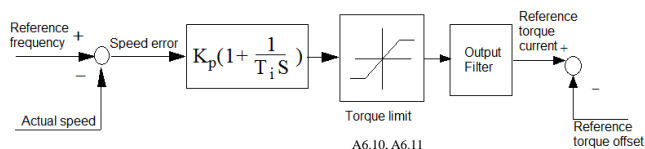


Fig.6-13 Speed regulator

When integral time is set to 0 ( $A5.02=0$ ,  $A5.05=0$ ), then the integral is invalid and the speed loop is just a proportional regulator.

2. Tuning of proportional gain P and integral time I for speed regulator(ASR).

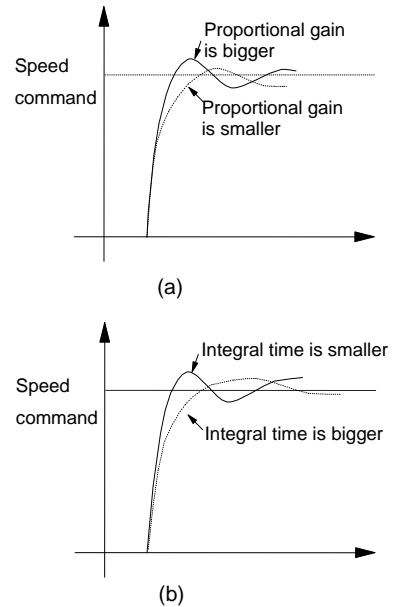


Fig.6-14 The relationship between step response and PI parameters of speed regulator(ASR)

When increasing proportional gain P, it can speed up the system's dynamic response. But if P is too big, the system will become oscillating.

When decreasing integral time I, it can speed up the system's dynamic response. But if I is too small, the system will become overshoot and easily oscillating.

Generally, to adjust proportional gain P firstly. The value of P can be increased as big as possible if the system don't become oscillating. Then adjust integral time to make the system with fast response but small overshoot. The speed step response curve of speed, when set a better value to P and I parameters, is shown in Fig.6-15. (The speed response curve can be observed by analog output terminal AO1, please refer to Group A6)

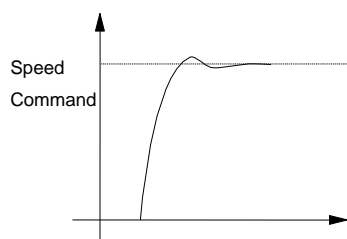


Fig.6-15 The step response with better dynamic performance

**Note:**

If the PI parameters are set incorrectly, it will cause over-voltage fault when the system is accelerated to high speed quickly (If the system doesn't connect external braking resistor or braking unit), that is because the energy return under the system's regenerative braking when the system is dropping after speed overshoot. It can be avoided by adjusting PI parameters

3. The PI parameters' adjustment for speed regulator (ASR) in the high/low speed running occasion

To set the switching frequency of ASR (A5.07) if the system requires fast response in high and low speed running with load. Generally when the system is running at a low frequency, user can increase proportional gain P and decrease integral time I if user wants to enhance the dynamic response. The sequence for adjusting the parameters of speed regulator is as following:

- 1) Select a suitable switching frequency (A5.07).
- 2) Adjust the proportional gain (A5.01) and integral time (A5.02) when running at high speed, ensure the system doesn't become oscillating and the dynamic response is good.
- 3) Adjust the proportional gain (A5.04) and integral time (A5.05) when running at low speed, ensure the system doesn't become oscillating and the dynamic response is good.
4. Get the reference torque current through a delay filter for the output of speed regulator. A5.03 and A5.06 are the time constant of output filter for ASR1 and ASR2.

|             |          |
|-------------|----------|
| A5.08~A5.09 | Reserved |
|-------------|----------|

Reserved function

|                            |                       |
|----------------------------|-----------------------|
| A5.10 Driving torque limit | 0.0%~+300.0% 【180.0%】 |
| A5.11 Braking torque limit | 0.0%~+300.0% 【180.0%】 |

Driving torque limit is the torque limit in motoring condition.

Braking torque limit is the torque limit in generating condition

In setting value, 100% is corresponding to drive's rated torque.

|              |          |
|--------------|----------|
| A5.12 ~A5.16 | Reserved |
|--------------|----------|

Reserved function

|             |                     |
|-------------|---------------------|
| A5.17 ACR-P | 1~5000 【1000】       |
| A5.18 ACR-I | 0.5~100.0mS 【8.0ms】 |

A5.17 and A5.18 are the parameters for PI regulator of current loop. Increasing P or decreasing I of current loop can speed up the dynamic response of torque. Decreasing P or increasing I can enhance the system's stability.

**Note:**

For most applications, there is no need to adjust the PI parameters of current loop, so the users are suggested to change these parameters carefully.

## 6.7 Group A6

|                                  |          |
|----------------------------------|----------|
| A6.00 Multi-function terminal X1 | 0~41 【0】 |
| A6.01 Multi-function terminal X2 | 0~41 【0】 |
| A6.02 Multi-function terminal X3 | 0~41 【0】 |
| A6.03 Multi-function terminal X4 | 0~41 【0】 |
| A6.04 Multi-function terminal X5 | 0~41 【0】 |
| A6.05; Reserved                  |          |
| A6.06: Reserved                  |          |
| A6.07: Reserved                  |          |

The functions of multi-function input terminal X1~X5 are extensive. You can select functions of X1~X5 according to your application by setting A6.00~A6.04. Refer to Table 6-1.

Table 6-1 Multi-function selection

| Setting | Function                              | Setting | Function                         |
|---------|---------------------------------------|---------|----------------------------------|
| 0       | No function                           | 1       | Forward                          |
| 2       | Reverse                               | 3       | Forward jog operation            |
| 4       | Reverse jog operation                 | 5       | 3-wire operation control         |
| 6       | External RESET signal input           | 7       | External fault signal input      |
| 8       | External interrupt signal input       | 9       | Drive operation prohibit         |
| 10      | External stop command                 | 11      | DC injection braking command     |
| 12      | Coast to stop                         | 13      | Frequency ramp up (UP)           |
| 14      | Frequency ramp down (DN)              | 15      | Switch to panel control          |
| 16      | Switch to terminal control            | 17      | Reserved                         |
| 18      | Main reference frequency via AI1      | 19      | Main reference frequency via AI2 |
| 20      | Reserved                              | 21      | Main reference frequency via DI  |
| 22      | Auxiliary reference frequency invalid | 23      | Reserved                         |
| 24      | Reserved                              | 25      | Reserved                         |
| 26      | Reserved                              | 27      | Preset frequency 1               |
| 28      | Preset frequency 2                    | 29      | Preset frequency 3               |
| 30      | Preset frequency 4                    | 31      | Acc/Dec time 1                   |
| 32      | Acc/Dec time 2                        | 33      | Multi-closed loop reference 1    |
| 34      | Multi-closed loop reference 2         | 35      | Multi-closed loop reference 3    |
| 36      | Multi-closed loop                     | 37      | Forward prohibit                 |

| Setting | Function                     | Setting | Function                                |
|---------|------------------------------|---------|---|
|         | reference 4                  |         |   |
| 38      | Reverse prohibit             | 39      | Acc/Dec prohibit                        |
| 40      | Process closed loop prohibit | 41      | Switch speed control and torque control |

Introductions to functions listed in Table 6-1:

1: Forward. 2: Reverse. 5: 3-wire operation control

These are used for terminal control mode. More details please refer to descriptions of A6.09.

3~4: Forward/reverse jog operation.

They are used to jog control of terminal control mode. The jog operation frequency, jog interval and jog Acc/Dec time are defined by A2.04~A2.05, A4.05~A4.06.

6: External RESET signal input.

The drive can be reset via this terminal when the drive has a fault. The function of this terminal is the same with that of **RST** on the panel.

7: External fault signal input.

If the setting is 7, the fault signal of external equipment can be input via the terminal, which is convenient for the drive to monitor the external equipment. Once the drive receives the fault signal, it will display "E015".

8: External interrupt signal input

If the setting is 8, the terminal is used to cut off the output and the drive operates at zero frequency when the terminal is enabled. If the terminal is disabled, the drive will start on automatically and continue the operation.

9: Drive operation prohibits.

If terminal is enabled, the drive that is operating will coast to stop and is prohibited to restart. This function is mainly used in application with requirements of safety protection.

10: External stop command.

This stopping command is active in all control modes. When terminal 35 is enabled; the drive will stop in the mode defined in A1.05.

11: DC injection braking command.

If the setting is 11, the terminal can be used to perform DC injection braking to the motor that is running so as to realize the emergent stop and accurate location of the motor. Initial braking frequency, braking delay time and braking current are defined by A1.06~A1.08. Braking time is the greater value between A1.09 and the effective continuous time defined by this control terminal.

12: Coast to stop.

If the setting is 12, the function of the terminal is the same with that defined by A1.05. It is convenient for remote control.

13~14: Frequency ramp UP/DN.

If the setting is 13~14, the terminal can be used to increase or decrease frequency. Its function is the same with ▲ and ▼ keys on the panel, which enables remote control. This terminal is enabled when A0.02=0 or A0.04=1. Increase or decrease rate is determined by A2.02 and A2.03.

15: Switch to panel control.

It is used to set the control mode as panel control.

16: Switch to terminal control

It is used to set the control mode as terminal control

17: Reserved.

18: Main reference frequency via AI1

19: Main reference frequency via AI2

20: Reseved

21: Main reference frequency via DI

These functions are used to set the main reference frequency controlled by AI1,AI2 or DI.

22: Auxiliary reference frequency invalid.

Auxiliary reference frequency is invalid when the terminal activate

23~26: Reserved.

27~30: Preset frequency selection.

Up to 15 speed references can be set through different ON/OFF combinations of these terminals K4, K3, K2 and K1.

Table 6-2 On/Off combinations of terminals

| K4  | K3  | K2  | K1  | Frequency setting          |
|-----|-----|-----|-----|----------------------------|
| OFF | OFF | OFF | OFF | Common operating frequency |
| OFF | OFF | OFF | ON  | Preset frequency 1         |
| OFF | OFF | ON  | OFF | Preset frequency 2         |
| OFF | OFF | ON  | ON  | Preset frequency 3         |
| OFF | ON  | OFF | OFF | Preset frequency 4         |
| OFF | ON  | OFF | ON  | Preset frequency 5         |
| OFF | ON  | ON  | OFF | Preset frequency 6         |
| OFF | ON  | ON  | ON  | Preset frequency 7         |
| ON  | OFF | OFF | OFF | Preset frequency 8         |
| ON  | OFF | OFF | ON  | Preset frequency 9         |
| ON  | OFF | ON  | OFF | Preset frequency 10        |
| ON  | OFF | ON  | ON  | Preset frequency 11        |
| ON  | ON  | OFF | OFF | Preset frequency 12        |
| ON  | ON  | OFF | ON  | Preset frequency 13        |
| ON  | ON  | ON  | OFF | Preset frequency 14        |
| ON  | ON  | ON  | ON  | Preset frequency 15        |

The frequency references will be used in multiple speed operation. Following is an example: Definitions of terminals X1, X2, X3and X4 as following:

After setting A6.00 to 27, A6.01 to 28 and A6.03 to 30, terminals X1~X4 can be used in multiple speed operation, as shown in Fig. 6-16.

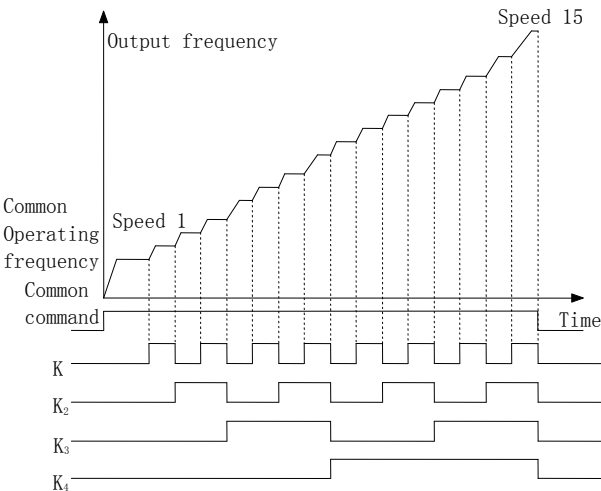


Fig.6-16 Multi-step speed operation

31~32: Acc/Dec time selection

Table 6-3 Acc/Dec time selection

| Terminal 2 | Terminal1 | Acc/Dec time selection |
|------------|-----------|------------------------|
| OFF        | OFF       | Acc time 1/Dec time 1  |
| OFF        | ON        | Acc time 2/Dec time 2  |
| ON         | OFF       | Acc time 3/Dec time 3  |
| ON         | ON        | Acc time 4/Dec time 4  |

Through the On/Off combinations of terminal 1 and 2, Acc/Dec time 1~4 can be selected.

33~36: Reserved.

37: Forward prohibit.

The drive will coast to stop if the terminal activate when running forward.If the terminal activate before the drive run forward,the drive will run in 0Hz.

38: Reverse prohibits.

The drive will coast to stop if the terminal activate when running reverse.If the terminal activate before the drive run reverse,the drive will run in 0Hz.

39: Acc/Dec prohibit

Keep the motor from the controlling of external signal (except the STOP command), so the the motor can runs at the current speed.

40:Reserved. Process closed loop prohibit

Forbid process closed loop control.

41:Switch speed control and torque control

Switch the control mode between speed control and torque control.

|                       |                |
|-----------------------|----------------|
| A6.08 Terminal filter | 0~500ms 【10ms】 |
|-----------------------|----------------|

A6.08 is used to set the time of filter for input terminals.When the state of input terminals change,it must keep the state for the filter time,or the new state won't be valid.

|                                       |         |
|---------------------------------------|---------|
| A6.09 Terminal control mode selection | 0~3 【0】 |
|---------------------------------------|---------|

This parameter defines four operating modes controlled by external terminals.

0: 2-wire operating mode 1

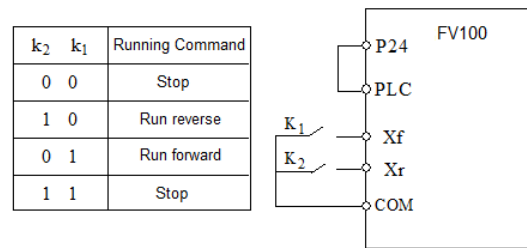


Fig.6-17 2-wire operating mode 1

1: 2-wire operating mode 2

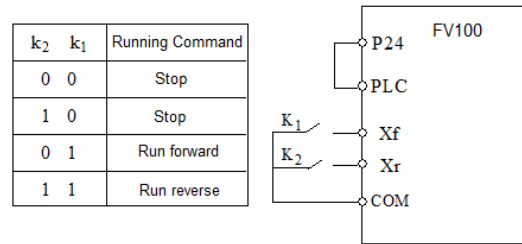


Fig.6-18 2-wire operating mode 2

2: 3-wire operating mode 1

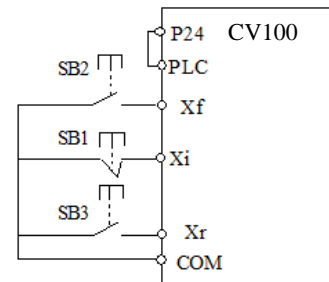


Fig.6-19 3-wire operating mode 1

Where:

SB1: Stop button

SB2: Run forward button

SB3: Run reverse button

Terminal Xi is the multi-function input terminal of X1~X5.At this time, the function of this terminal should be defined as No.5 function of “3-wire operation”.

3: 3-wire operation mode 2

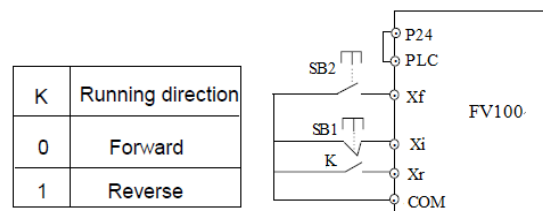


Fig.6-20 3-wire operation mode 2

Where:

SB1: Stop button

SB2: Run button

Terminal Xi is the multi-function input terminal of X1~X5. At this time, the function of this terminal should be defined as No.5 function of “3-wire operation”.

|  |              |
|--|--------------|
| A6.10  | Reserved     |
| A6.11  | Reserved     |
| A6.12  | Reserved     |
| A6.13 Input terminal's positive and negative logic | 00~FFH 【00H】 |

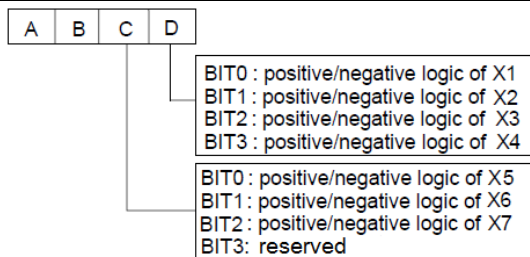


Fig.6-24 terminal's positive and negative logic

A6.13 defines the input terminal's positive and negative logic

Positive logic: Terminal Xi is enabled if it is connected to the common terminal;

Negative logic: Terminal Xi is disabled if it is connected to the common terminal;

If the bit is set at 0, it means positive logic; if set at 1, it means negative logic.

For example:

If X1~X4 are required to be positive logic, and X5 is required to be negative logic, then the settings are as following:

Logic status of X4~X1 is 0000, and the hex value is 0.

Logic status of X5 is 001, and the hex value is 1. The display on LED decade is 1; so the value in A6.13 should be set as 10..

Table 6-5 Conversion of binary code and hex value

| Binary settings |      |      |      | Hex value<br>(Displaying of LED) |
|-----------------|------|------|------|----------------------------------|
| BIT3            | BIT2 | BIT1 | BIT0 |                                  |
| 0               | 0    | 0    | 0    | 0                                |
| 0               | 0    | 0    | 1    | 1                                |
| 0               | 0    | 1    | 0    | 2                                |

| Binary settings |      |      |      | Hex value<br>(Displaying of LED) |
|-----------------|------|------|------|----------------------------------|
| BIT3            | BIT2 | BIT1 | BIT0 |                                  |
| 0               | 0    | 1    | 1    | 3                                |
| 0               | 1    | 0    | 0    | 4                                |
| 0               | 1    | 0    | 1    | 5                                |
| 0               | 1    | 1    | 0    | 6                                |
| 0               | 1    | 1    | 1    | 7                                |
| 1               | 0    | 0    | 0    | 8                                |
| 1               | 0    | 0    | 1    | 9                                |
| 1               | 0    | 1    | 0    | A                                |
| 1               | 0    | 1    | 1    | B                                |
| 1               | 1    | 0    | 0    | C                                |
| 1               | 1    | 0    | 1    | D                                |
| 1               | 1    | 1    | 0    | E                                |
| 1               | 1    | 1    | 1    | F                                |

#### Note:

Factory setting of all the terminals is positive logic.

|   |          |
|---|----------|
| A6.14 Bi-direction pen-collector output terminal Y1 | 0~20 【0】 |
| A6.15   | Reserved |
| A6.16 Output functions of relay R1                  | 0~20 【0】 |
| A6.17   | Reserved |

Refer to chapter 3 for the output characteristics of Y1 that are bi-direction open-collector output terminal and the relay's output terminal. Table 6-6 shows the functions of the above 2 terminals. One function can be selected repeatedly.

Table 6-6 Functions of output terminals

| Setting | Function                             | Setting | Function                             |
|---------|--------------------------------------|---------|--------------------------------------|
| 0       | Drive running signal (RUN)           | 1       | Frequency arriving signal (FAR)      |
| 2       | Frequency detection threshold (FDT1) | 3       | Frequency detection threshold (FDT2) |
| 4       | Reserved                             | 5       | Low voltage                          |



| Setting | Function                        | Setting | Function                      |
|---------|---------------------------------|---------|-------------------------------|
|         |                                 |         | lock-up signal (LU)           |
| 6       | External stopping command (EXT) | 7       | High limit of frequency (FHL) |
| 8       | Lower limit of frequency (FLL)  | 9       | Zero-speed running            |
| 10      | Reserved                        | 11      | Reserved                      |
| 12      | Reserved                        | 13      | Reserved                      |
| 14      | Reserved                        | 15      | Drive ready (RDY)             |
| 16      | Drive fails                     | 17      | Reserved                      |
| 18      | Reserved                        | 19      | Torque limiting               |
| 20      | Drive running forward/reverse   |         |                               |

The instructions of the functions in Table 6-6 as following:

#### 0: Drive running signal (RUN)

When the drive is in operating status, there will be running indication signal output by this terminal.

#### 1: Frequency arriving signal (FAR)

See A6.19.

#### 2: Frequency detection threshold (FDT1)

See A6.20~A6.21.

#### 3: Frequency detection threshold (FDT2)

See A6.22~A6.23.

#### 4: Reserved.

#### 5: Low voltage lock-up signal (LU)

The terminal outputs the indicating signal if the DC bus voltage is lower than the low voltage limit, and the LED displays “P.oFF”.

#### 6: External stopping command (EXT)

The terminal outputs the indicating signal if the drive outputs tripping signal caused by external fault (E015).

#### 7: High limit of frequency (FHL)

The terminal outputs the indicating signal if the preset frequency is higher than upper limit of frequency and the operating frequency reaches the upper limit of

frequency.

#### 8: Lower limit of frequency (FLL)

The terminal outputs the indicating signal if the preset frequency is higher than lower limit of frequency and the operating frequency reaches the lower limit of frequency.

#### 9: Zero-speed running

The terminal outputs the indicating signal if the drive's output frequency is 0 and the drive is in operating status.

10~14:Reserved.

#### 15: drive ready (RDY)

If RDY signal is output, it means the drive has no fault, its DC bus voltage is normal and it can receive starting command.

#### 16: Drive fails

The terminal outputs the indicating signal if the drive has faults.

17~18: Reserved.

#### 19: Torque limiting

The terminal outputs the indicating signal if the torque reach drive torque limit or brake torque limit.

#### 20: Drive running forward/reverse

The terminal outputs the indicating signal according to the drive's current running direction.

|  |              |
|--|--------------|
| A6.18 Ouput terminal's positive and negative logic | 00~1FH 【00H】 |
|--|--------------|

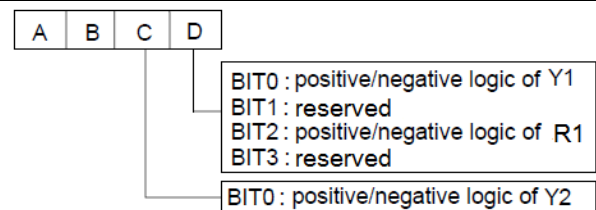


Fig.6-22 Ouput terminal's positive and negative logic  
A6.18 defines the output terminal's positive and negative logic.

Positive logic: Terminal is enabled if it is connected to the common terminal;

Negative logic: Terminal is disabled if it is connected to the common terminal;

If the bit is set at 0, it means positive logic; if set at 1, it means negative logic.

|                                       |                       |
|---------------------------------------|-----------------------|
| A6.19 Frequency arriving signal (FAR) | 0.00~300.0Hz 【2.50Hz】 |
|---------------------------------------|-----------------------|

As shown in Fig. 6-23, if the drive’s output frequency is within the detecting range of preset frequency, a pulse signal will be output.

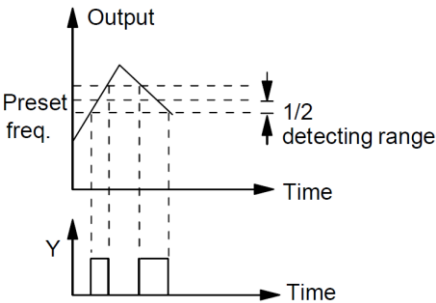


Fig.6-23 Frequency arriving signal

|                  |                        |
|------------------|------------------------|
| A6.20 FDT1 level | 0.00~300.0Hz 【50.00Hz】 |
| A6.21 FDT1 lag   | 0.00~300.0Hz 【1.00Hz】  |
| A6.22 FDT2 level | 0.00~300.0Hz 【25.00Hz】 |
| A6.23 FDT2 lag   | 0.00~300.0Hz 【1.00Hz】  |

A6.20~A6.21 is a complement to the No.2 function in Table 6-6. A6.22~A6.23 is a complement to the No.3 function in Table 6-6. Their functions are the same.Take A6.20~A6.21 for example:

When the drive’s output frequency reaches a certain preset frequency (FDT1 level), it outputs an indicating signal until its output frequency drops below a certain frequency of FDT1 level (FDT1 level-FDT1 lag), as shown in Fig. 6-24

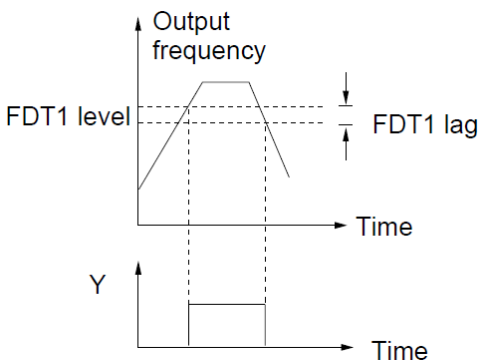
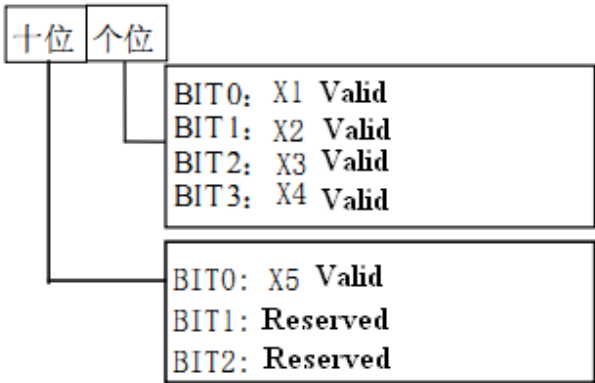


Fig.6-24 FDT level

|                                |               |
|--------------------------------|---------------|
| A6.24 Virtual terminal setting | 0~007FH 【00h】 |
|--------------------------------|---------------|



|                          |          |
|--------------------------|----------|
| A6.25 Y2 terminal output | 0~88 【0】 |
|--------------------------|----------|

0~50: Y2 is used as Y terminal output; its function is the same as Table 6-6.

51~88: Y2 function.

Pulse frequency frequency of Y2:0~Max pulse output frequency(Defined in A6.26).

The linear relationship between the displaying range and the output values of Y2 is shown as Table 6-7.

Table 6-7 Displaying range of Y2 terminal

| Setting | Function                         | Range                                |
|---------|----------------------------------|--------------------------------------|
| 51      | Output frequency                 | 0 ~ Max. output frequency            |
| 52      | Preset frequency                 | 0 ~ Max. output frequency            |
| 53      | Preset frequency (After Acc/Dec) | 0 ~ Max. output frequency            |
| 54      | Motor speed                      | 0~Max. speed                         |
| 55      | Output current Iei               | 0~2 times of motor’s rated current   |
| 56      | Output current Iem               | 0~3 times of motor’s rated current   |
| 57      | Output torque                    | 0~3 times of motor’s rated torque    |
| 58      | Output voltage                   | 0~1.2 times of drive’s rated voltage |
| 60      | Bus voltage                      | 0~800V                               |

| Setting | Function                    | Range    |
|---------|-----------------------------|----------|
| 61      | AI1 Voltage                 | −10V~10V |
| 62      | AI2 Voltage                 | −10V~10V |
| 64      | DI Pulse input              | 0-100KHz |
| 65      | Percentage of host computer | 0~4095   |
| 66~88   | Reserved                    | Reserved |

|                                   |                   |
|-----------------------------------|-------------------|
| A6.26 Max. output pulse frequency | 0.1~100kHz 【10.0】 |
|-----------------------------------|-------------------|

This parameter defines the permissible maximum pulse frequency of Y2.

|  |         |
|--|---------|
| A6.27 Centre point of pulse output selection | 0~2 【0】 |
|--|---------|

This parameter defines different centre point mode of Y2 pulse output.

0: No centre point.Shown as following figure:

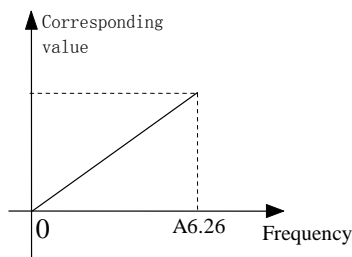


Fig.6-28 No centre point mode

All the corresponding value of pulse output frequency are positive.

1: Centre point mode 1.Shown as following figure.

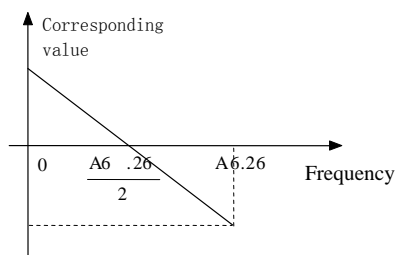


Fig.6-29 Centre point mode 1

There is a centre point in pulse output.The value of the centre point is a half of max. output pulse frequency (A6.26).The corresponding value is positive when the output pulse frequency is less than centre point.

## 2: Centre point mode 2

There is a centre point in pulse output.The value of the centre point is a half of max. output pulse frequency (A6.26).The corresponding value is positive when the input pulse frequency is greater than centre point.

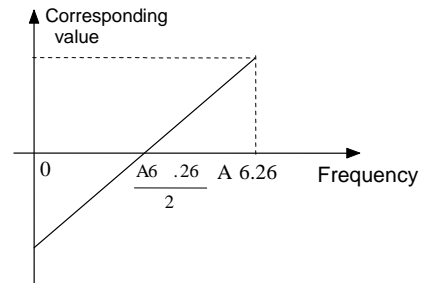


Fig.6-30 Centre point mode 2

|                                 |          |
|---------------------------------|----------|
| A6.28 Functions of terminal AO1 | 0~36 【0】 |
| A6.29                           | Reserved |

Refer to section 4.2 for the output characteristics of AO1

The relationship between the displaying range and the output values of AO1 is shown as Table 6-8

Table 6-8 Displaying range of Analog output

| Setting | Function                         | Range                                |
|---------|----------------------------------|--------------------------------------|
| 0       | No function                      | No function                          |
| 1       | Output frequency                 | 0~Max. output frequency              |
| 2       | Preset frequency                 | 0~Max. output frequency              |
| 3       | Preset frequency (After Acc/Dec) | 0~Max. output frequency              |
| 4       | Motor speed                      | 0~Max. speed                         |
| 5       | Output current                   | 0~2 times of drive's rated current   |
| 6       | Output current                   | 0~2 times of motor's rated current   |
| 7       | Output torque                    | 0~3 times of motor's rated torque    |
| 8       | Output torque current            | 0 ~ 3 times of motor's rated torque  |
| 9       | Output voltage                   | 0~1.2 times of drive's rated voltage |
| 10      | Bus voltage                      | 0~800V                               |

| Setting | Function       | Range               |
|---------|----------------|---------------------|
| 11      | AI1            | 0~Max. analog input |
| 12      | AI2            | 0~Max. analog input |
| 64      | DI Pulse input | 0-Max.pulse input   |
| Others  | Reserved       | Reserved            |

**Note:**

The external resistor is advised to be lower than 400Ω when AO output current signal.

|                                      |                     |
|--------------------------------------|---------------------|
| A6.30 Gain of AO1                    | 0.0~200.0% 【100.0%】 |
| A6.31 Zero offset calibration of AO1 | -100.0~100.0%【0.0%】 |

For the analog output AO1 and AO2,adjust the gain if user

need to change the display range or calibrate the gauge outfit error.

100% of zero offset of analog output is corresponding to the maximum output (10V or 20Ma).Take output voltage for example,the relationship between the value before adjustment and with after adjustment is as following:

AO output value = (Gain of AO)×(value before adjustment) + (Zero offset calibration)×10V

The relationship curve between analog output and gain and between analog output and zero offset calibration are as Fig.6-31 and Fig.6-32.

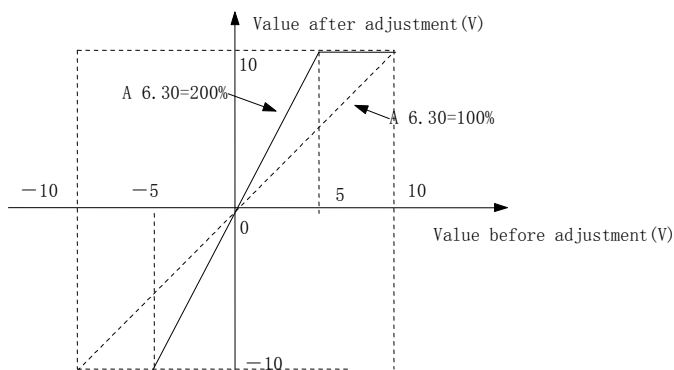


Fig.6-31 Relationship curve between analog output and gain

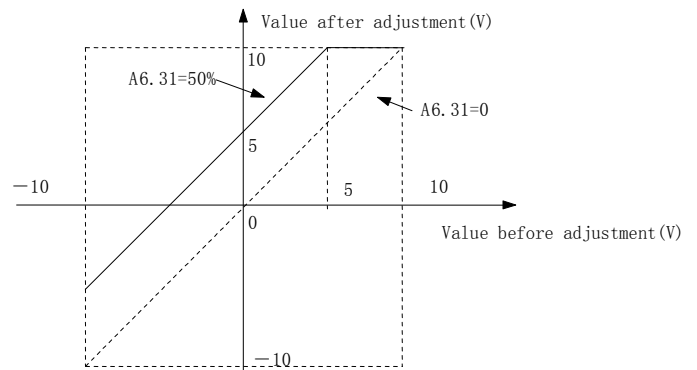


Fig.6-32 The relationship curve between analog output and zero offset

**Note:**

The parameters of gain and zero offset calibration affect the analog output all the time when it is changing.

|                  |                    |
|------------------|--------------------|
| A6.32            | Reserved           |
| A6.33            | Reserved           |
| A6.34 AI1 filter | 0.01~10.00s 【0.05】 |
| A6.35 AI2 filter | 0.01~10.00s 【0.05】 |
| A6.36            | Reserved           |

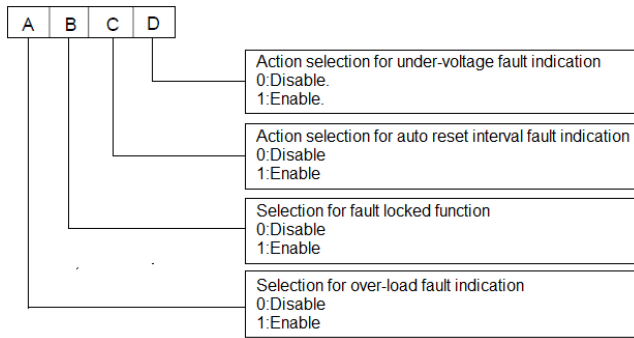
A6.34~A6.36 define the time constant of AI filter.The longer the filter time,the stronger the anti-interference ability,but the response will become slower.The shorter the filter time,the faster the response,but the anti-interference ability will become weaker.

## 6.8 Group A7

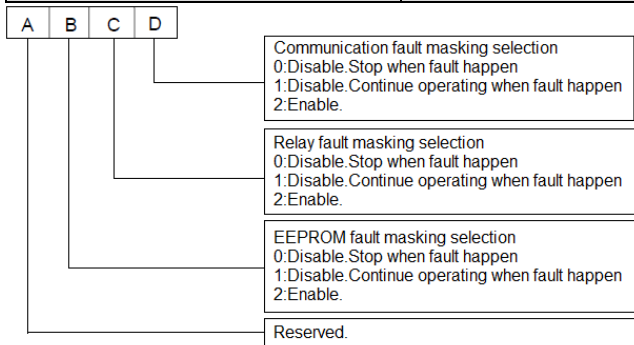
The parameters in this group are reserved

## 6.9 Group A8

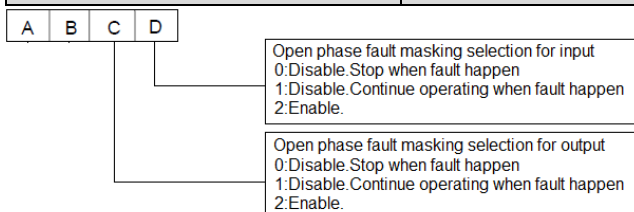
|                                  |                |
|----------------------------------|----------------|
| A8.00 Protective action of relay | 0~1111H 【0000】 |
|----------------------------------|----------------|



|                                 |                |
|---------------------------------|----------------|
| A8.01 Fault masking selection 1 | 0~2222H 【0000】 |
|---------------------------------|----------------|



|                                 |            |
|---------------------------------|------------|
| A8.02 Fault masking selection 2 | 0~22H 【00】 |
|---------------------------------|------------|



**Attention** Please set the fault masking selection function carefully, or it may cause worse accident, bodily injury and property damage.

|  |           |
|--|-----------|
| A8.03 Motor overload protection mode selection | 0、1、2 【1】 |
|--|-----------|

0: Disabled

The overload protection is disabled. Be careful to use this function because the drive will not protect the motor when overload occurs.

1: Common motor (with low speed compensation)

Since the cooling effects of common motor deteriorates at low speed (below 30Hz), the motor's overheat protecting threshold should be lowered, which is called low speed compensation.

2: Variable frequency motor (without low speed compensation)

The cooling effects of variable frequency motor is not affected by the motor's speed, so low speed compensation is not necessary.

|                        |                  |
|------------------------|------------------|
| A8.04 Auto reset times | 0~100 【0】        |
| A8.05 Reset interval   | 2.0~20.0s 【5.0s】 |

Auto reset function can reset the fault in preset times and interval. When A8.04 is set to 0, it means "auto reset" is disabled and the protective device will be activated in case of fault.

#### Note:

The IGBT protection (E010) and external equipment fault (E015) cannot be reset automatically.

|   |         |
|---|---------|
| A8.06 Fault locking function selection. | 0~1 【0】 |
|---|---------|

0:Disable.

1:Enable.

## 6.10 Group b0

|                                     |   |
|-------------------------------------|---|
| b0.00 Rated power                   | 0.4~999.9kW 【dependent on drive's model】                |
| b0.01 Rated voltage                 | 0~rated volotage of drive 【 dependent on drive's model】 |
| b0.02 Rated current                 | 0.1 ~ 999.9A 【dependent on drive's model】               |
| b0.03 Rated frequency               | 1.00 ~ 300.00Hz 【 dependent on drive's model】           |
| b0.04 Number of polarities of motor | 2~24 【4】  |
| b0.05 Rated speed                   | 0~60000RPM 【1440RPM】                                    |

These parameters are used to set the motor's parameters.

In order to ensure the control performance, please set b0.00~b0.05 with reference to the values on the motor's nameplate.

**Note:**

The motor's power should match that of the drive. Generally the motor's power is allowed to be lower than that of the drive by 20% or bigger by 10%, otherwise the control performance cannot be ensured.

|                                |  |
|--------------------------------|--|
| b0.06 Resistance of stator %R1 | 0.00~50.00% 【dependent on drive's model】 |
| b0.07 Leakage inductance %X1   | 0.00~50.00% 【dependent on drive's model】 |
| b0.08 Resistance of rotor %R2  | 0.00~50.00% 【dependent on drive's model】 |
| b0.09 Exciting inductance %Xm  | 0.0~2000.0% 【dependent on drive's model】 |
| b0.10 Current without load I0  | 0.1~999.9A 【dependent on drive's model】  |

See Fig. 6-33 for the above parameters.

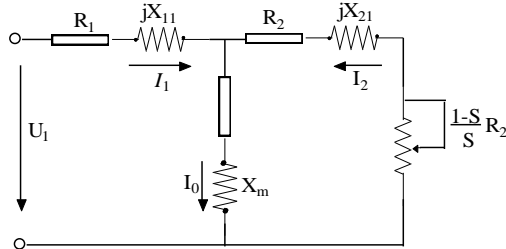


Fig. 6-33 Motor's equivalent circuit

In Fig. 6-33, R1, X11, R2, X21, Xm and I0 represent stator's resistance, stator's leakage inductance, rotor's resistance, rotor's leakage inductance, exciting inductance and current without load respectively. The setting of b0.07 is the sum of stator's leakage inductance and rotor's inductance.

The settings of b0.06 ~b0.09 are all percentage values calculated by the formula below:

$$\% R = \frac{R}{V / (\sqrt{3} \times I)} \times 100 \% \quad (1)$$

R: Stator's resistance or rotor's resistance that is converted to the rotor's side;

V: Rated voltage;

I: Motor's rated current

Formula used for calculating inductance (leakage inductance or exciting inductance):

$$\% X = \frac{X}{V / (\sqrt{3} \times I)} \times 100\% \quad (2)$$

X: sum of rotor's leakage inductance and stator's leakage inductance (converted to stator's side) or the exciting inductance based on base frequency.

V: Rated voltage;

I: Motor's rated current

If motor's parameters are available, please set b0.06~b0.09 to the values calculated according to the above formula. b0.10 is the motor current without load, the user can set this parameter directly.

If the drive performs auto-tuning of motor's parameters, the results will be written to b0.06~b0.10 automatically. After motor power (b0.00) is changed, the drive will change b0.02~b0.10 accordingly (b0.01 is the rated voltage of motor, user need to set this parameter by manual according to the value on the motor's nameplate.)

|                   |         |
|-------------------|---------|
| b0.11 Auto-tuning | 0~3 【0】 |
|-------------------|---------|

0: Auto-tuning is disabled

1: Stationary auto-tuning (Start auto-tuning to a standstill motor)

Values on the motor's nameplate must be input correctly before starting auto-tuning ( b0.00 ~ b0.05 ). When starting auto-tuning to a standstill motor, the stator's resistance (%R1), rotor's resistance (%R2) and the leakage inductance (%X1) will be detected and written into b0.06、 b0.07 and b0.08 automatically.

2: Rotating auto-tuning

Values on the motor's nameplate must be input correctly before starting auto-tuning ( b0.00 ~ b0.05 ). When starting a rotating auto-tuning, the motor is in standstill

status at first, and the stator's resistance (%R1), rotor's resistance (%R2) and the leakage inductance (%X1) will be detected, and then the motor will start rotating, exciting inductance (%Xm and I0 will be detected. All the above parameters will be saved in b0.06、b0.07、b0.08、b0.09 and b0.10 automatically.After auto-tuning, b0.05 will be set to 0 automatically.

Auto-tuning procedures:

- 1). A0.13(Torque boost of motor 1) is suggested to set as 0.
  - 2). Set the parameters b0.00(Rated power),b0.01(Rated voltage),b0.02(Rated current),b0.03(Rated frequency),b0.04 (Number of polarities of motor ) and b0.05(Rated speed) correctly;
  - 3). Set the parameter A0.10 correctly.The setting value of A0.10 can't be lower than rated frequency.
  - 4). Remove the load from the motor and check the Safety when set the parameter b0.11 as 2.
  - 5). Set b0.11 to 1 or 2, press **ENTER**, and then press **RUN** to start auto-tuning;
  - 6). When the operating LED turns off, that means the auto-tuning is over.
- 3:Reserved.

**Note:**

- 1.When setting b0.11 to 2, Acc/Dec time can be increased if over-current or over-voltage fault occurs in the auto-tuning process;
- 2.When setting b0.11 to 2, the motor's load must be removed first before starting rotating auto-tuning;
- 3.The motor must be in standstill status before starting the auto-tuning, otherwise the auto-tuning cannot be executed normally;
- 4.In some applications, for example, the motor cannot break away from the load or if you have no special requirement on motor's control performance, you can

select stationary auto-tuning. You can also give up the auto-tuning. At this time, please input the values on the motor's nameplate correctly .

5.If the auto-tuning cannot be applied and the correct motor's

parameters are available, the user should input the values on the motor's nameplate correctly (b0.00~b0.05), and then input the calculated values (b0.06~b0.10). Be sure to set the parameters correctly.

6.If auto-tuning is not successful, the drive will alarm and display fault code E024.

|   |                              |
|---|------------------------------|
| b0.12 Motor's overload protection coefficient | 20.0% ~ 110.0%<br>【 100.0% 】 |
|---|------------------------------|

In order to apply effective overload protection to different

kinds of motors, the Max. output current of the drive should be adjusted as shown in Fig. 6-34.。

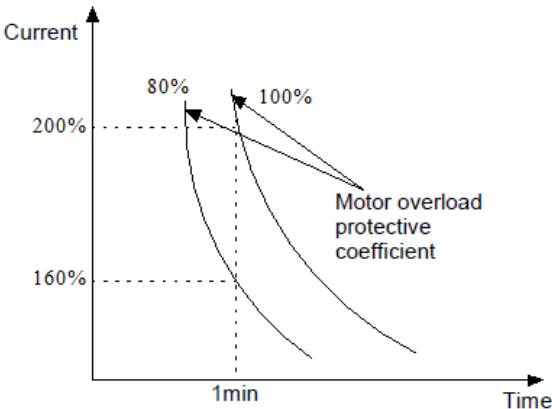


Fig.6-34 Motor's overload protection coefficient

This parameter can be set according to the user's requirement.In the same condition,set b0.12 to a lower value if the user need fast protection for overload of motor,or set it to a bigger value.

**Note:**

If the motor's rated current does not match that of the drive, motor's overload protection can be realized by setting b0.12.

|  |            |
|--|------------|
| b0.13 Oscillation inhibition coefficient | 0~255 【10】 |
|--|------------|

Adjust this parameter can prevent motor oscillation when drive using V/F control.

## 6.11 Group b1

|   |                      |
|---|----------------------|
| b1.00 V/F curve setting                 | 0~3 【0】              |
| b1.01 V/F frequency value F3 of motor 1 | b1.03~A0.08 【0.00Hz】 |
| b1.02 V/F voltage value V3 of motor 1   | b1.04~100.0% 【0.0%】  |
| b1.03 V/F frequency value F2 of motor 1 | b1.05~b1.01 【0.00Hz】 |
| b1.04 V/F voltage value V2 of motor 1   | b1.06~b1.02 【0.0%】   |
| b1.05 V/F frequency value F1 of motor 1 | 0.00~b1.03 【0.00Hz】  |
| b1.06 V/F voltage value V1 of motor 1   | 0.0~b1.04 【0.0%】     |

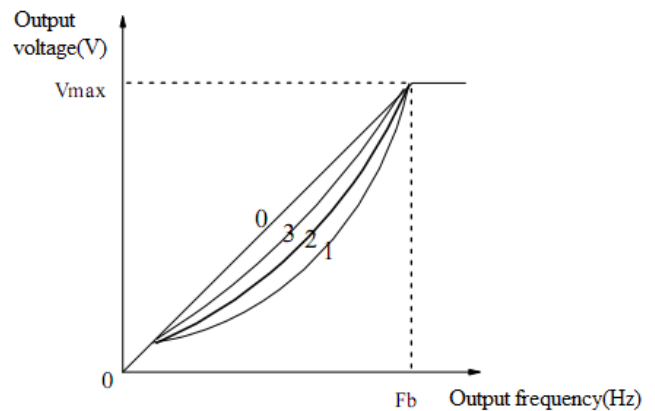
This group of parameters define the V/F setting modes of CV100 so as to satisfy the requirements of different loads. 3 preset curves and one user-defined curve can be selected according to the setting of b1.00.

If b1.00 is set to 1, a 2-order curve is selected, as shown in Fig. 6-35 as curve 1;

If b1.00 is set to 2, a 1.7-order curve is selected, as shown in Fig. 6-35 as curve 2;

If b1.00 is set to 3, a 1.2-order curve is selected, as shown in Fig. 6-35 as curve 3;

The above curves are suitable for the variable-torque loads such as fan & pumps. You can select the curves according to the actual load so as to achieve best energy-saving effects.

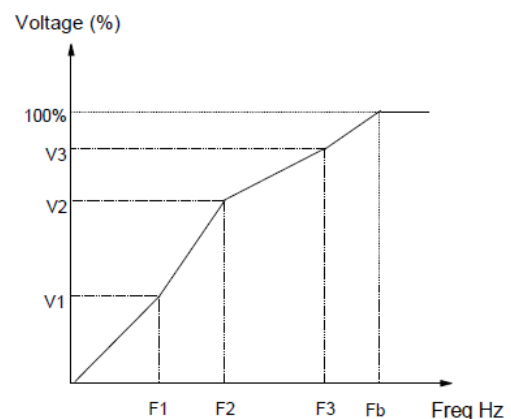


Vmax: Max.output voltage  
Fb: Basic operating frequency A0.12

Fig.6-35 Torque-reducing curve

If b1.00 is set to 0, you can define V/F curve via b1.01~b1.06, as shown in Fig. 6-36. The V/F curve can be defined by connecting 3 points of (V1,F1), (V2,F2) and (V3, F3), to adapt to special load characteristics.

Default V/F curve set by factory is a direct line as show in Fig. 6-35 as curve 0.



V1~V3: Voltage of sections 1~3  
F1~F3: Freq of sections 1~3  
Fb: Basic operating frequency of A0.12

Fig.6-36 V/F curve defined by user

|  |                    |
|--|--------------------|
| b1.07 Cut-off point used for manual torque boost | 0.0%~50.0% 【10.0%】 |
|--|--------------------|

b1.07 defines the ratio of the cut-off frequency used for manual torque boost to the basic operating frequency (defined by A0.12), as shown in Fig. 6-36 as Fz. This cut-off frequency adapts to any V/F curve defined by b1.00.



|                    |         |
|--------------------|---------|
| b1.08 AVR function | 0~2 【1】 |
|--------------------|---------|

0: Disable

1: Enable all the time

2: Disabled in Dec process

AVR means automatic voltage regulation.

The function can regulate the output voltage and make it constant. Therefore, generally AVR function should be enabled, especially when the input voltage is higher than the rated voltage.

In Dec-to-stop process, if AVR function is disabled, the Dec time is short but the operating current is big. If AVR function is enabled all the time, the motor decelerates steadily, the operating current is small but the Dec time is prolonged.

## 6.12 Group b2

|                              |                    |
|------------------------------|--------------------|
| b2.00 Carrier wave frequency | 2.0~15.0kHz 【8kHz】 |
|------------------------------|--------------------|

Drive's type and carrier wave frequency(CWF)

| Drives power | Default CWF value |
|--------------|-------------------|
| 2.2~5.5 kW   | 10kHz             |
| 7.5~55 kW    | 8kHz              |
| 55~250 kW    | 2kHz              |

### Note:

1.The carrier wave frequency will affect the noise when motor running,generally the carrier wave frequency is supposed to set as 3~5KHz.For some special situation where require operating mutely,the carrier wave frequency is supposed to set as 6~8KHz.

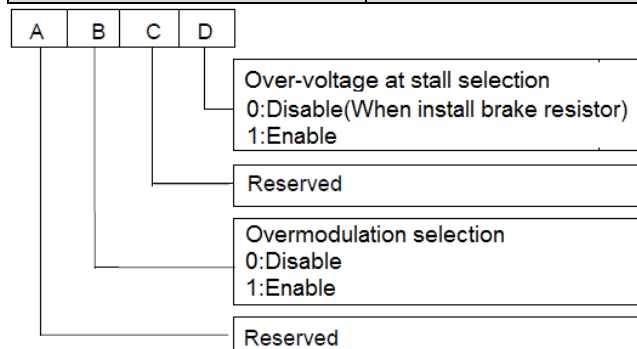
2. When set the carrier wave frequency larger than defaultvalue,then the power of drive need to derate 5% by every increase of 1KHz.

|                            |         |
|----------------------------|---------|
| b2.01Auto adjusting of CWF | 0~1 【0】 |
|----------------------------|---------|

0: Disable

1: Enable

|                                    |                   |
|------------------------------------|-------------------|
| b2.02 Voltage adjustment selection | 000~111H 【001H】   |
| b2.03 Overvoltage point at stall   | 120~150% 【140.0%】 |



During deceleration, the motor's decelerate rate may be lower than that of drive's output frequency due to the load inertia. At this time, the motor will feed the energy back to the drive, resulting in the voltage rise on the drive's DC bus. If no measures taken, the drive will trip due to over voltage.

During the deceleration, the drive detects the bus voltage and compares it with the over voltage point at stall defined by b2.03. If the bus voltage exceeds the stall overvoltage point, the drive will stop reducing its output frequency. When the bus voltage become lower than the point, the deceleration continues, as shown in Fig.6-37.

The hundred's place is used to set overmodulation function of V/F control.For vector control,the overmodulation function will be always enable.Overmodulation means when the voltage of power grid is low for long term(Lower than 15% of rated voltage),or is overload working for long term,then the drives will increase the use ratio of its own bus voltage to increase output voltage.

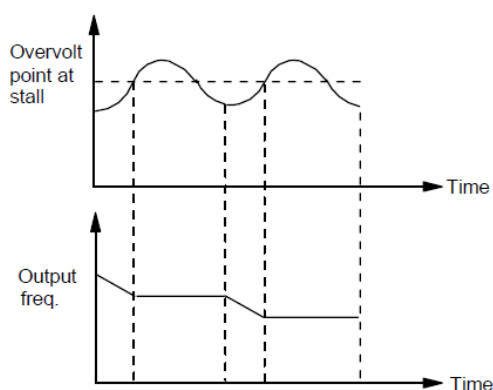


Fig.6-37Over-voltage at stall

|   |                                      |
|---|--------------------------------------|
| b2.04: Reserved                                     |                                      |
| b2.05 Auto current limiting threshold               | 20.0~200.0% <b>【150.0%】</b>          |
| b2.06 Frequency decrease rate when current limiting | 0.00~99.99Hz/s<br><b>【10.00Hz/s】</b> |
| b2.07 Auto current limiting selection               | 0~1 <b>【1】</b>                       |

Auto current limiting function is used to limit the load current smaller than the value defined by b2.05 in real time. Therefore the drive will not trip due to surge over-current. This function is especially useful for the applications with big load inertia or big change of load.

b2.05 defines the threshold of auto current limiting. It is a percentage of the drive's rated current.

b2.06 defines the decrease rate of output frequency when the drive is in auto current limiting status.

If b2.06 is set too small, overload fault may occur. If it is set too big, the frequency will change too sharply and therefore, the drive may be in generating status for long time, which may result in overvoltage protection.

Auto current limiting function is always active in Acc or Dec process. Whether the function is active in constant speed operating process is decided by b2.07.

b2.07=0, Auto current limiting function is disabled in constant speed operating process;

b2.07=1, Auto current limiting function is enabled in constant speed operating process;

In auto current limiting process, the drive's output frequency may change; therefore, it is recommended not

to enable the function when the drive's output frequency is required stable.

When the auto current limiting function is enabled, if b2.05 is set too low, the output overload capacity will be impaired.

|   |                                     |
|---|-------------------------------------|
| b2.08 Gain of slip compensation                       | 0.0~300.0% <b>【100%】</b>            |
| b2.09 Limit of slip compensation                      | 0.0~250.0% <b>【200%】</b>            |
| b2.10 Slip compensation time constant                 | 0.1~25.0s <b>【2】</b>                |
| b2.11 Energy-saving function                          | 0:Disable. 1:Enable. <b>【0】</b>     |
| b2.12 Frequency decrease rate at voltage compensation | 0.00~99.99Hz<br><b>【10.00 Hz/s】</b> |

|   |                                     |
|---|-------------------------------------|
| b2.13 Threshold of zero-frequency operation | 0.00~300.00Hz<br><b>【0.50 Hz/s】</b> |
|---|-------------------------------------|

This parameter is used together with No.9 function of digital output terminal.

|                   |                |
|-------------------|----------------|
| b2.14 Reserved    |                |
| b2.15 Fan control | 0~1 <b>【0】</b> |

0: Auto operating mode.

The fan runs all the time when the drive is operating. After the drive stops, its internal temperature detecting program will be activated to stop the fan or let the fan continue to run according to the IGBT's temperature. The drive will activate the internal temperature detecting program automatically when it is operating, and run or stop the fan according to the IGBT's temperature. If the fan is still running before the drive stop, then the fan will continue running for three minutes after the drive stops and then activate the internal temperature detecting program.

1: The fan operates continuously.

The fan operates continuously after the drive is switched on.

## 6.13 Group b3

Details please refer to the Group b3 of function list in chapter 9.

## 6.14 Group b4

|                                   |         |
|-----------------------------------|---------|
| b4.00 Key-lock function selection | 0~4 【0】 |
|-----------------------------------|---------|

0: The keys on the operation panel are not locked, and all the keys are usable.

1: The keys on the operation panel are locked, and all the keys are unusable.

2: All the keys except for the multi-functional key are unusable.

3: All the keys except for the **SHIFT** key are unusable.

4: All the keys except for the **RUN** AND **STOP** keys are unusable.

|                                    |         |
|------------------------------------|---------|
| b4.01 Multifunctional key function | 0~3 【0】 |
|------------------------------------|---------|

0: Jog

1: Coast to stop

2: Quick stop

3: Operating commands switchover

|                            |         |
|----------------------------|---------|
| b4.02 Parameter protection | 0~2 【0】 |
|----------------------------|---------|

0: All parameters are allowed modifying;

1: Only A0.03 and b4.02 can be modified;

2: Only b4.02 can be modified.

|                                |         |
|--------------------------------|---------|
| b4.03 Parameter initialization | 0~2 【0】 |
|--------------------------------|---------|

0: No operation

1: Clear falt information in memory

2: Restore to factory settings

|                      |         |
|----------------------|---------|
| b4.04 Parameter copy | 0~3 【0】 |
|----------------------|---------|

0: No action

1: parameters upload

2: parameters download

3: parameters download (except the parameters related

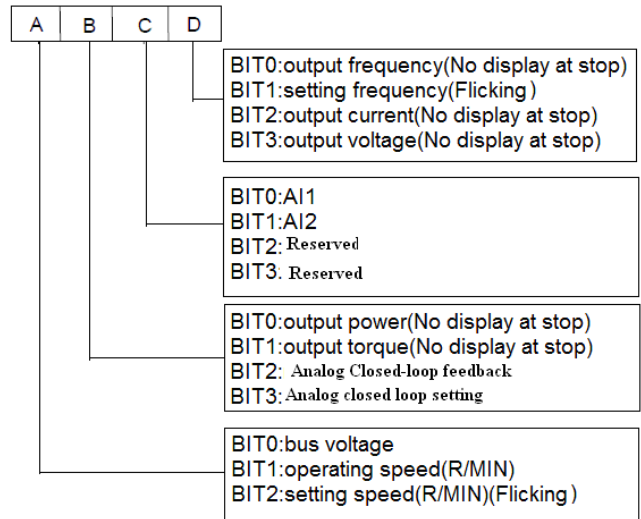
to drive type)

|                                    |                 |
|------------------------------------|-----------------|
| b4.05 Display parameters selection | 0~7FFFH 【1007H】 |
|------------------------------------|-----------------|

B4.05 defines the parameters that can be displayed by LED in operating status.

If Bit is 0, the parameter will not be displayed;

If Bit is 1, the parameter will be displayed.



Note: If all the BITs are 0, the drive will display setting frequency at stop and display output frequency at operating.

## 6.15 Group C0

|                          |   |
|--------------------------|---|
| C0.00 Preset frequency 1 | Lower limit of frequency~upper limit of frequency 【5.00Hz】  |
| C0.01 Preset frequency 2 | Lower limit of frequency~upper limit of frequency 【10.00Hz】 |
| C0.02 Preset frequency 3 | Lower limit of frequency~upper limit of frequency 【20.00Hz】 |
| C0.03 Preset frequency 4 | Lower limit of frequency~upper limit of frequency 【30.00Hz】 |
| C0.04 Preset frequency 5 | Lower limit of  |

|                           |   |
|---------------------------|---|
|                           | frequency~upper limit of frequency 【40.00Hz】                |
| C0.05 Preset frequency 6  | Lower limit of frequency~upper limit of frequency 【45.00Hz】 |
| C0.06 Preset frequency 7  | Lower limit of frequency~upper limit of frequency 【50.00Hz】 |
| C0.07 Preset frequency 8  | Lower limit of frequency~upper limit of frequency 【5.00Hz】  |
| C0.08 Preset frequency 9  | Lower limit of frequency~upper limit of frequency 【10.00Hz】 |
| C0.09 Preset frequency 10 | Lower limit of frequency~upper limit of frequency 【20.00Hz】 |
| C0.10 Preset frequency 11 | Lower limit of frequency~upper limit of frequency 【30.00Hz】 |
| C0.11 Preset frequency 12 | Lower limit of frequency~upper limit of frequency 【40.00Hz】 |
| C0.12 Preset frequency 13 | Lower limit of frequency~upper limit of frequency 【45.00Hz】 |
| C0.13 Preset frequency 14 | Lower limit of frequency~upper limit of frequency 【50.00Hz】 |
| C0.14 Preset frequency 15 | Lower limit of frequency~upper limit of frequency 【50.00Hz】 |

These frequencies will be used in multi-step speed operation, refer to the introductions of No.27,28,29 and 30 function of A6.00~A6.04.

## 6.16 Group C1

Process close-loop control

The process closed-loop control type of CV100 is analog

close-loop control. Fig.6-38 shows the typical wiring of analog close-loop control.

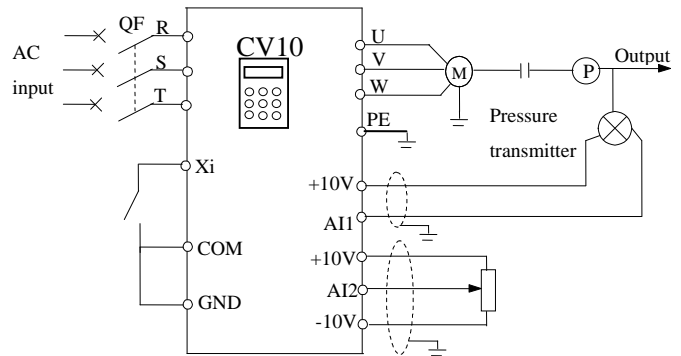


Fig.6-38 Analog feedback control system with internal process close-loop

Analog feedback control system:

An analog feedback control system uses a pressure transmitter as the feedback sensor of the internal close-loop. As shown in Fig. 6-38, pressure reference (voltage signal) is input via terminal AI2, while the feedback pressure value is input into terminal AI1 in the form of 0(4)~20mA current signal. The reference signal and feedback signal are detected by the analog channel. The start and stop of the drive can be controlled by terminal Xi.

The above system can also use a TG (speed measuring generator) in close speed-loop control.

### Note:

The reference can also be input via panel or serial port.

Operating principles of internal process close-loop of CV100 is shown in the Fig. 6-39.

In the above Fig., KP: proportional gain; Ki: integral gain

In Fig. 6-39, refer to C1.00~C1.14 for the definitions of close-loop reference, feedback, error limit and proportional and Integral parameters.

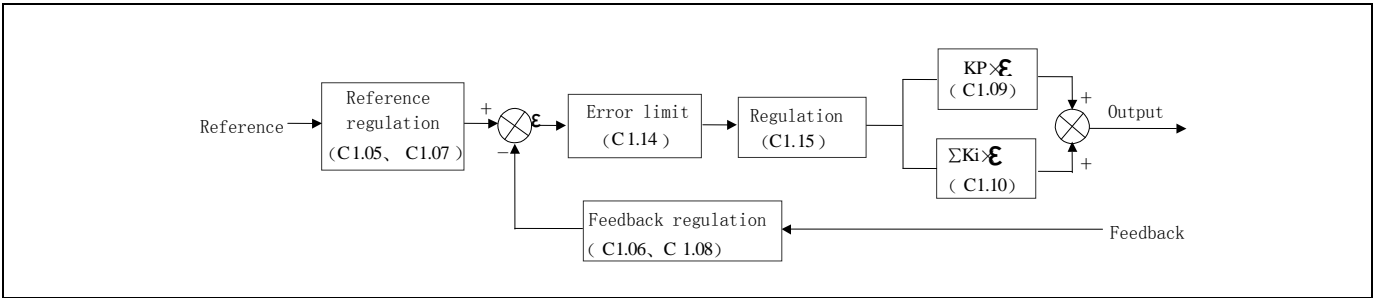


Fig.6-39 Principle diagram of process close-loop control

There are two features of internal close-loop of CV100:  
The relationship between reference and feedback can be defined by C1.05~C1.08

For example: In Fig. 6-38, if the reference is analog signal of -10~10V, the controlled value is 0~1MP, and the signal of pressure sensor is 4~20mA, then the relationship between reference and feedback is shown in Fig. 6-40.

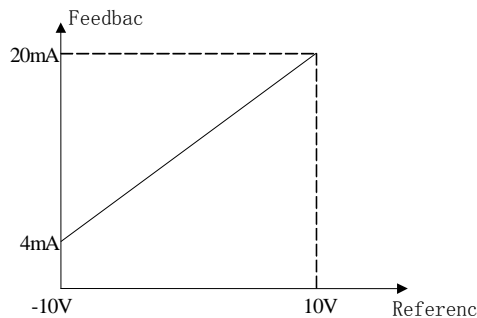


Fig.6-40 Reference and feedback

After the control type is determined, follow the procedures below to set close loop parameters.

- 1) Determine the close-loop reference and feedback channel (C1.01 and C1.02);
- 2) The relationship between close-loop reference and feedback value (C1.05~C1.08) should be defined for analog close-loop control;
- 3) Determine the close-loop regulation characteristic, if the relationship between motor speed and the reference is opposite, then set the close-loop regulation characteristic as negative characteristic (C1.15=1).
- 4) Set up the integral regulation function and close-loop frequency presetting function (C1.16~C1.18);

- 5) Adjust the close-loop filtering time, sampling cycle, error limit and gain (C1.09~C1.14).

|                                   |         |
|-----------------------------------|---------|
| C1.00 Close-loop control function | 0、1 【0】 |
|-----------------------------------|---------|

- 0: Disable.  
1: Enable.

|                                   |             |
|-----------------------------------|-------------|
| C1.01 Reference channel selection | 0、1、2、3 【1】 |
|-----------------------------------|-------------|

- 0: digital input  
Take the value of C1.03.  
1: AI1 analog input.  
2: AI2 analog input

|                                  |         |
|----------------------------------|---------|
| C1.02 Feedback channel selection | 0~5 【1】 |
|----------------------------------|---------|

- 0: AI1 analog input  
1: AI2 analog input  
2: AI1+ AI2  
3: AI1— AI2  
4: Min{ AI1, AI2}  
5: Max{ AI1, AI2}  
6: DI (Pulse)

Settings of AI are the same as above.

|                                    |                       |
|------------------------------------|-----------------------|
| C1.03 Digital setting of reference | - 10.00~10.00V 【0.00】 |
|------------------------------------|-----------------------|

This function can realize digital setting of reference via panel or serial port.

|   |                         |
|---|-------------------------|
| C1.04 Close-loop speed reference                        | 0~39000rpm              |
| C1.05 Min reference                                     | 0.0%~C1.08 【0.0%】       |
| C1.06 Feedback value corresponding to the Min reference | 0.0~100.0% 【0.0%】       |
| C1.07 Max reference                                     | C1.06 ~ 100.0% 【100.0%】 |
| C1.08 Feedback value corresponding to the Max reference | 0.0~100.0% 【100.0%】     |

The regulation relationship between C1.05,C1.07(in Fig.6-39) and reference is shown in Fig.6-41. When the analog input 6V, if C1.05=0% and C1.07=100%, then adjusted value is 60%. If C1.05=25% and C1.07=100%, then the adjusted value is 46.6%.

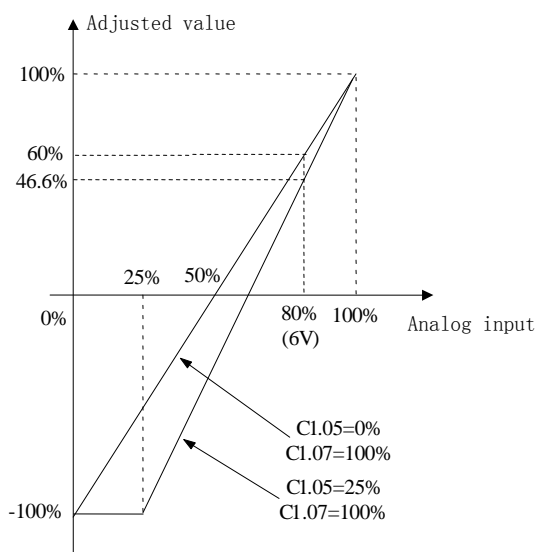


Fig.6-42 Regulation curve of reference

#### Note:

1. Fig.6-42, 0%~100% in X axis is corresponding to analog input -10V~10V, 10V of analog input is corresponding to 100%, and -10V is corresponding to 0%, 6V is corresponding to 80%.

2. If the analog type is current input, because the current input range is 4~20mA, then the range of X axis is 50%~100%.

3. The adjusted value can be observed in d0.24.

The regulation relationship between C1.06, C1.08 (in Fig.6-39) and feedback is similar to reference regulation. Its adjusted value can be observed in d0.25.

|                            |                      |
|----------------------------|----------------------|
| C1.09 Proportional gain KP | 0.000~10.000 【2.000】 |
| C1.10 Integral gain Ki     | 0.000~10.000 【0.100】 |
| C1.11 Differential gain Kd | 0.000~10.000 【0.100】 |
| C1.12 Sampling cycle T     | 0.01~50.00s 【0.50s】  |

The bigger the proportional gain of KP, the faster the response, but oscillation may easily occur.

If only proportional gain KP is used in regulation, the error cannot be eliminated completely. To eliminate the error, please use the integral gain Ki to form a PI control system. The bigger the Ki, the faster the response, but oscillation may easily occur if Ki is too big.

The sampling cycle T refers to the sampling cycle of feedback value. The PI regulator calculates once in each sampling cycle. The bigger the sampling cycle the slower the response.

|                     |                   |
|---------------------|-------------------|
| C1.13 Output filter | 0.01~10.00 【0.05】 |
|---------------------|-------------------|

This parameter defines the filter time of the close-loop output (Frequency or torque). The bigger the output filter, the slower the response.

|                   |                |
|-------------------|----------------|
| C1.14 Error limit | 0.0~20% 【2.0%】 |
|-------------------|----------------|

This parameter defines the max. deviation of the output from the reference, as shown in Fig. 6-43. Close-loop regulator stops operation when the feedback value is within this range. Setting this parameter correctly is helpful to improve the system output accuracy and stability.

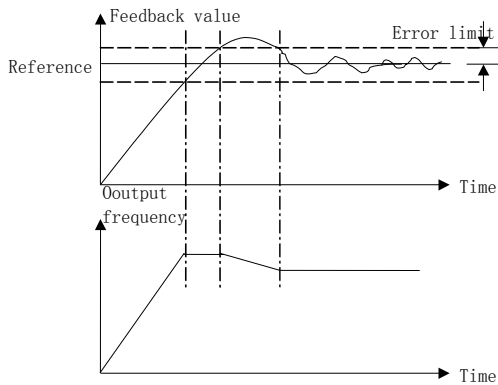


Fig.6-43 Error limit

|  |                |
|--|----------------|
| C1.15 Close-loop regulation characteristic | 0、1 <b>【0】</b> |
|--|----------------|

0: Positive

Set C1.15 to 0 if the motor speed is required to be increased with the increase of the reference.

1: Negative

Set C1.15 to 1 if the motor speed is required to decrease with the increase of the reference.

|                                     |                |
|-------------------------------------|----------------|
| C1.16 Integral regulation selection | 0、1 <b>【0】</b> |
|-------------------------------------|----------------|

0: Stop integral regulation when the frequency reaches the upper and lower limits

1: Continue the integral regulation when the frequency reaches the upper and lower limits

It is recommended to disable the integral regulation for the system that requires fast response.

|   |                               |
|---|-------------------------------|
| C1.17 Preset close-loop frequency                 | 0.00~1000.0Hz <b>【0.00Hz】</b> |
| C1.18 Holding time of preset close-loop frequency | 0.0~3600.0s <b>【0.0s】</b>     |

This function can make the close-loop regulation enter stable status quickly.

When the close-loop function is enabled, the frequency will ramp up to the preset close-loop frequency (C1.17) within the Acc time, and then the drive will start

close-loop operation after operating at the preset frequency for certain time(defined by C1.18).

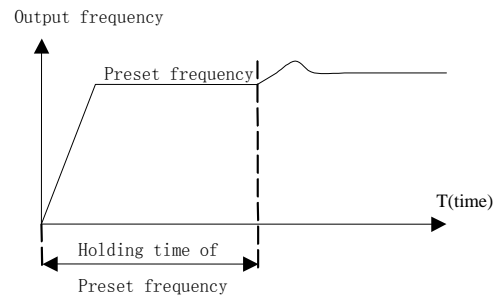


Fig.6-44 Preset frequency of close-loop operation

Note:

You can disable the function by set both C1.17 and C1.18 to 0.

|                                      |                              |
|--------------------------------------|------------------------------|
| C1.19 Preset close-loop reference 1  | -10.00~10.00V <b>【0.00V】</b> |
| C1.20 Preset close-loop reference 2  | -10.00~10.00V <b>【0.00V】</b> |
| C1.21 Preset close-loop reference 3  | -10.00~10.00V <b>【0.00V】</b> |
| C1.22 Preset close-loop reference 4  | -10.00~10.00V <b>【0.00V】</b> |
| C1.23 Preset close-loop reference 5  | -10.00~10.00V <b>【0.00V】</b> |
| C1.24 Preset close-loop reference 6  | -10.00~10.00V <b>【0.00V】</b> |
| C1.25 Preset close-loop reference 7  | -10.00~10.00V <b>【0.00V】</b> |
| C1.26 Preset close-loop reference 8  | -10.00~10.00V <b>【0.00V】</b> |
| C1.27 Preset close-loop reference 9  | -10.00~10.00V <b>【0.00V】</b> |
| C1.28 Preset close-loop reference 10 | -10.00~10.00V <b>【0.00V】</b> |
| C1.29 Preset close-loop reference 11 | -10.00~10.00V <b>【0.00V】</b> |
| C1.30 Preset close-loop reference 12 | -10.00~10.00V <b>【0.00V】</b> |
| C1.31 Preset close-loop              | -10.00~10.00V <b>【0.00V】</b> |

|                                      |                       |
|--------------------------------------|-----------------------|
| reference 13                         |                       |
| C1.32 Preset close-loop reference 14 | — 10.00~10.00V【0.00V】 |
| C1.33 Preset close-loop reference 15 | — 10.00~10.00V【0.00V】 |

Among the close-loop reference selectors, besides the 3 selectors defined by C1.01, the voltage value defined by C1.19~C1.33 can also be used as the close-loop reference.

Voltage of preset close-loop reference 1~15 can be selected by terminals, refer to introductions to A6.00~A6.06 for details.

The priority preset close-loop reference control is higher than the reference selectors defined by C1.01

|  |         |
|--|---------|
| C1.34 Close-loop output reversal selection | 0、1 【0】 |
|--|---------|

0: The close-loop output is negative,the drive will operate at zero frequency.

1: The close-loop output is negative,and the drive operate reverse.If the anti-reverse function is activated,then the drive will operate at zero frequency.Refer to the instructions of A1.12.

|   |           |
|---|-----------|
| C1.35 The action selection of close-loop feedback lost. | 0、1、2 【0】 |
|---|-----------|

0: No detection for close-loop feedback lost.

1: With detection for close-loop feedback lost.When the drive detects the close-loop feedback lost,then it will continue operating and display error information A021.

2: With detection for close-loop feedback lost.When the drive detects the close-loop feedback lost,then it will coast to stop and display error information E021.

|  |                    |
|--|--------------------|
| C1.36 Detected value of close-loop feedback lost | 0.0~100.0% 【50.0%】 |
| C1.37 Detected time of                           | 0.0~20.0s 【1.0s】   |

|                          |  |
|--------------------------|--|
| close-loop feedback lost |  |
|--------------------------|--|

When the close-loop feedback is lower than the detected value(C1.36) within the detected time(C1.37),the drive will operation the action set by C1.35.The detection sequence of close-loop feedback lost is shown in Fig.6-45.

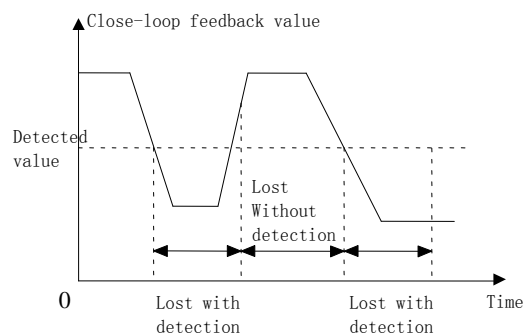


Fig.6-45 The detection sequence of close-loop feedback lost

## 6.17 Group C2

This group of parameters is simple PLC function (Custom-made).

## 6.18 Group d0

The parameters of Group d0 are used to monitor some states of drives and motors.

|                                |                       |
|--------------------------------|-----------------------|
| d0.00 Main reference frequency | — 300.0~300.0Hz【0.00】 |
|--------------------------------|-----------------------|

This parameter is used to monitor main reference frequency at normal operation mode.

|                                     |                       |
|-------------------------------------|-----------------------|
| d0.01 Auxiliary reference frequency | — 300.0~300.0Hz【0.00】 |
|-------------------------------------|-----------------------|

This parameter is used to monitor the auxiliary reference frequency at normal operation mode.

|                        |                       |
|------------------------|-----------------------|
| d0.02 Preset frequency | — 300.0~300.0Hz【0.00】 |
|------------------------|-----------------------|

This parameter is used to monitor the frequency combined by main reference frequency and auxiliary



reference frequency.Positive indicates running forwards, negative indicates running reverse.

|  |                      |
|--|----------------------|
| d0.03    Frequency    after<br>Acc/Dec | —300.0~300.0Hz【0.00】 |
|--|----------------------|

This parameter is used to monitor the drive’s output frequency(include direction) after the drive accelerating or decelerating.

|                        |                      |
|------------------------|----------------------|
| d0.04 Output frequency | —300.0~300.0Hz【0.00】 |
|------------------------|----------------------|

This parameter is used to monitor the drive’s output frequency(include direction).

|                      |            |
|----------------------|------------|
| d0.05 Output voltage | 0~480V 【0】 |
|----------------------|------------|

This parameter is used to monitor the drive’s output voltage.

|                      |             |
|----------------------|-------------|
| d0.06 Output current | 0.0~3Ie 【0】 |
|----------------------|-------------|

This parameter is used to monitor the drive’s output current.

|                      |                               |
|----------------------|-------------------------------|
| d0.07 Torque current | — 300.0 % ~ 300.0 %<br>【0.0%】 |
|----------------------|-------------------------------|

This parameter is used to monitor the percentage of drive’s torque current that corresponding to the motor’s rated current.

|                             |                   |
|-----------------------------|-------------------|
| d0.08 Magnetic flux current | 0.0%~100.0% 【0.0】 |
|-----------------------------|-------------------|

This parameter is used to monitor the percentage of drive’s magnetic flux current that corresponding to the motor’s rated current.

|                   |                   |
|-------------------|-------------------|
| d0.09 Motor power | 0.0%~200.0% 【0.0】 |
|-------------------|-------------------|

This parameter is used to monitor the percentage of drive’s output power that corresponding to the motor’s rated power.

|                             |                     |
|-----------------------------|---------------------|
| d0.10    Motor    estimated | — 300.00 ~ 300.00Hz |
|-----------------------------|---------------------|

|           |        |
|-----------|--------|
| frequency | 【0.00】 |
|-----------|--------|

This parameters is used to monitor the estimated motor rotor frequency under the condition of open-loop vector control.

|                                       |                               |
|---------------------------------------|-------------------------------|
| d0.11    Motor    actual<br>frequency | — 300.00 ~ 300.00Hz<br>【0.00】 |
|---------------------------------------|-------------------------------|

This parameter is used to monitor the actual motor rotor frequency measured by encoder under the condition of close-loop vector control.

|                   |            |
|-------------------|------------|
| d0.12 Bus voltage | 0~800V 【0】 |
|-------------------|------------|

This parameter is used to monitor the drive’s bus voltage.

|                                 |                   |
|---------------------------------|-------------------|
| d0.13 Drive operation<br>status | 0000~FFFFH 【0000】 |
|---------------------------------|-------------------|

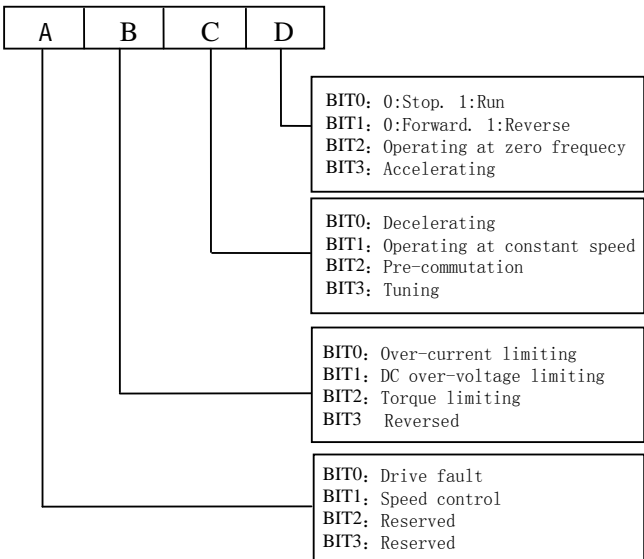


Fig.6-46 The drive’s operation status

|                              |             |
|------------------------------|-------------|
| d0.14 Input terminals status | 00~FFH 【00】 |
|------------------------------|-------------|

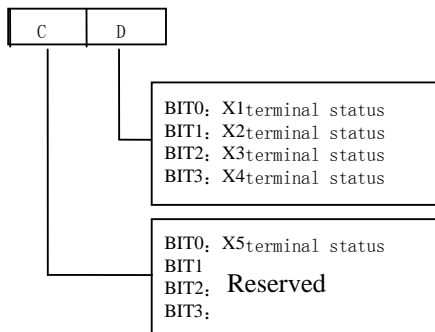


Fig.6-47 Input terminals status

This parameter is used to display the status of X1~X7.

0 indicates OFF status,1 indicates ON status.

|                               |           |
|-------------------------------|-----------|
| d0.15 Output terminals status | 0~1FH 【0】 |
|-------------------------------|-----------|

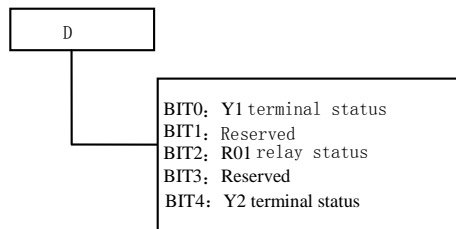


Fig.6-48 Output terminal status

This parameter is used to display the status of output terminals. When there is signal output, the corresponding bit will be set as 1.

|                 |                      |
|-----------------|----------------------|
| d0.16 AI1 input | -10.00~10.00V 【0.00】 |
| d0.17 AI2 input | -10.00~10.00V 【0.00】 |
| d0.18 AI3 input | -10.00~10.00V 【0.00】 |

d0.16~d0.18 are used to display the analog input value before regulation.

|  |                      |
|--|----------------------|
| d0.19 Percentage of AI1 after regulation | -100.0%~100.0% 【0.0】 |
| d0.20 Percentage of AI2 after regulation | -100.0%~100.0% 【0.0】 |
| d0.21 Percentage of AI3 after regulation | -100.0%~100.0% 【0.0】 |

d0.19~d0.21 are used to display the percentage of analog input after regulation.

|                  |                   |
|------------------|-------------------|
| d0.22 AO1 output | 0.0%~100.0% 【0.0】 |
| d0.23            | Reserved          |

d0.22、d0.23 are used to display the percentage of analog output that corresponding to the full range.

|                                    |                      |
|------------------------------------|----------------------|
| d0.24 Process close-loop reference | -100.0%~100.0% 【0.0】 |
| d0.25 Process close-loop feedback  | -100.0%~100.0% 【0.0】 |
| d0.26 Process close-loop error     | -100.0%~100.0% 【0.0】 |
| d0.27 Process close-loop output    | -100.0%~100.0% 【0.0】 |

|                                 |                  |
|---------------------------------|------------------|
| d0.28 Temperature of heatsink 1 | 0.0~150.0℃ 【0.0】 |
| d0.29 Temperature of heatsink 2 | 0.0~150.0℃ 【0.0】 |

Temperature of heatsink 1 is the temperature of IGBT modules. Different IGBT modules have different over-temperature threshold.

Temperature of heatsink 2 is the temperature of rectifier. The drive of 30kW or below does not detect this temperature.

Temperature display range:0~100℃.Accuracy: 5%

|                                  |                   |
|----------------------------------|-------------------|
| d0.30 Total conduction time      | 0~65535 hours 【0】 |
| d0.31 Total operating time       | 0~65535 hours 【0】 |
| d0.32 Total fan's operating time | 0~65535 hours 【0】 |

d0.30 ~ d0.32 define the drive's total conduction time, operating time and fan's operating time after production.

|                             |   |
|-----------------------------|---|
| d0.33 ASR controller output | -300.0~300.0%<br>(Corresponding to rated torque of motor) |
| d0.34 Reference torque      | -300.0~300.0%<br>(Corresponding to rated torque of motor) |

---

## 6.19 Group d1

|   |                    |
|---|--------------------|
| d1.00 Fault record 1                            | 0~50 【0】           |
| d1.01 Bus voltage of the latest failure         | 0~999V 【0】         |
| d1.02 Actual current of the latest failure      | 0.0~999.9A 【0】     |
| d1.03 Operation frequency of the latest failure | 0.00~300.0Hz【0.00】 |
| d1.04 Operation status of the latest failure    | 0~FFFFH 【0000】     |
| d1.05 Fault record 2                            | 0~50 【0】           |
| d1.06 Fault record 3                            | 0~50 【0】           |

CV100 support 50 kinds of protection alarm and can record the latest three fault code (d1.00,d1.05,d1.06) and bus voltage, current,operation frequency and operation status of the latest fault.

Fault record 1 is the latest fault record.

See Chapter 7 of failure and alarm information during failures recently occurred for the ease of Trouble Shooting and repair.

## 6.20 Group d2

|                                  |                      |
|----------------------------------|----------------------|
| d2.00 Serial number              | 0~FFFF 【100】         |
| d2.01 Software version number    | 0.00~99.99 【1.00】    |
| d2.02 Custom-made version number | 0~9999 【0】           |
| d2.03 Rated capacity             | 0~999.9KVA 【Factory】 |
| d2.04 Rated voltage              | 0~999V 【Factory】     |
| d2.05 Rated current              | 0~999.9A 【Factory】   |

This group of parameters can be changed by user.

## Chapter 7 Troubleshooting

Table 7-1 list the possible faults of CV100, the fault code varies from E001 to E050. Once a fault occurs, you may check it against the table and record the detailed phenomena before seeking service from your supplier.

Table 7-1 Faults and actions

| Fault code | Fault categories                                 | Possible reasons for fault                                       | Actions   |
|------------|--|--|---|
| E001       | Over-current during accerleration                | Acc time is too short  | Prolong the Acc time                            |
|            |  | Parameters of motor are wrong                                    | Atuo-tune the parameters of motor               |
|            |  | Coded disc breaks down, when PG is running                       | Check the coded disc and the connection         |
|            |  | Drive power is too small   | Select a higher power drive                     |
|            |  | V/F curve is not suitable  | Check and adjust V/F curve, adjust torque boost |
| E002       | Over-current during deceleration                 | Deceleration time is too short                                   | Prolong the Dec time                            |
|            |  | The load generates energy or the load inertial is too big        | Connect suitable braking kit                    |
|            |  | Coded disc breaks down, when PG is running                       | Check the coded disc and the connection         |
|            |  | Drive power is too small   | Select a higher power drive                     |
| E003       | Over-current in constant speed operation         | Acceleration /Deceleration time is too short                     | Prolong Acceleration/Deceleration time          |
|            |  | Sudden change of load or Abnormal load                           | Check the load                                  |
|            |  | Low AC supply voltage  | Check the AC supply voltage                     |
|            |  | Coded disc breaks down, when PG is running                       | Check the coded disc and the connection         |
|            |  | Drive power is too small   | Select a higher power drive                     |
| E004       | Over voltage during acceleration                 | Abnormal AC supply voltage                                       | Check the power supply                          |
|            |  | Too short acceleration time                                      | Prolong accerlation time                        |
| E005       | Over voltage during deceleration                 | Too short Deceleration time (with reference to generated energy) | Prolong the deceleration time                   |
|            |  | The load generates energy or the load inertial is too big        | Connect suitable braking kit                    |
| E006       | Over voltage in constant-speed operating process | Wrong ASR parameters, when drive run in the vector control mode  | Refer to A5. ASR parameter seting               |
|            |  | Acceleration /Deceleration time is too short                     | Prolong Acceleration/Deceleration time          |
|            |  | Abnormal AC supply voltage                                       | Check the power supply                          |
|            |  | Abnormal change of input voltage                                 | Install input reactor                           |
|            |  | Too big load inertia   | Connect suitable braking kit                    |

| Fault code | Fault categories                          | Possible reasons for fault   | Actions  |
|------------|---|--|--|
| E007       | Drive's control power supply over voltage | Abnormal AC supply voltage   | Check the AC supply voltage or seek service                      |
| E008       | Input phase loss                          | Any of phase R, S and T cannot be detected                           | Check the wiring and installation<br>Check the AC supply voltage |
| E009       | Output phase loss                         | Any of Phase U, V and W cannot be detected                           | Check the drive's output wiring<br>Check the cable and the motor |
| E010       | Protections of IGBT act                   | Short-circuit among 3-phase output or line-to-ground short circuit   | Rewiring, please make sure the insulation of motor is good       |
|            |   | Instantaneous over-current   | Refer to E001~E003   |
|            |   | Vent is obstructed or fan does not work                              | Clean the vent or replace the fan                                |
|            |   | Over-temperature   | Lower the ambient temperature                                    |
|            |   | Wires or connectors of control board are loose                       | Check and rewiring   |
|            |   | Current waveform distorted due to output phase loss                  | Check the wiring   |
|            |   | Auxiliary power supply is damaged or IGBT driving voltage is too low | Seek service   |
|            |   | Short-circuit of IGBT bridge   | Seek service   |
|            |   | Control board is abnormal  | Seek service   |
| E011       | IGBT module's heatsink overheat           | Ambient over-temperature   | Lower the ambient temperature                                    |
|            |   | Vent is obstructed   | Clean the vent   |
|            |   | Fan does not work  | Replace the fan  |
|            |   | IGBT module is abnormal  | Seek service   |
| E012       | Rectifier's heatsink overheat             | Ambient over-temperature   | Lower the ambient temperature                                    |
|            |   | Vent is obstructed   | Clean the vent   |
|            |   | Fan does not work  | Replace the fan  |
| E013       | Drive overload                            | Parameters of motor are wrong  | Atuo-tune the parameters of motor                                |
|            |   | Too heavy load   | Select the drive with bigger power                               |
|            |   | DC injection braking current is too big                              | Reduce the DC injection braking current and prolong              |

| Fault code | Fault categories                | Possible reasons for fault  | Actions   |
|------------|---------------------------------|---|---|
|            |                                 |   | the braking time  |
|            |                                 | Too short acceleration time   | Prolong acceleration time   |
|            |                                 | Low AC supply voltage   | Check the AC supply voltage   |
|            |                                 | Improper V/F curve  | Adjust V/F curve or torque boost value  |
| E014       | Motor over-load                 | Improper motor's overload protection threshold  | Modify the motor's overload protection threshold.   |
|            |                                 | Motor is locked or load suddenly become too big   | Check the load  |
|            |                                 | Common motor has operated with heavy load at low speed for a long time.   | Use a special motor if the motor is required to operate for a long time.  |
|            |                                 | Low AC supply voltage   | Check the AC supply voltage   |
|            |                                 | Improper V/F curve  | Set V/F curve and torque boost value correctly  |
| E015       | external equipment fails        | Terminal used for stopping the drive in emergent status is closed   | Disconnect the terminal if the external fault is cleared  |
| E016       | EEPROM R/W fault                | R/W fault of control parameters   | Press <b>STOP/RST</b> to reset, seek service  |
| E017       | reserved                        | reserved  | reserved  |
| E018       | Contactor not closed            | Low AC supply voltage   | Check the AC supply voltage   |
|            |                                 | Contactor damaged   | Replace the contactor in main circuit and seek service  |
|            |                                 | Soft start resistor is damaged  | Replace the soft start resistor and seek service  |
|            |                                 | Control circuit is damaged  | Seek service  |
|            |                                 | Input phase loss  | Check the wiring of R, S, T.  |
| E019       | Current detection circuit fails | Wires or connectors of control board are loose  | Check and re-wire   |
|            |                                 | Auxiliary power supply is damaged   | Seek service  |
|            |                                 | Hall sensor is damaged  | Seek service  |
|            |                                 | Amplifying circuit is abnormal  | Seek service  |
| E020~022   | reserved                        | reserved  | reserved  |
| E023       | Parameter copy error            | Panel's parameters are not complete or the version of the parameters are not the same as that of the main control board | Update the panel's parameters and version again. First set b4.04 to 1 to upload the parameters and then set b4.04 to 2 or 3 to download the parameters. |
|            |                                 | Panel's EEPROM is damaged   | Seek service  |
| E024       | Auto-tuning fault               | Improper settings of parameters on the nameplate  | Set the parameters correctly according to the nameplate   |

| Fault code | Fault categories          | Possible reasons for fault                             | Actions  |
|------------|---------------------------|--|--|
|            |                           | Prohibiting contrarotation Auto-tuning during rollback | Cancel prohibiting rollback  |
|            |                           | Overtime of auto-tuning                                | Check the motor's wiring   |
|            |                           |  | Check the set value of A0.10(upper limiting frequency), make sure if it is lower than the rated frequency or not |
| E025       | PG fails                  | With PG vector control, the signal of encoder is lost  | Check the wiring of the encoder, and re-wiring   |
| E026       | The load of drive is lost | The load is lost or reduced                            | Check the situation of the load  |
| E027       | Brake unit fault          | Brake tube is broken                                   | Seek service   |
| E028~E050  | Reserved                  |  |  |

Note:

The short circuit of the brake resistance can lead to the damage of brake unit fault.

Table 7-2 Abnormal phenomena and handling methods

| Phenomena                                | Conditions  | Possible reasons of fault                              | Actions  |
|--|---|--|--|
| No response of operation panel           | Part of the keys or all the keys are disabled       | Panel is locked up                                     | In stopping status, first press <b>ENTER</b> and hold on, then press <b>√</b> 3 times continuously to unlock the panel |
|  |   |  | Power-on the drive after it shuts down completely  |
|  |   | Panel's cables are not well connected.                 | Check the wiring   |
|  |   | Panel's keys are damaged.                              | Replace operation panel or seek service  |
| Settings of parameters cannot be changed | Operating status cannot be changed                  | Parameters are not allowed changing during operation   | Change the parameters at STOP status   |
|  | Part of parameters cannot be changed.               | b4.02 is set to 1 or 2                                 | Set b4.02 to 0   |
|  |   | Parameters are actually detected, not allowed changing | Do not try to change these parameters, users are not allowed to chaged these   |
|  | <b>MENU</b> is disabled                             | Panel is locked up                                     | See "No response of operation panel"   |
|  | Parameter not displayed when pressing <b>MENU</b> . | User's password is required                            | Input correct user's password  |
|  | Instead, "0.0.0.0." is displayed                    |  | Seek service   |

| Phenomena   | Conditions  | Possible reasons of fault   | Actions  |
|---|---|---|--|
| The drive stops during operating process                                    | The drive stops and its “RUN” LED is off, while there is no “STOP” command  | Fault alarm occurs  | Find the fault reason and reset the drive                                |
|   |   | AC supply is interrupted  | Check the AC supply condition  |
|   |   | Control mode is changed   | Check the setting of relevant parameters                                 |
|   |   | Logic of control terminal changes   | Check the settings of A6.13  |
|   | Motor stops when there is no stopping command, while the drive’s “RUN” LED illuminates and operates at zero frequency | Auto-reset upon a fault   | Check the setting of auto-reset  |
|   |   | Stopping command is input from external terminal  | Check the setting of this external terminal                              |
|   |   | Preset frequency is 0   | Check the frequency setting  |
|   |   | Start frequency is larger than preset frequency   | Check the start frequency  |
|   |   | Skip frequency is set incorrectly   | Check the setting of skip frequency                                      |
|   |   | Enable “ Ban forwarding” when run forward   | Check the set of terminal funtion  |
|   |   | Enable “Ban revesing” when run reversely  | Check the set of terminal function                                       |
| The drive does not work   | The drive does not work and its “RUN” LED is off when the “RUN” key is pressed.                                       | Terminal used for coasting to stop is enabled   | Check the terminal used for coasting to stop                             |
|   |   | Terminal used for prohibiting running of the drive is enabled.  | Check the terminal used for prohibiting running of the drive is enabled. |
|   |   | Terminal used for stopping the drive is enabled   | Check the terminal used for stopping the drive                           |
|   |   | In 3-wire control mode, the terminal used to control the 3-wire operation is not closed.  | Set and close the terminal   |
|   |   | Fault alarm occurs C  | Clear the fault  |
|   |   | Positive and negative logic of input terminal are not set correctly   | Check the setting of A6.13   |
| “P.oFF” is reported when the drive begin to run immediately after power-on. | Transistor or contactor disconnected and overload   | Since the transistor or contactor is disconnected, the bus voltage drops at heavy load, therefore, the drive displays P.Off, not E018 message | Run the drive until the transistor or contactor is connected.            |



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## Chapter 8 Maintenance

Many factors such as ambient temperature, humidity, dust, vibration, internal component aging, wear and tear will give rise to the occurrence of potential faults. Therefore, it is necessary to conduct routine maintenance to the drives.

Notes:

As safety precautions, before carrying out check and maintenance of the drive, please ensure that :

The drive has been switched off;

The charging LED lamp inside the drive is off.

Use a volt-meter to test the voltage between terminals (+) and (-) and the voltage should be below 36V.

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### 8.1 Daily Maintenance

The drive must be operated in the environment specified in the Section 2.1. Besides, some unexpected accidents may occur during operation. You should maintain the drive conditions according to the table below, record the operation data, and find out problems in the early stage.

Table 8-1 Daily checking items

| Items                       | Instructions             |          |                            | Criterion                               |
|-----------------------------|--------------------------|----------|----------------------------|---|
|                             | Items                    | Cycle    | Checking methods           |   |
| Operating environment       | Temperature and humidity | Any time | Thermometer and hygrometer | -10℃~+40℃, derating at 40℃<br>~50℃      |
|                             | Dust and water dripping  |          | Visual inspection          |   |
|                             | Gas                      |          | olfactometry               |   |
| Drive                       | Vibration and heating    | Any time | Touch the case             | Stable vibration and proper temperature |
|                             | Noise                    |          | Listen                     | No abnormal sound                       |
| Motor                       | Heating                  | Any time | Touch by hand              | No overheat                             |
|                             | Noise                    |          | Listen                     | Low and regular noise                   |
| Operating status parameters | Output current           | Any time | Current meter              | Within rated range                      |
|                             | Output voltage           |          | Volt-meter                 | Within rated range                      |
|                             | Internal temperature     |          | Thermometer                | Temperature rise is less than 35℃       |

### 8.2 Periodical Maintenance

Customer should check the drive every 3 months or 6 months according to the actual environment.

Notes:

1. Only trained personnel can dismantle the drive to replace or repair components;
  2. Don't leave metal parts like screws or pads inside the drive; otherwise the equipment may be damaged.
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#### General Inspection:

1. Check whether the screws of control terminals are loose. If so, tighten them with a screwdriver;
  2. Check whether the main circuit terminals are properly connected; whether the mains cables are over heated;
  3. Check whether the power cables and control cables are damaged, check especially for any wear on the cable tube;
  4. Check whether the insulating tapes around the cable lugs are stripped;
  5. Clean the dust on PCBs and air ducts with a vacuum cleaner;
  6. For drives that have been stored for a long time, it must be powered on every 2 years. When supplying AC power to the drive, use a voltage regulator to raise the input voltage to rated input voltage gradually. The drive should be powered for 5 hours without load.
  7. Before performing insulation tests, all main circuit input/output terminals should be short-circuited with conductors. Then proceed insulation test to the ground. Insulation test of single main circuit terminal to ground is forbidden; otherwise the drive might be damaged.  
Please use a 500V Mega-Ohm-Meter.
  8. Before the insulation test of the motor, disconnect the motor from the drive to avoid damaging it.
- 

#### Note:

Dielectric Strength test of the drive has already been conducted in the factory. Do not do the test again, otherwise, the internal components might be damaged.

Using different component to substitute the original component may damage the driver.

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## 8.3 Replacing Wearing Parts

The components that are easily damaged are: cooling fan and electrolytic capacitors of filters. Their lifetime depends largely on their application environment and preservation. Normally, lifetime is shown in following table.

Table 8-2 Lifetime of components

| Components             | Lifetime           |
|------------------------|--------------------|
| Fan                    | 3~40,000 hours     |
| electrolytic capacitor | 4~50,000 hours     |
| Relay                  | About 10,000 times |

You can decide the time when the components should be replaced according to their service time.

#### 1. Cooling fan

Possible cause of damages: wear of the bearing, aging of the fan vanes.

Criteria: After the drive is switched off, check whether abnormal conditions such as crack exists on fan vanes and other parts. When the drive is switched on, check whether drive running is normal, and check whether there is any abnormal vibration.

#### 2. Electrolytic capacitors

Possible cause of damages: high ambient temperature, aging of electrolyte and large pulse current caused by rapid changing loads.

Criteria: Check if there is any leakage of liquids. Check if the safety valve protrudes. Measure static capacitance and insulation resistance.

#### 3. Relay

Possible cause of damages: corrosion, frequent-switching.

Criteria: Check whether the relay has open and shut failure.

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## 8.4 Storage

The following points must be followed for the temporary and long-term storage of drive:

1. Store in locations free of high temperature, humidity, dust, metal powder, and with good ventilation.
2. Long-term storage will cause the deterioration of electrolytic capacitors. Therefore, the drive must be switched on for a test within 2 years at least for 5 hours. The input voltage must be boosted gradually by the voltage regulator to the rated value.

## Chapter 9 List of Parameters

CV100 series VFD's parameters are organized in groups. Each group has several parameters that are identified by "Group No.+ Function Code. There are AX,YZ letters in other content in this manual,it indicate the YZ function code in group X.For example,"A6.08" belongs to group A6 and its function code is 8.

The parameter descriptions are listed in the tables below.

Table 9-1 Descriptions of Function Code Parameter Structure Table

| No.  | Name            | Description  |
|--|-----------------|--|
| 1  | Function code   | The number of function code  |
| 2  | Name            | The name of function code  |
| 3  | Setting range   | The setting range of parameters.   |
| 4  | Unit            | The minimum unit of the setting value of parameters.   |
| 5  | Factory setting | The setting value of parameters after the product is delivered   |
| 6  | Modification    | <p>The "modification" column in the parameter table means whether the parameter can be modified.</p> <p>“○”Denotes the parameters can be modified during operation or at STOP state;</p> <p>“×”: Denotes the parameters cannot be modified during operating;</p> <p>“* ”: Denotes the parameters are actually detected and cannot be revised;</p> <p>“—”: Denotes the parameters are defaulted by factory and cannot be modified ;</p> <p>(When you try to modify some parameters, the system will check their modification property automatically to avoid mis-modification.)</p> |
| <p>Note:</p> <p>1. Parameter settings are expressed in decimal (DEC) and hexadecimal (HEX). If the parameter is expressed in hexadecimal, the bits are independent to each other.The value of the bits can be 0~F.</p> <p>2. "Factory settings" means the default value of the parameter. When the parameters are initialized, they will resume to the factory settings. But the actual detected or recorded parameters cannot be initialized;</p> |                 |  |

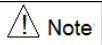
|   |   |
|---|---|
|  | It is defaulted that no parameters except A0.03 are allowed changing. If you need change them, please first set b4.02(parameter write-in protection) from 1 to 0. |
|---|---|

Table 9-2 List of Parameters

| Function code                        | Name          | Descriptions  | Unit | Factory setting | Modif. | Setting range |
|--------------------------------------|---------------|---|------|-----------------|--------|---------------|
| Group A0: Basic operating parameters |               |   |      |                 |        |               |
| A0.00                                | User password | 0: No password protection.<br>Others:Password protection. | 1    | 0               | ○      | 0~FFFF        |
| A0.01                                | Control mode  | 0:Vector control without PG<br>1:Vector control with PG   | 1    | 0               | ×      | 0~2           |

| Function code | Name  | Descriptions  | Unit   | Factory setting   | Modif. | Setting range |
|---------------|---|---|--------|---|--------|---------------|
|               |   | 2: V/F control  |        |   |        |               |
| A0.02         | Main reference frequency selector           | 0: Digital setting<br>1: AI1<br>2: AI2<br>3: AI3<br>4: Set via DI terminal(PULSE) | 1      | 0   | ○      | 0~5           |
| A0.03         | Set the operating frequency in digital mode | A0.11~A0.10   | 0.01Hz | 50.00   | ○      | 0~30000       |
| A0.04         | Methods of inputting operating commands     | 0: Panel control<br>1: Terminal control<br>2: Communication control               | 1      | 1   | ○      | 0~2           |
| A0.05         | Set running direction                       | 0: Forward 1: Reverse   | 1      | 0   | ○      | 0~1           |
| A0.06         | Acc time 1                                  | 0.0~6000.0  | 0.1S   | 2KW or below:6.0S<br>30KW~45KW:20.0S<br>45KW or above:30.0S | ○      | 0~60000       |
| A0.07         | Dec time 1                                  | 0.0~6000.0  | 0.1S   | 2KW or below:6.0S<br>30KW~45KW:20.0S<br>45KW or above:30.0S | ○      | 0~60000       |
| A0.08         | Max. output frequency                       | upper limit of frequency A0.11~300.00Hz   | 0.01Hz | 50.00   | ×      | 0~30000       |
| A0.09         | Max. output voltage                         | 0~480   | 1V     | VFD's rated values  | ×      | 0~480         |
| A0.10         | Upper limit of frequency                    | A0.12~A0.08   | 0.01Hz | 50.00   | ○      | 0~30000       |
| A0.11         | Lower limit of frequency                    | 0.00~A0.11  | 0.01Hz | 0.00  | ○      | 0~30000       |
| A0.12         | Basic operating frequency                   | 0.00~Max.output frequency   | 0.01Hz | 50.00   | ○      | 0~30000       |
|               | frequency                                   | A0.08   |        |   |        |               |

| Function code                       | Name   | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|-------------------------------------|--|---|--------|-----------------|--------|---------------|
| A0.13                               | Torque boost                                   | 0.0% (Auto), 0.1%~30.0%   | 0.1%   | 0.0%            | ○      | 0~300         |
| Group A1: Start and stop parameters |  |   |        |                 |        |               |
| A1.00                               | Starting mode                                  | 0 Start from the starting frequency<br>1 Brake first and then start<br>2 Start on the fly(including direction judgement), start at starting frequency | 1      | 0               | ×      | 0~2           |
| A1.01                               | Starting frequency                             | 0.00~60.00Hz  | 0.01Hz | 0.00Hz          | ○      | 0~6000        |
| A1.02                               | Holding time of starting frequency             | 0.00~10.00s   | 0.01s  | 0.00s           | ○      | 0~1000        |
| A1.03                               | DC injection braking current at start          | 0.0%~100.0% drive's rated current   | 0.1%   | 0.0%            | ○      | 0~1000        |
| A1.04                               | DC injection braking time at start             | 0.00 (No action)<br>0.01~30.00s   | 0.01s  | 0.00s           | ○      | 0~3000        |
| A1.05                               | Stopping mode                                  | 0: Dec-to-stop<br>1: Coast-to-stop<br>2 : Dec-to-stop+DC injection braking  | 1      | 0               | ×      | 0~2           |
| A1.06                               | DC injection braking initial frequency at stop | 0.00~60.00Hz  | 0.01Hz | 0.00Hz          | ○      | 0~6000        |
| A1.07                               | Injection braking waiting time at stop         | 0.00~10.00s   | 0.01s  | 0.00s           | ○      | 0~1000        |
| A1.08                               | DC injection braking current at stop           | 0.0%~100.0% drive's rated current   | 0.1%   | 0.0%            | ○      | 0~1000        |
| A1.09                               | DC injection braking time at stop              | 0.0 (No action)<br>0.01~30.00s  | 0.01s  | 0.00s           | ○      | 0~3000        |
| A1.10                               | Restart after power failure                    | 0:Disable<br>1:Enable   | 1      | 0               | ×      | 0~1           |
| A1.11                               | Delay time for                                 | 0.0~10.0s   | 0.1s   | 0.0s            | ○      | 0~100         |

| Function code               | Name  | Descriptions   | Unit   | Factory setting | Modif. | Setting range |
|-----------------------------|---|--|--------|-----------------|--------|---------------|
|                             | restart after power failure   |  |        |                 |        |               |
| A1.12                       | Anti-reverse running function                                       | 0: Disabled<br>1: Enabled (It will operate at zero frequency when input a reverse command)   | 1      | 0               | ×      | 0~1           |
| A1.13                       | Delay time of run reverse/forward                                   | 0.00~360.00s   | 0.01s  | 0.00s           | ○      | 0~36000       |
| A1.14                       | Switch mode of run reverse/forward (Reserved)                       | 0: Switch when pass 0Hz<br>1: Switch when pass starting frequency  | 1      | 0               | ×      | 0~1           |
| A1.15                       | Detecting frequency of stop   | 0.00~150.00Hz  | 0.01Hz | 0.10Hz          | ×      | 0~15000       |
| A1.16                       | Action voltage of braking unit                                      | 650~750V   | 1      | 720             | ×      | 650~750       |
| A1.17                       | Dynamic braking   | 0: Disable<br>1: Enable  | 1      | 0               | ×      | 0~1           |
| A1.18                       | Ratio of working time of braking unit to drive's total working time | 0.0~100.0%   | 0.1%   | 80.0%           | ○      | 0~1000        |
| Group A2: Frequency setting |   |  |        |                 |        |               |
| A2.00                       | Auxiliary reference frequency selector                              | 0 : No auxiliary reference frequency<br>1: AI1<br>2: AI2<br>3: Reserved<br>4: Set by DI (PULSE) terminal<br>5: Output by PID process | 1      | 0               | ○      | 0~5           |
| A2.01                       | Main and auxiliary reference frequency calculation                  | 0: +<br>1: -<br>2: MAX ( Main reference , Auxiliary reference )<br>3: MIN ( Main reference ,   | 1      | 0               | ○      | 0~3           |

| Function code          | Name                                | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|------------------------|-------------------------------------|---|--------|-----------------|--------|---------------|
|                        |                                     | Auxiliary reference)  |        |                 |        |               |
| A2.02                  | UP/DN rate                          | 0.01~99.99Hz/s  | 0.01   | 1.00            | ○      | 1~9999        |
| A2.03                  | UP/DN regulating control            | LED unit's place:<br>0: Save reference frequency upon power outage<br>1: Not save reference frequency upon power outage.<br>LED ten's place:<br>0: Hold reference frequency at stop<br>1: Clear reference frequency at stop | 1      | 00              | ○      | 0~11H         |
| A2.04                  | Jog operating frequency             | 0.10~50.00Hz  | 0.01Hz | 5.00            | ○      | 10~5000       |
| A2.05                  | Interval of Jog operation           | 0.0~100.0s  | 0.1s   | 0.0             | ○      | 0~1000        |
| A2.06                  | Skip frequency 1                    | 0.00~300.00Hz   | 0.01Hz | 0.00            | ×      | 0~30000       |
| A2.07                  | Range of skip frequency 1           | 0.00~30.00Hz  | 0.01Hz | 0.00            | ×      | 0~3000        |
| A2.08                  | Skip frequency 2                    | 0.00~300.00Hz   | 0.01Hz | 0.00            | ×      | 0~30000       |
| A2.09                  | Range of skip frequency             | 0.00~30.00Hz  | 0.01Hz | 0.00            | ×      | 0~3000        |
| A2.10                  | Skip frequency 3                    | 0.00~300.00Hz   | 0.01Hz | 0.00            | ×      | 0~30000       |
| A2.11                  | Range of skip frequency 3           | 0.00~30.00Hz  | 0.01Hz | 0.00            | ×      | 0~3000        |
| Group A3:Setting curve |                                     |   |        |                 |        |               |
| A3.00                  | Reference frequency curve selection | LED unit's place : AI1 curve selection<br>0: Curve 1<br>1: Curve 2<br>2: Curve 3<br>3: Curve 4<br>LED ten's place : AI2 curve selection<br>0: Curve 1   | 1      | 0000            | ○      | 0~3333H       |



| Function code | Name   | Descriptions   | Unit  | Factory setting | Modif. | Setting range |
|---------------|--|--|-------|-----------------|--------|---------------|
|               |  | 1: Curve 2<br>2: Curve 3<br>3: Curve 4<br>LED hundred's place: Reserved<br>LED thousand's place:Reserved |       |                 |        |               |
| A3.01         | Max reference of curve 1                                   | A3.03~110.00%  | 0.01% | 100.00%         | ○      | 0~11000       |
| A3.02         | Actual value corresponding to the Max reference of curve 1 | Reference frequency:<br>0.0~100.00%Fmax<br>Torque: 0.0~300.00%Te   | 0.01% | 100.00%         | ○      | 0~10000       |
| A3.03         | Min reference of curve 1                                   | 0.0%~A3.01   | 0.01% | 0.00%           | ○      | 0~11000       |
| A3.04         | Actual value corresponding to the Min reference of curve 1 | The same as A3.02  | 0.01% | 0.00%           | ○      | 0~10000       |
| A3.05         | Max reference of curve 2                                   | A3.07~110.00%  | 0.01% | 100.00%         | ○      | 0~11000       |
| A3.06         | Actual value corresponding to the Max reference of curve 2 | The same as A3.02  | 0.01% | 100.00%         | ○      | 0~10000       |
| A3.07         | Min reference of curve 2                                   | 0.0%~A3.05   | 0.01% | 0.00%           | ○      | 0~11000       |
| A3.08         | Actual value corresponding to the Min reference of curve 2 | The same as A3.02  | 0.01% | 0.00%           | ○      | 0~10000       |
| A3.09         | Max reference of curve 3                                   | A3.11~110.00%  | 0.01% | 100.00%         | ○      | 0~11000       |
| A3.10         | Actual value corresponding to the Max reference of curve 3 | The same as A3.02  | 0.01% | 100.00%         | ○      | 0~10000       |
| A3.11         | Min reference of   | 0.0%~A3.09   | 0.01% | 0.00%           | ○      | 0~11000       |

| Function code                | Name   | Descriptions                     | Unit  | Factory setting | Modif. | Setting range |
|------------------------------|--|----------------------------------|-------|-----------------|--------|---------------|
|                              | curve 3  |                                  |       |                 |        |               |
| A3.12                        | Actual value corresponding to the Min reference of curve 3                       | The same as A3.02                | 0.01% | 0.00%           | ○      | 0~10000       |
| A3.13                        | Max reference of curve 4   | A3.15~110.00%                    | 0.01% | 100.00%         | ○      | 0~11000       |
| A3.14                        | Actual value corresponding to the Max reference of curve 4                       | The same as A3.02                | 0.01% | 100.00%         | ○      | 0~10000       |
| A3.15                        | Reference of inflection point 2 of curve 4                                       | A3.17~A3.13                      | 0.01% | 100.00%         | ○      | 0~11000       |
| A3.16                        | Actual value corresponding to the Min reference of inflection point 2 of curve 4 | The same as A3.02                | 0.01% | 100.00%         | ○      | 0~10000       |
| A3.17                        | Reference of inflection point 1 of curve 4                                       | A3.19~A3.15                      | 0.01% | 0.00%           | ○      | 0~11000       |
| A3.18                        | Actual value corresponding to the Min reference of inflection point 1 of curve 4 | The same as A3.02                | 0.01% | 0.00%           | ○      | 0~10000       |
| A3.19                        | Min reference of curve 4   | 0.0%~A3.17                       | 0.01% | 0.00%           | ○      | 0~11000       |
| A3.20                        | Actual value corresponding to the Min reference of curve 4                       | The same as A3.02                | 0.01% | 0.00%           | ○      | 0~10000       |
| Group A4: Acc/Dec parameters |  |                                  |       |                 |        |               |
| A4.00                        | Acc/Dec mode   | 0: Linear Acc/Dec<br>1: Reserved | 1     | 0               | ×      | 0~1           |

| Function code                | Name  | Descriptions                                    | Unit   | Factory setting | Modif. | Setting range |
|------------------------------|---|---|--------|-----------------|--------|---------------|
| A4.01                        | Acc time 2  | 0.0~6000.0                                      | 0.1S   | 20.0S           | ○      | 0~60000       |
| A4.02                        | Dec time 2  | 0.0~6000.0                                      | 0.1S   | 20.0S           | ○      | 0~60000       |
| A4.03                        | Acc time 3  | 0.0~6000.0                                      | 0.1S   | 20.0S           | ○      | 0~60000       |
| A4.04                        | Dec time 3  | 0.0~6000.0                                      | 0.1S   | 20.0S           | ○      | 0~60000       |
| A4.05                        | Acc time 4  | 0.0~6000.0                                      | 0.1S   | 20.0S           | ○      | 0~60000       |
| A4.06                        | Dec time 4  | 0.0~6000.0                                      | 0.1S   | 20.0S           | ○      | 0~60000       |
| A4.07~A4.10                  | Reserved  |   |        |                 |        |               |
| Group A5: Control parameters |   |   |        |                 |        |               |
| A5.00                        | Speed/torque control mode                                   | 0: Speed control mode<br>1: Torque control mode | 1      | 0               | ×      | 0~1           |
| A5.01                        | ASR1-P  | 0.1~200.0                                       | 0.1    | 20.0            | ○      | 1~2000        |
| A5.02                        | ASR1-I  | 0.000~10.000S                                   | 0.001S | 0.200s          | ○      | 0~10000       |
| A5.03                        | ASR1 output filter  | 0~8(Corresponding to 0~2^8/10ms)                | 1      | 0               | ○      | 0~8           |
| A5.04                        | ASR2-P  | 0.1~200.0                                       | 0.1    | 20.0            | ○      | 1~2000        |
| A5.05                        | ASR2-I  | 0.000~10.000S                                   | 0.001S | 0.200s          | ○      | 0~10000       |
| A5.06                        | ASR2 output filter  | 0~8 (Corresponding to 0~2^8/12.5ms)             | 1      | 0               | ○      | 0~8           |
| A5.07                        | ASR1/2 switching frequency                                  | 0.0%~100.0%                                     | 0.1    | 10.0%           | ○      | 0~1000        |
| A5.08                        | Maximum speed limit for forward running when torque control | 0.0%~+100.0%                                    | 0.1%   | 100.0%          | ○      | 0~1000        |
| A5.09                        | Maximum speed limit for reverse running when torque control | 0.0%~+100.0%                                    | 0.1%   | 100.0%          | ○      | 0~1000        |
| A5.10                        | Driving torque limit  | 0.0%~+300.0%                                    | 0.1%   | 180.0%          | ○      | 0~3000        |
| A5.11                        | Braking torque limit  | 0.0%~+300.0%                                    | 0.1%   | 180.0%          | ○      | 0~3000        |
| A5.12                        | Reserved  |   |        |                 |        |               |
| A5.13                        | Reserved  |   |        |                 |        |               |
| A5.14                        | Reserved  |   |        |                 |        |               |

| Function code                          | Name                          | Descriptions  | Unit | Factory setting | Modif. | Setting range |
|--|-------------------------------|---|------|-----------------|--------|---------------|
| A5.15                                  | Reserved                      |   |      |                 |        |               |
| A5.16                                  | Reserved                      |   |      |                 |        |               |
| A5.17                                  | ACR-P                         | 1~5000  | 1    | 1000            | ○      | 1~5000        |
| A5.18                                  | ACR-I                         | 0.5~100.0mS   | 0.1  | 8.0             | ○      | 5~1000        |
| Group A6: Control terminals parameters |                               |   |      |                 |        |               |
| A6.00~A6.04                            | Multi-function terminal X1~X5 | 0: No function<br>1: Forward<br>2: Reverse<br>3: Forward jog operation<br>4: Reverse jog operation<br>5: 3-wire operation control<br>6: External RESET signal input<br>7: External fault signal input<br>8: External interrupt signal input<br>9: Drive operation prohibit<br>10: External stop command<br>11 : DC injection braking command<br>12: Coast to stop<br>13: Frequency ramp up (UP)<br>14: Frequency ramp down (DN)<br>15: Switch to panel control<br>16: Switch to terminal control<br>17 : Switch to communication control mode<br>18: Main reference frequency via AI1<br>19: Main reference frequency via AI2<br>20: Reserved<br>21: Main reference frequency via DI<br>22: Auxiliary reference frequency invalid | 1    | 0               | ×      | 0~41          |

| Function code | Name                            | Descriptions  | Unit | Factory setting | Modif. | Setting range |
|---------------|---------------------------------|---|------|-----------------|--------|---------------|
|               |                                 | 23: Auxiliary reference frequency via AI1 (Reserved)<br>24: Auxiliary reference frequency via AI2 (Reserved)<br>25: (Reserved)<br>26: Auxiliary reference frequency via DI (Reserved)<br>27: Preset frequency 1<br>28: Preset frequency 2<br>29: Preset frequency 3<br>30: Preset frequency 4<br>31: Acc/Dec time 1<br>32: Acc/Dec time 2<br>33: Multiple close-loop reference selection 1<br>34: Multiple close-loop reference selection 2<br>35: Multiple close-loop reference selection 3<br>36: Multiple close-loop reference selection 4<br>37: Forward prohibit<br>38: Reverse prohibit<br>39: Acc/Dec prohibit<br>40: Process close-loop prohibit<br>41 : Speed/torque control switching terminal<br>Others:Reserved |      |                 |        |               |
| A6.08         | Terminal filter                 | 0~500ms   | 1    | 10              | ○      | 0~500         |
| A6.09         | Terminal control mode selection | 0: 2-wire operating mode 1<br>1: 2-wire operating mode 2<br>2: 3-wire operating mode 1<br>3: 3-wire operation mode 2  | 1    | 0               | ×      | 0~3           |
| A6.10         | Reserved                        |   |      |                 |        |               |

| Function code | Name  | Descriptions   | Unit | Factory setting | Modif. | Setting range |
|---------------|---|--|------|-----------------|--------|---------------|
| A6.11         | Reserved                                      |  |      |                 |        |               |
| A6.12         | Reserved                                      |  |      |                 |        |               |
| A6.13         | Input terminal's positive and negative logic  | <p>Binary setting</p> <p>0: Positive logic: Terminal Xi is enabled if it is connected to corresponding common terminal, and disabled if it is disconnected.</p> <p>1: Negative logic: Terminal Xi is disabled if it is connected to corresponding common terminal, and enabled is it is disconnected.</p> <p>Unit's place of LED:BIT0~BIT3: X1~X4</p> <p>Ten's place of LED:BIT0~BIT2: X5~X7</p>   | 1    | 00              | ○      | 0~FFH         |
| 6.14          | Bi-direction pen-collector output terminal Y1 | <p>0: Running signal(RUN)</p> <p>1: frequency arriving signal(FAR)</p> <p>2: frequency detection threshold (FDT1)</p> <p>3: frequency detection threshold (FDT2)</p> <p>4: overload signal(OL)</p> <p>5: low voltage signal(LU)</p> <p>6: external fault signal(EXT)</p> <p>7: frequency high limit(FHL)</p> <p>8: frequency low limit(FLL)</p> <p>9: zero-speed running</p> <p>10: Terminal X1(Reserved)</p> <p>11: Terminal X2(Reserved)</p> <p>12: Reserved</p> <p>13: Reserved</p> <p>14: Reserved</p> <p>15: Drive ready (RDY)</p> <p>16: Drive fault</p> | 1    | 0               | ×      | 0~20          |

| Function code | Name  | Descriptions   | Unit   | Factory setting | Modif. | Setting range |
|---------------|---|--|--------|-----------------|--------|---------------|
|               |   | 17:Switching signal of host<br>18: Reserved<br>19: Torque limiting<br>20:Drive running forward/reverse<br>Others:Reserved  |        |                 |        |               |
| A6.15         |   | Reserved   | 1      | 1               | ×      | 0~20          |
| A6.16         | Output functions of relay R1                  | The same as A6.14  | 1      | 15              | ×      | 0~20          |
| A6.17         |   | Reserved   | 1      | 16              | ×      | 0~20          |
| A6.18         | Output terminal's positive and negative logic | Binary setting:<br>0: Terminal is enabled if it is connected to corresponding common terminal, and disabled if it is disconnected.<br>1: Terminal is disabled if it is connected to corresponding common terminal, and enabled if it is disconnected.<br>Unit's place of LED:<br>BIT0~BIT3: Y1、R1<br>Ten's place of LED:<br>BIT0: Y2 | 1      | 0               | ○      | 0~1FH         |
| A6.19         | Frequency arriving signal (FAR)               | 0.00~300.00Hz  | 0.01Hz | 2.50Hz          | ○      | 0~30000       |
| A6.20         | FDT1 level                                    | 0.00~300.00Hz  | 0.01Hz | 50.00Hz         | ○      | 0~30000       |
| A6.21         | FDT1 lag                                      | 0.00~300.00Hz  | 0.01Hz | 1.00Hz          | ○      | 0~30000       |
| A6.22         | FDT2 level                                    | 0.00~300.00Hz  | 0.01Hz | 25.00Hz         | ○      | 0~30000       |
| A6.23         | FDT2 lag                                      | 0.00~300.00Hz  | 0.01Hz | 1.00Hz          | ○      | 0~30000       |
| A6.24         | Virtual terminal setting                      | Binary setting<br>0: Disable<br>1: Enable<br>Unit's place of LED:<br>BIT0~BIT3: X1~X4<br>Ten's place of LED:   | 1      | 00              | ○      | 0~FFH         |

| Function code | Name               | Descriptions  | Unit | Factory setting | Modif. | Setting range |
|---------------|--------------------|---|------|-----------------|--------|---------------|
|               |                    | BIT0~BIT2: X5~X7  |      |                 |        |               |
| A6.25         | Y2 terminal output | 0~50: Y2 is used as Y terminal output.<br>51~88: Y2 function<br>0:Running signal(RUN)<br>1:frequency arriving signal(FAR)<br>2:frequency detection threshold (FDT1)   | 1    | 0               | ○      | 0~88          |
| A6.25         | Y2 terminal output | 3:frequency detection threshold (FDT2)<br>4:overload signal(OL)<br>5:low voltage signal(LU)<br>6:external fault signal(EXT)<br>7:frequency high limit(FHL)<br>8:frequency low limit(FLL)<br>9:zero-speed running<br>10: Terminal X1(Reserved)<br>11: Terminal X2(Reserved)<br>12: Reserved<br>13: Reserved<br>14: Reserved<br>15: Drive ready (RDY)<br>16: Drive fault<br>17:Switching signal of host<br>18: Reserved<br>19: Torque limiting<br>20 : Drive running forward/reverse<br>21~50: Reserved<br>51: Output frequency (0~ Max. output frequency)<br>52: Preset frequency (0~ Max. output frequency)<br>53 : Preset frequency (After Acc/Dec) ( 0~ Max. output | 1    | 0               | ○      | 0~88          |



| Function code | Name                      | Descriptions   | Unit | Factory setting | Modif. | Setting range |
|---------------|---------------------------|--|------|-----------------|--------|---------------|
|               |                           | frequency)<br>54: Motor speed (0~ Max. speed)<br>55: Output current (0~2*Iei)<br>56: Output current (0~2*Iem)<br>57: Output torque (0~3*Tem)<br>58: Output power (0~2*Pe)<br>59: Output voltage (0~1.2*Ve)<br>60: Bus voltage (0~800V)<br>61: AI1<br>62: AI2<br>63: Reserved<br>64: Reserved<br>65: Percentage of host (0~4095)<br>66~88: Reserved   |      |                 |        |               |
| A6.26         | Reserved                  |  |      |                 |        |               |
| A6.27         | Reserved                  |  |      |                 |        |               |
| A6.28         | Functions of terminal AO1 | 0: No function<br>1: Output frequency (0~ Max. output frequency)<br>2: Preset frequency (0~ Max. output frequency)<br>3: Preset frequency ( After Acc/Dec ) ( 0~ Max. output frequency)<br>4: Motor speed (0~ Max. speed)<br>5: Output current (0~2*Iei)<br>6: Output current (0~2*Iem)<br>7: Output torque (0~3*Tem)<br>8: Output power (0~2*Pe)<br>9: Output voltage (0~1.2*Ve)<br>10: Bus voltage (0~800V)<br>11: AI1 | 1    | 0               | ○      | 0~36          |

| Function code              | Name                           | Descriptions  | Unit  | Factory setting | Modif. | Setting range |
|----------------------------|--------------------------------|---|-------|-----------------|--------|---------------|
|                            |                                | 12: AI2<br>13: Reserved<br>14: Reserved<br>15: Percentage of host (0~4095)<br>16~36: Reserved   |       |                 |        |               |
| A6.29                      | Reserved                       |   |       |                 |        |               |
| A6.30                      | Gain of AO1                    | 0.0%~200.0%   | 0.1%  | 100.0%          | ○      | 0~2000        |
| A6.31                      | Zero offset calibration of AO1 | -100.0%~100.0%  | 0.1%  | 0.0             | ○      | 0~2000        |
| A6.32                      | Reserved                       |   |       |                 |        |               |
| A6.33                      | Reserved                       |   |       |                 |        |               |
| A6.34                      | AI1 filter                     | 0.01~10.00s   | 0.01s | 0.05            | ○      | 1~1000        |
| A6.35                      | AI2 filter                     | 0.01~10.00s   | 0.01s | 0.05            | ○      | 1~1000        |
| A6.36                      | Reserved                       |   |       |                 |        |               |
| Group A7: Reserved         |                                |   |       |                 |        |               |
| Group A8: Fault parameters |                                |   |       |                 |        |               |
| A8.00                      | Protective action of relay     | Unit's place of LED:<br>Action selection for under-voltage fault indication.<br>0:Disable<br>1:Enable<br>Ten's place of LED:<br>Action selection for auto reset interval fault indication.<br>0:Disable<br>1:Enable<br>Hundred's place of LED:<br>Selection for fault locked function.<br>0:Disable<br>1:Enable<br>Thousand's place of LED:<br>Reserved | 1     | 0000            | ×      | 0~1111H       |

| Function code | Name                                     | Descriptions   | Unit | Factory setting | Modif. | Setting range |
|---------------|--|--|------|-----------------|--------|---------------|
| A8.01         | Fault masking selection 1                | Unit's place of LED:<br>Communication fault masking selection<br>Ten's place of LED:<br>Relay faultmasking selection<br>Hundred's place of LED:<br>EEPROMfault masking selection<br>Thousand's place of LED:<br>Reserved<br>0:Disable.Stop when fault happen<br>1:Disable.Continue operating when fault happen<br>2:Enable | 1    | 0000            | ×      | 0~2222H       |
| A8.02         | Fault masking selection 2                | Unit's place of LED:<br>Open phase fault masking selection for input<br>Ten's place of LED:<br>Open phase fault masking selection for output<br>0:Disable.Stop when fault happen<br>1:Disable.Continue operating when fault happen<br>2:Enable   | 1    | 00              | ×      | 0~22H         |
| A8.03         | Motor overload protection mode selection | 0: Disabled<br>1:Common mode (with low speed compensation)<br>2: Variable frequency motor (without low speed compensation)   | 1    | 1               | ×      | 0~2           |
| A8.04         | Auto reset times                         | 0: No function<br>1~100: Auto reset times<br>Note: The IGBT protection (E010) and external equipment fault (E015) cannot be reset automatically.   | 1    | 0               | ×      | 0~100         |
| A8.05         | Reset interval                           | 2.0~20.0s/time   | 0.1s | 5.0s            | ×      | 20~200        |

| Function code             | Name                                    | Descriptions  | Unit   | Factory setting            | Modif. | Setting range |
|---------------------------|---|---|--------|----------------------------|--------|---------------|
| A8.06                     | Fault locking function selection.       | 0:Disable.<br>1:Enable.   | 1      | 0                          | ×      | 0~1           |
| Group b0:Motor parameters |   |   |        |                            |        |               |
| b0.00                     | Rated power                             | 0.4~999.9KW   | 0.1    | 0                          | ×      | 4~9999        |
| b0.01                     | Rated voltage                           | 0~ rated volotage of drive  | 1      | 0                          | ×      | 0~999         |
| b0.02                     | Rated current                           | 0.1~999.9A  | 0.1A   | Dependent on drive's model | ×      | 1~9999        |
| b0.03                     | Rated frequency                         | 1.00~1000.00Hz  | 0.01Hz | Dependent on drive's model | ×      | 100~3000<br>0 |
| b0.04                     | Number of polarities of motor           | 2~24  | 1      | 4                          | ×      | 2~24          |
| b0.05                     | Rated speed                             | 0~60000RPM  | 1RPM   | 1440RPM                    | ×      | 0~60000       |
| b0.06                     | Resistance of stator %R1                | 0.00%~50.00%  | 0.01%  | Dependent on drive's model | ×      | 0~5000        |
| b0.07                     | Leakage inductance %Xl                  | 0.00%~50.00%  | 0.01%  | Dependent on drive's model | ×      | 0~5000        |
| b0.08                     | Resistance of rotor %R2                 | 0.00%~50.00%  | 0.01%  | Dependent on drive's model | ×      | 0~5000        |
| b0.09                     | Exciting inductance %Xm                 | 0.0%~2000.0%  | 0.1%   | Dependent on drive's model | ×      | 0~20000       |
| b0.10                     | Current without load I0                 | 0.1~999.9A  | 0.1A   | Dependent on drive's model | ×      | 1~9999        |
| b0.11                     | Auto-tuning                             | 0: Auto-tuning is disabled<br>1: Stationary auto-tuning (Start auto-tuning to a standstill motor)<br>2: Rotating auto-tuning<br>3:Reserved. | 1      | 0                          | ×      | 0~3           |
| b0.12                     | Motor's overload protection coefficient | 20.0%~110.0%  | 0.1%   | 100.0%                     | ×      | 200~1100      |

| Function code                | Name                                       | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|------------------------------|--|---|--------|-----------------|--------|---------------|
| b0.13                        | Oscillation inhibition coefficient         | 0~255   | 1      | 10              | ○      | 0~255         |
| Group b1:V/F parameters      |  |   |        |                 |        |               |
| b1.00                        | V/F curve setting                          | 0: V/F curve is defined by user<br>1: 2-order curve<br>2: 1.7-order curve<br>3: 1.2-order curve               | 1      | 0               | ×      | 0~3           |
| b1.01                        | V/F frequency value F3                     | B1.03~A0.08   | 0.01Hz | 0.00Hz          | ×      | 0~30000       |
| b1.02                        | V/F voltage value V3                       | B1.04~100.0%  | 0.1%   | 0.0%            | ×      | 0~1000        |
| b1.03                        | V/F frequency value F2                     | B1.05 ~B1.01  | 0.01Hz | 0.00Hz          | ×      | 0~30000       |
| b1.04                        | V/F voltage value V2                       | B1.06~B1.02   | 0.1%   | 0.0%            | ×      | 0~1000        |
| b1.05                        | V/F frequency value F1                     | 0.00~B1.03  | 0.01Hz | 0.00Hz          | ×      | 0~30000       |
| b1.06                        | V/F voltage value V1                       | 0~B1.04   | 0.1%   | 0.0%            | ×      | 0~1000        |
| b1.07                        | Cut-off point used for manual torque boost | 0.0%~50.0%( Corresponding to A0.12)   | 0.1%   | 10.0%           | ○      | 0~500         |
| b1.08                        | AVR function                               | 0: Disable<br>1: Enable all the time<br>2: Disabled in Dec process  | 1      | 2               | ×      | 0~2           |
| Group b2:Enhanced parameters |  |   |        |                 |        |               |
| b2.00                        | Carrier wave frequency                     | 2.0~15.0KHz   | 0.1    | 8.0             | ○      | 20~150        |
| b2.01                        | Auto adjusting of CWF                      | 0: Disable<br>1: Enable   | 1      | 1               | ○      | 0~1           |
| b2.02                        | Voltage adjustment selection               | Unit's place of LED:<br>Over-voltage at stall Selection<br>0:Disable(When install brake resistor)<br>1:Enable | 1      | 001             | ×      | 0~111H        |

| Function code | Name  | Descriptions  | Unit      | Factory setting | Modif. | Setting range |
|---------------|---|---|-----------|-----------------|--------|---------------|
|               |   | Ten's place of LED:<br>Not stop when instantaneous stop function selection<br>0:Disable<br>1:Enable(Low voltage compensation)<br>Hundred's place of LED:<br>Overmodulation selection<br>0:Disable<br>1:Enable |           |                 |        |               |
| b2.03         | Overvoltage point at stall                      | 120.0%~150.0%U <sub>dce</sub>   | 0.1%      | 140.0%          | ×      | 1200~1500     |
| b2.04         | Droop control                                   | 0: Disable, 0.01~10.00Hz  | 0.01      | 0.00Hz          | ○      | 0~1000        |
| b2.05         | Auto current limiting threshold                 | 20.0%~200.0%I <sub>e</sub>  | 0.1%      | 150.0%          | ×      | 200~2000      |
| b2.06         | Frequency decrease rate when current limiting   | 0.00~99.99Hz/s  | 0.01Hz /S | 10.00 Hz/s      | ○      | 0~9999        |
| b2.07         | Auto current limiting selection                 | 0:Invalid at constant speed<br>1:Valid at constant speed<br>Note:It is valid all the time at Acc/Dec  | 1         | 1               | ×      | 0~1           |
| b2.08         | Gain of Slip compensation                       | 0.0~300.0%  | 0.1%      | 100.0%          | ○      | 0~3000        |
| b2.09         | Slip compensation limit                         | 0.0~250.0%  | 0.1%      | 200.0%          | ○      | 0~2500        |
| b2.10         | Slip compensation time constant                 | 0.1~25.0s   | 0.1s      | 2.0s            | ○      | 0~250         |
| b2.11         | auto energy-saving function                     | 0: Disable<br>1: Enable   | 1         | 0               | ×      | 0~1           |
| b2.12         | Frequency decrease rate at voltage compensation | 0.00~99.99Hz/s  | 0.01Hz /S | 10.00 Hz/s      | ○      | 0~9999        |

| Function code                    | Name                                 | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|----------------------------------|--------------------------------------|---|--------|-----------------|--------|---------------|
| b2.13                            | Zero-frequency operation threshold   | 0.00~300.00Hz   | 0.01Hz | 0.50Hz          | ○      | 0~30000       |
| b2.14                            | Zero-frequency Hysteresis (Reserved) | 0.00~300.00Hz   | 0.01Hz | 0.00Hz          | ○      | 0~30000       |
| b2.15                            | Fan control                          | 0:Auto operation mode<br>1:Fan operate continuously when power is on<br>Note: Continue to operate for 3 minutes   | 1      | 0               | ×      | 0~1           |
| Group b3:Communication parameter |                                      |   |        |                 |        |               |
| b3.00                            | Communication configuration          | Unit's place of LED:<br>Baud rate selection<br>0: 4800BPS<br>1: 9600BPS<br>2: 19200BPS<br>3: 38400BPS<br>4: 115200BPS<br>5: 125000BPS<br>Ten's place of LED:<br>Data format<br>0:1-8-2-N format,RTU<br>1:1-8-1-E format,RTU<br>2:1-8-1-O format, RTU<br>3:1-7-2-N format,ASCII<br>4:1-7-1-E format,ASCII<br>5:1-7-1-O format,ASCII<br>Hundred's place of LED:<br>wiring mode<br>0:Direct connection via cable (RS232/485)<br>1: MODEM (RS232) | 1      | 001             | ×      | 0~155H        |
| b3.01                            | Local address                        | 0~247 , 0 is the broadcasting address   | 1      | 5               | ×      | 0~247         |
| b3.02                            | Time threshold for                   | 0.0~1000.0S   | 0.1    | 0.0S            | ×      | 0~10000       |

| Function code                | Name                               | Descriptions  | Unit | Factory setting | Modif. | Setting range |
|------------------------------|------------------------------------|---|------|-----------------|--------|---------------|
|                              | judging the communication status   |   |      |                 |        |               |
| b3.03                        | Delay for responding to control PC | 0~1000mS  | 1    | 5mS             | ×      | 0~1000        |
| Group b4:Keyboard parameters |                                    |   |      |                 |        |               |
| b4.00                        | Key-lock function selection        | <p>0: The keys on the operation panel are not locked, and all the keys are usable.</p> <p>1: The keys on the operation panel are locked, and all the keys are unusable.</p> <p>2: All the keys except for the multi-functional key are unusable.</p> <p>3: All the keys except for the <b>SHIFT</b> key are unusable.</p> <p>4: All the keys except for the <b>RUN</b> AND <b>STOP</b> keys are unusable.</p> | 1    | 0               | ○      | 0~4           |
| b4.01                        | Multi-function key definition      | <p>0: Jog function</p> <p>1: Coast-to-stop</p> <p>2: Stop in shortest time</p> <p>3: Switch of input method of operating command</p>  | 1    | 0               | ○      | 0~3           |
| b4.02                        | Parameter protection               | <p>0: All parameters are allowed modifying;</p> <p>1: Only A0.03 and b4.02 can be modified;</p> <p>2: Only b4.02 can be modified.</p>   | 1    | 1               | ○      | 0~2           |
| b4.03                        | Parameter initialization           | <p>0: No operation</p> <p>1: Clear fault information in memory</p> <p>2: Restore to factory settings</p>  | 1    | 0               | ×      | 0~2           |
| b4.04                        | Parameter copy                     | <p>0: No action</p> <p>1: parameters upload</p> <p>2: parameters download</p>   | 1    | 0               | ×      | 0~3           |



| Function code | Name                         | Descriptions  | Unit | Factory setting | Modif. | Setting range |
|---------------|------------------------------|---|------|-----------------|--------|---------------|
|               |                              | 3: parameters download (except the parameters related to drive type)<br>Note:Not to upload/download drive's parameters.   |      |                 |        |               |
| b4.05         | Display parameters selection | Binary setting:<br>BIT1:Operating<br>0: No display; 1: Display<br>Unit's place of LED:<br>BIT0: Output frequency(No display at stop.Display power frequency at energy feedback mode)<br>BIT1:Setting frequency (Flicking.No display at energy feedback mode)<br>BIT2:Output current(No display at stop.Display power frequency at energy feedback mode)<br>BIT3:Output voltage(No display at stop.Display power frequency at energy feedback mode)<br>Ten's place of LED:<br>BIT0: AI1<br>BIT1: AI2<br>BIT2: Reserved<br>BIT3: Reserved<br>Hundred's place of LED:<br>BIT0:Output power(No display at stop and energy feedback mode)<br>BIT1:Output torque(No display at stop and energy feedback mode)<br>BIT2:Analog close-loop feedback (%)(No display at feedback | 1    | 1007H           | ○      | 0~7FFFH       |

| Function code                     | Name                | Descriptions   | Unit   | Factory setting | Modif. | Setting range |
|-----------------------------------|---------------------|--|--------|-----------------|--------|---------------|
|                                   |                     | mode)<br>BIT3:Analog close-loop setting<br>(%) (Flicking, no display at feedback mode)<br>Thousand's place of LED:<br>BIT0:Bus voltage<br>BIT1:Speed(R/MIN)(No display at feedback mode)<br>BIT2:Setting speed(R/MIN)<br>(Flicking, no display at feedback mode)<br>Note:If all the BITs are 0,the drive will display setting frequency at stop,display output frequency at operating and display bus voltage at energy feedback mode. |        |                 |        |               |
| Group C0:Multi-section parameters |                     |  |        |                 |        |               |
| C0.00                             | Preset frequency 1  | A0.12 (Lower limit of frequency) ~A0.11(upper limit of frequency)  | 0.01Hz | 5.00Hz          | ○      | 0~30000       |
| C0.01                             | Preset frequency 2  | Same as above  | 0.01Hz | 10.00Hz         | ○      | 0~30000       |
| C0.02                             | Preset frequency 3  | Same as above  | 0.01Hz | 20.00Hz         | ○      | 0~30000       |
| C0.03                             | Preset frequency 4  | Same as above  | 0.01Hz | 30.00Hz         | ○      | 0~30000       |
| C0.04                             | Preset frequency 5  | Same as above  | 0.01Hz | 40.00Hz         | ○      | 0~30000       |
| C0.05                             | Preset frequency 6  | Same as above  | 0.01Hz | 45.00Hz         | ○      | 0~30000       |
| C0.06                             | Preset frequency 7  | Same as above  | 0.01Hz | 50.00Hz         | ○      | 0~30000       |
| C0.07                             | Preset frequency 8  | Same as above  | 0.01Hz | 5.00Hz          | ○      | 0~30000       |
| C0.08                             | Preset frequency 9  | Same as above  | 0.01Hz | 10.00Hz         | ○      | 0~30000       |
| C0.09                             | Preset frequency 10 | Same as above  | 0.01Hz | 20.00Hz         | ○      | 0~30000       |
| C0.10                             | Preset frequency 11 | Same as above  | 0.01Hz | 30.00Hz         | ○      | 0~30000       |
| C0.11                             | Preset frequency 12 | Same as above  | 0.01Hz | 40.00Hz         | ○      | 0~30000       |
| C0.12                             | Preset frequency 13 | Same as above  | 0.01Hz | 45.00Hz         | ○      | 0~30000       |
| C0.13                             | Preset frequency    | Same as above  | 0.01Hz | 50.00Hz         | ○      | 0~30000       |

| Function code                   | Name  | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|---------------------------------|---|---|--------|-----------------|--------|---------------|
|                                 | 14  |   |        |                 |        |               |
| C0.14                           | Preset frequency                                  | Same as above   | 0.01Hz | 50.00Hz         | ○      | 0~30000       |
|                                 | 15  |   |        |                 |        |               |
| Group C1:Process PID parameters |   |   |        |                 |        |               |
| C1.00                           | Close-loop control function                       | 0: Disable<br>1: Enable   | 1      | 0               | ×      | 0~1           |
| C1.01                           | Reference channel selection                       | 0: Digital input<br>1: AI1;<br>2: AI2;<br>3: Reserved;  | 1      | 1               | ○      | 0~3           |
| C1.02                           | Feedback channel selection                        | 0: AI1;<br>1: AI2;<br>2: AI1+AI2;<br>3: AI1-AI2;<br>4: MIN (AI1, AI2);<br>5: MAX (AI1, AI2);<br>6: DI | 1      | 1               | ○      | 0~6           |
| C1.03                           | Digital setting of reference                      | -10.00V~10.00V  | 0.01   | 0.00            | ○      | 0~2000        |
| C1.04                           | Close-loop speed reference                        | 0~39000rpm  | 1rpm   | 0               | ○      | 0~39000       |
| C1.05                           | Min reference                                     | 0.0%~(C1.07)<br>(Ratio of Min reference to base value of 10V/20mA))                                   | 0.1%   | 0.0%            | ○      | 0~1000        |
| C1.06                           | Feedback value corresponding to the Min reference | 0.0~100.0%<br>(Ratio of Min reference to base value of 10V/20mA)                                      | 0.1%   | 0.0%            | ○      | 0~1000        |
| C1.07                           | Max reference                                     | (C1.05)~100.0%<br>(Ratio of Max reference to base value of 10V/20mA)                                  | 0.1%   | 100.0%          | ○      | 0~1000        |
| C1.08                           | Feedback value corresponding to the Max reference | 0.0~100%<br>(Ratio of Max reference to base value of 10V/20mA)  | 0.1%   | 100.0%          | ○      | 0~1000        |
| C1.09                           | Proportional gain KP                              | 0.000~10.000  | 0.001  | 2.000           | ○      | 0~10000       |

| Function code | Name  | Descriptions   | Unit   | Factory setting | Modif. | Setting range |
|---------------|---|--|--------|-----------------|--------|---------------|
| C1.10         | Integral gain Ki                            | 0.000~10.000   | 0.001  | 0.100           | ○      | 0~10000       |
| C1.11         | Differential gain Kd                        | 0.000~10.000   | 0.001  | 0.100           | ○      | 0~10000       |
| C1.12         | Sampling cycle T                            | 0.01~50.00s  | 0.01s  | 0.50s           | ○      | 1~5000        |
| C1.13         | Output filter                               | 0.01~10.00s  | 0.01s  | 0.05            | ○      | 1~1000        |
| C1.14         | Error limit                                 | 0.0~20.0%<br>(Corresponding to close-loop reference)   | 0.1%   | 2.0%            | ○      | 0~200         |
| C1.15         | Close-loop regulation characteristic        | 0: Positive<br>1: Negative   | 1      | 0               | ×      | 0~1           |
| C1.16         | Integral regulation selection               | 0: Stop integral regulation when the frequency reaches the upper and lower limits<br>1: Continue the integral regulation when the frequency reaches the upper and lower limits | 1      | 0               | ×      | 0~1           |
| C1.17         | Preset close-loop frequency                 | 0.00~300.00Hz  | 0.01Hz | 0.00Hz          | ○      | 0~30000       |
| C1.18         | Holding time of preset close-loop frequency | 0.0~3600.0S  | 0.1S   | 0.0S            | ×      | 0~36000       |
| C1.19         | Preset close-loop reference 1               | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.20         | Preset close-loop reference 2               | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.21         | Preset close-loop reference 3               | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.22         | Preset close-loop reference 4               | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.23         | Preset close-loop reference 5               | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.24         | Preset close-loop reference 6               | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.25         | Preset close-loop                           | -10.00V ~10.00V  | 0.01V  | 0.00V           | ○      | 0~2000        |

| Function code           | Name                                 | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|-------------------------|--------------------------------------|---|--------|-----------------|--------|---------------|
|                         | reference 7                          |   |        |                 |        |               |
| C1.26                   | Preset close-loop reference 8        | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.27                   | Preset close-loop reference 9        | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.28                   | Preset close-loop reference 10       | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.29                   | Preset close-loop reference 11       | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.30                   | Preset close-loop reference 12       | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.31                   | Preset close-loop reference 13       | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.32                   | Preset close-loop reference 14       | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.33                   | Preset close-loop reference 15       | -10.00V ~10.00V   | 0.01V  | 0.00V           | ○      | 0~2000        |
| C1.34                   | Close-loop output reversal selection | 0 : The close-loop output is negative,<br>the drive will operate at zero frequency.<br>1 : The close-loop output is negative,<br>and the drive operate reverse. | 1      | 0               | ○      | 0~1           |
| Group d0:Status display |                                      |   |        |                 |        |               |
| d0.00                   | Main reference frequency             | -300.00~300.00Hz  | 0.01Hz | 0.00            | *      | 0~60000       |
| d0.01                   | Auxiliary reference frequency        | -300.00~300.00Hz  | 0.01Hz | 0.00            | *      | 0~60000       |
| d0.02                   | Preset frequency                     | -300.00~300.00Hz  | 0.01Hz | 0.00            | *      | 0~60000       |
| d0.03                   | Frequency after Acc/Dec              | -300.00~300.00Hz  | 0.01Hz | 0.00            | *      | 0~60000       |
| d0.04                   | Output frequency                     | -300.00~300.00Hz  | 0.01Hz | 0.00            | *      | 0~60000       |
| d0.05                   | Output voltage                       | 0~480V  | 1V     | 0               | *      | 0~480         |

| Function code | Name                      | Descriptions   | Unit  | Factory setting | Modif. | Setting range |
|---------------|---------------------------|--|-------|-----------------|--------|---------------|
| d0.06         | Output current            | 0.0~3Ie  | 0.1A  | 0.0             | *      | 0~65535       |
| d0.07         | Torque current            | -300.0~+300.0%   | 0.1%  | 0.0%            | *      | 0~6000        |
| d0.08         | Magnetic flux current     | 0~+100.0%  | 0.1%  | 0.0%            | *      | 0~1000        |
| d0.09         | Motor power               | 0.0~200.0% (Corresponding to the motor's rated power)  | 0.1%  | 0.0%            | *      | 0~2000        |
| d0.10         | Motor estimated frequency | -300.00~300.00Hz   | 0.01  | 0.00            | *      | 0~60000       |
| d0.11         | Motor actual frequency    | -300.00~300.00Hz   | 0.01  | 0.00            | *      | 0~60000       |
| d0.12         | Bus voltage               | 0~800V   | 1V    | 0               | *      | 0~800         |
| d0.13         | Drive operation status    | 0~FFFH<br>bit0: Run/Stop<br>bit1: Reverse/Forward<br>bit2: Operating at zero frequency<br>bit3: Accelerating<br>bit4: Decelerating<br>bit5: Operating at constant speed<br>bit6: Pre-commutation<br>bit7: Tuning<br>bit8: Over-current limiting<br>bit9: DC over-voltage limiting<br>bit10: Torque limiting<br>bit11: Speed limiting<br>bit12: Drive fault<br>bit13: Speed control<br>bit14: Torque control<br>bit15: Position control(Reserved) | 1     | 0               | *      | 0~FFFFH       |
| d0.14         | Input terminals status    | 0~FFH, 0: OFF; 1: ON   | 1     | 00              | *      | 0~FFH         |
| d0.15         | Output terminals status   | 0~1FH, 0: OFF; 1: ON   | 1     | 0               | *      | 0~1FH         |
| d0.16         | AI1 input                 | -10.00~10.00V  | 0.01V | 0.00            | *      | 0~2000        |
| d0.17         | AI2 input                 | -10.00~10.00V  | 0.01V | 0.00            | *      | 0~2000        |

| Function code         | Name                               | Descriptions  | Unit    | Factory setting | Modif. | Setting range |
|-----------------------|------------------------------------|---|---------|-----------------|--------|---------------|
| d0.18                 | Reserved                           |   |         |                 |        |               |
| d0.19                 | Percentage of AI1 after regulation | -100.00%~110.00%  | 0.01%   | 0.00            | *      | 0~20000       |
| d0.20                 | Percentage of AI2 after regulation | -100.00%~110.00%  | 0.01%   | 0.00            | *      | 0~20000       |
| d0.21                 | Reserved                           | -100.00%~110.00%  | 0.01%   | 0.00            | *      | 0~20000       |
| d0.22                 | AO1 output                         | 0.0~100.0% (Ratio of the full range)  | 0.1%    | 0.0%            | *      | 0~1000        |
| d0.23                 | Reserved                           |   |         |                 |        |               |
| d0.24                 | Process close-loop reference       | -100.0~100.0% (Ratio of the full range)   | 0.1%    | 0.0%            | *      | 0~2000        |
| d0.25                 | Process close-loop feedback        | -100.0~100.0% (Ratio of the full range)   | 0.1%    | 0.05%           | *      | 0~2000        |
| d0.26                 | Process close-loop error           | -100.0~100.0% (Ratio of the full range)   | 0.1%    | 0.0%            | *      | 0~2000        |
| d0.27                 | Process close-loop                 | -100.0~100.0% (Ratio of the full range)   | 0.1%    | 0.0%            | *      | 0~2000        |
| d0.28                 | Temperature of heatsink 1          | 0.0~150.0℃  | 0.1℃    | 0.0             | *      | 0~1500        |
| d0.29                 | Temperature of heatsink 2          | 0.0~150.0℃  | 0.1℃    | 0.0             | *      | 0~1500        |
| d0.30                 | Total conduction time              | 0~65535 hours   | 1 hours | 0               | *      | 0~65535       |
| d0.31                 | Total operating time               | 0~65535 hours   | 1 hours | 0               | *      | 0~65535       |
| d0.32                 | Total fan's operating time         | 0~ 65535 hours  | 1 hours | 0               | *      | 0~65535       |
| d0.33                 | ASR controller output              | -300.0~300.0% (Corresponding to drive's rated torque)   | 0.1%    | 0.0%            | *      | 0~6000        |
| d0.34                 | Reference torque                   | -300.0~300.0% (Corresponding to drive's rated torque)   | 0.1%    | 0.0%            | *      | 0~6000        |
| Group d1:Fault record |                                    |   |         |                 |        |               |
| d1.00                 | Fault record 1                     | 0: No fault records<br>1 : Over-current during acceleration (E001)<br>2 : Over-current during | 1       | 0               | *      | 0~50          |

| Function code | Name | Descriptions   | Unit | Factory setting | Modif. | Setting range |
|---------------|------|--|------|-----------------|--------|---------------|
|               |      | deceleration (E002)<br>3: Over-current in constant speed operation (E003)<br>4 : Over voltage during acceleration (E004)<br>5 : Over voltage during deceleration (E005)<br>6: Over voltage in constant-speed operating process (E006)<br>7: Drive's control power supply over voltage (E007)<br>8: Input phase loss (E008)<br>9: Output phase failure (E009)<br>10 : Protections of IGBT act (E010)<br>11 : IGBT module's heatsink overheat (E011)<br>12: Rectifier's heatsink overheat (E012)<br>13: Drive overload (E013)<br>14: Motor over-load (E014)<br>15 : External equipment fails (E015)<br>16: EEPROM R/W fault (E016)<br>17: RS232/RS485 communication failure (E017)<br>18: Contactor not closed (E018)<br>19: Current detection circuit has fault,Hall sensor or amplifying circuit(E019 )<br>20: Reserved<br>21: Reserved<br>22: Reserved<br>23: Parameter copy error (E023) |      |                 |        |               |



| Function code                        | Name                                      | Descriptions  | Unit   | Factory setting | Modif. | Setting range |
|--------------------------------------|---|---|--------|-----------------|--------|---------------|
|                                      |   | 24: Auto-tuning fails (E024)<br>25: Reserved<br>26: Reserved<br>27: Brake unit failure (E027)<br>Note:<br>① E007 is not detected if the the model is 18.5G/22G or blow.<br>② Fault E010 can't be reset until delaying 10 seconds.<br>③ The over-current fault can'tbe reset until delaying 6 seconds.<br>④ The keypad will diplay fault A××× when fault warning appears.(For example,when contactor failure,the keypad will display E018 if it is action protection,and the keypad will display A018 if it is warning and continue to run). |        |                 |        |               |
| d1.01                                | Bus voltage of the latest failure         | 0~999V  | 1V     | 0V              | *      | 0~999         |
| d1.02                                | Actual current of the latest failure      | 0.0~999.9A  | 0.1A   | 0.0A            | *      | 0~9999        |
| d1.03                                | Operation frequency of the latest failure | 0.00Hz~300.00Hz   | 0.01Hz | 0.00Hz          | *      | 0~30000       |
| d1.04                                | Operation status of the latest failure    | 0~FFFFH   | 1      | 0000            | *      | 0~FFFFH       |
| d1.05                                | Fault record 2                            | 0~55  | 1      | 0               | *      | 0~50          |
| d1.06                                | Fault record 3                            | 0~55  | 1      | 0               | *      | 0~50          |
| Group d2:Product Identity Parameters |   |   |        |                 |        |               |
| d2.00                                | Serial number                             | 0~FFFF  | 1      | 100             | *      | 0~65535       |

| Function code               | Name                       | Descriptions   | Unit       | Factory setting | Modif. | Setting range |
|-----------------------------|----------------------------|--|------------|-----------------|--------|---------------|
| d2.01                       | Software version number    | 0.00~99.99   | 1          | 1.00            | *      | 0~9999        |
| d2.02                       | Custom-made version number | 0~9999   | 1          | 0               | *      | 0~9999        |
| d2.03                       | Rated capacity             | Output power , 0~999.9KVA<br>(Dependent on drive's model)  | 0.1KV<br>A | Factory setting | *      | 0~9999        |
| d2.04                       | Rated voltage              | 0~999V (Dependent on drive's model)  | 1V         | Factory setting | *      | 0~999         |
| d2.05                       | Rated current              | 0~999.9A (Dependent on drive's model)  | 0.1A       | Factory setting | *      | 0~9999        |
| Group U0:Factory parameters |                            |  |            |                 |        |               |
| U0.00                       | Factory password           | ****<br><br>Note:Other parameters in this group can't display until entering the right password. | 1          | Factory setting | —      | 0~FFFF        |

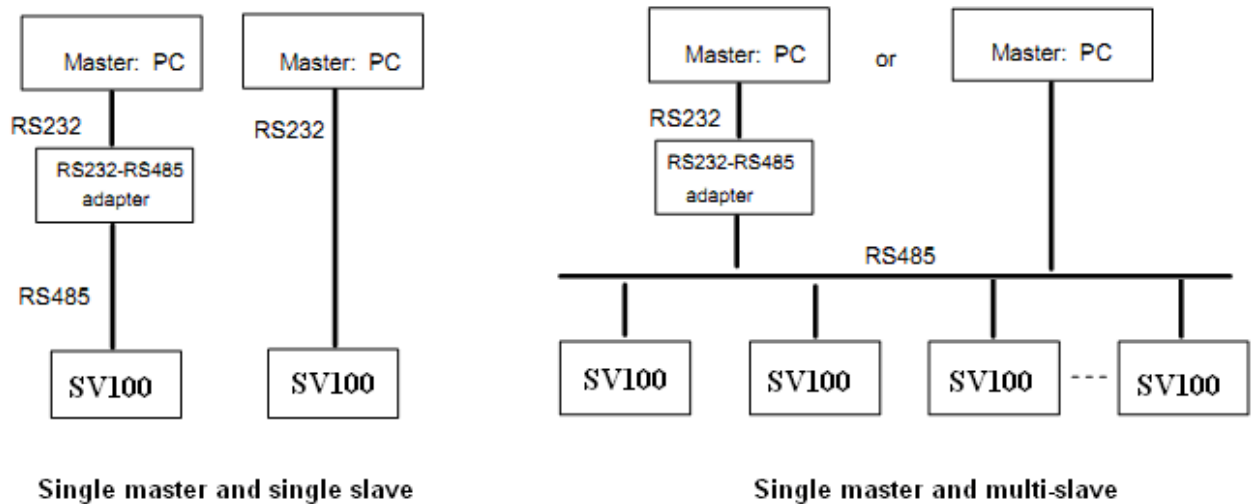
**Note:** ○: Can be modified during operation;  
 ×: Cannot be modified during operating;  
 \*: Actually detected and cannot be revised;  
 —:Defaulted by factory and cannot be modified.

---

# Communication Protocol

## 1. Networking Mode

According to the following pic 10-1, there are two networking modes: Single master and multi-slave, Single master and single slave.



Pic 10-1

## 2. Interfaces

RS485 or RS232: asynchronous, semi-duplex

Default: 8-N-1, 9600bps, RTU. Refer to Group b3 for parameter settings.

## 3. Communication Modes

1. The communication protocol for the drive is Modbus. It support normal reading and writing of the registers, also supports managing the funtion code.
2. The drive is a slave in the network. It communicates in “point to point” mode.
3. When there is multi-station communication or the communication distance is long, please connect a 100~200 ohm resistance to the positive and minus terminal of the master’s signal wire in parallel.
4. FV 100 normally provides RS485 interface, if you need RS232, please choose to add a RS232/RS485 conversion equipment.

## 4. Protocol Format

CV100 support Modbus RTU and ASCII,its frame format is shown in Fig.10-2.

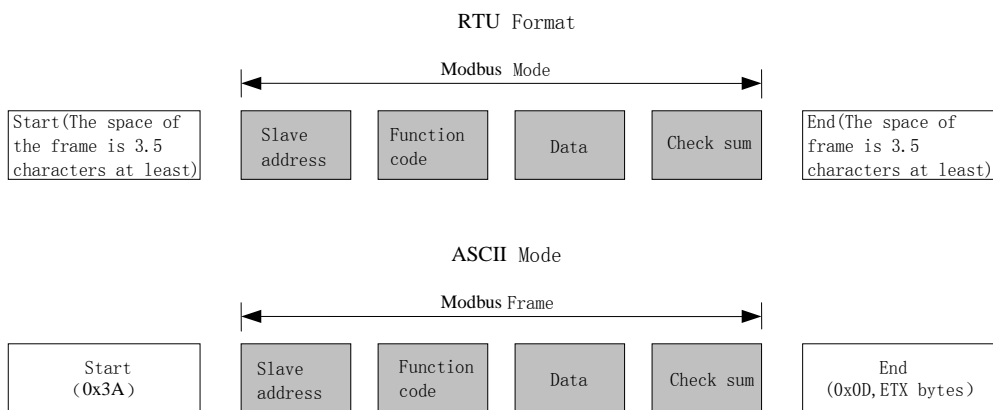


Fig.10-2 Modbus protocol format

Modbus use “Big Endian” of encoder mode, which means sending data with high byte in front and low byte behind.

### 1. RTU mode

In RTU mode,there must be a idle of at least 3.5 characters between two frames.It use CRC-16 for data check.

Following is an example for read the parameter of internal register 0101(A1.01) from No.5 slave.

Request frame:

| Slave address | Function code | Data             |      |        |      | Checksum |      |
|---------------|---------------|------------------|------|--------|------|----------|------|
|               |               | Register address |      | Length |      |          |      |
| 0x05          | 0x03          | 0x01             | 0x01 | 0x00   | 0x01 | 0xD5     | 0xB2 |

Response frame:

| Slave address | Function code | Data            |                  | Checksum |      |
|---------------|---------------|-----------------|------------------|----------|------|
|               |               | Response length | Register content |          |      |
| 0x05          | 0x03          | 0x02            | 0x13 0x88        | 0x44     | 0xD2 |

Therein, checksum is CRC value.

### 2. ASCII mode

In ASCII *mode*, characters are used to start and end a frame. The colon “0x3A” is used to flag the start of a message and each message is ended with a “0x0D,0x0D” combination. Except frame header and end of frame,all other messages are coded in hexadecimal values, represented with readable ASCII characters. Only the characters 0...9 and A...F are used for coding. Herein the data use LRC as error checksum.

Following is an example for writing value 4000(0x0FA0) into the parameter of internal register 0201(A2.01) from No.5 slave.

Request frame:

|           | Frame header | Slave address |    | Function code |    | Data             |    |    |    |               |    |    |    | Check code |    | Frame trail |    |
|-----------|--------------|---------------|----|---------------|----|------------------|----|----|----|---------------|----|----|----|------------|----|-------------|----|
|           |              |               |    |               |    | Register address |    |    |    | Setting value |    |    |    |            |    |             |    |
| Character | :            | 0             | 5  | 0             | 6  | 0                | 2  | 0  | 1  | 0             | F  | A  | 0  | 4          | 3  | CR          | LF |
| ASCII     | 3A           | 30            | 31 | 30            | 36 | 30               | 32 | 30 | 31 | 30            | 46 | 41 | 30 | 34         | 33 | 0D          | 0A |

Therein,the check code is LRC checksum,which value is equal to the complement of (05+06+02+01+0x0F+0xA0) .

Response frame:

|  | Frame header | Slave address | Function code | Data             |               | Check code | Frame trail |
|--|--------------|---------------|---------------|------------------|---------------|------------|-------------|
|  |              |               |               | Register address | Setting value |            |             |

|           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Character | :  | 0  | 5  | 0  | 6  | 0  | 2  | 0  | 1  | 0  | F  | A  | 0  | 4  | 3  | CR | LF |
| ASCII     | 3A | 30 | 31 | 30 | 36 | 30 | 32 | 30 | 31 | 30 | 46 | 41 | 30 | 34 | 33 | 0D | 0A |

VFD can set different delay time for response according to different application. For RTU mode, the actual delay time for response is 3.5 characters interval at least. For ASCII mode, the actual delay time for response is 1 ms at least.

## 5. Protocol Function

The main functions of Modbus are read and write parameters. Different function codes need different operation request. The modbus protocol of VFD support the operations in the following table.

| Function code | Meaning   |
|---------------|---|
| 0x03          | Read parameters of VFD, including function code parameters, control parameters and status parameters.                               |
| 0x06          | Rewrite single function code or control parameter with 16bit length, the value of the parameter can't be saved after VFD power off. |
| 0x08          | Diagnosis.  |
| 0x10          | Rewrite multiple function code or control parameters, the value of the parameters can't be saved after VFD power off.               |
| 0x41          | Rewrite single function code or control parameter with 16bit length, the value can be saved after VFD power off.                    |
| 0x42          | Manage function code of VFD.  |
| 0x43          | Rewrite multiple function code or control parameters, the value of the parameters can be saved after VFD power off.                 |

All the function code, control parameters and status parameters of VFD are mapping to the read/write register of Modbus. The group number of function code is mapping to the high byte of register address and the index address in the group is mapping to the low byte of register address. The corresponding relationship between group number and register address is shown in following table.

| Group No. | High byte of mapping address | Group No.         | High byte of mapping address |
|-----------|------------------------------|-------------------|------------------------------|
| Group A0  | 0x00                         | Group B2          | 0x0C                         |
| Group A1  | 0x01                         | Group B3          | 0x0D                         |
| Group A2  | 0x02                         | Group B4          | 0x0E                         |
| Group A3  | 0x03                         | Group C0          | 0x14                         |
| Group A4  | 0x04                         | Group C1          | 0x15                         |
| Group A5  | 0x05                         | Group D0          | 0x1E                         |
| Group A6  | 0x06                         | Group D1          | 0x1F                         |
| Group A7  | 0x07                         | Group D2          | 0x20                         |
| Group A8  | 0x08                         | Group U0          | 0x5A                         |
| Group B0  | 0x0A                         | Control parameter | 0x32                         |
| Group B1  | 0x0B                         | Status parameter  | 0x33                         |

For example, the register address of function code A3.02 is 0x0302, and the register address of the first control parameter (Control command 1) is 0x3200.

---

## 6.Control parameters and status parameters of VFD

The control parameters of VFD can achieve the function such as startup, stop,setting operating frequency and so on.Retrieving the status parameters of VFD can obtain the parameters such as operating frequency,output current,output torque and so on.

### 1. Control parameter

The control parameters of VFD are shown in following table.

| Register | Parameter Name                   | Saved after powered off | Note   |
|----------|----------------------------------|-------------------------|--|
| 0X3200   | Control word 1                   | No                      |  |
| 0x3201   | Main setting                     | No                      | The main setting frequency: In the common operation mode, the channel of main setting is serial communication, it tack effects if the bit8 of control word 1 is set on. Wether it saves or not depends on the setting in A2.03 |
| 0x3202   | Operation frequency setting      | No                      | Same as above  |
| 0x3203   | Digital closed loop setting      | yes                     | Takes effects after the closed loop is enabled   |
| 0x3204   | Pulse closed loop setting        | /                       | Do not support   |
| 0x3205   | Analog outprut AO1 setting       | No                      | Enable when A6.28=15   |
| 0x3206   | Reserved                         |                         |  |
| 0x3207   | Digital output DO setting        | No                      | Enable when A6.25=65   |
| 0x3208   | Frequency Proportion setting     |                         | Do not support   |
| 0x3209   | Virtual terminal control setting | No                      | Bit~bit6: X1~X7. Corresponding to on state of the bits in A6.24<br>Bit10~bit13: Y1/Y2/RO1/RO2, They are enabled when A6.14~A6.17=17  |
| 0x320A   | Set the acceleration time        | Yes                     |  |
| 0x320B   | Set the deceleration time        | Yes                     |  |
| Ox3212   | Control command word 2           | No                      |  |

Note:

(1) When read control parameters,it will return the value which is rewrote in the previous communication.

(2) In control parameters,the preset value,range of input/output setting value and decimal point scaling should refer to the corresponding function code.

The bits for the control command word 1 are defined as follows:

| Bit         | Value   | Function                             | Note   |
|-------------|---------|--------------------------------------|--|
| bit2~bit0   | 111B    | Running command                      | Start VFD (enable when jog is disable)   |
|             | 110B    | Stop mode 0                          | Stop according to the preset deceleration time(enable when jog is disable)   |
|             | 101B    | Stop mode 1                          | Coast to stop  |
|             | 100B    | Stop by external fault               | Coast to stop and VFD display external fault   |
|             | 011B    | Stop mode 2                          | Not support  |
|             | Others  | Reserved                             |  |
| bit3        | 1       | Reverse                              | Set the operating direction when run command is enable   |
|             | 0       | Forward                              |  |
| bit4        | 1       | Jog forward                          | No action when bits for jog forward and reverse are enable at the same time,and jog stop when both are disable at the same time. |
|             | 0       | Jog forward disable                  |  |
| bit5        | 1       | Jog reverse                          |  |
|             | 0       | Jog reverse disable                  |  |
| bit6        | 1       | Enable Acc/Dec                       | The bit5~bit0 of control word 1 are enable when this bit is enable.  |
|             | 0       | Disable Acc/Dec                      |  |
| bit7        | 1       | Host computer control word 1 enable  | Selection bit of host computer control word 1  |
|             | 0       | Host computer control word 1 disable |  |
| bit8        | 1       | Main reference enable                | Selection bit of main reference  |
|             | 0       | Main reference disable               |  |
| bit9        | 1       | Fault reset enable                   | Selection bit of fault reset   |
|             | 0       | Fault reset disable                  |  |
| bit15~bit10 | 000000B | Reserved                             |  |

Note:

(1) The host computer control word(control word1 and control word 2) is enable when set “Methods of inputting operating commands” to “communication control”.The control word 1 is enabled when the bit7 of control word 1 is enable.And bit5~bit0 are enable when the bit6 of control word 1 is enable.

(2) Processing of fault and alarm in host computer:when VFD is failure,all the command of control word 1 and control word 2,except fault reset command,are disable,it need to reset fault firstly before sending other commands.When the alarm happens,the control words is still enable.

The bits definitions of control word 2 are shown as follows:

| Bit | Value | Function | Note |
|-----|-------|----------|------|
|-----|-------|----------|------|

|            |   |   |  |
|------------|---|---|--|
| bit0       | 1 | VFD operation disable                           | Selection bit for VFD operation enable/disable       |
|            | 0 | VFD operation enable                            |  |
| bit1       | 1 | Running(The direction refer to function code)   | Running direction                                    |
|            | 0 | Other operation status(Refer to control word 1) |  |
| bit2       | 1 | Auxiliary reference enable                      | The selection bit for auxiliary reference frequency. |
|            | 0 | Auxiliary reference disable                     |  |
| bit3       | 1 | The control word 2 enable                       | The selection bit for control word 2.                |
|            | 0 | The control word 2 disable                      |  |
| bit15~bit4 |   | Reserved  |  |

Note: control word 2 is enabling when the bit3 of control word 2 is enable.

## 2. Status parameters

| Register address | Parameters name                        | Note   |
|------------------|--|--|
| 0x3300           | VFD operation status word 1            |  |
| 0x3301           | Current main reference value           | Current operating frequency                        |
| 0x3302           | Slave model                            |  |
| 0x3303           | VFD model                              |  |
| 0x3304           | Software version                       |  |
| 0x3305           | Current operating frequency            |  |
| 0x3306           | Output current                         |  |
| 0x3307           | Output voltage                         |  |
| 0x3308           | Output power                           |  |
| 0x3309           | Operating rotary speed                 |  |
| 0x330A           | Operating line speed                   |  |
| 0x330B           | Analog close-loop feedback             |  |
| 0x330C           | Bus voltage                            |  |
| 0x330D           | External counter                       | Not support  |
| 0x330E           | Output torque                          |  |
| 0x330F           | Digital input/output terminal status   | bit0~bit6:<br>X1~X7;<br>bit10~bit12:<br>Y1/Y2/RO1。 |
| 0x3310           | Actual length                          | Not support  |
| 0x3311           | Operating frequency after compensation | Not support  |
| 0x3312           | The first operating fault              |  |
| 0x3313           | The second operating fault             |  |
| 0x3314           | The latest operating fault             |  |
| 0x3315           | Operating frequency setting            |  |
| 0x3316           | Rotary speed setting                   |  |
| 0x3317           | Analog close-loop setting              |  |
| 0x3318           | Line speed setting                     |  |



| Register address | Parameters name  | Note        |
|------------------|--|-------------|
| 0x3319           | AI1  |             |
| 0x331A           | AI2  |             |
| 0x331B           | Length setting   | Not support |
| 0x331C           | Acceleration time 1 setting  |             |
| 0x331D           | Deceleration time 1 setting  |             |
| 0x331E           | Methods of inputting<br>operating commands<br>0: Panel control<br><br>1: Terminal control<br><br>2: Communication control  |             |
| 0x331F           | VFD operating status word 2  |             |
| 0x3320           | Main reference frequency selector<br><br>0:Digital setting 1(Keypad $\wedge \vee$ setting)<br>1:Digital setting 2(Terminal UP/DN setting)<br>2:Digital setting 3 (Serial port)<br>3:AI analog setting<br>4:DI pulse setting<br>5:Expansion card. |             |
| 0x3321           | Accumulated length   | Not support |

Note:

- (1) Status parameters don't support write operation.
- (2) The encoding rules of slave model is as follows:the range of slave model is 0~999.

The bit definitions of VFD operating status word 1 are shown in following table:

| Bit         | Value     | Function                    | Note  |
|-------------|-----------|-----------------------------|---|
| bit0        | 1         | VFD running                 |   |
|             | 0         | VFD stop                    |   |
| bit1        | 1         | VFD reverse rotation        |   |
|             | 0         | VFD forward rotation        |   |
| bit2        | 1         | Reach main reference        |   |
|             | 0         | Not reach main reference    |   |
| bit3        | 1         | Serial port control enable  |   |
|             | 0         | Serial port control disable |   |
| bit4        | 1         | Serial port setting enable  |   |
|             | 0         | Serial port setting disable |   |
| bit5~bit6   |           | Reserved                    |   |
| bit7        | 1         | Alarm                       | When this bit is 0,the bit15~8 of control word 1show the status.If bit15~8 are 0,means normal.If not,means failure. |
|             | 0         | Fault or normal             |   |
| bit15~ bit8 | 0x00~0xFF | Fault/alarm code            | 0: normal.<br>Not 0: fault/alarm.   |

The bit definitions of VFD operating status word 2 are shown in following table:

| Bit  | Value | Function               | Note |
|------|-------|------------------------|------|
| bit0 | 1     | Jog running            |      |
|      | 0     | Non-jog running        |      |
| bit1 | 1     | Close loop running     |      |
|      | 0     | Non-close loop running |      |

|        |   |  |  |
|--------|---|--|--|
| bit2   | 1 | PLC running                            |  |
|        | 0 | Non-PLC running                        |  |
| bit3   | 1 | Multi-section frequency operation      |  |
|        | 0 | Non multi-section frequency operation. |  |
| bit4   | 1 | Common operation                       |  |
|        | 0 | Non-common operation                   |  |
| bit5   | 1 | Swing frequency                        |  |
|        | 0 | Non-swing frequency                    |  |
| bit6   | 1 | Under voltage                          |  |
|        | 0 | Normal voltage                         |  |
| bit7   |   | Reserved                               |  |
| bit8   |   | Servo operation                        |  |
| bit9   |   | Customized operation                   |  |
| bit10  |   | Synchronous speed operation            |  |
| Others |   | Reserved                               |  |

The bit definitions of VFD operating status word 3 are shown as following table:

| Bit       | Value | Function                 | Note |
|-----------|-------|--------------------------|------|
| bit0~bit1 |       | Reserved                 |      |
| bit2      |       | Zero speed operation     |      |
| bit3      |       | Accelerating             |      |
| bit4      |       | Decelerating             |      |
| bit5      |       | Constant speed running   |      |
| bit6      |       | Pre-excitation           |      |
| bit7      |       | Tuning                   |      |
| bit8      |       | Over-current limiting    |      |
| bit9      |       | DC over-voltage limiting |      |
| bit10     |       | Torque limiting          |      |
| bit11     |       | Speed limiting           |      |
| bit12     |       | VFD failure              |      |
| bit13     |       | Speed control            |      |
| bit14     |       | Torque control           |      |
| bit15     |       | Position control         |      |

## 1. Some instructions

1. For function code 0x10 and 0x43,when rewrite multiple continous function codes,if any one of the function codes is invalid for write operation,then it will return error information and all of the parameters can't be rewritten.When rewrite multiple continuous control parameters,if any one of the parameters is invalid for write operation, then it will return error information and this parameter and others behind can't be rewritten,but other parameters before this parameter can be rewritten normally.

2. For some special function code,Using 0x06 and 0x41 or 0x10 and 0x43 are the same function,in write operation,the parameters can be saved after power failure.

| Function code | Description |
|---------------|-------------|
|---------------|-------------|

|             |  |
|-------------|--|
| B4.02       | Parameters protection setting            |
| A6.00~A6.04 | Selection of input terminal X1~X5        |
| A2.03       | Main reference frequency control         |
| A2.03       | Auxiliary reference frequency control    |
| C2.00       | PLC operation mode                       |
| C3.00       | Swing frequency operation mode           |
| B0.00       | Motor rated power                        |
| U0.01       | Machine model setting(Factory parameter) |
| U0.09       | VFD series selection(Factory parameter)  |

3. Some control parameters can't save in EEPROM,so for these parameters,using function code 0x41 and 0x06 or 0x43and 0x10 are the same,mean parameters can be saved after power failure.

4. Some internal parameters of VFD are reserved and can't be changed via communication, refer to following table:

| Function code | Description                  |
|---------------|------------------------------|
| B4.04         | Parameters copy              |
| B0.11         | Motor parameters auto-tuning |

5. The operation of user password and factory password in host computer

(1) User password

1) Protection of user password:Read/write function code, function code management (except “read address of displaydata” and”switch display data”)

2) If you set user password (A0.00!=0) ,then you must enter the right password to A0.00 when you want to visit function code,but control parameters and status parameters are not protected by user password.

3) User password can't be set,change or cancel by host computer,it can only operated by keypad. To A0.00 of write operation, only effective in two situations: one is in the password decryption; Second,write 0 is in the situation of no password.It will return invalid operation information in other situations.

4) The operation of host computer and keypad to user password is independent. Even if the keyboard completes decryption, but host computer still need to decrypt when it want to access function codes, and vice versa.

5) After host computer acquire the access right of parameters,when reading user password,it will return “0000” instead of actual user password.

6) The host computer will acquire the access right of function code after decryption,if there is no communication for 5minutes,then the access right will disable.And if it want to access function code,it need to enter user password again.

7) When host computer has acquired access right(no user password or has decryption),if the user password is rewritten by keypad at this moment,the host computer has still the current access right and no need to decryption again.

(2) Factory password

1) Protection range of factory password:Read/write parameters of Group U0, function code management of Group U0.

2) Host computer can only access function code of Group U0 after decryption(write correct factory password into U0.00).If there is no communication for 5 minutes after acquiring access right,the right will disable automatically,and it need to enter password again to access Group U0.

3) After acquiring the access right of Group U0,if host computer read U0.00,it will return 0000 instead of actual factory password.

4) The operation of host computer and keypad to user password is independent. They need to enter the correct password separately to acquire the access right.

5) Host computer has no right to modify factory password.When host computer write data into U0.00, it will return invalid operation unless the data is correct password.

## 2. Application example

CV100 only support 16bit access.

Start No.5 VFD to perform forward rotation.

| Data frame | Address | Function code | Register address | Register content | Checksum |
|------------|---------|---------------|------------------|------------------|----------|
| Request    | 0x05    | 0x06          | 0x3200           | 0x00C7           | 0xC764   |
| Response   | 0x05    | 0x06          | 0x3200           | 0x00C7           | 0xC764   |

No.5 VFD stops in mode 0.

| Data frame | Address | Function code | Register address | Register content | Checksum |
|------------|---------|---------------|------------------|------------------|----------|
| Request    | 0x05    | 0x06          | 0x3200           | 0x00C6           | 0x06A4   |
| Response   | 0x05    | 0x06          | 0x3200           | 0x00C6           | 0x06A4   |

No.5 VFD jogs forward.

| Data frame | Address | Function code | Register address | Register content | Checksum |
|------------|---------|---------------|------------------|------------------|----------|
| Request    | 0x05    | 0x06          | 0x3200           | 0x00D0           | 0x876A   |
| Response   | 0x05    | 0x06          | 0x3200           | 0x00D0           | 0x876A   |

No.5 VFD stop jogging.

| Data frame | Address | Function code | Register address | Register content | Checksum |
|------------|---------|---------------|------------------|------------------|----------|
| Request    | 0x05    | 0x06          | 0x3200           | 0x00C0           | 0x86A6   |
| Response   | 0x05    | 0x06          | 0x3200           | 0x00C0           | 0x86A6   |

No.5 VFD reset fault:

| Data frame | Address | Function code | Register address | Register content | Checksum |
|------------|---------|---------------|------------------|------------------|----------|
| Request    | 0x05    | 0x06          | 0x3200           | 0x0280           | 0x8636   |
| Response   | 0x05    | 0x06          | 0x3200           | 0x0280           | 0x8636   |

Read the operating frequency of No.5 VFD and the response operating frequency of the VFD is 50.00Hz:

| Data frame | Address | Function code | Register address | Number of registers or bytes | Register content | Checksum |
|------------|---------|---------------|------------------|------------------------------|------------------|----------|
| Request    | 0x05    | 0x03          | 0x3301           | 0x0001                       | None             | 0xDB0A   |
| Response   | 0x05    | 0x03          | None             | 0x02                         | 0x1388           | 0x44D2   |

Rewrite the acceleration time 1(Function code A0.06) of No.5 VFD to 10.0s and can't save after power failure.

| Data frame | Address | Function code | Register address | Register content | Checksum |
|------------|---------|---------------|------------------|------------------|----------|
|------------|---------|---------------|------------------|------------------|----------|

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|          |      |      |        |        |        |
|----------|------|------|--------|--------|--------|
| Request  | 0x05 | 0x06 | 0x0006 | 0x0064 | 0x69A4 |
| Response | 0x05 | 0x06 | 0x0006 | 0x0064 | 0x69A4 |

Read the output current of No.5 VFD and the response output current of the VFD is 30.0A.

| Data frame | Address | Function code | Register address | Number of registers or bytes | Register content | Checksum |
|------------|---------|---------------|------------------|------------------------------|------------------|----------|
| Request    | 0x05    | 0x03          | 0x3306           | 0x0001                       | None             | 0x6ACB   |
| Response   | 0x05    | 0x03          | None             | 0x02                         | 0x012C           | 0x49C9   |

Read the deceleration time 1(Function code A0.07) of No.5 VFD and the response deceleration time of the VFD is 6.0s.

| Data frame | Address | Function code | Register address | Number of registers or bytes | Register content | Checksum |
|------------|---------|---------------|------------------|------------------------------|------------------|----------|
| Request    | 0x05    | 0x03          | 0x0007           | 0x0001                       | None             | 0x344F   |
| Response   | 0x05    | 0x03          | None             | 0x02                         | 0x003C           | 0x344F   |

Scaling relationship of VFD:

A) Scaling of frequency C is 1: 100.

If you want to make the VFD run at 50Hz,then the main reference should be set as 0x1388(5000).

B) Scaling of time is 1: 10

If you want to set the acceleration time of the VFD as 30s,then the function code should be set as 0x012C(300).

C) Scaling of current is 1: 10

If the response current of VFD is 0x012C(300),then current of the VFD is 30A.

D) Output power is the absolute value.

E) Other (such as the input and output terminals, etc.) please reference inverter user manual