

# S3100E series inverter

General vector control (PM)

User manual



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User manual

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All users could contact with the nearest SAVCH office or service center,  
also could contact with our headquarters directly.

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Thank you for choosing SAVCH inverter! This instruction manual, which includes operation descriptions and notes for maintenance, shall be delivered to the end-user.


For safety running and effective operation, this instruction manual shall be read thoroughly prior to use, which shall also be preserved for later use. Provided problems occur and solution is not provided in this instruction manual, contact your SAVCHELECTRIC representative or contact with our company directly. Our professional technicians will serve for you actively. And please continue to adopt products of SAVCH, give valuable opinion and advice.

## **1. Reading Instructions**

Symbols of " DANGER" and " CAUTION" in the manual indicates that, for safety running or maintenance of inverters or other electrical products, attention shall be attached during delivering, installation, operation and checks for the inverter. And these notes shall be applied for a better and safer operation.

|   |   |
|---|---|
|  <b>DANGER</b>   | Indicates a potentially hazardous situation visiting. If not used correctly, personnel damage even death may be caused.             |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation visiting. If not used correctly, serious damage to inverter or machine may be resulted. |

|  |
|--|
|  <b>DANGER</b>  |
| <ul style="list-style-type: none"><li>• Never connect wires while power on. Do not check components or signal for circuit board during operation.</li><li>• Do not dismantle or change inner wire, circuit or components unnecessarily.</li><li>• Make sure grounding terminals are correctly grounded. 220V level: Grounding III, 440V special grounding.</li></ul> |

|  |
|--|
|  <b>CAUTION</b>   |
| <ul style="list-style-type: none"><li>• Do not perform a withstand voltage test for components of inverter, it can cause semi-conductor components to be damaged by high voltage.</li><li>• Never connect the output terminals U, V, W to AC power supply.</li><li>• IC of CMOS on control circuit of the inverter shall be damaged by electrostatic influence. Do not touch main circuit board.</li></ul> |

## **2. Products Receiving**

All products have been performed with strict test and inspection. After receiving the inverters, the following checks shall be performed.

- To check that SAVCH inverter, an instruction manual and a cover is inside of the package
- To check whether model number correspond with model and capacity your purchase order.
- To check whether there are damaged parts during transportation and delivering. If there are, do not connect with power supply.

If any of the above checkpoints are not satisfactory, contact your SAVCHELECTRIC representative for a quick resolution.

# **1. SAFETY INSTRUCTIONS**

## **1.1 Notes for Operation**

### **Before wiring**

#### **CAUTION**

Specification of applying power supply shall correspond to input voltage of the inverter.

#### **DANGER**

Main circuit terminals must be correct, R/L1, S/L2 and T/L3 is input terminals and it's forbidden to use mixing with U/T1, V/T2 and W/T3. Failure to observe this may cause the inverter damaged.

### **Installation**

#### **DANGER**

- When handling the inverter, do not draw front cover directly but handle it by the heat sink to prevent the cover from falling off and to avoid the falling of the inverter and causing personal injury or damage to the inverter.
- Install the inverter on a base made of metal or other non-flammable material, Do not place flammable object nearby to prevent fires.
- If several inverters are installed in a electric cabinet, add extra cooling fan to keep the temperature lower than 40 °C to prevent over-heating or fire.
- Operator shall be dismantled or refitted after power supply is off. Fixed operator shall be processed as diagram shows.
- Confirm whether the input voltage is identical with the voltage in the nameplate on the right side of the inverter, Otherwise the malfunction could happen.

### **Operation**

#### **DANGER**

- Never put in or take off the motor during operation, otherwise over-current even over burning the main circuit of the inverter may happen.
- Do not remove the cover while current is flowing. Failure to observe this may result in electrical shock to personnel.
- When auto-restart function is set, do not approach the machine since motor can be reset suddenly after being stopped.
- As STOP key can be invalid unless being set, which is different from the emergency stop key, please pay attention to it.

**⚠ CAUTION**

- Never touch heat sink or discharging resistor since temperature may be very high.
- Since it is easy to change running speed from low to a high speed, verify safe working range of motor and machine before running.
- Pay attention to relative equipments before using the brake unit.
- Do not check signals during running.
- All parameters of the inverter have been preset at the factory according to line frequency. Do not change the settings value at will.
- Please confirm that the power is turned off and wait for 10 minutes before disassembly or inspection.

### Check and maintenance

**⚠ CAUTION**

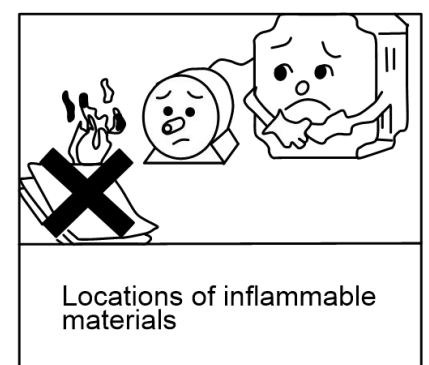
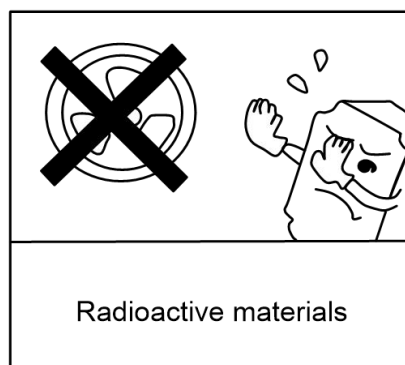
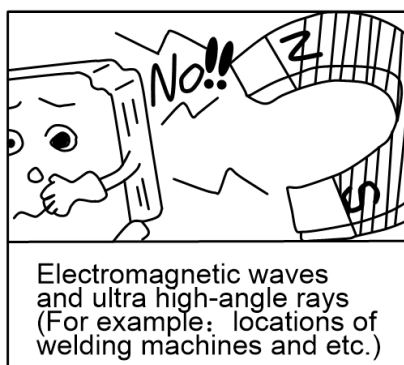
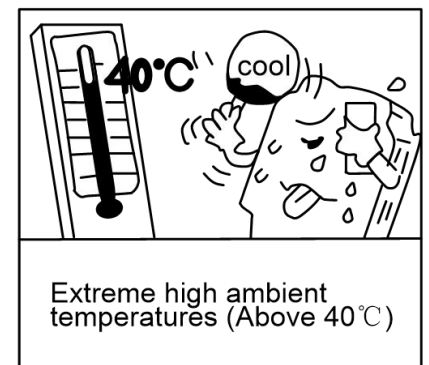
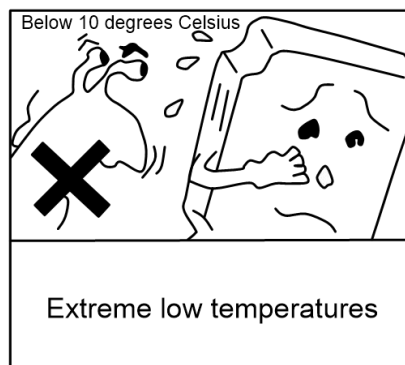
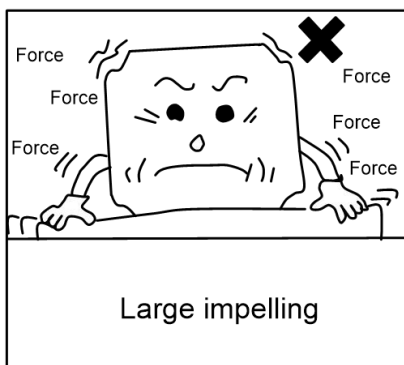
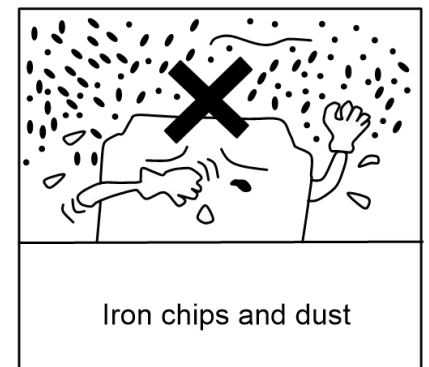
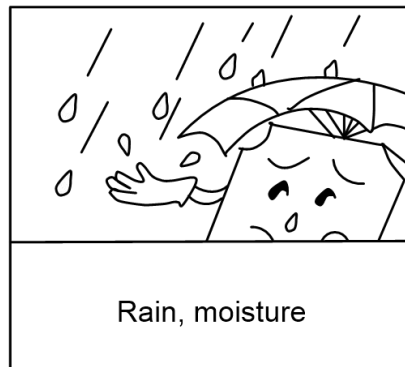
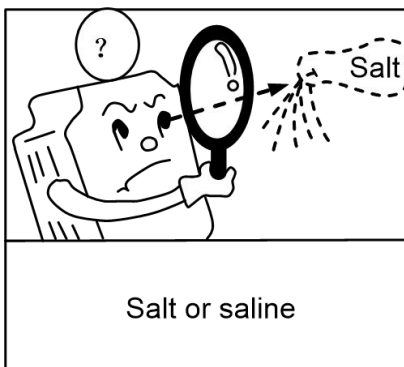
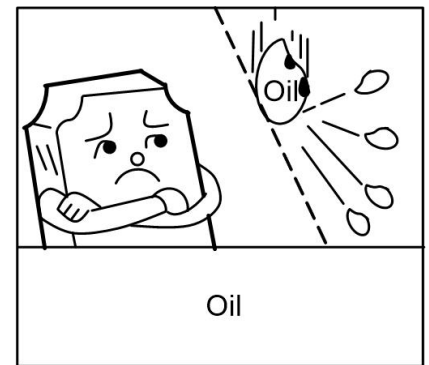
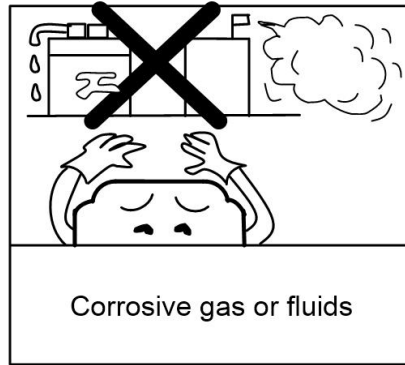
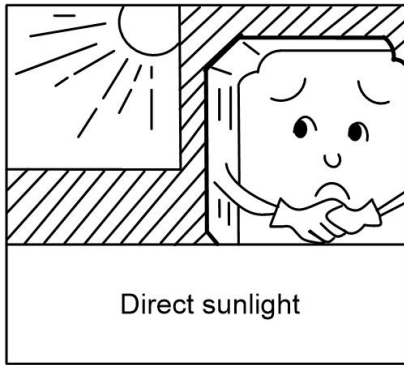
- Ambient temperature for operating the inverter shall be  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  and 90%RH no condensation.
- After removing the cover, ambient temperature for operating the inverter shall be  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  and 95%RH no condensation, the ambient environment must be without drips of water or metal dust. If it was, the cover shall be set and check ambient temperature is within  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ .

### Disposal precaution

**⚠ CAUTION**

- Explosion may occur when burning the electrolytic capacitor of the main circuit and printing plate. Toxic gas may be generated when burning control panel and other plastic fittings.  
It shall be treated as Industrial waste when disposing of it.

## 1.2 Notes for Operation Environment





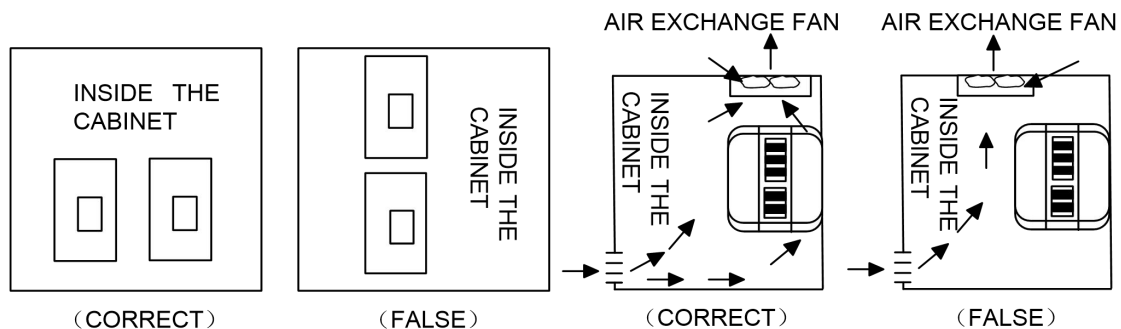
## **2 HARDWARE DESCRIPTION AND INSTALLATION**

### **2.1 Operational Environment**

Since operation environment can directly influence functions and operation life, to ensure proper performance and long operation, follow the recommendations below when choosing allocation for installing the inverter:

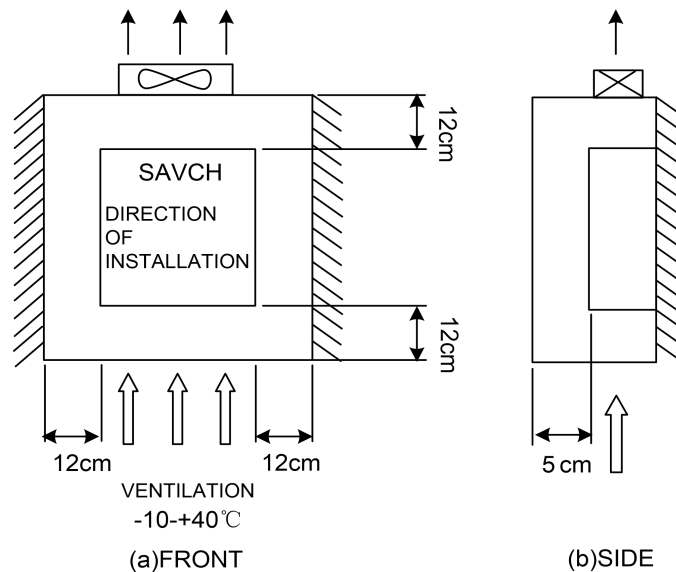
- Use only with the ambient temperature range:-10℃ to + 40℃; -10℃ to + 50℃ applicable when dust cover is removed.
- Rain, moisture
- Direct sunlight.(Avoid using outdoors)
- Corrosion of oil sprays or salt
- Corrosive fluid and methane
- Dust or batting and metallic particles in the air
- Radioactive materials and inflammable materials
- Electromagnetic interference (Avoid using together with welding machine or dynamic machines.)
- Vibration. (If inverter must be used in this environment, an anti vibration pad is necessary).

Attention shall be attached to clearance of inverters allocated closely. A fan shall be installed to make sure temperature is lower than 40℃



For cooling off, face shall be toward front and upper parts shall be upwards.

Clearance shall meet the following specifications:




## 2.2 Model Description

Model →

Input power supply Spec →

Output power supply Spec →

Output frequency →




**TYPE: S3100E-4T7.5G/11P**    **CE**


**SOURCE: AC 3PH 380~460V 50/60Hz**

**OUTPUT: 3PH 0~460V 13kVA 17/21.7A**

**FREQUENCY RANGE: 0~500Hz**

S/N:  NJ3019380000037

Designed by Savch Electric  
SAVCH ELECTRIC CO.,LTD.



| <u>S</u> | <u>3100E</u>   | <u>- 4T</u>   | <u>7.5G/11P</u> |  |   |
|----------|----------------|---|-----------------|--|---|
| SAVCH    | Product series | Input power souece:<br>2T: 3ph 220V<br>(Note: 2T2.2G or below<br>with compatibility of<br>single phase)<br>4T: 3ph 440V |                 | 0.4: 0.4kW<br>0.75: 0.75kW<br>1.5: 1.5kW<br>2.2: 2.2kW<br>4.0: 4.0kW<br>5.5: 5.5kW<br>7.5: 7.5kW<br>11: 11kW<br>15: 15kW<br>18.5: 18.5kW<br>22: 22kW<br>30: 30kW<br>37: 37kW<br>45: 45kW<br>55: 55kW<br>75: 75kW<br>90: 90kW | 110: 110kW<br>132: 132kW<br>160: 160kW<br>185: 185kW<br>200: 200kW<br>220: 220kW<br>250: 250kW<br>280: 280kW<br>315: 315kW<br>350: 350kW<br>400: 400kW<br>450: 450kW<br>500: 500kW<br>560: 560kW<br>630: 630kW<br>G: General<br>P: Light load |

## 2.3 Inverter Specifications

### 2.3.1 Standard Specifications

220V single phase/Three phase Series

| Item           |   |              | specification                 |      |      |      |                       |      |      |
|----------------|---|--------------|-------------------------------|------|------|------|-----------------------|------|------|
| S3100E-2T□□□G  |   |              | 0.4                           | 0.75 | 1.5  | 2.2  | 4.0                   | 5.5  | 7.5  |
| output         | Maximum applicable motor output power(kW) |              | 0.4                           | 0.75 | 1.5  | 2.2  | 4.0                   | 5.5  | 7.5  |
|                | Maximum applicable motor output power(HP) |              | 0.5                           | 1    | 2    | 3    | 5.4                   | 7.4  | 10   |
|                | Output rated capacity(kVA)                |              | 1.1                           | 1.5  | 2.7  | 3.7  | 6.5                   | 9.5  | 12.2 |
|                | Output rated current(A)                   |              | 2.3                           | 4.0  | 7.0  | 9.6  | 17.0                  | 25   | 32   |
|                | Output frequency range                    |              | 0~500Hz                       |      |      |      |                       |      |      |
|                | Overload capacity                         |              | 150%-60s                      |      |      |      |                       |      |      |
|                | Max output voltage                        |              | same to input voltage         |      |      |      |                       |      |      |
| input          | Voltage,Frequency                         |              | 200~240V. 50/60Hz             |      |      |      |                       |      |      |
|                | Voltage frequency variations              |              | voltage:±15%    frequency:±5% |      |      |      |                       |      |      |
|                | Input current(A)                          | single phase | 5.4                           | 8.2  | 14.2 | 23   | no single phase input |      |      |
|                |   | three phase  | 3.1                           | 5.0  | 7.7  | 11.1 | 22.2                  | 31.5 | 42.7 |
| cooling method |   |              | fan cooling                   |      |      |      |                       |      |      |

| Item           |   |              | specification              |      |      |      |      |      |     |     |
|----------------|---|--------------|----------------------------|------|------|------|------|------|-----|-----|
| S3100E-2T□□□G  |   |              | 11                         | 15   | 18.5 | 22   | 30   | 37   | 45  | 55  |
| Output         | Maximum applicable motor output power(kW) |              | 11                         | 15   | 18.5 | 22   | 30   | 37   | 45  | 55  |
|                | Maximum applicable motor output power(HP) |              | 15                         | 20   | 25   | 30   | 40   | 50   | 60  | 75  |
|                | Output rated capacity(kVA)                |              | 17.1                       | 22.8 | 28   | 34.6 | 42.7 | 57.1 | 67  | 80  |
|                | Output rated current(A)                   |              | 45                         | 60   | 75   | 91   | 112  | 150  | 176 | 210 |
|                | Output frequency range                    |              | 0~500Hz                    |      |      |      |      |      |     |     |
|                | Overload capacity                         |              | 150%-60s                   |      |      |      |      |      |     |     |
|                | Max output voltage                        |              | Same to input voltage      |      |      |      |      |      |     |     |
| Input          | Voltage,Frequency                         |              | 200~240V. 50/60Hz          |      |      |      |      |      |     |     |
|                | Voltage frequency variations              |              | Voltage:±15% frequency:±5% |      |      |      |      |      |     |     |
|                | Input current(A)                          | Single phase | No single phase input      |      |      |      |      |      |     |     |
|                |   | Three phase  | 46.5                       | 62   | 76   | 92   | 113  | 157  | 180 | 214 |
| Cooling method |   |              | Fan cooling                |      |      |      |      |      |     |     |

Three phase 440V Series

| Item                         |   | Specification              |                               |              |             |            |                       |              |              |            |            |
|------------------------------|---|----------------------------|-------------------------------|--------------|-------------|------------|-----------------------|--------------|--------------|------------|------------|
| S3100E -4T□□□G/P             |   | 0.75                       | 1.5                           | 2.2          | 4.0         | 5.5        | 7.5                   | 11           | 15           | 18.5       | 22         |
| Output                       | Maximum applicable motor output power(kW) | 0.75                       | 1.5                           | 2.2          | 4.0         | 5.5        | 7.5                   | 11           | 15           | 18.5       | 22         |
|                              | Maximum applicable motor output power(HP) | 1                          | 2                             | 3            | 5.4         | 7.4        | 10                    | 14.7         | 20           | 24.7       | 29.4       |
|                              | Output rated capacity(kVA)                | 1.9                        | 2.9                           | 3.9          | 6.9         | 9.9        | 13                    | 19.1         | 24.4         | 28.2       | 34.3       |
|                              | Output rated current(A)                   | 2.5<br>(3.2)               | 3.8<br>(4.7)                  | 5.1<br>(6.5) | 9<br>(11.8) | 13<br>(15) | 17<br>(21.7)          | 25<br>(28.5) | 32<br>(35.4) | 37<br>(42) | 45<br>(60) |
|                              | Output frequency range                    | 0～500Hz                    |                               |              |             |            |                       |              |              |            |            |
|                              | Overload capacity                         | G type:150%-60seconds      |                               |              |             |            | P type:120%-60seconds |              |              |            |            |
|                              | Max output voltage                        | Same to input voltage      |                               |              |             |            |                       |              |              |            |            |
|                              | Input                                     | Phase,voltage,Frequency    | Three phase·380-460V ·50/60Hz |              |             |            |                       |              |              |            |            |
| Voltage frequency variations |   | Voltage:±15% Frequency:±5% |                               |              |             |            |                       |              |              |            |            |
| Input current(A)             |   | 3.4                        | 5.0                           | 5.8          | 10.5        | 15         | 20.5                  | 26           | 35           | 38         | 46         |
| Cooling method               |   | Fan cooling                |                               |              |             |            |                       |              |              |            |            |



| Item            |   | Specification                 |            |             |              |              |                       |              |              |              |
|-----------------|---|-------------------------------|------------|-------------|--------------|--------------|-----------------------|--------------|--------------|--------------|
| S3100E-4T□□□G/P |   | 30                            | 37         | 45          | 55           | 75           | 90                    | 110          | 132          | 160          |
| Output          | Maximum applicable motor output power(kW) | 30                            | 37         | 45          | 55           | 75           | 90                    | 110          | 132          | 160          |
|                 | Maximum applicable motor output power(HP) | 40                            | 50         | 60          | 74           | 100          | 120                   | 147          | 176          | 214          |
|                 | Output rated capacity(kVA)                | 45.7                          | 57.1       | 68.6        | 83.8         | 114.3        | 134                   | 160          | 191          | 229          |
|                 | Output rated current(A)                   | 60<br>(75)                    | 75<br>(85) | 90<br>(110) | 110<br>(152) | 152<br>(176) | 176<br>(210)          | 210<br>(253) | 253<br>(304) | 304<br>(340) |
|                 | Output frequency range                    | 0～500Hz                       |            |             |              |              |                       |              |              |              |
|                 | Overload capacity                         | G type:150%-60seconds         |            |             |              |              | P type:120%-60seconds |              |              |              |
|                 | Max output voltage                        | same to input voltage         |            |             |              |              |                       |              |              |              |
| Input           | Phase,voltage,Frequency                   | Three phase·380-460V ·50/60Hz |            |             |              |              |                       |              |              |              |
|                 | Voltage frequency variations              | Voltage:±15% Frequency:±5%    |            |             |              |              |                       |              |              |              |
|                 | Input current(A)                          | 62                            | 76         | 92          | 113          | 157          | 180                   | 214          | 256          | 308          |
| Cooling method  |   | Fan cooling                   |            |             |              |              |                       |              |              |              |

### Three phase 440V Series

| Item            |   | Specification                 |              |              |              |                       |              |              |              |
|-----------------|---|-------------------------------|--------------|--------------|--------------|-----------------------|--------------|--------------|--------------|
| S3100E-4T□□□G/P |   | 185                           | 200          | 220          | 250          | 280                   | 315          | 355          | 400          |
| Output          | Maximum applicable motor output power(kW) | 185                           | 200          | 220          | 250          | 280                   | 315          | 355          | 400          |
|                 | Maximum applicable motor output power(HP) | 247                           | 267          | 294          | 334          | 374                   | 420          | 470          | 530          |
|                 | Output rated capacity(kVA)                | 259                           | 290          | 316          | 358          | 396                   | 445          | 500          | 565          |
|                 | Output rated current(A)                   | 340<br>(377)                  | 377<br>(426) | 426<br>(465) | 465<br>(520) | 520<br>(585)          | 585<br>(650) | 650<br>(725) | 725<br>(820) |
|                 | Output frequency range                    | 0~500Hz                       |              |              |              |                       |              |              |              |
|                 | Overload capacity                         | G type:150%-60seconds         |              |              |              | P type:120%-60seconds |              |              |              |
|                 | Max output voltage                        | same to input voltage         |              |              |              |                       |              |              |              |
| Input           | Phase,voltage,Frequency                   | Three phase·380-460V ·50/60Hz |              |              |              |                       |              |              |              |
|                 | Voltage frequency variations              | Voltage:±15% Frequency:±5%    |              |              |              |                       |              |              |              |
|                 | Input current(A)                          | 345                           | 382          | 430          | 470          | 525                   | 590          | 655          | 730          |
| Cooling method  |   | Fan cooling                   |              |              |              |                       |              |              |              |

| Item            |   | Specification                 |     |                       |      |
|-----------------|---|-------------------------------|-----|-----------------------|------|
| S3100E-4T□□□G/P |   | 450                           | 500 | 560                   | 630  |
| Output          | Maximum applicable motor output power(kW) | 450                           | 500 | 560                   | 630  |
|                 | Maximum applicable motor output power(HP) | 600                           | 660 | 755                   | 840  |
|                 | Output rated capacity(kVA)                | 630                           | 700 | 785                   | 871  |
|                 | Output rated current(A)                   | 820<br>(860)                  | 860 | 1040                  | 1180 |
|                 | Output frequency range                    | 0～500Hz                       |     |                       |      |
|                 | Overload capacity                         | G type:150%-60seconds         |     | P type:120%-60seconds |      |
|                 | Max output voltage                        | same to input voltage         |     |                       |      |
| Input           | Phase,voltage,Frequency                   | Three phase·380-460V ·50/60Hz |     |                       |      |
|                 | Voltage frequency variations              | Voltage:±15% Frequency:±5%    |     |                       |      |
|                 | Input current(A)                          | 825                           | 865 | 1045                  | 1185 |
| Cooling method  |   | Fan cooling                   |     |                       |      |

### 2.3.2 General Specification

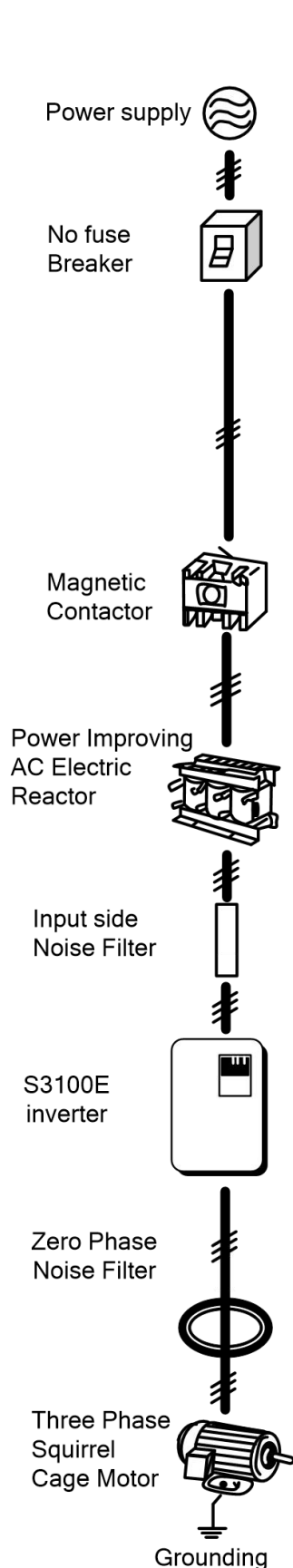
| Item                     |                                     |                     | Detailed information   |
|--------------------------|-------------------------------------|---------------------|--|
| Control characteristic   | Control mode                        |                     | V/f control, open loop vector control, torque control  |
|                          | range of output frequency           |                     | 0~500.00Hz(V/f highest 3200.0Hz)   |
|                          | Frequency setting resolution        |                     | 0.01 Hz  |
|                          | Output Frequency setting resolution |                     | 0.01 Hz  |
|                          | PWM carrier frequency               |                     | adjust from 0.5khz to 12khz  |
|                          | Torque boost                        |                     | open loop vector control(SVC):G type:0.5Hz/150%, P type:0.5 Hz/120%  |
|                          | V/f curve                           |                     | Three types:line, multi-point. Nth power V/f curve (1.2th power,1.4 <sup>th</sup> power,1.6 <sup>th</sup> power,1.8 <sup>th</sup> power,2th power)   |
|                          | V/f separation                      |                     | two types:full separation, semi-separation   |
|                          | Jump frequency                      |                     | adjust from 0.1hz to 500.00hz  |
|                          | Acceleration/deceleration time      |                     | 0.00 to 65000 seconds (4-stage acceleration/deceleration time is set independently), linear or S-curve acceleration/deceleration mode.   |
|                          | Over current stall prevention level |                     | Can be set according to the motor load characteristics with 100~200% of the rated current of the driver  |
|                          | DC brake                            |                     | When stopping, it can be operated from 0.00 to the maximum operating frequency, and the braking current is 0 to 100% of the rated current; Start time 0-100.0 seconds, stop time 0-100.0 seconds.  |
|                          | Brake torque                        |                     | 20% (external optional brake resistor can reach 125%) (1-30HP brake transistor built-in, 40HP and above can be connected to the external brake unit module)  |
|                          | Speed ratio                         |                     | open loop vector control:1:100   |
| operation characteristic | Frequency setting signal            | bit operation board | set by     |
|                          |                                     | external terminal   | 0-10VDC, 4-20mADC, Serial communication(RS485)   |
|                          | Operation signal                    | bit operation board | Available to be operated by RUN,STOP,JOG keys  |
|                          |                                     | external terminal   | 2-wire / 3-wire operation, jog operation, serial communication (RS485)   |
|                          | Input terminal of multi-function    |                     | Forward and reverse running, three-wire operation control, Forward and reverse jog running, free stop, reset fault, running pause, external fault input, increment/decrement frequency terminal setting, 16-segment preset speed switching, acceleration/deceleration time switching , frequency source switching, running command switching, PID control, PLC status reset, pause swing frequency, reset swing frequency, prohibit acceleration and deceleration, disable torque control, calculator function, length count, frequency increase and decrease setting clear, high speed pulse frequency , stop DC braking, frequency modification enable, speed control and torque control switching, clear running time of this time. |
|                          | Output terminal of multi-function   |                     | Inverter operation, fault output, frequency level detection FDT output, frequency arrival, zero speed operation, overload pre-alarm, count value arrival, length arrival, PLC cycle completion, cumulative running time arrival, frequency limitation, torque limit Ready to run, AVI1>AVI2, upper   |

| Item                     |                                   | Detailed information  |
|--------------------------|-----------------------------------|---|
|                          |                                   | limit frequency arrival, lower limit frequency arrival (operation related), undervoltage status output, communication setting, cumulative power-on time arrival, frequency arrival output, timing arrival output, offload, reverse In operation, the zero current state, the module temperature reaches, the output current exceeds the limit, the lower limit frequency arrives (the stop is also output), the alarm output (continues to run), and the running time arrives.  |
|                          | Analog signal output              | Corresponding to the actual output frequency, output current, output voltage, etc.  |
|                          | Fault signal contact              | Contact "ON" (one "C" contact relay or two open collector outputs when the AC drive fails)  |
| Inner function           |                                   | Output frequency upper and lower limit setting, instantaneous power failure restart, abnormal fault restart, speed tracking<br>Simple PLC, multi-speed operation, PID control, timing control<br>Automatic regulated output regulation<br>Abnormal record, parameter lock, parameter factory reset<br>Reverse rotation prohibited, overcurrent stall prevention, overvoltage stall prevention, electronic thermal relay   |
| Protection function      |                                   | Short circuit protection, acceleration over current, deceleration over current, constant speed over current, acceleration over voltage, deceleration over voltage, constant speed over voltage, bus undervoltage fault, motor overload, inverter overload, over torque protection, loss phase on the input (7.5G/11P and above), loss phase on the output, module overheating, external fault, communication fault, current detection fault, motor self-learning fault, parameter read and write abnormality, inverter hardware abnormality, motor short circuit to ground, running time arrival, the power-on time arrives, the load dropped, the PID feedback disconnected, and the fast current limit timeout. |
| Number of part on keypad |                                   | Contains 8 function keys, 5-digit 8-segment LED display, 7 status indicator LED lights Can set the frequency, display the actual output frequency, output current, user-defined unit Parameter browsing and modification settings and parameter locking, abnormal fault display Executable operation, stop, reset, forward/reverse, jogging   |
| environment              | Operation temperature             | -10℃to +50℃(+40℃~+50℃ Below 90%RH, No condensation)   |
|                          | Temperature of stock              | -20℃ to +60℃  |
|                          | Humidity of operation environment | Below 90%RH, No condensation  |
|                          | Height of installation            | No more than 1000m in height, no corrosive gas, liquid, dust  |
|                          | Vibration                         | Below 20Hz 9.80665m/s <sup>2</sup> (1g), 20~50Hz 5.88m/s <sup>2</sup> (0.6g)  |
|                          | Enclosure                         | IP20 (Depending on the end customer's installation environment)   |

Note: The instantaneous power failure compensation time varies due to the inverter capacity. If a long instantaneous power failure time is required, the external "instantaneous power failure compensation device" can be added.

# Inverter Using and the Main Circuit Wiring, the Basic Wiring Diagram

## Peripheral Equipment Application and Precautions



### Power:

- Use the power supply in the permissible specifications of the inverter model to avoid damaging the drive.

### No fuse circuit breaker(MCCB):

- A non-fuse circuit breaker (MCCB) must be installed between the AC power supply and the inverter, but do not use it as inverter's operation / stop switching function.
- Use a non-fuse circuit breaker (MCCB) that complies with the rated voltage and current rating of the inverter. When the capacity is selected, it is at least 2 times the sum of the rated output current of the inverter (mainly considering 150% of the inverter overload, 1min).

### Leakage circuit breaker(RCD/ELCB):

- Please install the leakage circuit breaker, to prevent leakage caused by the malfunction and to protect the safety of the use of personnel;
- Each inverter should use a dedicated circuit breaker whose sensitive current is more than 30mA;
- When using an ordinary circuit breaker, the current sensitivity must be more than 200mA, operation Time must be more than 0.1s.

### Electromagnetic contactor:

- Normally, there is no need to add electromagnetic contactor, but it can be used as an external control protection, automatic restart after power failure and other functions, must install electromagnetic contactor.
- When using the brake unit, please connect to the thermal relay contact of the brake unit, close the electromagnetic contactor when overheating;
- Do not use the electromagnetic contactor as the inverter's operation / stop switching function, which will shorten the life of the inverter.

### Power Improvement AC Reactor:

- If a large capacity (500KVA or more) is used for the inverter, an excessive peak current may flow into the input side of the inverter, and the rectifier element may be damaged. In this case, the AC reactor can also improve the power factor on the power supply side.

### Input side noise filter:

- It is possible to remove the noise from the power supply line into the inverter and to reduce the noise from the inverter to the power supply line.
- When there is an inductive load around the inverter, please ensure to install it.

### Inverter:

- Input power terminals R / L1, S / L2, T / L3 are connected without any phase sequence.
- The output terminals U / T1, V / T2, W / T3 are connected to the U / T1, V / T2, W / T3 terminals of the motor. If the inverter is running forward, the motor is reversed. / T2, W / T3 terminal in any two can be adjusted.
- Do not connect output terminals U, V, W to AC power to avoid damage to the inverter.
- Ground terminal should be properly grounded, 220V level: grounding resistance should be below 100  $\Omega$ , 440V class: grounding resistance should be 10  $\Omega$  or less.

### Zero phase filter:

- When you want to reduce the electromagnetic interference caused by the inverter, it is effective in the range of 1MHz ~ 10MHz. The more the number of the motor wires are bypassed, the better. Install as close to the inverter as possible, suitable for either the input side or output side of the inverter.

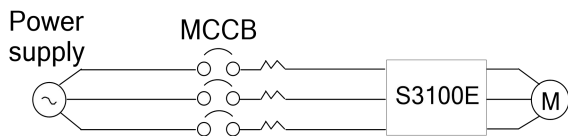


Wiring shall be checked whether correct or not. Peripheral wiring shall fulfill the following requirements.

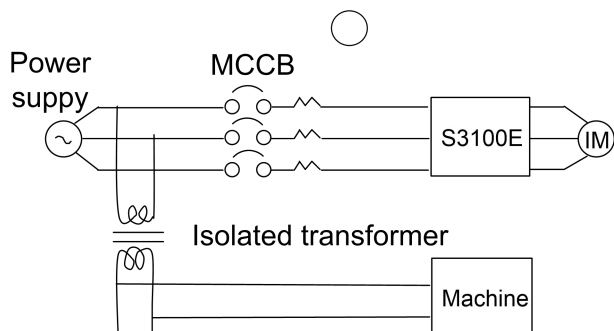
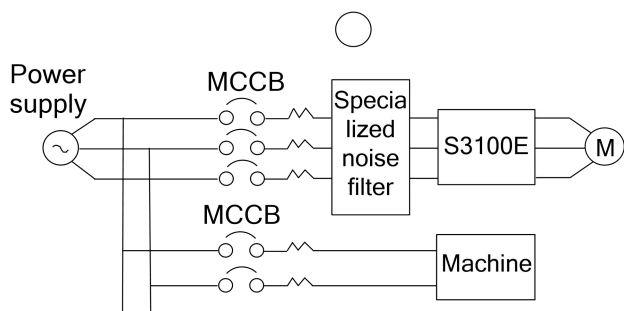
(Warning: Do not use a buzzer of control circuit to check wiring)

**(A) Wiring for control circuit Power supply must be isolated or far from other high voltage wirings or high current power lines, thus electromagnetic interference can be avoided. See diagrams below:**

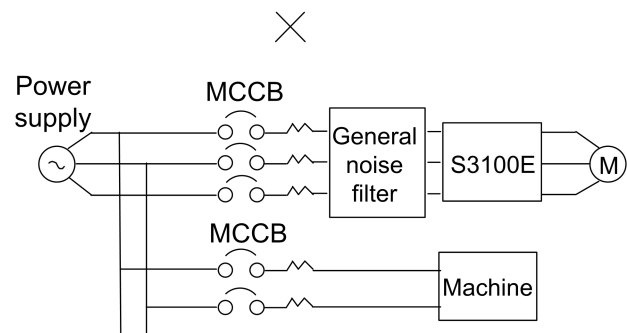
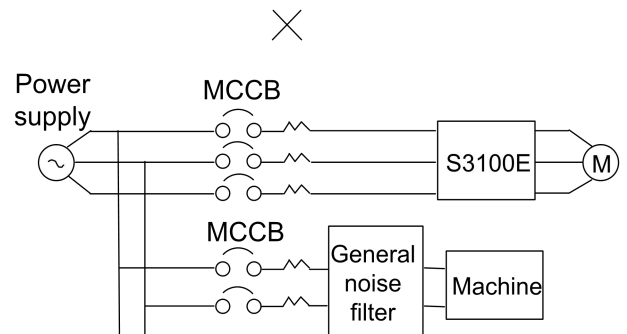
- Individual power supply bridge for inverter



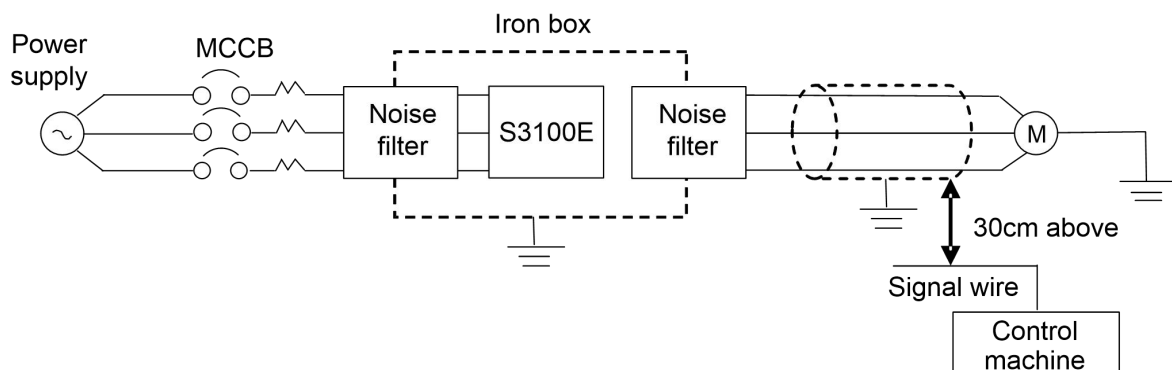
- If inverter power supply circuit is used commonly with other machines, inverter-specialized noise filter or isolating transformer shall be added.



- Good effect may not be received if general use noise filters are applied



- Interference during transmission can be prohibited by adding an inverter-specialized noise filter at main circuit output side. For preventing electromagnetic radiation, a metal tube shall be installed, and distance from signal wiring of other control machines shall be 30cm at least



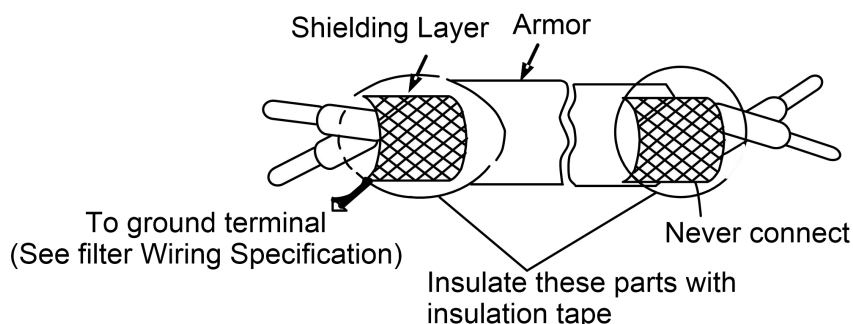
- Voltage drop of wiring shall be considered providing that inverter and motor are with an excessive distance. Voltage drop (V) =  $\sqrt{3} \times \text{wiring resistance } (\Omega/\text{km}) \times \text{wire length (m)} \times \text{current} \times 10^{-3}$ , load wave frequency shall be modified according to wiring prepared.

|  |             |            |            |
|--|-------------|------------|------------|
| Distance between inverter and motor wiring | Below 50M   | Below 100M | Above 100M |
| Allowable carrier frequency                | Below 12kHz | Below 9kHz | Below 6kHz |
| Set value for parameter 00-10              | 12          | 9          | 6          |

**(B)Wiring for control circuit shall be isolated or far from main circuit wiring or other high voltage/current power lines, thus electromagnetic interference shall be avoided.**

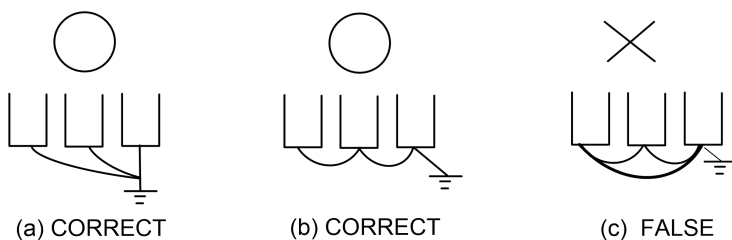
- For preventing electromagnetic interference and false sequence, shielding wiring shall be used for control circuit. Shielding wiring shall connect grounding terminals.

**Distance for wiring shall be 50m or less.**



**(C) Grounding terminal for inverters shall be grounded properly. 220V:below 100Ω, Category III;440V:below 10Ω. Special.**

- AWG shall be taken as electrical equipment technical standard for ground wire. Ground wire shall be as short as possible.
- Never ground simultaneously for Inverter ground wire with other large current load (such as welding machine or large Power motors). They shall be grounded separately.
- Ground circuit shall be avoided when several inverters are grounded simultaneously.



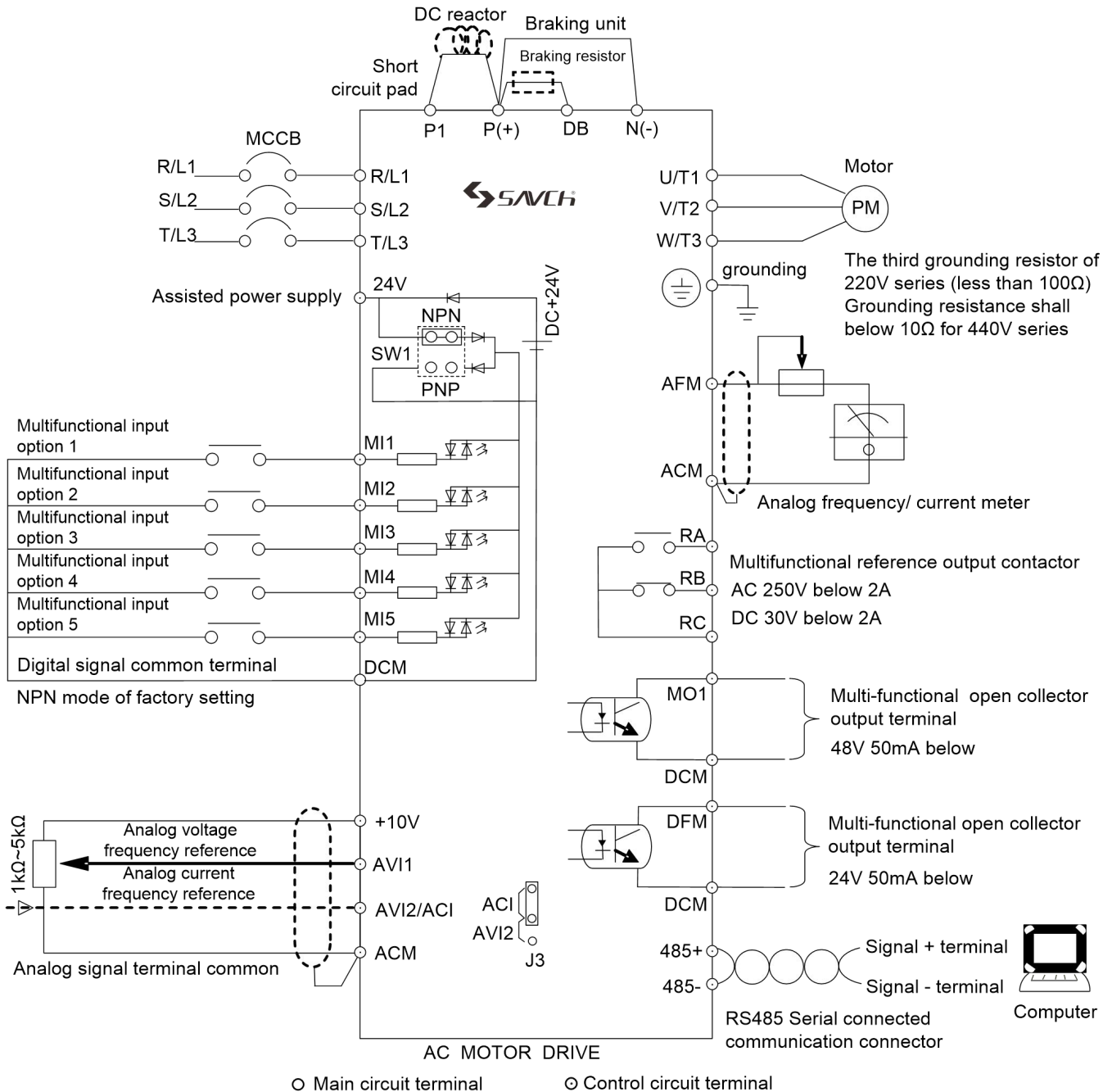
**(D)Cable line width for main circuit and control circuit shall be selected according to power line standard.**

**(E) After completing of grounding and wiring, check for the following items:wiring is proper; wire is not broken and screws are securely locked.**

## 2.4 Basic Wiring Diagram

Wiring of AC motor drive can be divided into two parts, the main circuit and control circuit. After removing the cover, terminals of main circuit and control circuit shall be found. Users must connect terminals as diagram shows.

The following diagram is the standard wiring diagram of S3100E series AC motor driver. If only digital control panel was used, only main circuit terminal wiring applicable.




### Remarks:

1. The external terminal has two AVI inputs (AVI1, AVI2), one of which is shared with ACI and can be switched to each other.
2. Analog current frequency command ACI: It can switch 4~20mA or 0~+10V as input signal according to J3.
3. There are 5 multi-function input terminals (MI1~MI5) in the external terminal, and the configuration input can be selected.
4. The external terminals have 2 open collector outputs (MO1, DFM).
5. The external terminal has one relay output (RA-RB-RC).
6. The power of 22kW and above can be equipped with I/O expansion card: HCA-EIO-AO/MC1, the whole machine realizes 2 analog (voltage/current optional) signals + 2 relay outputs.
7. The DC reactor, braking unit and braking resistor are selected according to the requirements. When using the DC reactor, please remove the short-circuit copper sheet between P1 / P (+) before connecting.

## Main Circuit Terminal Descriptions

### Description for S3100E Series inverter terminals

| Terminal symbols  | Function   |
|---|--|
| R/L1,S/L2,T/L3  | Main circuit AC power supply input (For single phase input, connect R/L1 and T/L3) |
| U/T1, V/T2, W/T3  | connect to motor   |
| P(+),DB   | Braking resistor connecting terminal   |
| P(+),N(-)   | Brake unit connection terminal   |
| P1,P(+)   | External DC reactor  |
|  | For grounding (High voltage wave impact and noise interference shall be avoided.)  |

## Terminal Symbol Description

| Terminal symbols | Function of Terminal                              | Specification   |
|------------------|---|---|
| RA-RC            | Multifunctional reference signal output contactor | See description 06-01 for relay contactor output  |
| RB-RC            | Multifunctional reference signal output contactor |   |
| MI1-DCM          | Multifunctional input option 1                    | See description from 04-00 to 04-05   |
| MI2-DCM          | Multifunctional input option 2                    |   |
| MI3-DCM          | Multifunctional input option 3                    |   |
| MI4-DCM          | Multifunctional input option 4                    |   |
| MI5-DCM          | Multifunctional input option 5                    |   |
| MO1-DCM          | Multifunctional output terminal 1                 | See description 06-07 (Open collector output)   |
| DFM-DCM          | Multifunctional output terminal 2                 | See description of 06-04(DFM(M) multifunction output ) or of 06-06(DFM(P) pulse output) |
| +10V-ACM         | Power supply for speed setting                    | Speed reference power supply (+10V)   |
| AVI1-ACM         | Analog voltage frequency reference                | 0 to +10V/Max. output frequency   |
| AVI2-ACM         | Analog voltage frequency reference                | 0 to +10V/Max. output frequency   |
| ACI-ACM          | Analog current frequency reference                | 4 to +20mA/Max. output frequency  |
| AFM-ACM          | Analog frequency/ current meter                   | 0 to +10V/Max. output frequency   |
| 485+-485-        | Serial connected communication board              | RS485 Serial connected communication connector  |
| 24V -DCM         | Assisted control power supply                     | DC 20V-24V (50mA Max)   |

Please insulate the control signal wire with insulation tape.

Only use double Null Modem from communication cable of RS485.

## 2.5 External Dimensions

### 2.5.1 Inverter Size

| Model               | W   | W1  | W2  | H     | H1    | D     | M   | N   | Fig.    |
|---------------------|-----|-----|-----|-------|-------|-------|-----|-----|---------|
| S3100E-2T0.4G       | 108 | 94  | 94  | 138.1 | 118   | 159.5 | 5   | 5   | Size 1  |
| S3100E-2T0.75G      |     |     |     |       |       |       |     |     |         |
| S3100E-2T1.5G       |     |     |     |       |       |       |     |     |         |
| S3100E-4T0.75G/1.5P |     |     |     |       |       |       |     |     |         |
| S3100E-4T1.5G/2.2P  |     |     |     |       |       |       |     |     |         |
| S3100E-4T2.2G/4.0P  |     |     |     |       |       |       |     |     |         |
| S3100E-2T2.2G       | 130 | 108 | 108 | 209   | 198   | 169.8 | 5   | 5   | Size 2  |
| S3100E-2T4.0G       |     |     |     |       |       |       |     |     |         |
| S3100E-4T4.0G/5.5P  |     |     |     |       |       |       |     |     |         |
| S3100E-4T5.5G/7.5P  |     |     |     |       |       |       |     |     |         |
| S3100E-4T7.5G       |     |     |     |       |       |       |     |     |         |
| S3100E-4T7.5G/11P   | 140 | 122 | 122 | 260   | 248   | 176.6 | 6   | 6   | Size 3A |
| S3100E-4T11G/15P    |     |     |     |       |       |       |     |     |         |
| S3100E-4T15G        |     |     |     |       |       |       |     |     |         |
| S3100E-2T5.5G       | 180 | 160 | 160 | 298   | 284   | 180   | 6.5 | 6.5 | Size 3  |
| S3100E-2T7.5G       |     |     |     |       |       |       |     |     |         |
| S3100E-4T7.5G/11P   |     |     |     |       |       |       |     |     |         |
| S3100E-4T11G/15P    |     |     |     |       |       |       |     |     |         |
| S3100E-4T15G/18.5P  |     |     |     |       |       |       |     |     |         |
| S3100E-4T18.5G/22P  |     |     |     |       |       |       |     |     |         |
| S3100E-4T22G        |     |     |     |       |       |       |     |     |         |
| S3100E-2T11G        | 260 | 176 | 176 | 412   | 397.5 | 203   | 6.5 | 13  | Size 4  |
| S3100E-2T15G        |     |     |     |       |       |       |     |     |         |
| S3100E-2T18.5G      |     |     |     |       |       |       |     |     |         |
| S3100E-4T22G/30P    |     |     |     |       |       |       |     |     |         |
| S3100E-4T30G/37P    |     |     |     |       |       |       |     |     |         |
| S3100E-4T37G/45P    |     |     |     |       |       |       |     |     |         |
| S3100E-2T22G        | 305 | 160 | -   | 460   | 442   | 243   | 7   | 14  | Size 5A |
| S3100E-4T45G/55P    |     |     |     |       |       |       |     |     |         |
| S3100E-2T30G        | 320 | 160 | 230 | 580   | 563   | 280   | 9   | 17  | Size 5  |
| S3100E-2T37G        |     |     |     |       |       |       |     |     |         |
| S3100E-2T45G        |     |     |     |       |       |       |     |     |         |
| S3100E-2T55G        |     |     |     |       |       |       |     |     |         |
| S3100E-4T55G/75P    |     |     |     |       |       |       |     |     |         |
| S3100E-4T75G/90P    |     |     |     |       |       |       |     |     |         |
| S3100E-4T90G/110P   |     |     |     |       |       |       |     |     |         |
| S3100E-4T110G       |     |     |     |       |       |       |     |     |         |
| S3100E-4T110G/132P  | 380 | 160 | -   | 724.2 | 694   | 330.5 | 12  | 22  | Size 6A |
| S3100E-4T132G/160P  |     |     |     |       |       |       |     |     |         |
| S3100E-4T160G       |     |     |     |       |       |       |     |     |         |

| Model                            | W    | W1  | W2  | H    | H1  | D   | M    | N    | Fig.    |
|----------------------------------|------|-----|-----|------|-----|-----|------|------|---------|
| S3100E-4T110G/132P               | 460  | 160 | 160 | 778  | 745 | 340 | 12.5 | 12.5 | Size 6  |
| S3100E-4T132G/160P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T160G                    |      |     |     |      |     |     |      |      |         |
| S3100E-4T185G/200P               | 450  | 160 | 160 | 780  | 746 | 385 | 12   | 25   | Size 7A |
| S3100E-4T200G/220P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T185G/200P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T200G/220P               | 393  | 150 | 150 | 882  | 849 | 413 | 13   | 25   | Size 7  |
| S3100E-4T220G                    |      |     |     |      |     |     |      |      |         |
| S3100E-4T220G/250P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T250G/280P               | 500  | 190 | 190 | 882  | 849 | 414 | 13   | 25   | Size 8  |
| S3100E-4T280G/315P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T315G                    |      |     |     |      |     |     |      |      |         |
| S3100E-4T315G/355P               | 626  | 250 | 250 | 982  | 949 | 408 | 13   | 25   | Size 9  |
| S3100E-4T355G/400P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T400G/450P               |      |     |     |      |     |     |      |      |         |
| S3100E-4T450G/500P               | 737  | 250 | 250 | 982  | 947 | 413 | 13   | 25   | Size 10 |
| S3100E-4T500G                    |      |     |     |      |     |     |      |      |         |
| S3100E-4T560G Integrated machine |      |     |     |      |     |     |      |      |         |
| S3100E-4T630G Integrated machine | 1000 | -   | -   | 2155 | -   | 800 | -    | -    | Size 11 |

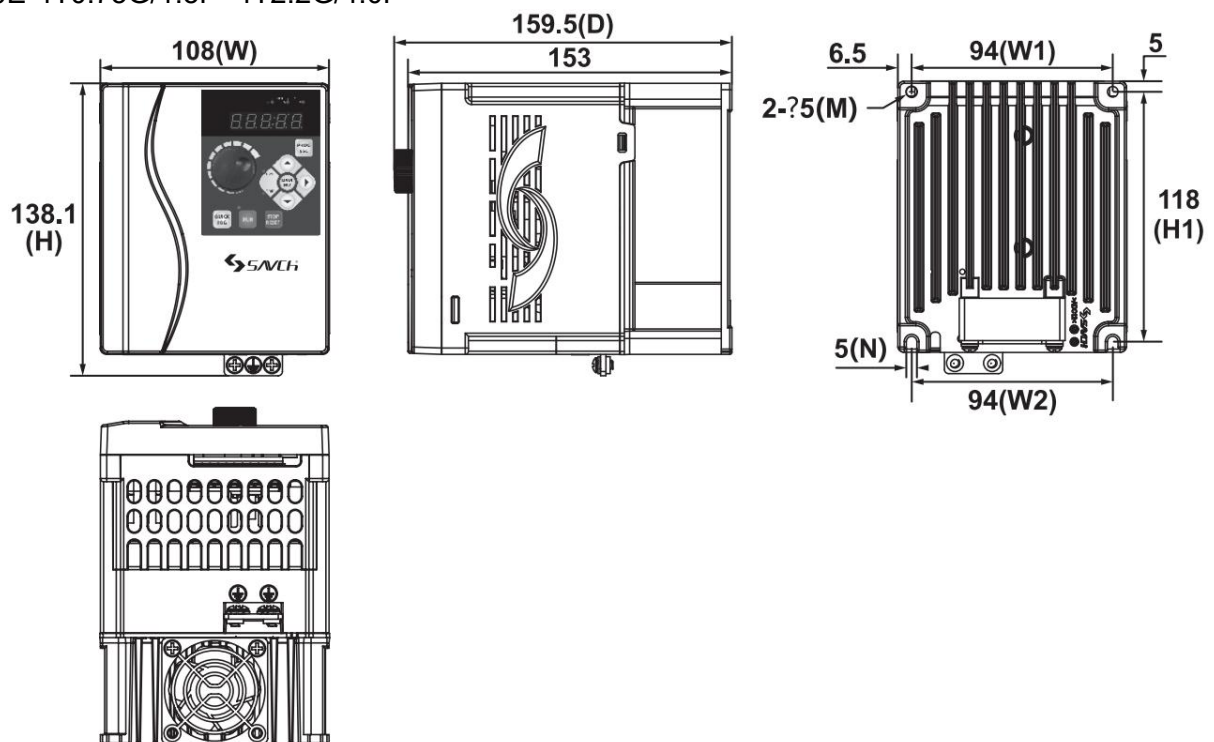
## 2.5.2 External Dimensions of Inverter

### Size 1

Unit:mm

S3100E-2T0.4G~2T1.5G

S3100E-4T0.75G/1.5P~4T2.2G/4.0P

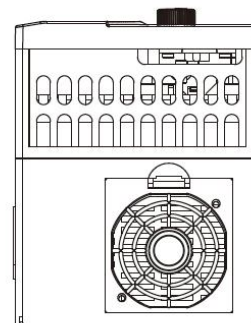
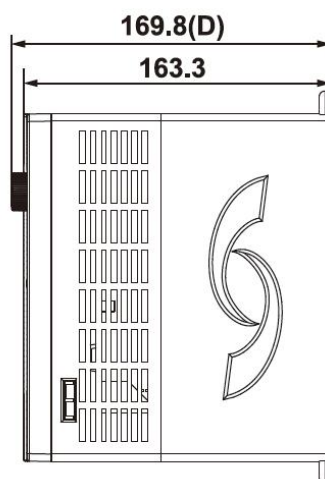
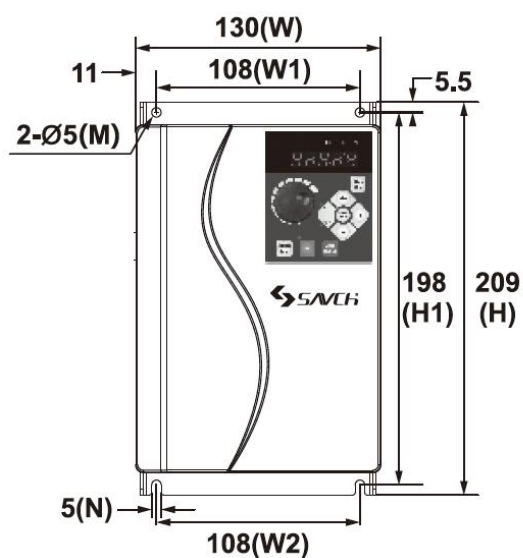


## Size 2

Unit:mm

S3100E-2T2.2G~2T4.0G

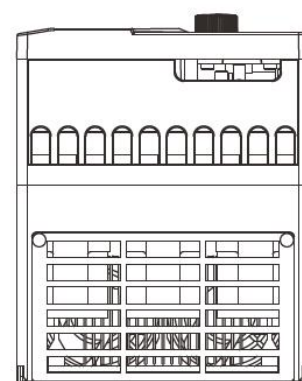
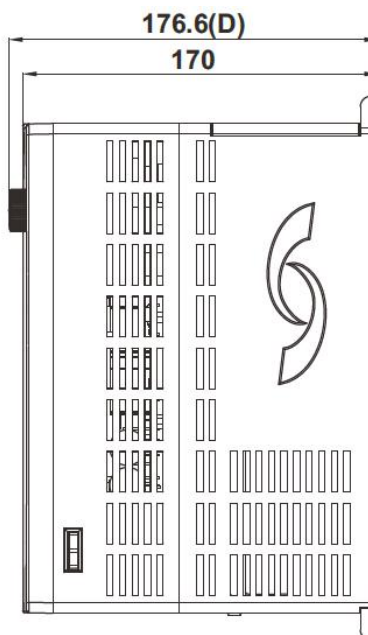
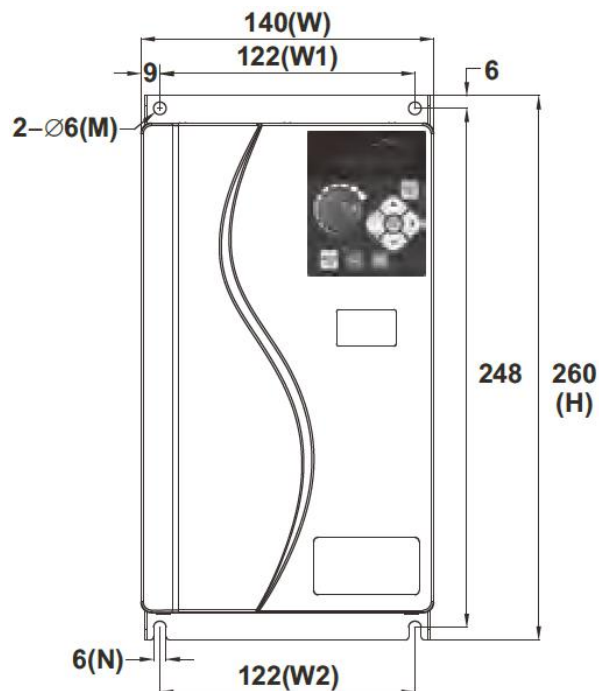
S3100E-4T4.0G/5.5P~4T7.5G



## Size 3A

Unit:mm

S3100E-4T7.5G/11P~4T15G

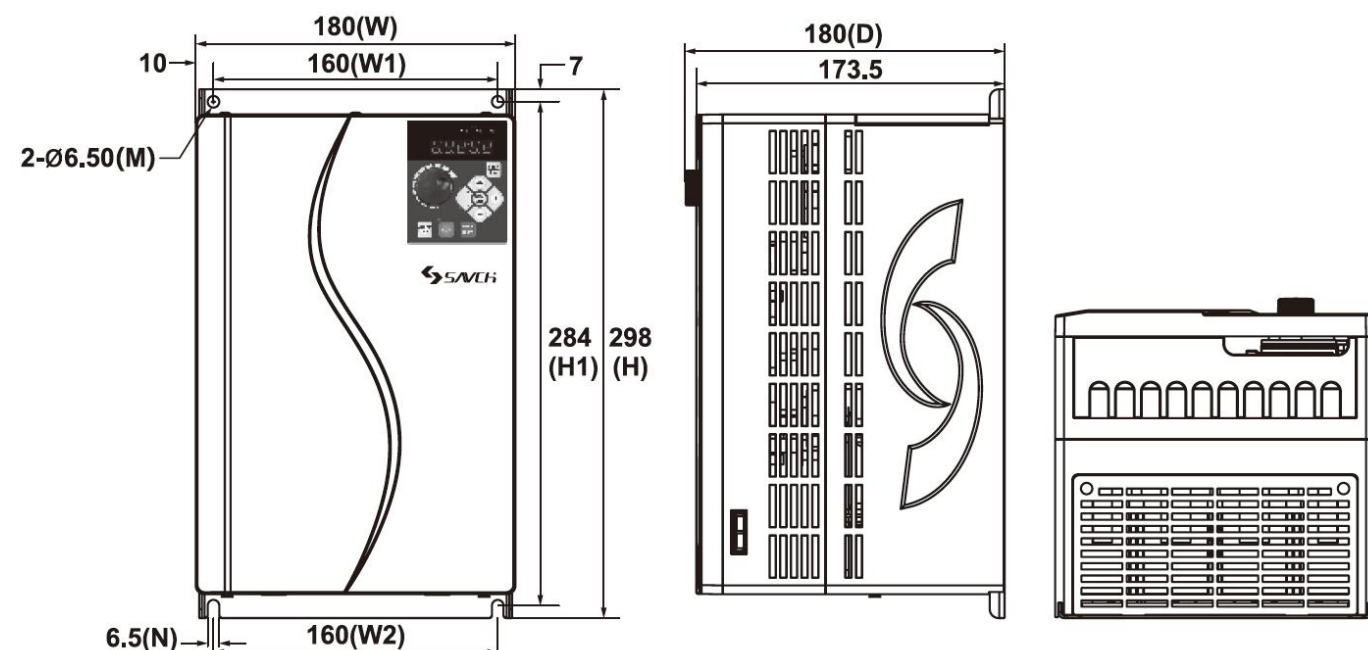


## Size 3

Unit:mm

S3100E-2T5.5G~2T7.5G

S3100E-4T7.5G/11P~4T22G

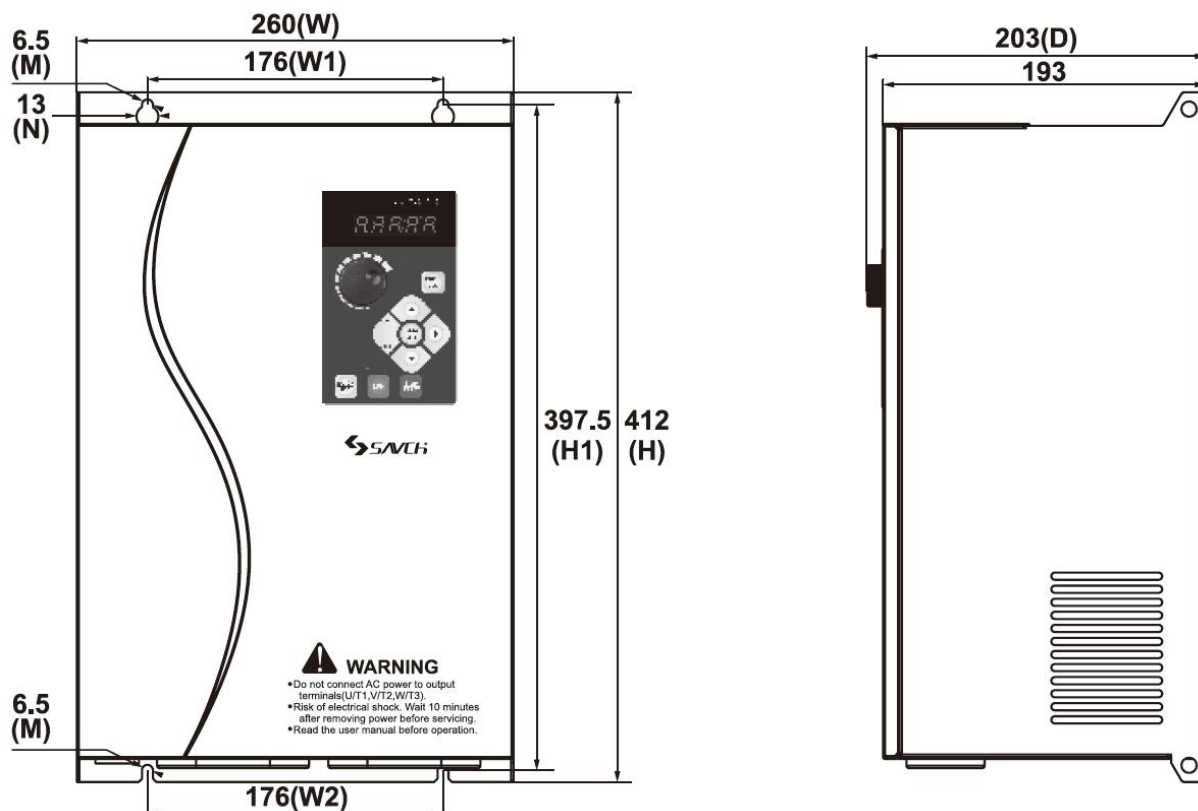


## Size 4

Unit:mm

S3100E-2T11G~2T18.5G

S3100E-4T22G/30P~4T37G/45P



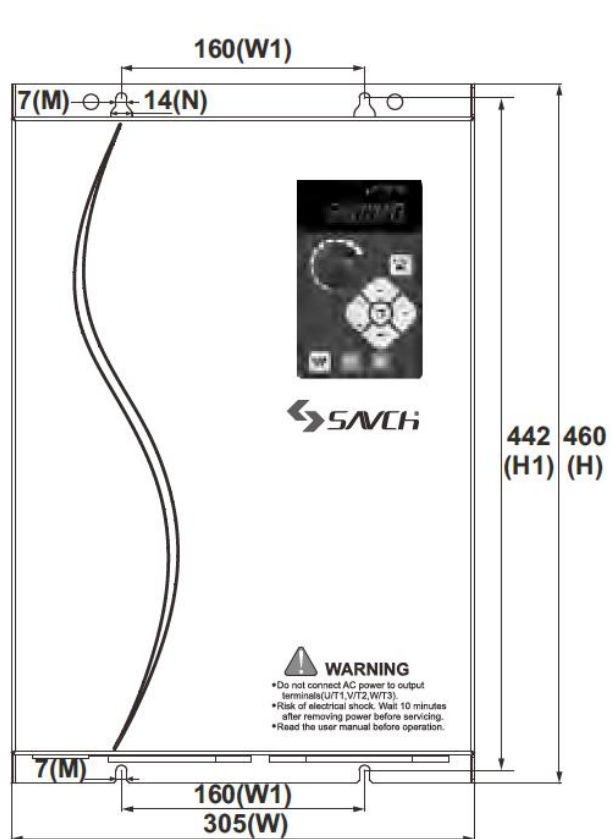


## Size 5A

Unit:mm

S3100E-2T22G

S3100E-4T45G/55P

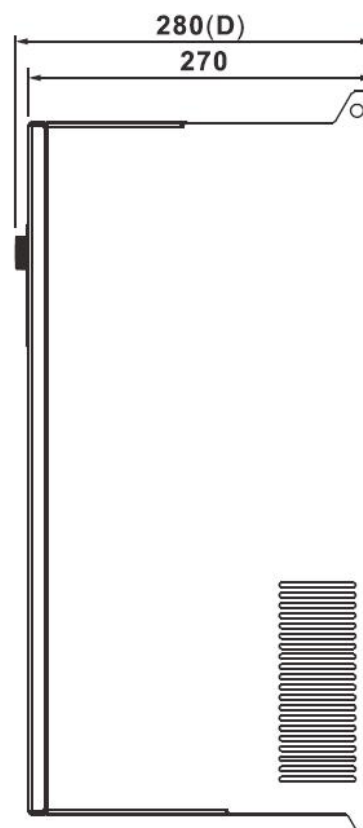
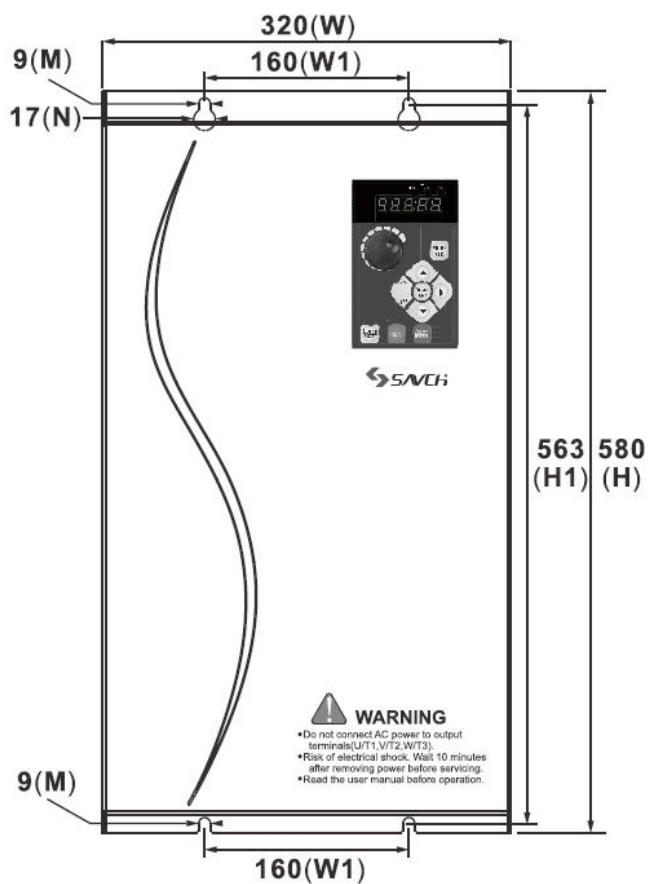


## Size 5

Unit:mm

S3100E-2T30G-2T55G

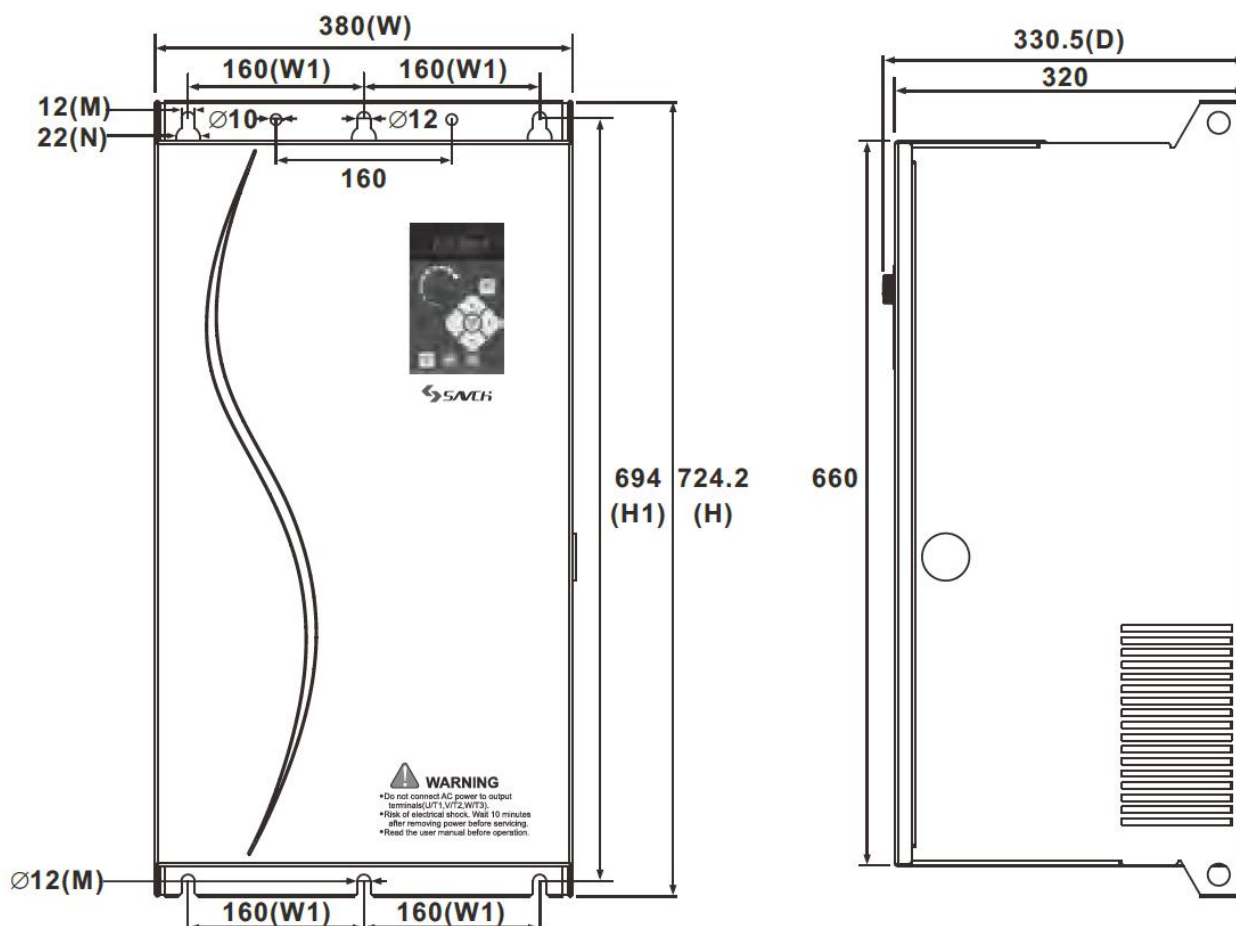
S3100E-4T55G/75P~4T110G



## Size 6A

Unit:mm

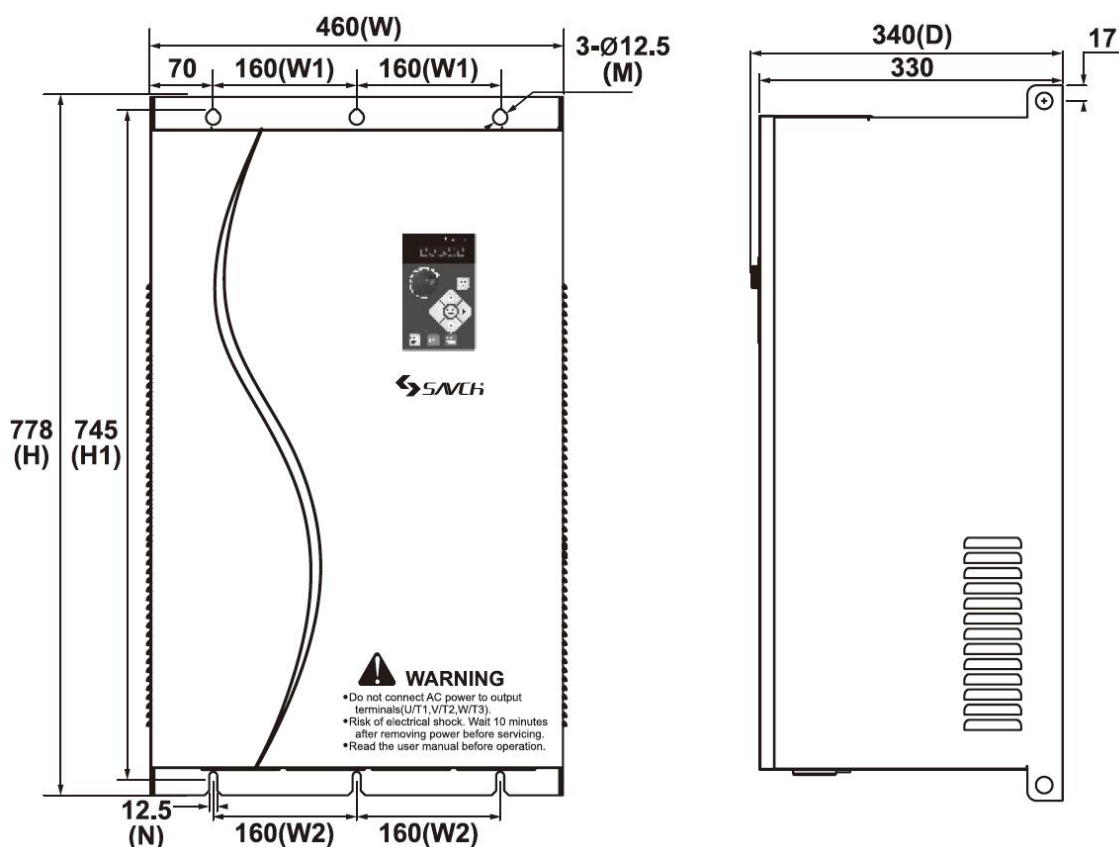
S3100E-4T110G/132P~4T160G



## Size 6

Unit:mm

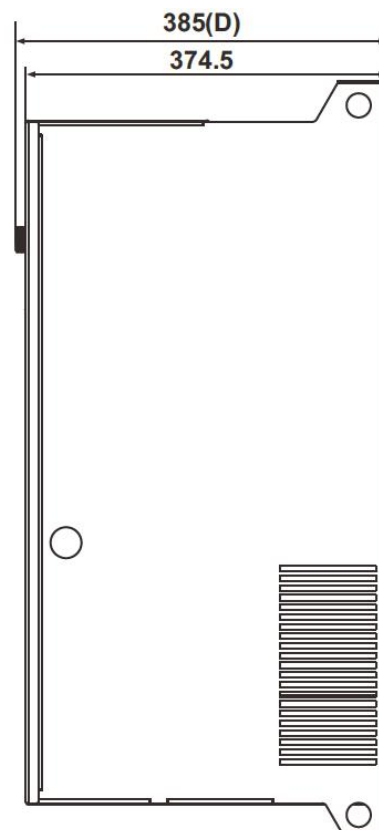
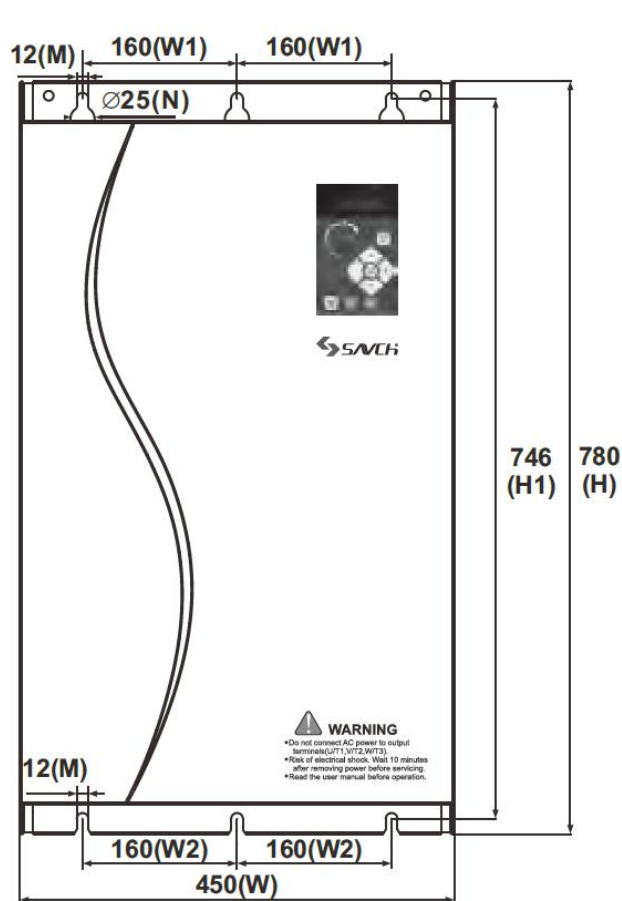
S3100E-4T110G/132P~4T160G



## Size 7A

Unit:mm

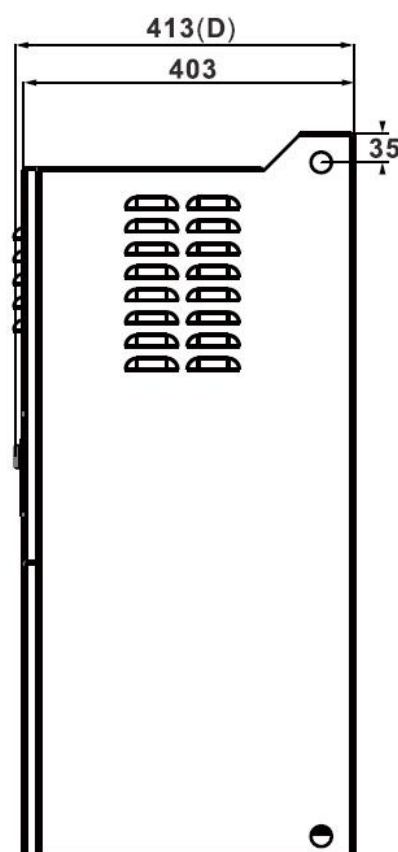
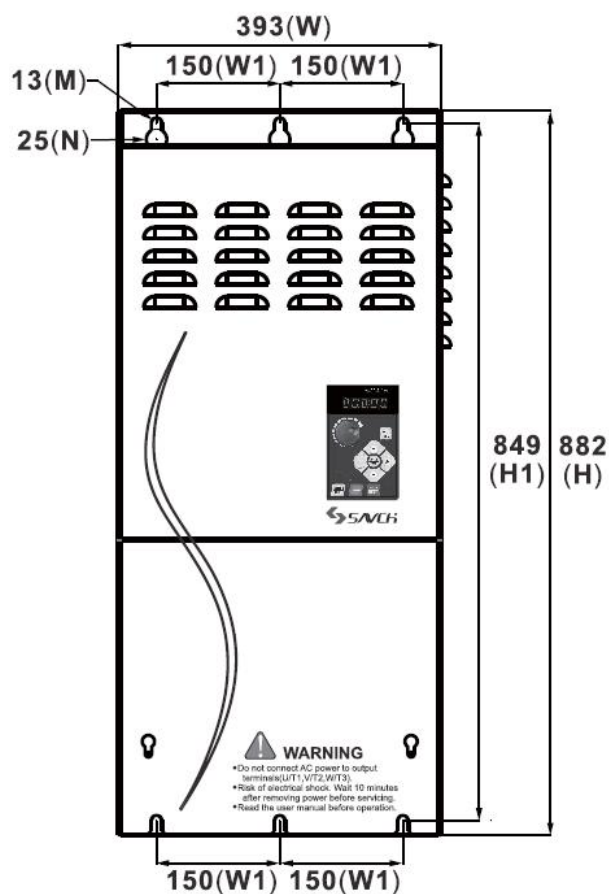
S3100E-4T185G/200P~4T200G/220P



## Size 7

Unit:mm

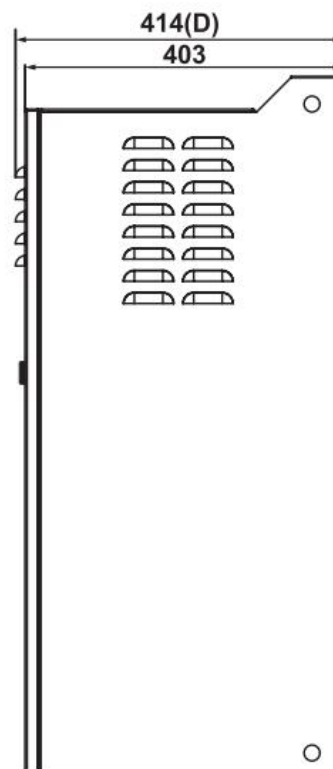
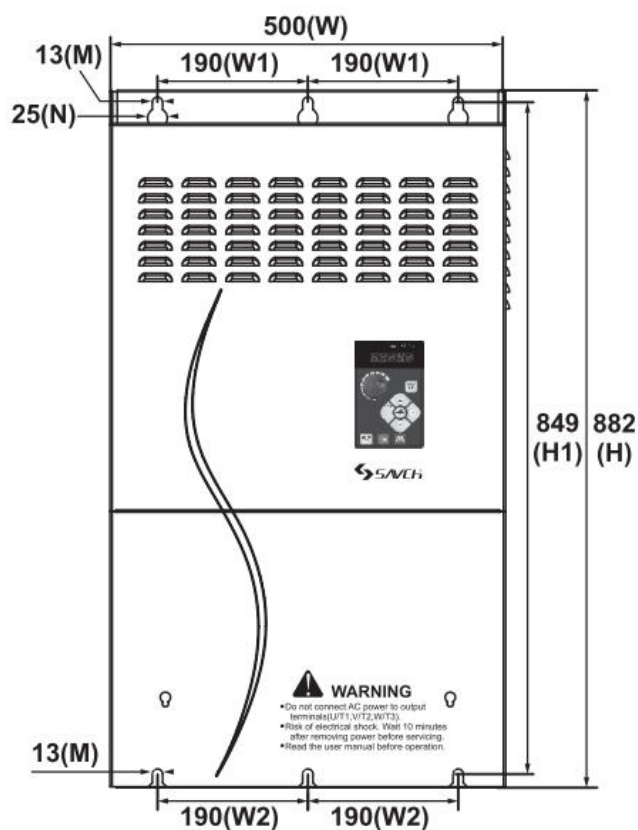
S3100E-4T185G/200P~4T220G



## Size 8

Unit:mm

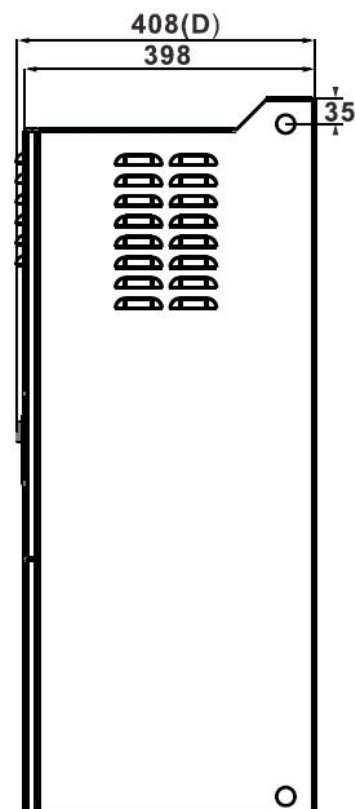
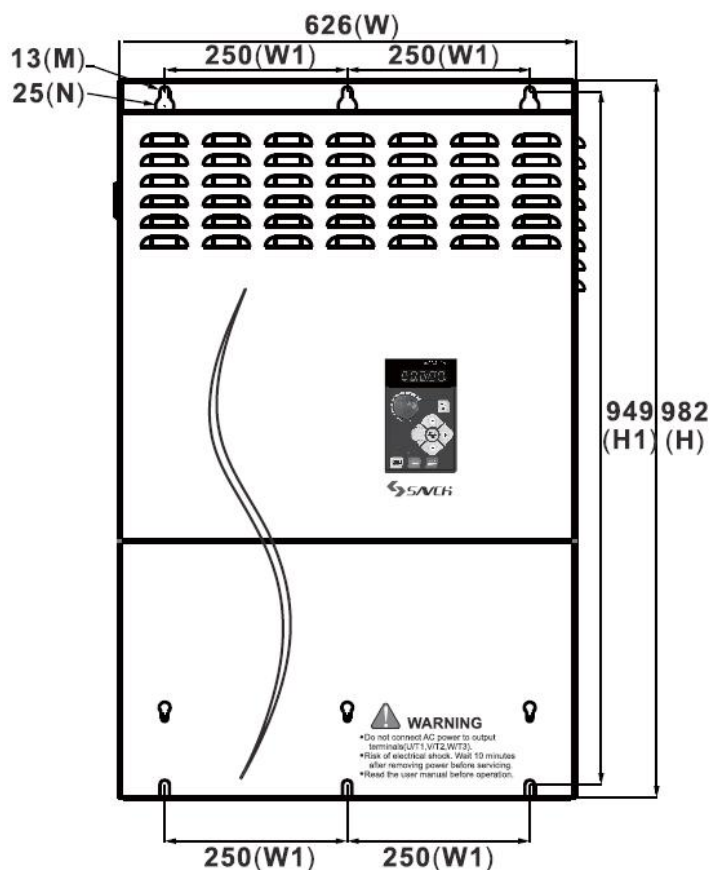
S3100E-4T220G/250P~4T315G



## Size 9

Unit:mm

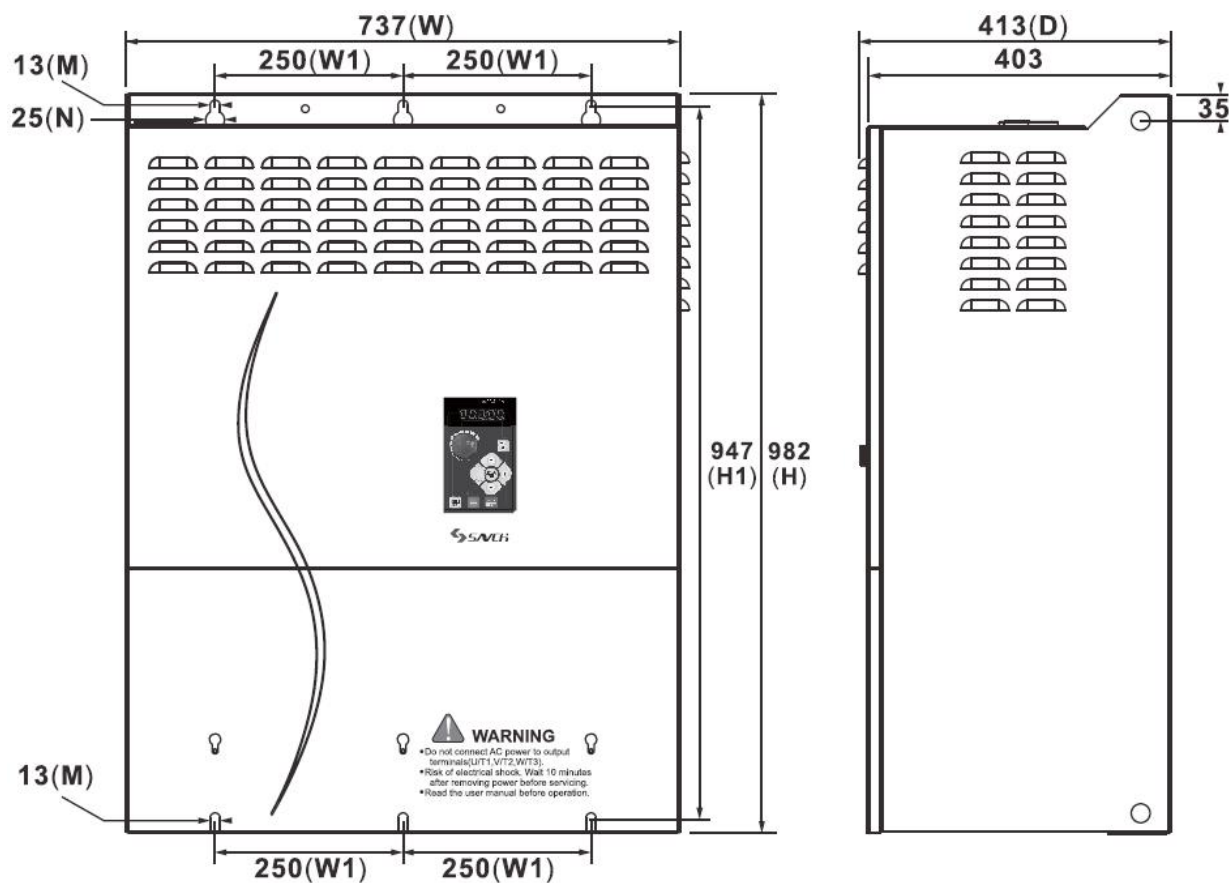
S3100E-4T315G/355P~4T400G/450P



## Size 10

Unit:mm

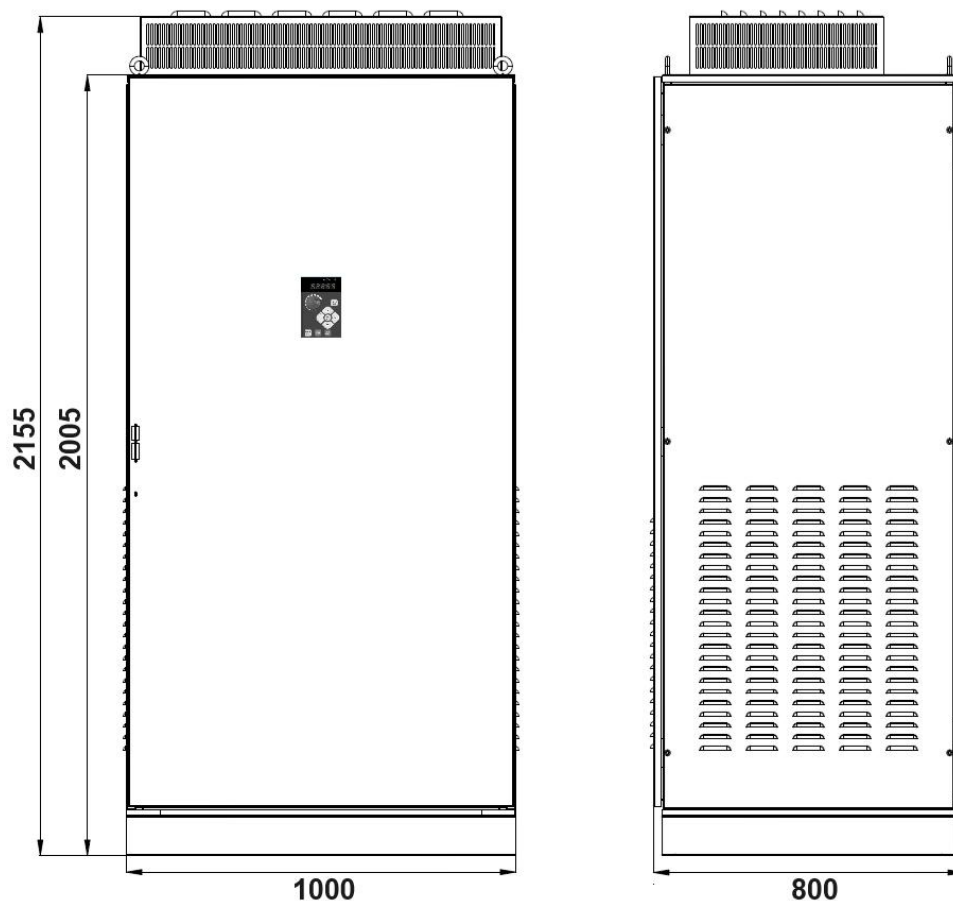
S3100E-4T450G/500P~4T500G



## Size 11

Unit:mm

S3100E-4T560G~4T630G Integrated machine

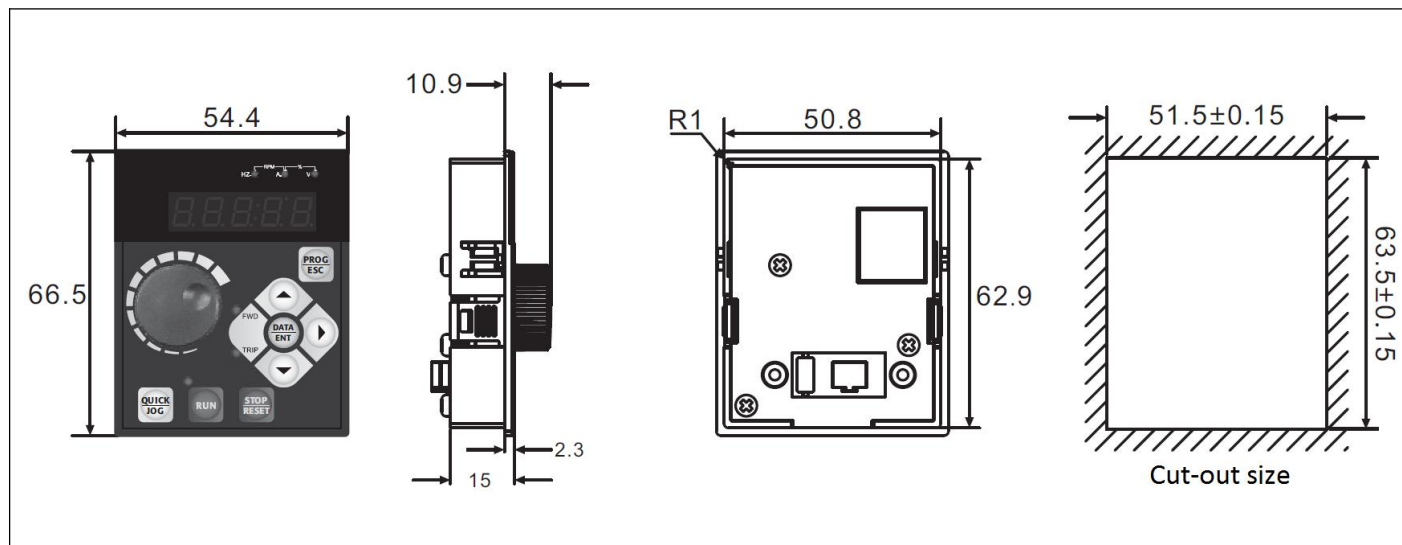


## 2.5.3 Multi-Functions Operation Keypad

- Small power keypad (HCA-OP-A2) external dimensions and Installation dimensions

Below 18.5kW (include 18.5kW)

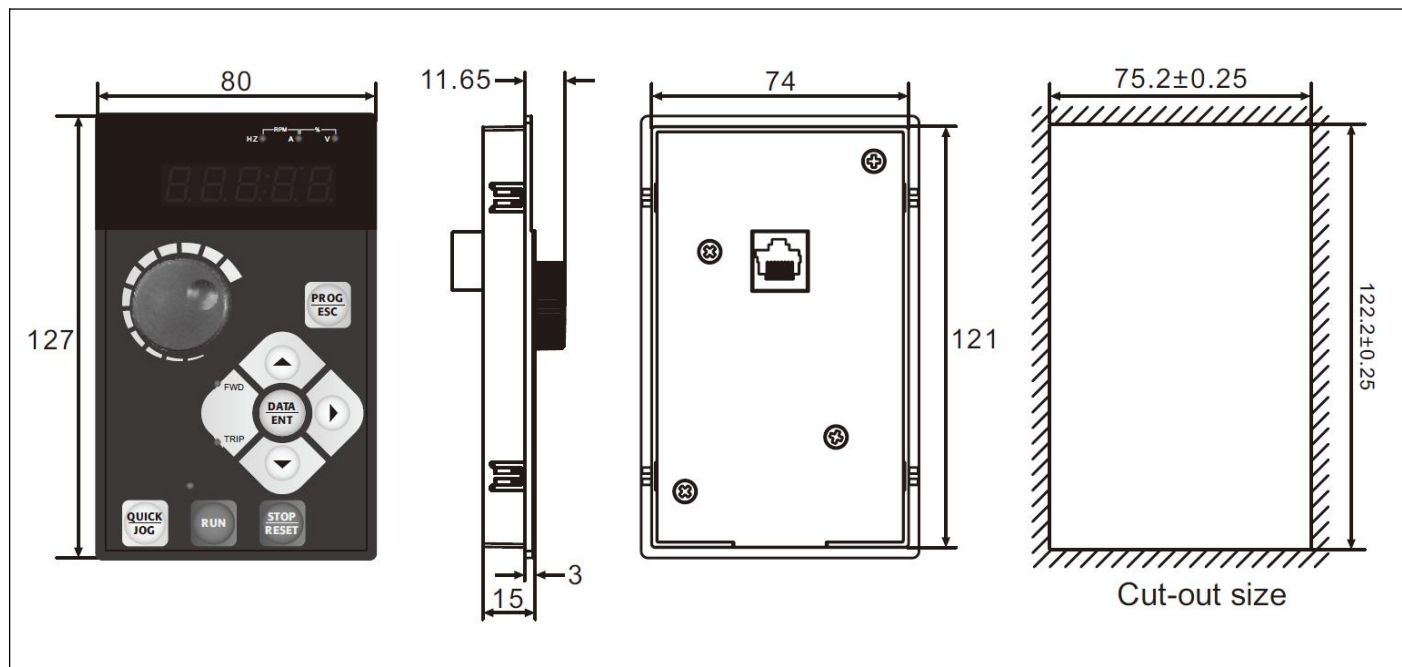
Unit:mm



- Large power keypad (HCA-OP-B2) external dimensions and Installation dimensions

Above 22kW (include 22kW)

Unit:mm

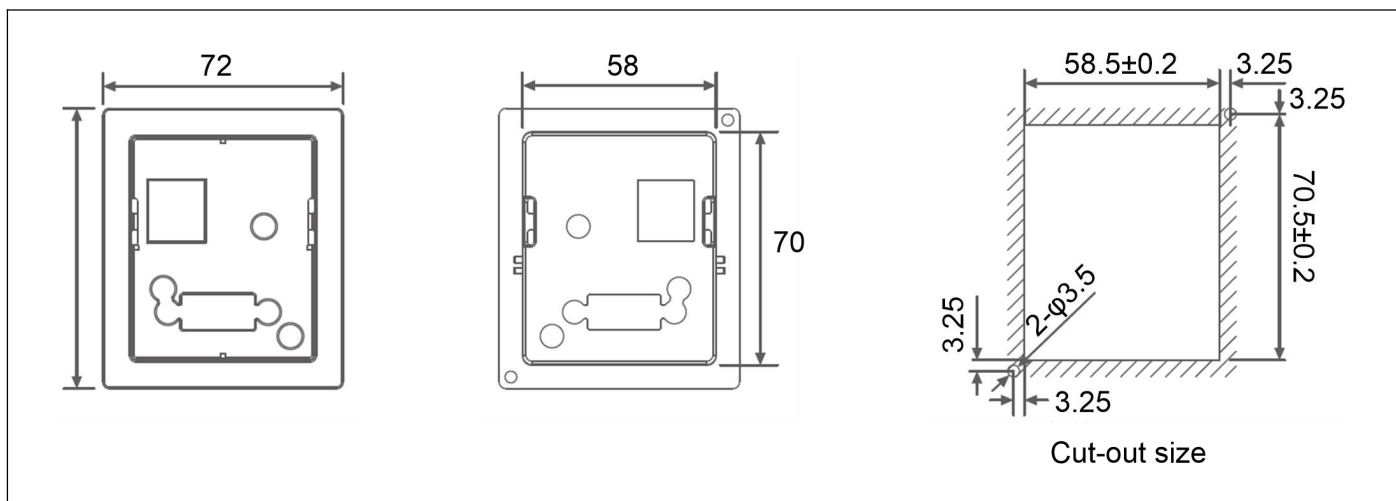


Note: This keyboard can be extended with ordinary network cable (8 cores).

## Dimensions of epitaxial supporting box of extending keypad

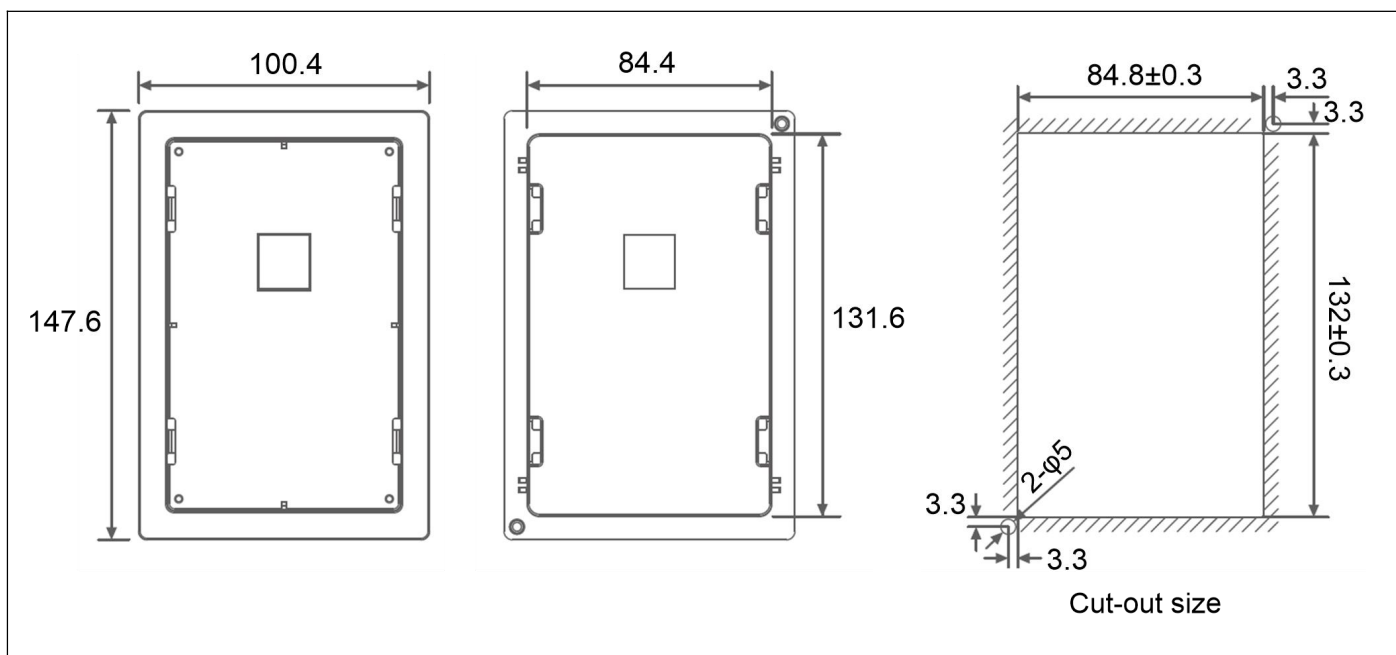
- Below 18.5kW (include 18.5kW )

Unit:mm



- Above 22kW (include 22kW)

Unit:mm



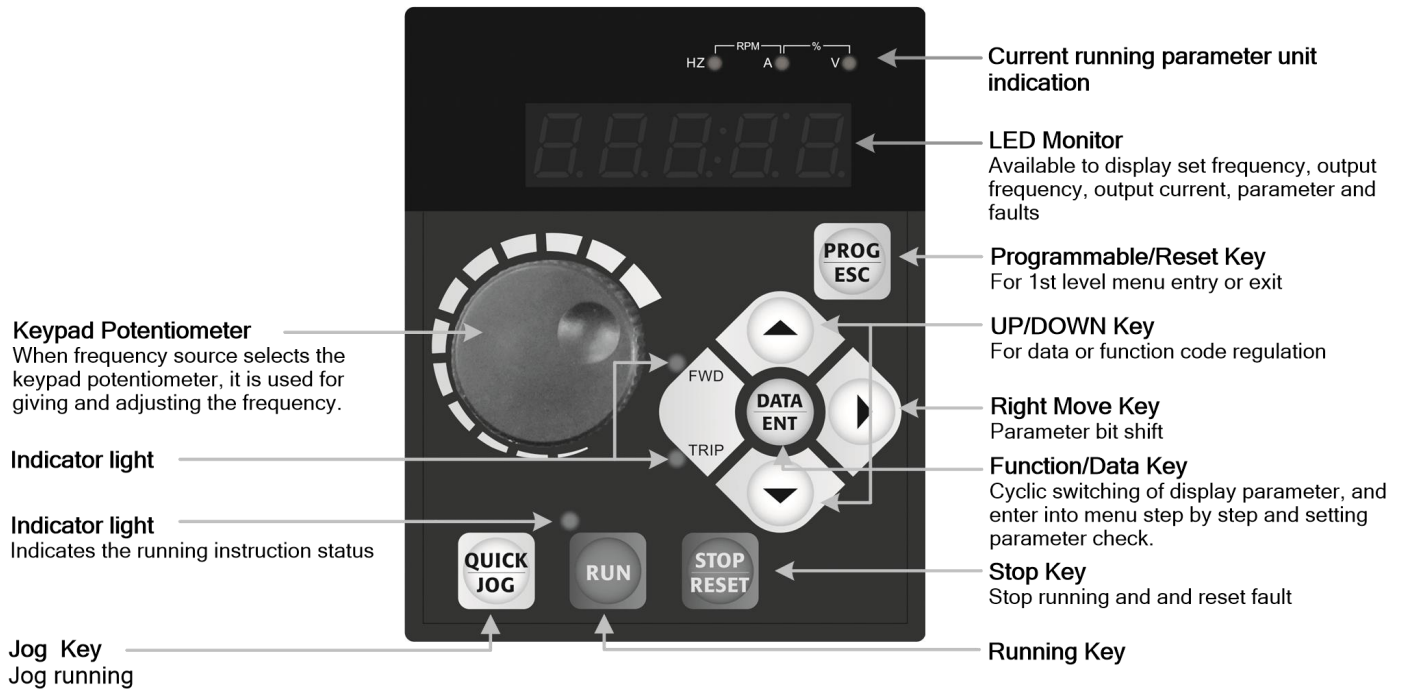


### 3 KEYPAD DESCRIPTION






#### 3.1 Keyboard Description for HCA-OP-A2 / HCA-OP-B2 Digital Operator

Descriptions and functions of the keyboard




Locating on AC motor drive, the digital operator has two spaces: display space and operating space. Programmed mode and different operation states shall be displayed on the display space, while for the operating space, it is an interface for communication of the operators and AC motor drive.



Functions description of the keyboard

| Display and Keyboard  |             | Functions description   |
|---|-------------|---|
|  | Program key | Enter or quit the first menu  |
|  | Enter key   | Enter into menu step by step, set parameter   |
|  | UP key      | Increase of data or function code   |
|  | DOWN key    | Decrease of data or function code   |
|  | Shift key   | On stopping and running mode, the parameter can be selected circularly.<br>Able to select the parameter when modifying it |



| Display and Keyboard  |                            | Functions description   |
|---|----------------------------|---|
|  | Running key                | For start operation under operation keyboard mode   |
|  | Stop / reset key           | To stop motor in running mode by pressing this key, limited by function code 08-02;<br>To reset fault in the state of fault alarm, free from function code 08-02.               |
|  | Shortcut multifunction key | The key is identified by function code 08-01.<br>0:Jog-run<br>1:switching key for forward and reverse<br>2:Clear UP / DOWN setting, clear the frequency value set by UP / DOWN. |

## Indicator Description

### 1)Description of function indicator:

| Name of indicator | Description of indicator   |
|-------------------|--|
| RUN/TUNE          | Operation indicator<br>ON-running<br>OFF-stop<br>FLICKER-parameter self-learning   |
| FWD               | Forward & Reverse run indicator:<br>ON-reverse<br>OFF-forward  |
| TRIP              | Fault indicator light description:<br>The light on indicates the torque control mode, The slow flashing light indicates auto-tuning, The flashing light indicates a fault state. |

### 2)Description of unit indicator:

| symbol | Symbol Description |
|--------|--------------------|
| Hz     | Frequency          |
| A      | Current            |
| V      | Voltage            |
| RPM    | Rotating speed     |
| %      | Percentage         |

## 3.2 Description of Keyboard Operation

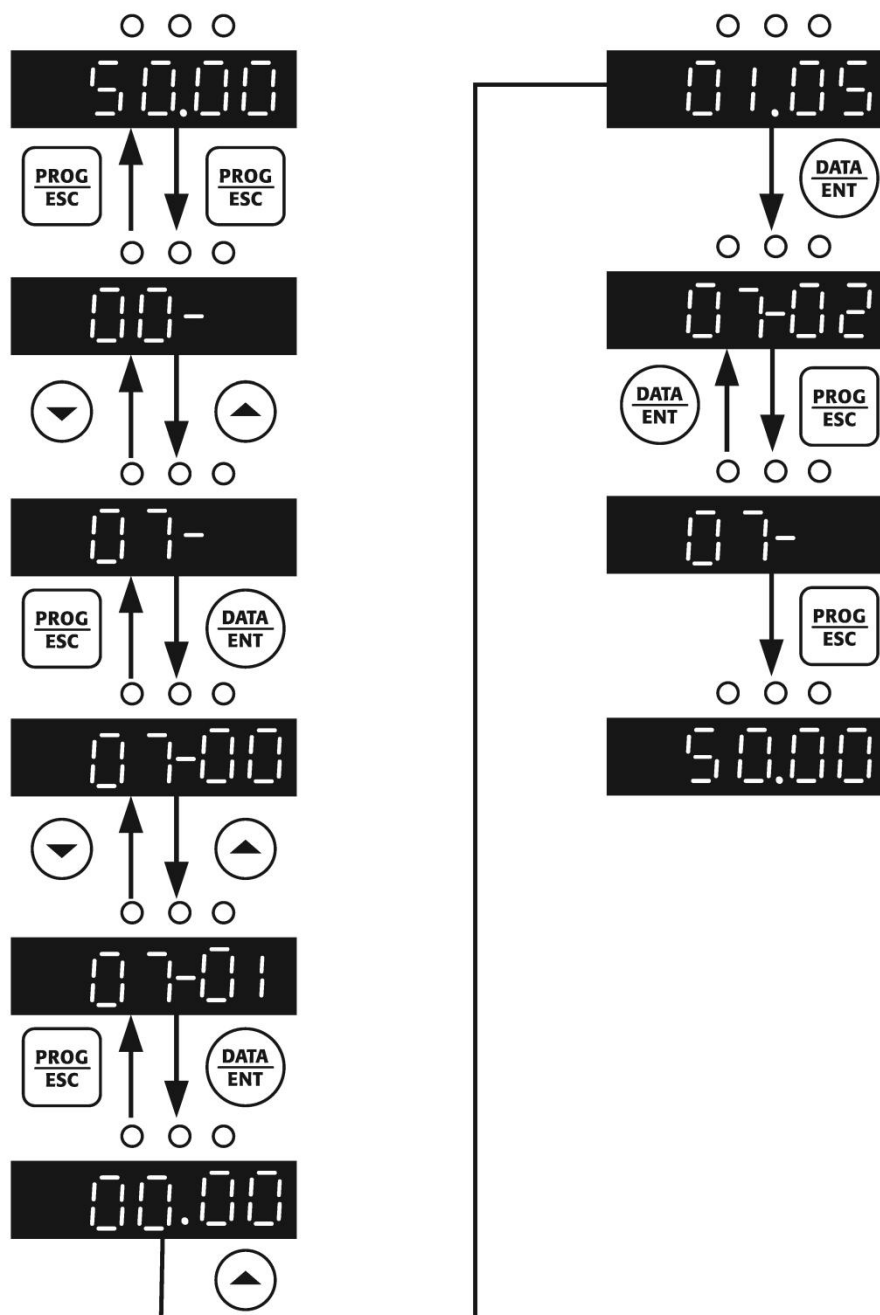
### 3.2.1 Parameter setting

Here are three levels of menu:

- 1.Function code number group (first)
- 2.Function code labeling (second)
- 3.Function code value setting(third)

Note:Press PRG / ESC or DATA / ENT to back to second-level menu when in the third-level. The difference between them is:DATA / ENT key stores the set parameter into control board before backing to second-level menu and shifts to the next function code automatically. While PRG / ESC key backs to the second-level menu directly without storing parameters and keeps the current function code.

For example, set the frequency of function code 07-01 from 00.00Hz to 01.05Hz.



In the state of third-level menu, the function code can't be modified if the indicator does not flicker, the reason of would be:

1)The parameter s of function code can not be modified, e.g. actual detection parameters, operation record parameters, etc.

2)The parameter s of function code can not be modified in running state, the code could be modified only when the motor stops.

### 3.2.2 Failure Resetting

When the inverter receives a fault, it will display the relative fault information. User can reset the fault by the STOP/RESET key on keyboard or terminal function (group 04). The inverter will be in standby state after fault resetting. If the user doesn't reset when the inverter receives a fault, it will be in running protection state and unable to be operated.

### 3.2.3 Motor Parameter Self-learning

The nameplate parameter of motor is needed to be input accurately when selecting open loop vector control. The inverter will match the standard motor parameter according to the nameplate parameters. To obtain the excellent control performance, it is recommended to carry out the motor parameters self-learning, the operation step as follows.

First, select the running reference channel (00-00) as the keyboard reference channel .

Then input following parameters according to motor actual parameters.

01-02: motor rated power

01-03: motor rated frequency

01-04: motor rated rotation speed

01-05: motor rated voltage

01-06: motor rated current

During the self-learning process, select the 01-01 self-learning mode and press the DATA / ENT key, the keyboard will display TUNE, and then press the keyboard RUN key, the inverter will drive the motor to perform self-learning for about 2 minutes, the display information disappears, and returns Normal display status indicates that the motor parameter self-learning is completed.

Note: During the process of self-learning, the motor must be uncoupled from load. Otherwise, incorrect parameters would be obtained.

### 3.2.4 Password Setting

S3100E series inverters provide user password protection function. When 08-00 is set to non-zero, it is the user password, exit the function code editing state, the password protection is effective, and press PRG / ESC key again to enter the function code editing state, "-----" is displayed. After pressing the DATA / ENT key, the "00000" user password input interface is displayed. The operator must enter the user password correctly, otherwise he cannot enter.

To cancel the password protection function, set 08-00 to 0. The user password does not protect the parameters in the shortcut menu.

Exit the function code editing state, the user password is locked immediately, and the user password is required to enter again.

## **3.2.5 Running State**

### **3.2.5.1 Power on Initialization**

On the course of inverter power on, the system is initialized firstly, LED displays "- - - -" with 7 indicators on. The inverter is in standby state after finishing initialization.

### **3.2.5.2 Standby**

Under stop or running status, various status parameters can be displayed. The function code 08-03 / 08-04 (operation parameter) and 08-05 (stop parameter) can be used to select whether to display this parameter according to the binary digits. Please refer to the descriptions of 08-03, 08-04 and 08-05 for the definition of each bit .

In the stop state, there are 12 stop state parameters that can be selected to be displayed or not, which are: set frequency, bus voltage, switch input state, open collector output state, analog input AVI1 voltage, analog input AVI2 voltage, count value, The length value, the number of PLC segments, the load speed, the PID setting, and the PULSE input pulse frequency are selected by function code 08-05 by bit (converted to binary). ENT + QUICK / JOG key to switch to the left to display selected parameters.

### **3.2.5.3 Motor Parameters Self-learning**

Please see the description of function code 01-01 for details.

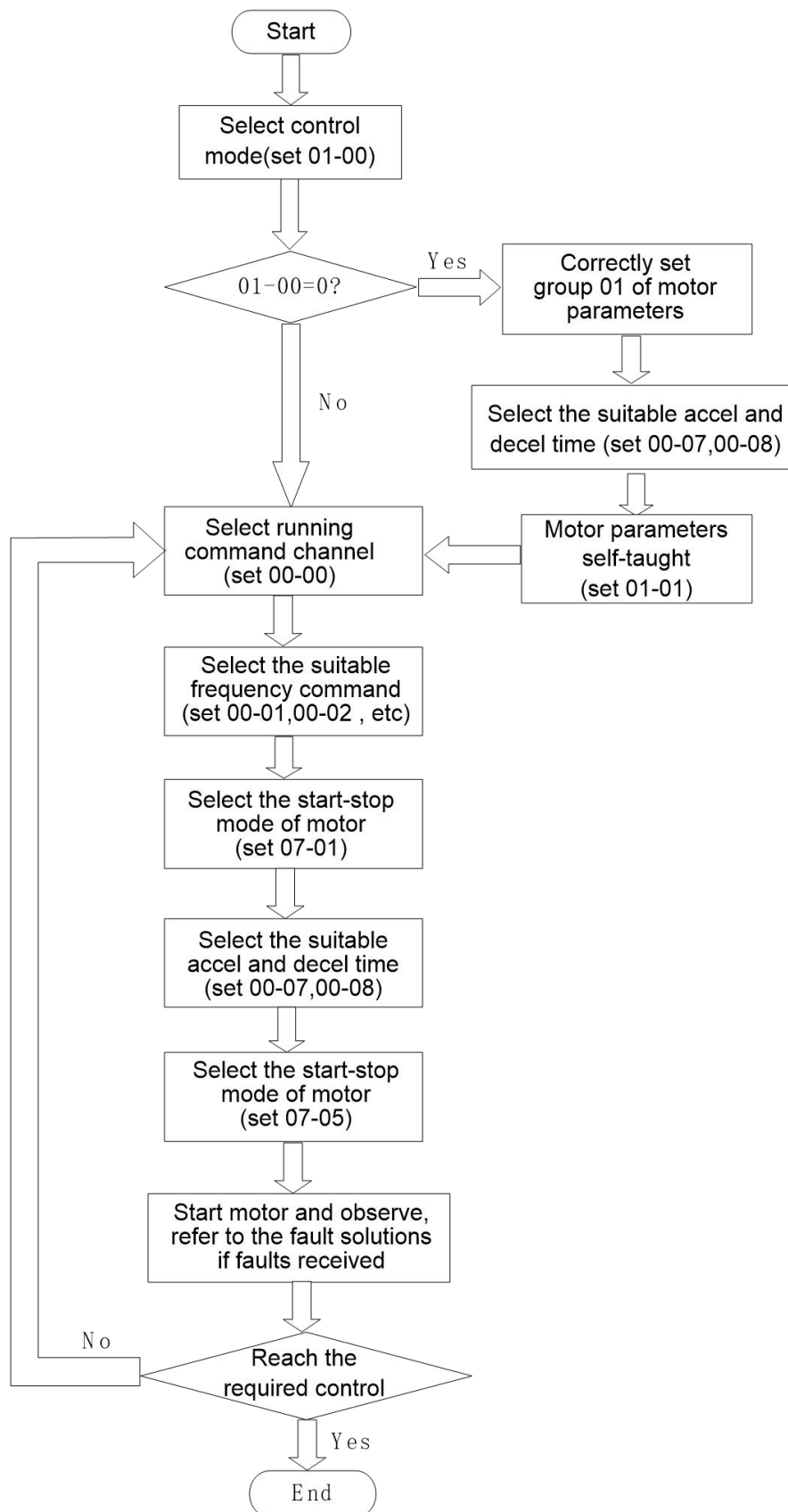
### **3.2.5.4 Operation**

In the running state, there are 28 state parameters that can be selected to be displayed or not, respectively: running frequency, set frequency, bus voltage, output voltage, output current, output power, output torque, MI input status, MO output status, AVI1 Voltage, AVI2 voltage, count value, length value, load speed display, PID setting, PID feedback, PLC segments, PULSE input pulse frequency, operating frequency 2, remaining operating time, voltage before AVI1 correction, voltage before AVI2 / ACI correction, Line speed, current power-on time, current running time, communication setting value, main frequency X display, auxiliary frequency Y display. Whether to display is selected bit by bit (converted to binary) by function code 08-03 / 08-04, press " > "Key sequence switch to display the selected parameter, press DATA / ENT + QUICK / JOG key to switch to display the selected parameter to the left in order.

### **3.2.5.5 Alarms**

S3100E series inverter provides of alarm information. Please see the alarms and solutions of S3100E series inverter for details.

### 3.2.6 Quick Debugging

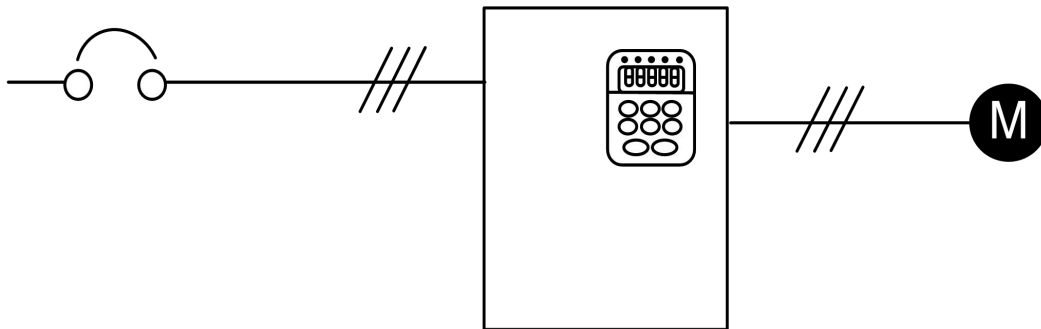


### 3.3 Preliminary Operation-not Connecting with Motor

- Prior to connecting power supply with AC motor drive, check and make sure that AC power supply voltage is within input voltage range of the drive.
- Connect power supply to R/L1, S/L2 and T/L3 input terminals of the AC motor drive.
- Operation mode control selection.

Operation mode can be divided into the following categories:

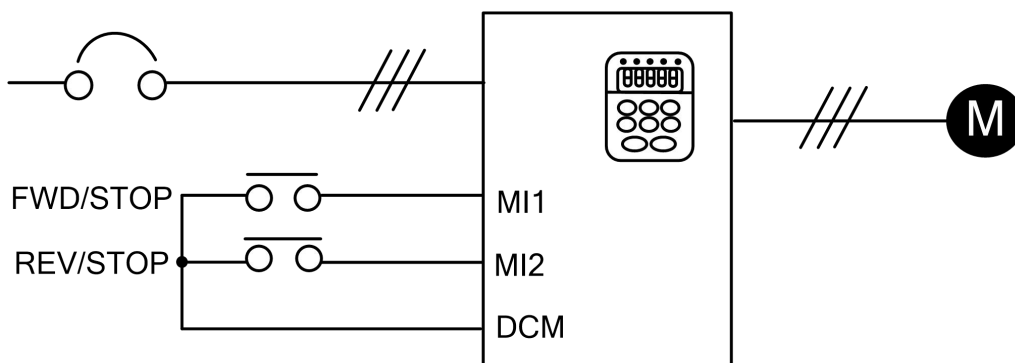
- Both frequency command and operation control are determined by keyboard. (00-00=0) (Factory setting)



- Frequency command is controlled by keyboard.

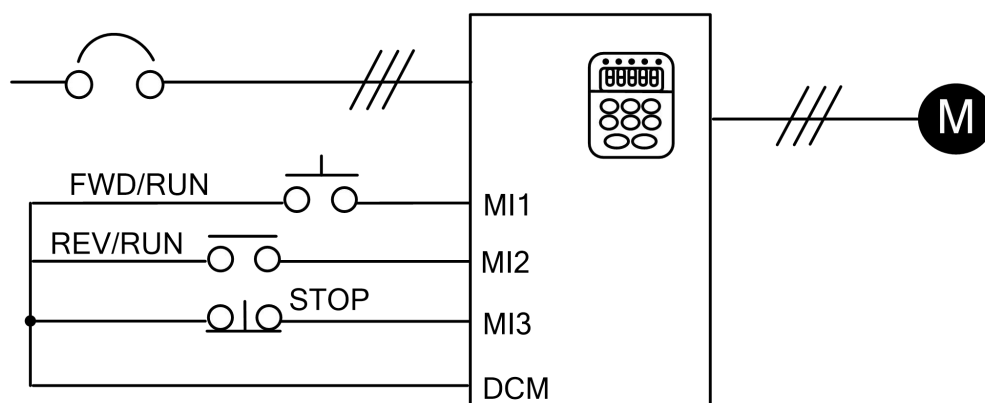
Operation command is controlled by external terminals. STOP key on keyboard valid.

Two wire operation control, "FWD/STOP" and "REV/STOP"(04-00=1, 04-01=2, 04-09=0 or 1)



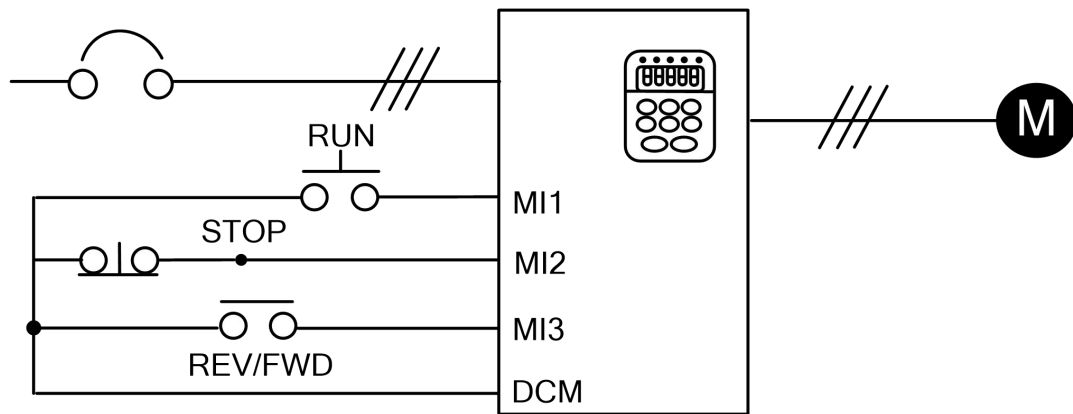
- Frequency command is controlled by keyboard.

Three wire operation control mode Configuration 1 (04-00=1, 04-01=2, 04-02=3, 04-09=2)



- Frequency command is controlled by keyboard.

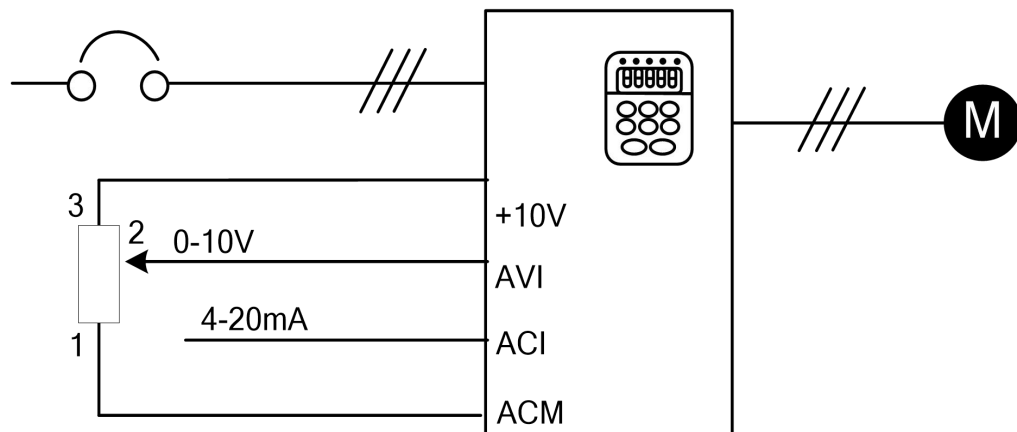
Three wire operation control mode Configuration 2 (04-00=1, 04-01=3, 04-02=2, 04-09=3)



- Frequency command is input by analog signals.

(DC 0 to +10V)+(DC 4 to 20mA)

Operation command is controlled by keyboard.(00-02 is set as 1,2)



## **4 FUNCTIONAL PARAMETERS LIST**

| <b>00 Basic functions parameters</b> |   | ↗ indicates that the parameters can be set during operation   |                 |   |
|--------------------------------------|---|---|-----------------|---|
| Parameter                            | Parameter function  | Setting range   | Factory setting |   |
| 00-00                                | Command source selection  | 1:Keyboard command (LED off)<br>2:Terminal command (LED on)<br>3:Communication command (LED flicker)  | 0               | ↗ |
| 00-01                                | Keyboard and terminal UP / DOWN setting selection                 | 0:Stop memory and power failure storage<br>1:Stop memory<br>2:Stop no memory  | 2               | ↗ |
| 00-02                                | Main Frequency source selection                                   | 0:Digital setting (keyboard given frequency 00-06, UP /DOWN can be modified)<br>1:AVI1<br>2:AVI2 / ACI<br>3:Reserved<br>4:Multi-speed command<br>5:PID control<br>6:Communication setting<br>7:Simple PLC<br>8:Panel potentiometer<br>9:Pulse setting (MI5) | 1               |   |
| 00-03                                | Maximum frequency   | 50.00Hz~500.00Hz  | 50.00Hz         |   |
| 00-04                                | Upper limitation of running frequency                             | Lower limit frequency 00-05~max frequency 00-03   | 50.00Hz         | ↗ |
| 00-05                                | Lower limitation of running frequency                             | 0.00Hz ~ Upper limit frequency  | 0.00Hz          | ↗ |
| 00-06                                | Keyboard setting frequency  | 0.00Hz to the maximum frequency (00-03)   | 50.00Hz         | ↗ |
| 00-07                                | Acceleration time 1   | 0.00s~65000s  | Type setting    | ↗ |
| 00-08                                | Deceleration time 1   | 0.00s~65000s  | Type setting    | ↗ |
| 00-09                                | Operation direction   | 0: Reverse<br>1: Forward  | 0               | ↗ |
| 00-10                                | Carrier frequency   | 0.5kHz~16.0kHz  | Type setting    | ↗ |
| 00-11                                | Parameter initialization  | 0:No operation<br>1:Restore factory parameters, excluding motor parameters<br>2:Clear record information  | 0               |   |
| 00-12                                | Carrier frequency adjusts with temperature                        | 0:no<br>1:yes   | 1               | ↗ |
| 00-13                                | G/P setting   | 1:G type (constant torque load model)<br>2:P type (fan, pump type)  | 1               |   |
| 00-14                                | Auxiliary frequency source Y selection                            | Same as 00-02 (Main frequency source X selection)   | 0               |   |
| 00-15                                | Auxiliary frequency source Y range selection during superposition | 0:Relative to the maximum frequency<br>1:Relative to frequency source X   | 0               | ↗ |



| 00 Basic functions parameters                               |   |   |                 |   |
|---|---|---|-----------------|---|
| ↗ indicates that the parameters can be set during operation |   |   |                 |   |
| Parameter   | Parameter function  | Setting range   | Factory setting |   |
| 00-16   | Auxiliary frequency source Y range when superimposed          | 0%~150%   | 100%            | ↗ |
| 00-17   | Frequency source selection                                    | Single digit:Frequency source selection<br>0:Main frequency source X<br>1:Main and auxiliary calculation results<br>(Operation relationship is determined by ten digits)<br>2:Switch between the main frequency source X and the auxiliary frequency source Y<br>3:Switch between the main frequency source X and the main and auxiliary calculation results<br>4:Switch between auxiliary frequency source Y and main and auxiliary calculation results<br>Tens digit:the relationship between the main and auxiliary operations of the frequency source<br>0:Main+auxiliary<br>1:Main-auxiliary<br>2:Maximum of both<br>3:Minimum of both | 0               | ↗ |
| 00-19   | Auxiliary frequency source offset frequency when superimposed | 0.00Hz to the maximum frequency (00-03)   | 0.00Hz          | ↗ |
| 00-20   | Upper frequency source  | 0:00-04 setting<br>1:AVI1<br>2:AVI2 / ACI<br>3:reserved<br>4:PULSE pulse setting<br>5:Communication given   | 0               |   |
| 00-21   | Upper frequency offset  | 0.00Hz~Max frequency 00-03  | 0.00Hz          | ↗ |
| 00-22   | Acceleration / deceleration time unit                         | 0:1s<br>1:0.1s<br>2:0.01s   | 1               |   |
| 00-23   | Base frequency of acceleration and deceleration time          | 0:Maximum frequency (00-03)<br>1:set frequency<br>2:100Hz   | 0               |   |
| 00-24   | Base frequency for UP/DOWN command during running             | 0:Running frequency<br>1:Set frequency  | 1               |   |
| 00-25   | Frequency command resolution                                  | 1:0.1Hz<br>2:0.01Hz   | 2               |   |

| 01 Motor control parameters                                 |   |  |                 |  |
|---|---|--|-----------------|--|
| ↗ indicates that the parameters can be set during operation |   |  |                 |  |
| Parameter   | Parameter function                        | Setting range  | Factory setting |  |
| 01-00   | The first motor control mode              | 0:Speed sensorless vector control (SVC)<br>2:V/f control   | 0               |  |
| 01-01   | Motor parameter self-learning             | 0:No self-learning<br>11:Synchronous motor static self-learning<br>12:Synchronous motor complete self-learning | 0               |  |
| 01-02   | Motor rated power                         | 0.1kW~1000.0kW   | Type setting    |  |
| 01-03   | Motor rated frequency                     | 0.01Hz~max frequency   | Type setting    |  |
| 01-04   | Motor rated rotation speed                | 1rpm~65535rpm  | Type setting    |  |
| 01-05   | Motor rated voltage                       | 1V~2000V   | Type setting    |  |
| 01-06   | Motor rated current                       | 0.01A~655.35A(inverter power ≤55kW)<br>0.1A~6553.5A(inverter power >55kW)                                      | Type setting    |  |
| 01-12   | Motor type selection                      | 2:Permanent magnet synchronous motor   | 2               |  |
| 01-16   | Stator resistance of synchronous motor    | 0.001Ω~65.535Ω(inverter power ≤55kW)<br>0.0001Ω~6.5535Ω(inverter power >55kW)                                  | Type setting    |  |
| 01-17   | D-axis inductance of synchronous motor    | 0.1mH~6553.5mH(inverter power ≤55kW)<br>0.01mH~655.35mH(inverter power >55kW)                                  | Type setting    |  |
| 01-18   | Q-axis inductance of synchronous motor    | 0.1mH~6553.5mH(inverter power ≤55kW)<br>0.01mH~655.35mH(inverter power >55kW)                                  | Type setting    |  |
| 01-20   | Back-EMF coefficient of synchronous motor | 0.1V~6553.5V   | Type setting    |  |

| 02 Vector control parameters                                |   |                     |                 |   |
|---|---|---------------------|-----------------|---|
| ↗ indicates that the parameters can be set during operation |   |                     |                 |   |
| Parameter   | Parameter function  | Setting range       | Factory setting |   |
| 02-00   | Speed loop proportional gain 1                              | 1~100               | 20              | ↗ |
| 02-01   | Speed loop integration time 1                               | 0.01s~10.00s        | 0.50s           | ↗ |
| 02-02   | Switching frequency 1                                       | 0.00~02-05          | 5.00Hz          | ↗ |
| 02-03   | Speed loop proportional gain 2                              | 1~100               | 20              | ↗ |
| 02-04   | Speed loop integration time 2                               | 0.01s~10.00s        | 1.00s           | ↗ |
| 02-05   | Switching frequency 2                                       | 02-02~max frequency | 10.00Hz         | ↗ |
| 02-06   | Vector control slip gain                                    | 50%~200%            | 100%            | ↗ |
| 02-07   | Digital setting of torque upper limit in speed control mode | 0.0%~200.0%         | 150.0%          | ↗ |
| 02-08   | Speed loop filter time constant                             | 0~31                | 28              | ↗ |
| 02-09   | Vector control over excitation gain                         | 0~200               | 64              | ↗ |

## 02 Vector control parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function   | Setting range  | Factory setting |   |
|-----------|--|--|-----------------|---|
| 02-10     | Torque upper limit source in speed control mode            | 0:Parameter 02-07 setting<br>1:AVI1<br>2:AVI2 / ACI<br>3:reserved<br>4:PULSE pulse setting<br>5:Communication setting<br>6:MIN (AVI1, AVI2 / ACI)<br>7:MAX (AVI1, AVI2 / ACI)<br>The full scale of the 1-7 option corresponds to 02-07 | 0               | ⚡ |
| 02-13     | Excitation adjustment proportional gain                    | 0~60000  | 3000            | ⚡ |
| 02-14     | Excitation adjustment integral gain                        | 0~60000  | 500             | ⚡ |
| 02-15     | Torque adjustment proportional gain                        | 0~60000  | 300             | ⚡ |
| 02-16     | Torque adjustment integral gain                            | 0~60000  | 500             | ⚡ |
| 02-17     | Reserved   |  | 0               | ⚡ |
| 02-18     | Field weakening mode of synchronous motor                  | 0,1,2  | 1               | ⚡ |
| 02-19     | Field weakening gain of synchronous motor                  | 0~50   | 5               | ⚡ |
| 02-22     | The upper limit of generating torque becomes effective     | 0:Close<br>1:Open  | 0               |   |
| 02-23     | Synchronous motor output voltage upper limit margin        | 0%~50%   | 5%              | ⚡ |
| 02-24     | Synchronous motor initial position angle detection current | 10%~180%   | 80%             | ⚡ |
| 02-25     | Synchronous motor initial position angle detection         | 0:Check every run<br>1:Not check<br>2:Power-on first run detection   | 0               | ⚡ |
| 02-36     | Low speed excitation current                               | 0~80%  | 30%             | ⚡ |
| 02-37     | Low speed carrier frequency                                | 0.8K~00-10   | 1.5K            | ⚡ |
| 02-43     | Zero servo enabling  | 0~1  | 0               | ⚡ |
| 02-44     | Switchover frequency                                       | 0.00~02-02   | 0.30Hz          | ⚡ |
| 02-45     | Zero servo KP gain   | 1~100  | 10              | ⚡ |
| 02-46     | Zero servo TI time   | 0.01s~10.00s   | 0.50s           | ⚡ |
| 02-49     | Auto-tuning mode   | 0, 1, 2  | 0               | ⚡ |
| 02-51     | Initial position compensation angle                        | 0.0°~360.0   | 0.0             | ⚡ |

### 03 V/f control parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                           | Setting range   | Factory setting |   |
|-----------|--|---|-----------------|---|
| 03-00     | V/f curve setting                            | 0: Straight line V/f<br>1: Multi-point V/f<br>2: Square 2.0<br>3: 1.2 power V/f<br>4: 1.4 power V/f<br>6: 1.6 power V/f<br>8: 1.8 power V/f<br>9: reserved<br>10: V/f complete separation mode<br>11: V/f half separation mode                  | 0               |   |
| 03-01     | Torque boost                                 | 0.0%:(auto-torque boost)<br>0.1%~30.0%  | Type setting    | ⚡ |
| 03-02     | Cut-off frequency of torque boost            | 0.00Hz~max frequency  | 50.00Hz         |   |
| 03-03     | Multi-point V/f frequency 1                  | 0.00Hz~03-05  | 0.00Hz          |   |
| 03-04     | Multi-point V/f voltage 1                    | 0.0%~100.0%   | 0.0%            |   |
| 03-05     | Multi-point V/f frequency 2                  | 03-03~03-07   | 0.00Hz          |   |
| 03-06     | Multi-point V/f voltage 2                    | 0.0%~100.0%   | 0.0%            |   |
| 03-07     | Multi-point V/f frequency 3                  | 03-05~motor rated frequency(01-03)  | 0.00Hz          |   |
| 03-08     | Multi-point V/f voltage 3                    | 0.0%~100.0%   | 0.0%            |   |
| 03-09     | V/f slip compensation gain                   | 0.0%~200.0%   | 0.0%            | ⚡ |
| 03-10     | V/f overexcitation gain                      | 0~200   | 64              | ⚡ |
| 03-11     | V/f oscillation suppression gain             | 0~100   | Type setting    | ⚡ |
| 03-13     | V/f separated voltage source                 | 0: Digital setting (03-14)<br>1: AVI1<br>2: AVI2 / ACI<br>3: Reserved<br>4: Pulse setting (MI5)<br>5: Multi-speed command<br>6: Simple PLC<br>7: PID<br>8: Communication setting<br>Note: 100.0% corresponds to the rated voltage of the motor. | 0               | ⚡ |
| 03-14     | Voltage digital setting of V/f detached      | 0V~motor rated voltage  | 0V              | ⚡ |
| 03-15     | V/f separated voltage rise time              | 0.0s~1000.0s<br>Note: It means the time from 0V to the rated voltage of the motor.  | 0.0s            | ⚡ |
| 03-16     | Voltage deceleration time for V/f separation | 0.0s~1000.0s<br>Note: indicates the time from 0V to the rated voltage of the motor  | 0.0s            | ⚡ |
| 03-17     | V/f separation stop mode selection           | 0: Frequency/voltage is reduced to<br>1: The frequency is reduced after the voltage is reduced to 0   | 0               |   |

### 03 V/f control parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function  | Setting range          | Factory setting            |   |
|-----------|---|------------------------|----------------------------|---|
| 03-18     | Over current stall action current                                       | 50~200%                | 150%                       |   |
| 03-19     | Overflow rate enable  | 0: invalid<br>1: valid | 1                          |   |
| 03-20     | Over-current stall suppression gain                                     | 0~100                  | 20                         | ⚡ |
| 03-21     | Double-speed over-current stall action current compensation coefficient | 50~200%                | 50%                        |   |
| 03-22     | Overvoltage stall action voltage  | 330.0V~800.0V          | 380V: 760.0<br>220V: 370.0 |   |
| 03-23     | Overvoltage stall enable  | 0: invalid<br>1: valid | 1                          |   |
| 03-24     | Overvoltage stall suppression frequency gain                            | 0~100                  | 30                         | ⚡ |
| 03-25     | Overvoltage stall suppression voltage gain                              | 0~100                  | 30                         | ⚡ |
| 03-26     | Overvoltage stall maximum rise frequency limit                          | 0~50Hz                 | 5Hz                        |   |

### 04 Input terminal parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function  | Setting range  | Factory setting |  |
|-----------|---|--|-----------------|--|
| 04-00     | MI1 Terminal function selection                             | 0:No function<br>1:Forward running (FWD)<br>2:Reverse running (REV)<br>3:Three-wire control<br>4:Forward Jog (FJOG)<br>5:Reverse jog (RJOG)<br>6:Terminal UP<br>7:Terminal DOWN<br>8:Coast to stop<br>9:Fault reset (RESET)<br>10:Run pause<br>11:Normally open input for external fault<br>12:Multi-step speed command terminal 1<br>13:Multi-step speed command terminal 2<br>14:Multi-step speed command terminal 3<br>15:Multi-step speed command terminal 4<br>16:Acceleration / deceleration time selection terminal 1<br>17:Acceleration / deceleration time selection terminal 2<br>18:Frequency source switching<br>19:UP / DOWN set to cleared (Terminal, keyboard)<br>20:Run command switching terminal | 1               |  |
| 04-01     | MI2 Terminal function selection                             |  | 2               |  |
| 04-02     | MI3 Terminal function selection                             |  | 9               |  |
| 04-03     | MI4 Terminal function selection                             |  | 0               |  |
| 04-04     | MI5 Terminal function selection (high-speed pulse optional) |  | 0               |  |
| 04-05     | Reserved  |  | 0               |  |
| 04-06     | Reserved  |  | 0               |  |
| 04-07     | Reserved  |  | 0               |  |

## 04 Input terminal parameters

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function                               | Setting range   | Factory setting |   |
|-----------|--|---|-----------------|---|
|           |  | 21:Acceleration / deceleration prohibited<br>22:PID pause<br>23:PLC status reset<br>24:Wobble frequency pause<br>25:Counter input<br>26:Counter reset<br>27:Length count input<br>28:Length reset<br>29:Torque control prohibited<br>30:PULSE (pulse) frequency input (MI5)<br>31:reserved<br>32:Immediate DC braking<br>33:Normally closed input for external fault<br>34:Frequency modification enable<br>35:PID action direction is reversed<br>36:External stop terminal 1<br>37:Control command switching terminal 2<br>38:PID integration pause<br>39:Frequency source X and keyboard set frequency switching<br>40:Frequency source Y and keyboard set frequency switching<br>41:Reserved<br>42:Reserved<br>43:PID parameter switching<br>44:Reserved<br>45:reserved<br>46:Speed control / torque control switching<br>47:Emergency stop<br>48:External stop terminal 2<br>49:Deceleration DC braking<br>50:Clear the current running time<br>51-59:reserved |                 |   |
| 04-08     | MI Filter time                                   | 0.000s~1.000s   | 0.010s          | ↗ |
| 04-09     | Terminal command mode                            | 0:Two-wire 1<br>1:Two-wire 2<br>2:Three-wire 1<br>3:Three-wire 2  | 0               |   |
| 04-10     | Terminal UP / DOWN change rate                   | 0.001Hz/s~65.535Hz/s  | 1.00Hz/s        | ↗ |
| 04-11     | AVI curve 1 lower limit                          | 0.00V~04-13   | 0.10V           | ↗ |
| 04-12     | Corresponding setting of AVI curve 1 lower limit | -100.0%~+100.0%   | 0.0%            | ↗ |
| 04-13     | AVI curve 1 upper limit                          | 04-11~+10.00V   | 10.00V          | ↗ |
| 04-14     | Corresponding setting of AVI curve 1 upper limit | -100.0%~+100.0%   | 100.0%          | ↗ |
| 04-15     | AVI1 filter time                                 | 0.00s~10.00s  | 0.10s           | ↗ |

| 04 Input terminal parameters                                |  |   |                 |   |
|---|--|---|-----------------|---|
| ↗ indicates that the parameters can be set during operation |  |   |                 |   |
| Parameter   | Parameter function                                   | Setting range   | Factory setting |   |
| 04-16   | AVI curve 2 lower limit                              | 0.00V~04-18   | 0.10V           | ↗ |
| 04-17   | Corresponding setting of AVI curve 2 lower limit     | -100.0%~+100.0%   | 0.0%            | ↗ |
| 04-18   | AVI curve 2 upper limit                              | 04-16~+10.00V   | 10.00V          | ↗ |
| 04-19   | Corresponding setting of AVI curve 2 upper limit     | -100.0%~+100.0%   | 100.0%          | ↗ |
| 04-20   | AVI2/ACI filter time                                 | 0.00s~10.00s  | 0.10s           | ↗ |
| 04-28   | Pulse minimum input                                  | 0.00kHz~04-30   | 0.00kHz         | ↗ |
| 04-29   | Corresponding setting of pulse minimum input         | -100.0%~100.0%  | 0.0%            | ↗ |
| 04-30   | Pulse maximum input                                  | 04-28~100.00kHz   | 50.00kHz        | ↗ |
| 04-31   | Corresponding setting of pulse maximum input         | -100.0%~100.0%  | 100.0%          | ↗ |
| 04-32   | PULSE filter time                                    | 0.00s~10.00s  | 0.10s           | ↗ |
| 04-33   | AVI curve selection                                  | Single digit:AVI1 curve selection<br>1:AVI curve 1 (2 points, see 04-11~04-14)<br>2:AVI curve 2 (2 points, see 04-16~04-19)<br>3:Reserved<br>4:Reserved<br>5:Reserved<br>Tenth digit:AVI2 / ACI curve selection, same as above<br>Hundreds digit:Reserved | 321             | ↗ |
| 04-34   | AVI is less than the minimum input setting selection | Single digit:AVI1 is below the minimum input setting selection<br>0:Corresponds to the minimum input setting<br>1:0.0%<br>Tens digit:AVI2 / ACI is lower than the minimum input setting selection, same as above  | 000             | ↗ |
| 04-35   | MI1 delay time                                       | 0.0s~3600.0s  | 0.0s            | ↗ |
| 04-36   | MI2 delay time                                       | 0.0s~3600.0s  | 0.0s            | ↗ |
| 04-37   | MI3 delay time                                       | 0.0s~3600.0s  | 0.0s            | ↗ |
| 04-38   | MI terminal valid mode selection 1                   | 0:High level valid<br>1:Low level valid<br>Single digit:MI1<br>Tens digit:MI2<br>Hundreds digit :MI3<br>Thousands digit:MI4<br>Tens of thousands digit :MI5   | 0               |   |

## 05 Multi-speed, simple PLC control

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function   | Setting range  | Factory setting |   |
|-----------|--|--|-----------------|---|
| 05-00     | Multi-speed command 0  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-01     | Multi-speed command 1  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-02     | Multi-speed command 2  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-03     | Multi-speed command 3  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-04     | Multi-speed command 4  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-05     | Multi-speed command 5  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-06     | Multi-speed command 6  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-07     | Multi-speed command 7  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-08     | Multi-speed command 8  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-09     | Multi-speed command 9  | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-10     | Multi-speed command 10   | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-11     | Multi-speed command 11   | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-12     | Multi-speed command 12   | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-13     | Multi-speed command 13   | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-14     | Multi-speed command 14   | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-15     | Multi-speed command 15   | -100.0%~100.0%   | 0.0%            | ↗ |
| 05-16     | Simple PLC operation mode                                      | 0:Stop at the end of a single run<br>1:Keep the final value at the end of a single run<br>2:keep circulating   | 0               | ↗ |
| 05-17     | Simple PLC power-down memory selection                         | Single digit:Power failure memory selection<br>0:Power failure no memory<br>1:Power failure memory<br>Tenth digit:Stop memory selection<br>0:Stop no memory<br>1:Stop memory | 0               | ↗ |
| 05-18     | Simple PLC stage 0 running time                                | 0.0s(h)~6500.0s(h)   | 0.0s(h)         | ↗ |
| 05-19     | Simple PLC step 0 acceleration / deceleration time selection   | 0~3  | 0               | ↗ |
| 05-20     | Simple PLC stage 1 <sup>st</sup> running time                  | 0.0s(h)~6500.0s(h)   | 0.0s(h)         | ↗ |
| 05-21     | Simple PLC step 1st acceleration / deceleration time selection | 0~3  | 0               | ↗ |
| 05-22     | Simple PLC stage 2 <sup>nd</sup> running time                  | 0.0s(h)~6500.0s(h)   | 0.0s(h)         | ↗ |
| 05-23     | Simple PLC step 2nd acceleration / deceleration time selection | 0~3  | 0               | ↗ |
| 05-24     | Simple PLC stage 3 <sup>rd</sup> running time                  | 0.0s(h)~6500.0s(h)   | 0.0s(h)         | ↗ |
| 05-25     | Simple PLC step 3rd acceleration / deceleration time selection | 0~3  | 0               | ↗ |
| 05-26     | Simple PLC stage 4 <sup>th</sup> running time                  | 0.0s(h)~6500.0s(h)   | 0.0s(h)         | ↗ |



## 05 Multi-speed, simple PLC control

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function  | Setting range      | Factory setting |   |
|-----------|---|--------------------|-----------------|---|
| 05-27     | Simple PLC step 4th acceleration / deceleration time selection  | 0~3                | 0               | ↗ |
| 05-28     | Simple PLC stage 5 <sup>th</sup> running time                   | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-29     | Simple PLC step 5th acceleration / deceleration time selection  | 0~3                | 0               | ↗ |
| 05-30     | Simple PLC stage 6 <sup>th</sup> running time                   | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-31     | Simple PLC step 6th acceleration / deceleration time selection  | 0~3                | 0               | ↗ |
| 05-32     | Simple PLC stage 7 <sup>th</sup> running time                   | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-33     | Simple PLC step 7th acceleration / deceleration time selection  | 0~3                | 0               | ↗ |
| 05-34     | Simple PLC stage 8 <sup>th</sup> running time                   | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-35     | Simple PLC step 8th acceleration / deceleration time selection  | 0~3                | 0               | ↗ |
| 05-36     | Simple PLC stage 9 <sup>th</sup> running time                   | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-37     | Simple PLC step 9th acceleration / deceleration time selection  | 0~3                | 0               | ↗ |
| 05-38     | Simple PLC stage 10 <sup>th</sup> running time                  | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-39     | Simple PLC step 10th acceleration / deceleration time selection | 0~3                | 0               | ↗ |
| 05-40     | Simple PLC stage 11 <sup>th</sup> running time                  | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-41     | Simple PLC step 11th acceleration / deceleration time selection | 0~3                | 0               | ↗ |
| 05-42     | Simple PLC stage 12th running time                              | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-43     | Simple PLC step 12th acceleration / deceleration time selection | 0~3                | 0               | ↗ |
| 05-44     | Simple PLC stage 13th running time                              | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-45     | Simple PLC step 13th acceleration / deceleration time selection | 0~3                | 0               | ↗ |
| 05-46     | Simple PLC stage 14th running time                              | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-47     | Simple PLC step 14th acceleration / deceleration time selection | 0~3                | 0               | ↗ |
| 05-48     | Simple PLC stage 15th running time                              | 0.0s(h)~6500.0s(h) | 0.0s(h)         | ↗ |
| 05-49     | Simple PLC step 15th acceleration / deceleration time selection | 0~3                | 0               | ↗ |

## 05 Multi-speed, simple PLC control

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                    | Setting range  | Factory setting |   |
|-----------|---------------------------------------|--|-----------------|---|
| 05-50     | Simple PLC running time unit          | 0:s(second)<br>1:h(hour)   | 0               | ⚡ |
| 05-51     | Multi-step speed command 0 given mode | 0:Parameter 05-00 given<br>1:AVI1<br>2:AVI2 / ACI<br>3:reserved<br>4:PULSE<br>5:PID<br>6:The keyboard setting frequency (00-06) is given, UP /DOWN can be modified | 0               | ⚡ |

## 06 Output terminal parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                                | Setting range   | Factory setting |   |
|-----------|---|---|-----------------|---|
| 06-00     | MO1 output function selection                     | 0:No output   | 1               | ⚡ |
| 06-01     | Control board relay function selection (RA-RB-RC) | 1:Inverter is running<br>2:Fault output (stop)  | 2               | ⚡ |
| 06-02     | Reserved  | 3:Frequency level detection FDT1 output   |                 | ⚡ |
| 06-03     | Reserved  | 4:Frequency reached   |                 | ⚡ |
| 06-04     | DFM (M) output function selection                 | 5:Running at zero speed (no output when stopped)<br>6:Motor overload pre-alarm<br>7:Inverter overload pre-alarm<br>8:Set count value reached<br>9:Designated count value reached<br>10:Length reached<br>11:PLC cycle completed<br>12:Cumulative running time arrived<br>13:Frequency limited<br>14:Torque limited<br>15:Ready for run<br>16:AVI1> AVI2 / ACI<br>17:Upper limit frequency reached<br>18:Lower limit frequency reached (operation valid)<br>19:Undervoltage state output<br>20:Communication setting<br>21:(reserved)<br>22:(Reserved)<br>23:Zero speed running 2 (also output when stopped)<br>24:Cumulative power-on time arrived<br>25:Frequency level detection FDT2 output<br>26:Frequency 1 reaches the output<br>27:Frequency 2 reaches the output<br>28:Current 1 reaches the output | 0               | ⚡ |

| 06 Output terminal parameters                               |                                    |  |                 |   |
|---|------------------------------------|--|-----------------|---|
| ⚡ indicates that the parameters can be set during operation |                                    |  |                 |   |
| Parameter   | Parameter function                 | Setting range  | Factory setting |   |
| 06-04   | DFM (M) output function selection  | 29:Current 2 reaches the output<br>30:Timing reached<br>31:AVI1 input exceeds limit<br>32:Lost load<br>33:Reverse running<br>34:Zero current state<br>35:Module temperature reached<br>36:Output current exceeded<br>37:Lower limit frequency reached (also output when stopped)<br>38:Warning output (continued)<br>39:reserved<br>40:Current running time reached  | 0               | ⚡ |
| 06-05   | DFM terminal output mode selection | 0:Pulse output (DFM (P))<br>1:Switch output (DFM (M))  | 0               | ⚡ |
| 06-06   | DFM (P) output function selection  | 0:Running frequency<br>1:Set frequency<br>2:Output current<br>3:Output torque<br>4:Output power<br>5:Output voltage<br>6:PULSE input (100.% corresponds to 100.0kHz)<br>7:AVI1<br>8:AVI2 / ACI<br>9:Reserved<br>10:Length<br>11:Count value<br>12:Communication setting<br>13:Motor rotation speed<br>14:Output current (100.0% corresponds to 1000.0A)<br>15:BUS voltage (100.0% corresponds to 1000.0V)<br>16:Reserved | 0               | ⚡ |
| 06-07   | AFM output function selection      |  | 0               | ⚡ |
| 06-08   | Reserved                           |  |                 | ⚡ |
| 06-09   | DFM (P) output maximum frequency   | 0.01kHz~100.00kHz  | 50.00kHz        | ⚡ |
| 06-10   | AFM zero offset coefficient        | -100.0%~+100.0%  | 0.0%            | ⚡ |
| 06-11   | AFM gain                           | -10.00~+10.00  | 1               | ⚡ |
| 06-12   | AFM2 zero offset coefficient       | -100.0%~+100.0%  | 0.0%            | ⚡ |
| 06-13   | AFM2 gain                          | -10.00~+10.00  | 1.00            | ⚡ |
| 06-17   | MO1 output delay time              | 0.0s~3600.0s   | 0.0s            | ⚡ |
| 06-18   | Relay RA-RB-RC output delay time   | 0.0s~3600.0s   | 0.0s            | ⚡ |

## 07 Start and stop control parameters

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function                                  | Setting range  | Factory setting |   |
|-----------|---|--|-----------------|---|
| 07-00     | Startup mode  | 0:Direct start<br>1:Rotation speed tracking restart<br>2:Pre-excitation start  | 0               | ↗ |
| 07-01     | Startup frequency                                   | 0.00Hz~10.00Hz   | 0.00Hz          | ↗ |
| 07-02     | Startup frequency holding time                      | 0.0s~100.0s  | 0.0s            |   |
| 07-03     | Startup DC braking current / pre-excitation current | 0%~100%  | 0%              |   |
| 07-04     | Startup DC braking time / pre-excitation time       | 0.0s~100.0s  | 0.0s            |   |
| 07-05     | Stop mode   | 0:Decelerate to stop<br>1:Coast to stop  | 0               | ↗ |
| 07-06     | Starting DC braking frequency at stop               | 0.00Hz~max frequency   | 0.00Hz          | ↗ |
| 07-07     | DC braking waiting time at stop                     | 0.0s~100.0s  | 0.0s            | ↗ |
| 07-08     | DC braking current at stop                          | 0%~100%  | 0%              | ↗ |
| 07-09     | DC braking time at stop                             | 0.0s~100.0s  | 0.0s            | ↗ |
| 07-10     | Brake usage   | 0%~100%  | 80%             | ↗ |
| 07-11     | Acceleration and deceleration mode                  | 0:linear acceleration / deceleration<br>1:S curve acceleration and deceleration A<br>2:S curve acceleration / deceleration B | 0               |   |
| 07-12     | S curve start time ratio                            | 0.0%~(100.0%-07-13)  | 30.0%           |   |
| 07-13     | S curve end time ratio                              | 0.0%~(100.0%-07-12)  | 30.0%           |   |
| 07-14     | Rotation speed tracking mode                        | 0:Start from stop frequency<br>1:Start from zero speed<br>2:Start from maximum frequency                                     | 0               |   |
| 07-15     | Rotation speed tracking speed                       | 1~100  | 20              |   |

## 08 Man-machine interface parameters

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function               | Setting range   | Factory setting |   |
|-----------|----------------------------------|---|-----------------|---|
| 08-00     | User password                    | 0~65535   | 0               | ↗ |
| 08-01     | QUICK/JOG key function selection | 0:QUICK/JOG invalid<br>1:Keyboard command channel and remote command channel (terminal Terminal command channel or communication command channel) switch<br>2:Forward and reverse switching<br>3:Forward jog<br>4:Reverse jog | 3               |   |
| 08-02     | STOP/RESET key function          | 0:Only in the keyboard operation mode, the STOP/RESET key stop function is effective<br>1:In any operation mode, the STOP/RESET key stop function is effective  | 1               | ↗ |

## 08 Man-machine interface parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                | Setting range  | Factory setting |   |
|-----------|-----------------------------------|--|-----------------|---|
| 08-03     | LED operation display parameter 1 | 0000~FFFF<br>Bit00:Running frequenc 1(Hz)<br>Bit01:Setting frequency(Hz)<br>Bit02:BUS Voltage(V)<br>Bit03:Output voltage(V)<br>Bit04:Output current(A)   | 1F              | ⚡ |
| 08-03     | LED operation display parameter 1 | Bit05:Output power(kW)<br>Bit06:Output torque(%)<br>Bit07:MI input status<br>Bit08:MO output status<br>Bit09:AVI1 voltage(V)<br>Bit10:AVI2/ACI voltage(V)<br>Bit11:Reserved<br>Bit12:Count value<br>Bit13:Length<br>Bit14:Load speed<br>Bit15:PID setting  | 1F              | ⚡ |
| 08-04     | LED operation display parameter 2 | 0000~FFFF<br>Bit00:PID feedback<br>Bit01:PLC stage<br>Bit02:PULSE input pulse frequency(kHz)<br>Bit03:Running frequenc 2(Hz)<br>Bit04:Remaining running time<br>Bit05:AVI1 voltage before correction(V)<br>Bit06:AVI2/ACI voltage before correction(V)<br>Bit07:Reserved<br>Bit08:Line speed<br>Bit09:Current power-on time(Hour)<br>Bit10:Current running time(Min)<br>Bit11:PULSE input pulse frequency(Hz)<br>Bit12:Communication setting value<br>Bit13:Reserved<br>Bit14:Main frequency X display (Hz)<br>Bit15:Auxiliary frequency Y display(Hz) | 0               | ⚡ |
| 08-05     | LED shutdown display parameters   | 0000~FFFF<br>Bit00:Setting frequency(Hz)<br>Bit01:BUS voltage(V)<br>Bit02:MI input status<br>Bit03:MO output status<br>Bit04:AVI1 voltage(V)<br>Bit05:AVI2/ACI voltage(V)<br>Bit06:Reserved<br>Bit07:Count value<br>Bit08:Length<br>Bit09:PLC stage<br>Bit10:Load speed<br>Bit11:PID setting<br>Bit12:PULSE input pulse frequency(kHz)   | 33              | ⚡ |

## 08 Man-machine interface parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                              | Setting range   | Factory setting |   |
|-----------|---|---|-----------------|---|
| 08-06     | Load speed display coefficient                  | 0.0001~6.5000   | 1               | ⚡ |
| 08-07     | Reserved  |   | -               |   |
| 08-08     | Inverter module radiator temperature            | 0.0℃~100.0℃   | -               |   |
| 08-09     | Reserved  | -   | -               |   |
| 08-10     | Software version No.                            | -   | -               |   |
| 08-11     | Cumulative running time                         | 0h~65535h   | -               |   |
| 08-12     | Load speed display the number of decimal places | Units: Number of decimal places for load speed<br>Tens place: Number of decimal places for feedback speed<br>0:0 decimal place<br>1:1 decimal place<br>2:2 decimal places<br>3:3 decimal places | 21              | ⚡ |
| 08-13     | Cumulative power-on time                        | 0h~65535h   | -               |   |
| 08-14     | Cumulative power consumption                    | 0~65535 degree  | -               |   |

## 09 Accessibility parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function   | Setting range  | Factory setting |   |
|-----------|--|--|-----------------|---|
| 09-00     | Jog running frequency  | 0.00Hz~max frequency   | 5.00Hz          | ⚡ |
| 09-01     | Jog acceleration time  | 0.0s~6500.0s   | 20.0s           | ⚡ |
| 09-02     | Jog deceleration time  | 0.0s~6500.0s   | 20.0s           | ⚡ |
| 09-03     | Acceleration time 2  | 0.0s~6500.0s   | Type setting    | ⚡ |
| 09-04     | Deceleration time 2  | 0.0s~6500.0s   |                 | ⚡ |
| 09-05     | Acceleration time 3  | 0.0s~6500.0s   |                 | ⚡ |
| 09-06     | Deceleration time 3  | 0.0s~6500.0s   |                 | ⚡ |
| 09-07     | Acceleration time 4  | 0.0s~6500.0s   |                 | ⚡ |
| 09-08     | Deceleration time 4  | 0.0s~6500.0s   |                 | ⚡ |
| 09-09     | Jump frequency 1   | 0.00Hz~max frequency   | 0.00Hz          | ⚡ |
| 09-10     | Jump frequency 2   | 0.00Hz~max frequency   | 0.00Hz          | ⚡ |
| 09-11     | Jump frequency Amplitude   | 0.00Hz~max frequency   | 0.00Hz          | ⚡ |
| 09-12     | Forward and reverse dead time                                      | 0.0s~3000.0s   | 0.0s            | ⚡ |
| 09-13     | Reverse control enable   | 0:Enabled<br>1:Disabled  | 0               | ⚡ |
| 09-14     | Operating mode with set frequency lower than lower limit frequency | 0:Run at the lower limit frequency<br>1:Downtime<br>2:Zero speed operation | 0               | ⚡ |
| 09-15     | Drop control   | 0.00Hz~10.00Hz   | 0.00Hz          | ⚡ |

| 09 Accessibility parameters                                 |   |  |                 |   |
|---|---|--|-----------------|---|
| ↗ indicates that the parameters can be set during operation |   |  |                 |   |
| Parameter   | Parameter function  | Setting range  | Factory setting |   |
| 09-16   | Set cumulative power-on arrival time  | 0h~65000h  | 0h              | ↗ |
| 09-17   | Set cumulative running arrival time   | 0h~65000h  | 0h              | ↗ |
| 09-18   | Power-on operation protection options   | 0:Run command is valid when power on<br>1:Run command is invalid when power on | 1               | ↗ |
| 09-19   | Frequency detection value(FDT1)   | 0.00Hz~max frequency   | 50.00Hz         | ↗ |
| 09-20   | Frequency detection hysteresis(FDT1)  | 0.0%~100.0%(FDT1 Level)  | 5.0%            | ↗ |
| 09-21   | Frequency reach detection width   | 0.0%~100.0%(max frequency)   | 0.0%            | ↗ |
| 09-22   | Whether the jump frequency is effective during acceleration and deceleration  | 0:Invalid<br>1:Valid   | 0               | ↗ |
| 09-25   | Switching frequency point between acceleration time 1 and acceleration time 2 | 0.00Hz~max frequency   | 0.00Hz          | ↗ |
| 09-26   | Switching frequency point between deceleration time 1 and deceleration time 2 | 0.00Hz~max frequency   | 0.00Hz          | ↗ |
| 09-27   | Terminal jogging priority   | 0:Invalid<br>1:Valid   | 0               | ↗ |
| 09-28   | Frequency detection value(FDT2)   | 0.00Hz~max frequency   | 50.00Hz         | ↗ |
| 09-29   | Frequency detection hysteresis(FDT2)  | 0.0%~100.0%(FDT2 Level)  | 5.0%            | ↗ |
| 09-30   | Arbitrary arrival frequency detection value 1                                 | 0.00Hz~max frequency   | 50.00Hz         | ↗ |
| 09-31   | Arbitrary arrival frequency detection width 1                                 | 0.0%~100.0%(max frequency)   | 0.0%            | ↗ |
| 09-32   | Arbitrary arrival frequency detection value 2                                 | 0.00Hz~max frequency   | 50.00Hz         | ↗ |
| 09-33   | Arbitrary arrival frequency detection width 2                                 | 0.0%~100.0%(max frequency)   | 0.0%            | ↗ |
| 09-34   | Zero current detection level  | 0.0%~300.0%<br>100.0% corresponds to the rated current of the motor            | 5.0%            | ↗ |
| 09-35   | Zero current detection delay time   | 0.01s~600.00s  | 0.10s           | ↗ |
| 09-36   | Output current limit  | 0.0% (No detection)<br>0.1%~300.0% (motor rated current)                       | 200.0%          | ↗ |
| 09-37   | Output overcurrent detection delay time                                       | 0.00s~600.00s  | 0.00s           | ↗ |
| 09-38   | Arbitrary arrival current 1   | 0.0%~300.0%(motor rated current)   | 100.0%          | ↗ |
| 09-39   | Arbitrary arrival current 1 width   | 0.0%~300.0%(motor rated current)   | 0.0%            | ↗ |
| 09-40   | Arbitrary arrival current 2   | 0.0%~300.0%(motor rated current)   | 100.0%          | ↗ |
| 09-41   | Arbitrary arrival current 2 width   | 0.0%~300.0%(motor rated current)   | 0.0%            | ↗ |

| 09 Accessibility parameters                                 |  |  |                 |   |
|---|--|--|-----------------|---|
| ↗ indicates that the parameters can be set during operation |  |  |                 |   |
| Parameter   | Parameter function                                 | Setting range  | Factory setting |   |
| 09-42   | Timing function selection                          | 0:Invalid<br>1:Valid   | 0               |   |
| 09-43   | Timed running time selection                       | 0:09-44 setting<br>1:AVI1<br>2:AVI2/ACI<br>3:Reserved<br>Analog input range corresponds to 09-44 | 0               |   |
| 09-44   | Timed running time                                 | 0.0Min~6500.0Min   | 0.0Min          |   |
| 09-45   | Lower limit of AVI1 input voltage protection value | 0.00V~09-46  | 3.10V           | ↗ |
| 09-46   | Upper limit of AVI1 input voltage protection value | 09-45~11.00V   | 6.80V           | ↗ |
| 09-47   | Module temperature reached                         | 0℃~100℃  | 75℃             | ↗ |
| 09-48   | Cooling fan control                                | 0:Fans run during operation<br>1:The fan keeps running   | 0               |   |
| 09-49   | Wake frequency                                     | Sleep frequency(09-51)~max frequency(00-03)  | 0.00Hz          | ↗ |
| 09-50   | Wake delay time                                    | 0.0s~6500.0s   | 0.0s            | ↗ |
| 09-51   | Sleep frequency                                    | 0.00Hz~Wake frequency(09-49)   | 0.00Hz          | ↗ |
| 09-52   | Sleep delay time                                   | 0.0s~6500.0s   | 0.0s            | ↗ |
| 09-53   | Arrival time setting for this run                  | 0.0Min~6500.0Min   | 0.0Min          | ↗ |

| 10 PID Control parameters                                   |                     |   |                 |   |
|---|---------------------|---|-----------------|---|
| ↗ indicates that the parameters can be set during operation |                     |   |                 |   |
| Parameter   | Parameter function  | Setting range   | Factory setting |   |
| 10-00   | PID given source    | 0:10-01 setting<br>1:AVI1<br>2:AVI2/ACI<br>3:Reserved<br>4:PULSE setting(MI5)<br>5:Communication setting<br>6:Multi-step speed command given  | 0               | ↗ |
| 10-01   | PID data given      | 0.0%~100.0%   | 50.0%           | ↗ |
| 10-02   | PID feedback source | 0:AVI1<br>1:AVI2/ACI<br>2:Reserved<br>3:AVI1-AVI2/ACI<br>4:PULSE setting(MI5)<br>5:Communication setting<br>6:AVI1+AVI2/ACI<br>7:MAX( AVI1 ,  AVI2/ACI )<br>8:MIN( AVI1 ,  AVI2/ACI ) | 0               | ↗ |



| 10 PID Control parameters |  |   | ⚡ indicates that the parameters can be set during operation |   |
|---------------------------|--|---|---|---|
| Parameter                 | Parameter function   | Setting range   | Factory setting   |   |
| 10-03                     | PID action direction   | 0:Positive action      1:Reaction   | 0   | ⚡ |
| 10-04                     | PID given feedback range                                       | 0~65535   | 1000  | ⚡ |
| 10-05                     | Proportional gain Kp1  | 0.0~100.0   | 20  | ⚡ |
| 10-06                     | Integration time Ti1   | 0.00s~10.00s  | 2.00s   | ⚡ |
| 10-07                     | Differential time Td1  | 0.000s~10.000s  | 0.000s  | ⚡ |
| 10-08                     | PID reverse cutoff frequency                                   | 0.00~Max frequency  | 0.00Hz  | ⚡ |
| 10-09                     | PID deviation limit  | 0.0%~100.0%   | 0.0%  | ⚡ |
| 10-10                     | PID differential limiting                                      | 0.00%~100.00%   | 0.10%   | ⚡ |
| 10-11                     | PID given change time  | 0.00~650.00s  | 0.00s   | ⚡ |
| 10-12                     | PID feedback filter time                                       | 0.00~60.00s   | 0.00s   | ⚡ |
| 10-13                     | PID output filter time   | 0.00~60.00s   | 0.00s   | ⚡ |
| 10-14                     | Reserved   | -   | -   | ⚡ |
| 10-15                     | Proportional gain Kp2  | 0.00~100.00   | 20.00   | ⚡ |
| 10-16                     | Integration time Ti2   | 0.00s~10.00s  | 2.00s   | ⚡ |
| 10-17                     | Differential time Td2  | 0.000s~10.000s  | 0.000s  | ⚡ |
| 10-18                     | PID parameter switching conditions                             | 0:No switch<br>1:Switch via MI terminal<br>2:Automatically switch according to deviation  | 0   | ⚡ |
| 10-19                     | PID parameter switching deviation 1                            | 0.0%~10-20  | 20.0%   | ⚡ |
| 10-20                     | PID parameter switching deviation 2                            | 10-19~100.0%  | 80.0%   | ⚡ |
| 10-21                     | PID Initial value  | 0.0%~100.0%   | 0.0%  | ⚡ |
| 10-22                     | PID initial value hold time                                    | 0.00~650.00s  | 0.00s   | ⚡ |
| 10-23                     | Maximum deviation between two PID outputs in forward direction | 0.00%~100.00%   | 1.00%   | ⚡ |
| 10-24                     | Maximum deviation between two PID outputs in reverse direction | 0.00%~100.00%   | 1.00%   | ⚡ |
| 10-25                     | PID integral attribute   | Single digit: Integral separation<br>0:Invalid<br>1:Valid<br>Tens digital: Whether to stop integration after output to limit<br>0:Continue to integrate<br>1:Stop integration | 0   | ⚡ |
| 10-26                     | PID feedback loss detection value                              | 0.0%:No judge the loss of feedback<br>0.1%~100.0%   | 0.0%  | ⚡ |
| 10-27                     | PID feedback loss detection time                               | 0.0s~20.0s  | 0.0s  | ⚡ |
| 10-28                     | PID shutdown calculation                                       | 0:No operation during shutdown<br>1:Operation at shutdown   | 0   | ⚡ |

| 11 Fault and protection parameters                          |   |   |                 |   |
|---|---|---|-----------------|---|
| ↗ indicates that the parameters can be set during operation |   |   |                 |   |
| Parameter   | Parameter function  | Setting range   | Factory setting |   |
| 11-00   | Motor overload protection selection   | 0:Disabled<br>1:Enabled   | 1               | ↗ |
| 11-01   | Motor overload protection gain  | 0.20~10.00  | 1               | ↗ |
| 11-02   | Motor overload pre-warning coefficient  | 50%~100%  | 80%             | ↗ |
| 11-03   | Power-on short circuit protection selection   | 0:Invalid<br>1:Valid  | 1               | ↗ |
| 11-09   | Fault automatic reset times   | 0~20  | 0               | ↗ |
| 11-10   | Action selection of fault multi-function output terminal during fault automatic reset | 0:No action<br>1:Action   | 0               | ↗ |
| 11-11   | Fault automatic reset interval time   | 0.1s~100.0s   | 1.0s            | ↗ |
| 11-12   | Input phase loss protection selection   | 0:Disabled<br>1:Enabled   | 1               | ↗ |
| 11-13   | Output phase loss protection selection  | 0:Disabled<br>1:Enabled   | 1               | ↗ |
| 11-14   | First failure type  | 0:No fault  | —               |   |
| 11-15   | Second failure type   | 1:Short circuit protection (sc)<br>2:Overcurrent during acceleration (oc1)<br>3:Overcurrent during deceleration (oc2)<br>4:Overcurrent at constant speed (oc3)<br>5:Overvoltage during acceleration (ou1)<br>6:Overvoltage during deceleration (ou2)<br>7:Overvoltage at constant speed (ou3)<br>8:Reserved   | —               |   |
| 11-16   | Third (last) fault type   | 9:Undervoltage (UV)<br>10:Inverter overload (OL2)<br>11:Motor overload (ORL1)<br>12:Input phase loss (SPI)<br>13:Output phase loss (SPO)<br>14:Module overheat (oh2)<br>15:External fault (EF)<br>16:Communication error (CE)<br>17:Contactor fault (Cotr)<br>18:Current detection fault (it)<br>19:Motor auto-tuning fault (TE)<br>20:Reserved<br>21:EEPROM read write error (EEP)<br>22:Inverter hardware fault (EIU)<br>23:Motor short circuit to ground (SG)<br>24:Reserved<br>25:Reserved<br>26:Running time arrival(Eond)<br>27:Reserved<br>28:Reserved<br>29:Power-on time arrival(EIND) | —               |   |

## 11 Fault and protection parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                                 | Setting range  | Factory setting |   |
|-----------|--|--|-----------------|---|
|           |  | 30:Load failure (oLL)<br>31:The PID feedback disconnected (EPID)<br>40:Wave-by-wave current limiting fault (CbC) |                 |   |
| 11-17     | Frequency at the third (latest) failure            | —  | —               |   |
| 11-18     | Current at the third (latest) fault                | —  | —               |   |
| 11-19     | Bus voltage at the third (latest) fault            | —  | —               |   |
| 11-20     | Input terminal status at the third (latest) fault  | —  | —               |   |
| 11-21     | Output terminal status at the third (latest) fault | —  | —               |   |
| 11-22     | Inverter status at the third (latest) fault        | —  | —               |   |
| 11-23     | Power-on time at the third (latest) fault          | —  | —               |   |
| 11-24     | Running time at the third (latest) failure         | —  | —               |   |
| 11-27     | Frequency at second failure                        | —  | —               |   |
| 11-28     | Current at second fault                            | —  | —               |   |
| 11-29     | Bus voltage at the second fault                    | —  | —               |   |
| 11-30     | Input terminal status at the second fault          | —  | —               |   |
| 11-31     | Output terminal status at the second fault         | —  | —               |   |
| 11-32     | Inverter status at the second fault                | —  | —               |   |
| 11-33     | Power-on time at the second fault                  | —  | —               |   |
| 11-34     | Running time on second failure                     | —  | —               |   |
| 11-37     | Frequency at first failure                         | —  | —               |   |
| 11-38     | Current at first fault                             | —  | —               |   |
| 11-39     | Bus voltage at first fault                         | —  | —               |   |
| 11-40     | Input terminal status at the first fault           | —  | —               |   |
| 11-41     | Output terminal status at the first fault          | —  | —               |   |
| 11-42     | Inverter status at first fault                     | —  | —               |   |
| 11-43     | Power-on time at first failure                     | —  | —               |   |
| 11-44     | Operating time at first failure                    | —  | —               |   |
| 11-47     | Fault protection action selection1                 | Single digit:Motor overload<br>0:Coast to stop<br>1:Stop according to the stop mode<br>2:Continue to run         | 0               | ⚡ |

## 11 Fault and protection parameters

⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function  | Setting range  | Factory setting |   |
|-----------|---|--|-----------------|---|
|           |   | Tens digital:input phase loss(Same bit)<br>hundreds digital:output phase loss(Same bit)<br>thousands digital:External fault(Same bit)<br>ten thousands digital:Communication error(Same bit)   |                 |   |
| 11-48     | Fault protection action selection 2                       | Single digit:Reserved<br>Tens digital:EEPROM read write fault<br>0:Coast to stop<br>1:Stop according to the stop mode<br>hundreds digital:Reserved<br>thousands digital:Reserved<br>ten thousands digital:Operating time arrival(same as 11-47 digits)   | 0               | ⚡ |
| 11-49     | Fault protection action selection 3                       | Single digit:Reserved<br>Tens digital:Reserved<br>hundreds digital:Power-on time arrival(same as 11-47 digits)<br>thousands digital:Lost load<br>0:Coast to stop<br>1:Stop according to the stop mode<br>2:Decelerate to 7% of the rated frequency of the motor and continue to run. If the load is not lost, it will automatically return to the set frequency.<br>ten thousands digital:PID feedback lost during operation(same as 11-47 digits) | 0               | ⚡ |
| 11-50     | Fault protection action selection 4                       | Reserved   | 0               | ⚡ |
| 11-54     | Continue running frequency selection in case of failure   | 0:Run at current operating frequency<br>1:Run at set frequency<br>2:Run at upper limit frequency<br>3:Run at the lower limit frequency<br>4:Run at abnormal standby frequency  | 0               | ⚡ |
| 11-55     | Abnormal standby frequency                                | 0.0% ~ 100.0%(100.0% corresponds to the maximum frequency 00-03)   | 100.0%          | ⚡ |
| 11-56     | Reserved  |  |                 |   |
| 11-57     | Reserved  |  |                 |   |
| 11-58     | Reserved  |  |                 |   |
| 11-59     | Instantaneous power failure action selection              | 0:Invalid<br>1:Deceleration<br>2:Decelerate to stop  | 0               | ⚡ |
| 11-60     | Instantaneous power failure action pause judgment voltage | 80~100.0%  | 85%             | ⚡ |
| 11-61     | Judgment time of instantaneous power failure voltage rise | 0.0s~100.0s  | 0.5s            | ⚡ |

## 11 Fault and protection parameters

⚡ indicates that the parameters can be set during operation











| Parameter | Parameter function                              | Setting range                  | Factory setting |   |
|-----------|---|--------------------------------|-----------------|---|
| 11-62     | Judgment voltage of instantaneous power failure | 60%~100%(Standard bus Voltage) | 80%             | ⚡ |
| 11-63     | Lost load protection options                    | 0:Invalid<br>1:Valid           | 0               | ⚡ |
| 11-64     | Lost load detection level                       | 0.0~100.0%                     | 10.0%           | ⚡ |
| 11-65     | Lost load detection time                        | 0.0s~60.0s                     | 1.0s            | ⚡ |
| 11-67     | Reserved  |                                |                 |   |
| 11-68     | Reserved  |                                |                 |   |
| 11-69     | Reserved  |                                |                 |   |
| 11-70     | Reserved  |                                |                 |   |

## 12 Serial communication parameters


⚡ indicates that the parameters can be set during operation

| Parameter | Parameter function                       | Setting range  | Factory setting |   |
|-----------|--|--|-----------------|---|
| 12-00     | Local address                            | 1~247, 0 is broadcast address  | 1               | ⚡ |
| 12-01     | Baud rate                                | Single digit:modbus<br>0:300bps<br>1:600bps<br>2:1200bps<br>3:2400bps<br>4:4800bps<br>5:9600bps<br>6:19200bps<br>7:38400bps<br>8:57600bps<br>9:115200bps | 0005            | ⚡ |
| 12-02     | Data formate                             | 0:No checking(8-N-1)<br>1:Even parity checking(8-E-1)<br>2:Odd parity checking(8-O-1)<br>3:No checking(8-N-2)  | 0               | ⚡ |
| 12-03     | Communication response delay             | 0ms~20ms   | 2               | ⚡ |
| 12-04     | Communication timeout                    | 0.0(invalid), 0.1s~60.0s   | 0               | ⚡ |
| 12-05     | Reserved                                 |  |                 | ⚡ |
| 12-06     | Communication reading current resolution | 0:0.01A<br>1:0.1A  | 0               | ⚡ |






### 13 Wobble frequency counting parameters indicates that the parameters can be set during operation

| Parameter | Parameter function             | Setting range   | Factory setting |   |
|-----------|--------------------------------|---|-----------------|---|
| 13-00     | Wobble setting mode            | 0:Relative to center frequency<br>1:Relative to Max frequency | 0               |  |
| 13-01     | Wobble amplitude               | 0.0%~100.0%   | 0.0%            |  |
| 13-02     | Jump frequency amplitude       | 0.0%~50.0%  | 0.0%            |  |
| 13-03     | Wobble frequency cycle         | 0.1s~3000.0s  | 10.0s           |  |
| 13-04     | Wobble triangle wave rise time | 0.1%~100.0%   | 50.0%           |  |
| 13-05     | Set length                     | 0m~65535m   | 1000m           |  |
| 13-06     | Actual Length                  | 0m~65535m   | 0m              |  |
| 13-07     | Pulses per meter               | 0.1~6553.5  | 100.0           |  |
| 13-08     | Set count value                | 1~65535   | 1000            |  |
| 13-09     | Designated count value         | 1~65535   | 1000            |  |

### 16 Parameter management indicates that the parameters can be set during operation

| Parameter | Parameter function                | Setting range  | Factory setting |   |
|-----------|-----------------------------------|--|-----------------|---|
| 16-04     | Parameter modification properties | 0:Parameters can be read and written<br>1:The parameter is read-only | 0               |  |

### 17 Torque control parameters indicates that the parameters can be set during operation

| Parameter | Parameter function                                     | Setting range  | Factory setting |   |
|-----------|--|--|-----------------|---|
| 17-00     | Speed/torque control method selection                  | 0:Speed control<br>1:Torque control  | 0               |   |
| 17-01     | Torque setting source selection in torque control mode | 0:Digital setting1(17-03)<br>1:AVI1<br>2:AVI2/ACI<br>3:Reserved<br>4:PULSE<br>5:Communication setting<br>6:MIN(AVI1,AVI2/ACI)<br>7:MAX(AVI1,AVI2/ACI)(1-7 option full scale, corresponding to 17-03 digital setting) | 0               |   |
| 17-03     | Torque digital setting in torque control mode          | -200.0%~200.0%   | 150.0%          |  |
| 17-05     | Torque control forward maximum frequency               | 0.00Hz~Max frequency   | 50.00Hz         |  |
| 17-06     | Torque control reverse maximum frequency               | 0.00Hz~Max frequency   | 50.00Hz         |  |
| 17-07     | Torque control acceleration time                       | 0.00s~65000s   | 0.00s           |  |
| 17-08     | Torque control Deceleration time                       | 0.00s~65000s   | 0.00s           |  |

## 22 Control optimization parameters

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function                    | Setting range   | Factory setting        |   |
|-----------|---------------------------------------|---|------------------------|---|
| 22-00     | DPWM switching upper limit frequency  | 5.00Hz~Maximum operating frequency                                    | 8.00Hz                 | ↗ |
| 22-01     | Reserved                              |   |                        | ↗ |
| 22-02     | Dead zone compensation mode selection | 0:No compensation<br>1:Compensation mode 1                            | 1                      | ↗ |
| 22-03     | Random PWM depth                      | 0:Random PWM is invalid<br>1~10:Random depth of PWM carrier frequency | 0                      | ↗ |
| 22-04     | Fast current limit enable             | 0:No enabling<br>1:Enabling   | 1                      | ↗ |
| 22-05     | Current detection compensation        | 100~120   | 110                    | ↗ |
| 22-06     | Undervoltage level                    | DC200V-DC420V   | 220V:200V<br>380V:350V | ↗ |
| 22-07     | Reserved                              |   |                        |   |
| 22-08     | Reserved                              |   |                        |   |
| 22-09     | Overvoltage level                     | DC200V-DC820V   | 220V:400V<br>380V:820V |   |

## 99 Monitoring parameters

↗ indicates that the parameters can be set during operation

| Parameter | Parameter function    | Setting range |
|-----------|-----------------------|---------------|
| 99-00     | Running frequency(Hz) | 0.01Hz        |
| 99-01     | Setting frequency(Hz) | 0.01Hz        |
| 99-02     | Bus voltage(V)        | 0.1V          |
| 99-03     | Output voltage(V)     | 1V            |
| 99-04     | Output current(A)     | 0.01A         |
| 99-05     | Output power(kW)      | 0.1kW         |
| 99-06     | Output torque(%)      | 0.1%          |
| 99-07     | MI input status       | 1             |
| 99-08     | MO output status      | 1             |
| 99-09     | AVI1 voltage(V)       | 0.01V         |
| 99-10     | AVI2/ACI voltage(V)   | 0.01V         |
| 99-11     | Reserved              |               |
| 99-12     | Count value           | 1             |
| 99-13     | Length                | 1             |
| 99-14     | Load speed            | 1             |
| 99-15     | PID setting           | 1             |
| 99-16     | PID feedback          | 1             |
| 99-17     | PLC stage             | 1             |

## 99 Monitoring parameters

✎ indicates that the parameters can be set during operation

| Parameter | Parameter function  | Setting range |
|-----------|---|---------------|
| 99-18     | PULSE input pulse frequency(Hz)                               | 0.01kHz       |
| 99-19     | Feedback speed(Unit 0.1Hz)                                    | 0.1Hz         |
| 99-20     | Remaining running time  | 0.1Min        |
| 99-21     | AVI1 voltage before calibration                               | 0.001V        |
| 99-22     | AVI2/ACI voltage before calibration                           | 0.001V        |
| 99-23     | Reserved  |               |
| 99-24     | Line speed  | 1m/Min        |
| 99-25     | Current power-on time   | 1Min          |
| 99-26     | Current running time  | 0.1Min        |
| 99-27     | PULSE input pulse frequency                                   | 1Hz           |
| 99-28     | Communication setting value                                   | 0.01%         |
| 99-29     | Reserved  |               |
| 99-30     | Main frequency X display                                      | 0.01Hz        |
| 99-31     | Auxiliary frequency Y display                                 | 0.01Hz        |
| 99-32     | View any memory address value                                 | 1             |
| 99-33     | Reserved  |               |
| 99-34     | Reserved  |               |
| 99-35     | Target torque(%)  | 0.1%          |
| 99-36     | Reserved  |               |
| 99-37     | Reserved  |               |
| 99-38     | Reserved  |               |
| 99-39     | V/f separation target voltage                                 | 1V            |
| 99-40     | V/f separation output voltage                                 | 1V            |
| 99-41     | Visual display of MI input status                             | 1             |
| 99-42     | Visual display of MO input status                             | 1             |
| 99-43     | MI function status visual display 1(function 01- function 40) | 1             |
| 99-44     | MI function status visual display 2(function 41- function 50) | 1             |
| 99-59     | Setting frequency(%)  | 0.01%         |
| 99-60     | Running frequency(%)  | 0.01%         |
| 99-61     | Inverter status   | 1             |



## **5 DESCRIPTION OF FUNCTIONAL PARAMETERS**

This chapter will give a detailed description of all functional parameters. It is divided into various parameter groups according to the attributes of the parameters; making parameter setting easier. In most applications, users can complete the settings before operation according to the related parameter settings in the parameter group.

**The parameter groups are as follows**

| Parameter | Function                        | Parameter | Function                          | Parameter | Function                             |
|-----------|---------------------------------|-----------|-----------------------------------|-----------|--------------------------------------|
| 00        | Basic function parameters       | 06        | Output terminal parameters        | 12        | Serial communication parameters      |
| 01        | Motor control parameters        | 07        | Start and stop control parameters | 13        | Wobble frequency counting parameters |
| 02        | Vector control parameters       | 08        | Man-machine interface parameters  | 17        | Torque control parameters            |
| 03        | V/f control parameters          | 09        | Accessibility parameters          | 22        | Control optimization parameters      |
| 04        | Input terminal parameters       | 10        | PID control parameters            | 99        | Monitoring parameters                |
| 05        | Multi-speed, simple PLC control | 11        | Fault and protection parameters   |           |                                      |

↗ Indicates that the parameters can be set during operation

### **00 Basic Functions Parameters**

|              |                          |   |                                     |                 |   |
|--------------|--------------------------|---|-------------------------------------|-----------------|---|
| <b>00-00</b> | Command source selection |   | ↗                                   | Factory setting | 0 |
|              | Setting range            | 0 | Keyboard command (LED off)          |                 |   |
|              |                          | 1 | Terminal command (LED on)           |                 |   |
|              |                          | 2 | Communication command (LED flicker) |                 |   |

Select the input channel for inverter control commands.

Inverter control commands include: start, stop, forward, reverse, and jog.

0: Keyboard command channel ("LOC/REM" indicator off)

Run command control is performed by the RUN, STOP/RESET buttons on the operation panel.

1: Terminal command channel ("LOC/REM" indicator on)

Run command control is performed by multi-function input terminals FWD, REV, FJOG, RJOG, etc.

2: Communication command channel ("LOC/REM" indicator flicker)

The running command is given by the host computer through communication.

|              |   |   |                                       |                 |   |
|--------------|---|---|---------------------------------------|-----------------|---|
| <b>00-01</b> | Keyboard and terminal UP/DOWN setting selection |   | ↗                                     | Factory setting | 2 |
|              | Setting range                                   | 0 | Stop memory and power failure storage |                 |   |
|              |   | 1 | Stop memory                           |                 |   |
|              |   | 2 | Stop no memory                        |                 |   |

This function is only valid when the frequency source is set digitally.

"Stop memory" refers to the inverter is stopped, a digital frequency keep the last set frequency retention time, keyboard ▲, ▼ key or the UP terminal, the frequency correction for maintaining effective DOWN, and again after power down Still effective.

"Stop memory" means that after the inverter is stopped, the digital set frequency is retained as the set frequency at the last stop time, and the frequency correction by the keyboard ▲, ▼ keys or terminals UP and DOWN remains valid.

"Stop no memory" means that after the inverter stops, the digital set frequency value returns to the value of 00-06 (keyboard given frequency), and the frequency correction performed by the keyboard ▲, ▼ keys or terminals UP and DOWN is cleared.

| 00-02 | Main frequency source X selection |   | Factory setting   | 1 |
|-------|-----------------------------------|---|---|---|
|       | Setting range                     | 0 | Digital setting (keyboard given frequency 00-06, UP/DOWN can be modified) |   |
|       |                                   | 1 | AVI1  |   |
|       |                                   | 2 | AVI2/ACI  |   |
|       |                                   | 3 | Reserved  |   |
|       |                                   | 4 | Multi-speed command   |   |
|       |                                   | 5 | PID control   |   |
|       |                                   | 6 | Communication setting   |   |
|       |                                   | 7 | Simple PLC  |   |
|       |                                   | 8 | Panel potentiometer   |   |
|       |                                   | 9 | Pulse setting (MI5)   |   |

Select the input channel of the main given frequency of the inverter:

#### 0: Digital setting

The initial value of the set frequency is 00-06 "Keyboard given frequency" value. The set frequency value of the inverter can be changed by the ▲ and ▼ keys of the keyboard (or UP and DOWN of the multi-function input terminal).

Tip: Please refer to parameter 00-01 for UP and DOWN.

#### 1: AVI1

#### 2: AVI2/ACI

#### 3: Reserved

The frequency is determined by the analog input terminal. The control board provides 2 analog input terminals (AVI1, AVI2/ACI).

Among them, AVI1 is 0V ~ 10V voltage type input, AVI2/ACI can be 0V ~ 10V voltage input, can also be 4mA ~ 20mA current input, selected by the jumper on the control board.

The corresponding relationship between the input voltage value of AVI1, AVI2/ACI and the target frequency can be freely selected by the user.

#### 4: Multi-speed command

When this frequency setting mode is selected, the inverter runs in multi-speed mode. Group 04 and Group 05 "multi-stage speed control group" parameters need to be set to determine the correspondence between a given percentage and a given frequency, the multi-step speed command will take precedence over other frequency reference methods.

#### 5: PID

If this parameter is selected, the inverter operation mode is process PID control. At this time, 10 groups of "PID control groups" need to be set. The running frequency of the inverter is the frequency value after PID function. For the meaning of PID given source, given amount and feedback source, please refer to the introduction of 10 groups of "PID function".

## 6: Communication setting

The frequency command is given by the host computer through communication. For details, please refer to 12 Communication protocol.

## 7: Simple PLC

When the frequency source is a simple PLC, the operating frequency source of the inverter can be switched between 1 to 16 arbitrary frequency commands. The holding time of 1 to 16 frequency commands and the respective acceleration and deceleration time can also be set by the user. 05 group related instructions.

## 8: Panel potentiometer

The main frequency source is given by the rotation of the potentiometer on the panel.

## 9: Pulse setting (MI5)

Frequency setting is given by terminal pulse (pulse can only be input from input terminal MI5). Pulse given signal specifications: voltage range 20V ~ 27V, frequency range 0kHz ~ 100kHz.

The pulse frequency of the MI5 terminal input is set with reference to 04-28~04-31. The pulse input is set to 100.0%, relative to the percentage of the maximum frequency 00-03.

|       |                   |                  |                 |          |
|-------|-------------------|------------------|-----------------|----------|
| 00-03 | Maximum frequency |                  | Factory setting | 50.00 Hz |
|       | Setting range     | 50.00Hz~500.00Hz |                 |          |

Used to set the maximum output frequency of the inverter. Frequency commands are all scaled according to this parameter, which is the basis of frequency setting.

The maximum output frequency of S3100E can reach 3200Hz. The frequency command resolution and frequency input range can be changed by selecting the number of decimal places of frequency command through 00-25.

When 00-25 is 1, the frequency resolution is 0.1Hz, and the setting range of 00-03 is 50.0Hz~3200.0Hz;

|       |                       |   |                 |         |
|-------|-----------------------|---|-----------------|---------|
| 00-04 | Upper limit frequency | ↗   | Factory setting | 50.00Hz |
|       | Setting range         | Lower limit frequency 00-05~max frequency 00-03 |                 |         |

When the upper limit frequency is set by analog or PULSE, 00-21 is used as the offset value of the set value, and the offset frequency is 00-20.

The set upper limit frequency value is superimposed as the final upper limit frequency setting value.

|       |                       |                                    |                 |        |
|-------|-----------------------|------------------------------------|-----------------|--------|
| 00-05 | Lower limit frequency | ↗                                  | Factory setting | 0.00Hz |
|       | Setting range         | 0.00Hz~Upper limit frequency 00-04 |                 |        |

When the frequency command is lower than the lower limit frequency set by 00-05, the inverter can be stopped, run at the lower limit frequency or run at zero speed, and set the operation mode through 09-14 (the set frequency is lower than the lower limit frequency operation mode).

|       |                            |                          |                 |         |
|-------|----------------------------|--------------------------|-----------------|---------|
| 00-06 | Keyboard setting frequency | ↗                        | Factory setting | 50.00Hz |
|       | Setting range              | 0.00~max frequency 00-03 |                 |         |

When the frequency source is selected as "digital setting", the parameter value is the initial value of the frequency digital setting of the inverter.

|       |                     |              |                 |              |
|-------|---------------------|--------------|-----------------|--------------|
| 00-07 | Acceleration time1  | ↗            | Factory setting | Type setting |
|       | Setting range       | 0.00s~65000s |                 |              |
| 00-08 | Deceleration time 1 | ↗            | Factory setting | Type setting |
|       | Setting range       | 0.00s~65000s |                 |              |

The acceleration time refers to the time required for the inverter to accelerate from zero frequency to the acceleration and deceleration base frequency (determined from 00-23), see t1 in Figure 5-1.

The deceleration time refers to the time required for the inverter to decelerate to the zero frequency from the base frequency of acceleration and deceleration (determined from 00-23), see t2 in Figure 5-1

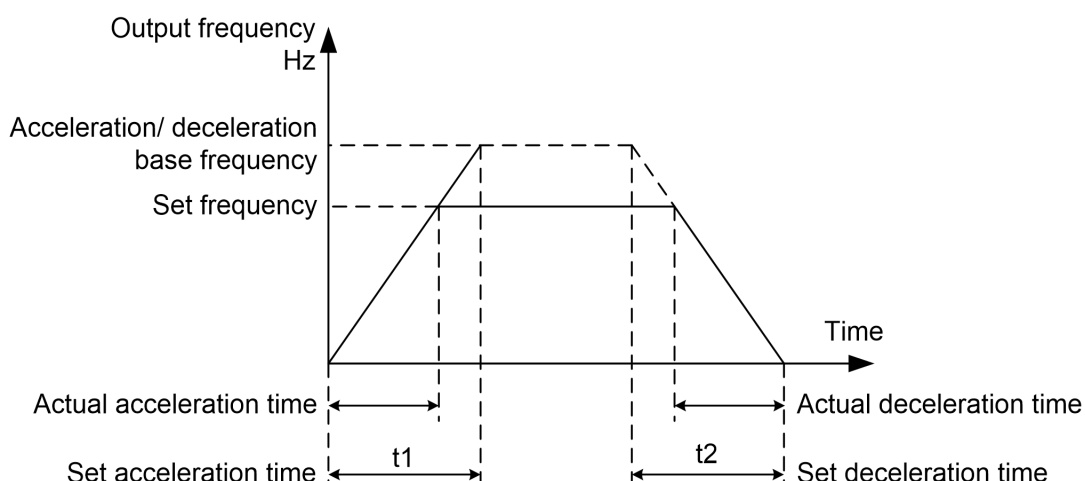


Figure 5-1 Schematic diagram of acceleration and deceleration time

S3100E provides 4 groups of acceleration and deceleration time, users can use the digital input terminal MI to switch selection, the four groups of acceleration and deceleration time are set by the following parameters:

The first group: 00-07, 00-08; The second group: 09-03, 09-04; The third group: 09-05, 09-06; The fourth group: 09-07, 09-08.

|       |                     |   |         |   |                 |   |
|-------|---------------------|---|---------|---|-----------------|---|
| 00-09 | Operation direction |   |         | ↗ | Factory setting | 0 |
|       | Setting range       | 0 | Reverse |   |                 |   |
|       |                     | 1 | Forward |   |                 |   |

Used to change the direction of the motor, its role is equivalent to changing the direction of motor rotation by adjusting any two motor lines.

Note: After the parameters are initialized, the motor running direction will return to its original state. For occasions where it is strictly forbidden to change the direction of the motor after system debugging, please use it with caution.

|       |                   |                |  |   |                 |              |
|-------|-------------------|----------------|--|---|-----------------|--------------|
| 00-10 | Carrier frequency |                |  | ↗ | Factory setting | Type setting |
|       | Setting range     | 0.5kHz~16.0kHz |  |   |                 |              |

This function adjusts the carrier frequency of the inverter. By adjusting the carrier frequency can reduce the motor noise, avoid the resonance point of the mechanical system, reduce the line leakage current to the ground and reduce the interference generated by the inverter.

The advantages of high carrier frequency: the current waveform is ideal, the current harmonics are less, and the motor noise is small;

Disadvantages of high carrier frequency: increased switching loss, increased temperature rise of the inverter, and affected the output capacity of the inverter. Under high carrier frequency, the inverter needs to be derated; at the same time, the leakage current of the inverter increases, which Increased electromagnetic interference.

The effect of carrier frequency on the following performance:

|                           |       |   |       |
|---------------------------|-------|---|-------|
| Carrier frequency         | Low   | → | High  |
| Motor noise               | Large | → | Small |
| Output current waveform   | Bad   | → | Good  |
| Motor temperature rise    | High  | → | Low   |
| Inverter temperature rise | Low   | → | High  |

|                                 |               |
|---------------------------------|---------------|
| Leakage current                 | Small → Large |
| External radiation interference | Small → Large |

The factory setting of carrier frequency is different according to different power models. The user can modify it as needed, but it should be noted that if the carrier frequency is set higher than the factory value, it will cause the temperature rise of the inverter radiator to increase. At this time, the user needs to derate the inverter, otherwise the inverter will be in danger of overheating.

|              |                          |                 |  |
|--------------|--------------------------|-----------------|--|
| <b>00-11</b> | Parameter initialization | Factory setting | 0  |
|              | Setting range            | 0               | No operation   |
|              |                          | 1               | Restore factory parameters, excluding motor parameters |
|              |                          | 2               | Clear record information                               |

1. Restore the factory settings, most of the inverter parameters are restored to the factory values, but the motor parameters, frequency command decimal point (00-25), fault record information, cumulative running time (08-11), cumulative power-on time (08-13), the cumulative power consumption (08-14) does not recover.

2. Clear record information

Clear the inverter fault record information, cumulative running time (08-11), cumulative power-on time (08-13), cumulative power consumption (08-14).

Note: The parameter value automatically returns to 0 after the operation is completed.

|       |  |   |     |   |                 |   |
|-------|--|---|-----|---|-----------------|---|
| 00-12 | Carrier frequency adjusts with temperature |   |     | ⚡ | Factory setting | 1 |
|       | Setting range                              | 0 | no  |   |                 |   |
|       |  | 1 | yes |   |                 |   |

The carrier frequency is adjusted with the temperature. When the inverter detects that the radiator temperature is high, the carrier frequency is automatically reduced to prevent the inverter temperature from rising too high and reduce the overheating alarm. When the temperature of the radiator drops, the carrier frequency automatically returns to the set value.

|              |   |                 |  |
|--------------|---|-----------------|--|
| <b>00-14</b> | Auxiliary frequency source Y selection (Refer to 00-02) | Factory setting | 0  |
|              | Setting range   | 0               | Digital setting (keyboard given frequency 00-06, UP /DOWN can be modified) |
|              |   | 1               | AVI1   |
|              |   | 2               | AVI2/ACI   |
|              |   | 3               | Reserved   |
|              |   | 4               | Multi-speed command  |
|              |   | 5               | PID control  |
|              |   | 6               | Communication setting  |
|              |   | 7               | Simple PLC   |
|              |   | 8               | Panel potentiometer  |
|              |   | 9               | Pulse setting (MI5)  |

When the auxiliary frequency source is used independently as the frequency reference channel (that is, the frequency source selection is switched to Y), the method of use is the same as the main frequency source X. You can refer to the 00-02 instructions.

When the auxiliary frequency source is given as a superposition (that is, the frequency source is selected as X+Y, X to X+Y switching or Y to X+Y switching), please note:

(1) When the auxiliary frequency source selects the digital setting, the given frequency (00-06) of the keyboard does not work, and the frequency can be adjusted by the ▲ and ▼ keys of the keyboard (or UP and DOWN of the multi-function input terminal). The frequency is adjusted on the basis of the main frequency.

(2) When the auxiliary frequency source selects analog (AVI1, AVI2/ACI) or pulse input as the timing, the input setting 100% corresponds to the frequency range, which can be set by 00-15 and 00-16.

Note: The setting values of 00-02 and 00-14 cannot be the same, that is, the auxiliary frequency source Y and the main frequency source X cannot select the same channel, otherwise the operation may be messy.

|       |   |         |   |                 |      |
|-------|---|---------|---|-----------------|------|
| 00-15 | Selection of auxiliary frequency source Y range during stacking |         | ↗                                       | Factory setting | 0    |
|       | Setting range   | 0       | Relative to the maximum frequency       |                 |      |
|       |   | 1       | Relative to the main frequency source X |                 |      |
| 00-16 | Auxiliary frequency source Y range when superimposed            |         | ↗                                       | Factory setting | 100% |
|       | Setting range   | 0%~150% |   |                 |      |

When the frequency source is selected as "frequency superposition" (that is, 00-17 is set to 1, 3 or 4), these two parameters are used to determine the adjustment range of the auxiliary frequency source.

00-15 if you select 1 relative to the main frequency source X, the range of the auxiliary frequency source will change with the change of the main frequency X.

|       |                                    |              |   |                 |   |
|-------|------------------------------------|--------------|---|-----------------|---|
| 00-17 | Frequency source overlay selection |              | ↗   | Factory setting | 0 |
|       | Setting range                      | Single digit | Frequency source selection  |                 |   |
|       |                                    | 0            | Main frequency source X   |                 |   |
|       |                                    | 1            | Main and auxiliary calculation results (the operation relationship is determined by ten digits) |                 |   |
|       |                                    | 2            | Switch between main frequency source X and auxiliary frequency source Y                         |                 |   |
|       |                                    | 3            | Switch between main frequency source X and main and auxiliary calculation results               |                 |   |
|       |                                    | 4            | Switch between auxiliary frequency source Y and main and auxiliary calculation results          |                 |   |
|       |                                    | Tens digit   | Frequency source main and auxiliary operation relationship                                      |                 |   |
|       |                                    | 0            | Main+auxiliary  |                 |   |
|       |                                    | 1            | Main-auxiliary  |                 |   |
|       |                                    | 2            | Maximum of both   |                 |   |
|       |                                    | 3            | Minimum of both   |                 |   |

Use this parameter to select the frequency reference channel. The frequency setting is realized by the combination of the main frequency source X and the auxiliary frequency source Y.

Single digit: frequency source selection:

0: Main frequency source X

The main frequency X is taken as the target frequency.

1: Main and auxiliary calculation results The main and auxiliary calculation results are used as the target frequency. For the relationship between the main and auxiliary calculations, please refer to the description of "Ten" of this parameter.

2: Switch between main frequency source X and auxiliary frequency source Y When multi-function input terminal function 18 (frequency switching) is invalid, main frequency X is used as the target frequency.

When the multi-function input terminal function 18 (frequency source switching) is valid, the auxiliary frequency Y is used as the target frequency.

3: Switch between main frequency source X and main and auxiliary calculation results When multi-function input terminal function 18 (frequency switching) is invalid, main frequency X is used as the target frequency. When the multi-function input terminal function 18 (frequency switching) is valid, the main and auxiliary calculation results are used as the target frequency.

4: Switch between auxiliary frequency source Y and main and auxiliary calculation results When multi-function input terminal function 18 (frequency switching) is invalid, auxiliary frequency Y is used as the target frequency. When the multi-function input terminal function 18 (frequency switching) is valid, the main and auxiliary calculation results are used as the target frequency.

Tens: Main and auxiliary calculation relationship of frequency source:

0: Main frequency source X + auxiliary frequency source Y

The sum of the main frequency X and the auxiliary frequency Y is taken as the target frequency. Realize the given function of frequency superposition.

1: Main frequency source X- auxiliary frequency source Y

The difference between the main frequency X and the auxiliary frequency Y is taken as the target frequency.

2: MAX (main frequency source X, auxiliary frequency source Y) Take the maximum absolute value of the main frequency X and auxiliary frequency Y as the target frequency.

3: MIN (main frequency source X, auxiliary frequency source Y) Take the minimum absolute value of the main frequency X and auxiliary frequency Y as the target frequency. In addition, when the frequency source is selected as the main and auxiliary operations, the offset frequency can be set through 00-19, and the offset frequency is superimposed on the main and auxiliary operation results to flexibly respond to various needs.

|       |   |                            |                 |        |
|-------|---|----------------------------|-----------------|--------|
| 00-19 | Auxiliary frequency source offset frequency when superimposed | ↗                          | Factory setting | 0.00Hz |
|       | Setting range   | 0.00Hz~max frequency 00-03 |                 |        |

This parameter is only valid when the frequency source is selected as the main and auxiliary operation.

When the frequency source is the main and auxiliary operation, 00-19 is used as the offset frequency, and the result of the main and auxiliary operation is superimposed as the final frequency setting value, and the frequency setting is more flexible.

|       |                        |   |                       |                 |   |
|-------|------------------------|---|-----------------------|-----------------|---|
| 00-20 | Upper frequency source |   |                       | Factory setting | 0 |
|       | Setting range          | 0 | 00-04 setting         |                 |   |
|       |                        | 1 | AVI1                  |                 |   |
|       |                        | 2 | AVI2/ACI              |                 |   |
|       |                        | 3 | Reserved              |                 |   |
|       |                        | 4 | Pulse setting         |                 |   |
|       |                        | 5 | Communication setting |                 |   |

Source selection for upper frequency. Especially in torque control, the output frequency of the inverter can be changed by changing the upper limit frequency.

Note: 100% of the analog input setting corresponds to 00-04.

|       |                        |                            |   |                 |        |
|-------|------------------------|----------------------------|---|-----------------|--------|
| 00-21 | Upper frequency offset |                            | ↗ | Factory setting | 0.00Hz |
|       | Setting range          | 0.00Hz～max frequency 00-03 |   |                 |        |

When the upper limit frequency is set by analog or PULSE, 00-21 is used as the offset value of the set value, and the offset frequency is superimposed on the set upper limit frequency value of 00-20 as the final set value of the upper limit frequency.

|       |   |   |       |                 |   |
|-------|---|---|-------|-----------------|---|
| 00-22 | Acceleration and deceleration time unit |   |       | Factory setting | 1 |
|       | Setting range                           | 0 | 1s    |                 |   |
|       |   | 1 | 0.1s  |                 |   |
|       |   | 2 | 0.01s |                 |   |

S3100E has 3 kinds of acceleration and deceleration time unit selection. When modified, the decimal points of the 4 groups of acceleration and deceleration time will change, and the corresponding acceleration and deceleration time will also change. In application, pay attention to the specific value of acceleration and deceleration time.

|       |  |   |                           |                 |   |
|-------|--|---|---------------------------|-----------------|---|
| 00-23 | Base frequency of acceleration and deceleration time |   |                           | Factory setting | 0 |
|       | Setting range  | 0 | Maximum frequency (00-03) |                 |   |
|       |  | 1 | Set frequency             |                 |   |
|       |  | 2 | 100Hz                     |                 |   |

The acceleration and deceleration time refers to the acceleration and deceleration time from zero frequency to the frequency set by 00-23. Figure 5-1 is the schematic diagram of acceleration and deceleration time.

When 00-23 is selected as 1, if the set frequency changes frequently, the acceleration of the motor will also follow the change, so you need to pay attention to it during application.

|       |   |   |                   |                 |   |
|-------|---|---|-------------------|-----------------|---|
| 00-24 | Base frequency for UP/DOWN command during running |   |                   | Factory setting | 1 |
|       | Setting range                                     | 0 | Running frequency |                 |   |
|       |   | 1 | Set frequency     |                 |   |

This parameter is valid only when the frequency source is digitally set.

When the ▲, ▼ keys on the keyboard or the terminal UP/DOWN change the frequency, select whether to increase or decrease based on the running frequency or increase or decrease based on the set frequency.

Note that when 0 is selected, when the inverter is increasing or decreasing when the inverter is in the process of acceleration and deceleration, the given frequency may change significantly.

|       |                              |   |        |                 |   |
|-------|------------------------------|---|--------|-----------------|---|
| 00-25 | Frequency command resolution |   |        | Factory setting | 2 |
|       | Setting range                | 1 | 0.1Hz  |                 |   |
|       |                              | 2 | 0.01Hz |                 |   |

This parameter is used to determine the number of decimal points for all frequencies, and the frequency resolution also changes accordingly.

When the frequency resolution is 0.1Hz, the maximum output frequency of S3100E can reach 3200.0Hz.



# 01 Motor Control Parameters

|       |                              |   |                                       |   |
|-------|------------------------------|---|---------------------------------------|---|
| 01-00 | The first motor control mode |   | Factory setting                       | 0 |
|       | Setting range                | 0 | Speed sensorless vector control (SVC) |   |
|       |                              | 2 | Vf control                            |   |

0: Speed sensorless vector control

Refers to open-loop vector control, which is suitable for the usual high-performance control occasions. One inverter can only drive one motor. Such as machine tools, centrifuges, wire drawing machines, injection molding machines and other loads.

2: V/f control Applicable to the occasions where the load requirement is not high, or one inverter drives multiple motors, such as fans and pumps. It can be used in a situation where one inverter drives multiple motors.

Tip: Motor vector parameter self-learning must be done when selecting vector control mode. Only accurate motor parameters can take advantage of the vector control method. By adjusting the speed regulator parameter 02 group of parameters, you can get better performance.

|       |                               |    |  |   |
|-------|-------------------------------|----|--|---|
| 01-01 | Motor parameter self-learning |    | Factory setting                          | 0 |
|       | Setting range                 | 0  | No self-learning                         |   |
|       |                               | 11 | Synchronous motor static self-learning   |   |
|       |                               | 12 | Synchronous motor complete self-learning |   |

0: No self-learning.

11: Synchronous motor static auto-tuning

When the synchronous motor can not be separated from the load, the synchronous motor with load auto-tuning has to be selected. In this process, the motor does not run.

Before the auto-tuning of synchronous motor with belt, it is necessary to set motor type and motor name plate parameter 01-02-01-06 correctly.

The synchronous motor is equipped with auto-tuning, and the frequency converter can obtain the initial position angle of the synchronous motor. At this time, it is necessary for the synchronous motor to operate normally. Therefore, the auto-tuning must be carried out before the synchronous motor is installed and used for the first time.

Action description: set the function code to 11, and then press the run key, the frequency converter will carry out on load auto-tuning.

12: Synchronous motor complete auto-tuning

If the motor can be separated from the load, it is recommended to select the no-load auto-tuning of synchronous motor, which can obtain better performance than the synchronous motor with load auto-tuning.

In the process of no-load auto-tuning, the inverter completes the on-load auto-tuning first, then accelerates to 00-06 according to the acceleration time 00-07, and then stops the machine according to the deceleration time 00-07 and ends the auto-tuning. Note that 00-06 must be set to a value other than 0, otherwise identification can not be carried out normally.

Before no-load auto-tuning of synchronous motor, in addition to setting motor type and motor nameplate parameters 01-02 ~ 01-06, it is also necessary to set encoder pulse number 01-27, encoder type 01-28, encoder pole pairs 01-34 and 01-35.

Action description: set the function code to 11, and then press the run key, the frequency converter will carry out no-load auto-tuning

Note: self learning can only be carried out in keyboard operation mode, and motor auto-tuning cannot be carried out in terminal operation and communication operation mode.

|       |                            |  |              |
|-------|----------------------------|--|--------------|
| 01-02 | Motor rated power          | Factory setting  | Type setting |
|       | Setting range              | 0.1kW~1000.0kW   |              |
| 01-03 | Motor rated frequency      | Factory setting  | Type setting |
|       | Setting range              | 0.01Hz~max frequency   |              |
| 01-04 | Motor rated rotation speed | Factory setting  | Type setting |
|       | Setting range              | 1rpm~65535rpm  |              |
| 01-05 | Motor rated voltage        | Factory setting  | Type setting |
|       | Setting range              | 1V~2000V   |              |
| 01-06 | Motor rated current        | Factory setting  | Type setting |
|       | Setting range              | 0.01A~655.35A(Inverter power <=55kW)<br>0.1A~6553.5A(Inverter power >55kW) |              |

Note: The above are the motor nameplate parameters, regardless of V/f control or vector control, the relevant parameters need to be set accurately according to the motor nameplate.

In order to obtain better V/f or vector control performance, motor parameter self-learning is required. Accurate parameter self-learning comes from the correct input of motor nameplate parameters.

|       |                      |                 |                                    |
|-------|----------------------|-----------------|------------------------------------|
| 01-12 | Motor type selection | Factory setting | 2                                  |
|       | Setting range        | 2               | Permanent magnet synchronous motor |

|       |   |  |              |
|-------|---|--|--------------|
| 01-16 | Stator resistance of synchronous motor    | Factory setting  | Type setting |
|       | Setting range                             | 0.001Ω~65.535Ω(Inverter power<=55kW)<br>0.0001Ω~6.5535Ω(Inverter power >55kW)    |              |
| 01-17 | D-axis inductance of synchronous motor    | Factory setting  | Type setting |
|       | Setting range                             | 0.01mH~655.35mH(Inverter power <=55kW)<br>0.001mH~65.535mH(Inverter power >55kW) |              |
| 01-18 | Q axis inductance of synchronous motor    | Factory setting  | Type setting |
|       | Setting range                             | 0.01mH~655.35mH(Inverter power <=55kW)<br>0.001mH~65.535mH(Inverter power >55kW) |              |
| 01-20 | Back-EMF coefficient of synchronous motor | Factory setting  | Type setting |
|       | Setting range                             | 0.1V~6553.5V   |              |

01-16~01-20 are the parameters of the synchronous motor. These parameters are generally not on the nameplate of the motor, and need to be obtained through the inverter self-learning.

Among them, "synchronous motor on-load learning" can only obtain three parameters 01-16~01-18, while "synchronous motor no-load learning" can obtain these four parameters.

If the synchronous motor cannot be learned on site, you can enter the above corresponding parameter values according to the parameters provided by the motor manufacturer.

## 02 Vector Control Parameters

02 Group parameters are only valid for vector control, not for V/f control.

|       |                                |                     |                 |         |
|-------|--------------------------------|---------------------|-----------------|---------|
| 02-00 | Speed loop proportional gain 1 | ↗                   | Factory setting | 20      |
|       | Setting range                  | 1~100               |                 |         |
| 02-01 | Speed loop integration time 1  | ↗                   | Factory setting | 0.50s   |
|       | Setting range                  | 0.01s~10.00s        |                 |         |
| 02-02 | Switching frequency 1          | ↗                   | Factory setting | 5.00Hz  |
|       | Setting range                  | 0.00~02-05          |                 |         |
| 02-03 | Speed loop proportional gain 2 | ↗                   | Factory setting | 20      |
|       | Setting range                  | 0~100               |                 |         |
| 02-04 | Speed loop integration time 2  | ↗                   | Factory setting | 1.00s   |
|       | Setting range                  | 0.01s~10.00s        |                 |         |
| 02-05 | Switching frequency 2          | ↗                   | Factory setting | 10.00Hz |
|       | Setting range                  | 02-02~max frequency |                 |         |

When the inverter runs at different frequencies, you can select different speed loop PI parameters. Below the switching frequency 1 (02-02), the speed loop PI parameters are: 02-00 and 02-01. Above the switching frequency 2 (02-05), the speed loop PI parameters are: 02-03 and 02-04. Between the two, the PI parameters are obtained from the linear changes of the two sets of parameters, as shown in Figure 5-2:

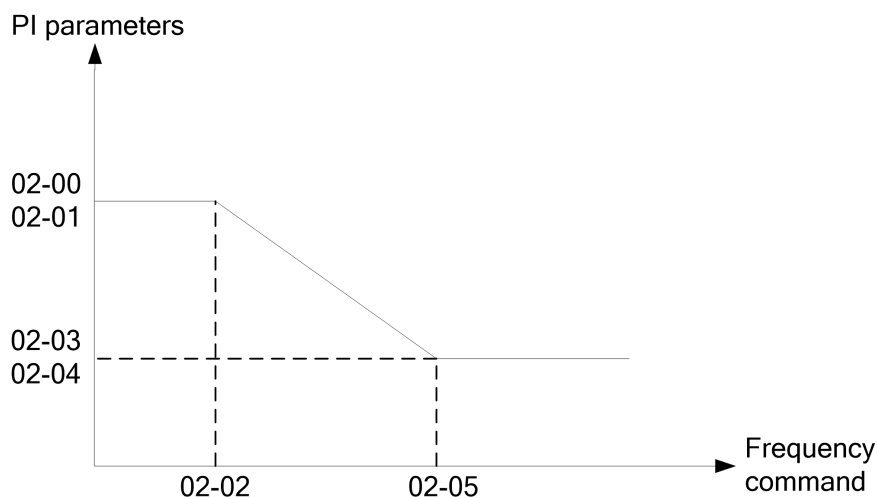


Figure 5-2 Schematic diagram of PI parameter

By setting the proportional coefficient and integral time of the speed regulator, the dynamic response characteristics of the speed loop of vector control can be adjusted. Increasing the proportional gain and reducing the integration time can speed up the dynamic response of the speed loop. However, if the proportional gain is too large or the integration time is too small, it is easy to cause system oscillation and overshoot. If the proportional gain is too small, it may easily lead to steady-state oscillation of the system, and there may be a static speed difference.

The PI parameters of the speed loop are closely related to the inertia of the system. For different load characteristics, the default PI parameters need to be adjusted to meet the needs of various occasions.

|       |                          |          |                 |      |
|-------|--------------------------|----------|-----------------|------|
| 02-06 | Vector control slip gain | ↗        | Factory setting | 100% |
|       | Setting range            | 50%~200% |                 |      |

For speed sensorless vector control, this parameter is used to adjust the speed stability accuracy of the motor: when the motor is loaded with a low speed, increase this parameter, and vice versa.

|       |   |             |                 |        |
|-------|---|-------------|-----------------|--------|
| 02-07 | Digital setting of torque upper limit in speed control mode | ↗           | Factory setting | 150.0% |
|       | Setting range   | 0.0%~200.0% |                 |        |

In speed control mode, the maximum value of the inverter's output torque is selected by the upper torque source 02-10. When the analog, PULSE pulse, and communication settings are selected, the corresponding set 100% corresponds to 02-07, 100% is the rated torque of the inverter.

|       |                                 |      |                 |    |
|-------|---------------------------------|------|-----------------|----|
| 02-08 | Speed loop filter time constant | ↗    | Factory setting | 28 |
|       | Setting range                   | 0~31 |                 |    |

In vector control mode, this parameter is used to filter the speed loop torque command. This parameter generally does not need to be adjusted. When the speed fluctuation is large, the filtering time can be increased appropriately; if the motor oscillates, the parameter should be appropriately reduced. The speed loop filter time constant is small, the output torque of the inverter may fluctuate greatly, but the speed response is fast.

|       |                                     |       |                 |    |
|-------|-------------------------------------|-------|-----------------|----|
| 02-09 | Vector control over excitation gain | ↗     | Factory setting | 64 |
|       | Setting range                       | 0~200 |                 |    |

During deceleration of the inverter, overexcitation control can suppress the rise of bus voltage and avoid overvoltage faults. The greater the overexcitation gain, the stronger the suppression effect.

However, if the gain is too large, it is easy to cause the output current to increase, which needs to be set appropriately. For the occasions with small inertia and braking resistance, it is recommended to set the gain to 0.

|       |   |   |                       |                 |   |
|-------|---|---|-----------------------|-----------------|---|
| 02-10 | Torque upper limit source in speed control mode       |   | ↗                     | Factory setting | 0 |
|       | Setting range   | 0 | Parameter setting     |                 |   |
|       |   | 1 | AVI1                  |                 |   |
|       |   | 2 | AVI2/ACI              |                 |   |
|       |   | 3 | reserved              |                 |   |
|       |   | 4 | Pulse setting         |                 |   |
|       |   | 5 | Communication setting |                 |   |
|       |   | 6 | MIN(AVI1,AVI2/ACI)    |                 |   |
|       |   | 7 | MAX(AVI1,AVI2/ACI)    |                 |   |
|       | The full scale of the 1-7 option corresponds to 02-07 |   |                       |                 |   |

In speed control mode, this parameter is used to select the torque upper limit source of the inverter.

|       |   |         |                 |      |
|-------|---|---------|-----------------|------|
| 02-13 | Excitation adjustment proportional gain | ↗       | Factory setting | 3000 |
|       | Setting range                           | 0~60000 |                 |      |
| 02-14 | Excitation adjustment integral gain     | ↗       | Factory setting | 500  |
|       | Setting range                           | 0~60000 |                 |      |

|       |                                     |         |                 |     |
|-------|-------------------------------------|---------|-----------------|-----|
| 02-15 | Torque adjustment proportional gain | ↗       | Factory setting | 300 |
|       | Setting range                       | 0~60000 |                 |     |
| 02-16 | Torque adjustment integral gain     | ↗       | Factory setting | 500 |
|       | Setting range                       | 0~60000 |                 |     |

The vector control PI adjusts the parameter. This parameter is automatically obtained after the asynchronous motor completes self-learning, and generally does not need to be modified.

|       |  |        |   |    |
|-------|--|--------|---|----|
| 02-18 | Field weakening mode of synchronous motor              | ↗      | Factory setting                                       | 1  |
|       | Setting range  | 0      | Not weak magnetic                                     |    |
|       |  | 1      | Automatic adjustment mode                             |    |
|       |  | 2      | Calculation + automatic adjustment comprehensive mode |    |
| 02-19 | Field weakening gain of synchronous motor              | ↗      | Factory setting                                       | 5  |
|       | Setting range  | 0~50   |   |    |
| 02-23 | Output voltage upper limit margin of synchronous motor | ↗      | Factory setting                                       | 5% |
|       | Setting range  | 0%~50% |   |    |

This group of parameters is used for field weakening control of the synchronous motor.

(1) 02-18=0 not weak magnetic

The synchronous motor does not perform field weakening control. At this time, the maximum value of the motor speed can be related to the inverter bus voltage. The advantage is that there is no field weakening current and the output current is small. The disadvantage is that the operating frequency cannot reach the set frequency. Higher speeds need to turn on the field weakening function.

(2) 02-18=1 automatic adjustment mode

This field weakening method is simple and reliable. The higher the speed, the larger the field weakening current. When the rated current of the motor is reached, it is not allowed to increase the speed, otherwise it will report an overload after a long time of operation. Weak magnetic coefficient 02-19, but excessive 02-19 will cause current instability.

(3) 02-18=2 calculation + automatic adjustment comprehensive mode

The speed of weak field current adjustment of the calculation + automatic adjustment synthesis method is relatively fast. It can be set to this mode when the automatic adjustment cannot meet the requirements. However, this mode depends on the motor parameter values, and its stability is not as good as Mode 1.

After entering the field weakening, if the output voltage is expected to be higher, so that the field weakening current is smaller, the output voltage saturation margin of the synchronous motor can be appropriately reduced 02-23, but too small 02-23 will make the output voltage more easily saturated and affect the control performance.

|       |  |   |                 |   |
|-------|--|---|-----------------|---|
| 02-22 | The upper limit of generating torque becomes effective |   | Factory setting | 0 |
|       | Setting range  | 0 | Close           |   |
|       |  | 1 | Open            |   |

When 02-22 is set to 1, the upper limit of power generation torque 02-12 and the upper limit of power generation torque 02-11 are effective. By default, there is no distinction between power generation and electric torque, and the upper limit is 22-07

|       |   |          |                 |     |
|-------|---|----------|-----------------|-----|
| 02-24 | Initial position angle detection current of synchronous motor | ↗        | Factory setting | 80% |
|       | Setting range   | 10%~180% |                 |     |

|       |   |   |                              |                 |   |
|-------|---|---|------------------------------|-----------------|---|
| 02-25 | Initial position angle detection of synchronous motor |   | ↗                            | Factory setting | 0 |
|       | Setting range   | 0 | Check every run              |                 |   |
|       |   | 1 | Not check                    |                 |   |
|       |   | 2 | Power-on first run detection |                 |   |

The initial position angle detection is generally used for SVC. Its advantage is that it will not reverse when starting, but the disadvantage is that there is a certain noise. For the occasions where reverse rotation is not allowed at startup and the position of the motor rotor will change after stopping 02-25 Must be set to 0, otherwise it can be set to 1 or 2.

You can set the detected current value through 02-24. The smaller the current is, the smaller the sound will be during detection, but too small may cause inaccurate position detection.

## 03 V/f Control Parameters

Group 03 parameters are only valid for V/f control, not for vector control.

|       |                   |    |                              |                 |   |
|-------|-------------------|----|------------------------------|-----------------|---|
| 03-00 | V/f curve setting |    |                              | Factory setting | 0 |
|       | Setting range     | 0  | Straight line V/f            |                 |   |
|       |                   | 1  | Multi-point V/f              |                 |   |
|       |                   | 2  | Square V/f                   |                 |   |
|       |                   | 3  | 1.2 power V/f                |                 |   |
|       |                   | 4  | 1.4 power V/f                |                 |   |
|       |                   | 6  | 1.6 power V/f                |                 |   |
|       |                   | 8  | 1.8 power V/f                |                 |   |
|       |                   | 9  | reserved                     |                 |   |
|       |                   | 10 | V/f complete separation mode |                 |   |
|       |                   | 11 | V/f half separation mode     |                 |   |

0: Straight line V/f. Suitable for ordinary constant torque loads.

1: Multi-point V/f. Suitable for special loads such as dehydrator and centrifuge. By setting 03-03~03-08 parameters, you can get any V/f curve.

2: Square V/f. Suitable for centrifugal loads such as fans and pumps.

3~8: V/f relationship curve between straight line V/f and 2.0th order V/f.

10: V/f complete separation mode. At this time, the output frequency of the inverter is independent of the output voltage. The output frequency is determined by the frequency source, and the output voltage is determined by 03-13 (V/f separated voltage source).

This mode is generally used in induction heating, inverter power supply, torque motor control and other occasions.

11: V/f half separation mode. In this mode, V and F are proportional, but the proportional relationship can be set by voltage source 03-13, and the relationship between V and F is also related to the rated voltage and rated frequency of motor group 01.

Assuming that the voltage source input is X (X is a value of 0~100%), the relationship between the output voltage V of the inverter and the frequency F is:  $V/f = 2 * X * (\text{motor rated voltage}) / (\text{motor rated frequency})$

|       |                                   |   |                 |              |
|-------|-----------------------------------|---|-----------------|--------------|
| 03-01 | Torque boost                      | ↗                                       | Factory setting | Type setting |
|       | Setting range                     | 0.0%:( auto-torque boost)<br>0.1%~30.0% |                 |              |
| 03-02 | Cut-off frequency of torque boost |   | Factory setting | 50.00Hz      |
|       | Setting range                     | 0.00Hz~max frequency                    |                 |              |

Torque boosting can improve the low-frequency torque characteristics of V/f and do boost compensation for the output voltage. However, if the torque boost setting is too large, the motor is easily overheated and the inverter is easily overcurrent.

When the torque boost is set to 0.0, the inverter is in automatic torque boost, and the inverter automatically calculates the torque boost value according to the motor stator resistance and other parameters.

Torque boost torque cut-off frequency: Below this frequency, the torque boost is valid, and beyond this set frequency, the torque boost is invalid, as shown in Figure 5-3.

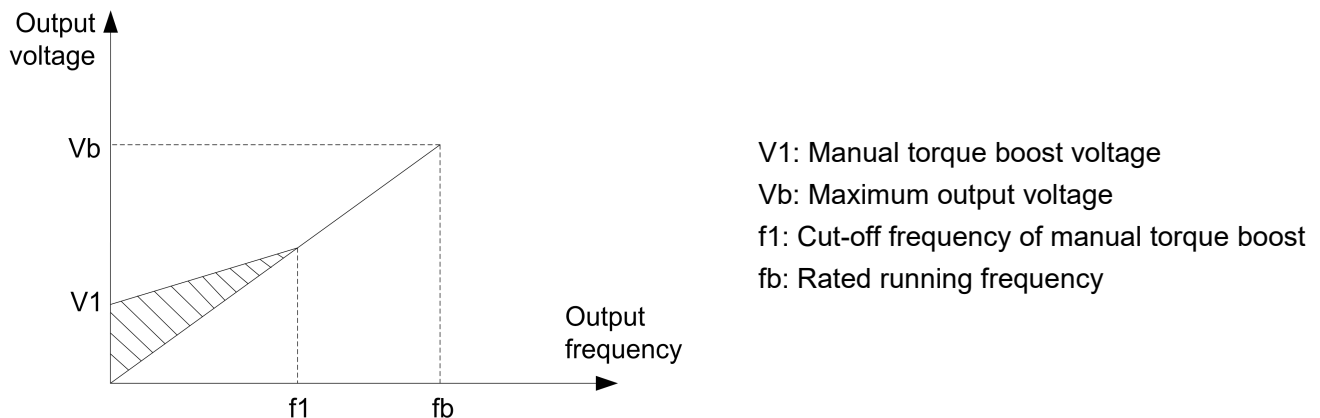


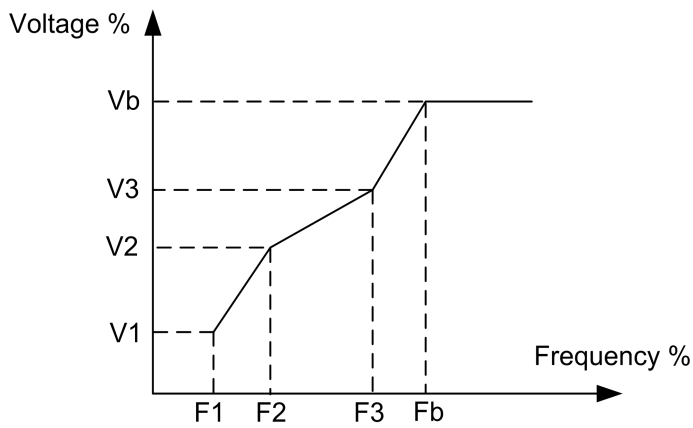
Figure 5-3 Schematic diagram of manual torque boost

|       |                                   |                                    |                 |        |
|-------|-----------------------------------|------------------------------------|-----------------|--------|
| 03-03 | Multi-point V/f frequency point 1 |                                    | Factory setting | 0.00Hz |
|       | Setting range                     | 0.00Hz~03-05                       |                 |        |
| 03-04 | Multi-point V/f voltage point 1   |                                    | Factory setting | 0.0%   |
|       | Setting range                     | 0.0%~100.0%                        |                 |        |
| 03-05 | Multi-point V/f frequency point 2 |                                    | Factory setting | 0.00Hz |
|       | Setting range                     | 03-03~03-07                        |                 |        |
| 03-06 | Multi-point V/f voltage point 2   |                                    | Factory setting | 0.0%   |
|       | Setting range                     | 0.0%~100.0%                        |                 |        |
| 03-07 | Multi-point V/f frequency point 3 |                                    | Factory setting | 0.00Hz |
|       | Setting range                     | 03-05~motor rated frequency(01-03) |                 |        |
| 03-08 | Multi-point V/f voltage point 3   |                                    | Factory setting | 0.0%   |
|       | Setting range                     | 0.0%~100.0%                        |                 |        |

Parameters 03-03~03-08 can define multi-segment V/f curve.

The curve of the multi-point V/f should be set according to the load characteristics of the motor. Note that the relationship between the three voltage points and the frequency point must meet:  $V1 < V2 < V3$ ,  $F1 < F2 < F3$ . Figure 5-4 is a schematic diagram of multi-point V/f curve setting.

If the voltage is set too high at low frequency, the motor may overheat or even burn, and the inverter may be overcurrent stalled or overcurrent protected.



V1-V3: Voltage percentage of the 1st-3rd segment of multi-point V/f  
Vb: Rated voltage of motor  
f1-f3: Frequency percentage of the 1st-3rd segment of multi-point V/f  
fb: Rated running frequency of motor

Figure 5-4 Schematic diagram of multi-point V/f curve setting.

|       |                            |             |                 |      |
|-------|----------------------------|-------------|-----------------|------|
| 03-09 | V/f slip compensation gain | ⚡           | Factory setting | 0.0% |
|       | Setting range              | 0.0%~200.0% |                 |      |

V/f slip compensation can compensate the motor rotation deviation generated by the asynchronous motor when the load increases, so that the motor speed can be basically stabilized when the load changes.


|       |                         |       |                 |    |
|-------|-------------------------|-------|-----------------|----|
| 03-10 | V/f overexcitation gain | ⚡     | Factory setting | 64 |
|       | Setting range           | 0~200 |                 |    |

During the deceleration of the inverter, the overexcitation control can suppress the rise of the bus voltage and avoid overvoltage faults. The greater the gain, the stronger the suppression effect. However, if the overexcitation gain is too large, the output current is likely to increase, and a moderate setting is required. For applications where the inertia is small or the braking resistor is used, the recommended gain is set to zero.

|       |                                  |       |                 |              |
|-------|----------------------------------|-------|-----------------|--------------|
| 03-11 | V/f oscillation suppression gain | ⚡     | Factory setting | Type setting |
|       | Setting range                    | 0~100 |                 |              |

The selection method of the gain is as small as possible under the premise of effectively suppressing the oscillation, so as to avoid adversely affecting the V/f operation. Select this gain to be 0 when there is no oscillation in the motor. It is only necessary to increase the gain appropriately when the motor oscillates significantly. The greater the gain, the more obvious the suppression of the oscillation.

When using the suppression oscillation function, the motor rated current and no-load current parameters are required to be accurate, otherwise the V/f oscillation suppression effect is not good.

|       |  |   |                          |   |                 |   |
|-------|--|---|--------------------------|---|-----------------|---|
| 03-13 | V/f separated voltage source                               |   |                          |  | Factory setting | 0 |
|       | Setting range  | 0 | Digital setting(03-14)   |   |                 |   |
|       |  | 1 | AVI1                     |   |                 |   |
|       |  | 2 | AVI2/ACI                 |   |                 |   |
|       |  | 3 | Reserved                 |   |                 |   |
|       |  | 4 | PULSE setting (MI5)      |   |                 |   |
|       |  | 5 | Multi-step speed command |   |                 |   |
|       |  | 6 | Simple PLC               |   |                 |   |
|       |  | 7 | PID                      |   |                 |   |
|       |  | 8 | Communication setting    |   |                 |   |
|       | Note: 100.0% corresponds to the rated voltage of the motor |   |                          |   |                 |   |



|       |   |                        |                 |    |
|-------|---|------------------------|-----------------|----|
| 03-14 | Voltage digital setting of V/f detached | ↗                      | Factory setting | 0V |
|       | Setting range                           | 0V~Motor rated voltage |                 |    |

V/f detach separation is generally used in applications such as induction heating, inverter power supply and torque motor control.

If V/f separated control is selected, the output voltage can be set by parameter 03-14, or set communication can be given by analog quantity, multi-step speed command, PLC, PID or communication. When a non-numeric setting is selected, 100% of each setting corresponds to the rated voltage of the motor. When the percentage of the output setting such as the analog quantity is negative, the set absolute value is used as the effective setting value.

0.Digital setting (03-14):Voltage is set by 03-14.

1.AVI1

2.AVI2/ACI

Voltage is confirmed by analog input terminal.

4.Pulse setting(MI5)

The voltage reference is given by the terminal pulse. Pulse given signal specifications: voltage range 20V ~ 27V, frequency range 0kHz ~ 100kHz.

5.Multi-step speed command

When the voltage source is a multi-speed command,set the 04 group and 05 group parameters to select the correspondence between the given signal and the given voltage.

6. Simple PLC

When the voltage source is a simple PLC, you need to set 05 group of parameters to determine the given output voltage.

7.PID

The output voltage is generated according to the PID closed loop. For details, see 10 group of PID introduction.

8.Communication setting

The voltage is given by the host computer through communication.

When the above voltage source is selected from 1 to 8, 0 to 100% corresponds to the output voltage 0V to the rated voltage of the motor.

|       |                                 |              |                 |      |
|-------|---------------------------------|--------------|-----------------|------|
| 03-15 | V/f separated voltage rise time | ↗            | Factory setting | 0.0s |
|       | Setting range                   | 0.0s~1000.0s |                 |      |

The V/f detach rise time refers to the time required for the output voltage to change from 0V to the rated voltage of the motor. As shown in figure 5-5:

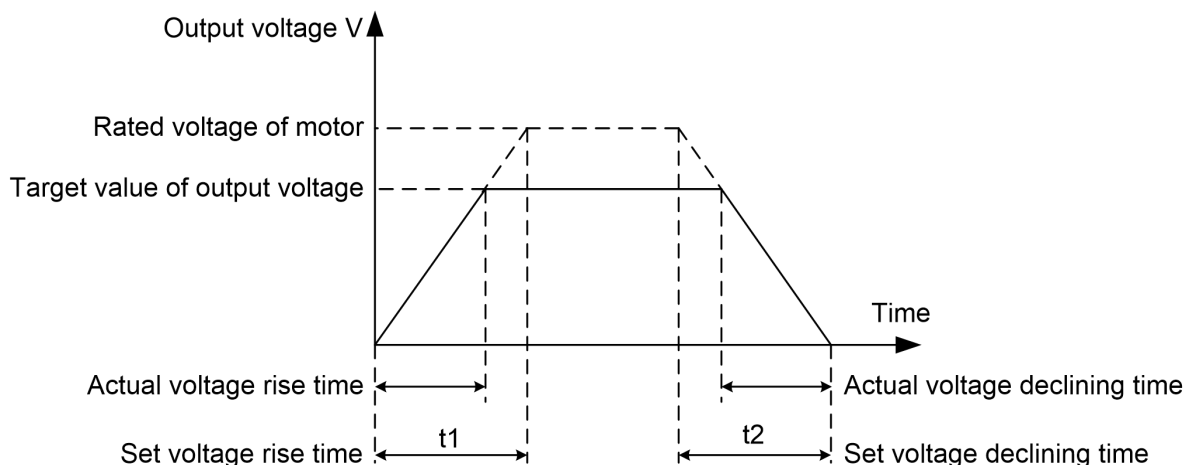


Figure 5-5 V/f detach diagram

## 04 Input Terminal Parameters

|       |  |                 |   |
|-------|--|-----------------|---|
| 04-00 | MI1 terminal function selection                            | Factory setting | 1 |
| 04-01 | MI2 terminal function selection                            | Factory setting | 2 |
| 04-02 | MI3 terminal function selection                            | Factory setting | 9 |
| 04-03 | MI4 terminal function selection                            | Factory setting | 0 |
| 04-04 | MI5 Terminal function selection(high-speed pulse optional) | Factory setting | 0 |
| 04-05 | Reserved   | Factory setting | 0 |
| 04-06 | Reserved   | Factory setting | 0 |
| 04-07 | Reserved   | Factory setting | 0 |

These parameters are used to set the function of the digital multi-function input terminal Terminal. The functions that can be selected are shown in the following table:

| Setting value | Function                               | Description  |
|---------------|--|--|
| 0             | No function                            | It is recommended to set the unused terminals to “no function” to prevent malfunction.   |
| 1             | Forward running(FWD)                   | Control inverter forward and reverse running through external terminals.   |
| 2             | Reverse running(REV)                   |  |
| 3             | Three-wire control                     | This terminal is used to determine the inverter operation mode is the three-wire control mode. For details, please refer to the description of parameter 04-09 (terminal command mode).  |
| 4             | Forward jog(FJOG)                      | Jog running frequency, jog acceleration and deceleration time, see the description of parameters 09-00, 09-01, 09-02.  |
| 5             | Reverse jog(RJOG)                      |  |
| 6             | Terminal UP                            | The frequency increment and decrement instructions are modified when the frequency is given by the external terminal. When the frequency source is set to digital setting, the set frequency can be adjusted up and down.                          |
| 7             | Terminal DOWN                          |  |
| 8             | Coast to stop                          | The inverter blocks the output, and the motor's stopping process is not controlled by the inverter.  |
| 9             | Fault reset(RESET)                     | A fault reset can be achieved by using a terminal for fault reset. Same as keyboard RESET.   |
| 10            | Run pause                              | The inverter decelerates to stop, but all running parameters are memorized. Such as PLC parameters, wobble frequency parameters,PID parameters. After the terminal signal disappears, the inverter returns to the operating state before stopping. |
| 11            | Normally open input for external fault | When the signal is valid, the inverter reports the fault EF and performs fault processing according to the fault protection action mode (details participate in parameters 11-47).   |
| 12            | Multi-step speed terminal 1            | Through the combination of the states of the four terminals, the 16-speed setting or the setting of 16 other commands can be realized. See appendix 1 for details.   |
| 13            | Multi-step speed terminal 2            |  |
| 14            | Multi-step speed terminal 3            |  |
| 15            | Multi-step speed terminal 4            |  |

| Setting value | Function  | Description  |
|---------------|---|--|
| 16            | Acceleration / deceleration time selection terminal 1 | Through the four states of the two terminals, four types of acceleration and deceleration time are selected. See Table 2 for details.  |
| 17            | Acceleration / deceleration time selection terminal 2 |  |
| 18            | Frequency source switching                            | According to the setting of the frequency source selection parameter (00-17), when switching between two frequency sources is set as the frequency source, the terminal is used to switch between the two frequency sources.   |
| 19            | UP/DOWN set to clear (terminal, keyboard)             | When the frequency is given as digital timing, this terminal can clear the frequency value changed by terminal UP/DOWN or keyboard UP/DOWN, so that the given frequency is restored to the value set by 00-06.   |
| 20            | Run command switching terminal                        | When the command source is terminal control (00-00=1), this terminal can switch between terminal control and keyboard control.<br>When the command source is communication control (00-00=2), this terminal can switch between communication control and keyboard control. |
| 21            | Acceleration / deceleration prohibited                | Ensure that the inverter is not affected by external signals (except the stop command) and maintain the current output frequency.  |
| 22            | PID Pause   | The PID is temporarily disabled, and the inverter maintains the current output frequency.  |
| 23            | PLC status reset                                      | The PLC pauses during execution, and when running again, you can use this terminal to restore the inverter to the initial state of the simple PLC.   |
| 24            | Wobble frequency pause                                | The inverter outputs at the center frequency. The wobble frequency function is suspended.  |
| 25            | Counter Input   | Count pulse input terminal.  |
| 26            | Counter reset   | Clear the counter status.  |
| 27            | Length counter input                                  | Input terminal for length counting.  |
| 28            | Length reset  | Length clear   |
| 29            | Torque control prohibited                             | The inverter is prohibited from torque control, the inverter enters the speed control mode   |
| 30            | PULSE (pulse) frequency input (only valid for MI5)    | MI5 functions as a pulse input terminal.   |
| 31            | Reserved  | Reserved   |
| 32            | Immediate DC braking                                  | When this terminal is valid, the inverter directly switches to the DC braking state  |
| 33            | Normally closed input for external fault              | When this signal is valid, the inverter reports fault EF and stops.  |
| 34            | Frequency modification enable                         | When this function is valid, the inverter does not respond to changes in frequency commands.   |

| Setting value | Function  | Description   |
|---------------|---|---|
| 35            | PID action direction is reversed                        | When this terminal is valid, the direction of PID action is reversed to the direction set in 10-03.   |
| 36            | External stop terminal 1                                | During keyboard control, this terminal can be used to stop the inverter, which is equivalent to the function of the STOP key on the keyboard.   |
| 37            | Control command switching terminal 2                    | This function is used to switch between terminal control and communication control.   |
| 38            | PID integration pause                                   | When this terminal is valid, the PID integral adjustment function is suspended, but other PID adjustments are still effective.  |
| 39            | Frequency source X and keyboard set frequency switching | When this terminal is valid, the frequency source X is replaced with the frequency given by the keyboard (00-06)  |
| 40            | Frequency source Y and keyboard set frequency switching | When this terminal is valid, the frequency source Y is replaced with the frequency given by the keyboard (00-06)  |
| 41            | Reserved  |   |
| 42            | Reserved  |   |
| 43            | PID parameter switching                                 | When the PID parameter switching condition selects the MI terminal (10-18=1), when this terminal is invalid, the PID parameter uses 10-05~10-07; when the terminal is valid, it uses 10-15~10-17;   |
| 44            | Reserved  |   |
| 45            | Reserved  |   |
| 46            | Speed control/torque control switching                  | Switch the inverter between torque control and speed control mode. When this terminal is invalid, the inverter runs in the mode defined by 17-00 (Speed/Torque Control Mode). When this terminal is valid, it switches to another mode.   |
| 47            | Emergency stop  | When this terminal is valid, the inverter stops at the fastest speed, and the current is in the upper limit of the set current during this stop. This function is used to meet the occasions where the inverter needs to stop as soon as possible when the system is in an emergency state. |
| 48            | External stop terminal 2                                | In any command control mode (panel control, terminal control, communication control), the terminal can be used to decelerate the inverter to stop, and the deceleration time is fixed at 4 deceleration time.   |
| 49            | Deceleration DC braking                                 | When this terminal is valid, the inverter decelerates to the initial frequency of DC braking at stop, and then switches to DC braking.  |
| 50            | Clear the current running time                          | When this terminal is valid, the timing time of the inverter's current operation is cleared. This function needs to be used in conjunction with the timing operation (09-42) and the current operation time arrival (09-53).  |

Attached Table 1 Multi-step speed command function description

Four multi-speed command terminals can be combined into 16 states, and these 16 states correspond to 16 command setting values. As shown in Table 1:

| K4  | K3  | K2  | K1  | Command setting             | Corresponding parameters |
|-----|-----|-----|-----|-----------------------------|--------------------------|
| OFF | OFF | OFF | OFF | Multi-step speed command 0  | 05-00                    |
| OFF | OFF | OFF | ON  | Multi-step speed command 1  | 05-01                    |
| OFF | OFF | ON  | OFF | Multi-step speed command 2  | 05-02                    |
| OFF | OFF | ON  | ON  | Multi-step speed command 3  | 05-03                    |
| OFF | ON  | OFF | OFF | Multi-step speed command 4  | 05-04                    |
| OFF | ON  | OFF | ON  | Multi-step speed command 5  | 05-05                    |
| OFF | ON  | ON  | OFF | Multi-step speed command 6  | 05-06                    |
| OFF | ON  | ON  | ON  | Multi-step speed command 7  | 05-07                    |
| ON  | OFF | OFF | OFF | Multi-step speed command 8  | 05-08                    |
| ON  | OFF | OFF | ON  | Multi-step speed command 9  | 05-09                    |
| ON  | OFF | ON  | OFF | Multi-step speed command 10 | 05-10                    |
| ON  | OFF | ON  | ON  | Multi-step speed command 11 | 05-11                    |
| ON  | ON  | OFF | OFF | Multi-step speed command 12 | 05-12                    |
| ON  | ON  | OFF | ON  | Multi-step speed command 13 | 05-13                    |
| ON  | ON  | ON  | OFF | Multi-step speed command 14 | 05-14                    |
| ON  | ON  | ON  | ON  | Multi-step speed command 15 | 05-15                    |

When the frequency source is selected as multi-step speed, the parameters 100.0% of 05-00~05-15 correspond to the maximum frequency max frequency 00-03. Multi-step speed command can not only be used as a multi-step speed function, but also can be used as a given source of PID, or as a voltage source for V/f separation control to meet the needs of switching between different given values.

Attached Table 2 Acceleration and deceleration time terminal function description

| Terminal 2 | Terminal 1 | Acceleration or deceleration time selection | Corresponding parameters |
|------------|------------|---|--------------------------|
| OFF        | OFF        | Acceleration time 1                         | 00-07,00-08              |
| OFF        | ON         | Acceleration time 2                         | 09-03,09-04              |
| ON         | OFF        | Acceleration time 3                         | 09-05,09-06              |
| ON         | ON         | Acceleration time 4                         | 09-07,09-08              |

|       |                |               |                 |        |
|-------|----------------|---------------|-----------------|--------|
| 04-08 | MI Filter time | ↗             | Factory setting | 0.010s |
|       | Setting range  | 0.000s~1.000s |                 |        |

Set the software filtering time for the terminal state of the MI terminal. If the input terminal of the application occasion is susceptible to interference and cause malfunctions, this parameter can be increased to enhance the anti-interference ability. However, the increase of the filtering time will cause the response of the MI terminal to become slow.

|       |                       |   |                 |   |
|-------|-----------------------|---|-----------------|---|
| 04-09 | Terminal command mode |   | Factory setting | 0 |
|       | Setting range         | 0 | Two-wire 1      |   |
|       |                       | 1 | Two-wire 2      |   |
|       |                       | 2 | Three-wire 1    |   |
|       |                       | 3 | Three-wire 2    |   |

This parameter defines four different ways to control the operation of the inverter through the external terminal Terminal.

0: Two-wire mode 1: This mode is the most commonly used two-wire mode.

Terminal Reverse running is determined by TerminalMlx and Mly.

The terminal terminal function settings are as follows:

| Terminal | Setting value | Description          |
|----------|---------------|----------------------|
| Mlx      | 1             | Forward running(FWD) |
| Mly      | 2             | Reverse running(REV) |

Among them, Mlx and Mly are the multi-function input terminals Terminal of MI1~MI5, the level is effective.

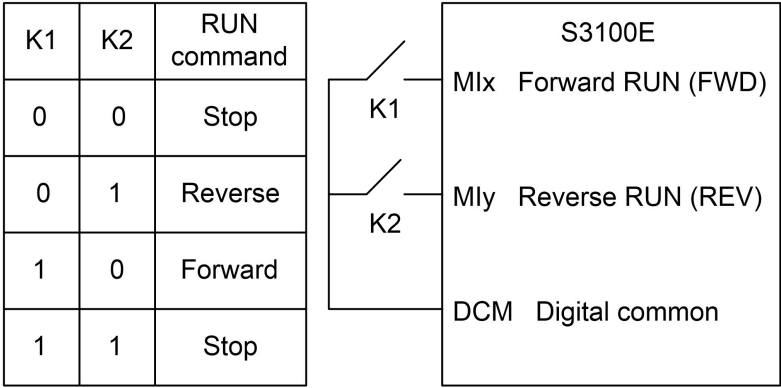


Figure 5-6 Two-wire mode 1

1: Two-wire mode 2: When using this mode, the terminal function of the Mlx terminal is the running enable terminal, and the terminal function of the Mly terminal determines the running direction.

The terminal terminal function settings are as follows:

| Terminal | Setting value | Description          |
|----------|---------------|----------------------|
| Mlx      | 1             | Forward running(FWD) |
| Mly      | 2             | Reverse running(REV) |

Among them, Mlx and Mly are the multi-function input terminals Terminal of MI1~MI5, the level is effective.

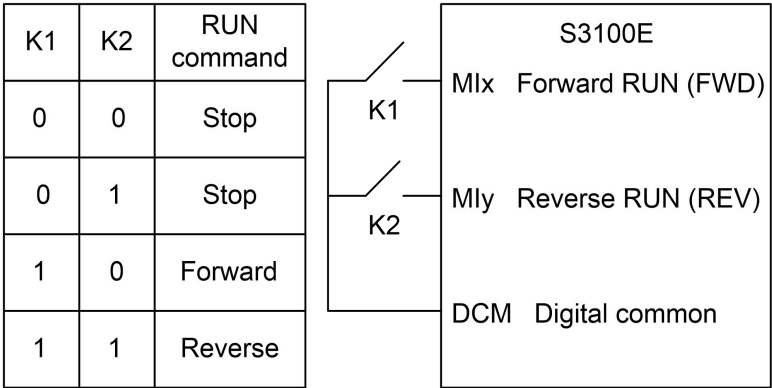


Figure 5-7 Two-wire mode 2

2: Three-wire control mode1: This mode MIn is the enable terminal, the direction is controlled by Mlx and Mly respectively.

The terminal terminal function settings are as follows:

| Terminal | Setting value | Description                |
|----------|---------------|----------------------------|
| Mlx      | 1             | Forward running(FWD)       |
| Mly      | 2             | Reverse running(REV)       |
| MIn      | 3             | Three-wire running control |

When you need to run, you must first close the MIn terminal, and realize the forward or reverse control of the motor by the rising edge of the pulse of Mlx or Mly.

When it is necessary to stop, it must be achieved by disconnecting the terminal signal of the MIn terminal. Among them, Mlx, Mly, MIn are multi-function input terminals Terminal MI1 ~ MI5, Mlx, Mly are pulse effective, MIn is level effective.

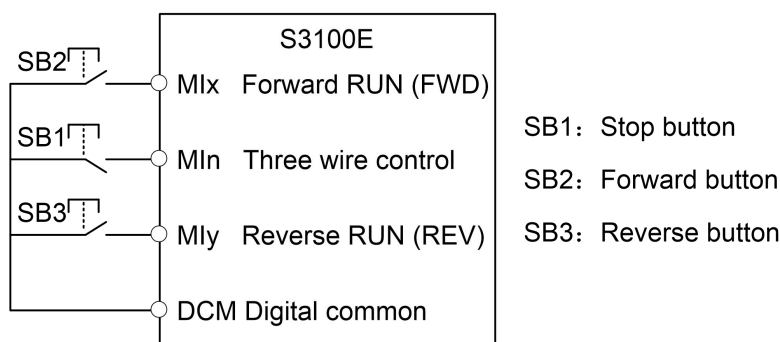


Figure 5-8 Three-wire control mode 1

3: Three-wire control mode 2: The enable terminal I in this mode is MIn, the running command is given by Mlx, and the direction is determined by the state of Mly.

The terminal terminal function settings are as follows:

| Terminal | Setting value | Description                |
|----------|---------------|----------------------------|
| Mlx      | 1             | Forward running(FWD)       |
| Mly      | 2             | Reverse running(REV)       |
| MIn      | 3             | Three-wire running control |

When you need to run, you must first close the MIn terminal, the Mlx pulse rising edge generates the motor running signal, and the Mly state generates the motor direction signal.

When it is necessary to stop, it must be achieved by disconnecting the terminal signal of the MIn terminal. Among them, Mlx, Mly, and MIn are the multi-function input terminals of MI1 to MI5, Mlx is pulse effective, and Mly, MIn are level effective.

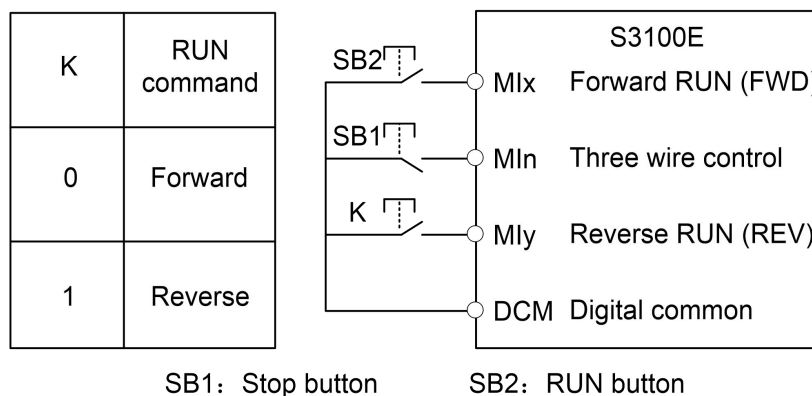


Figure 5-9 Three-wire control mode 2

|       |                              |                     |                 |          |
|-------|------------------------------|---------------------|-----------------|----------|
| 04-10 | Terminal UP/DOWN change rate | ↗                   | Factory setting | 1.00Hz/s |
|       | Setting range                | 0.01Hz/s~65.535Hz/s |                 |          |

Used to set the terminal UP/DOWN to adjust the set frequency, the speed of frequency change, that is the amount of frequency change per second.

When 00-25 (frequency decimal point) is 2, the value range is 0.001Hz/s~65.535Hz/s. When 00-25 (frequency decimal point) is 1, the value range is 0.01Hz/s~655.35Hz/s.

|       |  |                 |                 |        |
|-------|--|-----------------|-----------------|--------|
| 04-11 | AVI curve 1 lower limit                          | ↗               | Factory setting | 0.10V  |
|       | Setting range                                    | 0.00V~04-13     |                 |        |
| 04-12 | Corresponding setting of AVI curve 1 lower limit | ↗               | Factory setting | 0.0%   |
|       | Setting range                                    | -100.0%~+100.0% |                 |        |
| 04-13 | AVI curve 1 upper limit                          | ↗               | Factory setting | 10.00V |
|       | Setting range                                    | 04-11~+10.00V   |                 |        |
| 04-14 | Corresponding setting of AVI curve 1 upper limit | ↗               | Factory setting | 100.0% |
|       | Setting range                                    | -100.0%~+100.0% |                 |        |
| 04-15 | AVI1 filter time                                 | ↗               | Factory setting | 0.10s  |
|       | Setting range                                    | 0.00s~10.00s    |                 |        |

The relationship between the above parameter analog input voltage and the setting value it represents.

When the analog input voltage exceeds the set range of the maximum input or minimum input, it will be calculated as the maximum input or minimum input.

When the analog input is current input, 0mA~20mA current corresponds to 0V~5V Voltage.

In different applications, the meaning of the nominal value corresponding to 100.0% of the analog setting is different. For details, please refer to the description of each application.

The following illustrations show two typical settings:

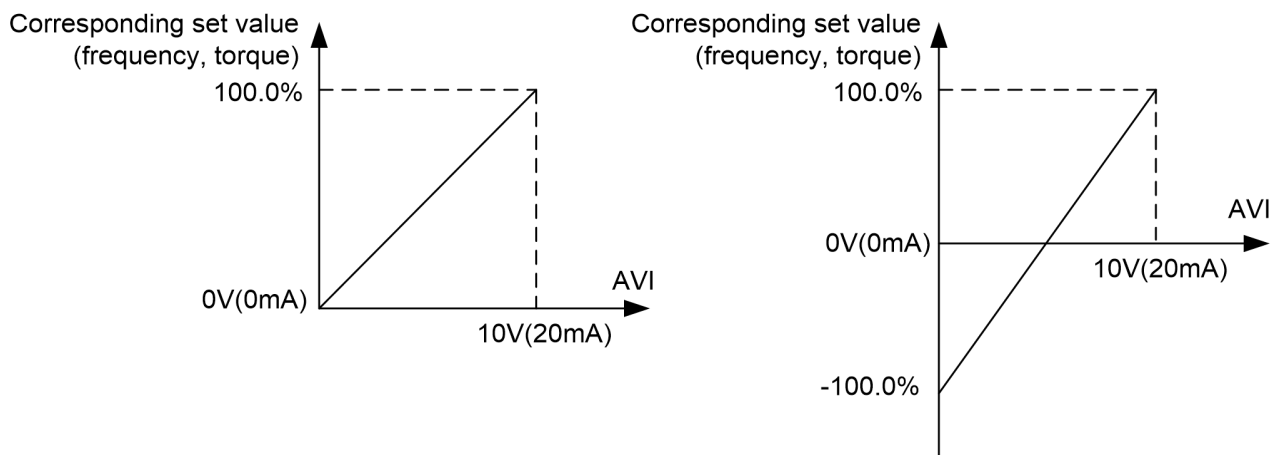


Figure 5-10 Correspondence relationship between analog input and set value

AVI1 input filter time: adjust the sensitivity of analog input. Properly increasing this value can enhance the anti-interference of the analog quantity, but it will reduce the sensitivity of the analog input.

|       |                         |             |                 |       |
|-------|-------------------------|-------------|-----------------|-------|
| 04-16 | AVI curve 2 lower limit | ↗           | Factory setting | 0.10V |
|       | Setting range           | 0.00V~04-18 |                 |       |



|       |  |                 |                 |        |
|-------|--|-----------------|-----------------|--------|
| 04-17 | Corresponding setting of AVI curve 2 lower limit | ↗               | Factory setting | 0.0%   |
|       | Setting range                                    | -100.0%~+100.0% |                 |        |
| 04-18 | AVI curve 2 upper limit                          | ↗               | Factory setting | 10.00V |
|       | Setting range                                    | 04-16~+10.00V   |                 |        |
| 04-19 | Corresponding setting of AVI curve 2 upper limit | ↗               | Factory setting | 100.0% |
|       | Setting range                                    | -100.0%~+100.0% |                 |        |
| 04-20 | AVI2/ACI filter time                             | ↗               | Factory setting | 0.10s  |
|       | Setting range                                    | 0.00s~10.00s    |                 |        |

For the method of setting AVI curve 2 function, please refer to the description of AVI curve 1.

Analog AVI2/ACI can support 0~10V or 0~20mA input. When AVI2/ACI selects 0~20mA input, the corresponding Voltage of 20mA is 5V.

|       |  |                 |                 |          |
|-------|--|-----------------|-----------------|----------|
| 04-28 | Pulse minimum input                          | ↗               | Factory setting | 0.00kHz  |
|       | Setting range                                | 0.00kHz~04-30   |                 |          |
| 04-29 | Corresponding setting of pulse minimum input | ↗               | Factory setting | 0.0%     |
|       | Setting range                                | -100.0%~100.0%  |                 |          |
| 04-30 | Pulse maximum input                          | ↗               | Factory setting | 50.00kHz |
|       | Setting range                                | 04-28~100.00kHz |                 |          |
| 04-31 | Corresponding setting of pulse maximum input | ↗               | Factory setting | 100.0%   |
|       | Setting range                                | -100.0%~100.0%  |                 |          |
| 04-32 | PULSE filter time                            | ↗               | Factory setting | 0.10s    |
|       | Setting range                                | 0.00s~10.00s    |                 |          |

This group of parameters is used for setting, the relationship between MI5 pulse frequency and the corresponding setting.

The pulse frequency can only be input to the inverter through the MI5 channel. The application of this group of functions is similar to AVI curve 1, please refer to the description of AVI curve 1.

|       |                     |                  |   |     |
|-------|---------------------|------------------|---|-----|
| 04-33 | AVI curve selection | ↗                | Factory setting                             | 321 |
|       | Setting range       | Single digit     | AVI 1 curve selection                       |     |
|       |                     | 1                | AVI curve 1(2 points, refer to 04-11~04-14) |     |
|       |                     | 2                | AVI curve 2(2 points, refer to 04-16~04-19) |     |
|       |                     | 3                | Reserved                                    |     |
|       |                     | 4                | Reserved                                    |     |
|       |                     | 5                | Reserved                                    |     |
|       |                     | Tens digital     | AVI2/ACI curve selection, same as above     |     |
|       |                     | Hundreds digital | Reserved                                    |     |

The single digit and tens digital of this parameter are used to select the setting curve corresponding to analog input AVI1, AVI2/ACI respectively.

Two kinds of analog input can choose any one of two kinds of curves.

|       |  |              |  |                 |     |
|-------|--|--------------|--|-----------------|-----|
| 04-34 | AVI is less than the minimum input setting selection |              | ↗  | Factory setting | 000 |
|       | Setting range  | Single digit | AVI1 is less than the minimum input setting selection                    |                 |     |
|       |  | 0            | Corresponding analog lower limit   |                 |     |
|       |  | 1            | 0.0%   |                 |     |
|       |  | Tens digital | AVI2/ACI is less than the minimum input setting selection, same as above |                 |     |

This parameter is used to select the analog value when the analog input voltage is less than the set "minimum input".

The analog lower limit value refers to the less limit value of parameters 04-11 and 04-16.

If the selection is 1, when the AVI input is less than the minimum input, the corresponding setting of the analog quantity is 0.0%.

|       |                |              |   |                 |      |
|-------|----------------|--------------|---|-----------------|------|
| 04-35 | MI1 delay time |              | ↗ | Factory setting | 0.0s |
|       | Setting range  | 0.0s~3600.0s |   |                 |      |
| 04-36 | MI2 delay time |              | ↗ | Factory setting | 0.0s |
|       | Setting range  | 0.0s~3600.0s |   |                 |      |
| 04-37 | MI3 delay time |              | ↗ | Factory setting | 0.0s |
|       | Setting range  | 0.0s~3600.0s |   |                 |      |

It is used to set the delay time for the inverter to change the terminal state when the MI terminal changes.

Currently, only MI1, MI2, and MI3 have the function of setting the delay time.

|       |                                    |                       |                  |                 |   |
|-------|------------------------------------|-----------------------|------------------|-----------------|---|
| 04-38 | MI terminal valid mode selection 1 |                       |                  | Factory setting | 0 |
|       | Setting range                      | 0                     | High level valid |                 |   |
|       |                                    | 1                     | Low level valid  |                 |   |
|       |                                    | Single digit          | MI1              |                 |   |
|       |                                    | Tens digital          | MI2              |                 |   |
|       |                                    | Hundreds digital      | MI3              |                 |   |
|       |                                    | Thousands digital     | MI4              |                 |   |
|       |                                    | Ten thousands digital | MI5              |                 |   |

Used to set the active status mode of the digital input terminal. When the selection is active high, the corresponding MI terminal is valid when connected to the DCM, and the disconnection is invalid. When the selection is active low, the corresponding MI terminal is invalid when it is connected to the DCM, and the disconnection is valid.

## 05 Multi-Speed, Simple PLC Control

The S3100E's multi-speed command is more abundant than the normal multi-speed. In addition to the multi-speed function, it can also be used as a voltage source for V/f separation and a given source of process PID. For this reason, the dimension of the multi-speed command is a relative value.

|       |                             |                |                 |      |
|-------|-----------------------------|----------------|-----------------|------|
| 05-00 | Multi-step speed command 0  | ↗              | Factory setting | 0.0% |
| 05-01 | Multi-step speed command 1  | ↗              | Factory setting | 0.0% |
| 05-02 | Multi-step speed command 2  | ↗              | Factory setting | 0.0% |
| 05-03 | Multi-step speed command 3  | ↗              | Factory setting | 0.0% |
| 05-04 | Multi-step speed command 4  | ↗              | Factory setting | 0.0% |
| 05-05 | Multi-step speed command 5  | ↗              | Factory setting | 0.0% |
| 05-06 | Multi-step speed command 6  | ↗              | Factory setting | 0.0% |
| 05-07 | Multi-step speed command 7  | ↗              | Factory setting | 0.0% |
| 05-08 | Multi-step speed command 8  | ↗              | Factory setting | 0.0% |
| 05-09 | Multi-step speed command 9  | ↗              | Factory setting | 0.0% |
| 05-10 | Multi-step speed command 10 | ↗              | Factory setting | 0.0% |
| 05-11 | Multi-step speed command 11 | ↗              | Factory setting | 0.0% |
| 05-12 | Multi-step speed command 12 | ↗              | Factory setting | 0.0% |
| 05-13 | Multi-step speed command 13 | ↗              | Factory setting | 0.0% |
| 05-14 | Multi-step speed command 14 | ↗              | Factory setting | 0.0% |
| 05-15 | Multi-step speed command 15 | ↗              | Factory setting | 0.0% |
|       | Setting range               | -100.0%~100.0% |                 |      |

The multi-speed command can be used in three situations: as a frequency source, as a voltage source for V/f separation, as a set source for the process PID.

In three applications, the dimension of the multi-speed command is relative, ranging from -100.0% to 100.0%. When used as a frequency source, it is a percentage of the relative maximum frequency max frequency; as a V/f separation voltage source, Relative to the percentage of the rated voltage of the motor; and since the PID given is originally a relative value, the multi-speed command does not require dimension conversion as the PID setting source.

The multi-speed command needs to be switched according to the different states of the multi-function input MI. For details, please refer to the 04 group.

|       |                           |   |   |   |
|-------|---------------------------|---|---|---|
| 05-16 | Simple PLC operation mode | ↗ | Factory setting                                 | 0 |
|       | Setting range             | 0 | Stop at the end of a single run                 |   |
|       |                           | 1 | Keep the final value at the end of a single run |   |
|       |                           | 2 | Keep circulating                                |   |

The simple PLC function has two functions: as a frequency source or as a voltage source with V/f separation.

Figure 5-11 is a schematic diagram of a simple PLC as a frequency source. When the simple PLC is used as the frequency source, the sign of 05-00~05-15 determines the running direction. If it is a negative value, it indicates that the inverter runs in the opposite direction.

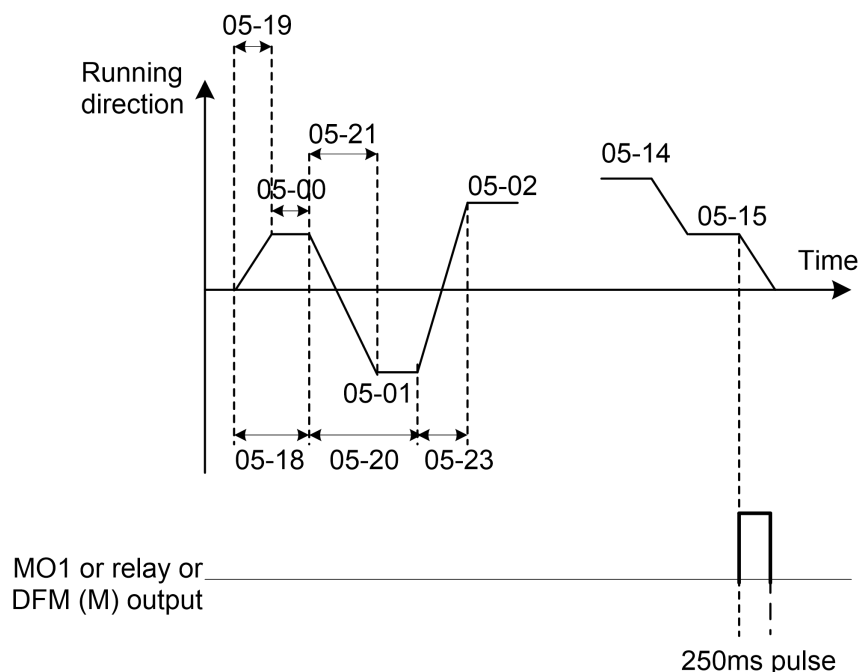


Figure 5-11 Schematic diagram of simple PLC

When used as a frequency source, the PLC has three operating modes, but not as a V/f voltage source. among them:

0: Stop at the end of a single run:

The inverter will automatically stop after completing a single cycle. It needs to give the run command again to start.

1: Keep the final value at the end of a single run:

After the inverter completes a single cycle, it automatically maintains the running frequency and direction of the last segment.

2: Keep circulating:

After the inverter completes one cycle, it automatically starts the next cycle until it stops when there is a stop command.

|       |   |              |                                |                 |   |
|-------|---|--------------|--------------------------------|-----------------|---|
| 05-17 | Simple PLC power failure memory selection |              | ⚡                              | Factory setting | 0 |
|       | Setting range                             | Single digit | Power failure memory selection |                 |   |
|       |   | 0            | Power failure no memory        |                 |   |
|       |   | 1            | Power failure memory           |                 |   |
|       |   | Tens digital | Stop memory selection          |                 |   |
|       |   | 0            | Stop no memory                 |                 |   |
|       |   | 1            | Stop memory                    |                 |   |

PLC power failure memory refers to memorizing the PLC's running stage and running frequency before power failure. It will continue to operate from the memory stage when it is next powered on. If no memory is selected, the PLC process will be restarted every time the power is turned on.

PLC stop memory is to record the previous PLC running stage and running frequency during stop, and continue to operate from the memory stage during the next operation. If you choose not to remember, the PLC process will be restarted every time you start.

|       |                                 |                    |   |                 |         |
|-------|---------------------------------|--------------------|---|-----------------|---------|
| 05-18 | Simple PLC stage 0 running time |                    | ⚡ | Factory setting | 0.0s(h) |
|       | Setting range                   | 0.0s(h)~6500.0s(h) |   |                 |         |

|       |  |                    |                 |         |
|-------|--|--------------------|-----------------|---------|
| 05-19 | Simple PLC step 0 acceleration / deceleration time selection               | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-20 | Simple PLC stage 1 <sup>st</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-21 | Simple PLC step 1 <sup>st</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-22 | Simple PLC stage 2 <sup>nd</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-23 | Simple PLC step 2 <sup>nd</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-24 | Simple PLC stage 3 <sup>rd</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-25 | Simple PLC step 3 <sup>rd</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-26 | Simple PLC stage 4 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-27 | Simple PLC step 4 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-28 | Simple PLC stage 5 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-29 | Simple PLC step 5 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-30 | Simple PLC stage 6 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-31 | Simple PLC step 6 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-32 | Simple PLC stage 7 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-33 | Simple PLC step 7 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-34 | Simple PLC stage 8 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-35 | Simple PLC step 8 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |
| 05-36 | Simple PLC stage 9 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range  | 0.0s(h)~6500.0s(h) |                 |         |
| 05-37 | Simple PLC step 9 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range  | 0~3                |                 |         |

|       |   |                    |                 |         |
|-------|---|--------------------|-----------------|---------|
| 05-38 | Simple PLC stage 10 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range   | 0.0s(h)~6500.0s(h) |                 |         |
| 05-39 | Simple PLC step 10 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range   | 0~3                |                 |         |
| 05-40 | Simple PLC stage 11 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range   | 0.0s(h)~6500.0s(h) |                 |         |
| 05-41 | Simple PLC step 11 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range   | 0~3                |                 |         |
| 05-42 | Simple PLC stage 12 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range   | 0.0s(h)~6500.0s(h) |                 |         |
| 05-43 | Simple PLC step 12 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range   | 0~3                |                 |         |
| 05-44 | Simple PLC stage 13 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range   | 0.0s(h)~6500.0s(h) |                 |         |
| 05-45 | Simple PLC step 13 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range   | 0~3                |                 |         |
| 05-46 | Simple PLC stage 14 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range   | 0.0s(h)~6500.0s(h) |                 |         |
| 05-47 | Simple PLC step 14 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range   | 0~3                |                 |         |
| 05-48 | Simple PLC stage 15 <sup>th</sup> running time                              | ↗                  | Factory setting | 0.0s(h) |
|       | Setting range   | 0.0s(h)~6500.0s(h) |                 |         |
| 05-49 | Simple PLC step 15 <sup>th</sup> acceleration / deceleration time selection | ↗                  | Factory setting | 0       |
|       | Setting range   | 0~3                |                 |         |

|       |                                |   |  |   |
|-------|--------------------------------|---|--|---|
| 05-50 | Simple PLC running time unit   | ↗ | Factory setting  | 0 |
|       | Setting range                  | 0 | s(Second)  |   |
|       |                                | 1 | h(Hour)  |   |
| 05-51 | Multi-speed command given mode | ↗ | Factory setting  | 0 |
|       | Setting range                  | 0 | Parameter 05-00 given  |   |
|       |                                | 1 | AVI1   |   |
|       |                                | 2 | AVI2/ACI   |   |
|       |                                | 3 | Reserved   |   |
|       |                                | 4 | PULSE  |   |
|       |                                | 5 | PID  |   |
|       |                                | 6 | The keyboard setting frequency (00-06) is given, UP/DOWN can be modified |   |

This parameter determines the given channel of Multi-step speed command 0.

## 06 Output Terminal Parameters

S3100E series inverters are equipped with a multi-function analog output terminal Terminal, a multi-function digital output terminal Terminal, a multi-function relay output terminal Terminal, a DFM terminal Terminal (can be used as high-speed pulse output terminal Terminal, also can be used as an open collector switch output).

|       |  |   |                 |   |
|-------|--|---|-----------------|---|
| 06-00 | MO1 output function selection                    | ↗ | Factory setting | 1 |
| 06-01 | Control board relay function selection(RA-RB-RC) | ↗ | Factory setting | 2 |
| 06-02 | Reserved   | ↗ | Factory setting |   |
| 06-03 | Reserved   | ↗ | Factory setting |   |
| 06-04 | DFM(M) output function selection                 | ↗ | Factory setting | 0 |

The function descriptions of the multi-function output terminals are as follows:

| Setting value | Function  | Description  |
|---------------|---|--|
| 0             | No output   | Output terminal is invalid   |
| 1             | Inverter is running                               | Indicates that the inverter is in running state and has an output frequency (which can be zero), at this time it outputs an ON signal  |
| 2             | Fault output (stop)                               | When the inverter is faulty and the fault is stopped, the ON signal is output.   |
| 3             | Frequency level detection<br>FDT1 output          | Please refer to the parameters 09-19,09-20   |
| 4             | Frequency reached                                 | Please refer to the parameters 09-21   |
| 5             | Running at zero speed<br>(No output when stopped) | When the inverter is running and the output frequency is 0, the ON signal is output. When the inverter is stopped, this signal is OFF.   |
| 6             | Motor overload pre-alarm                          | Before the overload protection action of the motor, the judgment is based on the threshold value of the overload pre-alarm, and the ON signal is output after the pre-alarm threshold is exceeded. Refer to parameters 11-00 ~ 11-02 for motor overload parameter setting. |
| 7             | Inverter overload pre-alarm                       | 10s before the inverter overload protection occurs, output ON signal.  |
| 8             | Set count value reached                           | When the count value reaches the value set in 13-08, the ON signal is output.  |
| 9             | Designated count value reached                    | When the count value C reaches the value set in 13-09, the ON signal is output. For counting function, please refer to 13 groups of function description   |
| 10            | Length reached                                    | When the detected actual length exceeds the length set by 13-05, the ON signal is output.  |
| 11            | PLC cycle completed                               | When the simple PLC completes one cycle of operation, it outputs a pulse signal with a width of 250ms.   |
| 12            | Cumulative running time arrived                   | When the cumulative running time of the inverter exceeds the time set in 09-17, it outputs an ON signal.   |
| 13            | Frequency limited                                 | When the set frequency exceeds the upper limit frequency or lower limit frequency, and the output frequency of the inverter reaches the upper limit frequency or lower limit frequency, an ON signal is output.  |

| Setting value | Function   | Description  |
|---------------|--|--|
| 14            | Torque limited   | In the speed control mode of the frequency converter, when the output torque reaches the torque limit value, the frequency converter is in the stall protection state and outputs an ON signal at the same time.             |
| 15            | Ready for run  | When the power supply of the main circuit and the control circuit of the inverter has stabilized, and the inverter has not detected any fault information, and the inverter is in a operable state, it outputs an ON signal. |
| 16            | AVI1>AVI2/ACI  | When the value of analog input AVI1 is greater than the input value of AVI2/ACI, an ON signal is output.   |
| 17            | Upper limit frequency reached                            | When the running frequency reaches the upper limit frequency, the ON signal is output.   |
| 18            | Lower limit frequency reached (operation valid)          | When the running frequency reaches the lower limit frequency, the ON signal is output. The output is OFF in the stop state.  |
| 19            | Undervoltage state output                                | When the inverter is undervoltage state, it outputs ON signal.   |
| 20            | Communication setting                                    | Please refer to the communication protocol.  |
| 21            | Reserved   | Reserved   |
| 22            | Reserved   | Reserved   |
| 23            | Zero speed running 2 (also output when stopped)          | When the output frequency of the inverter is 0, the ON signal is output. This signal is also ON in the stop state.   |
| 24            | Cumulative power-on time arrival                         | When the cumulative power-on time (08-13) of the inverter exceeds the set time of 09-16, it outputs an ON signal.  |
| 25            | Frequency level detection FDT2 output                    | Please refer to the parameters 09-28,09-29   |
| 26            | Frequency 1 reaches the output                           | Please refer to the parameters 09-30,09-31   |
| 27            | Frequency 2 reaches the output                           | Please refer to the parameters 09-32,09-33   |
| 28            | Current 1 reaches the output                             | Please refer to the parameters 09-38,09-39   |
| 29            | Current 2 reaches the output                             | Please refer to the parameters 09-40,09-41   |
| 30            | Timing reached   | When the timing function selection (09-42) is valid, the inverter will output an ON signal after the current running time of the inverter reaches the set time.  |
| 31            | AVI1 input exceeds limit                                 | When the value of analog input AVI1 is greater than 09-46 (AVI1 input protection upper limit) or less than 09-45 (AVI1 input protection lower limit), ON signal is output.   |
| 32            | Lost load  | When the inverter is in the load drop state, it outputs ON signal.   |
| 33            | Reverse running  | When the inverter is running in reverse, output ON signal  |
| 34            | Zero current state                                       | Please refer to the parameters 09-34,09-35   |
| 35            | Module temperature reached                               | Inverter module radiator temperature (08-08) reaches the set module temperature reached value(09-47), output ON signal   |
| 36            | Software current limit exceeded                          | Please refer to the parameters 09-36,09-37   |
| 37            | Lower limit frequency reached (also output when stopped) | When the running frequency reaches the lower limit frequency, the ON signal is output. The signal is also ON in the stop state.  |



| Setting value | Function                     | Description   |
|---------------|------------------------------|---|
| 38            | Warning output               | When the inverter fails, and the fault handling mode is Continue to run, the inverter warning output. |
| 39            | Reserved                     | Reserved  |
| 40            | Current running time reached | When the inverter's current running time exceeds the time set in 09-53, it outputs an ON signal.      |

|       |                                    |   |                       |                 |   |
|-------|------------------------------------|---|-----------------------|-----------------|---|
| 06-05 | DFM terminal output mode selection |   | ↗                     | Factory setting | 0 |
|       | Setting range                      | 0 | Pulse output(DFM(P))  |                 |   |
|       |                                    | 1 | Switch output(DFM(M)) |                 |   |

The DFM terminal is a programmable multiplex terminal, which can be used as a high-speed pulse output terminal (DFM(P)) or an open collector switching output terminal (DFM(M)).

When DFM(P) is output as a pulse, please refer to 06-06 for DFM(P) related functions. The maximum frequency of the output pulse is 100kHz.

When DFM(M) is output as a switch, please refer to 06-04 for DFM(M) related functions.

|       |                                  |   |                 |   |
|-------|----------------------------------|---|-----------------|---|
| 06-06 | DFM(P) output function selection | ↗ | Factory setting | 0 |
| 06-07 | AFM output function selection    | ↗ | Factory setting | 0 |
| 06-08 | Reserved                         | ↗ | Factory setting |   |

DFM (P) terminal output pulse frequency range is 0.01kHz ~ 06-09 (DFM (P) output maximum frequency), 06-09 can be set between 0.01kHz ~ 100.00kHz.

Analog output AFM output range is 0V ~ 10V. The relationship between the range of pulse output or analog output and the scaling of corresponding functions is shown in the following table:

| Setting value | Funtion               | Pulse or analog output 0.0%~100.0% corresponding function      |
|---------------|-----------------------|--|
| 0             | Running frequency     | 0 to max output frequency                                      |
| 1             | Set frequency         | 0 to max output frequency                                      |
| 2             | Output current        | 0 to 2 times of motor rated current                            |
| 3             | Output torque         | 0 to 2 times of motor rated torque                             |
| 4             | Output power          | 0 to 2 times rated power                                       |
| 5             | Output voltage        | 0 to 1.2 times of inverter rated voltage                       |
| 6             | PULSE input           | 0.01kHz~100.00kHz  |
| 7             | AVI1                  | 0V~10V   |
| 8             | AVI2/ACI              | 0V~10V(or 0~20mA)  |
| 9             | Reserved              |  |
| 10            | Length                | 0 to maximum set length  |
| 11            | Count value           | 0 to maximum count value                                       |
| 12            | Communication setting | 0.0%~100.0%  |
| 13            | Motor rotation speed  | 0~The rotation speed corresponding to maximum output frequency |
| 14            | Output current        | 0.0A~1000.0A   |
| 15            | BUS voltage           | 0.0V~1000.0V   |

|       |                                  |                   |                 |          |
|-------|----------------------------------|-------------------|-----------------|----------|
| 06-09 | DFM (P) output maximum frequency | ↗                 | Factory setting | 50.00kHz |
|       | Setting range                    | 0.01kHz~100.00kHz |                 |          |

When the DFM terminal is selected as the pulse output, this parameter is used to select the maximum frequency value of the output pulse.

|       |                              |                 |                 |      |
|-------|------------------------------|-----------------|-----------------|------|
| 06-10 | AFM zero offset coefficient  | ↗               | Factory setting | 0.0% |
|       | Setting range                | -100.0%~+100.0% |                 |      |
| 06-11 | AFM gain                     | ↗               | Factory setting | 1    |
|       | Setting range                | -10.00~+10.00   |                 |      |
| 06-12 | AFM2 zero offset coefficient | ↗               | Factory setting | 0.0% |
|       | Setting range                | -100.0%~+100.0% |                 |      |
| 06-13 | AFM2 gain                    | ↗               | Factory setting | 1.00 |
|       | Setting range                | -10.00~+10.00   |                 |      |

The above parameters are generally used to correct the zero drift of the analog output and the deviation of the output amplitude. It can also be used to customize the desired AFM output curve.

If the zero offset is represented by "b", the gain is represented by k, the actual output is represented by Y, and the standard output is represented by X, then the actual output is:

$Y=kX+b$ . Among them, the zero deviation coefficient of AFM 100% corresponds to 10V, the standard output refers to the amount of 0V ~ 10V corresponding to the analog output without zero deviation and gain correction.

|       |                                  |              |                 |      |
|-------|----------------------------------|--------------|-----------------|------|
| 06-17 | MO1 output delay time            | ↗            | Factory setting | 0.0s |
| 06-18 | Relay RA-RB-RC output delay time | ↗            | Factory setting | 0.0s |
|       | Setting range                    | 0.0s~3600.0s |                 |      |

Set the delay time for the output terminal Terminal to change from the state to the actual output.

## 07 Start and Stop Control Parameters

|       |               |   |                                 |   |
|-------|---------------|---|---------------------------------|---|
| 07-00 | Startup mode  | ↗ | Factory setting                 | 0 |
|       | Setting range | 0 | Direct start                    |   |
|       |               | 1 | Rotation speed tracking restart |   |
|       |               | 2 | Pre-excitation start            |   |

0: Direct start:

If the startup DC braking time is set to 0, the inverter starts to run from the startup frequency. If the startup DC braking time is not 0, then DC braking first, and then start running from the startup frequency. Applicable to small inertial loads, where the motor may rotate when starting.

1: Rotation speed tracking restart:

The inverter first judges the speed and direction of the motor, and then starts at the tracked motor frequency, and implements the smoothing of the rotating motor.

Start without sliding. It is suitable for restart after instantaneous power failure of large inertia load. In order to ensure the performance of speed tracking and restart, it is necessary to set the motor 01 group parameters accurately.

## 2: Pre-excitation start:

Used to establish the magnetic field before the motor runs. For the pre-excitation current and time, please refer to the description of parameters 07-03 and 07-04.

If the pre-excitation time is set to 0, the inverter cancels the pre-excitation process and starts from the startup frequency. If the pre-excitation time is not 0, pre-excitation first and then start, can improve the dynamic response performance of the motor.

|              |                                |                |   |                 |        |
|--------------|--------------------------------|----------------|---|-----------------|--------|
| <b>07-01</b> | Startup frequency              |                | ↗ | Factory setting | 0.00Hz |
|              | Setting range                  | 0.00Hz~10.00Hz |   |                 |        |
| <b>07-02</b> | Startup frequency holding time |                |   | Factory setting | 0.0s   |
|              | Setting range                  | 0.0s~100.0s    |   |                 |        |

The inverter starts to run from the startup frequency (07-01), after the startup frequency holding time (07-02), then accelerates to the target frequency according to the set acceleration time.

The startup frequency 07-01 is not limited by the lower limit frequency. However, when the set target frequency is less than the startup frequency, the inverter does not start and is in a standby state.

During the switching between forward and reverse rotation, the startup frequency holding time has no effect. The startup frequency holding time is not included in the acceleration time, but included in the running time of the simple PLC.

|              |   |             |  |                 |      |
|--------------|---|-------------|--|-----------------|------|
| <b>07-03</b> | Startup DC braking current / pre-excitation current |             |  | Factory setting | 0%   |
|              | Setting range                                       | 0%~100%     |  |                 |      |
| <b>07-04</b> | Startup DC braking time/pre-excitation time         |             |  | Factory setting | 0.0s |
|              | Setting range                                       | 0.0s~100.0s |  |                 |      |

Startup DC braking is only effective when the starting mode is direct start. At this time, the inverter performs DC braking according to the set startup DC braking current, and then starts running after the startup DC braking time. If the DC braking time is set to 0, DC braking is invalid. The greater the DC braking current, the greater the braking force.

If the startup mode is asynchronous motor pre-excitation start, the inverter first establishes the magnetic field according to the set pre-excitation current, and then starts running after the pre-excitation time.

If the pre-excitation time is set to 0, the pre-excitation is invalid and starts directly.

The startup DC braking current/pre-excitation current is a percentage of the rated current of the inverter.

|              |               |   |                    |                 |   |
|--------------|---------------|---|--------------------|-----------------|---|
| <b>07-05</b> | Stop mode     |   | ↗                  | Factory setting | 0 |
|              | Setting range | 0 | Decelerate to stop |                 |   |
|              |               | 1 | Coast to stop      |                 |   |

0: Decelerate to stop after the stop command is valid, the inverter reduces the output frequency according to the deceleration time, and stops after the frequency drops to 0.

1: After the coast stop command is valid, the inverter immediately terminates the output, and the motor coasts to stop according to the mechanical inertia.

|              |  |                      |   |                 |        |
|--------------|--|----------------------|---|-----------------|--------|
| <b>07-06</b> | Starting frequency of DC braking at stop |                      | ↗ | Factory setting | 0.00Hz |
|              | Setting range                            | 0.00Hz~Max frequency |   |                 |        |
| <b>07-07</b> | DC braking waiting time at stop          |                      |   | Factory setting | 0.0s   |
|              | Setting range                            | 0.0s~100.0s          |   |                 |        |

|       |                            |             |   |                 |      |
|-------|----------------------------|-------------|---|-----------------|------|
| 07-08 | DC braking current at stop |             | ↗ | Factory setting | 0%   |
|       | Setting range              | 0%~100%     |   |                 |      |
| 07-09 | DC braking time at stop    |             | ↗ | Factory setting | 0.0s |
|       | Setting range              | 0.0s~100.0s |   |                 |      |

Starting frequency of DC braking at stop: When the running frequency is reduced to this frequency during deceleration to stop, the DC braking process starts.

Waiting time for DC braking at stop: After the running frequency is reduced to the initial frequency of DC braking at stop, the inverter will stop output for a period of time before starting the DC braking process. It is used to prevent overcurrent and other faults that may be caused by starting DC braking at a higher speed.

DC braking current at stop: refers to the output current Output current during DC braking, as a percentage of the motor rated current. The larger the value, the stronger the braking, but the greater the heat generated by the motor and inverter.

DC braking time at stop: The time the DC braking amount is maintained. This value is 0, the DC braking process is canceled. The DC braking process during shutdown is shown in the schematic diagram in Figure 5-12.

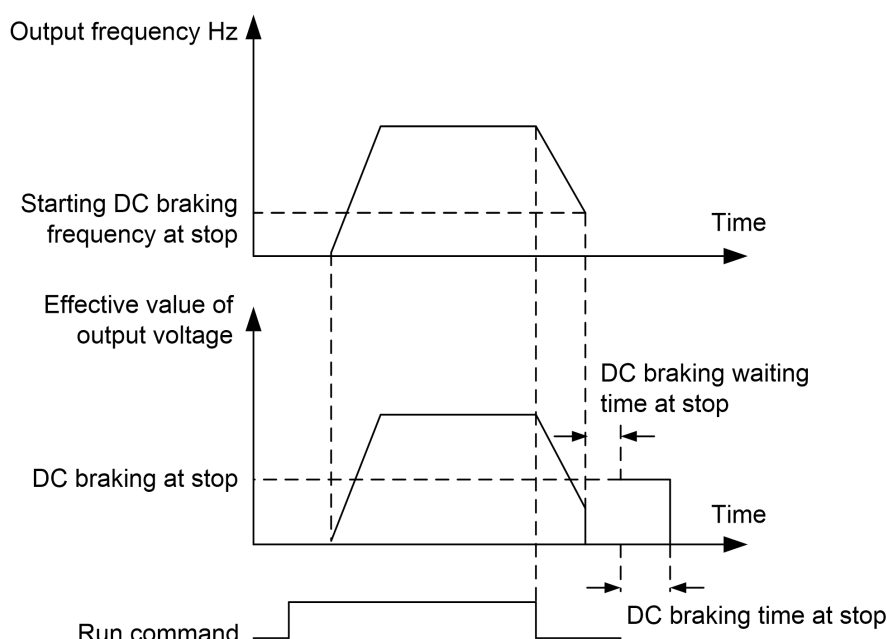


Figure 5-12 Schematic diagram of DC braking at shutdown

|       |               |         |   |                 |     |
|-------|---------------|---------|---|-----------------|-----|
| 07-10 | Brake usage   |         | ↗ | Factory setting | 80% |
|       | Setting range | 0%~100% |   |                 |     |

It is only valid for the inverter with built-in braking unit.

The higher the braking usage rate, the stronger the braking effect, but the voltage fluctuation of the inverter bus voltage during braking is large.

|       |                                    |   |                                       |                 |   |
|-------|------------------------------------|---|---------------------------------------|-----------------|---|
| 07-11 | Acceleration and deceleration mode |   |                                       | Factory setting | 0 |
|       | Setting range                      | 0 | Linear acceleration / deceleration    |                 |   |
|       |                                    | 1 | S curve acceleration / deceleration A |                 |   |
|       |                                    | 2 | S curve acceleration / deceleration B |                 |   |

Select the frequency change method of the inverter during start and stop.

0: linear acceleration and deceleration

The output frequency increases or decreases in a straight line. 4 kinds of acceleration/deceleration time can be selected through multi-function digital input terminals (04-00~04-04).

## 1: S curve acceleration and deceleration A

The output frequency increases or decreases according to the S curve. The S curve is used in places that require gentle start or stop, such as elevators and conveyor belts. Parameters 07-12 and 07-13 respectively define the time proportion of the start and end segments of the S curve acceleration and deceleration

## 2: S curve acceleration and deceleration B

In this S curve acceleration/deceleration B, the rated frequency of the motor is always the inflection point of the S curve. As shown in Figure 5-14. It is generally used in high-speed areas above the rated frequency that require rapid acceleration and deceleration.

When the set frequency is above the rated frequency, the acceleration/deceleration time is:

$$t = \left( \frac{4}{9} \times \left( \frac{f}{f_b} \right)^2 + \frac{5}{9} \right) \times T$$

Among them,  $f$  is the set frequency,  $f_b$  is the rated frequency of the motor, and  $T$  is the time from 0 frequency acceleration to the rated frequency  $f_b$ .

|              |                          |                     |                 |       |
|--------------|--------------------------|---------------------|-----------------|-------|
| <b>07-12</b> | S curve start time ratio |                     | Factory setting | 30.0% |
|              | Setting range            | 0.0%~(100.0%-07-13) |                 |       |
| <b>07-13</b> | S curve end time ratio   |                     | Factory setting | 30.0% |
|              | Setting range            | 0.0%~(100.0%-07-12) |                 |       |

Parameters 07-12 and 07-13 respectively define the start and end time ratios of the acceleration and deceleration A of the S curve. The two parameters must meet:  $07-12 + 07-13 \leq 100.0\%$ .

In Figure 5-13,  $t_1$  is the parameter defined by parameter 07-12. During this period of time, the slope of the output frequency change gradually increases.  $t_2$  is the time defined by parameter 07-13. During this time period, the slope of the output frequency change gradually changes to 0.

During the time between  $t_1$  and  $t_2$ , the slope of the output frequency change is fixed, that is, linear acceleration and deceleration are performed in this interval.

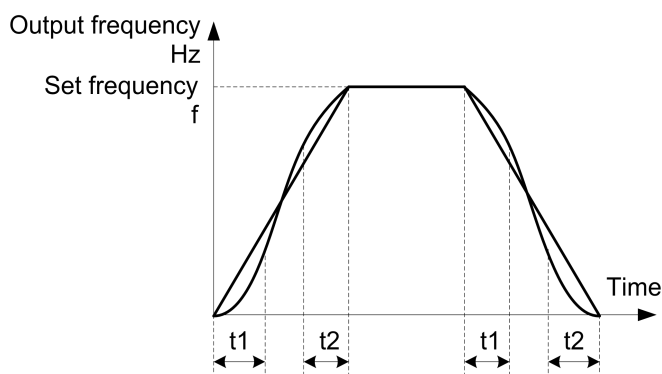


Figure 5-13 S curve acceleration and deceleration A

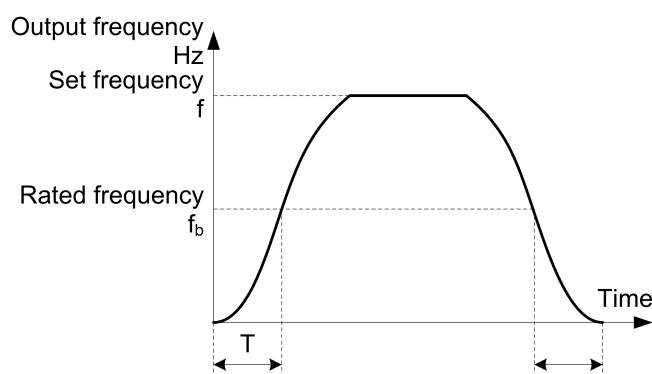


Figure 5-14 S curve acceleration and deceleration B

|              |                              |   |                              |   |
|--------------|------------------------------|---|------------------------------|---|
| <b>07-14</b> | Rotation speed tracking mode |   | Factory setting              | 0 |
|              | Setting range                | 0 | Start from stop frequency    |   |
|              |                              | 1 | Start from zero speed        |   |
|              |                              | 2 | Start from maximum frequency |   |

In order to complete the speed tracking process in the shortest time, choose the method of inverter tracking:

0: Track down from the frequency of power failure, this method is usually selected.

1: Start tracking from 0 frequency and use when the power is off for a long time before restarting.

2: Track down from the maximum frequency, generally used for generating loads.

|       |                               |       |                 |    |
|-------|-------------------------------|-------|-----------------|----|
| 07-15 | Rotation speed tracking speed |       | Factory setting | 20 |
|       | Setting range                 | 1~100 |                 |    |

When the speed tracking is restarted, select the speed of the speed tracking.

The larger the parameter, the faster the tracking speed. However, if the setting is too large, the tracking effect may be unreliable.

## 08 Man-machine Interface Parameters

|       |               |         |   |                 |   |
|-------|---------------|---------|---|-----------------|---|
| 08-00 | User password |         | ⚡ | Factory setting | 0 |
|       | Setting range | 0~65535 |   |                 |   |

08-00 sets any non-zero number, the password protection function takes effect. The next time you enter the menu, you must enter the password correctly, otherwise you cannot view and modify the function parameters, please remember the set user password.

Set 08-00 to 00000, then clear the set user password and invalidate the password protection function.

|       |                                  |   |   |                 |   |
|-------|----------------------------------|---|---|-----------------|---|
| 08-01 | QUICK/JOG key function selection |   |   | Factory setting | 3 |
|       | Setting range                    | 0 | QUICK/JOG invalid   |                 |   |
|       |                                  | 1 | Keyboard command channel and remote command channel (terminal Terminal command channel or communication command channel) switch |                 |   |
|       |                                  | 2 | Forward and reverse switching   |                 |   |
|       |                                  | 3 | Forward jog   |                 |   |
|       |                                  | 4 | Reverse jog   |                 |   |

QUICK/JOG is a multi-function key, and the function of QUICK/JOG key can be set through this parameter. You can use this key to switch between stop and running.

0: This button has no function.

1: Switch between keyboard command and remote operation. Refers to the switching of the command source, that is, the switching between the current command source and the keyboard control (local operation). If the current command source is keyboard control, the function of this key is invalid.

2: Forward and reverse switching Use this key to switch the direction of the frequency command. This function is only valid when the command source is the command channel of the operation panel.

3: Forward jog (FJOG) can be achieved through this key.

4: Reverse jog (RJOG) can be realized through this key.

|       |                         |   |  |                 |   |
|-------|-------------------------|---|--|-----------------|---|
| 08-02 | STOP/RESET key function |   | ↗  | Factory setting | 1 |
|       | Setting range           | 0 | Only in the keyboard operation mode, the STOP/RESET key stop function is effective |                 |   |
|       |                         | 1 | In any operation mode, the STOP/RESET key stop function is effective               |                 |   |

|       |                                   |           |                        |                 |    |
|-------|-----------------------------------|-----------|------------------------|-----------------|----|
| 08-03 | LED operation display parameter 1 |           | ↗                      | Factory setting | 1F |
|       | Setting range                     | 0000~FFFF |                        |                 |    |
|       |                                   | Bit00     | Running frequency1(Hz) |                 |    |

|       |   |           |                                       |   |                 |    |
|-------|---|-----------|---------------------------------------|---|-----------------|----|
| 08-03 | LED operation display parameter 1   |           |                                       | ↗ | Factory setting | 1F |
|       |   | Bit01     | Setting frequency(Hz)                 |   |                 |    |
|       |   | Bit02     | BUS Voltage(V)                        |   |                 |    |
|       |   | Bit03     | Output voltage(V)                     |   |                 |    |
|       |   | Bit04     | Output current(A)                     |   |                 |    |
|       |   | Bit05     | Output power(kW)                      |   |                 |    |
|       |   | Bit06     | Output torque(%)                      |   |                 |    |
|       |   | Bit07     | MI input status                       |   |                 |    |
|       |   | Bit08     | MO output status                      |   |                 |    |
|       |   | Bit09     | AVI1 voltage(V)                       |   |                 |    |
|       |   | Bit10     | AVI2/ACI voltage(V)                   |   |                 |    |
|       |   | Bit11     | Reserved                              |   |                 |    |
|       |   | Bit12     | Count value                           |   |                 |    |
|       |   | Bit13     | Length                                |   |                 |    |
|       |   | Bit14     | Load speed                            |   |                 |    |
|       |   | Bit15     | PID setting                           |   |                 |    |
|       | If the above parameters need to be displayed during operation, set the corresponding position to 1, set the binary number to hexadecimal and set it to 08-03. |           |                                       |   |                 |    |
| 08-04 | LED operation display parameter 2   |           |                                       | ↗ | Factory setting | 0  |
|       | Setting range   | 0000~FFFF |                                       |   |                 |    |
|       |   | Bit00     | PID feedback                          |   |                 |    |
|       |   | Bit01     | PLC stage                             |   |                 |    |
|       |   | Bit02     | PULSE input pulse frequency(kHz)      |   |                 |    |
|       |   | Bit03     | Running frequency 2(Hz)               |   |                 |    |
|       |   | Bit04     | Remaining running time                |   |                 |    |
|       |   | Bit05     | AVI1 voltage Before correction(V)     |   |                 |    |
|       |   | Bit06     | AVI2/ACI voltage Before correction(V) |   |                 |    |
|       |   | Bit07     | Reserved                              |   |                 |    |
|       |   | Bit08     | Line speed                            |   |                 |    |
|       |   | Bit09     | Current power-on time(Hour)           |   |                 |    |
|       |   | Bit10     | Current running time(Min)             |   |                 |    |
|       |   | Bit11     | PULSE Input pulse frequency(Hz)       |   |                 |    |
|       |   | Bit12     | Communication setting value           |   |                 |    |
|       |   | Bit13     | Reserved                              |   |                 |    |
|       |   | Bit14     | Main frequency X display (Hz)         |   |                 |    |
|       |   | Bit15     | Auxiliary frequency Y display (Hz)    |   |                 |    |
|       | If the above parameters need to be displayed during operation, set the corresponding position to 1, set the binary number to hexadecimal and set it to 08-04. |           |                                       |   |                 |    |

Running display parameters are used to set the parameters that can be viewed when the inverter is in running state.

The maximum number of status parameters available for viewing is 32, and the status parameters to be displayed are selected according to the binary bits of the 08-03 and 08-04 parameter values. The display order starts from the lowest bit of 08-03.

|       |   |                                  |                       |                 |    |
|-------|---|----------------------------------|-----------------------|-----------------|----|
| 08-05 | LED shutdown display parameters   |                                  | ↗                     | Factory setting | 33 |
|       | Setting range   | 0000~FFFF                        |                       |                 |    |
|       |   | Bit00                            | Setting frequency(Hz) |                 |    |
|       |   | Bit01                            | BUS voltage(V)        |                 |    |
|       |   | Bit02                            | MI input status       |                 |    |
|       |   | Bit03                            | MO output status      |                 |    |
|       |   | Bit04                            | AVI1 voltage(V)       |                 |    |
|       |   | Bit05                            | AVI2/ACI voltage(V)   |                 |    |
|       |   | Bit06                            | Reserved              |                 |    |
|       |   | Bit07                            | Count value           |                 |    |
|       |   | Bit08                            | Length                |                 |    |
|       |   | Bit09                            | PLC stage             |                 |    |
|       |   | Bit10                            | Load speed            |                 |    |
|       |   | Bit11                            | PID setting           |                 |    |
|       | Bit12   | PULSE input pulse frequency(kHz) |                       |                 |    |
|       | If the above parameters need to be displayed during operation, set the corresponding position to 1, set the binary number to hexadecimal and set it to 08-05. |                                  |                       |                 |    |

|       |                                |               |   |                 |   |
|-------|--------------------------------|---------------|---|-----------------|---|
| 08-06 | Load speed display coefficient |               | ↗ | Factory setting | 1 |
|       | Setting range                  | 0.0001~6.5000 |   |                 |   |

When the load speed Load speed needs to be displayed, this parameter is used to adjust the corresponding relationship between the inverter output frequency and the load speed Load speed. Refer to the instructions of 08-12.

|       |          |  |  |                 |   |
|-------|----------|--|--|-----------------|---|
| 08-07 | Reserved |  |  | Factory setting | - |
|-------|----------|--|--|-----------------|---|

|       |                                      |             |  |                 |   |
|-------|--------------------------------------|-------------|--|-----------------|---|
| 08-08 | Inverter module radiator temperature |             |  | Factory setting | - |
|       | Setting range                        | 0.0℃~100.0℃ |  |                 |   |

Displays the temperature of the inverter module IGBT.

Different types of inverter modules have different IGBT over-temperature protection values.

|       |                      |  |  |                 |   |
|-------|----------------------|--|--|-----------------|---|
| 08-09 | Reserved             |  |  | Factory setting | - |
| 08-10 | Software version No. |  |  | Factory setting | - |



|       |                         |                 |   |
|-------|-------------------------|-----------------|---|
| 08-11 | Cumulative running time | Factory setting | - |
|       | Setting range           | 0h~65535h       |   |

Cumulative running time of the inverter is displayed. When the running time reaches the set running time 09-17, the inverter's multi-function digital output function (12) outputs an ON signal.

|       |   |   |                  |    |
|-------|---|---|------------------|----|
| 08-12 | Load speed display the number of decimal places | ↗   | Factory setting  | 21 |
|       | Setting range                                   | Units: Number of decimal places for load speed<br>Tens place: Number of decimal places for feedback speed |                  |    |
|       |   | 0   | 0 decimal place  |    |
|       |   | 1   | 1 decimal place  |    |
|       |   | 2   | 2 decimal places |    |
|       |   | 3   | 3 decimal places |    |

Used to set the number of decimal places for load speed display. The following example illustrates the calculation method of load speed:

If the load speed display coefficient 08-06 is 2.000, the load speed decimal point number 08-12 is 2 (2 decimal points), when the inverter running frequency is 40.00Hz, the load speed is:  $40.00 \times 2.000 = 80.00$  (2 decimal points display)

If the inverter is in a stopped state, the load speed is displayed as the speed corresponding to the setting frequency, that is, "set load speed". Taking the set frequency of 50.00Hz as an example, the load speed in the stop state is:  $50.00 \times 2.000 = 100.00$  (2 decimal places display)

|       |                          |                 |   |
|-------|--------------------------|-----------------|---|
| 08-13 | Cumulative power-on time | Factory setting | - |
|-------|--------------------------|-----------------|---|

Shows the cumulative power-on time of the inverter since the factory.

When this time reaches the set power-on time (09-17), the inverter's multi-function digital output function (24) outputs an ON signal.

|       |                              |                 |   |
|-------|------------------------------|-----------------|---|
| 08-14 | Cumulative power consumption | Factory setting | - |
|       | Setting range                | 0~65535 degree  |   |

Displays the cumulative power consumption of the inverter so far

## 09 Accessibility Parameters

|       |                       |                      |                 |        |
|-------|-----------------------|----------------------|-----------------|--------|
| 09-00 | Jog running frequency | ↗                    | Factory setting | 5.00Hz |
|       | Setting range         | 0.00Hz~Max frequency |                 |        |
| 09-01 | Jog acceleration time | ↗                    | Factory setting | 20.0s  |
|       | Setting range         | 0.0s~6500.0s         |                 |        |
| 09-02 | Jog deceleration time | ↗                    | Factory setting | 20.0s  |
|       | Setting range         | 0.0s~6500.0s         |                 |        |

Define the given frequency and acceleration/deceleration time of the inverter when jogging.

During jog operation, the start mode is fixed to the direct start mode (07-00=0), and the stop mode is fixed to the deceleration stop (07-05=0).

|       |                     |              |                 |              |
|-------|---------------------|--------------|-----------------|--------------|
| 09-03 | Acceleration time 2 | ↗            | Factory setting | Type setting |
| 09-04 | Deceleration time 2 | ↗            | Factory setting | Type setting |
| 09-05 | Acceleration time 3 | ↗            | Factory setting | Type setting |
| 09-06 | Deceleration time 3 | ↗            | Factory setting | Type setting |
| 09-07 | Acceleration time 4 | ↗            | Factory setting | Type setting |
| 09-08 | Deceleration time 4 | ↗            | Factory setting | Type setting |
|       | Setting range       | 0.0s~6500.0s |                 |              |

S3100E provides 4 groups of acceleration and deceleration time, respectively 00-07/00-08 and the above 3 groups of acceleration and deceleration time.

The definitions of the 4 groups of acceleration and deceleration times are exactly the same, please refer to the relevant descriptions of 00-07 and 00-08. Through different combinations of multi-function digital input terminals MI, you can switch to select 4 groups of acceleration and deceleration time. For specific usage, please refer to the relevant descriptions in parameters 04-00~04-05.

|       |                          |                      |                 |        |
|-------|--------------------------|----------------------|-----------------|--------|
| 09-09 | Jump frequency 1         | ↗                    | Factory setting | 0.00Hz |
|       | Setting range            | 0.00Hz~Max frequency |                 |        |
| 09-10 | Jump frequency 2         | ↗                    | Factory setting | 0.00Hz |
|       | Setting range            | 0.00Hz~Max frequency |                 |        |
| 09-11 | Jump frequency amplitude | ↗                    | Factory setting | 0.00Hz |
|       | Setting range            | 0.00Hz~Max frequency |                 |        |

When the set frequency is within the range of the jump frequency, the actual operating frequency will run at the jump frequency closer to the set frequency. By setting the jump frequency, the inverter can avoid the mechanical resonance point of the load.

The S3100E can set two jump frequency points. If both jump frequencies are set to 0, the jump frequency function is cancelled. Please refer to Figure 5-15 for the principle of jump frequency and jump frequency amplitude.

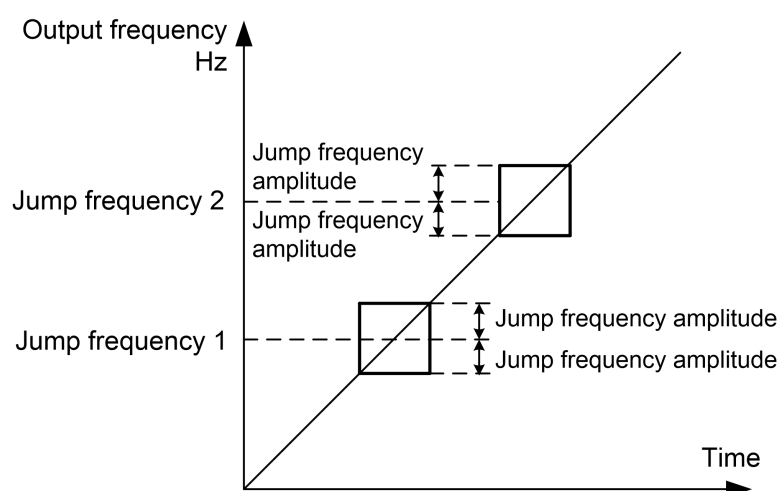


Figure 5-15 Schematic diagram of jumping frequency

|       |                               |               |                 |      |
|-------|-------------------------------|---------------|-----------------|------|
| 09-12 | Forward and reverse dead time | ↗             | Factory setting | 0.0s |
|       | Setting range                 | 0.00s~3000.0s |                 |      |

Set the transition time at the output 0Hz during the inverter forward and reverse transition, as shown in Figure 5-16:

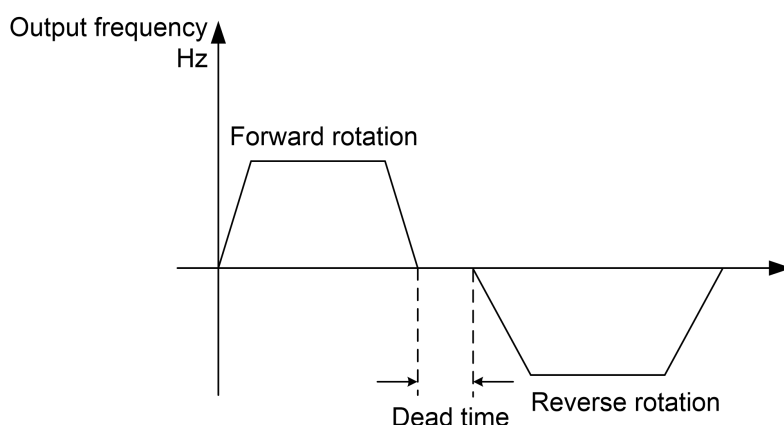


Figure 5-16 Schematic diagram of forward and reverse dead time

|       |                        |   |          |                 |   |
|-------|------------------------|---|----------|-----------------|---|
| 09-13 | Reverse control enable |   | ↗        | Factory setting | 0 |
|       | Setting range          | 0 | Enabled  |                 |   |
|       |                        | 1 | Disabled |                 |   |

Use this parameter to set the inverter to set 09-13=1 when the motor is not allowed to reverse.

|       |  |   |                                  |                 |   |
|-------|--|---|----------------------------------|-----------------|---|
| 09-14 | Operating mode with set frequency lower than lower limit frequency |   | ↗                                | Factory setting | 0 |
|       | Setting range  | 0 | Run at the lower limit frequency |                 |   |
|       |  | 1 | Downtime                         |                 |   |
|       |  | 2 | Zero speed operation             |                 |   |

When the set frequency is lower than the lower limit frequency, the running state of the inverter can be selected by this parameter. S3100E provides three operating modes to meet various application requirements.

|       |               |                |   |                 |        |
|-------|---------------|----------------|---|-----------------|--------|
| 09-15 | Drop control  |                | ↗ | Factory setting | 0.00Hz |
|       | Setting range | 0.00Hz~10.00Hz |   |                 |        |

Refers to the output frequency drop value when the inverter is outputting the rated load. This function is generally used for load distribution when multiple motors drag the same load.

The droop control means that as the load increases, the output frequency of the inverter decreases, so that when multiple motors drag the same load, the output frequency of the motor in the load decreases more, which can reduce the load of the motor and realize the The load is even.

|       |                                      |           |   |                 |    |
|-------|--------------------------------------|-----------|---|-----------------|----|
| 09-16 | Set cumulative power-on arrival time |           | ↗ | Factory setting | 0h |
|       | Setting range                        | 0h~65000h |   |                 |    |

When the cumulative power-on time (08-13) reaches the power-on time set in 09-16, the inverter's multi-function output terminal Terminal (function 24) turns on.

|       |                                     |           |   |                 |    |
|-------|-------------------------------------|-----------|---|-----------------|----|
| 09-17 | Set cumulative running arrival time |           | ↗ | Factory setting | 0h |
|       | Setting range                       | 0h~65000h |   |                 |    |

Used to set the running time of the inverter.

When the accumulated running time (08-11) reaches this set running time, the inverter's multi-function output terminal Terminal (function 12) turns on.

|       |                                       |   |                                      |                 |   |
|-------|---------------------------------------|---|--------------------------------------|-----------------|---|
| 09-18 | Power-on operation protection options |   | ↗                                    | Factory setting | 1 |
|       | Setting range                         | 0 | Run command is valid when power on   |                 |   |
|       |                                       | 1 | Run command is invalid when power on |                 |   |

The parameter is 1, if the running command is valid when the inverter is powered on (such as the terminal running command is closed before powering on), the inverter does not respond to the running command, and the running command must be canceled once before the inverter is valid again response.

In addition, if this parameter is set to 1, if the running command is valid at the time of inverter fault reset, the inverter will not respond to the running command, and the running command must be removed before the running protection state can be eliminated.

Setting this parameter to 1 can prevent the danger caused by the motor responding to the running command when the power is turned on or the fault is reset without knowing it.

|       |                                      |                         |   |                 |         |
|-------|--------------------------------------|-------------------------|---|-----------------|---------|
| 09-19 | Frequency detection value(FDT1)      |                         | ↗ | Factory setting | 50.00Hz |
|       | Setting range                        | 0.00Hz~Max frequency    |   |                 |         |
| 09-20 | Frequency detection hysteresis(FDT1) |                         | ↗ | Factory setting | 5.0%    |
|       | Setting range                        | 0.0%~100.0%(FDT1 Level) |   |                 |         |

When the running frequency is greater than or equal to the frequency detection value, the inverter's multi-function output terminal (function 3) outputs an ON signal. When the frequency is lower than the detection value by a certain frequency value, the output ON signal is canceled.

The above parameters are used to set the detection value of the output frequency and the hysteresis value of the output operation release. Where 09-20 is the percentage of the hysteresis frequency relative to the frequency detection value 09-19. Figure 5-17 is a schematic diagram of the FDT function.

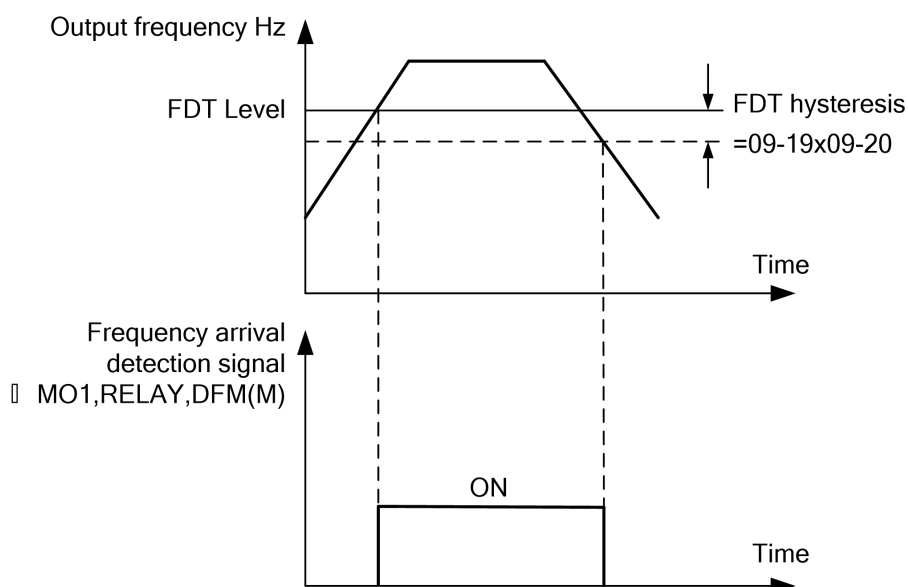


Figure 5-17 Schematic diagram of FDT level

|       |                                 |                           |   |                 |      |
|-------|---------------------------------|---------------------------|---|-----------------|------|
| 09-21 | Frequency reach detection width |                           | ↗ | Factory setting | 0.0% |
|       | Setting range                   | 0.00~100%(Max frequency ) |   |                 |      |

When the running frequency of the inverter is within a certain range of the target frequency, the multi-function output terminal (function 4) of the inverter outputs an ON signal.

This parameter is used to set the detection range of frequency arrival. This parameter is a percentage relative to the maximum frequency. Figure 5-18 is a schematic diagram of frequency arrival.

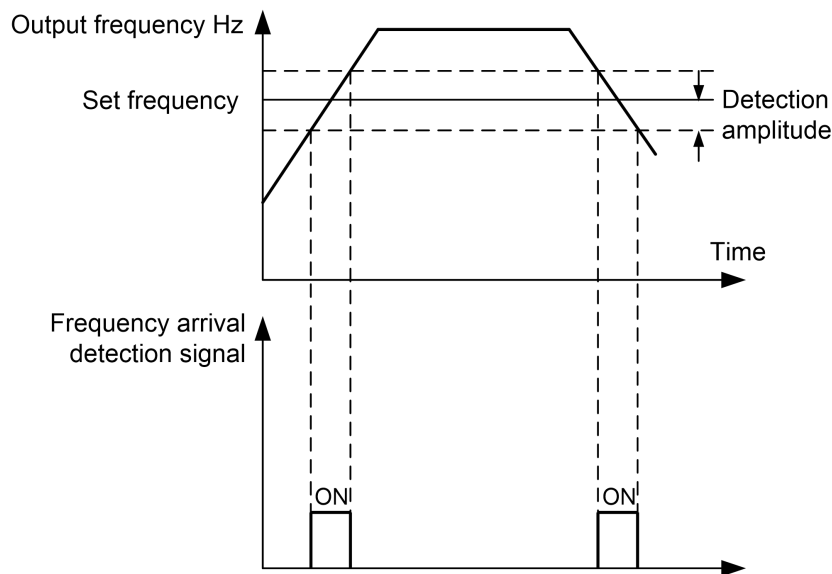


Figure 5-18 Schematic diagram of the frequency arrival detection amplitude

|       |  |   |         |   |                 |   |
|-------|--|---|---------|---|-----------------|---|
| 09-22 | Whether the jump frequency is effective during acceleration and deceleration |   |         | ↗ | Factory setting | 0 |
|       | Setting range  | 0 | Invalid |   |                 |   |
|       |  | 1 | Valid   |   |                 |   |

When the setting is valid, when the operating frequency is within the range of the skip frequency, the actual operating frequency will skip the boundary of the set skip frequency. As shown in Figure 5-19.

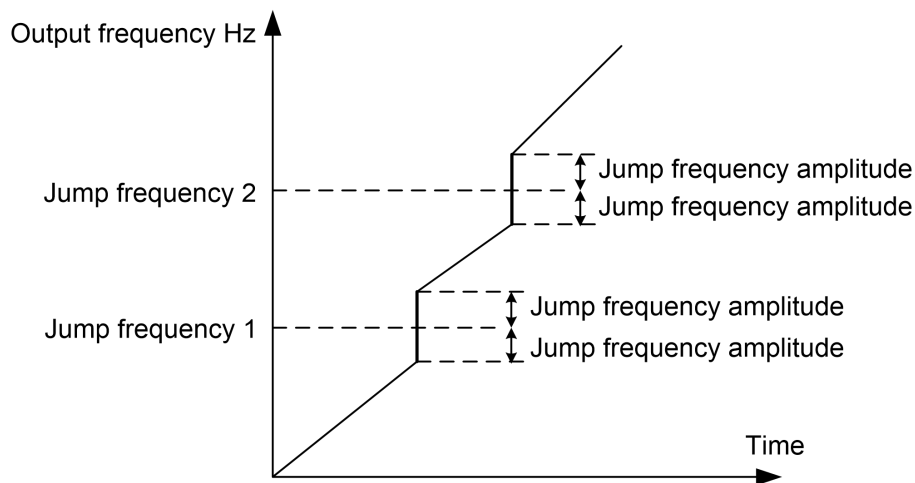


Figure 5-19 Effective schematic diagram of jump frequency during acceleration and deceleration

|       |   |                      |  |   |                 |        |
|-------|---|----------------------|--|---|-----------------|--------|
| 09-25 | Switching frequency point between acceleration time 1 and acceleration time 2 |                      |  | ↗ | Factory setting | 0.00Hz |
|       | Setting range   | 0.00Hz~Max frequency |  |   |                 |        |
| 09-26 | Switching frequency point between deceleration time 1 and deceleration time 2 |                      |  | ↗ | Factory setting | 0.00Hz |
|       | Setting range   | 0.00Hz~Max frequency |  |   |                 |        |

During the operation of the inverter, different acceleration and deceleration times can be selected according to the operating frequency range instead of the MI terminal.

Figure 5-20 is a schematic diagram of acceleration/deceleration time switching. During acceleration, if the operating frequency is less than 09-25, select acceleration time 2; if the operating frequency is greater than 09-25, select acceleration time 1.

During deceleration, if the operating frequency is greater than 09-26, select deceleration time 1, if the operating frequency is less than 09-26, select deceleration time 2.

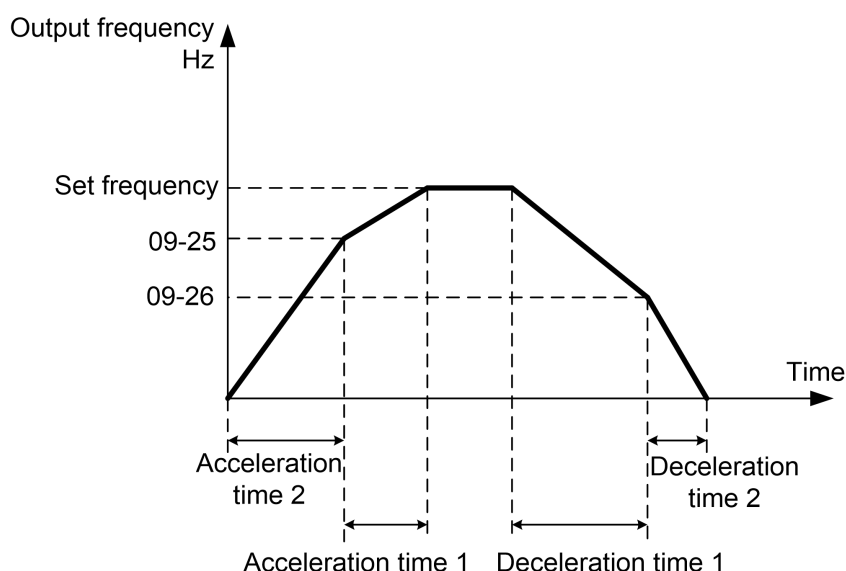


Figure 5-20 Acceleration and deceleration time switching diagram

|       |                           |   |         |   |                 |   |
|-------|---------------------------|---|---------|---|-----------------|---|
| 09-27 | Terminal jogging priority |   |         | ↗ | Factory setting | 0 |
|       | Setting range             | 0 | Invalid |   |                 |   |
|       |                           | 1 | Valid   |   |                 |   |

This parameter can set the priority of the terminal jog command to the highest.

When the terminal jog priority is effective, if the terminal jog command appears during the operation, the inverter will switch to the terminal jog running state.

|       |                                      |                         |  |   |                 |         |
|-------|--------------------------------------|-------------------------|--|---|-----------------|---------|
| 09-28 | Frequency detection value(FDT2)      |                         |  | ↗ | Factory setting | 50.00Hz |
|       | Setting range                        | 0.00Hz~Max frequency    |  |   |                 |         |
| 09-29 | Frequency detection hysteresis(FDT2) |                         |  | ↗ | Factory setting | 5.0%    |
|       | Setting range                        | 0.0%~100.0%(FDT2 Level) |  |   |                 |         |

The frequency detection function is exactly the same as the function of FDT1. Please refer to the relevant description of FDT1, namely the description of parameters 09-19 and 09-20.

|       |   |                             |  |   |                 |         |
|-------|---|-----------------------------|--|---|-----------------|---------|
| 09-30 | Arbitrary arrival frequency detection value 1 |                             |  | ↗ | Factory setting | 50.00Hz |
|       | Setting range                                 | 0.00Hz~Max frequency        |  |   |                 |         |
| 09-31 | Arbitrary arrival frequency detection width 1 |                             |  | ↗ | Factory setting | 0.0%    |
|       | Setting range                                 | 0.0%~100.0%(Max frequency ) |  |   |                 |         |
| 09-32 | Arbitrary arrival frequency detection value 2 |                             |  | ↗ | Factory setting | 50.00Hz |
|       | Setting range                                 | 0.00Hz~Max frequency        |  |   |                 |         |
| 09-33 | Arbitrary arrival frequency detection width 2 |                             |  | ↗ | Factory setting | 0.0%    |
|       | Setting range                                 | 0.0%~100.0%(Max frequency ) |  |   |                 |         |

When the output frequency is within the range of the positive and negative detection amplitude of any detected frequency, the multi-function output terminal (function 26/27) outputs an ON signal.

S3100E provides two sets of arbitrary arrival frequency detection parameters, set frequency value and frequency detection range respectively.

Figure 5-21 is a schematic diagram of this function.

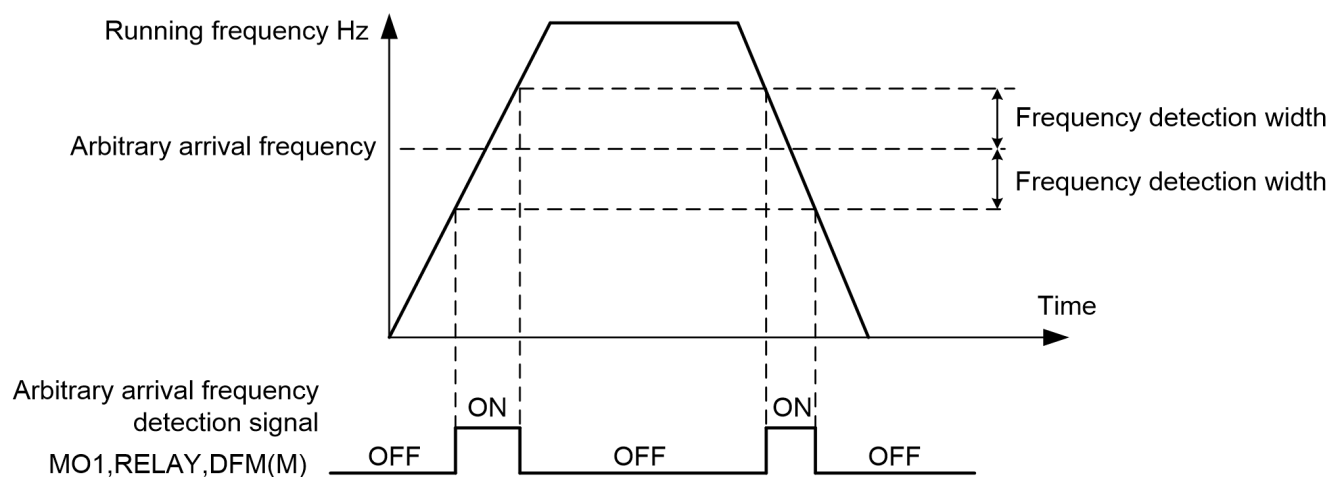


Figure 5-21 Schematic diagram of arbitrary arrival frequency detection

|       |                                   |  |                 |       |
|-------|-----------------------------------|--|-----------------|-------|
| 09-34 | Zero current detection level      | ↗  | Factory setting | 5.0%  |
|       | Setting range                     | 0.0%~300.0% (100.0% corresponds to the rated current of the motor) |                 |       |
| 09-35 | Zero current detection delay time | ↗  | Factory setting | 0.10s |
|       | Setting range                     | 0.01s~600.00s  |                 |       |

When the output current of the inverter is less than or equal to the zero current detection level and the duration exceeds the zero current detection delay time, the multi-function output terminal (function 34) of the inverter outputs an ON signal. Figure 5-22 is a schematic diagram of zero current detection.

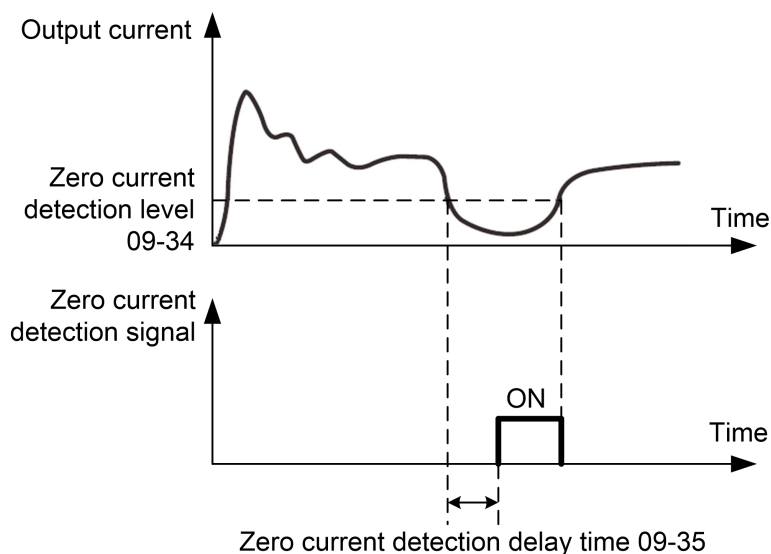


Figure 5-22 Schematic diagram of zero current detection

|       |   |  |                 |        |
|-------|---|--|-----------------|--------|
| 09-36 | Output current limit                    | ↗  | Factory setting | 200.0% |
|       | Setting range                           | 0.0%(No detection)<br>0.1%~300.0%(motor rated current) |                 |        |
| 09-37 | Output overcurrent detection delay time | ↗  | Factory setting | 0.00s  |
|       | Setting range                           | 0.00s~600.00s  |                 |        |

When the output current of the inverter is greater than or exceeds the limit detection point and the duration exceeds the software overcurrent detection delay time, the inverter's multi-function output terminal (function 36) outputs an ON signal.

Figure 5-23 is a schematic diagram of the output overcurrent detection.

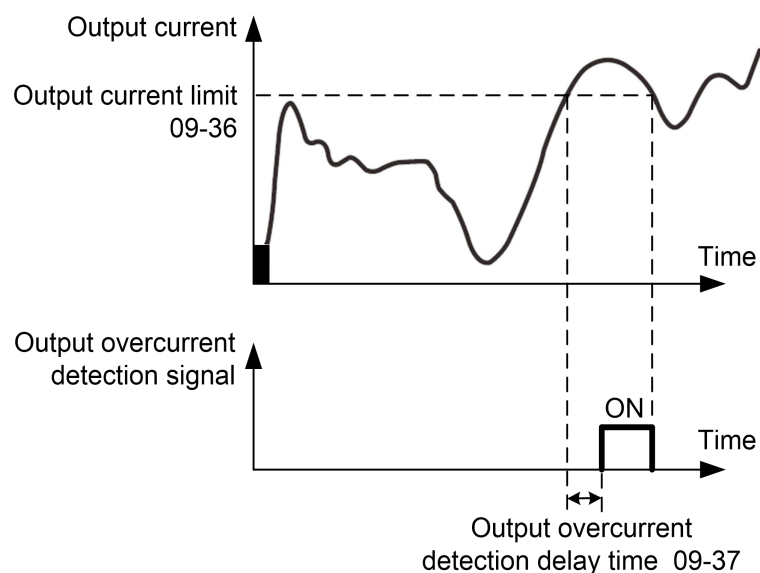


Figure 5-23 Schematic diagram of output overcurrent detection

|       |                                   |                                  |   |                 |        |
|-------|-----------------------------------|----------------------------------|---|-----------------|--------|
| 09-38 | Arbitrary arrival current 1       |                                  | ↗ | Factory setting | 100.0% |
|       | Setting range                     | 0.0%~300.0%(motor rated current) |   |                 |        |
| 09-39 | Arbitrary arrival current 1 width |                                  | ↗ | Factory setting | 0.0%   |
|       | Setting range                     | 0.0%~300.0%(motor rated current) |   |                 |        |
| 09-40 | Arbitrary arrival current 2       |                                  | ↗ | Factory setting | 100.0% |
|       | Setting range                     | 0.0%~300.0%(motor rated current) |   |                 |        |
| 09-41 | Arbitrary arrival current 2 width |                                  | ↗ | Factory setting | 0.0%   |
|       | Setting range                     | 0.0%~300.0%(motor rated current) |   |                 |        |

When the inverter output current is within any positive or negative detection width of the current, the inverter multi-function output terminal Terminal (function 28/29) outputs ON signal.

S3100E provides two sets of arbitrary current arrival and detection width parameters. Figure 5-24 is a schematic diagram of the function.

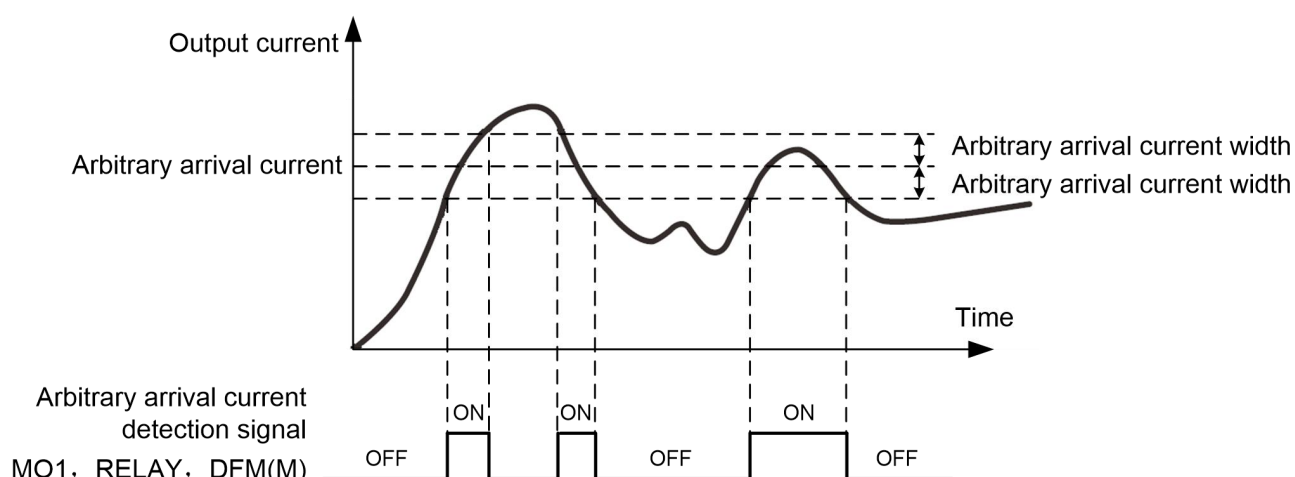


Figure 5-24 Schematic diagram of arbitrary arrival current detection

|       |                           |   |         |                 |   |
|-------|---------------------------|---|---------|-----------------|---|
| 09-42 | Timing function selection |   |         | Factory setting | 0 |
|       | Setting range             | 0 | Invalid |                 |   |
|       |                           | 1 | Valid   |                 |   |



|       |                              |  |               |                 |        |
|-------|------------------------------|--|---------------|-----------------|--------|
| 09-43 | Timed running time selection |  |               | Factory setting | 0      |
|       | Setting range                | 0  | 09-44 Setting |                 |        |
|       |                              | 1  | AVI1          |                 |        |
|       |                              | 2  | AVI2/ACI      |                 |        |
|       |                              | 3  | Reserved      |                 |        |
|       |                              | Analog input range 100% corresponds to 09-44 |               |                 |        |
| 09-44 | Timed running time           |  |               | Factory setting | 0.0Min |
|       | Setting range                | 0.0Min~6500.0Min                             |               |                 |        |

09-42 when the timing function selection is valid, the inverter starts timing when it starts, and when the set timing operation time is reached, the inverter automatically stops, and the multi-function output terminal (function 30) outputs an ON signal.

Every time the inverter starts, it starts counting from 0, and the remaining running time can be checked through 99-20. The scheduled running time is set by 09-43 and 09-44, and the time unit is minutes.

|       |  |              |  |   |                 |       |
|-------|--|--------------|--|---|-----------------|-------|
| 09-45 | Lower limit of AVI1 input voltage protection value |              |  | ↗ | Factory setting | 3.10V |
|       | Setting range                                      | 0.00V~09-46  |  |   |                 |       |
| 09-46 | Upper limit of AVI1 input voltage protection value |              |  | ↗ | Factory setting | 6.80V |
|       | Setting range                                      | 09-45~11.00V |  |   |                 |       |

When the value of the analog input AVI1 is greater than 09-46, or the AVI1 input is less than 09-45, the inverter's multi-function output terminal (function 31) outputs an ON signal, which is used to indicate whether the AVI1 input voltage is within the set range.

|       |                            |         |  |   |                 |     |
|-------|----------------------------|---------|--|---|-----------------|-----|
| 09-47 | Module temperature reached |         |  | ↗ | Factory setting | 75℃ |
|       | Setting range              | 0℃~100℃ |  |   |                 |     |

When the temperature of the inverter radiator reaches this temperature, the multi-function output terminal (function 35) of the inverter outputs an ON signal.

|       |                     |   |                           |  |                 |   |
|-------|---------------------|---|---------------------------|--|-----------------|---|
| 09-48 | Cooling fan control |   |                           |  | Factory setting | 0 |
|       | Setting range       | 0 | Fans run during operation |  |                 |   |
|       |                     | 1 | The fan keeps running     |  |                 |   |

It is used to select the operation mode of the cooling fan. When it is set to 0, the fan runs in the running state. If the temperature of the radiator is higher than 40 degrees in the stopped state, the fan runs.

When selected as 1, the fan keeps running after power on.

|       |                 |   |  |   |                 |        |
|-------|-----------------|---|--|---|-----------------|--------|
| 09-49 | Wake frequency  |   |  | ↗ | Factory setting | 0.00Hz |
|       | Setting range   | Sleep frequency (09-51) ~ max frequency (00-03) |  |   |                 |        |
| 09-50 | Wake delay time |   |  | ↗ | Factory setting | 0.0s   |
|       | Setting range   | 0.0s~6500.0s                                    |  |   |                 |        |
| 09-51 | Sleep frequency |   |  | ↗ | Factory setting | 0.00Hz |
|       | Setting range   | 0.00Hz~Wake frequency(09-49)                    |  |   |                 |        |

|       |                  |              |                 |      |
|-------|------------------|--------------|-----------------|------|
| 09-52 | Sleep delay time | ↗            | Factory setting | 0.0s |
|       | Setting range    | 0.0s~6500.0s |                 |      |

This group of parameters is used to implement sleep and wake-up functions in water supply applications.

During the operation of the inverter, when the set frequency is less than or equal to the sleep frequency of 09-51, after the delay time of 09-52, the inverter enters the sleep state and automatically stops.

If the inverter is in sleep state and the current running command is valid, when the set frequency is greater than or equal to the wake-up frequency of 09-49, the inverter will start after a delay time of 09-50.

In general, please set the wake-up frequency to be greater than or equal to the sleep frequency. If the wake-up frequency and sleep frequency are both set to 0.00Hz, the sleep and wake-up functions are invalid.

When the sleep function is enabled, if the frequency source uses PID, whether the PID operation in the sleep state is affected by the parameter 10-28. At this time, it is necessary to select PID calculation when the machine is stopped (10-28=1).

|       |                                   |                  |                 |        |
|-------|-----------------------------------|------------------|-----------------|--------|
| 09-53 | Arrival time setting for this run | ↗                | Factory setting | 0.0Min |
|       | Setting range                     | 0.0Min~6500.0Min |                 |        |

When the running time of this startup reaches this time, the inverter multi-function output terminal Terminal (function 40) outputs ON signal.

## 10 PID Control Parameters

PID control is a common method of process control. By performing proportional, integral, and differential operations on the difference between the controlled variable feedback signal and the target signal, and by adjusting the output frequency of the inverter, a closed-loop system is formed to stabilize the controlled variable at Target value. It is suitable for process control occasions such as flow control, pressure control and temperature control. Figure 5-25 shows the principle block diagram of the process PID control.

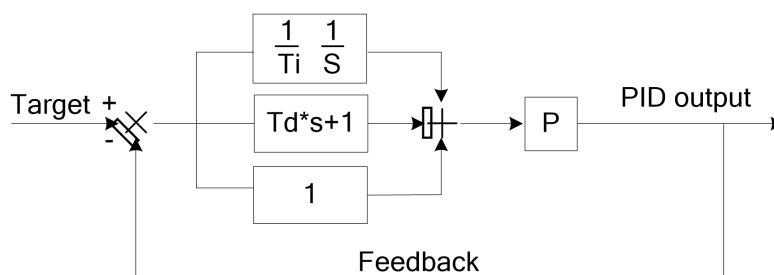


Figure 5-25 Principle block diagram of PID control

|       |                  |   |                                |   |
|-------|------------------|---|--------------------------------|---|
| 10-00 | PID given source | ↗ | Factory setting                | 0 |
|       | Setting range    | 0 | 10-01 Setting                  |   |
|       |                  | 1 | AVI1                           |   |
|       |                  | 2 | AVI2/ACI                       |   |
|       |                  | 3 | Reserved                       |   |
|       |                  | 4 | PULSE setting (MI5)            |   |
|       |                  | 5 | Communication setting          |   |
|       |                  | 6 | Multi-step speed command given |   |

|       |                |             |                 |       |
|-------|----------------|-------------|-----------------|-------|
| 10-01 | PID data given | ↗           | Factory setting | 50.0% |
|       | Setting range  | 0.0%~100.0% |                 |       |

This parameter is used to select the given channel for the target quantity of the process PID.

The process PID setting target value is a relative value, and the setting range is 0.0%~100.0%. Similarly, the feedback quantity of PID is also a relative quantity. The role of PID is to make these two relative quantities the same.

|       |                     |   |                           |   |
|-------|---------------------|---|---------------------------|---|
| 10-02 | PID feedback source | ↗ | Factory setting           | 0 |
|       | Setting range       | 0 | AVI1                      |   |
|       |                     | 1 | AVI2/ACI                  |   |
|       |                     | 2 | Reserved                  |   |
|       |                     | 3 | AVI1 – AVI2/ACI           |   |
|       |                     | 4 | PULSE setting (MI5)       |   |
|       |                     | 5 | Communication setting     |   |
|       |                     | 6 | AVI1+AVI2/ACI             |   |
|       |                     | 7 | MAX( AVI1 ,  AVI2/ACI  )  |   |
|       |                     | 8 | MIN ( AVI1 ,  AVI2/ACI  ) |   |

This parameter is used to select the feedback signal channel of the process PID.

The feedback value of the process PID is also a relative value, and the setting range is 0.0%~100.0%.

|       |                      |   |                 |   |
|-------|----------------------|---|-----------------|---|
| 10-03 | PID action direction | ↗ | Factory setting | 0 |
|       | Setting range        | 0 | Positive action |   |
|       |                      | 1 | Reaction        |   |

Positive effect: When the PID feedback signal is less than the given amount, the output frequency of the inverter rises. Such as tension control in winding.

Reverse effect: When the PID feedback signal is less than the given amount, the output frequency of the inverter decreases. Such as unwinding tension control occasions.

This function is affected by the multi-function terminal "PID reverse direction" (function 35), which needs attention during use.

|       |                          |         |                 |      |
|-------|--------------------------|---------|-----------------|------|
| 10-04 | PID Given feedback range | ↗       | Factory setting | 1000 |
|       | Setting range            | 0~65535 |                 |      |

PID given feedback range is a dimensionless unit, used for PID given display 99-15 and PID feedback display 99-16.

The relative value of PID given feedback is 100.0%, corresponding to the given feedback range 10-04.

For example, if 10-04 is set to 2000, when PID setting is 100.0%, PID setting displays 99-15 to 2000.

|       |                       |              |                 |       |
|-------|-----------------------|--------------|-----------------|-------|
| 10-05 | Proportional gain Kp1 | ↗            | Factory setting | 20.0  |
|       | Setting range         | 0.0~100.0    |                 |       |
| 10-06 | Integration time Ti1  | ↗            | Factory setting | 2.00s |
|       | Setting range         | 0.00s~10.00s |                 |       |

|       |                       |                |                 |        |
|-------|-----------------------|----------------|-----------------|--------|
| 10-07 | Differential time Td1 | ↗              | Factory setting | 0.000s |
|       | Setting range         | 0.000s~10.000s |                 |        |

Proportional gain Kp1:

Determines the adjustment intensity of the entire PID regulator. The greater the Kp1, the greater the adjustment intensity. The parameter 100.0 indicates that when the deviation between the PID feedback amount and the given amount is 100.0%, the adjustment range of the PID regulator for the output frequency command is the maximum frequency.

Integration time Ti1:

Determine the intensity of PID regulator integral adjustment. The shorter the integration time, the greater the adjustment intensity. The integration time refers to the amount of PID feedback, when the deviation from the given amount is 100.0%, the integral regulator continuously adjusts after this time, and the adjustment amount reaches the maximum frequency, when the integral time is 0, there is a deviation between the given quantity and the feedback quantity of the PID, and the adjustment quantity of the integral regulator is 0.

Differential time Td1:

Determines the strength of the PID regulator to adjust the deviation rate of change. The longer the differential time, the greater the adjustment intensity. Differential time refers to

The feed rate changes by 100.0% within this time, and the adjustment amount of the differential regulator is the maximum frequency.

|       |                              |                    |                 |        |
|-------|------------------------------|--------------------|-----------------|--------|
| 10-08 | PID reverse cutoff frequency | ↗                  | Factory setting | 0.00Hz |
|       | Setting range                | 0.00~Max frequency |                 |        |

In some applications, only when the PID output frequency is negative (that is, the inverter reverses) can the PID control the given amount and the feedback amount to the same state, but in some occasions, excessive reverse frequency is not allowed. 10-08 to set the upper limit of reverse frequency.

|       |                     |             |                 |      |
|-------|---------------------|-------------|-----------------|------|
| 10-09 | PID deviation limit | ↗           | Factory setting | 0.0% |
|       | Setting range       | 0.0%~100.0% |                 |      |

When the deviation between the PID given amount and the feedback amount is less than 10-09, the PID stops adjusting. In this way, the output frequency is stable when the deviation between the reference and feedback is small, which is very effective for some closed-loop control occasions.

|       |                           |               |                 |       |
|-------|---------------------------|---------------|-----------------|-------|
| 10-10 | PID differential limiting | ↗             | Factory setting | 0.10% |
|       | Setting range             | 0.00%~100.00% |                 |       |

In PID regulators, the role of differential is relatively sensitive, and it is easy to cause system oscillation. Therefore, the role of PID differential is generally limited to a small range. 10-10 is used to set the range of PID differential output.

|       |                       |               |                 |       |
|-------|-----------------------|---------------|-----------------|-------|
| 10-11 | PID given change time | ↗             | Factory setting | 0.00s |
|       | Setting range         | 0.00s~650.00s |                 |       |

PID given change time refers to the time required for PID given value to change from 0.0% to 100.0%.

When the PID setting changes, the PID setting value changes linearly according to the given change time, which reduces the adverse effect of the mutation on the system.

|       |                          |              |                 |       |
|-------|--------------------------|--------------|-----------------|-------|
| 10-12 | PID feedback filter time | ↗            | Factory setting | 0.00s |
|       | Setting range            | 0.00s~60.00s |                 |       |
| 10-13 | PID output filter time   | ↗            | Factory setting | 0.00s |
|       | Setting range            | 0.00s~60.00s |                 |       |

10-12 is to filter the PID feedback value. This filtering is helpful to reduce the influence of the feedback value, but it will affect the response performance of the process closed-loop system.

10-13 is to filter the PID output frequency. This filtering will reduce the sudden change of the inverter output frequency, but it will also affect the response performance of the process control.

|       |          |   |                 |   |
|-------|----------|---|-----------------|---|
| 10-14 | Reserved | ↗ | Factory setting | - |
|-------|----------|---|-----------------|---|

|       |                                     |                |   |        |
|-------|-------------------------------------|----------------|---|--------|
| 10-15 | Proportional gain Kp2               | ↗              | Factory setting                             | 20.00  |
|       | Setting range                       | 0.00~100.00    |   |        |
| 10-16 | Integration time Ti2                | ↗              | Factory setting                             | 2.00s  |
|       | Setting range                       | 0.00s~10.00s   |   |        |
| 10-17 | Differential time Td2               | ↗              | Factory setting                             | 0.000s |
|       | Setting range                       | 0.000s~10.000s |   |        |
| 10-18 | PID parameter switching conditions  | ↗              | Factory setting                             | 0      |
|       | Setting range                       | 0              | No switch                                   |        |
|       |                                     | 1              | Switch via MI terminal                      |        |
|       |                                     | 2              | Automatically switch according to deviation |        |
| 10-19 | PID parameter switching deviation 1 | ↗              | Factory setting                             | 20.0%  |
|       | Setting range                       | 0.0%~10-20     |   |        |
| 10-20 | PID parameter switching deviation 2 | ↗              | Factory setting                             | 80.0%  |
|       | Setting range                       | 10-19~100.0%   |   |        |

In some applications, a group of PID parameters cannot meet the requirements of the entire operation process, and different PID parameters need to be used in different situations.

This group of parameters is used to switch between two groups of PID parameters. The setting method of the parameters 10-15~10-17 of the regulator is similar to the parameters 10-05~10-07.

The two sets of PID parameters can be switched through the multi-function input MI terminal I, and can also be automatically switched according to the deviation of PID.

When switching through the multi-function MI terminal I, the function selection I of the multi-function terminal I should be set to function 43 (PID parameter switching terminal I), when the terminal I is invalid, select the parameter group 1 (10-05~10-07), When terminal I is valid, select parameter group 2 (10-15~10-17).

When the automatic switching is selected, the absolute value of the deviation between the given and feedback is less than the PID parameter switching deviation 1 10-19, PID parameter selection parameter group 1. When the absolute value of the deviation between the reference and feedback is greater than the PID switching deviation 2 (10-20), PID parameter selection selects parameter group 2. When the deviation between reference and feedback is between switching deviation 1 and switching deviation 2, the PID parameters are the linear interpolation values of the two groups of PID parameters, as shown in Figure 5-26.

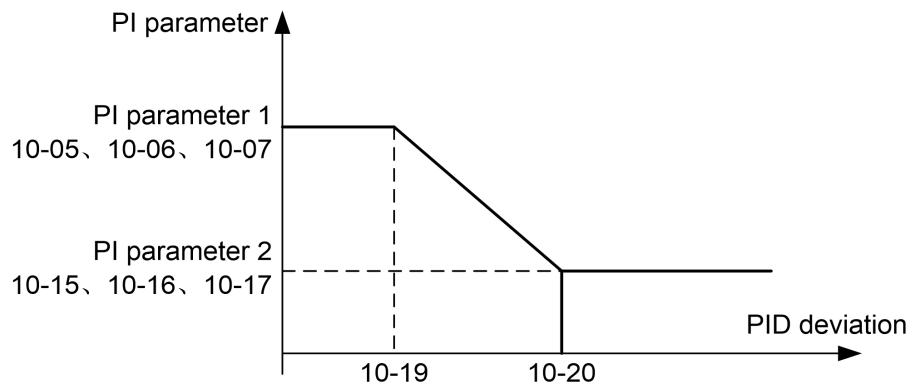


Figure 5-26 PID parameter switching

|       |                             |               |                 |       |
|-------|-----------------------------|---------------|-----------------|-------|
| 10-21 | PID Initial value           | ↗             | Factory setting | 0.0%  |
|       | Setting range               | 0.0%~100.0%   |                 |       |
| 10-22 | PID initial value hold time | ↗             | Factory setting | 0.00s |
|       | Setting range               | 0.00s~650.00s |                 |       |

When the inverter starts, the PID output is fixed at the initial PID value of 10-21, and the PID will start the closed-loop adjustment operation only after the initial PID holding time of 10-22.

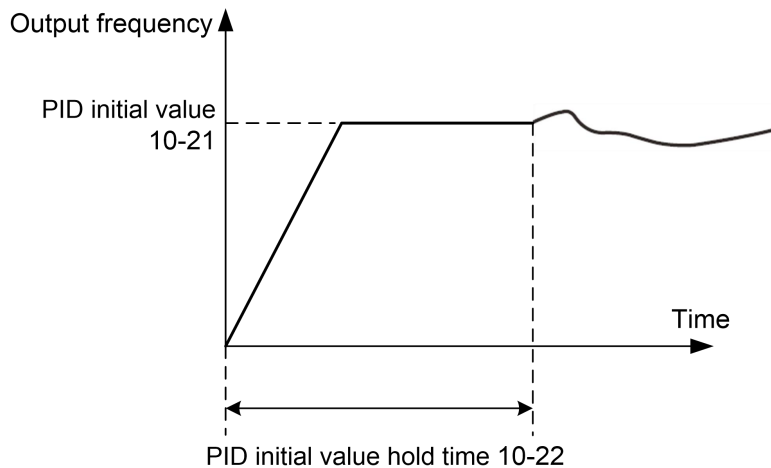


Figure 5-27 Schematic diagram of PID initial value function

This function is used to limit the difference between two beats (2ms/beat) of PID output, so as to restrain the PID output from changing too fast, and make the operation of the inverter tend to be stable.

|       |  |               |                 |       |
|-------|--|---------------|-----------------|-------|
| 10-23 | Maximum deviation between two PID outputs in forward direction | ↗             | Factory setting | 1.00% |
|       | Setting range  | 0.00%~100.00% |                 |       |
| 10-24 | Maximum deviation between two PID outputs in reverse direction | ↗             | Factory setting | 1.00% |
|       | Setting range  | 0.00%~100.00% |                 |       |

10-23 and 10-24 respectively correspond to the maximum value of the absolute value of the output deviation during forward rotation and reverse rotation.

|       |                        |              |                     |   |
|-------|------------------------|--------------|---------------------|---|
| 10-25 | PID integral attribute | ↗            | Factory setting     | 0 |
|       | Setting range          | Single digit | Integral separation |   |
|       |                        | 0            | Invalid             |   |
|       |                        | 1            | Valid               |   |

|       |                        |              |   |                 |   |
|-------|------------------------|--------------|---|-----------------|---|
| 10-25 | PID integral attribute |              | ↗   | Factory setting | 0 |
|       |                        | Tens digital | Whether to stop integration after output to limit |                 |   |
|       |                        | 0            | Continue to integrate                             |                 |   |
|       |                        | 1            | Stop integration                                  |                 |   |

Integral separation: If integral separation is set to be valid, when the multi-function terminal MI integral pause (function 38) is valid, PID integral PID integral stops calculation, at this time PID only the proportional and derivative functions are valid. When the integral separation is invalid, regardless of whether the multi-function terminal MI is valid, the integral separation is invalid.

Whether to stop integration after the output reaches the limit: After the PID operation output reaches the maximum or minimum value, you can choose whether to stop the integration. If you choose to stop integration, then the PID integration will stop calculating, which may help reduce the amount of PID overshoot.

|       |                                   |   |   |                 |      |
|-------|-----------------------------------|---|---|-----------------|------|
| 10-26 | PID feedback loss detection value |   | ↗ | Factory setting | 0.0% |
|       | Setting range                     | 0.0%:No judge the loss of feedback<br>0.1%~100.0% |   |                 |      |
| 10-27 | PID feedback loss detection time  |   | ↗ | Factory setting | 0.0s |
|       | Setting range                     | 0.0s~20.0s  |   |                 |      |

This parameter can detect whether the PID feedback line is missing.

When the PID feedback amount is less than the feedback loss detection value 10-26, and the duration exceeds the PID feedback loss detection time 10-27, the inverter alarms the fault PIDE, and handles it according to the selected fault handling method.

|       |                          |   |                              |                 |   |
|-------|--------------------------|---|------------------------------|-----------------|---|
| 10-28 | PID Shutdown calculation |   | ↗                            | Factory setting | 0 |
|       | Setting range            | 0 | No operation during shutdown |                 |   |
|       |                          | 1 | Operation at shutdown        |                 |   |

It is used to select whether PID continues to operate under PID stop status. In general applications, PID should stop calculation in the stop state.

## 11 Fault and Protection Parameters

|       |                                     |            |          |                 |   |
|-------|-------------------------------------|------------|----------|-----------------|---|
| 11-00 | Motor overload protection selection |            | ↗        | Factory setting | 1 |
|       | Setting range                       | 0          | Disabled |                 |   |
|       |                                     | 1          | Enabled  |                 |   |
| 11-01 | Motor overload protection gain      |            | ↗        | Factory setting | 1 |
|       | Setting range                       | 0.20~10.00 |          |                 |   |

0: No protection, no motor overload protection feature (use with caution), at this time, the inverter has no overload protection for the load motor.

1: At this time, the inverter judges whether the motor is overloaded according to the inverse time limit curve of the motor overload protection. The inverse time limit curve of motor overload protection is:  $195\% \times (11-01) \times \text{motor rated current}$ , which will alarm the motor overload fault for 1 minute;  $150\% \times (11-01) \times \text{motor rated current}$ , which lasts 5 minutes Then alarm motor overload.

The user sets the value of 11-01 according to the actual overload capacity of the motor. If the setting is too large, the motor may be damaged due to overheating and the inverter may not alarm in time!

|              |  |          |   |                 |     |
|--------------|--|----------|---|-----------------|-----|
| <b>11-02</b> | Motor overload pre-warning coefficient |          | ↗ | Factory setting | 80% |
|              | Setting range                          | 50%~100% |   |                 |     |

This function is used to output an early warning signal to the control system through the multi-function output terminal before the motor overload protection. The early warning function can set how much early warning is given before the motor overload protection. The larger the value, the smaller the early warning advance.

When the cumulative output current of the inverter is greater than the product of the overload inverse time curve and 11-02, the inverter's multi-function output terminal (function 7) outputs the "motor overload pre-alarm" ON signal.

|              |   |   |         |                 |   |
|--------------|---|---|---------|-----------------|---|
| <b>11-03</b> | Power-on short circuit protection selection |   | ↗       | Factory setting | 1 |
|              | Setting range                               | 0 | Invalid |                 |   |
|              |   | 1 | Valid   |                 |   |

Select whether to detect the short circuit fault of the motor when the inverter is powered on.

If this function is valid, there will be voltage output from the UVW terminal of the inverter within a period of time after power-on.

|              |                             |      |   |                 |   |
|--------------|-----------------------------|------|---|-----------------|---|
| <b>11-09</b> | Fault automatic reset times |      | ↗ | Factory setting | 0 |
|              | Setting range               | 0~20 |   |                 |   |

When the inverter selects automatic fault reset, it is used to set the number of automatic resets. After this number of times, the inverter remains in a fault state and requires manual intervention.

|              |   |   |           |                 |   |
|--------------|---|---|-----------|-----------------|---|
| <b>11-10</b> | Action selection of fault multi-function output terminal during fault automatic reset |   | ↗         | Factory setting | 0 |
|              | Setting range   | 0 | No action |                 |   |
|              |   | 1 | Action    |                 |   |

If the inverter is equipped with a fault automatic reset function, whether the multi-function terminals are activated during the fault automatic reset can be set via 11-10.

|              |                                     |             |   |                 |      |
|--------------|-------------------------------------|-------------|---|-----------------|------|
| <b>11-11</b> | Fault automatic reset interval time |             | ↗ | Factory setting | 1.0s |
|              | Setting range                       | 0.1s~100.0s |   |                 |      |

Waiting time from inverter fault alarm to automatic fault reset.

|              |                                       |   |          |                 |   |
|--------------|---------------------------------------|---|----------|-----------------|---|
| <b>11-12</b> | Input phase loss protection selection |   | ↗        | Factory setting | 1 |
|              | Setting range                         | 0 | Disabled |                 |   |
|              |                                       | 1 | Enabled  |                 |   |

Choose whether to protect the input phase loss.

S3100E frequency converter 7.5kW, G type and above power, only have input phase loss protection function, 7.5kW, P type power and below power, no matter 11-12 is set to 0 or 1, there is no input phase loss protection function.



|       |  |   |          |   |                 |   |
|-------|--|---|----------|---|-----------------|---|
| 11-13 | Output phase loss protection selection |   |          | ↗ | Factory setting | 1 |
|       | Setting range                          | 0 | Disabled |   |                 |   |
|       |  | 1 | Enabled  |   |                 |   |

Choose whether to protect the output phase loss.

|       |                           |                 |   |
|-------|---------------------------|-----------------|---|
| 11-14 | First failure type        | Factory setting | - |
| 11-15 | Second failure type       | Factory setting | - |
| 11-16 | Third (latest) fault type | Factory setting | - |

Record the last three fault types of the inverter, 0 is no fault. For the cause and solution of the fault, please refer to the relevant instructions in Chapter 6.

|       |  |   |      |      |      |        |      |      |      |      |      |
|-------|--|---|------|------|------|--------|------|------|------|------|------|
| 11-17 | Frequency at the third failure             | Frequency at latest failure   |      |      |      |        |      |      |      |      |      |
| 11-18 | Current at the third fault                 | Current at latest fault   |      |      |      |        |      |      |      |      |      |
| 11-19 | Bus voltage at the third fault             | Bus voltage at the latest fault   |      |      |      |        |      |      |      |      |      |
| 11-20 | Input terminal status at the third fault   | The state of the digital input terminal during the latest failure, the order is:  |      |      |      |        |      |      |      |      |      |
|       |  | BIT9  | BIT8 | BIT7 | BIT6 | BIT5   | BIT4 | BIT3 | BIT2 | BIT1 | BIT0 |
|       |  | MI0   | MI9  | MI8  | MI7  | MI6    | MI5  | MI4  | MI3  | MI2  | MI1  |
|       |  | When the input terminal is ON, the corresponding secondary system bit is 1, OFF is 0, and all MI status is converted to decimal number display. |      |      |      |        |      |      |      |      |      |
| 11-21 | Output terminal status at the third fault  | The state of all output terminals during the latest fault,the order is  |      |      |      |        |      |      |      |      |      |
|       |  | BIT4  | BIT3 | BIT2 | BIT1 | BIT0   |      |      |      |      |      |
|       |  | MO2   | MO1  | REL2 | REL1 | DFM(P) |      |      |      |      |      |
|       |  | When the input terminal is ON, the corresponding secondary system bit is 1, OFF is 0, and all MI status is converted to decimal number display. |      |      |      |        |      |      |      |      |      |
| 11-22 | Inverter status at the third fault         | Reserved  |      |      |      |        |      |      |      |      |      |
| 11-23 | Power-on time at the third fault           | The current power-on time when the latest fault occurred  |      |      |      |        |      |      |      |      |      |
| 11-24 | Running time at the third failure          | Current running time at the time of the latest failure  |      |      |      |        |      |      |      |      |      |
| 11-27 | Frequency at second failure                | The same to 11-17~11-24   |      |      |      |        |      |      |      |      |      |
| 11-28 | Current at second fault                    |   |      |      |      |        |      |      |      |      |      |
| 11-29 | Bus voltage at the second fault            |   |      |      |      |        |      |      |      |      |      |
| 11-30 | Input terminal status at the second fault  |   |      |      |      |        |      |      |      |      |      |
| 11-31 | Output terminal status at the second fault |   |      |      |      |        |      |      |      |      |      |
| 11-32 | Inverter status at the second fault        |   |      |      |      |        |      |      |      |      |      |
| 11-33 | Power-on time at the second fault          |   |      |      |      |        |      |      |      |      |      |
| 11-34 | Running time on second failure             |   |      |      |      |        |      |      |      |      |      |
| 11-37 | Frequency at first failure                 |   |      |      |      |        |      |      |      |      |      |
| 11-38 | Current at first fault                     |   |      |      |      |        |      |      |      |      |      |
| 11-39 | Bus voltage at first fault                 |   |      |      |      |        |      |      |      |      |      |

|       |   |                         |
|-------|---|-------------------------|
| 11-40 | Input terminal status at the first fault  | The same to 11-17~11-24 |
| 11-41 | Output terminal status at the first fault |                         |
| 11-42 | Inverter status at first fault            |                         |
| 11-43 | Power-on time at first failure            |                         |
| 11-44 | Operating time at first failure           |                         |

|       |                                     |                       |   |                 |   |
|-------|-------------------------------------|-----------------------|---|-----------------|---|
| 11-47 | Fault protection action selection1  |                       | ↗   | Factory setting | 0 |
|       | Setting range                       | Single digit          | Motor overload(OL1)   |                 |   |
|       |                                     | 0                     | Coast to stop   |                 |   |
|       |                                     | 1                     | Stop according to the stop mode   |                 |   |
|       |                                     | 2                     | Continue to run   |                 |   |
|       |                                     | Tens digital          | Input phase loss(SPI)(Same bit)   |                 |   |
|       |                                     | Hundreds digital      | Output phase loss(SPo)(Same bit)  |                 |   |
|       |                                     | Thousands digital     | External fault(EF)(Same bit)  |                 |   |
|       |                                     | Ten thousands digital | Communication error(CE)(Same bit)   |                 |   |
| 11-48 | Fault protection action selection 2 |                       | ↗   | Factory setting | 0 |
|       | Setting range                       | Single digit          | Reserved  |                 |   |
|       |                                     | Tens digital          | EEPROM read write fault(EEP)  |                 |   |
|       |                                     | 0                     | Coast to stop   |                 |   |
|       |                                     | 1                     | Stop according to the stop mode   |                 |   |
|       |                                     | Hundreds digital      | Reserved  |                 |   |
|       |                                     | Thousands digital     | Reserved  |                 |   |
|       |                                     | Ten thousands digital | Operating time arrival (Eond) (same as 11-47 digits)  |                 |   |
| 11-49 | Fault protection action selection 3 |                       | ↗   | Factory setting | 0 |
|       | Setting range                       | Single digit          | Reserved  |                 |   |
|       |                                     | Tens digital          | Reserved  |                 |   |
|       |                                     | Hundreds digital      | Power-on time arrival (EIND) (same as 11-47 digits)   |                 |   |
|       |                                     | Thousands digital     | Lost load(oLL)  |                 |   |
|       |                                     | 0                     | Coast to stop   |                 |   |
|       |                                     | 1                     | Stop according to the stop mode   |                 |   |
|       |                                     | 2                     | Decelerate to 7% of the rated frequency of the motor and continue to run. If the load is not lost, it will automatically return to the set frequency. |                 |   |
|       |                                     | Ten thousands digital | PID feedback lost during operation (PIDE) (same as 11-47 bits)  |                 |   |
| 11-50 | Fault protection action selection 4 |                       | ↗   | Factory setting |   |
|       | Setting range                       | Reserved              |   |                 |   |

When "free stop" is selected, the inverter displays the fault code and directly stops.

When "Stop by Stop Mode" is selected: The inverter displays a fault and stops according to the stop mode.

When "Continue running" is selected: The inverter displays a fault and the running frequency continues to run at the selected frequency of 11-54.

|       |   |  |                                    |                 |        |
|-------|---|--|------------------------------------|-----------------|--------|
| 11-54 | Continue running frequency selection in case of failure |  | ↗                                  | Factory setting | 0      |
|       | Setting range   | 0  | Run at current operating frequency |                 |        |
|       |   | 1  | Run at set frequency               |                 |        |
|       |   | 2  | Run at upper limit frequency       |                 |        |
|       |   | 3  | Run at the lower limit frequency   |                 |        |
|       |   | 4  | Run at abnormal standby frequency  |                 |        |
| 11-55 | Abnormal standby frequency                              |  | ↗                                  | Factory setting | 100.0% |
|       | Setting range   | 0.0%~100.0%(100.0% corresponds to the maximum frequency 00-03) |                                    |                 |        |

When a fault occurs during the operation of the inverter, and the processing method of the fault is set to continue running, the inverter displays the fault and continues to run at the selected frequency of 11-54. When the abnormal standby frequency is selected for operation, the value set in 11-55 is a percentage relative to the maximum frequency.

|       |          |  |  |                 |  |
|-------|----------|--|--|-----------------|--|
| 11-56 | Reserved |  |  | Factory setting |  |
| 11-57 | Reserved |  |  | Factory setting |  |
| 11-58 | Reserved |  |  | Factory setting |  |

|       |   |                                |                    |                 |      |
|-------|---|--------------------------------|--------------------|-----------------|------|
| 11-59 | Instantaneous power failure action selection              |                                | ↗                  | Factory setting | 0    |
|       | Setting range   | 0                              | Invalid            |                 |      |
|       |   | 1                              | Deceleration       |                 |      |
|       |   | 2                              | Decelerate to stop |                 |      |
| 11-60 | Instantaneous power failure action pause judgment voltage |                                | ↗                  | Factory setting | 85%  |
|       | Setting range   | 80~100%                        |                    |                 |      |
| 11-61 | Judgment time of instantaneous power failure voltage rise |                                | ↗                  | Factory setting | 0.5s |
|       | Setting range   | 0.0s~100.0s                    |                    |                 |      |
| 11-62 | Judgment voltage of instantaneous power failure           |                                | ↗                  | Factory setting | 80%  |
|       | Setting range   | 60%~100%(Standard bus Voltage) |                    |                 |      |

Refers to the moment when there is a power failure or the voltage drops suddenly, the inverter reduces the output speed, so that the load feedback energy maintains the inverter DC bus voltage, so that the inverter continues to run.

If 11-59=1, the inverter decelerates when there is an instantaneous power failure or a sudden drop in voltage, and when the bus voltage returns to normal, the inverter normally accelerates to the set frequency. The basis for judging the return of the bus voltage to normal is that the bus voltage is normal and the duration exceeds the set time of 11-61.

If 11-59=2, during an instantaneous power failure or a sudden drop in voltage, the inverter decelerates until it stops.

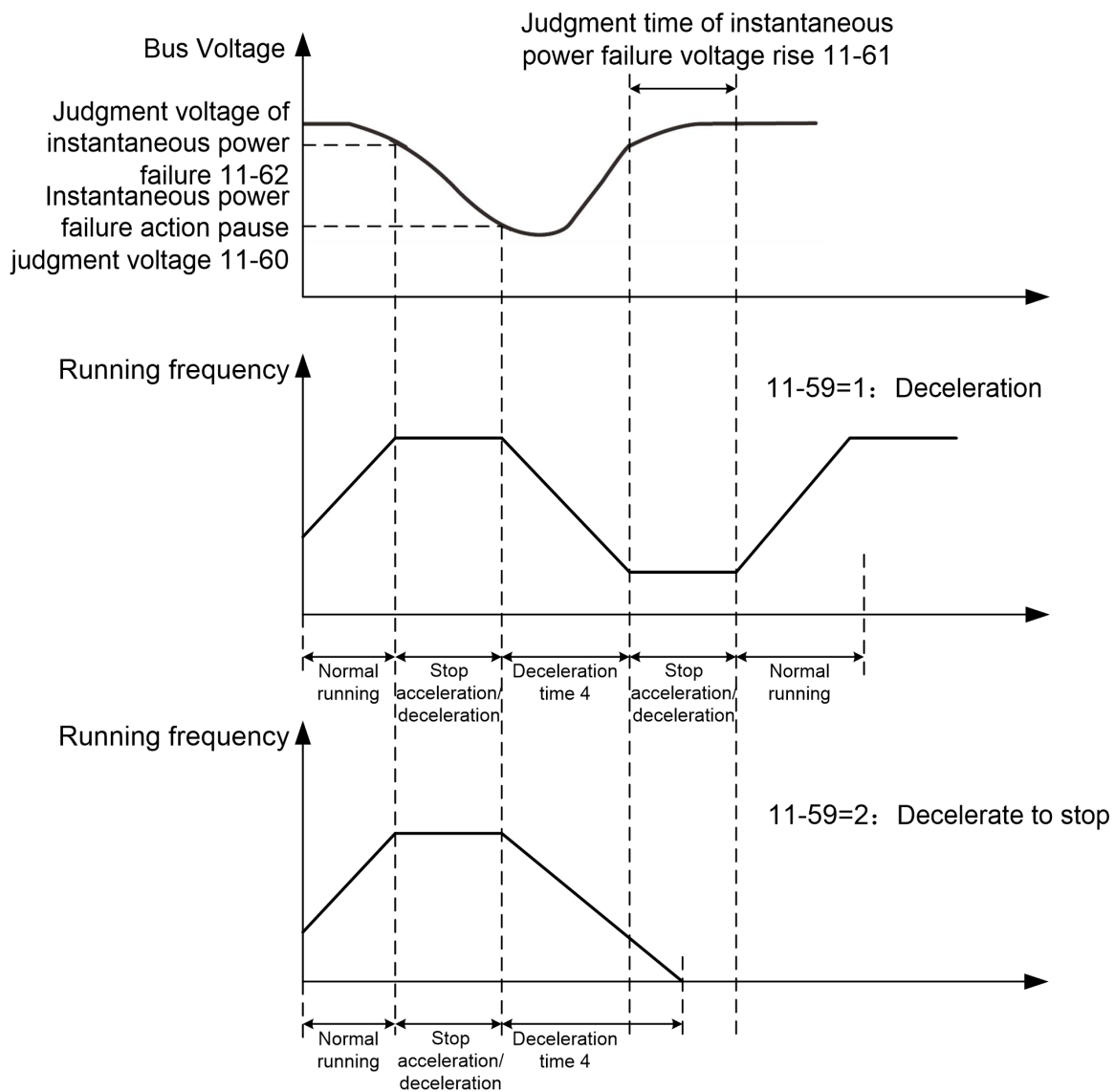


Figure 5-28 Schematic diagram of instantaneous power failure

|       |                              |            |         |                 |       |
|-------|------------------------------|------------|---------|-----------------|-------|
| 11-63 | Lost load protection options |            | ⚡       | Factory setting | 0     |
|       | Setting range                | 0          | Invalid |                 |       |
|       |                              | 1          | Valid   |                 |       |
| 11-64 | Lost load detection level    |            | ⚡       | Factory setting | 10.0% |
|       | Setting range                | 0.0~100.0% |         |                 |       |
| 11-65 | Lost load detection time     |            | ⚡       | Factory setting | 1.0s  |
|       | Setting range                | 0.0s~60.0s |         |                 |       |

If the off-load protection function is effective, when the inverter output current is less than the off-load detection level 11-64, and the duration is greater than the off-load detection time 11-65, the inverter output frequency is automatically reduced to 7% of the rated frequency. During the load protection period, if the load is restored, the inverter automatically resumes to run at the set frequency.

|       |          |  |                 |   |
|-------|----------|--|-----------------|---|
| 11-67 | Reserved |  | Factory setting | - |
| 11-68 | Reserved |  | Factory setting | - |
| 11-69 | Reserved |  | Factory setting | - |
| 11-70 | Reserved |  | Factory setting | - |

## 12 Serial Communication Parameters

|       |               |                               |                 |   |
|-------|---------------|-------------------------------|-----------------|---|
| 12-00 | Local address | ↗                             | Factory setting | 1 |
|       | Setting range | 1~247, 0 is broadcast address |                 |   |

When the local address is set to 0, it is the broadcast address to realize the broadcast function of the host computer.

The local address is unique (except broadcast address), which is the basis for the point-to-point communication between the host computer and the inverter.

|       |               |              |                  |      |
|-------|---------------|--------------|------------------|------|
| 12-01 | Baud rate     | ↗            | Factory setting  | 0005 |
|       | Setting range | Single digit | MODUBS Baud rate |      |
|       |               | 0            | 300BPS           |      |
|       |               | 1            | 600BPS           |      |
|       |               | 2            | 1200BPS          |      |
|       |               | 3            | 2400BPS          |      |
|       |               | 4            | 4800BPS          |      |
|       |               | 5            | 9600BPS          |      |
|       |               | 6            | 19200BPS         |      |
|       |               | 7            | 38400BPS         |      |
|       |               | 8            | 57600BPS         |      |
|       |               | 9            | 115200BPS        |      |

This parameter is used to set the data transmission rate between the host computer and the inverter. Note that the baud rate set by the host computer and the inverter must be the same; otherwise, communication cannot be performed. The higher the baud rate, the faster the communication speed.

|       |               |   |                             |   |
|-------|---------------|---|-----------------------------|---|
| 12-02 | Data format   | ↗ | Factory setting             | 0 |
|       | Setting range | 0 | No checking(8-N-1)          |   |
|       |               | 1 | Even parity checking(8-E-1) |   |
|       |               | 2 | Odd parity checking(8-O-1)  |   |
|       |               | 3 | No checking(8-N-2)          |   |

The host computer must coincide with the data format set by inverter, or communication can't be operated.

|       |                              |        |                 |   |
|-------|------------------------------|--------|-----------------|---|
| 12-03 | Communication response delay | ↗      | Factory setting | 2 |
|       | Setting range                | 0~20ms |                 |   |

Communication response delay refers to the interval time from end of inverter data receiving to sending response data to host computer. If the response delay time is shorter than system processing time, the response delay is subject to system processing time. If the response delay time is longer than system processing time, the system has to delay after processing the data. And send data to the host computer until the delay time is reached.

|       |                       |                        |                 |     |
|-------|-----------------------|------------------------|-----------------|-----|
| 12-04 | Communication timeout | ↗                      | Factory setting | 0.0 |
|       | Setting range         | 0.0(invalid),0.1~60.0s |                 |     |

When this function code is set as 0.0s, the parameter of communication overtime time is invalid.

When this function code is set as valid value, if the interval time between one communication and the next communication exceeds the time of communication overtime, the system will report communication error (CE).

Normally, this parameter is set as invalid value.setting this parameter in system of continuous communication can monitor the communication status.

|       |               |   |                 |  |
|-------|---------------|---|-----------------|--|
| 12-05 | Reserved      | ↗ | Factory setting |  |
|       | Setting range |   |                 |  |

|       |  |   |                 |   |
|-------|--|---|-----------------|---|
| 12-06 | Communication reading current resolution | ↗ | Factory setting | 0 |
|       | Setting range                            | 0 | 0.01A           |   |
|       |  | 1 | 0.1A            |   |

It is used to determine the output unit of the current value when the communication reads the output current.

## Modbus protocol

S3100E series inverters provide RS485 communication interface and support Modbus communication protocol. Users can realize centralized control through PC or PLC, set inverter running command, operating frequency, modify or read function code parameters, monitor inverter working status and fault information, etc.

### Protocol content

The serial communication protocol defines the content and format of information transmitted in serial communication. These include: host polling and broadcasting; host encoding methods, including: function codes that require actions, transmission data, and error checking. The response of the slave also adopts the same structure, including: action confirmation, return data and error check. If the slave receives an error when receiving information, or cannot complete the action required by the master, it will organize a fault message as a response to the master.

### Application method:

The frequency inverter can be connected to the "single master and multiple slave" control network with RS485 bus.

### Bus structure:

(1) Interface method

RS485 hardware interface

(2) Transmission method

Asynchronous serial, half-duplex transmission mode.At the same time, only one master and slave can send data and the other can only receive data. In the process of serial asynchronous communication, data is sent frame by frame in the form of messages.

(3) Topology

Single-master multi-slave system.The setting range of the slave address is 1~247, and 0 is the broadcast communication address. The slave addresses in the network are all unique.

### Protocol description:

The S3100E series inverter communication protocol is an asynchronous serial master-slave Modbus communication protocol. Only one device (host) in the network can establish the protocol (called "query/command"). Other devices (slave) can only respond to the "query/command" of the host by providing data, or make corresponding actions according to the "query/command" of the host.

The master here refers to a personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc., and the slave refers to the S3100E inverter.

The master can not only communicate with a certain slave, but also broadcast information to all slaves. For the "query/command" of the separately accessed host, the slave must return a message (called a response). For the broadcast information sent by the host, the slave does not need to respond to the host.

### Communication Frames Structure:

The Modbus protocol communication data format of S3100E series inverters uses RTU mode, and new frames always start with a silent transmission time of at least 3.5 bytes. On a network that calculates the transmission rate in baud rate, the transmission time of 3.5 bytes can be easily grasped. The data fields transmitted next are in order: slave address, operation command code, data and CRC check word, each field transmission byte is hexadecimal 0.9, A.F. Network equipment always monitors the activity of the communication bus. When receiving the first field (address information), each network device confirms the byte. As the transmission of the last byte is completed, there is a similar 3.5-byte transmission time interval, which is used to indicate the end of this frame. After that, a new frame transmission will start.

A message frame must be transmitted as a continuous data stream. If there is a pause time of more than 1.5 characters before the frame is completed, the receiving device will refresh the incomplete message and assume that the next byte is the address field of a new message. Similarly, if a new message starts after the previous message in less than 3.5 characters, the receiving device will consider it as a continuation of the previous message. This will cause an error because the value in the last CRC field cannot be correct.

RTU Frame format:

|                      |  |
|----------------------|--|
| Frame header (START) | 3.5 character time   |
| Slave address (ADR)  | Communication address:1~247  |
| Command code (CMD)   | 03: Read slave parameters;<br>06: Write slave parameters   |
| DATA(N-1)            | Data content: Function code parameter address, function code parameter number, function code parameter value, etc. |
| DATA(N-2)            |  |
| .....                |  |
| DATA 0               |  |
| CRC CHK upper bite   | Detection value: CRC value   |
| CRC CHK lower bite   |  |
| END                  | 3.5 character time   |

### Command code and communication data description:

Command code: 03H, read N words (Word can read up to 12 words)

For example: the start address 0002 of the inverter with slave address 01 is continuously reading two consecutive values.

RTU host command information

|                         |         |
|-------------------------|---------|
| ADR                     | 01H     |
| CMD                     | 03H     |
| Start address upper bit | 00H     |
| Start address lower bit | 02H     |
| Date number upper bit   | 00H     |
| Date number lower bit   | 02H     |
| CRC CHK lower bit       | CRC CHK |
| CRC CHK upper bit       |         |

RTU slave response information

|                              |         |
|------------------------------|---------|
| ADR                          | 01H     |
| CMD                          | 03H     |
| Byte number                  | 04H     |
| Date address 0002H upper bit | 00H     |
| Date address 0002H lower bit | 00H     |
| Date address 0003H upper bit | 00H     |
| Date address 0003H lower bit | 01H     |
| CRC CHK Lower bit            | CRC CHK |
| CRC CHK Upper bit            |         |

Command code: 06H Write a word (Word)

For example: write 5000 (1388H) to the slave address 02H inverter 0003H address

Host command information

|                        |         |
|------------------------|---------|
| ADR                    | 02H     |
| CMD                    | 06H     |
| Data address upper bit | 00H     |
| Data address lower bit | 03H     |
| Data content upper bit | 13H     |
| Data content lower bit | 88H     |
| CRC CHK lower bit      | CRC CHK |
| CRC CHK upper bit      |         |

Slave response information

|                        |         |
|------------------------|---------|
| ADR                    | 02H     |
| CMD                    | 06H     |
| Data address upper bit | 00H     |
| Data address lower bit | 03H     |
| Data content upper bit | 13H     |
| Data content lower bit | 88H     |
| CRC CHK lower bit      | CRC CHK |
| CRC CHK upper bit      |         |

### Checking method——CRC checking method:

In RTU frame format, the frame includes frame incorrect test field based on CRC computing. The CRC field detects the content of whole frames. The CRC field is 2 bytes and includes 16-binary. It is added to frame after being computed by transmission equipment. The receiving equipment recalculates the CRC which has received frames and compare it with values in the received CRC field. If the two CRC values are different, it indicates that there is transmission error received.

In CRC checking mode, it saves in 0xFFFF first, then uses a procedure and processes the continuous 8 more than bytes in frames together with current register. Only the 8-bit data in every character is available to CRC, the start bit, end bit and parity checking are all unavailable to it.

In CRC production course, every 8-bit character is different from the register content separately or (XOR). The result moves to the direction of lowest effective bit. And the highest bit is filled with 0. LSB is picked up to test. If LSB is 1, the register is different from the preset value alone. If LSB is 0, no actions. The whole process must be repeated 8 times. As the last bit (8th bit) is finished, the next 8-bit character is different from the present value of register again. The final value in register is the CRC value after all bytes in frame have been executed.

Here is a simple function of CRC algorithm for users' reference.

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
    int i;
    unsigned int crc_value=0xffff;
    while(data_length-->0)
    {
        crc_value^=*data_value++;
        for(i=0;i<8;i++)
        {
            if(crc_value&0x0001)
                crc_value=(crc_value>>1)^0xa001;
            else
                crc_value=crc_value>>1;
        }
    }
    return(crc_value);
}
```



## Definition of communication data address

It is the definition of communication data address, which is used to control inverter operation, obtain the state information and relative function parameters.

### (1)Using method of function code parameter address

Using numbers of function code as parameters to correspond to the register address, which has to be converted to hexadecimal system. For example, the number of 05-10, the function code address expressed by hexadecimal system is 050A.

Ranges of high and low characters: high-bit character-00~0FH; low-bit character--00~FFH. (The parameter's change attribute refers to the parameter description)

In addition, the frequent storage of EEPROM will reduce its service life. For users, some function codes don't need to be stored in communication mode. The application requirement can be meet only through altering values in RAM. This function can be realized as long as changing the highest bit of corresponding function code address from 0 to 1. For example, function code 00-06 isn't stored into EEPROM, just alter the value in RAM and set the address as 8006H. This address is used only when write RAM, which can't be used as read function, otherwise, it is an unavailable address.

### (2)Communication command address:

| Function description                | Address definition | Description of data meaning   | R/W characteristic |
|-------------------------------------|--------------------|---|--------------------|
| Communication control command       | 1000H              | 0001H:Forward running   | W/R                |
|                                     |                    | 0002H:Reverse running   |                    |
|                                     |                    | 0003H:Forward jog   |                    |
|                                     |                    | 0004H:Reverse jog   |                    |
|                                     |                    | 0005H:Stop  |                    |
|                                     |                    | 0006H:Coast to stop   |                    |
|                                     |                    | 0007H:Fault reset   |                    |
|                                     |                    | 0008H:Reserved  |                    |
| Inverter status                     | 1001H              | 0001H:Forward running   | R                  |
|                                     |                    | 0002H:Reverse running   |                    |
|                                     |                    | 0003H:Inverter standby  |                    |
| Communication setting value address | 2000H              | Communication setting value:range (-10000~10000)<br>Note: Communication setting value is the percentage of relative value,10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.For frequency dimension data, the percentage is the percentage of relative maximum frequency (00-03); for torque dimension data, the percentage is 02-07 (torque upper limit digital setting). About the PID feedback source, this percentage directly represents the value of the setting source. | W/R                |
| Digital output terminal control     | 2001H              | BIT0:MO1 output control<br>BIT1:Reserved<br>BIT2: Relay RA-RB-RC output control<br>BIT3:Reserved<br>BIT4:DFM(M) output control  | W/R                |

| Function description                         | Address definition | Description of data meaning  | R/W characteristic |
|--|--------------------|--|--------------------|
| Analog AFM output control                    | 2002H              | 0~7FFFmeans 0%~100%  | W/R                |
| Pulse DFM (P) output control                 | 2004H              | 0~7FFFmeans 0%~100%  | W/R                |
| Address description of start/stop parameters | 3000H              | Running frequency  | R                  |
|  | 3001H              | Setting frequency  | R                  |
|  | 3002H              | Bus voltage  | R                  |
|  | 3003H              | Output voltage   | R                  |
|  | 3004H              | Output current   | R                  |
|  | 3005H              | Operation rotating speed   | R                  |
|  | 3006H              | Output power   | R                  |
|  | 3007H              | Output torque  | R                  |
|  | 3008H              | PID set value  | R                  |
|  | 3009H              | PID feedback value   | R                  |
|  | 300AH              | Terminal input flag state  | R                  |
|  | 300BH              | Terminal output flag state   | R                  |
|  | 300CH              | Analog quantity AVI1 value   | R                  |
|  | 300DH              | Analog quantity AVI2/ACI value   | R                  |
|  | 300EH              | Reserved   | R                  |
|  | 300FH              | Count value  | R                  |
|  | 3010H              | Length   | R                  |
|  | 3011H              | Load speed   | R                  |
|  | 3012H              | Multi-speed and the current number of PLC  | R                  |
|  | 3013H              | PULSE input pulse frequency(unit: 1Hz)   | R                  |
|  | 3014H              | Communication setting value  | R                  |
|  | 3015H              | Reserved   | R                  |
|  | 3016H              | Main frequency X display   | R                  |
|  | 3017H              | Auxiliary frequency Y display  | R                  |
| Inverter fault address                       | 5000H              | Fault information code coincides with number of fault type in function code menu. But the data here returned to the host is in hexadecimal system and not fault character. | R                  |

Description: Data read from 5000H compares with the actual fault as shown in the table below.

| Inverter fault address | Description Inverter fault information description |   |
|------------------------|--|---|
| 5000H                  | 0000:No fault                                      | 0015:EEPROM read write error                |
|                        | 0001:Short-circuit protection                      | 0016:Inverter hardware fault                |
|                        | 0002:Acceleration over current                     | 0017:Motor short circuit to ground          |
|                        | 0003:Deceleration over current                     | 0018:Reserved                               |
|                        | 0004:Constant speed over current                   | 0019:Reserved                               |
|                        | 0005:Acceleration overvoltage                      | 001A:Running time arrival                   |
|                        | 0006:Deceleration overvoltage                      | 001B:Reserved                               |
|                        | 0007:Constant speed overvoltage                    | 001C:Reserved                               |
|                        | 0008:Reserved                                      | 001D:Power-on time arrival                  |
|                        | 0009:Bus undervoltage fault                        | 001E:Load failure                           |
|                        | 000A:Inverter overload                             | 001F:The PID feedback disconnected          |
|                        | 000B:Motor overload                                | 0028:Wave-by-wave current limiting fault    |
|                        | 000C:Input phase loss                              | 0029:Switching motor fault during operation |
|                        | 000D:Output phase loss                             | 002A: Excessive speed deviation             |
|                        | 000E:Module overheat                               | 002B:Motor over speed                       |
|                        | 000F:External fault                                | 002D:Motor over temperature                 |
|                        | 0010:Communication error                           | 005A: Encoder wire number setting error     |
|                        | 0011:Contactor fault                               | 005b: Encoder not connected                 |
|                        | 0012:Current detection fault                       | 005C: Initial position error                |
|                        | 0013:Motor self-learning error                     | 005E: Speed feedback error                  |
|                        | 0014:Reserved                                      |   |

### Communication error message response:

When a communication frame is detected as an error, the slave responds with a one-byte error code that defines the cause of the error. After the main device application receives an error code response, the typical process is to resend the message or make a command change for the corresponding error.

Communication error code definition:

| Communication error home address | Wrong code definition   |                               |
|----------------------------------|-------------------------|-------------------------------|
| 5001H                            | 0000:No fault           | 0005:Invalid parameters       |
|                                  | 0001:Password error     | 0006:Parameter change invalid |
|                                  | 0002:Command code error | 0007:System locked            |
|                                  | 0003:CRC checking error | 0008:Being EEPROM operation   |
|                                  | 0004:Invalid address    |                               |

### 13 Wobble Frequency Counting Parameters

The wobble frequency function is suitable for textile, chemical fiber and other industries, as well as occasions requiring traversing and winding functions. The wobble frequency function means that the output frequency of the inverter wobble up and down with the set frequency as the center. The trajectory of the running frequency on the time axis is shown in Figure 5-29. The wobble amplitude is set by 13-00 and 13-01. When 13-00 is set to 0, that is, the wobble amplitude is 0, the wobble frequency has no effect.

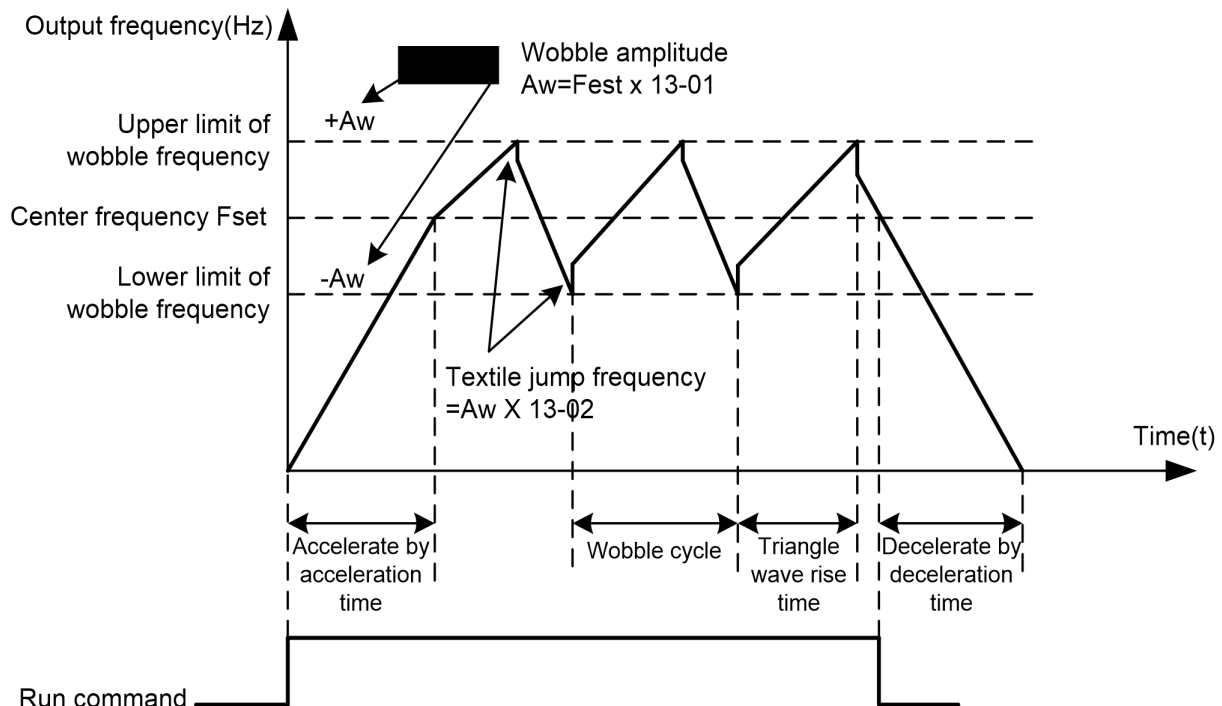


Figure 5-29 Schematic diagram of wobble frequency operation

|       |                     |   |                              |   |                 |   |
|-------|---------------------|---|------------------------------|---|-----------------|---|
| 13-00 | Wobble setting mode |   |                              | ⚡ | Factory setting | 0 |
|       | Setting range       | 0 | Relative to center frequency |   |                 |   |
|       |                     | 1 | Relative to Max frequency    |   |                 |   |

Use this parameter to determine the reference amount of wobble.

0: Relative to the center frequency (00-17 frequency source). The wobble amplitude changes with the change of the center frequency (set frequency), and the wobble amplitude is not fixed.

1: Relative maximum frequency (00-03). The wobble is fixed.

|       |                          |             |  |   |                 |      |
|-------|--------------------------|-------------|--|---|-----------------|------|
| 13-01 | Wobble amplitude         |             |  | ⚡ | Factory setting | 0.0% |
|       | Setting range            | 0.0%~100.0% |  |   |                 |      |
| 13-02 | Jump frequency amplitude |             |  | ⚡ | Factory setting | 0.0% |
|       | Setting range            | 0.0%~50.0%  |  |   |                 |      |

Use this parameter to determine the value of wobble amplitude and kick frequency.

When setting the wobble amplitude relative to the center frequency (13-00=0), the wobble amplitude  $AW = \text{frequency source (00-17)} \times \text{wobble amplitude (13-01)}$ . When setting the wobble amplitude relative to the maximum frequency (13-00=1), the wobble amplitude  $AW = \text{maximum frequency (00-03)} \times \text{wobble amplitude (13-01)}$ .

Sudden jump frequency amplitude: Sudden jump frequency = wobble amplitude  $AW \times \text{sudden jump frequency amplitude (13-02)}$ . If the wobble amplitude is selected relative to the center frequency (13-00=0), the kick frequency is the changing value. If the wobble amplitude is selected relative to the maximum frequency (13-00=1), the kick frequency is a fixed value.

The operating frequency of the wobble frequency is constrained by the upper and lower frequency limits.

|              |                                |              |                 |       |
|--------------|--------------------------------|--------------|-----------------|-------|
| <b>13-03</b> | Wobble frequency cycle         | ↗            | Factory setting | 10.0s |
|              | Setting range                  | 0.1s~3000.0s |                 |       |
| <b>13-04</b> | Wobble triangle wave rise time | ↗            | Factory setting | 50.0% |
|              | Setting range                  | 0.1%~100.0%  |                 |       |

Wobble cycle: the time value of a complete wobble cycle.

The triangular wave rise time (13-04) of the wobble frequency is the percentage of the triangular wave rise time relative to the wobble period (13-03).

Triangle wave rise time=(13-03)×(13-04), the unit is second.

Triangle wave fall time=(13-03)×(1-(13-04)), the unit is second.

|              |                  |            |                 |       |
|--------------|------------------|------------|-----------------|-------|
| <b>13-05</b> | Set length       | ↗          | Factory setting | 1000m |
|              | Setting range    | 0m~65535m  |                 |       |
| <b>13-06</b> | Actual Length    | ↗          | Factory setting | 0m    |
|              | Setting range    | 0m~65535m  |                 |       |
| <b>13-07</b> | Pulses per meter | ↗          | Factory setting | 100.0 |
|              | Setting range    | 0.1~6553.5 |                 |       |

The above parameters are used for fixed length control.

The length information needs to be collected through the multifunctional digital input terminal. The number of pulses sampled by the terminal is divided by 13-07 pulses per meter, and the actual length 13-06 can be calculated. When the actual length is greater than the set length 13-05, the multi-function output terminal (function 10) outputs an ON signal.

During the fixed-length control, the length reset operation can be performed through the multi-function MI terminal (MI function selection is 28). For details, please refer to 04-00~04-04.

In application, the corresponding multi-function input terminal function needs to be set to "length count input" (function 27). When the pulse frequency is high, the MI5 port must be used.

|              |                        |         |                 |      |
|--------------|------------------------|---------|-----------------|------|
| <b>13-08</b> | Set count value        | ↗       | Factory setting | 1000 |
|              | Setting range          | 1~65535 |                 |      |
| <b>13-09</b> | Designated count value | ↗       | Factory setting | 1000 |
|              | Setting range          | 1~65535 |                 |      |

The count value needs to be collected through the multi-function digital input terminal. The application needs to set the corresponding multi-function input terminal function to "counter input" (function 25). When the pulse frequency is high, the MI5 port must be used.

When the count value reaches the set count value 13-08, the multi-function output terminal (function 8) outputs an ON signal, and then the counter stops counting.

When the count value reaches the designated count value 13-09, the multi-function output terminal (Function 9) outputs an ON signal. At this time, the counter continues to count until the "set count value" stops the counter.

The designated count value 13-09 should not be greater than the set count value 13-08.

Figure 5-30 is a schematic diagram of the set count value arrival and designated count value arrival functions.

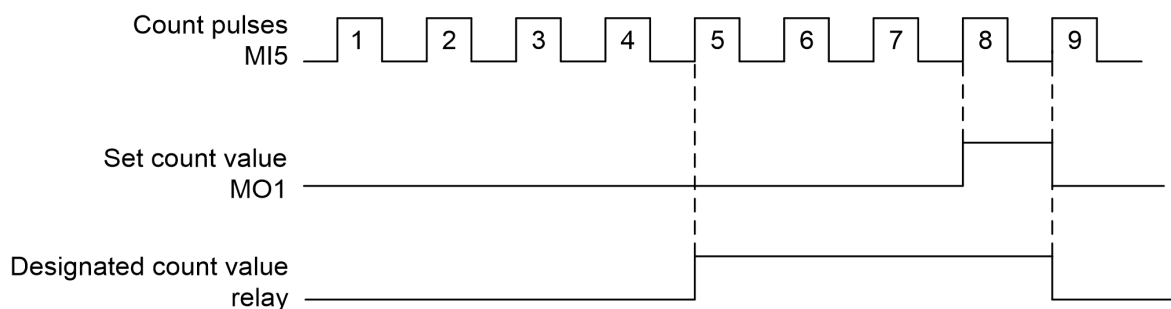


Figure 5-30 Schematic diagram of set count value and designated count value

## 17 Torque Control Parameters

|              |                                       |   |                 |   |
|--------------|---------------------------------------|---|-----------------|---|
| <b>17-00</b> | Speed/torque control method selection |   | Factory setting | 0 |
|              | Setting range                         | 0 | Speed control   |   |
|              |                                       | 1 | Torque control  |   |

Select the control method of the inverter.

The S3100E's multi-function input M I terminal has two functions related to torque control: torque control prohibition (function 29) and speed control/torque control switching (function 46). These two terminals should be used in conjunction with 17-00 to achieve the switching between speed and torque control.

When the speed control/torque control switching terminal is invalid, the control mode is determined by 17-00. If the speed control/torque control switching is effective, the control mode is equivalent to the reverse of the value of 17-00.

When the torque control inhibit terminal is valid, the inverter is fixed to speed control mode.

|       |  |   |                        |                 |                 |        |
|-------|--|---|------------------------|-----------------|-----------------|--------|
| 17-01 | Torque setting source selection in torque control mode |   |                        | Factory setting | 0               |        |
|       | Setting range  | 0   | Digital setting(17-03) |                 |                 |        |
|       |  | 1   | AVI1                   |                 |                 |        |
|       |  | 2   | AVI2/ACI               |                 |                 |        |
|       |  | 3   | Reserved               |                 |                 |        |
|       |  | 4   | PULSE                  |                 |                 |        |
|       |  | 5   | Communication setting  |                 |                 |        |
|       |  | 6   | MIN(AVI1, AVI2/ACI)    |                 |                 |        |
|       |  | 7   | MAX(AVI1, AVI2/ACI)    |                 |                 |        |
|       |  | 1-7 option full scale, corresponding to 17-03 digital setting |                        |                 |                 |        |
| 17-03 | Torque digital setting in torque control mode          |   |                        | ↗               | Factory setting | 150.0% |
|       | Setting range  | -200.0%~200.0%  |                        |                 |                 |        |

Used to select the torque setting source.

The torque setting adopts a relative value, and 100.0% corresponds to the rated torque of the inverter. Setting range-200.0%~200.0%, indicating that the maximum torque of the inverter is 2 times the rated torque of the inverter.

When the torque setting source is selected from 1 to 7, 100% of communication, analog input, and pulse input correspond to 17-03.

|       |  |                              |   |                 |         |
|-------|--|------------------------------|---|-----------------|---------|
| 17-05 | Torque control forward maximum frequency |                              | ↗ | Factory setting | 50.00Hz |
|       | Setting range                            | 0.00Hz~Max frequency (00-03) |   |                 |         |
| 17-06 | Torque control reverse maximum frequency |                              | ↗ | Factory setting | 50.00Hz |
|       | Setting range                            | 0.00Hz~Max frequency (00-03) |   |                 |         |

It is used to set the maximum running frequency of inverter forward or reverse in torque control mode.

When the inverter torque control, if the load torque is less than the motor output torque, it will continue to rise, in order to prevent accidents such as speeding of the mechanical system, the maximum speed of the motor during torque control must be limited.

|       |                                  |              |   |                 |       |
|-------|----------------------------------|--------------|---|-----------------|-------|
| 17-07 | Torque control acceleration time |              | ↗ | Factory setting | 0.00s |
|       | Setting range                    | 0.00s~65000s |   |                 |       |
| 17-08 | Torque control Deceleration time |              | ↗ | Factory setting | 0.00s |
|       | Setting range                    | 0.00s~65000s |   |                 |       |

In the torque control mode, the difference between the motor output torque and the load torque determines the speed change rate of the motor and the load, so the motor speed may change rapidly, causing problems such as excessive noise or mechanical stress. By setting the torque control acceleration and deceleration time, the motor speed can be changed gently.

However, when quick torque response is required, the torque control acceleration/deceleration time needs to be set to 0.00s. For example, two motors are connected by a hard connection to drive the same load. In order to ensure that the load is evenly distributed, one inverter is set as the master to adopt the speed control mode, the other inverter is the slave and uses torque control, the actual output torque of the master As the torque command of the slave, the torque of the slave needs to quickly follow the master at this time, then the acceleration and deceleration time of the torque control of the slave is 0.00s.

## 22 Control Optimization Parameters

|       |                                      |                                    |   |                 |        |
|-------|--------------------------------------|------------------------------------|---|-----------------|--------|
| 22-00 | DPWM switching upper limit frequency |                                    | ↗ | Factory setting | 8.00Hz |
|       | Setting range                        | 5.00Hz~Maximum operating frequency |   |                 |        |

Only valid for V/f control. When the V/f is running, the wave transmission mode is lower than this value for the 7-segment continuous modulation mode, and the opposite is the 5-segment intermittent modulation mode.

In the 7-segment continuous modulation, the switching loss of the inverter is large, but the current ripple is small; in the 5-step intermittent debugging mode, the switching loss is small and the current ripple is large; but it may cause the motor at high frequency The instability of operation generally does not require modification.

For the V/f operation instability, please refer to parameter 03-11, for inverter loss and temperature rise, please refer to parameter 00-10;

|       |                                       |   |                     |                 |   |
|-------|---------------------------------------|---|---------------------|-----------------|---|
| 22-01 | Reserved                              |   | ↗                   | Factory setting |   |
| 22-02 | Dead zone compensation mode selection |   | ↗                   | Factory setting | 1 |
|       | Setting range                         | 0 | No compensation     |                 |   |
|       |                                       | 1 | Compensation mode 1 |                 |   |

This parameter generally does not need to be modified. Only when there are special requirements on the quality of the output voltage waveform, or when the motor exhibits abnormalities such as oscillation, it is necessary to try to switch between different compensation modes. It is recommended to use compensation mode 2 for high power.

|       |                  |      |                                       |                 |   |
|-------|------------------|------|---------------------------------------|-----------------|---|
| 22-03 | Random PWM depth |      | ⚡                                     | Factory setting | 0 |
|       | Setting range    | 0    | Random PWM is invalid                 |                 |   |
|       |                  | 1~10 | Random depth of PWM carrier frequency |                 |   |

Setting random PWM can make the monotonous harsh motor sound softer, and can help reduce external electromagnetic interference. When the random PWM depth is set to 0, random PWM is invalid. Adjust the random PWM to different depths to get different effects.

|       |                           |   |             |                 |   |
|-------|---------------------------|---|-------------|-----------------|---|
| 22-04 | Fast current limit enable |   | ⚡           | Factory setting | 1 |
|       | Setting range             | 0 | No enabling |                 |   |
|       |                           | 1 | Enabling    |                 |   |

Enabling the fast current limit function can minimize the overcurrent fault of the inverter and ensure the continuous operation of the inverter. If the inverter continues to be in the fast current limiting state for a long time, the inverter may be damaged due to overheating, etc. This situation is not allowed.

Therefore, the inverter is used in the occasion of large current impact for a long time, please select 1, the rapid current limit will alarm the fault CBC after a period of time, indicating that the inverter is overloaded and needs to be stopped.

|       |                                |         |   |                 |     |
|-------|--------------------------------|---------|---|-----------------|-----|
| 22-05 | Current detection compensation |         | ⚡ | Factory setting | 105 |
|       | Setting range                  | 100~110 |   |                 |     |

It is used to set the current detection compensation of the inverter. If the setting is too large, the control performance may be reduced. Generally no modification is required.

|       |                    |               |   |                 |                        |
|-------|--------------------|---------------|---|-----------------|------------------------|
| 22-06 | Undervoltage level |               | ⚡ | Factory setting | 220V:200V<br>380V:350V |
|       | Setting range      | DC200V-DC420V |   |                 |                        |

It is used to set the voltage value of the undervoltage fault UV of the inverter. 100.0% of the inverters with different voltage levels correspond to different voltage points, respectively:

Single-phase 220V or three-phase 220V: DC200V

Three-phase 380V: DC350V

|       |          |  |  |                 |  |
|-------|----------|--|--|-----------------|--|
| 22-07 | Reserved |  |  | Factory setting |  |
| 22-08 | Reserved |  |  | Factory setting |  |

|       |                   |               |  |                 |                        |
|-------|-------------------|---------------|--|-----------------|------------------------|
| 22-09 | Overvoltage level |               |  | Factory setting | 220V:400V<br>380V:820V |
|       | Setting range     | DC200V-DC820V |  |                 |                        |



## 99 Monitoring Parameters

The 99 parameter group is used to monitor the running status information of the inverter. The user can view it through the operation panel, or read the value of the parameter group through communication in order to view the data on the spot or monitor the data of the host computer. Among them, 99-00 to 99-31 are the same as the monitoring parameters defined in 08-03/08-04.

See the table below for details.

| Parameter | Name                                | Unit    |
|-----------|-------------------------------------|---------|
| 99-00     | Running frequency(Hz)               | 0.01Hz  |
| 99-01     | Setting frequency(Hz)               | 0.01Hz  |
| 99-02     | Bus voltage(V)                      | 0.1V    |
| 99-03     | Output voltage(V)                   | 1V      |
| 99-04     | Output current(A)                   | 0.01A   |
| 99-05     | Output power(kW)                    | 0.1kW   |
| 99-06     | Output torque(%)                    | 0.1%    |
| 99-07     | MI Input status                     | 1       |
| 99-08     | MO Output status                    | 1       |
| 99-09     | AVI1 Voltage(V)                     | 0.01V   |
| 99-10     | AVI2/ACI Voltage(V)                 | 0.01V   |
| 99-11     | Reserved                            |         |
| 99-12     | Calculation value                   | 1       |
| 99-13     | Length                              | 1       |
| 99-14     | Load speed                          | 1       |
| 99-15     | PID setting                         | 1       |
| 99-16     | PID feedback                        | 1       |
| 99-17     | PLC stage                           | 1       |
| 99-18     | PULSE Input pulse frequency(Hz)     | 0.01kHz |
| 99-19     | Feedback speed(Unit 0.1Hz)          | 0.1Hz   |
| 99-20     | Remaining running time              | 0.1Min  |
| 99-21     | AVI1 voltage before calibration     | 0.001V  |
| 99-22     | AVI2/ACI voltage before calibration | 0.001V  |
| 99-23     | Reserved                            |         |
| 99-24     | Line speed                          | 1m/Min  |
| 99-25     | Current power-on time               | 1Min    |
| 99-26     | Current running time                | 0.1Min  |
| 99-27     | PULSE Input pulse frequency         | 1Hz     |
| 99-28     | Communication setting value         | 0.01%   |
| 99-29     | Reserved                            |         |
| 99-30     | Main frequency X display            | 0.01Hz  |
| 99-31     | Auxiliary frequency Y display       | 0.01Hz  |

| Parameter | Name                                | Unit  |
|-----------|-------------------------------------|-------|
| 99-32     | View any memory address value       | 1     |
| 99-33     | Reserved                            |       |
| 99-34     | Reserved                            |       |
| 99-35     | Target torque (%)                   | 0.1%  |
| 99-36     | Reserved                            |       |
| 99-37     | Reserved                            |       |
| 99-38     | Reserved                            |       |
| 99-39     | V/f separation target voltage       | 1V    |
| 99-40     | V/f separation output voltage       | 1V    |
| 99-41     | Visual display of MI input status   | 1     |
| 99-42     | Visual display of MO input status   | 1     |
| 99-43     | MI function status visual display 1 | 1     |
| 99-44     | MI function status visual display 2 | 1     |
| 99-59     | Setting frequency(%)                | 0.01% |
| 99-60     | Running frequency(%)                | 0.01% |
| 99-61     | Inverter status                     | 1     |

## **6 TROUBLE SHOOTING**

AC motor drive is provided with functions of warning and protection such as over voltage, low voltage and over current. Once fault occurs, protection function shall act, AC motor drive output stop, fault contactor act and also free running of motor shall stop. For causes and corrective measures of fault, display of fault shall be taken for reference. The alarm records will be stored into the computer memory of AC motor driver. Attention shall be paid that RESET key, would be available only after the fault has been eliminated.

### **6.1 Failures & Failure Elimination**

| Display     | Description                     | Possible reason   | corrective-measures   |
|-------------|---------------------------------|---|---|
| <b>SC</b>   | Short circuit fault             | <ol style="list-style-type: none"> <li>1. Accelerate too fast.</li> <li>2. Internal damage of IGBT.</li> <li>3. Malfunction caused by interference.</li> <li>4. Whether the grounding is good.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Increase acceleration time.</li> <li>2. Seek support.</li> <li>3. Check whether the peripheral equipment has a strong interference source.</li> </ol>   |
| <b>oc 1</b> | Overcurrent during acceleration | <ol style="list-style-type: none"> <li>1. Accelerate too fast.</li> <li>2. The input power voltage is low.</li> <li>3. The power of the inverter is too small.</li> <li>4. No parameter learning is performed during vector control.</li> <li>5. Manual torque boost or V/f curve is not suitable.</li> <li>6. The motor is rotating when starting.</li> <li>7. There is a short circuit in the inverter output circuit.</li> </ol> | <ol style="list-style-type: none"> <li>1. Increase the acceleration time.</li> <li>2. Check the input power.</li> <li>3. Select a inverter with a higher power.</li> <li>4. Perform parameter self-learning.</li> <li>5. Adjust manual lifting torque or V/f curve.</li> <li>6. Choose speed tracking or start after the motor stops.</li> <li>7. Eliminate peripheral faults.</li> </ol> |
| <b>oc 2</b> | Overcurrent during deceleration | <ol style="list-style-type: none"> <li>1. Decelerate too fast.</li> <li>2. Large load inertia torque.</li> <li>3. The power of the inverter is too small.</li> <li>4. No parameter learning is performed during vector control.</li> <li>5. There is a short circuit in the inverter output circuit.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Increase the deceleration time.</li> <li>2. Add appropriate energy consumption brake components.</li> <li>3. Select a frequency converter with a higher power.</li> <li>4. Perform parameter self-learning.</li> <li>5. Eliminate peripheral faults.</li> </ol>   |
| <b>oc 3</b> | Overcurrent at constant speed   | <ol style="list-style-type: none"> <li>1. Abrupt or abnormal load.</li> <li>2. The input power voltage is low.</li> <li>3. The power of the inverter is too small.</li> <li>4. No parameter learning is performed during vector control.</li> <li>5. There is a short circuit in the inverter output circuit.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check the load or reduce the sudden change of load.</li> <li>2. Check the input power.</li> <li>3. Select a frequency converter with a higher power.</li> <li>4. Perform parameter self-learning.</li> <li>5. Eliminate peripheral faults.</li> </ol>   |
| <b>ov 1</b> | Overvoltage during acceleration | <ol style="list-style-type: none"> <li>1. The input voltage is abnormal.</li> <li>2. After a momentary power failure, restart the rotating motor.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check the input power.</li> <li>2. Avoid restarting after stopping.</li> </ol>  |
| <b>ov 2</b> | Overvoltage during deceleration | <ol style="list-style-type: none"> <li>1. Decelerate too fast.</li> <li>2. Large load inertia.</li> <li>3. The input voltage is abnormal.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Increase the deceleration time.</li> <li>2. Increase energy consumption brake components.</li> <li>3. Check the input power.</li> </ol>   |

| Display    | Description                   | Possible reason   | corrective-measures  |
|------------|-------------------------------|---|--|
| <b>ou3</b> | Overvoltage at constant speed | <ol style="list-style-type: none"> <li>1. Abnormal changes in input voltage.</li> <li>2. The load inertia is large.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Install input reactor.</li> <li>2. Plus suitable energy consumption brake components.</li> </ol>   |
| <b>Uu</b>  | BUS undervoltage              | <ol style="list-style-type: none"> <li>1. The input power supply voltage is low.</li> <li>2. Instant power outage.</li> <li>3. The circuit board is abnormal.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check the input power</li> <li>2. Reset fault</li> <li>3. Seek service</li> </ol>  |
| <b>ol2</b> | Inverter overload             | <ol style="list-style-type: none"> <li>1. Accelerate too fast.</li> <li>2. Restart the rotating motor.</li> <li>3. The input power voltage is too low.</li> <li>4. The load is too large.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Increase the acceleration time.</li> <li>2. Avoid restarting after shutdown.</li> <li>3. Check the input power voltage</li> <li>4. Select the inverter with higher power.</li> </ol>   |
| <b>ol1</b> | Motor overload                | <ol style="list-style-type: none"> <li>1. The input power voltage is too low.</li> <li>2. The motor rated current is set incorrectly.</li> <li>3. The motor is blocked or the load mutation is too large.</li> <li>4. Motor overloaded.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check the input power voltage.</li> <li>2. Reset the rated current of the motor.</li> <li>3. Check the load and adjust the torque boost.</li> <li>4. Choose the right motor.</li> </ol>  |
| <b>ol3</b> | Motor overload 2              | <ol style="list-style-type: none"> <li>1. The motor is blocked or the load is too large.</li> <li>2. Improper setting of protection parameters.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check the load.</li> <li>2. Set appropriate protection parameters.</li> </ol>  |
| <b>SP1</b> | Input phase loss              | R/L1,S/L2,T/L3 Input phase loss   | <ol style="list-style-type: none"> <li>1. Check the input power.</li> <li>2. Check the installation wiring.</li> </ol>   |
| <b>SPo</b> | Output phase loss             | U/T1,V/T2,W/T3 phase loss on output side (or the load three-phase is severely asymmetric)   | <ol style="list-style-type: none"> <li>1. Check the output wiring.</li> <li>2. Check the motor and cable</li> </ol>  |
| <b>oh2</b> | Module overheat               | <ol style="list-style-type: none"> <li>1. Inverter overcurrent instantly.</li> <li>2. The output three phases have interphase or ground short circuit.</li> <li>3. The air duct is blocked or the fan is damaged.</li> <li>4. The ambient temperature is too high.</li> <li>5. Loose connection of control board or plug-in.</li> <li>6. The auxiliary power supply is damaged, and the driving voltage is undervoltage.</li> <li>7. Power module bridge arm is straight through.</li> <li>8. The control board is abnormal.</li> </ol> | <ol style="list-style-type: none"> <li>1. See overcurrent countermeasures.</li> <li>2. Rewiring.</li> <li>3. Ventilate channels or replace fans.</li> <li>4. Reduce the ambient temperature.</li> <li>5. Check and reconnect.</li> <li>6. Seek service.</li> <li>7. Seek service.</li> <li>8. Seek service.</li> </ol> |
| <b>EF</b>  | External fault                | MI external fault input terminal action   | Check external device input  |
| <b>CE</b>  | Communication error           | <ol style="list-style-type: none"> <li>1. The baud rate is not set properly.</li> <li>2. Communication error using serial communication.</li> <li>3. Communication is interrupted for a long time.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Set the appropriate baud rate.</li> <li>2. Press STOP/RESET button to reset and seek service.</li> <li>3. Check the wiring of the communication interface.</li> </ol>  |

| Display      | Description                             | Possible reason   | corrective-measures  |
|--------------|---|---|--|
| <b>IE</b>    | Current detection circuit fault         | <ol style="list-style-type: none"> <li>1. Poor contact of the control board connector.</li> <li>2. The auxiliary power supply is damaged.</li> <li>3. The Hall device is damaged.</li> <li>4. The amplifier circuit is abnormal.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check the connector and reinsert the cable.</li> <li>2. Search for factory maintenance.</li> <li>3. Search for factory maintenance.</li> <li>4. Search for factory maintenance.</li> </ol>                             |
| <b>SC</b>    | Motor to ground short circuit fault     | Short circuit of motor to ground  | Check the motor or change the cable or motor   |
| <b>LE</b>    | Motor auto-tuning error                 | <ol style="list-style-type: none"> <li>1. The capacity of the motor does not match the capacity of the inverter.</li> <li>2. Improper setting of rated motor parameters.</li> <li>3. The deviation of the self-learned parameters and the standard parameters is too large.</li> <li>4. Auto-tuning timeout.</li> </ol> | <ol style="list-style-type: none"> <li>1. Replace the inverter model.</li> <li>2. Set rated parameters according to the motor nameplate.</li> <li>3. Make the motor empty and re-identify.</li> <li>4. Check the motor wiring and parameter settings.</li> </ol> |
| <b>EEP</b>   | EEPROM reading-writing error            | <ol style="list-style-type: none"> <li>1. An error occurs in the reading and writing of control parameters.</li> <li>2. The EEPROM is damaged.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Press STOP/RESE key and search for factory maintenance.</li> <li>2. Search for factory maintenance</li> </ol>  |
| <b>Eond</b>  | Accumulated running time reaches fault  | Cumulative running time to set value  | Use the parameter initialization function to clear the record information.   |
| <b>E ind</b> | Accumulated power-on time reaches error | The cumulative power-on time reaches the set value.   | Use the parameter initialization function to clear the record information.   |
| <b>oLL</b>   | Load failure                            | The running current of the inverter is less than 11-64.   | Check whether the load or 11-64, 11-65 parameters are in accordance with the actual working conditions.  |
| <b>EP Id</b> | PID feedback disconnection fault        | <ol style="list-style-type: none"> <li>1. PID feedback disconnected.</li> <li>2. The PID feedback source disappears.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check the PID feedback signal line.</li> <li>2. Check the PID feedback source.</li> </ol>  |
| <b>cbC</b>   | Wave-by-wave current limiting fault     | <ol style="list-style-type: none"> <li>1. Whether the load is too large or the motor stalls.</li> <li>2. Inverter power is too small.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Reduce the load and check the motor and mechanical conditions.</li> <li>2. Select the inverter with higher power.</li> </ol>   |
| <b>End</b>   |   |   | Contact the service provider   |
| <b>EB</b>    | Charging resistor fault                 | Whether the input power is abnormal   | Check the input power  |
| <b>E42</b>   | Power-on initialization abnormal        | <ol style="list-style-type: none"> <li>1. Whether the input power supply is abnormal.</li> <li>2. The power supply or device is damaged.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check the power supply.</li> <li>2. Seek service.</li> </ol>   |
| <b>intP</b>  | Pole position detection failed          | Whether the permanent magnet synchronous motor is connected normally  | Check motor connection   |

## 6.2 General troubleshooting method

| Abnormal phenomenon                                 | Check points   | Processing content   |
|---|--|--|
| The motor does not run                              | Has the power supply voltage been sent to R/L1, S/L2, and T/L3?    | Whether the power supply is input;<br>Turn off the power first and then send it again;<br>Confirm the power voltage level;<br>Whether the terminal screw is tight. |
|   | Is there voltage output at the output terminals U/T1, V/T2, W/T3?  | Turn off the power first and then send it again  |
|   | Check if the load is too heavy, causing the motor to block?        | Reduce the load so that the motor can run  |
|   | Check if there is any abnormality in the inverter?                 | Refer to the troubleshooting instructions to deal with wiring inspection and correction  |
|   | Are forward or reverse instructions issued?                        |  |
|   | Check if there is an input for the analog frequency setting value? | Whether the analog frequency input signal wiring is correct;<br>Whether the frequency input setting voltage is correct.  |
|   | Are the operating mode settings correct?                           | Operated by digital operation  |
| Motor running<br>Opposite direction                 | Are the output terminals U/T1, V/T2, and W/T3 wired correctly?     | Must work with the U/T1,V/T2,W/T3 phase of the motor.  |
|   | Is the forward or reverse signal wiring correct?                   | Check and correct the wiring   |
| Motor running<br>Can't change speed                 | Is the analog frequency input wiring correct?                      | Check and correct the wiring   |
|   | Is the operation mode set correctly?                               | Operation panel operation mode setting check   |
|   | Is the load too heavy?   | Lighten the load   |
| Motor running<br>speed is too high or too low       | Is the motor specification (pole voltage) correct?                 | Check motor specifications   |
|   | Is the gear ratio correct?   | Confirm gear ratio   |
|   | Is the maximum output frequency setting correct?                   | Confirm the maximum output frequency value   |
|   | Is there an extreme drop in the voltage at the motor end?          | The V/f characteristic curve is set correctly  |
| When the motor is running<br>Abnormal speed changes | Will the load be too heavy?  | Lighten the load   |
|   | Does the load change greatly?                                      | Load fluctuation should be reduced;<br>The capacity of the inverter and motor is increased.  |
|   | Is there any phase loss in the input power supply?                 | When using single-phase specifications, add AC reactor on the input power side;<br>Check wiring when using three-phase specifications.                             |

## **7 MAINTENANCE AND AMBIENT ELEMENTS**

For safety and normal operation, the inverter shall be provided with daily as well as periodical maintenance.

Diagram below shows items that must be checked.

Check shall only performed 10 minutes after charging LEDs of the inverter go off, to prevent injury to operators caused by residual power of inverter condenser.

| Inspection item                                   | Inspection content                                     | Inspection period |        | Inspection method  | Assessment base                                   | Corrective measures to fault                         |
|---|--|-------------------|--------|--|---|--|
|   |  | Daily             | Annual |  |   |  |
| Machine ambient environment                       | Verify ambient temperature and humidity                | ○                 |        | Measure with temperature or humidity meter in accordance with notes for installation | Temperature:-10 to 40℃;<br>humidity:below 95%RH   | Improve environments                                 |
|   | Check stacking with inflammable materials              | ○                 |        | View inspection  | No foreign materials                              |  |
| Inverter installing and grounding                 | Check abnormal vibration to machine                    | ○                 |        | View and auditory inspection   | No foreign materials                              | Tighten securing screws                              |
|   | Check grounding resistance complies with specification |                   | ○      | Measure resistance with three-functional meter                                       | 200V Class: below 100Ω;<br>400V Class: below 100Ω | Modify grounding                                     |
| Input power supply voltage                        | Check main circuit voltage                             | ○                 |        | Measure resistance with three-functional meter                                       | Voltage value complies with specifications        | Modify input power supply                            |
| External terminal securing screws of the inverter | Check security of screwed parts                        |                   | ○      | View inspection and check screws are secured tightly with screwdriver                | All OK  | Tighten or sent for factory maintenance and overhaul |
|   | Check terminal board is not damaged                    |                   | ○      |  |   |  |
|   | Check no clear rust exists                             |                   | ○      |  |   |  |
| Inverter inner wiring                             | Check no distortion appears                            |                   | ○      |  | All OK  |  |
|   | Check outer shielding is not broken                    |                   | ○      | View inspection  | All OK  | Replace or sent for factory maintenance and overhaul |
| Radiator  | Check no dust or chipping stacked                      | ○                 |        | View inspection  | All OK  | Remove stacking such as dust                         |

| Inspection item        | Inspection content  | Inspection period |        | Inspection method                       | Assessment base  | Corrective measures to fault       |
|------------------------|---|-------------------|--------|---|--|------------------------------------|
|                        |   | Daily             | Annual |   |  |                                    |
| Printing circuit board | Check no inductive metal or oil stacked                                   |                   | ○      | View inspection                         | All OK   | Remove or replace electric board   |
|                        | Check elements are exclusive of color changing or burning due to overheat |                   | ○      |   |  |                                    |
| Cooling fan            | Check abnormal vibration or noise   |                   | ○      | View inspection and auditory inspection | All OK   | Replace cooling fan                |
|                        | Check no dust or chipping stacked   | ○                 |        | View inspection                         |  | Remove                             |
| Power elements         | Check no dust or chipping stacked   |                   | ○      | View inspection                         | All OK   | Remove                             |
|                        | Check resistance between terminals  |                   | ○      | Check using three-functional meter      | No short circuit or circuit break for three phase output | Replace power elements or inverter |
| Condenser              | Check for odor or leakage   | ○                 |        | View inspection                         | All OK   | Replace condenser or inverter      |
|                        | Check for expansion or distortion   | ○                 |        |   |  |                                    |

Always inspection and maintenance is not necessary for S3100E.

For long time safety operation, periodical inspection shall be prepared to the inverter in accordance with descriptions below. Inspection shall only performed after power supply is off and charging LED off (since residual voltage may exist in the large capacity condensers.)

1.Remove dirty stacking inside the machine

2.Check screws securing terminals or elements are securely tightened; if not, tighten the screws.



## 7.1 Braking Resistor Selection Guide

The choice of braking resistor needs to be determined according to the power generated by the motor in the actual application system and has the relationship with the inertia of the system, the deceleration time, the energy that the bit can load, etc., and needs the customer to choose according to the actual situation. The larger the system inertia, the shorter the deceleration time required, the more frequent braking, the greater the braking resistance power to choose, the smaller the resistance, but not lower than the recommended minimum resistance.

(1) When braking, the regenerative energy of the motor is almost entirely consumed on the brake resistor.

The formula is:  $U \times U / R = P_b$

U - braking voltage with stable system brake (440V-class default is DC750V, 220V-class default is DC360V)

$P_b$  - braking power

(2) Brake resistor power selection

The power of the brake resistor is theoretically the same to the braking power, but considering the derating is 70%.

The formula is:  $0.7 \times P_r = P_b \times ED$

$P_r$  - resistance power

ED - brake rate (brake process accounts for the proportion of the entire work process)

| Common occasions | Centrifuge | General brake load |
|------------------|------------|--------------------|
| Brake rate(ED)   | 50~60%     | 5%~10%             |

(3) Brake resistor selection calculation reference

- ① 380V5.5kW motor applications, for example, check the table below to get:10% braking resistor resistance specifications:500W100Ω, as applied to the lifting industry needs up to 30% of the braking rate, the formula between the resistance power and braking rate is in direct proportion,Therefore, the choice of resistance specifications:500W x (30% / 10%) = 1500W100Ω.
- ② If the braking torque is not enough, the test will need to use 80Ω to ensure not jump OU (inverter over-voltage), the formula that the resistance is inversely proportional to the braking power, Therefore, the new resistance specification at 10% ED is:500W x (100Ω / 80Ω) = 625W80Ω.
- ③ If the lifting load is heavy, also needs 80Ω resistor and 30% braking rate,Then the new resistance specifications:625W x (30% / 10%) = 1875W80Ω.

# Braking Resistor List

## 220V

| Voltage     | Applicable motor |      | Full load output torque (Nm) | Braking unit           | Braking resistor | Braking torque 10%ED% | Min resistance |
|-------------|------------------|------|------------------------------|------------------------|------------------|-----------------------|----------------|
|             | HP               | kW   |                              | Quantity               | Quantity         |                       |                |
| 220V Series | 0.5              | 0.4  | 2.22                         | Built-in               | 80W 400Ω         | 125                   | 150Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 1                | 0.75 | 4.15                         |                        | 80W 200Ω         | 125                   | 80Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 2                | 1.5  | 8.31                         |                        | 300W 100Ω        | 125                   | 55Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 3                | 2.2  | 12.19                        |                        | 300W 70Ω         | 125                   | 35Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 5                | 4.0  | 20.49                        |                        | 400W 40Ω         | 125                   | 30Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 7.5              | 5.5  | 30.46                        |                        | 1000W 20Ω        | 125                   | 12Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 10               | 7.5  | 41.54                        |                        | 1000W 20Ω        | 125                   | 12Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 15               | 11   | 60.93                        |                        | 1500W 13Ω        | 100                   | 13.6Ω          |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 20               | 15   | 83.09                        |                        | 2000W 8.6Ω       | 100                   | 8.3Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 25               | 18.5 | 102.47                       |                        | 2000W 8.6Ω       | 100                   | 8.3Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 30               | 22   | 121.86                       |                        | 3000W 6.6Ω       | 100                   | 5.8Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 40               | 30   | 166.17                       | DBU-2030C              | 4000W 5.1Ω       | 100                   | 5.1Ω           |
|             |                  |      |                              | 1                      | 1                |                       |                |
|             | 50               | 37   | 204.94                       | DBU-2030C              | 4800W 3.9Ω       | 100                   | 3.2Ω           |
|             |                  |      |                              | 2(parallel connection) | 1                |                       |                |
|             | 60               | 45   | 249.26                       | DBU-2030C              | 6000W 3.3Ω       | 100                   | 3.2Ω           |
|             |                  |      |                              | 2(parallel connection) | 1                |                       |                |
|             | 75               | 55   | 304.65                       | DBU-2030C              | 7200W 2.6Ω       | 100                   | 2.6Ω           |
|             |                  |      |                              | 2(parallel connection) | 1                |                       |                |

## 440V

| Voltage     | Applicable motor |      | Full load output torque (Nm) | Braking unit           | Braking resistor | Braking torque 10%ED% | Min resistance |
|-------------|------------------|------|------------------------------|------------------------|------------------|-----------------------|----------------|
|             | HP               | kW   |                              | Quantity               | Quantity         |                       |                |
| 440V Series | 1                | 0.75 | 4.15                         | Built-in               | 80W 750Ω         | 125                   | 260Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 2                | 1.5  | 8.31                         |                        | 300W 400Ω        | 125                   | 190Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 3                | 2.2  | 12.19                        |                        | 300W 250Ω        | 125                   | 145Ω           |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 5                | 4.0  | 22.16                        |                        | 400W 150Ω        | 125                   | 95Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 7.5              | 5.5  | 30.46                        |                        | 500W 100Ω        | 125                   | 60Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 10               | 7.5  | 41.54                        |                        | 1000W 75Ω        | 125                   | 45Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 15               | 11   | 60.93                        |                        | 1000W 50Ω        | 125                   | 50Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 20               | 15   | 83.09                        |                        | 1500W 40Ω        | 125                   | 40Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 25               | 18.5 | 102.47                       |                        | 4800W 32Ω        | 125                   | 32Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 30               | 22   | 121.86                       |                        | 4800W 27.2Ω      | 125                   | 27.2Ω          |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 40               | 30   | 166.17                       |                        | 6000W 20Ω        | 100                   | 20Ω            |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 50               | 37   | 204.94                       |                        | 9600W 13.6Ω      | 100                   | 13.6Ω          |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 60               | 45   | 249.26                       |                        | 9600W 13.6Ω      | 100                   | 13.6Ω          |
|             |                  |      |                              |                        | 1                |                       |                |
|             | 75               | 55   | 304.65                       | DBU-4030D              | 6000W 20Ω        | 100                   | 20Ω            |
|             |                  |      |                              | 2(parallel connection) | 2                |                       |                |
|             | 100              | 75   | 415.43                       | DBU-4045C              | 9600W 13.6Ω      | 100                   | 13.6Ω          |
|             |                  |      |                              | 2(parallel connection) | 2                |                       |                |
|             | 120              | 90   | 498.51                       | DBU-4045C              | 9600W 13.6Ω      | 100                   | 13.6Ω          |
|             |                  |      |                              | 2(parallel connection) | 2                |                       |                |

| Voltage     | Applicable motor |     | Full load output torque (Nm) | Braking unit           | Braking resistor | Braking torque 10%ED% | Min resistance |
|-------------|------------------|-----|------------------------------|------------------------|------------------|-----------------------|----------------|
|             | HP               | kW  |                              | Quantity               | Quantity         |                       |                |
| 440V Series | 150              | 110 | 609.29                       | DBU-4110B              | 30000W 6.8Ω      | 100                   | 6.8Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 180              | 132 | 731.15                       | DBU-4220B              | 30000W 4Ω        | 100                   | 4Ω             |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 215              | 160 | 886.24                       | DBU-4220B              | 40000W 4Ω        | 100                   | 3.4Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 250              | 185 | 1024.72                      | DBU-4220B              | 40000W 4Ω        | 100                   | 3.4Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 270              | 200 | 1107.80                      | DBU-4220B              | 40000W 4Ω        | 100                   | 3.4Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 300              | 220 | 1218.58                      | DBU-4220B              | 60000W 4Ω        | 100                   | 3.2Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 340              | 250 | 1384.75                      | DBU-4300               | 80000W 2.5Ω      | 100                   | 2.5Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 380              | 280 | 1550.92                      | DBU-4300               | 80000W 2.5Ω      | 100                   | 2.5Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 430              | 315 | 1744.79                      | DBU-4300               | 80000W 2.5Ω      | 100                   | 2.5Ω           |
|             |                  |     |                              | 1                      | 1                |                       |                |
|             | 470              | 355 | 1966.35                      | DBU-4300               | 60000W 3Ω        | 100                   | 3Ω             |
|             |                  |     |                              | 2(parallel connection) | 2                |                       |                |
|             | 540              | 400 | 2215.60                      | DBU-4300               | 60000W 3Ω        | 100                   | 3Ω             |
|             |                  |     |                              | 2(parallel connection) | 2                |                       |                |
|             | 600              | 450 | 2492.55                      | DBU-4300               | 80000W 2.5Ω      | 100                   | 2.5Ω           |
|             |                  |     |                              | 2(parallel connection) | 2                |                       |                |
|             | 700              | 500 | 2770                         | DBU-4300               | 90000W 2.5Ω      | 100                   | 2.5Ω           |
|             |                  |     |                              | 2(parallel connection) | 2                |                       |                |

Notes:

- 1.Watts of voltage value and frequency applied(ED %) shall be in accordance with specifications of this company.
- 2.This company shall not be responsible for damaging of inverter or other devices, which shall be caused by braking resistor or braking module that were not produced by this company.
- 3.When installing braking resistor, great care shall be attached on safety or inflammability of the ambient environments.
- 4.In case of Min resistance shall be used, contact your SAVCH ELECTRIC for suggestion of watts calculating.

## 7.2 Breaker,cable and contactor specifications list

| Model               | Breaker(A) | Input cable/Output cable<br>(Copper wire cable)mm <sup>2</sup> | Contactor rated current A |
|---------------------|------------|--|---------------------------|
| S3100E-2T0.4G       | 16         | 2.5  | 10                        |
| S3100E-2T0.75G      | 16         | 2.5  | 10                        |
| S3100E-2T1.5G       | 20         | 4  | 16                        |
| S3100E-2T2.2G       | 32         | 4  | 25                        |
| S3100E-2T4.0G       | 32         | 6  | 25                        |
| S3100E-2T5.5G       | 63         | 6  | 32                        |
| S3100E-2T7.5G       | 100        | 10   | 63                        |
| S3100E-2T11G        | 100        | 16   | 80                        |
| S3100E-2T15G        | 125        | 25   | 95                        |
| S3100E-2T18.5G      | 160        | 25   | 120                       |
| S3100E-2T22G        | 160        | 35   | 135                       |
| S3100E-2T30G        | 225        | 50   | 170                       |
| S3100E-2T37G        | 250        | 70   | 230                       |
| S3100E-2T45G        | 315        | 95   | 280                       |
| S3100E-2T55G        | 315        | 95   | 280                       |
| S3100E-4T0.75G/1.5P | 16         | 2.5  | 10                        |
| S3100E-4T1.5G/2.2P  | 16         | 2.5  | 10                        |
| S3100E-4T2.2G/4.0P  | 16         | 2.5  | 10                        |
| S3100E-4T4.0G/5.5P  | 25         | 4  | 16                        |
| S3100E-4T5.5G/7.5P  | 25         | 4  | 16                        |
| S3100E-4T7.5G       | 40         | 6  | 25                        |
| S3100E-4T7.5G/11P   | 40         | 6  | 25                        |
| S3100E-4T11G/15P    | 63         | 6  | 32                        |
| S3100E-4T15G/18.5P  | 63         | 6  | 50                        |
| S3100E-4T18.5G/22P  | 100        | 10   | 63                        |
| S3100E-4T22G/30P    | 100        | 16   | 80                        |
| S3100E-4T30G/37P    | 125        | 25   | 95                        |
| S3100E-4T37G/45P    | 160        | 25   | 120                       |
| S3100E-4T45G/55P    | 160        | 35   | 135                       |
| S3100E-4T55G/75P    | 225        | 50   | 170                       |
| S3100E-4T75G/90P    | 250        | 70   | 230                       |
| S3100E-4T90G/110P   | 315        | 95   | 280                       |
| S3100E-4T110G       | 315        | 95   | 280                       |

| Model              | Breaker(A) | Input cable/Output cable<br>(Copper wire cable)mm <sup>2</sup> | Contactor rated current A |
|--------------------|------------|--|---------------------------|
| S3100E-4T110G/132P | 350        | 120  | 315                       |
| S3100E-4T132G/160P | 400        | 120  | 380                       |
| S3100E-4T160G      | 500        | 120  | 450                       |
| S3100E-4T185G/200P | 500        | 185  | 500                       |
| S3100E-4T200G/220P | 630        | 185  | 580                       |
| S3100E-4T220G      | 630        | 240  | 630                       |
| S3100E-4T220G/250P | 630        | 240  | 630                       |
| S3100E-4T250G/280P | 700        | 2 x 120  | 700                       |
| S3100E-4T280G/315P | 800        | 2 x 120  | 780                       |
| S3100E-4T315G      | 1000       | 2 x 150  | 800                       |
| S3100E-4T315G/355P | 1000       | 2 x 150  | 800                       |
| S3100E-4T355G/400P | 1250       | 2 x 185  | 800                       |
| S3100E-4T400G/450P | 1250       | 2 x 240  | 1000                      |
| S3100E-4T450G/500P | 1250       | 2 x 240  | 1000                      |
| S3100E-4T500G      | 1250       | 2 x 240  | 1000                      |

### 7.3 Input/output AC reactor and DC reactor specifications

| Model          | Input AC reactor<br>(recommended) | Output AC reactor<br>(recommended) | DC<br>reactor(recommended) |
|----------------|-----------------------------------|------------------------------------|----------------------------|
| S3100E-2T0.4G  | ACL-0005-EISC-E2M8C               | OCL-0005-EISC-E1M4                 | ×                          |
| S3100E-2T0.75G | ACL-0005-EISC-E2M8C               | OCL-0005-EISC-E1M4                 | ×                          |
| S3100E-2T1.5G  | ACL-0007-EISC-E2M0C               | OCL-0005-EISC-E1M4                 | ×                          |
| S3100E-2T2.2G  | ACL-0010-EISC-E1M4C               | OCL-0010-EISC-EM70                 | ×                          |
| S3100E-2T4.0G  | ACL-0020-EISC-EM70C               | OCL-0020-EISC-EM35                 | ×                          |
| S3100E-2T5.5G  | ACL-0030-EISCL-EM47C              | OCL-0030-EISCL-EM23C               | ×                          |
| S3100E-2T7.5G  | ACL-0040-EISCL-EM35C              | OCL-0040-EISCL-EM18                | ×                          |
| S3100E-2T11G   | ACL-0060-EISCL-EM24C              | OCL-0060-EISCL-EM12C               | DCL-0050-EIDH-E1M1         |
| S3100E-2T15G   | ACL-0090-EISCL-EM16               | OCL-0080-EISC-E87U                 | DCL-0065-EIDH-EM80         |
| S3100E-2T18.5G | ACL-0090-EISCL-EM16               | OCL-0090-EISC-E78U                 | DCL-0078-EIDH-EM70         |
| S3100E-2T22G   | ACL-0120-EISCL-EM12C              | OCL-0120-EISC-E58UC                | DCL-0095-EIDH-EM54         |
| S3100E-2T30G   | ACL-0150-EISH-E95UC               | OCL-0150-EISH-E47UC                | DCL-0115-EIDH-EM45         |
| S3100E-2T37G   | ACL-0200-EISH-E70UC               | OCL-0200-EISH-E35UC                | DCL-0160-UIDH-EM36         |
| S3100E-2T45G   | ACL-0250-EISH-E56UC               | OCL-0250-EISH-E28UC                | DCL-0180-UIDH-EM33         |
| S3100E-2T55G   | ACL-0250-EISH-E56UC               | OCL-0250-EISH-E28UC                | DCL-0250-UIDH-EM26         |

| Model               | Input AC reactor<br>(recommended) | Output AC reactor<br>(recommended) | DC<br>reactor(recommended) |
|---------------------|-----------------------------------|------------------------------------|----------------------------|
| S3100E-4T0.75G/1.5P | ACL-0005-EISC-E2M8C               | OCL-0005-EISC-E1M4                 | ×                          |
| S3100E-4T1.5G/2.2P  | ACL-0005-EISC-E2M8C               | OCL-0005-EISC-E1M4                 | ×                          |
| S3100E-4T2.2G/4.0P  | ACL-0007-EISC-E2M0C               | OCL-0007-EISC-E1M0                 | ×                          |
| S3100E-4T4.0G/5.5P  | ACL-0015-EISC-EM93C               | OCL-0015-EISC-EM47                 | ×                          |
| S3100E-4T5.5G/7.5P  | ACL-0015-EISC- EM93C              | OCL-0015-EISC-EM47                 | ×                          |
| S3100E-4T7.5G       | ACL-0020-EISC-EM70C               | OCL-0020-EISC-EM35                 | ×                          |
| S3100E-4T7.5G/11P   | ACL-0020-EISC-EM70C               | OCL-0020-EISC-EM35                 | ×                          |
| S3100E-4T11G/15P    | ACL-0030-EISCL-EM47C              | OCL-0030-EISC-EM23                 | ×                          |
| S3100E-4T15G/18.5P  | ACL-0040-EISCL-EM35C              | OCL-0040-EISC-EM18                 | ×                          |
| S3100E-4T18.5G/22P  | ACL-0050-EISCL-EM28C              | OCL-0050-EISC-EM14                 | ×                          |
| S3100E-4T22G/30P    | ACL-0060-EISCL-EM24C              | OCL-0060-EISC-EM12                 | ×                          |
| S3100E-4T30G/37P    | ACL-0090-EISCL-EM16               | OCL-0080-EISC-E87U                 | DCL-0065-EIDH-EM80         |
| S3100E-4T37G/45P    | ACL-0090-EISCL-EM16               | OCL-0090-EISC-E78U                 | DCL-0078-EIDH-EM70         |
| S3100E-4T45G/55P    | ACL-0120-EISCL-EM12C              | OCL-0120-EISC-E58UC                | DCL-0095-EIDH-EM54         |
| S3100E-4T55G/75P    | ACL-0150-EISH-E95UC               | OCL-0150-EISH-E47UC                | DCL-0115-EIDH-EM45         |
| S3100E-4T75G/90P    | ACL-0200-EISH-E70UC               | OCL-0200-EISH-E35UC                | DCL-0160-UIDH-EM36         |
| S3100E-4T90G/110P   | ACL-0250-EISH-E56UC               | OCL-0250-EISH-E28UC                | DCL-0180-UIDH-EM33         |
| S3100E-4T110G       | ACL-0250-EISH-E56UC               | OCL-0250-EISH-E28UC                | DCL-0250-UIDH-EM26         |
| S3100E-4T110G/132P  | ACL-0250-EISH-E56UC               | OCL-0250-EISH-E28UC                | DCL-0250-UIDH-EM26         |
| S3100E-4T132G/160P  | ACL-0290-EISH-E48UC               | OCL-0290-EISH-E24UC                | DCL-0250-UIDH-EM26         |
| S3100E-4T160G       | ACL-0330-EISH-E42UC               | OCL-0330-EISH-E21UC                | DCL-0340-UIDH-EM17         |
| S3100E-4T185G/200P  | ACL-0390-EISH-E36UC               | OCL-0390-EISH-E18U                 | DCL-0450-UIWH-161          |
| S3100E-4T200G/220P  | ACL-0490-EISH-E28UC               | OCL-0490-EISH-E14UC                | DCL-0460-UIDH-EM09         |
| S3100E-4T220G       | ACL-0490-EISH-E28UC               | OCL-0490-EISH-E14UC                | DCL-0460-UIDH-EM09         |
| S3100E-4T220G/250P  | ACL-0490-EISH-E28UC               | OCL-0490-EISH-E14UC                | DCL-0460-UIDH-EM09         |
| S3100E-4T250G/280P  | ACL-0530-EISH-E26UC               | OCL-0530-EISH-E13U                 | DCL-0650-UIDH-E72U         |
| S3100E-4T280G/315P  | ACL-0600-EISH-E23UC               | OCL-0600-EISH-E12UC                | DCL-0650-UIDH-E72U         |
| S3100E-4T315G       | ACL-0660-EISH-E25UC               | OCL-0660-EISH-E11U                 | DCL-0650-UIDH-E72U         |
| S3100E-4T315G/355P  | ACL-0660-EISH-E25UC               | OCL-0660-EISH-E11U                 | DCL-0650-UIDH-E72U         |
| S3100E-4T355G/400P  | ACL-0800-EISH-E17UC               | OCL-0800-EISH-E8U7C                | DSL-0800-UIDA-E50U         |
| S3100E-4T400G/450P  | ACL-0800-EISH-E17UC               | OCL-0800-EISH-E8U7C                | DSL-0800-UIDA-E50U         |
| S3100E-4T450G/500P  | ASL-1000-EISA-E12U                | OSL-1000-EISA-E7U0                 | DSL-1000-UIDA-E40U         |
| S3100E-4T500G       | ASL-1200-EISA-E12U                | OSL-1200-EISA-E5U8                 | DSL-1200-UIDA-E40U         |

Note: 1. × shown that Needless or Built-in. 2.S3100E-4T30G(or above) external DC reactor.

## 7.4 Input/output filter specifications

| Model               | Input filter specifications<br>(recommended) | Output filter specifications<br>(recommended)                |
|---------------------|--|--|
| S3100E-2T0.4G       | NF241B6/01                                   | The single phase filter is regardless of<br>input and output |
| S3100E-2T0.75G      | NF241B6/01                                   |  |
| S3100E-2T1.5G       | NF241B10/01                                  |  |
| S3100E-2T2.2G       | NF241B10/01                                  |  |
| S3100E-2T4.0G       | NFI-020                                      | NFO-020  |
| S3100E-2T5.5G       | NFI-036                                      | NFO-036  |
| S3100E-2T7.5G       | NFI-050                                      | NFO-050  |
| S3100E-2T11G        | NFI-050                                      | NFO-050  |
| S3100E-2T15G        | NFI-080                                      | NFO-080  |
| S3100E-2T18.5G      | NFI-080                                      | NFO-080  |
| S3100E-2T22G        | NFI-100                                      | NFO-100  |
| S3100E-2T30G        | NFI-150                                      | NFO-150  |
| S3100E-2T37G        | NFI-150                                      | NFO-150  |
| S3100E-2T45G        | NFI-200                                      | NFO-200  |
| S3100E-2T55G        | NFI-250                                      | NFO-250  |
| S3100E-4T0.75G/1.5P | NFI-005                                      | NFO-005  |
| S3100E-4T1.5G/2.2P  | NFI-005                                      | NFO-005  |
| S3100E-4T2.2G/4.0P  | NFI-010                                      | NFO-010  |
| S3100E-4T4.0G/5.5P  | NFI-020                                      | NFO-020  |
| S3100E-4T5.5G/7.5P  | NFI-020                                      | NFO-020  |
| S3100E-4T7.5G       | NFI-020                                      | NFO-020  |
| S3100E-4T7.5G/11P   | NFI-020                                      | NFO-020  |
| S3100E-4T11G/15P    | NFI-036                                      | NFO-036  |
| S3100E-4T15G/18.5P  | NFI-036                                      | NFO-036  |
| S3100E-4T18.5G/22P  | NFI-050                                      | NFO-050  |
| S3100E-4T22G/30P    | NFI-050                                      | NFO-050  |
| S3100E-4T30G/37P    | NFI-080                                      | NFO-080  |
| S3100E-4T37G/45P    | NFI-080                                      | NFO-080  |
| S3100E-4T45G/55P    | NFI-100                                      | NFO-100  |
| S3100E-4T55G/75P    | NFI-150                                      | NFO-150  |
| S3100E-4T75G/90P    | NFI-150                                      | NFO-150  |
| S3100E-4T90G/110P   | NFI-200                                      | NFO-200  |
| S3100E-4T110G       | NFI-250                                      | NFO-250  |



| Model              | Input filter specifications<br>(recommended) | Output filter specifications<br>(recommended) |
|--------------------|--|---|
| S3100E-4T110G/132P | NFI-250                                      | NFO-250                                       |
| S3100E-4T132G/160P | NFI-300                                      | NFO-300                                       |
| S3100E-4T160G      | NFI-300                                      | NFO-300                                       |
| S3100E-4T185G/200P | NFI-400                                      | NFO-400                                       |
| S3100E-4T200G/220P | NFI-400                                      | NFO-400                                       |
| S3100E-4T220G      | NFI-600                                      | NFO-600                                       |
| S3100E-4T220G/250P | NFI-600                                      | NFO-600                                       |
| S3100E-4T250G/280P | NFI-900                                      | NFO-900                                       |
| S3100E-4T280G/315P | NFI-900                                      | NFO-900                                       |
| S3100E-4T315G      | NFI-900                                      | NFO-900                                       |
| S3100E-4T315G/355P | NFI-900                                      | NFO-900                                       |
| S3100E-4T355G/400P | NFI-1200                                     | NFO-1200                                      |
| S3100E-4T400G/450P | NFI-1200                                     | NFO-1200                                      |
| S3100E-4T450G/500P | NFI-1200                                     | NFO-1200                                      |
| S3100E-4T500G      | NFI-1200                                     | NFO-1200                                      |

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## **Qualification**

Designed by Taiwan savch electric

Received ISO9001 and CE certificate

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