# Shihlin Electric General Inverters

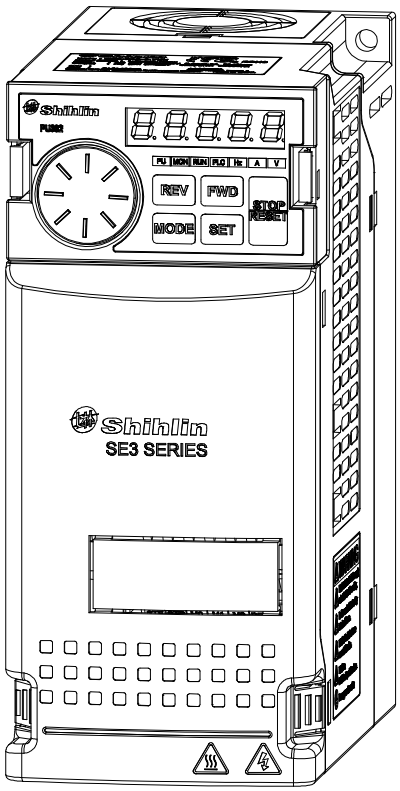
# SE3 Series

## User Manual

***High Functioning&High Performance***

SE3-021-0.4K ~ 2.2K  SE3-023-0.4K ~ 15K

SE3-043-0.4K ~ 22K





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# 1. MANUAL GUIDE

## 1.1 Safety instructions

Thank you for choosing Shihlin inverters of SE3 series. This instruction introduces how to correctly use this inverter. Before using this inverter, always carefully read this User Manual and moreover, please understand the safety instructions.

| **Safety Instructions** |
|---|
| ✓ **Installation, operation, maintenance and inspection must be performed by qualified personnel.** |
| ✓ **In this instruction, the safety instruction levels are classified into "Warning" and "Caution".** |
| ⚠**Warning: Incorrect handling may cause hazardous conditions, resulting in death or severe injury.** |
| ⚠ **Caution: Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.** |

| ⚠Warning |
|---|
| ✓ While the inverter power is ON, do not open the front cover or the wiring cover. Do not run the inverter with the front cover or the wiring cover removed. Otherwise you may access the exposed high voltage terminals or the charging part of the circuitry and get an electric shock. |
| ✓ It is crucial to turn off the motor drive power before any wiring installation or inspection is made. Before the inverter CHARGE light is OFF, which indicates that there is still high voltage in it, please do not touch the internal circuit and components.Operation must be made after measuring the voltage which is less than 24 VDC between + /P and - /N and with avometer. |
| ✓ The inverter must be connected to the ground properly. |
| ✓ Do not operate or touch the radiator or handle the cables with wet hands. Otherwise you may get an electric shock. |
| ✓ Do not change the cooling fan while power is ON. It is dangerous to change the cooling fan while power is ON. |

| ⚠Caution |
|---|
| ✓ The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur. |
| ✓ Do not conduct a pressure test on the components inside the inverter, for semiconductor of the inverter is easily to be broke down and damaged by high voltage. |
| ✓ While power is ON or for some time after power-OFF, do not touch the inverter as it will be extremely hot. Touching these devices may cause a burn. |
| ✓ The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur. |
| ✓ The polarity (+ and -) must be correct. Otherwise burst, damage, etc. may occur. |
| ✓ Inverter must be installed on a nonflammable wall without holes (so that nobody touches the inverter heatsink on the rear side, etc.). Mounting it to or near flammable material may cause a fire. |
| ✓ If the inverter has become faulty, the inverter power must be switched OFF. A continuous flow of large current may cause a fire. |
| ✓ Do not connect a resistor directly to the DC terminals + /P and - /N. Doing so could cause a fire. |

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## 1.3 Definitions of terminologies

### ✓ Output frequency, target frequency, steady output frequency

- The actual output current frequency of the inverter is called “output frequency.”
- The frequency set by user (viaparameter unit, multi-speed terminals, voltage signal, and current signal or communication settings) is called “target frequency.”
- When the motor starts running, the output frequency of the inverter will gradually accelerate to the target frequency before it finally runs steadily at the target frequency. This output frequency is called “stead output frequency.”

### ✓ Parameter settings

- Detail explanation on parameter settings are provided in Chapter 5.For users who are not familiar with these settings, arbitrary adjustment of the parameter may result in abnormal operations.All parameters can be reset to their default values by the parameter of 00-02. For setting procedures of this parameter, please refer to 00-02 in Section5.1.2.

### ✓ The “operation mode” and “working mode” of the parameter unit

- The operating mode determines the reference source for the target frequency and the signal source for starting. A total of nine operating modes are provided in each Shihlin inverter. Please refer to Section 4.3 for details.
- The parameter unit is used mainly for monitoring the numeric values, setting parameters and target frequency. There are a total of five working modes on the Shihlin parameter unit. Please refer to Section 4.2 for details.

### ✓ The difference between “terminal name” and “function name”:

- Printed letters can be found near the terminals of either the control board or the main board. They are used to distinguish each terminal and care called “terminal name.”
- For “multi-function control terminal” and “multi-function output terminal,” besides the terminal name, it is also necessary to define the “function name.” The function name indicates the actual functions of the terminal.
- When explaining the function for a terminal, the name used is its “function name”

### ✓ The difference between “on” and “turn on”:

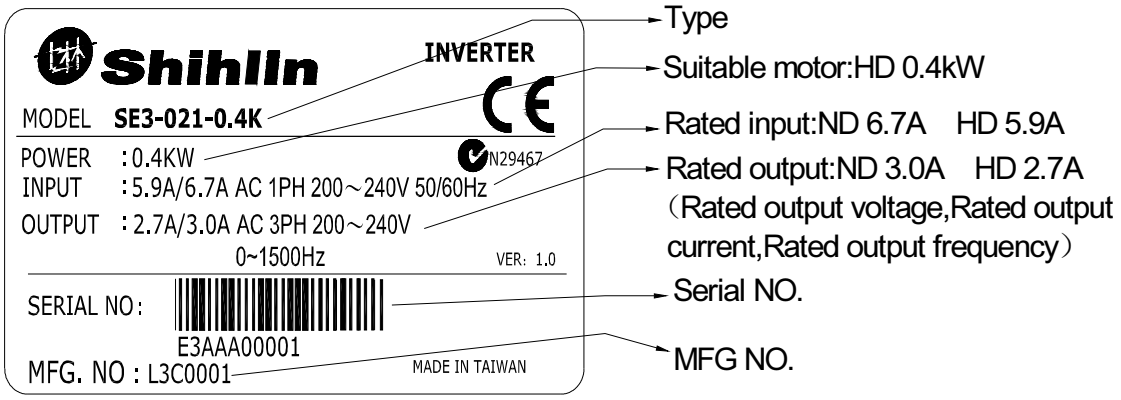
- When explaining the function for the “multi-function control terminal”, two words “on” and “turn on” are often used:
- The word “on” is used to indicate that the external switch of the terminal is in close state, and thus it belongs to the description of the state.
- The word “turn on” is used to describe the action that the external switch of the terminal is shut from the open state to the close state, and thus belongs to the description of action. Similarly, the words “off” and “turn off" belong to the above-mentioned states and actions.

# 2. DELIVERY CHECK

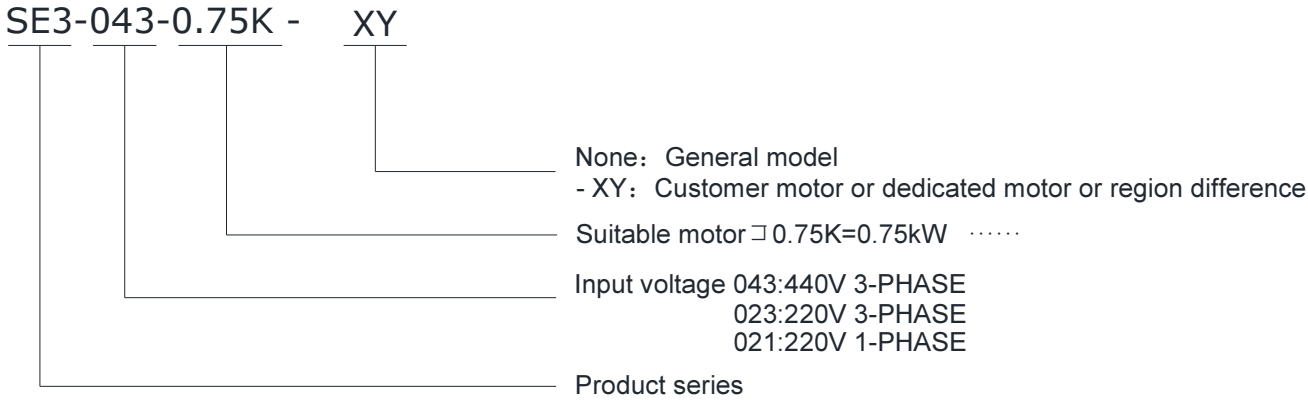
Each SE3-TYPE inverter has been checked thoroughly before delivery, and is carefully packed to prevent any mechanical damage. Please check for the following when opening the package.

- Checking out whether the product was damaged during transportation.
- Whether the model of inverter coincide with what is shown on the package.

## 2.1 Nameplate instruction




## 2.2 Type instruction




## 2.3 Order code description

Example:

| Inverter specification | Specificationdescription | Order code |
|---|---|---|
| SE3-043-1.5K | SE3series 440V 1.5KW inverter | LNKSE30431R5K |
| SE3-043-7.5K | SE3series 440V 7.5KW inverter | LNKSE30437R5K |
| SE3-043-15K | SE3series 440V 15KW inverter | LNKSE304315K |

# 3. INVERTER INTRODUCTION

## 3.1 Electric specification

### 3.1.1 440V series three-phase

| Frame | | | A | | | B | | C | | | D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ModelSE3-043-【】- xy | | | 0.4K | 0.75K | 1.5K | 2.2K | 3.7 K | 5.5 K | 7.5 K | 11 K | 15K | 18.5K | 22K |
| Output | HD | Rated outputcapacity (kVA) | 1 | 2 | 3 | 4.6 | 6.9 | 10 | 14 | 18 | 25 | 29 | 34 |
| | | Rated outputcurrent(A) | 1.5 | 2.7 | 4.2 | 6 | 9 | 12 | 17 | 24 | 32 | 38 | 45 |
| | | Applicable motor capacity (HP) | 0.5 | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 |
| | | Applicable motor capacity (kW) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| | | Overload current rating | 150% 60 seconds 200% 3seconds (inverse time characteristics) | | | | | | | | | | |
| | | Carrier frequency (kHz) | 1~15KHz | | | | | | | | | | |
| | ND | Rated outputcapacity (kVA) | 1.4 | 2.3 | 3.5 | 5 | 8 | 12 | 15.6 | 21.3 | 27.4 | 31.6 | 37.3 |
| | | Rated outputcurrent (A) | 1.8 | 3 | 4.6 | 6.5 | 10.5 | 15.7 | 20.5 | 28 | 36 | 41.5 | 49 |
| | | Applicable motor capacity (HP) | 0.5 | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 |
| | | Applicable motor capacity (kW) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| | | Overload current rating | 120% 60seconds (inverse time characteristics) | | | | | | | | | | |
| | | Carrier frequency (kHz) | 1 ~ 15KHz | | | | | | | | | | |
| | Maximum output voltage | | Three-phase 380-480V | | | | | | | | | | |
| Power supply | Rated power voltage | | Three-phase 380-480V 50Hz / 60Hz | | | | | | | | | | |
| | Power voltage permissiblefluctuation | | Three-phase 323-528V 50Hz / 60Hz | | | | | | | | | | |
| | Power frequency permissible fluctuation | | ±5% | | | | | | | | | | |
| | Power source capacity (kVA) | | 1.5 | 2.5 | 4.5 | 6.9 | 10.4 | 11.5 | 16 | 20 | 27 | 32 | 41 |
| Cooling method | | | Self cooling | Forced air cooling | | | | | | | | | |
| Inverter weight (kg) | | | 1.0 | 1.0 | 1.0 | 1.5 | 1.5 | 3.9 | 4.0 | 4.0 | 5.7 | 5.8 | 5.8 |

Note:The test conditions of rated output current, rated output capacity and frequency converter inverter power consumption are: the carrier frequency (P.72) is at the set value; the frequency converter/inverter output voltage is at 440V; the output frequency is at 60Hz, and the ambient temperature is 40℃.

## 3.1.2 220V series one-phase

| Frame | | | A | | B | |
|---|---|---|---|---|---|---|
| ModelSE3-021-【】- xy | | | 0.4K | 0.75K | 1.5K | 2.2K |
| Output | HD | Rated output capacity (kVA) | 1 | 1.5 | 3.2 | 4.2 |
| | | Rated outputcurrent (A) | 2.7 | 4.5 | 8 | 11 |
| | | Applicable motor capacity (HP) | 0.5 | 1 | 2 | 3 |
| | | Applicable motor capacity (kW) | 0.4 | 0.75 | 1.5 | 2.2 |
| | | Overload current rating | 150% 60 seconds 200% 3seconds (inverse time characteristics) | | | |
| | | Carrier frequency (kHz) | 1~15Hz | | | |
| | ND | Rated outputcapacity (kVA) | 1.2 | 2 | 3.4 | 4.8 |
| | | Rated outputcurrent (A) | 3 | 5 | 8.5 | 12.5 |
| | | Applicable motor capacity (HP) | 0.5 | 1 | 2 | 3 |
| | | Applicable motor capacity (kW) | 0.4 | 0.75 | 1.5 | 2.2 |
| | | Overload current rating | 120% 60seconds (inverse time characteristics) | | | |
| | | Carrier frequency (kHz) | 1~15KHz | | | |
| | Maximum output voltage | | Three-phase 200-240V | | | |
| Power supply | Rated power voltage | | One-phase 200-240V 50Hz / 60Hz | | | |
| | Power voltage permissiblefluctuation | | One -phase 170-264V 50Hz / 60Hz | | | |
| | Power frequency permissible fluctuation | | ±5% | | | |
| | Power source capacity (kVA) | | 1.5 | 2.5 | 4.5 | 6.9 |
| Cooling method | | | Self cooling | Forced air cooling | | |
| Inverter weight (kg) | | | 1.0 | 1.0 | 1.5 | 1.5 |

## 3.1.3 220V series three-phase

| Frame | | | A | | | B | | C | | D | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ModelSE3-023-【】 | | | 0.4K | 0.75K | 1.5K | 2.2K | 3.7 K | 5.5 K | 7.5K | 11K | 15K |
| Output | HD | Rated output capacity (kVA) | 1.2 | 2 | 3.2 | 4.2 | 6.7 | 9.5 | 12.5 | 18.3 | 24.7 |
| | | Rated outputcurrent (A) | 3 | 5 | 8 | 11 | 17.5 | 25 | 33 | 49 | 65 |
| | | Applicable motor capacity (HP) | 0.5 | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 |
| | | Applicable motor capacity (kW) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 |
| | | Overload current rating | 150% 60 seconds 200% 3seconds (inverse time characteristics) | | | | | | | | |
| | | Carrier frequency (kHz) | 1~15KHz | | | | | | | | |
| | ND | Rated outputcapacity (kVA) | 1.3 | 2.1 | 3.4 | 4.8 | 7.4 | 10.3 | 13.7 | 19.4 | 26.3 |
| | | Rated outputcurrent (A) | 3.2 | 5.5 | 8.5 | 12.5 | 19.5 | 27 | 36 | 51 | 69 |
| | | Applicable motor capacity (HP) | 0.5 | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 |
| | | Applicable motor capacity (kW) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 |
| | | Overload current rating | 120% 60seconds 150% 3seconds (inverse time characteristics) | | | | | | | | |
| | | Carrier frequency (kHz) | 1~15KHz | | | | | | | | |
| | Maximum output voltage | | Three-phase 200-240V | | | | | | | | |
| Power supply | Rated power voltage | | Three-phase 200-240V 50Hz / 60Hz | | | | | | | | |
| | Power voltage permissiblefluctuation | | Three-phase 170-264V 50Hz / 60Hz | | | | | | | | |
| | Power frequency permissible fluctuation | | ±5% | | | | | | | | |
| | Power source capacity (kVA) | | 1.5 | 2.5 | 4.5 | 6.4 | 10 | 12 | 17 | 20 | 28 |
| Cooling method | | | Forced air cooling | | | | | | | | |
| Inverter weight (kg) | | | 1.0 | 1.0 | 1.0 | 1.5 | 1.5 | 4.0 | 4.1 | 5.7 | 5.8 |

Note:The test conditions of rated output current, rated output capacity and frequency converter inverter power consumption are: the carrier frequency (P.72) is at the set value; the frequency converter/inverter output voltage is at 220V; the output frequency is at 60Hz, and the ambient temperature is 40℃.

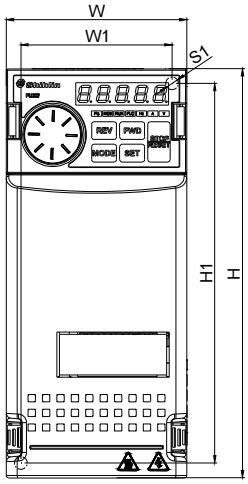
## 3.2 General specification

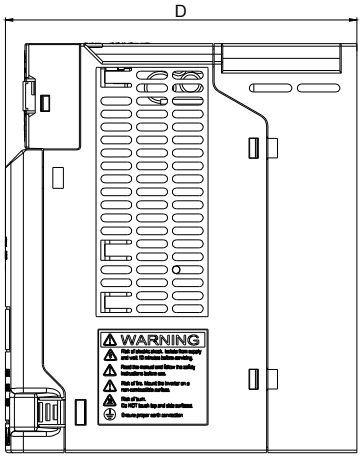
| | | |
|---|---|---|
| Control method | | SVPWM control, V/F control, close-loop V/F control (VF+PG), general flux vector control, sensorless vector control (SVC), close-loop vector control (FOC+PG), torque control (TQC+PG). |
| Output frequency range | | 0~1500.00Hz |
| Frequency setting resolution | Digital setting | The resolution is 0.01Hz. |
| | Analog setting | 0.01Hz/60Hz(terminal 2: -10～+10V / 13bit)<br>0.15Hz/60Hz(terminal 2: 0～±10V / 12bit)<br>0.03Hz/60Hz(terminal 2: 0～5V / 11bit)<br>0.06Hz/60Hz(terminal 4: 0~10V, 4-20mA / 12bit)<br>0.12Hz/60Hz(terminal 4: 0～5V / 11bit) |
| Output frequency accuracy | Digital setting | Maximum target frequency±0.01%. |
| | Analog setting | Maximum target frequency±0.1%. |
| Speed control range | | IM: WhenSVC, 1:200; when FOC+PG, 1:1000.<br>PM: When SVC,1:20; when FOC+PG, 1:1000. |
| Start torque | | 200% 0.5 Hz |
| V/Fcharacteristics | | Constant torque curve, variable torquecurve, five-point curve, VF separation |
| Acceleration / deceleration curve characteristics | | Linear acceleration /deceleration curve, S pattern acceleration /deceleration curve |
| Drive motor | | Induction motor(IM), permanent magnet motor(SPM, IPM) |
| Stalling protection | | The stalling protection level can be set to 0~250% |
| Target frequency setting | | Parameter unit setting, DC 0~5V/10V signal, DC -10~+10V signal, DC 4~20 mA signal, multiple speed stage level setting, communication setting, HDI setting. |
| PID control | | Please refer to parameter description |
| Built-in simple PLC | | Supports 21 basic instructions and 14 application instructions, including PC editing software; |
| Parameter unit | Operation monitoring | Output frequency, output current, output voltage, PN voltage, output torque, electronic thermal accumulation rate, temperature rising accumulation rate, output power, Analog value input signal, digital input and output terminal status…; alarm signal and alarm history 12 groups at most |
| | LED indication lamp (7) | Forward rotation indication lamp, reverse rotation indication lamp, frequency monitoring indication lamp, mode switch lindication lamp ,PUcontro lindication lamp, PLCindication lamp andwork lindication lamp |
| Communication function | | Built-in Shihlin/Modbus communication protocol, can select MODBUS TCP，CANopen、Profibus、DeviceNet、EtherCAT,high speed card |
| Protection mechanism / alarm function | | Output short circuit protection, Over-current protection, over-voltage protection, under-voltage protection, motor over-heat protection, IGBT module over-heat protection, communication abnormality protection, |
| Environment | Ambient temperature | Heavy load :-10 ~ +50℃ (non-freezing)，Light load :-10 ~ +40℃ (non-freezing), please refer to 3.4.2 Class of protection and operation temperature for details. |
| | Ambient humidity | Below 90%Rh (non-condensing). |

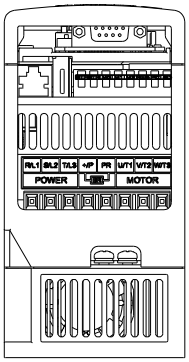
| | | |
|---|---|---|
| | Surrounding environment | Indoor, no corrosive gas, no flammable gas, no flammable powder. |
| | Altitude | Altitude below 2000 meters,when altitude is above 1,000 m,derate the rated current 2% per 100 m |
| | Vibration | Vibration below 5.9m/s$^2$ (0.6G). |
| | Grade of protection | IP20 |
| | The degree of environmental pollution | 2 |
| | Class of protection | Class I |
| International certification | | CE |

# 3.3 Appearance and dimensions

## 3.3.1 Frame A



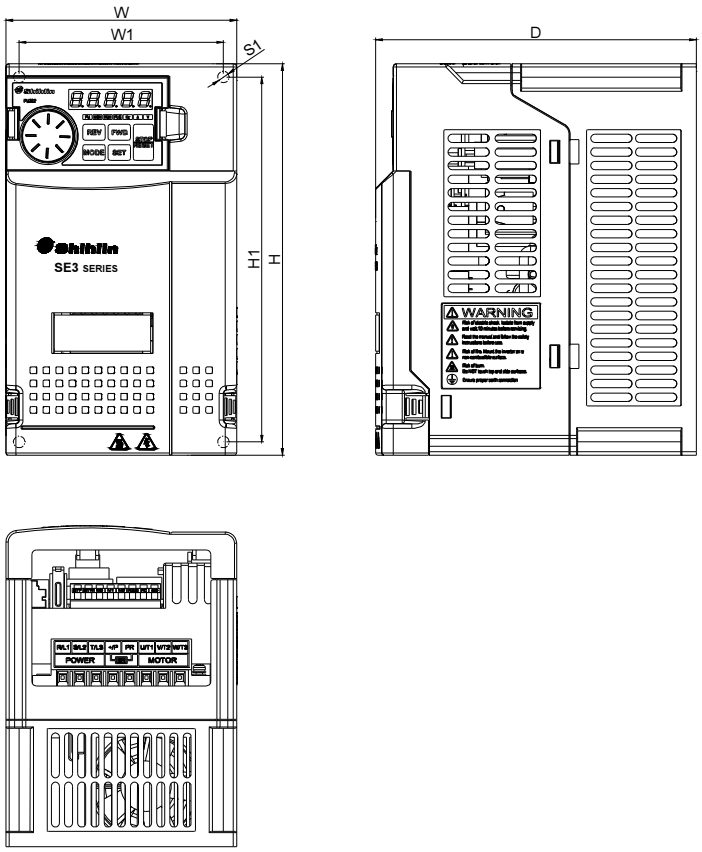




Unit:mm

| Model | W | W1 | H | H1 | D | S1 |
|---|---|---|---|---|---|---|
| SE3-043-0.4K | 62.0 | 74.0 | 167.0 | 155.0 | 144.0 | 5.2 |
| SE3-043-0.75K | | | | | | |
| SE3-043-1.5K | | | | | | |
| SE3-023-0.4K | | | | | | |
| SE3-023-0.75K | | | | | | |
| SE3-023-1.5K | | | | | | |
| SE3-021-0.4K | | | | | | |
| SE3-021-0.75K | | | | | | |

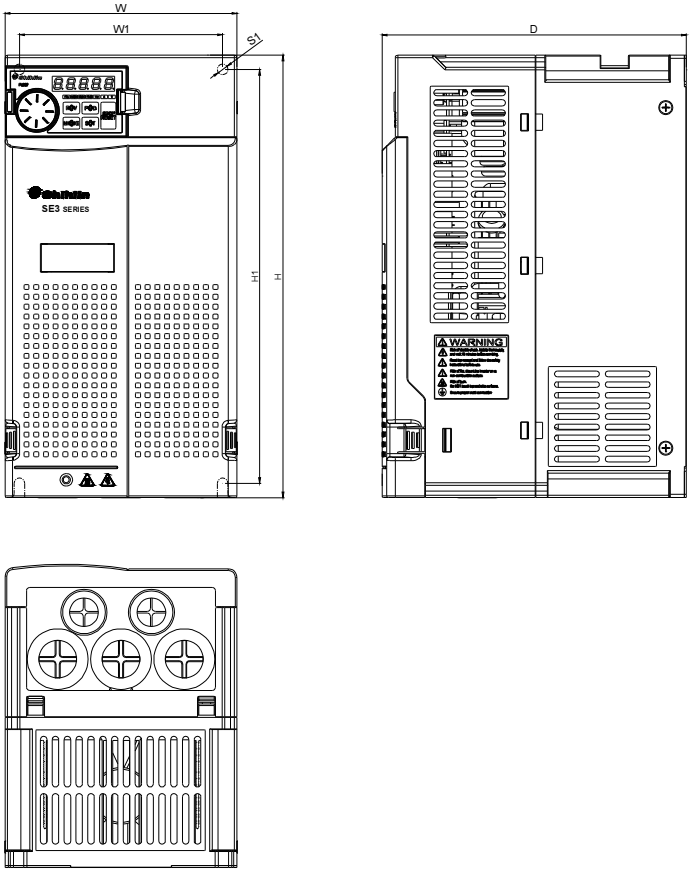
## 3.3.2 Frame B




Unit: mm

| Model | W | W1 | H | H1 | D | S1 |
|---|---|---|---|---|---|---|
| SE3-043-2.2K | 105.0 | 93.0 | 178.0 | 166.0 | 146.0 | 5.2 |
| SE3-043-3.7K | | | | | | |
| SE3-023-2.2K | | | | | | |
| SE3-023-3.7K | | | | | | |
| SE3-021-1.5K | | | | | | |
| SE3-021-2.2K | | | | | | |

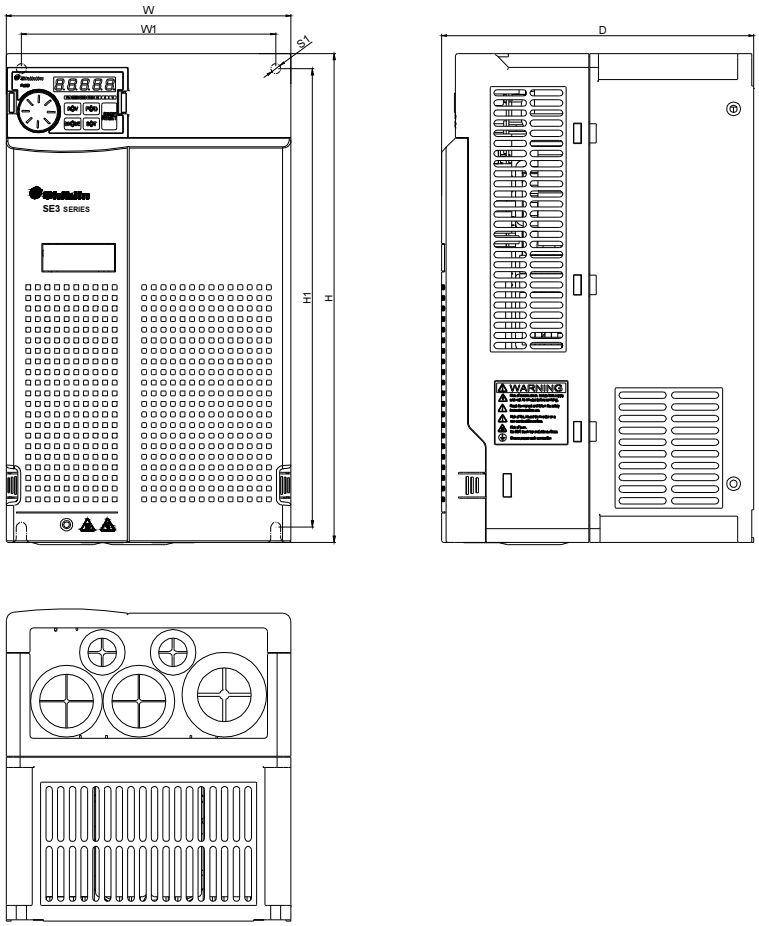
## 3.3.3 Frame C




Unit:mm

| Model | W | W1 | H | H1 | D | S1 |
|---|---|---|---|---|---|---|
| SE3-043-5.5K | 141.0 | 123.6 | 270.0 | 252.6 | 185.0 | 6.5 |
| SE3-043-7.5K | | | | | | |
| SE3-043-11K | | | | | | |
| SE3-023-5.5K | | | | | | |
| SE3-023-7.5K | | | | | | |

## 3.3.4 Frame D

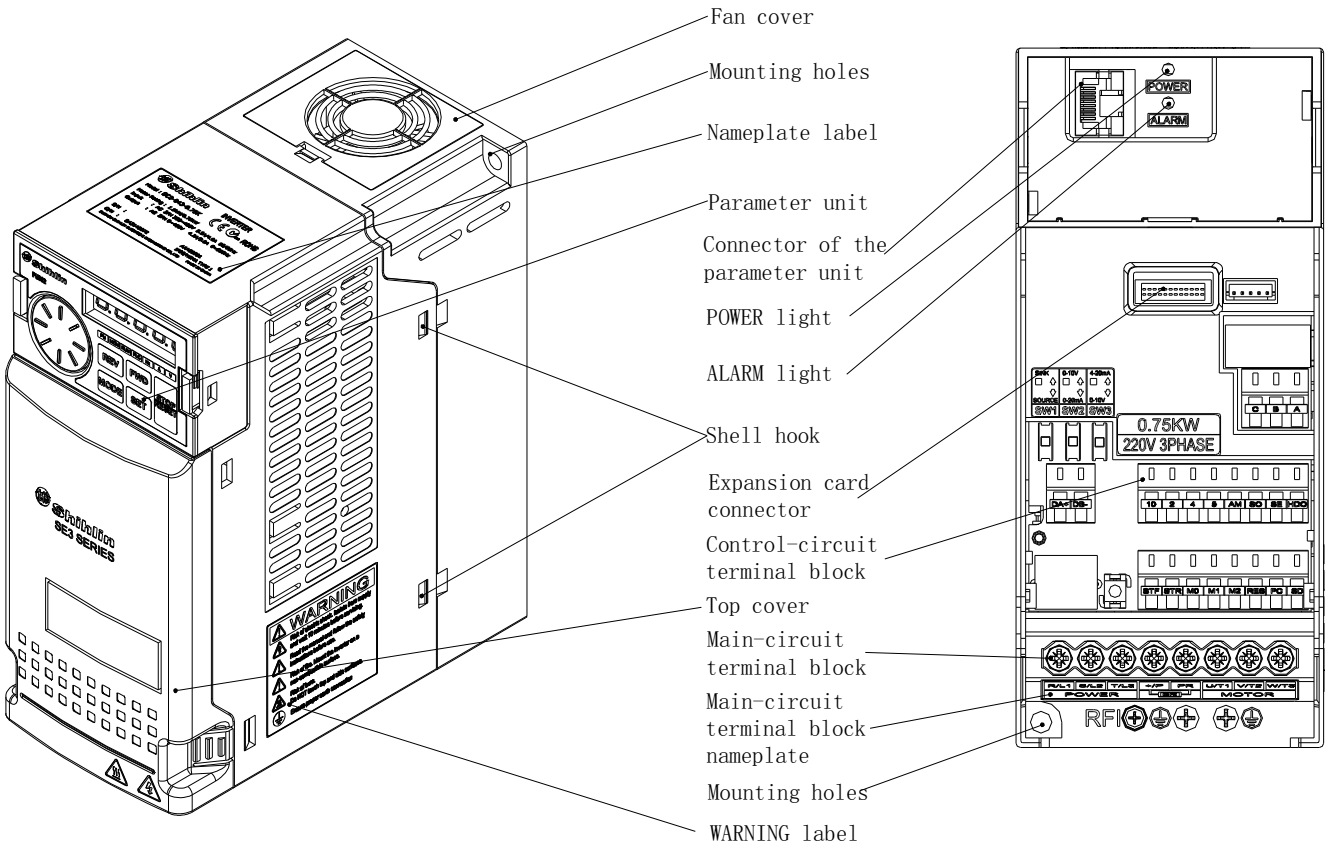



Unit: mm

| Model | W | W1 | H | H1 | D | S1 |
|---|---|---|---|---|---|---|
| SE3-043-15K | 175.0 | 156.4 | 300.0 | 281.4 | 191.8 | 6.2 |
| SE3-043-18.5K | | | | | | |
| SE3-043-22K | | | | | | |
| SE3-023-11K | | | | | | |
| SE3-023-15K | | | | | | |

# 3.4 Name of each component

## 3.4.1 Frame A/B/C/D




## 3.4.2 Protection level and operation temperature

| Frame | NEMA 1label | Conduit box | Protection level | Operation temperature |
|---|---|---|---|---|
| A/B | -- | -- | IP20/NEMA TYPE 1 | -10 ~ +40℃ |
| C/D | Standard withNEMA 1 label | Installation | IP20/NEMA TYPE 1 | 10 ~ +40℃ |
| | NEMA 1 label removed | No installation | IP20/NEMA OPEN TYPE | -10 ~ +50℃ |

## 3.5 Installation and wiring

### 3.5.1 Transportation

Take the pedestal when carrying and don't only take the cover or any part of the inverter, otherwise it may drop down.

### 3.5.2 Stockpile

Keep this product in the packaging before installation and when not in use. To change the frequency that meets the manufacturer's warranty and maintenance conditions, please pay attention to the following regarding storage:

1. Must be placed in dry and without dirt place.
2. The environment temperature for storage position must range from -20℃ to +65℃.
3. The relative humidity for storage position must range from 0% to 95%, and no condensation.
4. Avoid storing in the environment which contains corrosion gas or liquid.
5. It had better be packed properly and kept on shelf or table.

Note: 1. Even if the humidity meets the standard requirements, icing and condensation can also occurwhen the temperature changes rapidly. And the place should avoid.

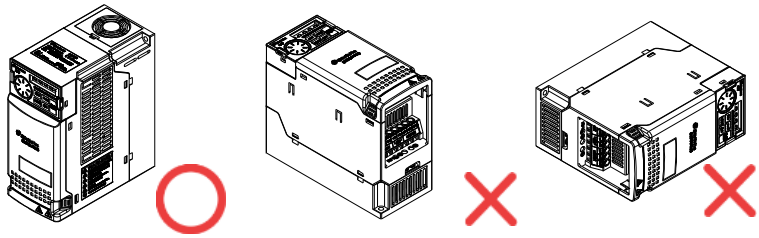
2. Don't place it on the ground, and it should be placed on appropriate shelf. If in the bad surroundings, the desiccant should be placed in the packaging bag.
3. If the custody period is more than 3 months, the ambient temperature should not be higher than 30℃. It is to consider that the character will easily degrade in high temperature when the electrolytic capacitors are deposited without electricity.
4. If the inverter is installed in device or control board when not in use (especially in construction site or the humid and dusty place), the inverter should be removed and put in suitable environment according with the above storage conditions.
5. If the electrolytic capacitors are long-term no electricity, the character will degrade. Do not place it in the state of no electricity for more than one year.

### 3.5.3 Installation notice

✓ Before installating, please confirm whether meet the conditions listed in the table below:

| | |
|---|---|
| Ambient temperature | Heavy load ：-10 ~ +50℃ (non-freezing)， Light load：-10 ~ +40℃ (non-freezing), please refer to 3.4.2 Class of protection and operation temperature for details. |
| Ambient humidity | 90%Rh 以下(non-condensing). |
| Storage temperature | -20 ~ +65℃. |
| Surrounding environment | Indoor, no corrosive gas, no flammable gas, no flammable powder. |
| Altitude | Altitude below 2000 meters,when altitude is above 1,000 m,derate the rated current 2% per 100 m |
| Vibration | Vibration below 5.9m/s$^2$ (0.6G). |
| Grade of protection | IP20 / NEMA TYPE 1 |
| The degree of environmental pollution | 2 |
| Class of protection | Class I |

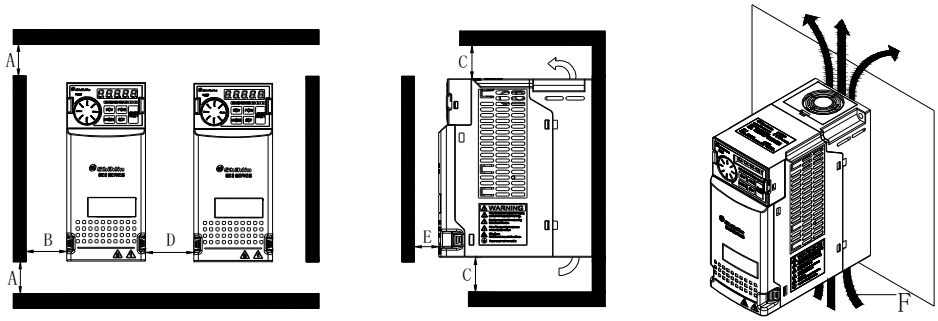
✓ Please ensure vertical arrangement to keep the cooling effect:



(a) Vertical arrangement (b) Horizontal arrangement (c) Level arrangement

✓ Please comply with installation conditions shown below to ensure enough ventilation space and wiring space for inverter cooling:

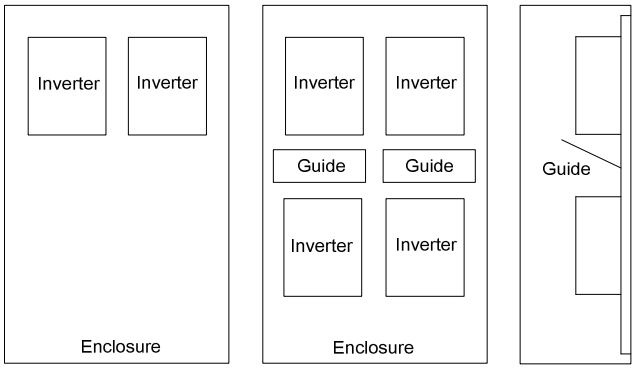
- Arrangement of single or paralleling inverter:




Unit:mm

| Size | Frame A~B | FrameC~D |
|---|---|---|
| A | 50 | 50 |
| B | 10 | 50 |
| C | 100 | 100 |
| D | 10 | 50 |
| E | 10 | 50 |
| F | Ventilation direction | |

- Arrangement of multiple inverters:




(a) Horizontal arrangement (b) Vertical arrangement

Note1. When mounting inverters of different sizes in parallel, please align the clearance above each inverter to install, which is easy to change the cooling fan

2. When it is inevitable to arrange inverters vertically to minimize space , take such measures as to provide guides since heat from the bottom inverters can increase the temperatures in the top inverters, causing inverter failures.

### 3.5.4 EMC installation instructions

Just as other electrical and electronic equipments, an inverter is the source of electromagnetic interference and an electromagnetic receiver when working with a power system. The amount of electromagnetic interference and noise is determined by the working principles of an inverter. In order to guarantee the inverter working reliably in the electromagnetic environment, it must have a certain ability of anti-electromagnetic interference in design. In order to make the drive system work normally, please meet the following several aspects requirements in installation:

- ✓ Field wiring

  Power line supply electric independently from power transformer, five or four core line are generally used, null line and ground sharing a single line is forbidden.

  Commonly signal wire (weak) and power wire (heavy) are in control cabinet, for the inverter, power wire is divided into input line and output line. Signal wire is easily interfered by power wire, so that causing the misoperation of the device. When wiring, signal wire and power wire should be distributed in different areas, parallel lines and interlaced lines are forbidden at close range(within 20cm), and especially don't bundle up the two lines. If the signal cables must pass via the power lines, the two should keep 90 degree Angle. Interlace lines and banding together is also forbidden for the input and output line of power wire, especially on the occasions which noise filter is installed. It will cause the coupling of electromagnetic noise via the distributed capacitance of the input and output lines, thus the noise filter will out of action.

  Generally a control cabinet has different electric equipments such as inverter, filter, PLC, measurement instrument, their ability of emitting and bearing electromagnetic noise are diverse from each other, and this requires classifying these equipments. The classification can be divided into strong noise equipment and noise sensitive equipment, Install the similar equipments in the same area and, and keep a distance more than 20cm among inhomogeneous equipments.

- ✓ Input noise filter, input and output magnet ring (Zero phase reactor)

  Adding noise filter to the input terminal, the inverter will be isolated from the other equipments, and its ability of conduction and radiation will be reduced effectively. The better EMI suppression effect will be obtained by installing the input reactor recommended by this manual. By adding winding ferrite bead to the input and output terminal and coordinating with internal filter, the inverters will have a better effect.

- ✓ Shielding

  Good shielding and grounding can greatly reduce the interference of inverter, and can improve the anti-interference ability of the inverter. Sealing off the inverter with the good conductive sheet metal and connecting the sheet metal to ground, the radiation interference will be reduced effectively. To reduce the interference of inverter and improve the anti-interference ability, cable with shielding layer should be used in input and output and the both ends of it should be connected to ground. Shielding cable is suggested to be used in control connecting and communication connecting of the inverter external terminals under bad electromagnetic environment. Generally, the both ends of shielding layer should be connected to the control /communication ground, and they can also be connected to ground.

- ✓ Grounding

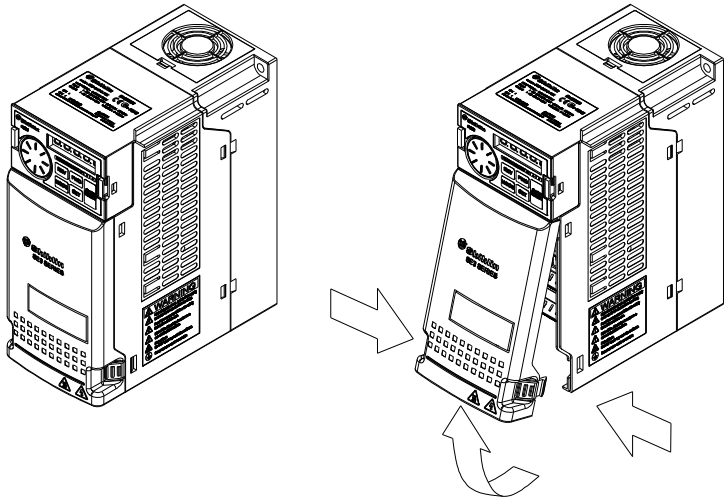
  The inverter must be connected to the ground safely and reliably. Grounding is not only for equipment and personal safety, but also the simplest, the most efficient and the lowest cost method to solving the EMC problem, so it should be prioritized. Please refer to the section of "3.7 Terminal wiring".

- ✓ Carrier wave

  The leakage current contains the leakage current from line to line or over the ground. It depends on the size of the distributed capacitance when wiring and the carrier frequency of the frequency. The higher the carrier frequency, the longer the motor cable, and the larger the cable cross-sectional area is, the larger the leakage current is. Reducing the carrier frequency can effectively reduce the leakage current. When the motor line is long (50m above), the output side should be installed with ac reactor or sine wave filter, when the motor line is longer, a reactor should be installed every other distance. At the same time, reducing carrier frequency can effectively reduce the conduction and radiation interference.

## 3.5.5 Removal of the wiring front cover

✓ Frame A/B

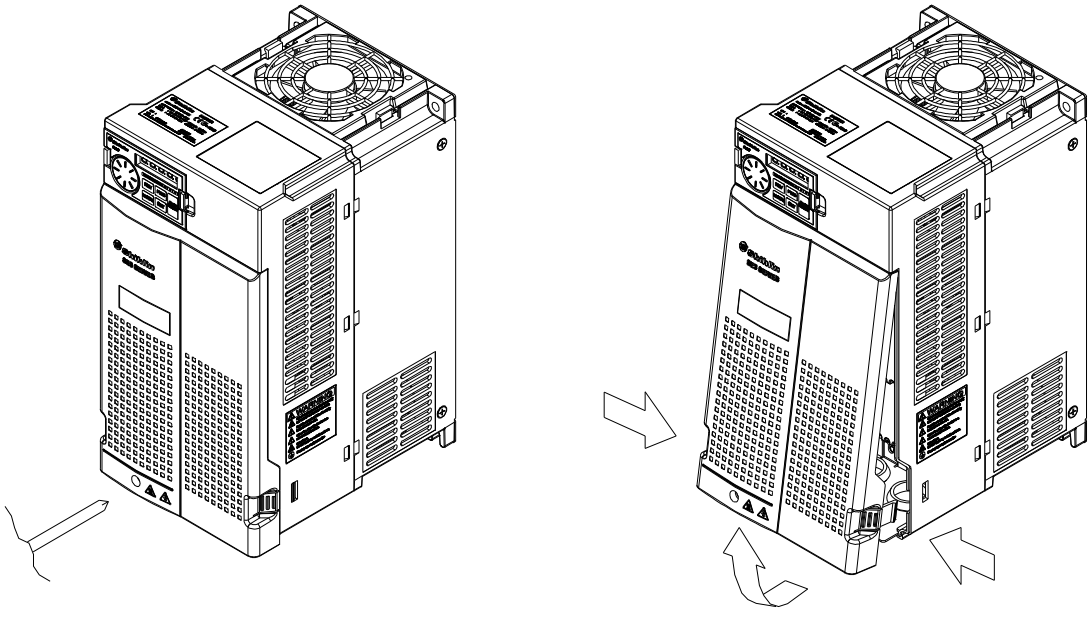


(a) (b)

(a) Loosen the screws on the wiring front cover.

(b) While holding the areas around the installation hooks on the sides of the wiring front cover, pull out the wiring front cover using its upper side as a support.

✓ Frame C/D



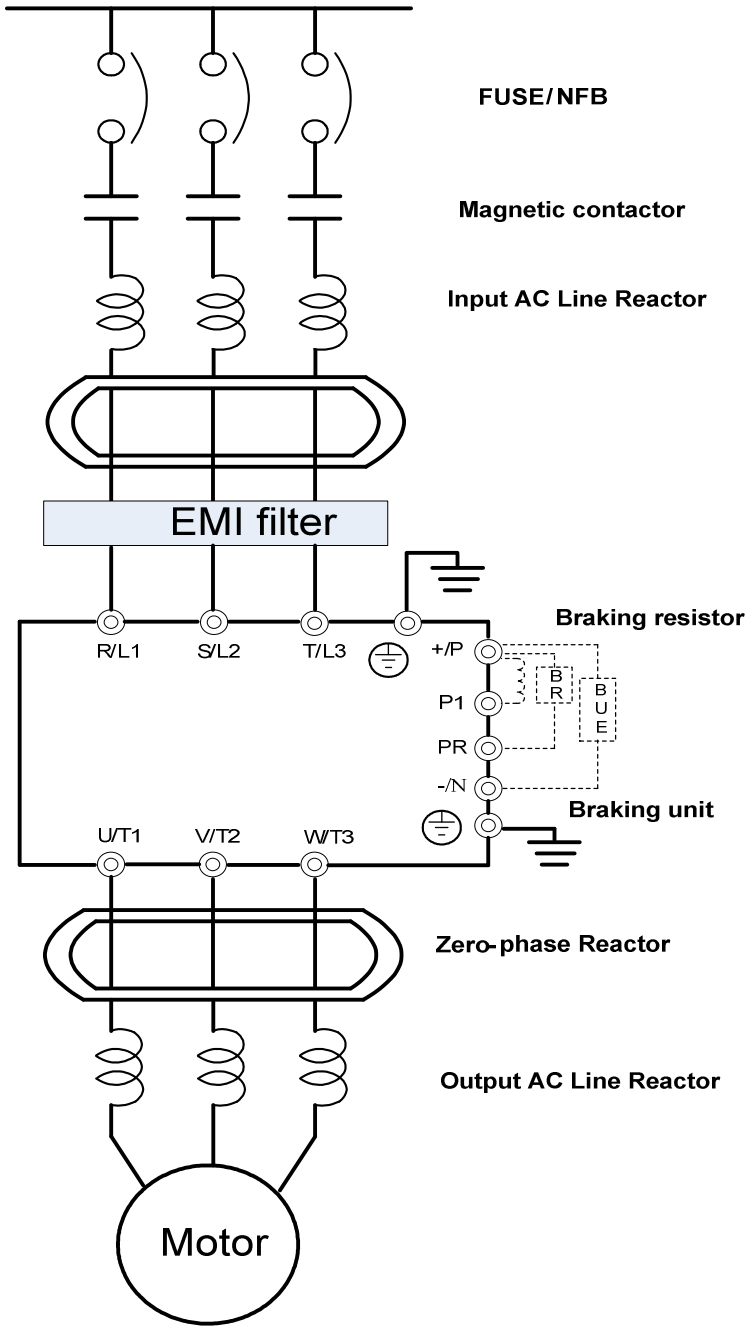
(a) (b)

(a) Loosen the screws on the wiring front cover.

(b) While holding the areas around the installation hooks on the sides of the wiring front cover, pull out the wiring front cover using its upper side as a support.

# 3.6 Peripheral devices

## 3.6.1 System Wire Arrangement




| | |
|---|---|
| Power supply | Please follow the specific power supply requirement shown in this manual. |
| Fuse/NFB | There may be an inrush current during power up. Please refer to 3.7.1 and select the correct fuse /NFB. |
| Magnetic contactor | Please do not use a Magnetic contactor as the I/O switch of the inverter, as it will reduce the operating life cycle of the inverter. |
| Input AC Line Reactor | AC line reactor should be installed to improve the input power factor. The wiring distance should be less than 10m. Please refer to 3.7.6. |
| Zero-phase Reactor | Zero-phase reactors are used to reduce radio noise especially when audio equipment installed near the inverter. Effective for noise reduction on both the input and output sides. The frequency band effective range is from 1MHz to 10 MHz. Please refer to 3.7.5. |
| EMI filter | Used to reduce electromagnetic interference. |
| Braking unit | Used to reduce stopping time of the motor. |
| Output AC Line Reactor | Motor surge voltage amplitudes depending on motor cable length. The output AC line reactor is necessary to install on the inverter output side. Please refer to 3.7.6. |

## 3.6.2 No-fuse switch and magnetic contactor

| Inverter model | Motor capacity | Power source capacity | Applicable no-fuse switch (NFB/MCCB) type (Shihlin Electric) | Applicable electromagnetic contactor (MC) type (Shihlin Electric) |
|---|---|---|---|---|
| SE3-043-0.4K | 440V 0.5HP | 1 kVA | BM30SN3P3A | S-P11 |
| SE3-043-0.75K | 440V 1HP | 2.5 kVA | BM30SN3P5A | S-P11 |
| SE3-043-1.5K | 440V 2HP | 4.8kVA | BM30SN3P10A | S-P11 |
| SE3-043-2.2K | 440V 3HP | 6.9kVA | BM30SN3P15A | S-P21 |
| SE3-043-3.7K | 440V 5HP | 10.4kVA | BM30SN3P20A | S-P21 |
| SE3-043-5.5K | 440V 7.5HP | 11.5 kVA | BM30SN3P30A | S-P21 |
| SE3-043-7.5K | 440V 10HP | 16 kVA | BM30SN3P30A | S-P21 |
| SE3-043-11K | 440V 15HP | 20 kVA | BM60SN3P50A | S-P30T |
| SE3-043-15K | 440V 20HP | 27 kVA | BM60SN3P60A | S-P40T |
| SE3-043-18.5KF | 440V 25HP | 32 kVA | BM100SN3P75A | S-P40T |
| SE3-043-22K | 440V 30HP | 41 kVA | BM100SN3P100A | S-P50T |
| SE3-023-0.4K | 220V 0.5HP | 0.5kVA | BM30SN3P5A | S-P11 |
| SE3-023-0.75K | 220V 1HP | 2.5kVA | BM30SN3P10A | S-P11 |
| SE3-023-1.5K | 220V 2HP | 4.5kVA | BM30SN3P15A | S-P11 |
| SE3-023-2.2K | 220V 3HP | 6.4kVA | BM30SN3P20A | S-P11/S-P12 |
| SE3-023-3.7K | 220V 5HP | 10kVA | BM30SN3P30A | S-P21 |
| SE3-023-5.5K | 220V 7.5HP | 12kVA | BM60SN3P50A | S-P25 |
| SE3-023-7.5K | 220V 15HP | 20 kVA | BM100SN3P100A | S-P35T |
| SE3-023-11K | 220V 20HP | 28 kVA | BM160SN3P125A | S-P50T |
| SE3-023-15K | 220V 25HP | 34 kVA | BM160SN3P160A | S-P60T |
| SE3-021-0.4K | 220V 0.5HP | 1 kVA | BM30SN3P3A | S-P11 |
| SE3-021-0.75K | 220V 1HP | 2.5kVA | BM30SN3P10A | S-P11 |
| SE3-021-1.5K | 220V 2HP | 4.5kVA | BM30SN3P15A | S-P11 |
| SE3-021-2.2K | 220V 3HP | 6.9kVA | BM30SN3P15A | S-P11/S-P12 |

## 3.6.3 Retrograde Brake Resistor

| Inverter model | Retrograde brake resistor specification |
|---|---|
| SE3-043-0.4K | 80W 1000Ω |
| SE3-043-0.75K | 100W 800Ω or above |
| SE3-043-1.5K | 200W 320Ω or above |
| SE3-043-2.2K | 300W 160Ω or above |
| SE3-043-3.7K | 500W 120Ω or above |
| SE3-043-5.5K | 1000W 75Ω or above |
| SE3-043-7.5K | 1200W 75Ω or above |
| SE3-043-11K | 2400W 50Ω or above |
| SE3-043-15K | 3000W 40Ω or above |
| SE3-043-18.5K | 4800W 32Ω or above |
| SE3-043-22K | 4800W 27.2Ω or above |
| SE3-023-0.4K | 100W 220Ω |

| Inverter model | Retrograde brake resistor specification |
|---|---|
| SE3-023-0.75K | 150W 120Ω or above |
| SE3-023-1.5K | 300W 60Ω or above |
| SE3-023-2.2K | 300W 60Ω or above |
| SE3-023-3.7K/ | 400W 40Ω or above |
| SE3-023-5.5K | 500W 30Ω or above |
| SE3-023-7.5K | 1000W 20Ω or above |
| SE3-023-11K | 2400W 13.6Ω or above |
| SE3-023-15K | 3000W 10Ω or above |
| SE3-021-0.4K | 100W 220Ω or above |
| SE3-021-0.75K | 150W 120Ω or above |
| SE3-021-1.5K | 300W 60Ω or above |
| SE3-021-2.2K | 300W 60Ω or above |

Note: 1. For brake resistor whose built-in brake unit offers model options, the capacity of the regenerative brake isbased on the condition that the regenerative brake duty is 10% (when braking lasts for 5 seconds, the machine has to be stopped for another 45 seconds must be stopped for heat dissipation). For models without a built-in brake unit, the capacity of the regenerative brake is based on the brake duty of the selected brake unit. The regenerative brake resistor wattage can be reduced according to the user's application (quantity of heat) and the regenerative brake duty. But the resistance must be larger than the value (ohms) listed in the above table (otherwise the inverter will be damaged).

2. In case frequent start and stop operations are required, a larger regenerative brake duty should be set. Meanwhile, a large brake resistor should be employed correspondingly.Please feel free to contact us if there is any problem regarding the selection of brake resistors.

### 3.6.4 Reactor

✓ AC input reactor

| Inverter model | Recommended reactor | | |
|---|---|---|---|
| | Shihlin Type | Rated current (A) | Inductance(mH) |
| SE3-043-0.4K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-043-0.75K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-043-1.5K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-043-2.2K | SH-OCL-0007-01000 | 7 | 1.000 |
| SE3-043-3.7K | SH-OCL-0010-00700 | 10 | 0.700 |
| SE3-043-5.5K | SH-OCL-0015-00470 | 15 | 0.465 |
| SE3-043-7.5K | SH-OCL-0020-00350 | 20 | 0.350 |
| SE3-043-11K | SH-OCL-0030-00230 | 30 | 0.230 |
| SE3-043-15K | SH-OCL-0040-00180 | 40 | 0.180 |
| SE3-043-18.5K | SH-OCL-0050-00140 | 50 | 0.140 |
| SE3-043-22K | SH-OCL-0060-00120 | 60 | 0.120 |
| SE3-023-0.4K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-023-0.75K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-023-1.5K | SH-OCL-0007-01000 | 7 | 1.000 |
| SE3-023-2.2K | SH-OCL-0015-00470 | 15 | 0.465 |
| SE3-023-3.7K | SH-OCL-0020-00350 | 20 | 0.35 |
| SE3-023-5.5K | SH-OCL-0030-00230 | 30 | 0.23 |
| SE3-023-7.5K | SH-OCL-0040-00180 | 40 | 0.18 |
| SE3-023-11K | SH-OCL-0060-00120 | 60 | 0.12 |
| SE3-023-15K | SH-OCL-0080-00087 | 80 | 0.087 |
| SE3-021-0.4K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-021-0.75K | SH-OCL-0005-01394 | 5 | 1.394 |
| SE3-021-1.5K | SH-OCL-0007-01000 | 7 | 1.000 |
| SE3-021-2.2K | SH-OCL-0015-00470 | 15 | 0.465 |

## ✓ AC output reactor

| Inverter model | Recommended reactor | | |
|---|---|---|---|
| | Shihlin Type | Rated current (A) | Inductance(mH) |
| SE3-043-0.4K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-043-0.75K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-043-1.5K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-043-2.2K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-043-3.7K | SH-OCL-0007-01900 | 7 | 1.9 |
| SE3-043-5.5K | SH-OCL-0010-01400 | 10 | 1.4 |
| SE3-043-7.5K | SH-OCL-0015-00930 | 15 | 0.93 |
| SE3-043-11K | SH-OCL-0020-00700 | 20 | 0.70 |
| SE3-043-15K | SH-OCL-0030-00460 | 30 | 0.46 |
| SE3-043-18.5K | SH-OCL-0040-00350 | 40 | 0.35 |
| SE3-043-22K | SH-OCL-0050-00280 | 50 | 0.28 |
| SE3-023-0.4K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-023-0.75K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-023-1.5K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-023-2.2K | SH-OCL-0010-01400 | 10 | 1.4 |
| SE3-023-3.7K | SH-OCL-0020-00350 | 20 | 0.35 |
| SE3-023-5.5K | SH-OCL-0030-00230 | 30 | 0.23 |
| SE3-023-7.5K | SH-OCL-0030-00230 | 30 | 0.23 |
| SE3-023-11K | SH-OCL-0040-00180 | 40 | 0.18 |
| SE3-023-15K | SH-OCL-0060-00120 | 60 | 0.12 |
| SE3-021-0.4K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-021-0.75K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-021-1.5K | SH-OCL-0005-02800 | 5 | 2.8 |
| SE3-021-2.2K | SH-OCL-0010-01400 | 10 | 1.4 |

## ✓ DC reactor

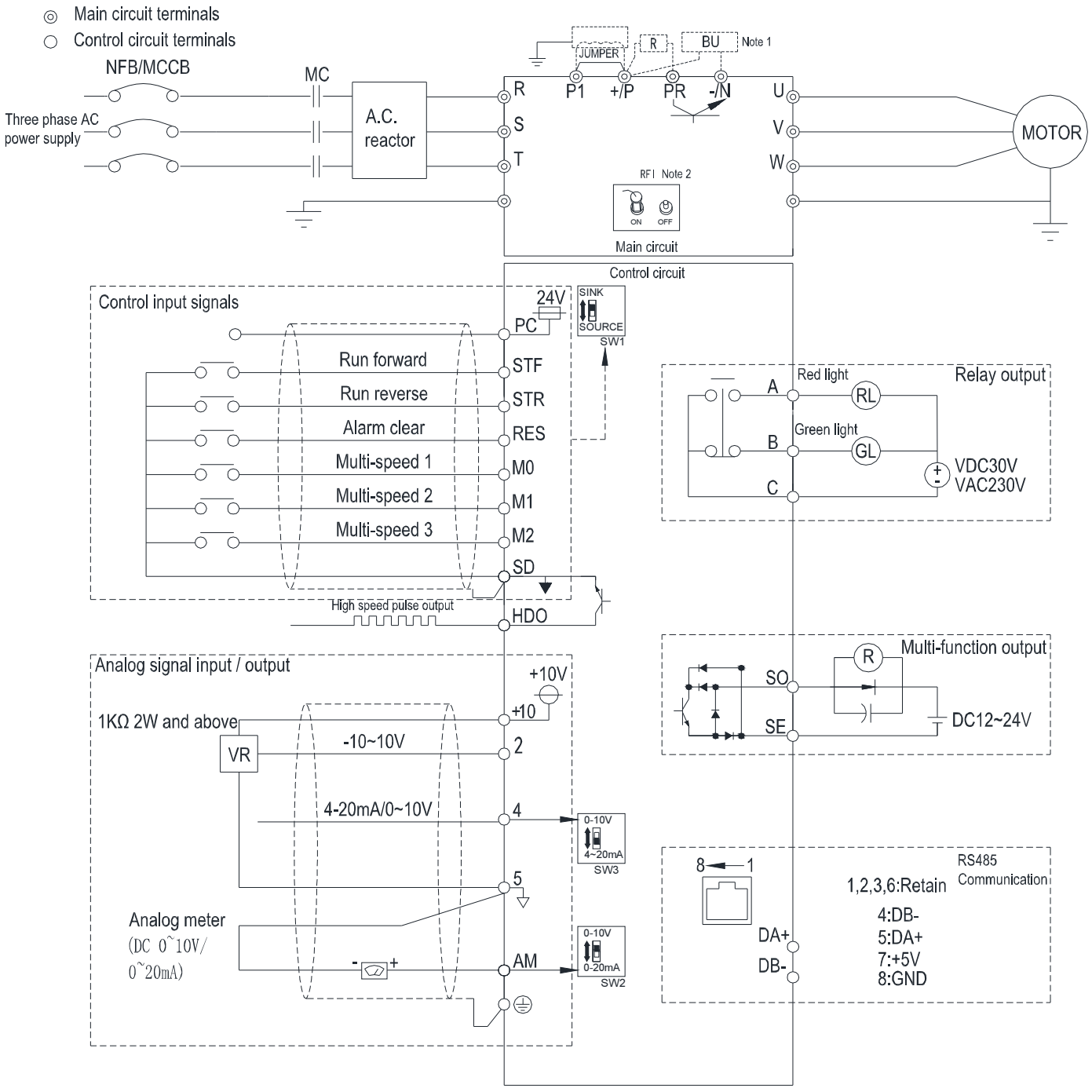
| Inverter model | Recommended reactor | | |
|---|---|---|---|
| | Shihlin Type | Rated current (A) | Inductance(mH) |
| SE3-043-5.5K | SH-DCL-0014-03450 | 14.0 | 3.45 |
| SE3-043-7.5K | SH-DCL-0020-02380 | 20.4 | 2.38 |
| SE3-043-11K | SH-DCL-0027-01770 | 27.5 | 1.77 |
| SE3-043-15K | SH-DCL-0034-01440 | 33.9 | 1.44 |
| SE3-043-18.5K | SH-DCL-0040-01210 | 40.3 | 1.21 |
| SE3-043-22K | SH-DCL-0055-00900 | 55.0 | 0.90 |
| SE3-023-5.5K | SH-DCL-0033-00860 | 33.4 | 0.86 |
| SE3-023-7.5K | SH-DCL-0048-00600 | 48.1 | 0.60 |
| SE3-023-11K | SH-DCL-0065-00450 | 64.7 | 0.45 |
| SE3-023-15K | SH-DCL-0080-00360 | 79.9 | 0.36 |

## 3.6.5 Filter

| Inverter model | kW | HP | Rated Amps of reactor | Types of filter |
|---|---|---|---|---|
| SE3-043-0.4K | 0.75 | 1 | 3.0 | NF311A5/01 |
| SE3-043-0.75K | 0.75 | 1 | 3.0 | NF311A5/01 |
| SE3-043-1.5K | 1.5 | 2 | 4.2 | NF311A10/01 |
| SE3-043-2.2K | 2.2 | 3 | 6 | NF311A10/01 |
| SE3-043-3.7K | 3.7 | 5 | 9 | NF311A20/05 |
| SE3-043-5.5K | 5.5 | 7.5 | 12 | NF311A20/05 |
| SE3-043-7.5K | 7.5 | 10 | 17 | NF311A30/05 |
| SE3-043-11K | 11 | 15 | 24 | NF311A50/05 |
| SE3-043-15K | 15 | 20 | 32 | NF311A50/05 |
| SE3-043-18.5K | 18.5 | 25 | 38 | NF311A50/05 |
| SE3-043-22K | 22 | 30 | 45 | NF311A80/05 |
| SE3-023-0.4K | 0.75 | 1 | 5 | NF311A10/01 |
| SE3-023-0.75K | 0.75 | 1 | 5 | NF311A10/01 |
| SE3-023-1.5K | 1.5 | 2 | 8 | NF311A20/05 |
| SE3-023-2.2K | 2.2 | 3 | 11 | NF311A20/05 |
| SE3-023-3.7K | 3.7 | 5 | 17.5 | NF311A30/05 |
| SE3-023-5.5K | 5.5 | 7.5 | 25 | NF311A50/05 |
| SE3-023-7.5K | 7.5 | 10 | 33 | NF311A50/05 |
| SE3-023-11K | 11 | 15 | 49 | NF311A80/05 |
| SE3-021-0.4K | 0.75 | 1 | 5 | NF311A10/01 |
| SE3-021-0.75K | 0.75 | 1 | 5 | NF311A10/01 |
| SE3-021-1.5K | 1.5 | 2 | 8 | NF311A20/05 |
| SE3-021-2.2K | 2.2 | 3 | 11 | NF311A20/05 |

Note: Products of CHANGZHOU DUOJI EME TECHNICAL CO., LTD are recommended for the filter used here.

# 3.7 Terminal wire arrangement




Note:1. Please refer to the Section 5.4.1 for the applications of external thermal overload relay.

2. Make sure that 10, SD, SE, 5 and PC are not shorted each other.

3. The DC reactor between +/P and P1 is optional. Please short +/P and P1 when DC reactor is not used.

4. For connecting the brake unit of Frame C and D to between +/P and -/N, please refer to the Section 3.7.1 for details.

5.When frame C and D adding DC reactors, please remove the short circuit piece between P1 and +/P. Please refer to the Section 3.6.4 for the reactor type.

6. Please refer to the Section 5.3.9 for wiring of HDO.

## 3.7.1 Maincircuit Terminals

### ✓ Description

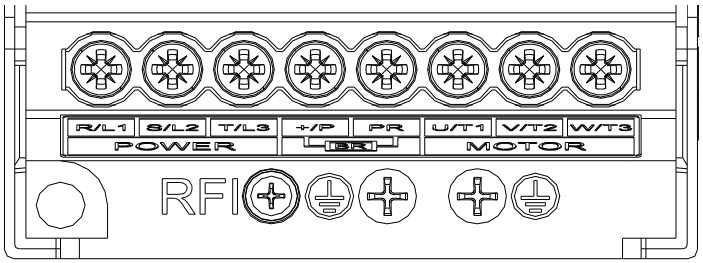
| Terminal symbol | Description |
|---|---|
| R/L1-S/L2-T/L3 | Connect to the frequency power supply |
| U/T1-V/T2-W/T3 | Connect to the electrical machine(Frame A,B have no terminal P1) |
| P1-(+/P) | Connect to the DC reactor. |
| (+/P)-PR | Connect to the brake resistor |
| (+/P)-(-/N) | Connect to the brake unit or input DC voltage(Frame A,B have no terminal N) |

Note: 1. For SE3 series of inverters, brake resistor is not included. For information related to braking resistor, please refer to Section 3.6.3 and 3.7.1.

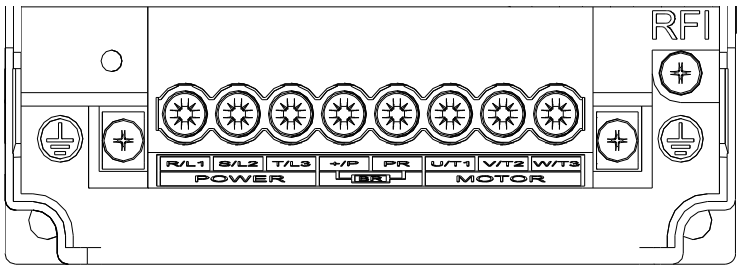
2. For information related to regenerative voltage, please refer to 06-05 and 06-06 in Secdtion 5.7.3.
3. +/P and -/N are the positive and negative terminals of the internal DC voltage of the inverter. In order to strengthen the braking capacity during deceleration, it is suggested to purchase the optional “brake unit” which is mounted between the terminals +/P and -/N. The “brake unit” can effectively dissipate the feedback energy from the motor to the inverter when decelerating.
4. In case there is any problem on purchasing the “brake unit,” please feel free to contact us.

### ✓ Terminal layout of the main circuit terminals

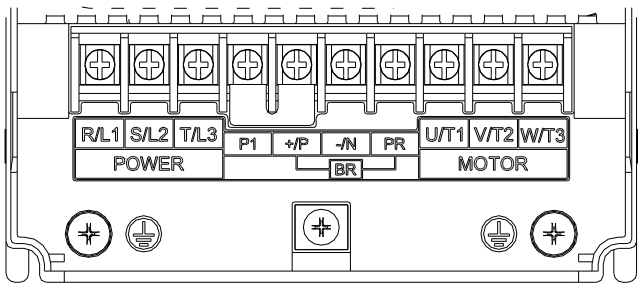
- Frame A



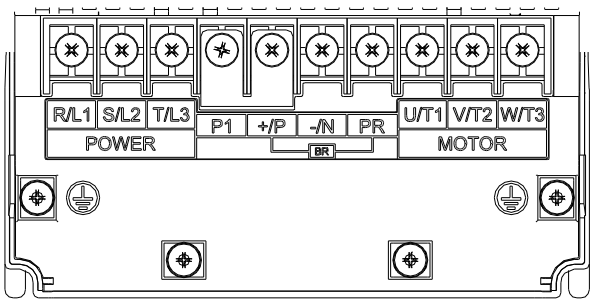

- Frame B



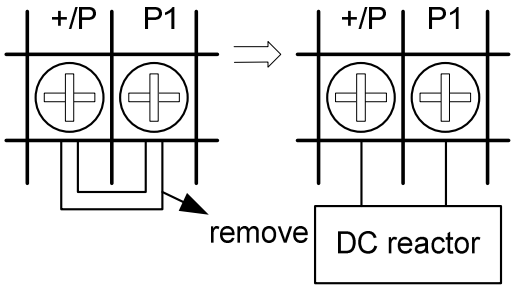

- Frame C



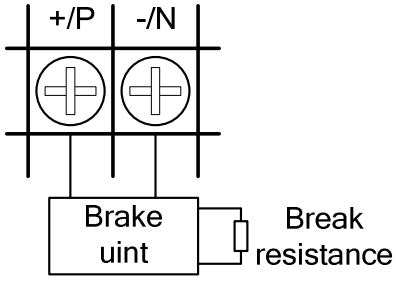
- Frame D




✓ DC reactor connection

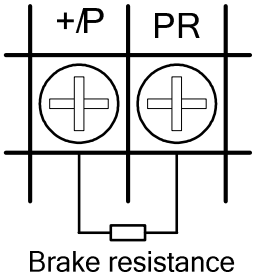



✓ Brake unit connection




Note: Frame C, D can be selected for brake units and brake resistance. Please refer to Section 3.3 for instruction on the frames.

✓ Brake resistance connection



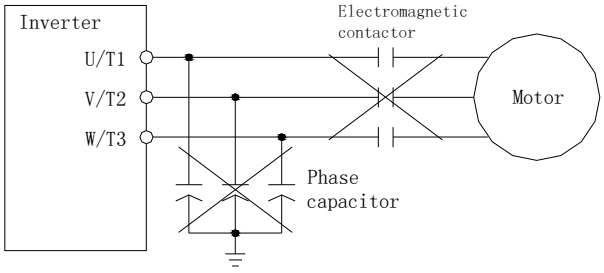

Note: It is suitable for frame A,B,C and D corresponded inverters. Please refer to Section 3.3 for instruction on the frames.

## 3.7.2 Main circuit wiring and terminal specification

| Inverter model | Terminal screw specifications | Tightening torque (Kgf.cm) | Recommended wiring specification (mm2) | | | | Recommended wiring specification (AWG) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | R,S,T | U,V,W | +/P, P1 | Grounding Cable | R,S,T | U,V,W | +/P ,P1 | Grounding Cable |
| SE3-021-0.4k | M3 | 6~8 | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-021-0.75k | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-023-0.4k | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-023-0.75k | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-023-1.5k | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-043-0.4K | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-043-0.75K | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-043-1.5K | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-021-1.5k | | | 6 | 6 | 6 | 6 | 10 | 10 | 10 | 10 |
| SE3-021-2.2k | | | 6 | 6 | 6 | 6 | 10 | 10 | 10 | 10 |
| SE3-023-2.2k | | | 4 | 4 | 4 | 4 | 12 | 12 | 12 | 12 |
| SE3-023-3.7K | | | 6 | 6 | 6 | 6 | 10 | 10 | 10 | 10 |
| SE3-043-2.2K | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-043-3.7K | | | 2.5 | 2.5 | 2.5 | 2.5 | 14 | 14 | 14 | 14 |
| SE3-023-5.5k | M4 | 15~18 | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 |
| SE3-023-7.5k | | | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 |
| SE3-043-5.5K | | | 6 | 6 | 6 | 6 | 10 | 10 | 10 | 10 |
| SE3-043-7.5K | | | 6 | 6 | 6 | 6 | 10 | 10 | 10 | 10 |
| SE3-043-11K | | | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 |
| SE3-023-11k | M5 | 18~20 | 25 | 25 | 25 | 25 | 4 | 4 | 4 | 4 |
| SE3-023-15k | | | 25 | 25 | 25 | 25 | 4 | 4 | 4 | 4 |
| SE3-043-15K | | | 10 | 10 | 10 | 10 | 8 | 8 | 8 | 8 |
| SE3-043-18.5K | | | 16 | 16 | 16 | 16 | 6 | 6 | 6 | 6 |
| SE3-043-22K | | | 25 | 25 | 25 | 25 | 4 | 4 | 4 | 4 |

Note: 1. Don't directly connect power input line with motor terminals (U/T1) - (V/T2) - (W/T3) of the converter, otherwise will cause the damage of the inverter.

2. Don’t add into the phase capacitor, surge absorber and electromagnetic contactor on the output of the inverter.




3. Do not use the power of the online "electromagnetic contactor" or "no fuse switch" to start and stop the motor.

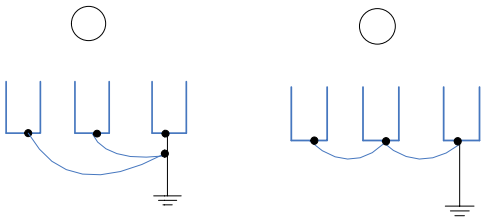
4. Please do implement chassis grounding of the inverter and motor, avoiding electric shock.

5. The specifications of the no-fuse switch and the electromagnetic contactor, please refer to the section 3.6.2.

6. If the distance between the inverter and motor is longer, please use thick wires, make sure wire pressure dropping under 2V (wire length below 500 meters).
7. The connection of the power supply side and load side use "insulation sleeve crimping terminal".
8. After terminal power outage, in a short time, high voltage still exist betwwen (+/P) and (-/N). Within 10 minutes, do not touch terminals, in order to avoid electric shock.

### 3.7.3 Ground

For safety and to reduce noise, the grounding terminal ⏚ of the inverter must be well grounded. To avoid electric shocks and fire accident, external metal wire of electrical equipment should be short and thick, and should be connected to special grounding terminals of an inverter. If several inverters are placed together, all inverters must be connected to the common ground. Please refer to the following diagrams and ensure that no circuit is formed between grounding terminals.

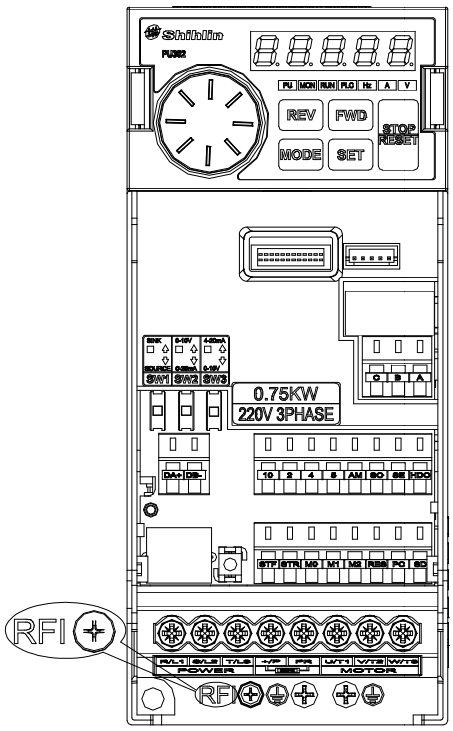


Best Average

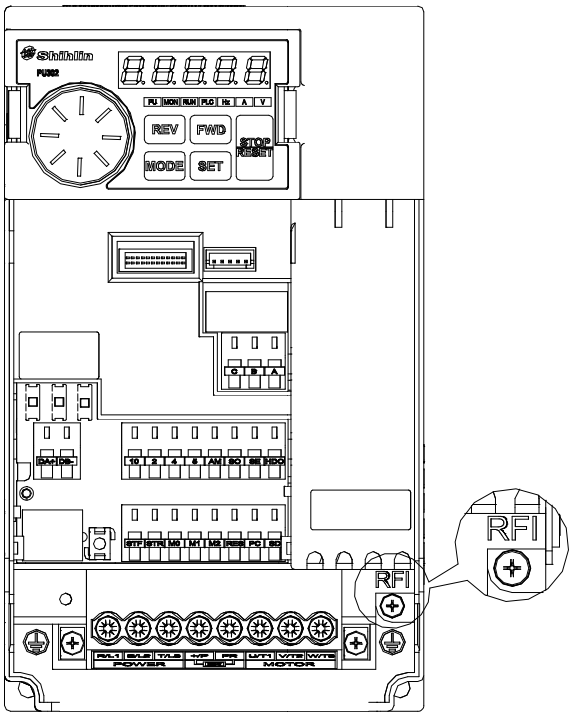
### 3.7.4 RFI filter

The invertersof SE3 seriesare equipped with built-in RFI filters.These filters are effective in reducingelectromagnetic interference,but if in line with CE standard, please refer to Section 3.5.4 for installation and wiring.

✓ Frame A/B

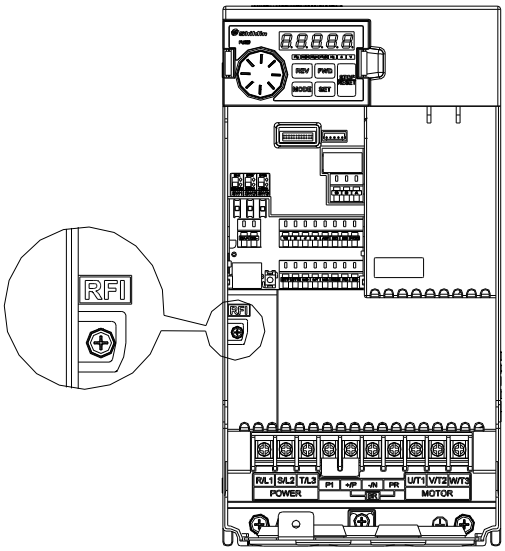



Frame A




Frame B

✓ Frame C/D




Frame C/D

RFI filter ON: screws fastened tightly(default status)

RFI filter OFF: screws loosened

Note: 1. Do not cut off the RFI filter state after applying power to the inverter. Please make sure that the main power has been switched off before cutting of RFI filter state.
2. Electic conductivity of the capacitor will be cut off by cutting off the RFI filter. Moreover, the electromagnetic capacitance of the inverter will be reduced by cutting of the RFI filter.
3. Do not switch off the RFI filter state when the main power is a grounded power system. To prevent machine damage, the RFI filter shall be cut off if the inverter is installed on an ungrounded power system, a high resistance-grounded (over 30 ohms) power system, or a corner grounded TN system.
4. The RFI filter cannot be cut off when performing the Hi-pot tests.

## 3.7.5 Control circuit

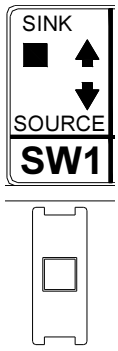
✓ Control terminal name

| Terminal type | Terminal name | Function instructions | Terminal specifications |
|---|---|---|---|
| Switch signal input | STF | There are multi-function control terminals, which can switch mode of SINK/SOURCE. | Input impedance: 4.7kΩ<br>Action current: 5mA(24VDC)<br>Voltage range: 10~28VDC<br>Maximum frequency: 1kHz |
| | STR | | |
| | RES | | |
| | M0 | There are multi-function control terminals, which can switch mode of SINK/SOURCE. | Maximum frequency:33kHz |
| | M1 | | |
| | M2 | There are multi-function control terminals, which can switch mode of SINK/SOURCE. Compatible HDI function | Maximum frequency: 100kHz |
| Analog signal input | 10 | +10.5±0.5V | Maximum current:10mA |
| | 2 | -10~+10V、0~5V | Input impedance:10kΩ |
| | 4 | 4~20mA/0~10V | When current is input into, the input impedance is 235Ω.<br>When voltage is input into, the input impedance is 24kΩ. |

| Terminal type | Terminal name | Function instructions | Terminal specifications |
|---|---|---|---|
| Relay output | A<br>B<br>C | Multi-function relay output terminals.<br>A-C is the normally open contact, B-C is the normally closed contact, C is common terminal. | Maximum voltage: 30VDC or 250VAC<br>Maximum current:<br>Resistor load 5A NO/3A NC<br>Inductance load 2A NO/1.2A NC<br>(cosΦ=0.4) |
| Open collector output | SO<br>SE | Multi-function open collector output terminal | Maximum voltage: 48VDC<br>Maximum current:50mA |
| Analog signal output | AM | 0~10V/0~20mA/4~20mA | Output voltage: 0~10VDC<br>Maximum current: 3mA;<br>Output current: 0~20mA<br>Maximum load: 500Ω |
| Pulse output | HDO | Multi-function pulse output terminal, FM and 10X are compatible. | Minimum load:4.7kΩ<br>Maximum current: 50mA<br>Maximum voltage: 48VDC<br>Maximum frequency: 100kHz |
| Communication terminal | DA+、DB-<br>RJ45 | RS-485, optical isolation | Highest rate: 115200bps<br>Longest distance: 500m |
| Common terminal | SD | SINK | --- |
| | PC | SOURCE | Output voltage: 24VDC±20%<br>Maximum current: 200mA |
| | 5 | 10、2、4、terminals of the public | --- |

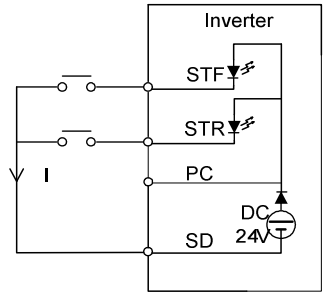
## ✓ Control logic (SINK/SOURCE) change

The multi-function control terminal of SE3 series inverter can select the sink input approach or the source input approach via the toggle switch SW1. The diagram is as follows

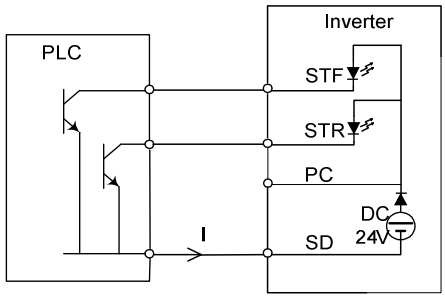



No matter what kind of multi-function control terminal is, all of its outside wire arrangement can be considered as a simple switch. If the switch is “on," the control signal will be put into the terminal. If the switch is “off,” the control signal is shut off.

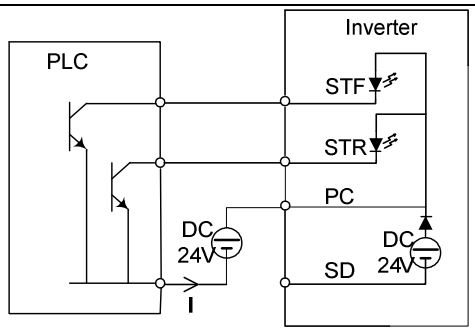
If "Sink Input” mode is selected, the function of the terminal is active when it is shorted with SD or connected with the external PLC. In this mode, the current flows out of the corresponding terminal when it is “on". Terminal “SD” is common to the contact input signals. When using an external power supply for output transistor, please use terminal PC as a common to prevent misoperation caused by leakage current.




Sink Input: the multi-function control terminal is shorted directly with SD

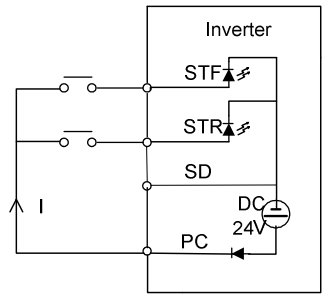



Sink Input: the multi-function control terminal is connected directly with open-collector PLC

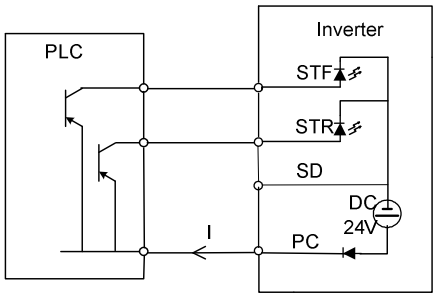



Sink Input: the multi-function control terminal is connected with open-collector PLC and external power supply

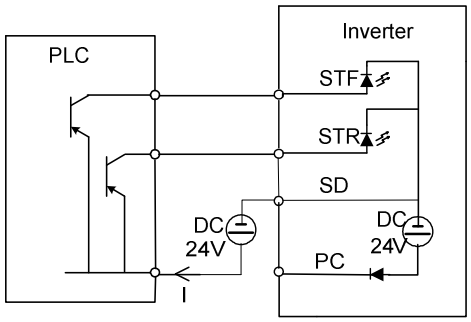
If "Source Input" mode is selected, the function of the terminal is active when it is shorted with PC or connected with the external PLC. In this mode, the current flows into the corresponding terminal when it is "on". Terminal PC is common to the contact input signals. When using an external power supply for transistor, please use terminal SD as a common to prevent misoperation caused by leakage current.




Source Input: the multi-function control terminal is shorted directly with PC

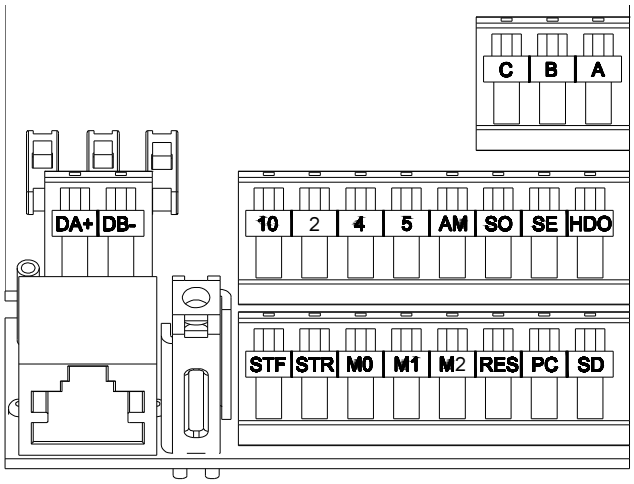



Source Input: the multi-function control terminal is connected directly with open-emitter PLC




Source Input: the multi-function control terminal is connected with open-emitter PLC and external power supply

## ✓ Arrangement of control terminal

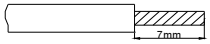



- Power supply connection

For the control circuit wiring, strip off the sheath of a cable, and use it with a blade terminal. For a single wire, strip off thesheath of the wire and apply directly.

(1) Strip off the sheath for the below length. If the length of the sheath peeled is too long, a short circuit may occur with neighboring wires. If the length is too short, wires might come off.

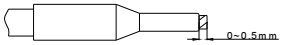
Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.




(2) Crimp the blade terminal.

Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.

Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate,or the face is damaged.



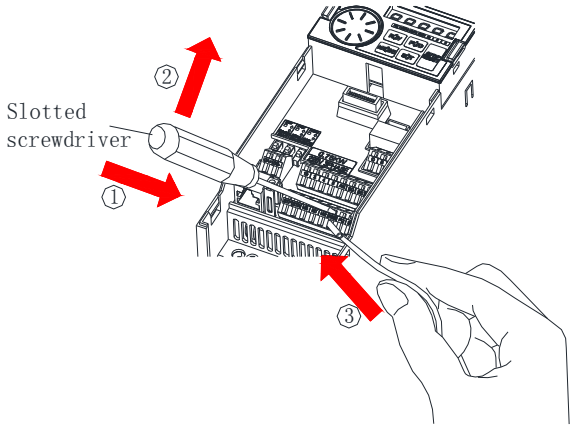

- Please do use blade terminals with insulation sleeve. Blade terminals commercially available:

| Cable gauge (mm²) | Blade terminals model | L (mm) | d1 (mm) | d2 (mm) | Manufacturer | Crimping tool product number |
|---|---|---|---|---|---|---|
| 0.3 | AI 0,25-6 WH | 10.5 | 0.8 | 2 | Phoenix Contact Co., Ltd. | CRIMPFOX 6 |
| 0.5 | AI 0,5-6 WH | 12 | 1.1 | 2.5 | | |
| 0.75 | AI 0,75-6 GY | 12 | 1.3 | 2.8 | | |
| 0.75 (for two wires) | AI-TWIN 2×0,75-6 GY | 12 | 1.3 | 2.8 | | |

Note:1. Please Use a small flathead screwdriver (tip thickness: 0.6mm, width: 3.0mm). If a flathead screwdriver with a narrow tip is used, terminal block maybe damaged.

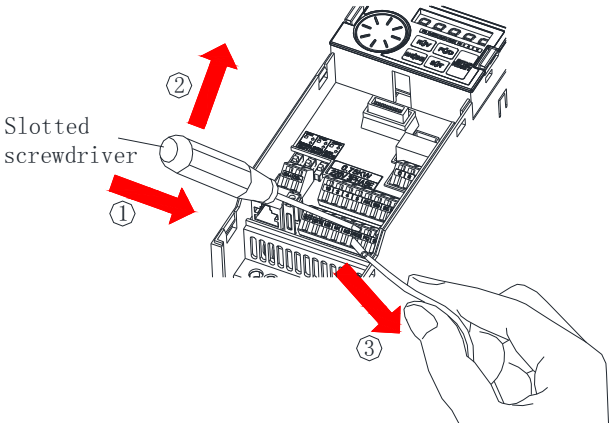
2. Tightening torque is2.12~3.18kgf.cm, too large tightening torque can cause screw slippage, too little tightening torque can cause a short circuit or malfunction.

- Wiring installation




First insert slotted screwdriver with terminal blocks, pressing terminal blocks down, and then insert the electric wires.

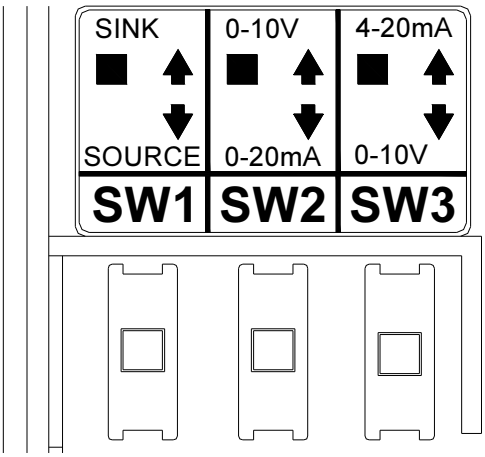
- Wiring demounting




First insert slotted screwdriver with terminal blocks, and pressing terminal blocks down, and then pull out the wire.

Note: 1. Screwdriver, use small slotted screwdriver (the tip thickness: 0.4mm/tip width: 2.5mm).
2. If you use the screwdriver tip width too narrow, and may cause Terminal damage.
3. Please alignment terminals pressing down with the slotted screwdriver, head of the sliding may cause damage or injury accident inverter.
4. Only qualified electrical professional personnel can carry out the installation, wire arrangement, dismounting and maintenance.
5. Please follow the wire arrangement notice. In case the installation has not been fully complied with, and damage of the inverter or dangerous accidence thus be resulted in, our company will not undertake any legal responsibility. In case there is any question on the wire arrangement, please feel free to contact us.

✓ Toggle switch

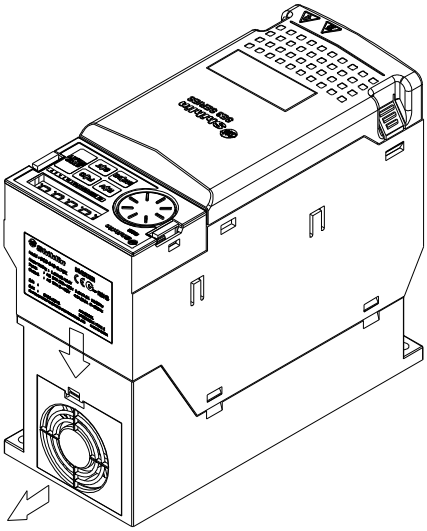
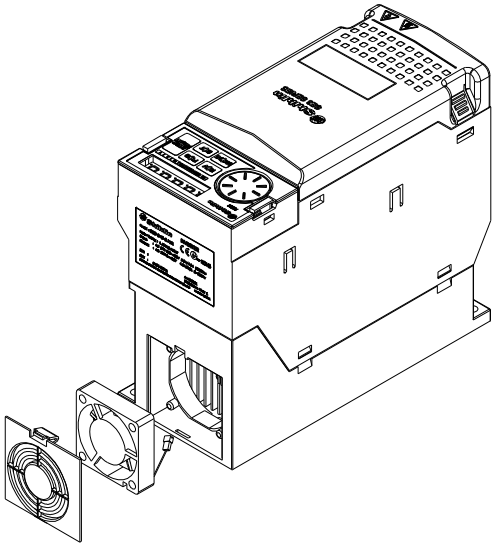



| Switch number | Switch state | Explanation | Remarks |
|---|---|---|---|
| SW1 | * | select the sink Input approach | Please refer to Section 3.7.5 Control logic change |
| | | select the sink Source approach | |
| SW2 | * | Output 0~10V voltage from terminal AM | Cooperating with 02-45, please refer to Section5.3.11 |
| | | Output 0~20mA/4~20mA current from terminal AM | |
| SW3 | * | Input 4~10V current from terminal 4-5 | Cooperating with 02-20, please refer to Section5.3.6. |
| | | Input 0~20mA voltage from terminal 4-5 | |

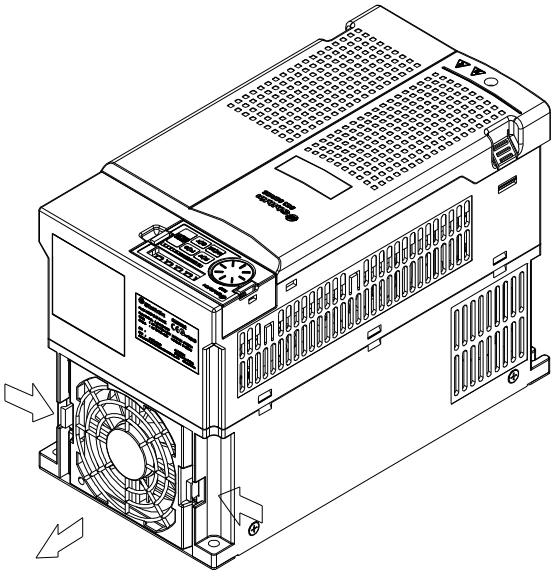
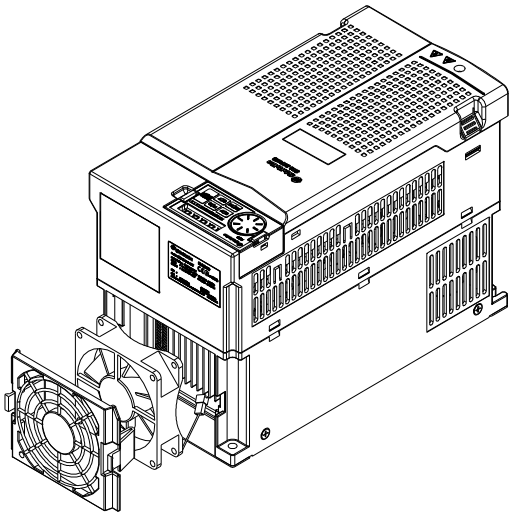
Note: 1. The state with "*" is the default state of switch.
2. The parts in black stand for switch handle.

# 3.8 Replacement procedure of fan

## 3.8.1 Frame A/B

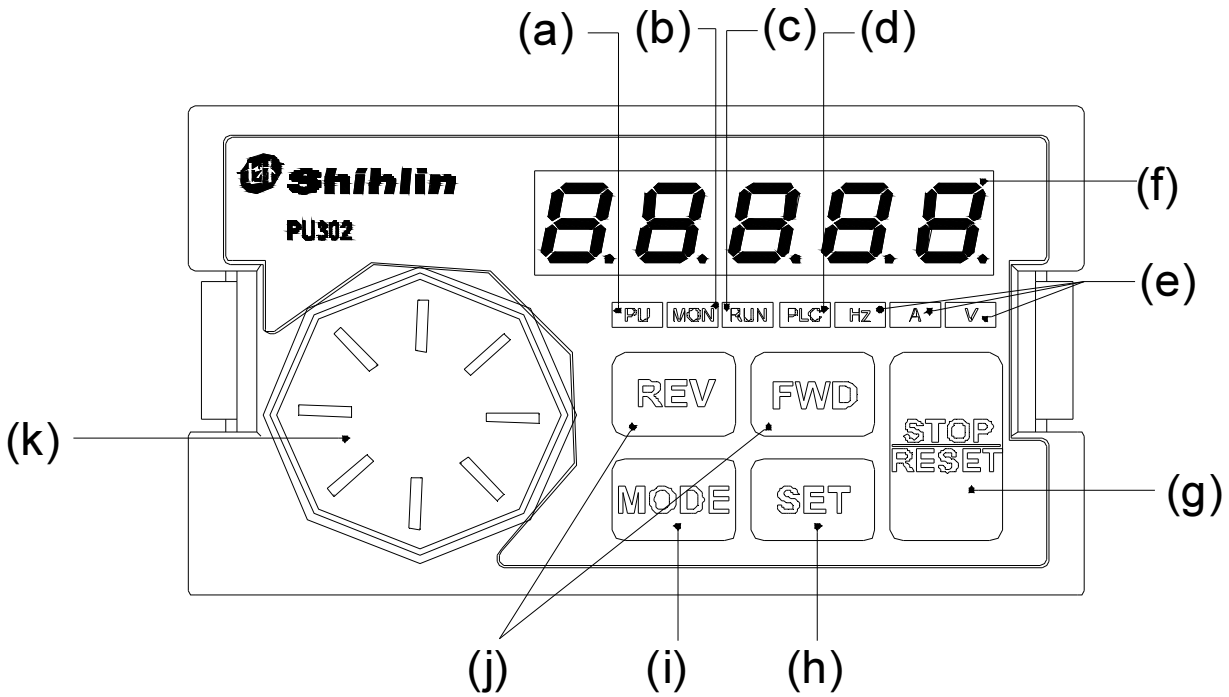
| 1. Press the hooks on both side of the fan to remove the fan. (As shown below.) | 2. Disconnect the power terminal, and thenremove the fan. (As shown below.) |
|---|---|
|  |  |

## 3.8.2 Frame C/D

| 1. Press the hooks on both side of the fan to remove the fan. (As shown below.) | 2.Disconnect the power terminal, and then remove the fan. (As shown below.) |
|---|---|
|  |  |

# 4. PRIMARY OPERATION

## 4.1 Component name of parameter unit (PU302)



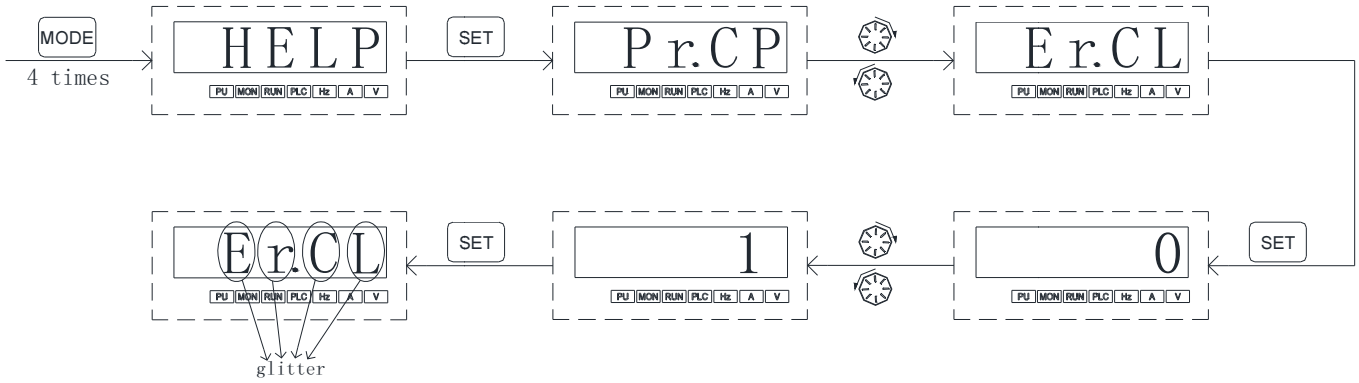

| NO. | Operation parts | Name | Content |
|---|---|---|---|
| (a) | PU | Operation mode indicator | PU: ON to indicate the PU and CU operation mode, flickers in the H1~H5 operation mode. |
| (b) | MON | Parameter unit status indicator | MON: ON to indicate the monitoring mode |
| (c) | RUN | Indicating lamp of running | ON to indicate the running |
| (d) | PLC | PLCfunction indicator | ON to indicate the PLC function valid. |
| (e) | Hz A V | Unit indicator | Hz:ON to indicate the frequency.<br>A:ON to indicate the output frequency.<br>V:ON to indicate the selected monitoring item. |
| (f) | 8.8.8.8.8. | Monitor (5-digit LED) | Shows the frequency, parameter number, and parameter value, etc. |
| (g) | STOP/RESET | STOP/RESETbutton | Stops the operation commands.<br>Resets the inverter for alarm. |
| (h) | SET | SETbutton | Press the button for a long time，Writes parameter value, frequency, etc.<br>Press the button for a short time，Read the parameter.<br>Enter into the next menu. |
| (i) | MODE | MODEbutton | Switches to different modes |
| (j) | FWD REV | FWDbutton REVbutton | FWD: Starts forward rotation.<br>REV: Starts reverse rotation. |
| (k) | | MSetting dial | The numerical increase when clockwise rotation,or can switch options<br>The numerical decrease when clockwise rotation,or can switch options |

Note:

The special operation menu by pressing MODE button switch to HELP mode to erter into is shown as the table below:

| Menu | Name | Press SET button to enter into next to realize the corresponding functioin description |
|---|---|---|
| Pr.CP | Parameter copy | 0: No action. |
| | | 1: Copy the inverter parameter values into the parameter unit. |
| Pr.CA | Parameter paste | 0: No action. |
| | | 1: Paste the copied parameter values in parameter unit into the inverter. (Please first restore the inverter parameters to the factory setting, and then paste the parameter. This action is only valid in the same series and types.) |
| Er.CL | Alarm clear | 0: No action. |
| | | 1: Clear all alarm and alarm information. |
| rESF | Inverter reset | 0: No action. |
| | | 1: Reset the inverter. |
| ALLC | Parameter restored to the factory setting | 0: No action. |
| | | 1: The inverter parameters are restored to the factory setting. |
| Pr.Cr | Part of parameters restored to the factory setting | 0: No action. |
| | | 1: Part of inverter parameters are restored to the factory setting. |
| | | 2: Inverter parameters are restored to the factory setting + user parameters ( 15-00(P.900)~15-19(P.919) ) are not restored to the factory value |
| | | 3: Part of inverter parameters are restored to the factory setting + user parameters ( 15-00(P.900)~15-19(P.919) ) are not restored to the factory value |
| PrGr | Parameter mode | 0: P parameter mode |
| | | 1: Parameter group mode |
| PU_F | Auto write frequency selection | 0: After the frequency changes, the frequency will not auto write into the inverter. |
| | | 1: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s, write into the inverter EEPROM after10s. |
| | | 2: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s,write into the inverter EEPROM after 30s. |
| | | 3: After the frequency changes,the frequency will auto write into the inverter RAM after 0.5s,do not write into the inverter EEPROM |
| E.H15 | Alarm record | Display the recent four alarm codes. (Read) |
| Sn | Inverter version | Display the version number of the inverter. (Read) |
| PUSn | Parameter unit version | Display the version number of PU302. (Read) |

For example:Press MODE button to erter into HELP menu to Alarm clear Er.CL, the operation flow chart is as follows:



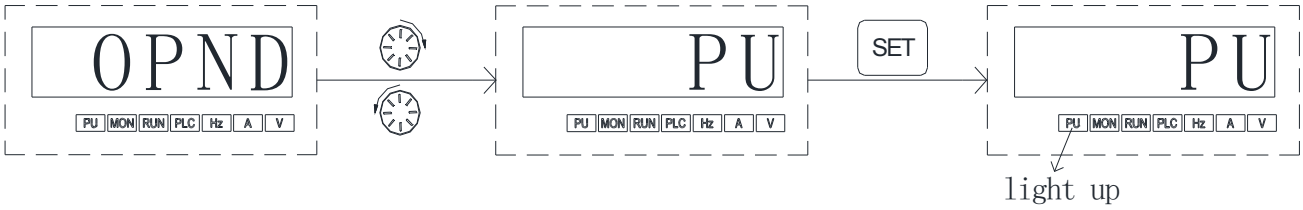
## 4.2 Operation modes of the inverter

- The operation modes are related to the reference source of the target frequency and the signal source of the motor starting. The Shihlin SE3 inverter has a total of ten kinds of operation modes,namely, “PU mode PU”, “JOG mode JOG”, “external mode EXT”, ”communication mode CU”, “combined mode 1 H1”, ”combined mode 2 H2”, “combined mode 3 H3”, “combined mode 4 H4” and “combined mode 5 H5” and the second operation mode.
- You can use parameter unit to monitor the output frequency, the output voltage and the output current, as well as to view the alarm message, the parameter setting and the frequency setting. The operator has four work modes, namely, “operation mode”, “monitoring mode”, “frequency setting mode” and “parameter setting mode”.

| Related parameters | Values | Operation mode | The reference source of target frequency | The signal source of motor starting | Remarks |
|---|---|---|---|---|---|
| Operation mode selection 00-16(P.79) | 0 | PU mode (PU) | PUparameter unit | FWD or REV button for PU parameter unit | The “PU mode”, “JOG mode” and “external mode” are interchangeable. |
| | | JOGmode (JOG) | The setting value of 01-13(P.15) | FWD or REV button for PU parameter unit | |
| | | External mode (EXT) | “External voltage/current signal”, “combination of multi-speed stage levels” and external JOG(01-13(P.15)) | External forward and reverse terminals | |
| | | | Frequency given by (03-05(P.82)) | | |
| | | | Frequency of each section in the programmed operation mode 04-19~ 04-26 /P.131~P.138 | External STF terminal | |
| | 1 | PUmode (PU) | Equal to the “PU mode” when 00-16(P.79) = 0 | | The “PU mode” and “JOG mode” are interchangeable. |
| | | JOGmode (JOG) | Equal to the “PU mode” when 00-16(P.79) = 0 | | |
| | 2 | External mode(EXT) | Equal to the “External mode” when00-16(P.79) = 0 | | |
| | 3 | Communication mode(CU) | Communication | Communication | |
| | 4 | Combined mode 1 (H1) | PUparameter unit | External forward and reverse terminals | |
| | 5 | Combined mode 2 (H2) | “External voltage / current signal”, “combination of multi-speed stage levels”, frequency given by pulse(03-05(P.82)) | FWD or REV button for PU parameter unit | |
| | 6 | Combined mode 3 (H3) | Communication, “combination of multi-speed stage levels” and External JOG(01-13(P.15)) | External forward and reverse terminals | |
| | 7 | Combined mode 4 (H4) | “External voltage / current signal”, “combination of multi-speed stage levels”, frequency given by pulse(03-05(P.82)) | Communication | |
| | 8 | Combined mode 5 (H5) | PU operation panl, “combination of multi-speed stage levels” and External JOG (01-13(P.15)) | External forward and reverse terminals | |
| | 99999 | Second operation mode (rEFE) | Sets by 00-17(P.97) | Sets by00-18(P.109) | |

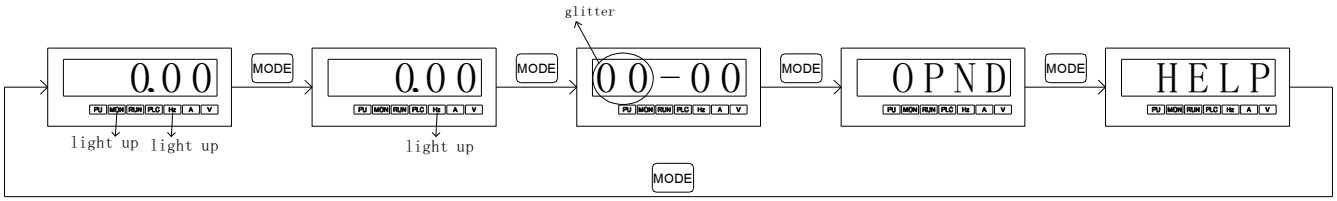
- When 00-16(P.79) = 0, the external mode (EXT) is the default mode after the inverter is turned on. Use 00-16(P.79) to switch the operation mode.

## 4.2.1 The flow chart for switching the operation mode




Note: 1.In “PU mode”,parameter unit screen displays PU, and the indicating lamp [PU] will light up.
2.In “external mode,” parameter unit screen displays OPnd
3.In “combined mode 1, 2, 3, 4, or 5”, the indicating lamp [PU] will gilttter on the parameter unit screen.
4. In “JOG mode”, the indicating lamp [PU] will light up.
5. No flow chart whenP.79=2, 3, 4, 5, 6, 7 or 8 because the operation mode will be constant.

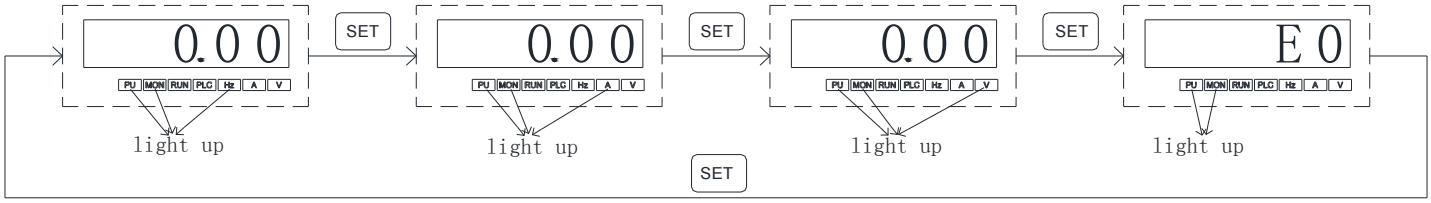
## 4.2.2 The flow chart for switching the working mode with PU302 parameter unit




Note: 1. Please refer to section 4.2.3 for the detailed operation flow under the monitoring mode.
2. Please refer to section 4.2.4 for the detailed operation flow under the frequency setting mode.
3. Please refer to section 4.2.5 for the detailed operation flow under the parameter setting mode.
4. Please refer to Section 4.2.1 for detailed operation flow under the switching operation mode.
5. Please refer to Section 4.2.6 for detailed operation flow under the HELP mode.

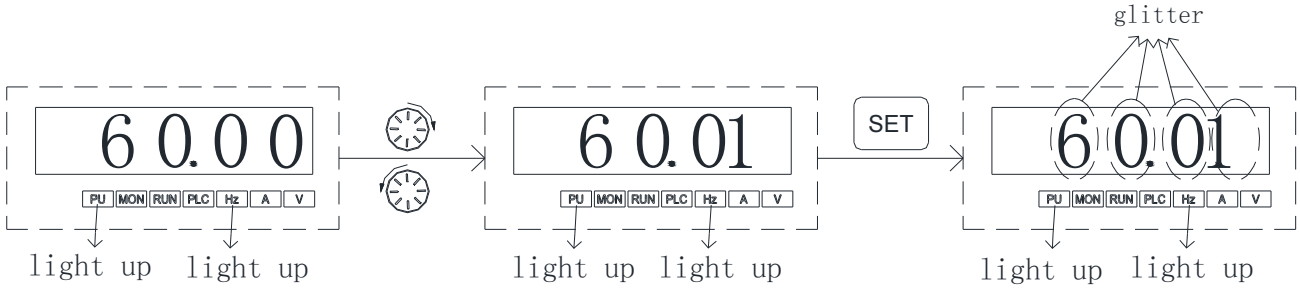
## 4.2.3 The operation flow charts for monitoring mode with PU302

- Take PU mode for example:




Note: 1.In the “monitoring output frequency mode”, indicating lamp [MON] and [Hz] will light up, and the screen will display the current output frequency.
2. In the “monitoring output voltage mode”, indicating lamp [MON] and [V] will light up, and the screen will display the current output voltage.
3. In the “monitoring output current mode”, indicating lamp [MON] and [A] will light up, and the screen will display the current output current.
4.When in the “browsing alarm record mode,” indicating lamp [MON] will light up, and the screen will display the current alarm code.
5. For alarm codes, please refer to Appendix 2.

## 4.2.4 Operation flow charts for frequency setting mode withPU302

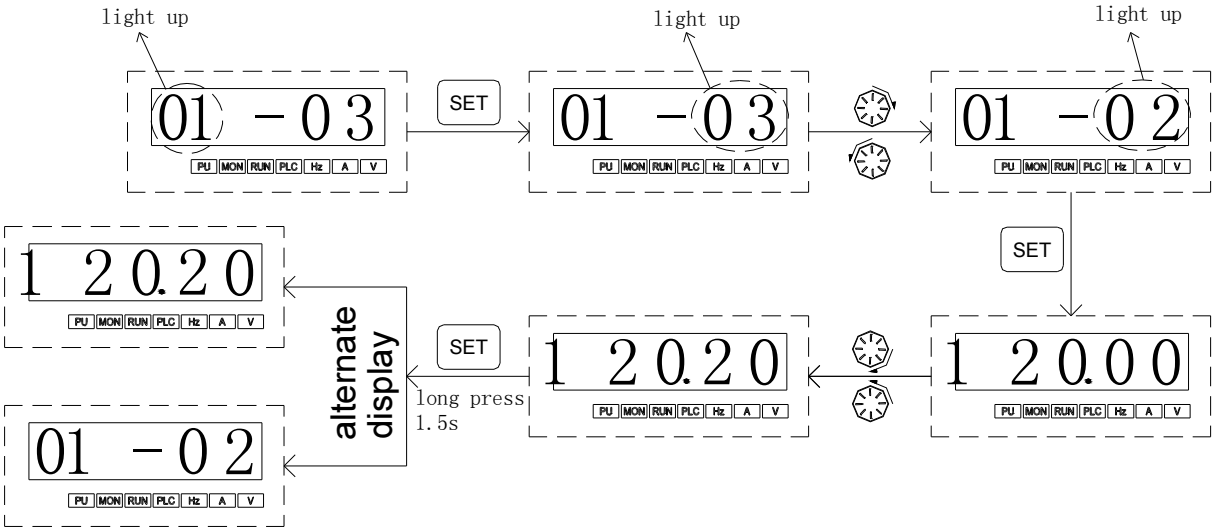



Note: 1. Use ⊛ to change the frequency when the inverter is running.

2. Indicating lamp Hz will light up, but not MON under the frequency setting mode.

3. When setting the frequency under the PU mode, the set value can not exceed the upper frequency. When high frequency is needed, the upper frequency should be changed first.

## 4.2.5 Operation flow charts for parameter setting mode with PU302




Note: Neither Indicating lamp Hz nor MON will light up under the parameter setting mode. Please must press (SET) for 0.5 seconds and above when write the parameter value into the parameter。

# 4.3 Basic operation procedures for different modes

## 4.3.1 Basic operation procedures for PU mode (00-16(P.79) = 0 or 1)

| Step | Description |
|---|---|
| 1 | • Change the operation mode to PU mode, and indicating lamp PU will light up.<br>Note: 1. When 00-16(P.79) =0, the inverter will first go into the external mode after the power is switched on or the inverter is reset.<br>2. For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • Enter into the frequency setting mode and write the target frequency into memory.<br>Note: For detailed setting procedures, please refer to Section4.2.4. |
| 3 | • Press FWD or REV to run the motor. At this point, indicating lamp RUN will glitter, indicating that the motor is running.<br>The PU302parameter unit will automatically go into the monitor mode and display the current stable output frequency.<br>Note: 1. For detailed operation flow for the monitoring mode, please refer to Section4.2.3.<br>2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed. |
| 4 | • Press STOP RESET and the motor will begin to decelerate until it comes to a full stop.<br>• Indicating lamp RUN will not turn off until the inverter stops the output voltage. |

## 4.3.2 Basic operation procedures for external mode (00-16(P.79) = 0 or 2)

| Step | Description |
|---|---|
| 1 | • Change the operation mode to external mode, the screen will display OPnd<br>Note: 1.When00-16(P.79) =0, after the power is switched on or the inverter is reset, press MODE to switch to operation mode, the inverter willfirst go into the external mode, and then use ⊛ to switch to PU mode.<br>2. When 00-16(P.79) =2, external mode will be the default for the inverter.<br>3. For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • The target frequency is set by external terminals (the default priority is from high to low):<br>• If the programmable operating mode is chosen, please refer to Section 5.4.1Function selection of digital input and 5.5.2Programmed operation mode.<br>• If the target frequency is set by multi-speed stage levels, please refer to 04-00(P.4) in Chapter 5. |
| 3 | • Turn on STF or STR to run the motor.<br>• At this point, indicating lampRUN will glitter, indicating that the motor is running.<br>Note: 1. For setting up the starting terminals STF and STR, please refer to 00-15(P.78) in Chapter 5.1.8 and 5.4.1Function selection of digital input.<br>2. For detailed operation flow for the monitor mode, please refer to Section4.2.3.<br>3. If programmed operation mode is chosen, then STF and STR will become the starting signal and the pause signal, respectively, instead of being the Run Forward or Run Reverse terminals. |
| 4 | •Turn off STF or STR to decelerate the motor until it comes to a full stop.<br>• Indicating lamp RUNwill not turn off until the inverter stops the output voltage. |

### 4.3.3 Basic operation procedures for JOG mode (00-16(P.79) = 0 or 1)

| Step | Description |
|---|---|
| 1 | • Change the operation mode to the JOG mode and indicating lamp PU will light up. At this point, the screen will display JOG.<br>Note: For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • Press FWD or REV to run the motor. At this point, indicating lamp RUN will glitter, indicating that the motor is running.<br>• Release FWD or REV to decelerate the motor until it comes to a full stop.Indicating lamp RUN will not turn off until the inverter stops the output.<br>Note: 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3.<br>2. In the JOG mode, the target frequency is the value of 01-13(P.15), and the acceleration / deceleration time is the value of 01-14(P.16). Please refer to 01-13(P.15) in Chapter 5. |

### 4.3.4 Basic operation procedures for communication mode (00-16(P.79) = 3)

◆ In the communication mode, the user can set the parameters and run/stop or reset the inverters by communication. Please refer to communication function related parameters for details.

### 4.3.5 Basic operation procedures for combined mode 1 (00-16(P.79) = 4)

| Step | Description |
|---|---|
| 1 | • In Combined Mode 1, indicating lamp PU will light up.<br>Note: For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • Enter into the frequency setting mode and write the target frequency into memory.<br>Note: For detailed frequency setting procedures, please refer to Section4.2.4. |
| 3 | • Set the target frequency via PU302parameter unit and start the inverter by the digital input terminals.<br>•At this point, indicating lamp RUN will glitter, indicating that the motor is running.<br>Note: For detailed operation flow for the monitor mode, please refer to Section4.2.3. |
| 4 | • When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop.<br>• Indicating lamp RUN will not turn off until the inverter stops the output. |

### 4.3.6 Basic operation procedures for combined mode 2 (00-16(P.79) = 5)

| Step | Description |
|---|---|
| 1 | • In Combined Mode 2, indicating lamp PU will light up.<br>Note: For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • The target frequency is set by the external terminals (the default priority is from high to low):<br>• If the programmable operating mode is chosen, please refer to Section5.4.1 Function selection of digital input and 5.5.2 Programmed operation mode.<br>• If the target frequency is set by multi-speed stage levels, please refer to 04-00(P.4) in Chapter 5.<br>• If the target frequency is set by the input signal of terminal A2/B2 on PG board, please refer to 09-07(P.356) in Chapter 5.<br>• If the target frequency is set by PWM input pulse, please refer to Section 5.4.1.<br>• If the target frequency is set by the input signal across terminal 2-5, please refer to 02-09(P.38) in Chapter 5.<br>• If the target frequency is set by the input signal across terminal 4-5, please refer to 02-21(P.39) in Chapter 5.<br>• If the target frequency is set by the high-speed pulse input across terminal M2, please refer to Section 5.3.8. |
| 3 | • Press FWD or REV of PU302parameter unit to run the motor. At this point, indicating lamp RUN will glitter, indicating that the motor is running.<br>Note: 1.For detailed operation flow for the monitor mode, please refer to Section4.2.3.<br>2.While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed. |
| 4 | • Press STOP RESET and the motor will begin to decelerate until it comes to a full stop.<br>• Indicating lamp RUN will not turn off until the inverter stops the output. |

### 4.3.7 Basic operation procedures for combined mode 3(00-16(P.79) = 6)

| Step | Description |
|---|---|
| 1 | • In Combined Mode 3, indicating lamp PU will glitter<br>Note: For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • The target frequency is determined by communication:<br>•When RL, RM, RH and REX of multi-speed stage levels are “on”, the target frequency is determined by combination of multi-speed stage levels(Please refer to 04-00~04-02/P.4~P.6, 03-00~03-05/P.80~P.84、P.86).<br>•When external JOG is “on”, the target frequency is determined by 01-13(P.15). Acceleration / deceleration time is set by the value of 01-14(P.16). |
| 3 | •The inverter starting is activated by the external Run Forward or Run Reverse terminals.At this point, indicating lamp RUN will glitter, indicating that the motor is running.<br>•The functions of 00-02(P.996、P.998、P.999) can be accomplished by communication.<br>Note: For detailed operation flow for the monitor mode, please refer to Section 4.2.3. |
| 4 | •When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop.<br>• Indicating lamp RUN will not turn off until the inverter stops the output. |

### 4.3.8 Basic operation procedures for combined mode 4(00-16(P.79) = 7)

| Step | Description |
|---|---|
| 1 | • In Combined Mode 4, indicating lamp PU will glitter.<br>Note: For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | • The target frequency of the inverter is determined by the external terminals' "external voltage signal", "external current signal", or "combination of multi-speed stage levels". |
| 3 | •The inverter starting is activated by communication (including "Reset"). At this point, indicating lamp RUN will glitter, indicating that the motor is running.<br>Note: 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3.<br>2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed. |
| 4 | •When communication sends the stop instruction, the motor will decelerate until it comes to a full stop.<br>• Indicating lamp RUN will not turn off until the inverter stops the output. |

### 4.3.9 Basic operation procedures for combined mode 5(00-16(P.79) = 8)

| Step | Description |
|---|---|
| 1 | • In Combined Mode 5, indicating lamp PU will light up.<br>Note: For selecting and switching the operation mode, please refer to Section4.2. |
| 2 | •The target frequency of the inverter is set by PU302 parameter unit:<br>• When RL, RM, RH and REX of multi-speed stage levels are "on", the target frequency is determined by combination of multi-speed stage levels (please refer to04-00~04-02/P.4~P.6, 03-00~03-05/P.80~P.84 、 P.86, 03-06(P.126) 、 03-09(P.550)).<br>•When external JOG is "on", the target frequency is determined by 01-13(P.15). Acceleration / deceleration time is set by the value of 01-14(P.16). |
| 3 | •The inverter starting is activated by the external forward and reverse terminals.<br>Note: 1. For detailed operation flow for the monitor mode, please refer to Section 4.2.3.<br>2. While the motor is running, the user can enter into the frequency setting mode to change the target frequency for regulating the motor speed. |
| 4 | •When the digital input terminals stop the output signals, the motor will decelerate until it comes to a full stop.<br>• Indicating lamp RUN will not turn off until the inverter stops the output. |

### 4.3.10 Basic operation procedures for the second operation mode(00-16(P.79) = 99999)

◆ In the second operation mode, the target frequency is determined by 00-17(P.97)], and the operation instruction is determined by 00-18(P.109), please refer to Section 5.1.9 Operation mode selection for related description and Section 4.3.1~4.3.5 for related operation method.

# 4.4 Operation

## 4.4.1 Pre-operation checks and preparation

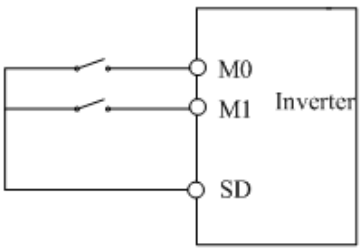
Before starting the operation, the following shall be examined:

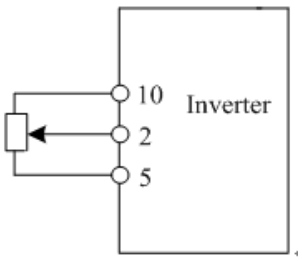
1. Check if the wiring is correct. Check especially the ac motor driver output terminals (U/T1, V/T2, W/T3), which cannot be connected to the power. Confirm that grounding terminal (⏚) is well grounded.
2. Check if there is a short circuit at the terminals or charged exposure.
3. Verify all terminal connections, and check if plug connectors (optional) and screws are all fastened.
4. Verify that no mechanical device is connected to the motor.
5. All switches must be disconnected before power on. Make sure that the inverter will not start and there is no abnormal activity when power on.
6. Turn on the power only after the cover is well placed.
7. Do not operate the switch with a wet hand.
8. Make sure of the following after power on:

   PU302parameter screen should be no fault display, both indicating lamp Hz and MON will light up.

## 4.4.2 Operation methods

For various operation methods, please refer to basic operation procedures in Chapter 4 and parameter description in Chapter 5.Select the most appropriate operation methods according to the application requirements and regulations. The most commonly used operation methods are shown below:

<table>
<tr><th>Operation method</th><th>Source of the target frequency</th><th>Source of the operating signal</th></tr>
<tr><td>parameter unit operation</td><td> </td><td>FWD or REV</td></tr>
<tr><td rowspan="2">External terminal signal operation</td><td> 

Parameter Setting :<br>04-01(P.5)=30<br>04-02(P.6)=10</td><td rowspan="2">Input by digital input terminal:<br>STF-SD<br>STR-SD</td></tr>
<tr><td> 

2-5 terminal input</td></tr>
</table>

## 4.4.3 Trial run

- Check cables and abnormalities before the trial run. After power on, the inverter is in the external mode.

  1. After power on, PU302parameter screen should be no fault display,make sure that the indicating lamp power and [MON] is on.
  2. Connect a switch between STF and SD or STR and SD.
  3. Connect a potentiometer between 2-5-10 or provide 0~5V dc between 2 and 5.
  4. Adjust potentiometer or 0~5V dc to a minimum value (under 1V).
  5. If STF is on, forward rotation is activated. If STR is on, reverse rotation is activated. Turn off STF or STR to decelerate the motor until it stops completely.
  6. Check the following:
     1).Whether the direction of motor rotation is correct.
     2).Whether the rotation is smooth (check for any abnormal noise and vibration).
     3).Whether the acceleration / deceleration is smooth.

- If there is an optional keyboard panel, do the following:

  1. Make sure that the keyboard panel is connected to the inverter properly.
  2. Change the operation mode to PU mode after power on, and the screen will display 50/60Hz.
  3. Press button to set the target frequency at about 5Hz.
  4. Press [FWD] for forward rotation and [REV] for reverse rotation. Press [STOP RESET] to decelerate the motor until it stops completely.
  5. Check the following:
     1)Whether the direction of motor rotation is correct.
     2)Whether the rotation is smooth (check for any abnormal noise and vibration).
     3) Whether the acceleration / deceleration is smooth.

- If no abnormal condition is found, continue the trial run by increasing the frequency and go through the above procedure. Put the machine into operation if no abnormal condition is found.

Note: Stop working immediately if abnormalities are found when running the inverter or the motor. Check for possible causes according to “fault diagnosis”. After inverter output is stopped and the power terminals (R/L1, S/L2, and T/L3) of the main circuit are disconnected, electric shock may occur if one touches the inverter’s output terminals (U/T1, V/T2, and W/T3).Even if the major loop power is cut off, there is still recharging voltage in the filter capacitors. As a result, discharge takes time. Once the major loop power is disconnected, wait for the power indicating lamp to go off before testing the intermediate dc loop with a dc voltage meter. Once the voltage is confirmed to be below the safe value, it is safe to touch the circuit inside the inverter.

# 5. PARAMETER DESCRIPTION

## 5.1 System parameter group00

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 00-00 | P.90 | The inverter model | Read | read | 61 |
| 00-01 | P.188 | Firmware version | Read | read | 61 |
| 00-02 | P.996 ~ P.999 | Parameter restoration | 0: Non-function<br>1: Alarm history clear (P.996=1)<br>2: Inverter reset (P.997=1)<br>3: Restoring all parameters to default values (P.998=1)<br>4: Restoring some parameters to default values1 (P.999=1)<br>5: Restoring some parameters to default values2 (P.999=2)<br>6: Restoring some parameters to default values3 (P.999=3) | 0 | 62 |
| 00-03 | P.77 | Selection of parameterswrite protection | 0: Parameters can be written only when the motor stops.<br>1: Parameters cannot be written.<br>2: Parameters can also be written when the motor is running.<br>3: Parameters cannot be written when in password protection. | 0 | 64 |
| 00-04 | P.294 | Decryption parameter | 0~65535 | 0 | 64 |
| 00-05 | P.295 | Password setup | 2~65535 | 0 | 64 |
| 00-06 | P.110 | Parameter unit monitoring selection | X0: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency.<br>X1: When the inverter starts, the screen of the parameter unit displays the target frequency.<br>X2: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system<br>0X：Boot screen to monitor model output frequency<br>1X：Boot screen to set the target frequency mode<br>2X：Boot screen to monitor model of output curren<br>3X：Boot screen to monitor mode of the output voltage | 1 | 68 |
| 00-07 | P.161 | Multi-function display | 0: Output voltage (V)<br>1: Inverter voltage between (+/P) and (-/N) terminals. (V)<br>2: Temperature rising accumulation rate of inverter (%)<br>3: Target pressure of the constant pressure system (%)<br>4: Feedback pressure of the constant pressure system (%) | 0 | 68 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 00-07 | P.161 | Multi-function display | 5: Operation frequency (Hz)<br>6: Electronic thermal accumulation rate (%)<br>7: Signal value (V) of 2-5 simulating input terminals.<br>8: Signal value (mA) of 4-5 simulating input terminals (mA/V).<br>9: Output power (kW).<br>10: Motor speed. (Hz)<br>11:Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state.<br>12: NTC temperature (℃)<br>13: Electronic thermal accumulation rate of motor (%)<br>14: Reserve.<br>15: Input frequency of terminal M2. (kHz)<br>16: Real-time curling radius value. (mm)<br>17: Real-time line speed. (m/min)<br>18: Output torque of inverter (%)(Validonly when 00-21 (P. 300) or 00-22 (P. 370) is set to 3 ~ 6 )<br>19: Digital terminal input state<br>20: Digital terminal output state<br>21: Actual working carrier frequency<br>22: Reserve.<br>23: Synchronousmotor rotor pole position ( Show the motor rotor magnetic pole position of the encoder only at 00-21 (P. 300) = 5 effective)<br>24：Current target frequency<br>25：PTC Enter the percentage<br>26：Target pressure and feedback the constant pressure system<br>27：Motor speed<br>28：Power factor<br>29：Power cumulative value(KWH)<br>30：PG feedback frequency | 0 | 68 |
| 00-08 | P.37 | Speed display | 0: Display output frequency(the mechanical speed is not displayed)<br>1~50000<br>1~9999 | 0.0 | 69 |
| 00-09 | P.259 | Custom decimal display | 0: Speed display selection unit is 1<br>1: Speed display selection unit is 0.1<br>0X: No decimal<br>1X: One decimal | 1 | 69 |
| 00-10 | Reserve | Reserve | Reserve | -- | --- |
| 00-11 | P.72 | Carrier frequency | 1~15KHz | 5 kHz | 70 |
| 00-12 | P.31 | Soft-PWM carrier operation selection | 0: None Soft-PWM operation<br>1: When 00-11(P.72)< 5, Soft-PWM is valid (only apply to V/F control ) | 0 | 70 |
| 00-13 | P.71 | Idling braking / DC braking | 0: Idling braking<br>1: DC braking | 1 | 70 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 00-14 | P.75 | Stop function selection | 0: Press STOP button and stop the operation only in the PU and H2 mode<br>1: Press STOP button and stop the operation in all mode. | 1 | 70 |
| 00-15 | P.78 | Forward/reverse rotation prevention selection | 0: Forward rotation and reverse rotation are both permitted.<br>1: Reverse rotation is prohibited (Press the reverse reference to decelerate and stop the motor).<br>2: Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor). | 0 | 71 |
| 00-16 | P.79 | Operation mode selection | 0: “PU mode”, “external mode” and “Jog mode” are interchangeable.<br>1: “PU mode” and “JOG mode” are interchangeable.<br>2: “External mode” only<br>3: “Communication mode” only<br>4: “Combined mode 1”<br>5: “Combined mode 2”<br>6: “Combined mode 3”<br>7: “Combined mode 4<br>8: “Combined mode 5”<br>99999: The second operation mode, operating instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97) | 0 | 72 |
| 00-17 | P.97 | The second target frequency selection | 0: Frequency set by parameter unit<br>1: Frequency set by Communication RS485<br>2: Frequency set by the analog<br>3: Frequency set by communication expansion card<br>4: Frequency set by PG board A2B2<br>5: Frequency set by HDIpulse | 0 | 72 |
| 00-18 | P.109 | The second start signal selection | 0: Operating signal set by parameter unit<br>1: Operating signal set by digital input terminal<br>2: Operating signal set by Communication RS485<br>3: Operating signal set by communication expansion card | 0 | 72 |
| 00-19 | P.35 | Communication mode instruction selection | 0: Incommunication mode, operating instruction and setting frequency is set by communication.<br>1: Incommunication mode, operating instruction and setting frequency is set by external. | 0 | 72 |

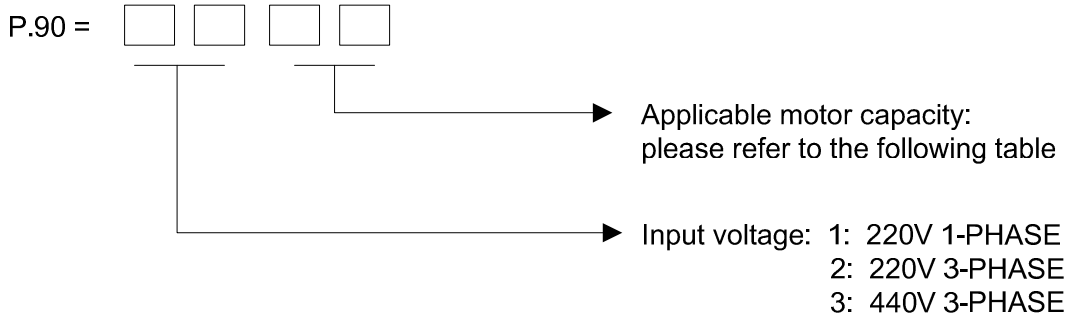
| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 00-20 | P.400 | Control mode selection | 0: Speed control<br>1: Torque control<br>2: Position control | 0 | 72 |
| 00-21 | P.300 | Motor control mode selection | 0: Induction motor V/F control<br>1: Induction motor close-loop V/F control (VF + PG)<br>2: Induction motor simple vector control<br>3: Induction motorsensorless vector control<br>4: Induction motorPG vector control<br>5: Synchronous motor PG vector control<br>6: Synchronous motor without PG vector control | 0 | 73 |
| 00-22 | P.370 | The second motor control mode selection | 0: Induction motorV/Fcontrol<br>1: Induction motorV/F close-loop control (VF+PG)<br>2: Induction motor simple vector control<br>3: Induction motorsensorless vector control<br>4: Induction motorPG vector control<br>5: Synchronous motor PG vector control<br>6: Synchronous motor without PG vector control<br>99999: The second motor control mode is not selected. | 99999 | 73 |
| 00-23 | P.186 | Motor types selection | 0: Normal Duty (ND), apply to the fans and water pump type duty.<br>1: Heavy Duty (HD), apply to other duties. | 1 | 74 |
| 00-24 | P.189 | 50Hz/60Hz switch selection | 0: The frequency parameter default valueis 60Hz system.<br>1: The frequency parameter default valueis 50Hz system. | 0<br>1 | 74 |
| 00-25 | P.990 | Parameter mode setting | 0: Parameter is displayed as “group mode”<br>1: Parameter is displayed as “conventional P mode” | 0 | 75 |
| 00-26 | P.125 | Expansion card type | Read | Read | 75 |
| 00-27 | P.991 | Frequency mode setting | 0: Normal mode<br>1: Highspeed mode | 0 | 75 |

## 5.1.1 Inverter information

➢ Inquire the inverter model, control board firmware version, and the connected expansion card, etc.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-00<br>P.90 | The inverter model | Read | Read | --- |
| 00-01<br>P.188 | Firmware version | Read | Read | The inverter control board firmware version |

◆ The inverter model




Read The applicable motor capacity:

| Value(value of the two low-order bits of 00-00) | Capacity (kw) |
|---|---|
| 4 | 0.4 |
| 5 | 1.5 |
| 6 | 2.2 |
| 7 | 3.7 |
| 8 | 5.5 |
| 9 | 7.5 |
| 10 | 11 |
| 11 | 15 |
| 12 | 18.5 |
| 13 | 22 |

Note: The parameters above are for reading only, not for writing.

## 5.1.2 Parameter restoration

➢ Restore the parameters to the default values.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-02 P.996 ~ P.999 | Parameter restoration | 0 | 0 | No function. |
| | | | 1 | Alarm history clear (P.996=1) |
| | | | 2 | Inverter reset (P.997=1) |
| | | | 3 | Restoring all parameters to default values (P.998=1) |
| | | | 4 | Restoring some parameters to default values1(P.999=1) |
| | | | 5 | Restoring some parameters to default values2(P.999=2) |
| | | | 6 | Restoring some parameters to default values3(P.999=3) |

Setting Parameter restoration

- 1: 00-02 is set to1, and the screen will display $E_r.CL$ after writing, the abnormal record will be erased, 00-02 is restoered to 0.
- 2: 00-02 is set to 1, and the screen will display $rESr$, the inverter will be reset.00-02 is restoered to 0.After resetting the inverter, the values of the two relays, “electronic thermal relay” and “IGBT module thermal relay”will be set to zero.
- 3: 00-02is set to3, and the screen will display $ALLC$, all the parameters will be restored to the default values except the parameters in the **table 1** below.After parameters are restored, 00-02 is restored to0.

***Exception***The parameters in **table 1** below will not be restored to the default values:

| Group | No. | Name |
|---|---|---|
| 00-00 | P.90 | The inverter model |
| 00-01 | P.188 | Firmware version |
| 00-24 | P.189 | 50Hz/60Hz switch selection |
| 01-08 | P.21 | Accelerate/Decelerate time increments |
| 03-59 | P.585 | Monitor noumenon digital input terminal state |
| 03-60 | P.586 | Monitor noumenon and expanded digital output terminal state |
| 03-62 | P.588 | Reserve |
| 03-61 | P.587 | Monitor expanded digital input terminal state |
| 06-27 | P.292 | Accumulative motor operation time (minutes) |
| 06-28 | P.293 | Accumulative motor operation time (days) |
| 06-29 | P.296 | Accumulative motor power time (minutes) |
| 06-30 | P.297 | Accumulative motor power time (days) |
| 06-31 | P.298 | Output power(low 16 position) |
| 06-32 | P.299 | Output power(high 16 position) |
| 06-44 | P.740 | E1 |
| 06-45 | P.741 | E2 |
| 06-46 | P.742 | E3 |

| Group | No. | Name |
|---|---|---|
| 06-47 | P.743 | E4 |
| 06-48 | P.744 | E5 |
| 06-49 | P.745 | E6 |
| 06-50 | P.746 | E7 |
| 06-51 | P.747 | E8 |
| 06-52 | P.748 | E9 |
| 06-53 | P.749 | E10 |
| 06-54 | P.750 | E11 |
| 06-55 | P.751 | E12 |
| 06-56 | P.752 | E1 alarm output frequency |
| 06-57 | P.753 | E1 alarm output current |
| 06-58 | P.754 | E1 alarm output voltage |
| 06-59 | P.755 | E1 alarm the temperature rising accumulation rate |
| 06-60 | P.756 | E1 alarm PN voltage |
| 06-61 | P.757 | E1 alarm the time of the inverter has run |
| 06-62 | P.758 | E1 alarm the inverter operation status code |
| 06-63 | P.759 | E1 alarm(years/months) |
| 06-64 | P.760 | E1 alarm (days/hours) |
| 06-65 | P.761 | E1 alarm (minutes/seconds) |
| 06-70 | P.766 | E2 alarm output frequency |

| Group | No. | Name |
|---|---|---|
| 06-71 | P.767 | E2 alarm output current |
| 06-72 | P.768 | E2 alarm output voltage |
| 06-73 | P.769 | E2 alarm the temperature rising accumulation rate |
| 06-74 | P.770 | E2 alarm PN voltage |
| 06-75 | P.771 | E2 alarm the time of inverter has run |
| 06-76 | P.772 | E2 alarm the inverter operation status code |

| Group | No. | Name |
|---|---|---|
| 06-77 | P.773 | E2 alarm (years/months) |
| 06-78 | P.774 | E2 alarm (days/hours) |
| 06-79 | P.775 | E2 alarm (minutes/seconds) |
| 09-13 | P.124 | Expansion card version |
| 13-02 | P.285 | Low frequency vibration inhibition factor |
| 13-03 | P.286 | High frequency vibration inhibition factor |
| | | |

- 4: 00-02 is set to4, and the screen will display P r.C r after writing, all the parameters will be restored to the default values except the parameters in the **table 1** and **table 2**below.After parameters are restored, 00-02is restored to0.

***Exception***The parameters in **table 2** below and **table 1**will not be restored to the default values:

| Group | No. | Name |
|---|---|---|
| 00-21 | P.300 | Motor control mode selection |
| 02-12 | P.192 | The minimum input positive voltage of 2-5 |
| 02-13 | P.193 | The maximum input positive voltage of 2-5 |
| 02-14 | P.194 | The percentage corresponding to the minimum positive voltage of terminal 2-5 |
| 02-15 | P.195 | The percentage corresponding to the maximum positive voltage of terminal 2-5 |
| 02-16 | P.512 | The minimum input negative voltage of 2-5 |
| 02-17 | P.513 | The maximum input negative voltage of 2-5 |
| 02-18 | P.510 | The percentage corresponding to the minimum negative voltage of termianl 2-5 |
| 02-19 | P.511 | The percentage corresponding to the maximum negative voltage of termianl 2-5 |
| 02-25 | P.198 | The minimum input current/voltage of 4-5 |
| 02-26 | P.199 | The maximum input current/voltage of 4-5 |
| 02-27 | P.196 | The percentage corresponding to the minimum input current/voltage of 4-5 |
| 02-28 | P.197 | The percentage corresponding to the maximum input current/voltage of 4-5 |
| 02-34 | P.548 | Reserve |
| 02-35 | P.549 | Reserve |
| 02-36 | P.546 | Reserve |
| 02-37 | P.547 | Reserve |
| 02-39 | P.524 | HDI input minimum frequency |
| 02-40 | P.525 | HDI input maximum frequency |
| 02-41 | P.522 | The percentage corresponding to HDI input minimum frequency |
| 02-42 | P.523 | The percentage corresponding to HDI input maximum frequency |
| 02-46 | P.191 | AM output gain |
| 02-47 | P.190 | AM output bias |

| Group | No. | Name |
|---|---|---|
| 02-49 | P.536 | Reserve |
| 02-50 | P.535 | Reserve |
| 02-59 | P.187 | FM calibration parameter |
| 05-00 | P.301 | Motor parameter auto-tuning function selection |
| 05-01 | P.302 | Motor rated power |
| 05-02 | P.303 | Motor poles |
| 05-03 | P.304 | Motor rated voltage |
| 05-04 | P.305 | Motor rated frequency |
| 05-05 | P.306 | Motor rated current |
| 05-06 | P.307 | Motor rated rotation speed |
| 05-07 | P.308 | Motor excitation current |
| 05-08 | P.309 | IM motor stator resistance |
| 05-09 | P.310 | IM motor rotor resistance |
| 05-10 | P.311 | IM motor leakage inductance |
| 05-11 | P.312 | IM motor mutual inductance |
| 05-12 | P.313 | PM motor stator resistance |
| 05-13 | P.314 | PM motor d-axis inductance |
| 05-14 | P.315 | PM motor q-axis inductance |
| 05-15 | P.316 | PM motor Back-EMF coefficient |
| 05-16 | P.317 | PM motor PhaseZ origin pulse compensation |
| 05-17 | P.318 | Rotation inertia |
| 11-00 | P.320 | Speed control proportion coefficient 1 |
| 11-01 | P.321 | Speed control integral time 1 |
| 11-02 | P.322 | PI coefficient switching frequency 1 |
| 11-03 | P.323 | Speed control proportion coefficient 2 |
| 11-04 | P.324 | Speed control integral time 2 |
| 11-05 | P.325 | PI coefficient switching frequency 2 |
| 11-06 | P.326 | Current control proportion coefficient |
| | | |

- 5: User registered parameter15-00~15-19will not be restored to the default value,During 15-00~15-19, the corresponding parameter valuesof setting parameter number and the parameters in **table 1** above will not be restored to the default values.After parameters are restored, 00-02 is restored to 0.
- 6: User registered parameter 15-00~15-19will not be restored to the default value, During 15-00~15-19, the corresponding parameter values of setting parameter number and the parameters in **table 1** and **table 2** above will not be restored to the default values.After parameters are restored, 00-02 is restored to 0.

Note: When restoring all or some to default values, please be sure that the screen displays End, which means parameters has been restored to factory values, and then execute other operations.

## 5.1.3 Parameter protection

- Whether to enable the writing to various parameters or not can be selected. Use this function to prevent parametervalues from being rewritten by misoperation.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-03 P.77 | Selection of parameters write protection | 0 | 0 | Parameters can be written only when the motor stops. |
| | | | 1 | Parameters cannot be written. |
| | | | 2 | Parameters can also be written when the motor is running. |
| | | | 3 | Parameters cannot be written when in password protection. |
| 00-04 P.294 | Decryption parameter | 0 | 0~65535 | Write the registered password to decrypt the parameter protection. |
| 00-05 P.295 | Password setup | 0 | 0~65535 | Register password for parameter protection setting. |

Setting Parameter writeprotection selection

- Writing parameters only during stop(00-03="0"initial value)

***Exception***During operation, the parameters below can be written:

| Group | No. | Name |
|---|---|---|
| 00-03 | P.77 | Selection ofparameters write protection |
| 00-07 | P.161 | Multi-function display |
| 02-04 | P.54 | Function of terminal AM output |
| 02-05 | P.537 | Reserve |
| 02-12 | P.192 | The minimum input positive voltage of 2-5 |
| 02-13 | P.193 | The maximum input positive voltage of 2-5 |
| 02-14 | P.194 | The percentage corresponding to the minimum positive voltage of terminal 2-5 |
| 02-15 | P.195 | The percentage corresponding to the maximum positive voltage of terminal 2-5 |
| 02-16 | P.512 | The minimum input negative voltage of 2-5 |
| 02-17 | P.513 | The maximum input negative voltage of 2-5 |

| Group | No. | Name |
|---|---|---|
| 02-18 | P.510 | The percentage corresponding to the minimum negative voltage of termianl 2-5 |
| 02-19 | P.511 | The percentage corresponding to the maximum negative voltage of termianl 2-5 |
| 02-25 | P.198 | The minimum input current/voltage of 4-5 |
| 02-26 | P.199 | The maximum input current/voltage of 4-5 |
| 02-27 | P.196 | The percentage corresponding to the minimum input current/voltage of 4-5 |
| 02-28 | P.197 | The percentage corresponding to the maximum input current/voltage of 4-5 |
| 02-34 | P.548 | Reserve |
| 02-35 | P.549 | Reserve |

| Group | No. | Name |
|---|---|---|
| 02-36 | P.546 | Reserve |
| 02-37 | P.547 | Reserve |
| 02-39 | P.524 | HDI input minimum frequency |
| 02-40 | P.525 | HDI input maximum frequency |
| 02-41 | P.522 | The percentage corresponding to HDI input minimum frequency |
| 02-42 | P.523 | The percentage corresponding to HDI input maximum frequency |
| 02-44 | P.543 | FM output function selection |
| 02-45 | P.64 | AM output signal selection |
| 02-46 | P.191 | AM output gain |
| 02-47 | P.190 | AM output bias |
| 02-48 | P.538 | Reserve |
| 02-49 | P.536 | Reserve |
| 02-50 | P.535 | Reserve |
| 02-51 | P.55 | Frequency display reference when in the analog output |
| 02-52 | P.56 | Current monitoring reference when in the analog output |
| 02-55 | P.592 | PT100 voltage level 1 |
| 02-56 | P.593 | PT100 voltage level 2 |
| 02-59 | P.187 | FM calibration parameter |
| 04-00 | P.4 | Speed1(high speed) |
| 04-01 | P.5 | Speed2(mediumspeed) |
| 04-02 | P.6 | Speed3(low speed) |
| 04-03 | P.24 | Speed4 |
| 04-04 | P.25 | Speed5 |
| 04-05 | P.26 | Speed6 |
| 04-06 | P.27 | Speed7 |
| 04-07 | P.142 | Speed8 |
| 04-08 | P.143 | Speed9 |
| 04-09 | P.144 | Speed10 |
| 04-10 | P.145 | Speed11 |
| 04-11 | P.146 | Speed12 |
| 04-12 | P.147 | Speed13 |

| Group | No. | Name |
|---|---|---|
| 04-13 | P.148 | Speed14 |
| 04-14 | P.149 | Speed15 |
| 04-19 | P.131 | Programmed operation mode speed 1 |
| 04-20 | P.132 | Programmed operation mode speed 2 |
| 04-21 | P.133 | Programmed operation mode speed 3 |
| 04-22 | P.134 | Programmed operation mode speed 4 |
| 04-23 | P.135 | Programmed operation mode speed 5 |
| 04-24 | P.136 | Programmed operation mode speed 6 |
| 04-25 | P.137 | Programmed operation mode speed 7 |
| 04-26 | P.138 | Programmed operation mode speed 8 |
| 06-17 | P.261 | Maintenance alarm function |
| 06-40 | P.288 | Alarm code query |
| 06-42 | P.290 | Alarm message query |
| 08-03 | P.225 | PID target value panel reference |
| 08-16 | P.221 | Reserve |
| 08-17 | P.222 | Reserve |
| 08-18 | P.223 | Reserve |
| 08-19 | P.224 | Reserve |
| 10-19 | P.230 | Dwell frequency at acceleration |
| 10-21 | P.232 | Dwell frequency at deceleration |
| 10-45 | P.267 | Regeneration and avoidance operation selection |
| 10-46 | P.268 | Regeneration and avoidance DC bus voltage level |
| 10-47 | P.269 | DC bus voltage detection sensitivity at deceleration |
| 10-48 | P.270 | Regeneration and avoidance frequency compensation value |
| 10-49 | P.271 | Regeneration avoidance voltage gain coefficient |
| 10-50 | P.272 | Regeneration avoidance frequency gain coefficient |
| 11-12 | P.401 | Torque reference |
| 14-05 | P.605 | Tension setting |
| 14-45 | P.657 | Line speed setting |

- The parameters cannot be written. (00-03="1")
- ***Exception*** The parameters below can be written.

| Group | No. | Name |
|---|---|---|
| 00-03 | P.77 | Selection of parameters write protection |

| Group | No. | Name |
|---|---|---|
| 00-16 | P.79 | Operation mode selection |

- During operation, the parameters below can also be written.(00-03="2")

***Exception*** During operation, the parameters below cannot be written:

| Group | No. | Name |
|---|---|---|
| 00-00 | P.90 | The inverter model |
| 00-01 | P.188 | Firmware version |
| 00-11 | P.72 | Carrier frequency |
| 00-15 | P.78 | Forward/reverse rotation prevention selection |
| 00-16 | P.79 | Operation mode selection |
| 00-26 | P.125 | Expansion card type |
| 03-59 | P.585 | Monitor noumenon digital input terminal state |
| 03-60 | P.586 | Monitor noumenon and expanded digital output terminal state |
| 03-61 | P.587 | Monitor expanded digital input terminal state |
| 03-62 | P.588 | Reserve |
| 06-01 | P.22 | Stall prevention operation level |
| 06-08 | P.155 | Over torque detection level |
| 06-11 | P.160 | Stall level when restart |
| 06-21 | P.705 | Low voltage level |
| 06-22 | P.706 | Regenerative brake operation level |
| 06-23 | P.707 | Regenerative brake operation level |
| 06-26 | P.710 | Capacitor lifetime detection level |
| 06-27 | P.292 | Accumulative motor operation time(minutes) |
| 06-28 | P.293 | Accumulative motor operation time (days) |
| 06-29 | P.296 | Accumulative motor power time (minutes) |
| 06-30 | P.297 | Accumulative motor power time (days) |
| 06-31 | P.298 | Output power(low 16 position) |
| 06-32 | P.299 | Output power(high 16 position) |
| 06-41 | P.289 | Alarm code display |
| 06-43 | P.291 | Alarm message display |
| 06-44 | P.740 | E1 |
| 06-45 | P.741 | E2 |
| 06-46 | P.742 | E3 |
| 06-47 | P.743 | E4 |
| 06-48 | P.744 | E5 |
| 06-49 | P.745 | E6 |

| Group | No. | Name |
|---|---|---|
| 06-50 | P.746 | E7 |
| 06-51 | P.747 | E8 |
| 06-52 | P.748 | E9 |
| 06-53 | P.749 | E10 |
| 06-54 | P.750 | E11 |
| 06-55 | P.751 | E12 |
| 06-56 | P.752 | E1 alarm output frequency |
| 06-57 | P.753 | E1 alarm output current |
| 06-58 | P.754 | E1 alarm output voltage |
| 06-59 | P.755 | E1 alarm the temperature rising accumulation rate |
| 06-60 | P.756 | E1 alarm PN voltage |
| 06-61 | P.757 | E1 alarm the time of inverter has run |
| 06-62 | P.758 | E1 alarm inverter operation status code |
| 06-63 | P.759 | E1 alarm(years/months) |
| 06-64 | P.760 | E1 alarm (days/hours) |
| 06-65 | P.761 | E1 alarm (minutes/seconds) |
| 06-70 | P.766 | E2 alarm output frequency |
| 06-71 | P.767 | E2 alarm output current |
| 06-72 | P.768 | E2 alarm output voltage |
| 06-73 | P.769 | E2 alarm the temperature rising accumulation rate |
| 06-74 | P.770 | E2 alarm PN voltage |
| 06-75 | P.771 | E2 alarm the time of inverter has run |
| 06-76 | P.772 | E2 alarm inverter operation status code |
| 06-77 | P.773 | E2 alarm (years/months) |
| 06-78 | P.774 | E2 alarm (days/hours) |
| 06-79 | P.775 | E2 alarm (minutes/seconds) |
| 07-17 | P.802 | CANopen communication status |
| 07-18 | P.803 | CANopen control status |
| 09-13 | P.124 | Expansion card version |
| 10-52 | P.265 | Overexcitation current level |
| 11-13 | P.402 | Speed limit |
| 11-14 | P.403 | Speed limit bias |
| 14-20 | P.618 | Current value of curling radius |
| 14-32 | P.630 | Actual line speed |

◆ When in password protection, parameters cannot be read. (00-03="3")

***Exception***The parameters below can still be read:

| Group | No. | Name |
|---|---|---|
| 00-00 | P.90 | The inverter model |
| 00-01 | P.188 | Firmware version |
| 00-05 | P.295 | Password setup |

| Group | No. | Name |
|---|---|---|
| 00-16 | P.79 | Operation mode selection |
| 00-25 | P.990 | Parameter mode setting |
| 00-26 | P.125 | Expansion card type |

| Group | No. | Name |
|---|---|---|
| 00-08 | P.37 | Speed display |
| 01-00 | P.1 | Maximum frequency |
| 01-01 | P.2 | Minimum frequency |
| 03-59 | P.585 | Monitor noumenon digital input terminal state |
| 03-60 | P.586 | Monitor noumenon and expanded digital output terminal state |
| 03-61 | P.587 | Monitor expanded digital input terminal state |
| 03-62 | P.588 | Reserve |
| 06-26 | P.710 | Capacitor lifetime detection level |
| 06-41 | P.289 | Alarm code display |
| 06-43 | P.291 | Alarm message display |
| 06-44 | P.740 | E1 |
| 06-45 | P.741 | E2 |
| 06-46 | P.742 | E3 |
| 06-47 | P.743 | E4 |
| 06-48 | P.744 | E5 |
| 06-49 | P.745 | E6 |
| 06-50 | P.746 | E7 |
| 06-51 | P.747 | E8 |
| 06-52 | P.748 | E9 |
| 06-53 | P.749 | E10 |
| 06-54 | P.750 | E11 |
| 06-55 | P.751 | E12 |
| 06-56 | P.752 | E1 alarm output frequency |
| 06-57 | P.753 | E1 alarm output current |

| Group | No. | Name |
|---|---|---|
| 00-27 | P.991 | Frequency mode setting |
| 06-58 | P.754 | E1 alarm output voltage |
| 06-59 | P.755 | E1 alarm the temperature rising accumulation rate |
| 06-60 | P.756 | E1 alarm PN voltage |
| 06-61 | P.757 | E1 alarm the time of inverter has run |
| 06-62 | P.758 | E1 alarm inverter operation status code |
| 06-63 | P.759 | E1 alarm(years/months) |
| 06-64 | P.760 | E1 alarm (days/hours) |
| 06-65 | P.761 | E1 alarm (minutes/seconds) |
| 06-70 | P.766 | E2 alarm output frequency |
| 06-71 | P.767 | E2 alarm output current |
| 06-72 | P.768 | E2 alarm output voltage |
| 06-73 | P.769 | E2 alarm the temperature rising accumulation rate |
| 06-74 | P.770 | E2 alarm PN voltage |
| 06-75 | P.771 | E2 alarm the time of inverter has run |
| 06-76 | P.772 | E2 alarm inverter operation status code |
| 06-77 | P.773 | E2 alarm (years/months) |
| 06-78 | P.774 | E2 alarm (days/hours) |
| 06-79 | P.775 | E2 alarm (minutes/seconds) |
| 07-17 | P.802 | CANopen communication status |
| 07-18 | P.803 | CANopen control status |
| 09-13 | P.124 | Expansion card version |
| 14-20 | P.618 | Current value of curling radius |
| 14-32 | P.630 | Actual line speed |
| | | |

Setting Password protection

- Registering a password
  1. Write a number (2 ~ 65535) in 00-05as a password, password protection takes effect immediately;
  2. After registering a password,00-05=1;
- Unlocking password protection
  1. Write the correct password in 00-04, and then password protection will be unlocked;
  2. After unlocking the password, 00-04=0, 00-05=1;
  3. If turn the inverter power off and then turn on, it will still restore to the password protection status.
- Password all clear
  1. Write the correct password in 00-04 to unlock the password protection;
  2. Write 0 in 00-05, password will be all cleared.

Note: Please keep the password properly. Bring the inverter to the factory for decryption if the password is forgotten.

## 5.1.4 Monitoring function

- The item to be displayed on the parameter unitcan beselected.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-06 P.110 | Parameter unit monitoring selection | 1 | X0 | When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency. |
| | | | X1 | When the inverter starts, the screen of the parameter unit displays the target frequency. |
| | | | X2 | When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system |
| | | | 0X | Boot screen to monitor model output frequency |
| | | | 1X | Boot screen to set the target frequency mode |
| | | | 2X | Boot screen to monitor model of output current |
| | | | 3X | Boot screen to monitor mode of the output voltage |
| 00-07 P.161 | Multi-function display | 0 | 0 | Output voltage (V) |
| | | | 1 | Inverter voltage between (+/P) and (-/N) terminals. (V) |
| | | | 2 | Temperature rising accumulation rate of inverter (%) |
| | | | 3 | Target pressure of the constant pressure system (%) |
| | | | 4 | Feedback pressure of the constant pressure system (%) |
| | | | 5 | Operation frequency (Hz) |
| | | | 6 | Electronic thermal accumulation rate (%) |
| | | | 7 | Signal value (V) of 2-5 simulating input terminals. |
| | | | 8 | Signal value (mA) of 4-5 simulating input terminals (mA/V). |
| | | | 9 | Output power (kW). |
| | | | 10 | Motor speed. (Hz) |
| | | | 11 | Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state. |
| | | | 12 | NTC temperature (℃) |
| | | | 13 | Electronic thermal accumulation rate of motor (%) |
| | | | 14 | Reserve. |
| | | | 15 | Input frequency of terminal M2. (kHz) |
| | | | 16 | Real-time curling radius value. (mm) |
| | | | 17 | Real-time line speed. (m/min) |
| | | | 18 | Output torque of inverter (%)(Validonly when 00-21 (P. 300) or 00-22 (P. 370) is set to 3 ~ 6 ) |
| | | | 19 | Digital terminal input state |
| | | | 20 | Digital terminal output state |
| | | | 21 | Actual working carrier frequency |
| | | | 22 | Reserve. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-07 P.161 | Multi-function display | 0 | 23 | Synchronousmotor rotor pole position ( Show the motor rotor magnetic pole position of the encoder only at 00-21 (P. 300) = 5 effective) |
| | | | 24 | Current target frequency |
| | | | 25 | PTC Enter the percentage |
| | | | 26 | Target pressure and feedback the constant pressure system |
| | | | 27 | motor speed |
| | | | 28 | Power factor |
| | | | 29 | Power cumulative value(KWH) |
| | | | 30 | PG feedback frequency |

Note: 1. The “output frequency” here is the value after slip compensation.

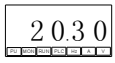
2. Set the boot screen for the target frequency mode, the "FWD" or "REV" or "STOP" button will cut images for the target frequency setting mode.

3.The multi-function display selection is realized in the monitoring voltage mode. Please refer to Section 4.2.3for monitoring mode selection

4. Please refer to 5.4.15 for the sort of terminal, 03-59(P.585) for digital terminal input state, 03-60(P.586) for digital output teriminal state.

Display Parameter unitmonitoring selection

◆ Display the current target pressure and feedback pressure of the constant pressure system(00-06=“2”).

At this point, the screen display shows two sections. A decimal point is used to separate the boundaries. What is on the left is the target pressure of the constant pressure system and what is on the right is the feedback pressure of the constant pressure system. As is shown in this figure, 

, 20 denotes that the target pressure of the constant pressure system is 2.0kg/cm$^3$; 30 denotes that the feedback pressure of the constant pressure system is 3.0kg/cm$^3$.

Display Multi-function display

◆ The multi-function display selection is realized in the monitoring voltage mode. Please refer to4.2.3The operation flow charts for monitoring mode with PU302 for for monitoring mode selection.

## 5.1.5 Speed display

➢ In the mode of “monitoring output frequency”, the screen displays the corresponding machine speed.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-08 P.37 | Speed display | 0.0 | 0 | 0: Display output frequency(the mechanical speed is not displayed) |
| | | | 0.1~5000.0 | When 00-09=1 |
| | | | 1~50000 | When 00-09=0 |
| 00-09 P.259 | Speed unit selection | 1 | X0 | Speed display selection unit is 1 |
| | | | X1 | Speed display selection unit is 0.1 |
| | | | 0X | 0X: No decimal |
| | | | 1X | 1X: One decimal |

Setting Speed display

- The setting value of 00-08 is the machine speed of the inverter when its output frequency is 60Hz.
  For example:
  1. If the transmitting belt speed is 950 m/minute when the inverter output frequency is 60Hz, set 00-08 = 950.
  2. After setting, in the “output frequency monitoring mode” of parameter unit, the screen will display the speed of the transmitting belt.

Note: The machine speed on the screen is the theoretical value calculated proportionately by the inverter output frequency and the setting value of 00-08. So there’s minute discrepancy between the displayed machine speed and the actual one.

## 5.1.6 PWMcarrier frequency

- The motor sound can be changed by adjusting PWM carrier frequency properly.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-11 P.72 | Carrier frequency | 5kHz | 1~15 kHz | --- |
| 00-12 P.31 | Soft-PWM carrier operation selection | 0 | 0 | None Soft-PWM operation |
| | | | 1 | When 00-11(P.72)< 5, Soft-PWM is valid(only apply to V/F control ) |

Setting Carrier frequency

- The higher the carrier frequency, the lower the motor acoustic noise. Unfortunately, it will result in greater leakage current and larger noises generated by the inverter.
- The higher the carrier frequency, the more energy dissipated, and the higher the temperature of the inverter.
- In case of a mechanical resonance occurring in a system within the inverter, P.72 is helpful for improving the performance by adjusting its value.

Note: The optimum carrier frequency shall be 8 times greater than the target frequency.

Setting Carrier operation selection**V/F**

- Soft-PWM control is a control method that changes the motor noise from a metallic sound into an inoffensive, complextone.
- Motor noise modulation control is when the inverter varies its carrier frequency from time to time during the operation. The metal noises generated by the motor are not a single frequency. This function selection is to improve the high peak single frequency noises.
- This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

## 5.1.7 Stop operation selection

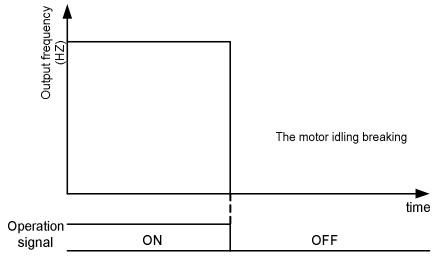
- Select the inverter stop operation

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-13 P.71 | Idling braking / DC braking | 1 | 0 | Idling braking |
| | | | 1 | DC braking |
| 00-14 P.75 | STOP RESET function selection | 1 | 0 | Press STOP RESET button and stop the operation only in the PU and H2 (combined mode 2)mode |
| | | | 1 | Press STOP RESET button and stop the operation in all mode. |

Setting Idling braking / linear braking

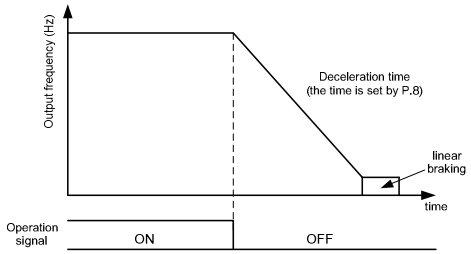
- Idling braking(00-13="0")

  The inverter will terminate the output immediately after the stop siganl is accepted, and the motor will be "racing".




- Linear braking(00-13="1")

  The output of the inverter will follow the acceleration / deceleration curve to decelerate until stop after the stop signal is accepted.




Setting STOP/RESET button function selection

- STOP/RESET to stop the operation.(00-14="1")

  ***Notice*** In any modes except the PU and the H2 mode, the motor can be stopped by pressing STOP/RESET. The inverter then displays E0 and all functions of the inverter are disabled. To unlock the state, follow the procedures below:

  1. If the start signal is the digital input terminal, it is necessary to cancel the digital input start signal given(Note1);
  2. Press STOP/RESET button for over 1.0 second to remove E0 state.

- No matter in which setting, press STOP/RESET button for over 1.0 second to reset the inverter after the alarm occurs.

Note: 1. In the programmed operation mode, it is not necessary to cancel the start signal.The inverter will run at the section where it stopped after reset.)

2.After resetting the inverter, the values of the two relays of "electronic thermal relay" and "IGBT module thermal relay" will be set to zero.

## 5.1.8 Forward/reverse rotation prevention selection

- Set this parameter to limit the motor rotation to only one direction, and prevent reverse rotation fault resulting from the incorrect input of the start signal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-15 P.78 | Forward/reverse rotation prevention selection | 0 | 0 | Forward rotation and reverse rotation are both permitted. |
| | | | 1 | Reverse rotation is prohibited (Press the reversereference to decelerate and stop the motor). |
| | | | 2 | Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor). |

Note: It is valid to all start signals.

## 5.1.9 Operation mode selection

➢ Select the operation mode of the inverter, and determine the source of start signal and target frequency.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-16 P.79 | Operation mode selection | 0 | 0 | “PU mode”, “external mode” and “Jog mode” are interchangeable. |
| | | | 1 | “PU mode” and “JOG mode” are interchangeable. |
| | | | 2 | “External mode” only |
| | | | 3 | “Communication mode” only |
| | | | 4 | “Combined mode 1” |
| | | | 5 | “Combined mode 2” |
| | | | 6 | “Combined mode 3” |
| | | | 7 | “Combined mode 4 |
| | | | 8 | “Combined mode 5” |
| | | | 99999 | The second operation mode, operating instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97) |
| 00-17 P.97 | The second target frequency selection | 0 | 0 | Frequency set by parameter unit |
| | | | 1 | Frequency set by Communication RS485 |
| | | | 2 | Frequency set by the analog |
| | | | 3 | Frequency set by communication expansion card |
| | | | 4 | Frequency set by PG board A2B2 |
| | | | 5 | Frequency set by HDIpulse |
| 00-18 P.109 | The second start signal selection | 0 | 0 | Operating signal set by parameter unit |
| | | | 1 | Operating signal set by digital input terminal |
| | | | 2 | Operating signal set by Communication RS485 |
| | | | 3 | Operating signal set by communication expansion card |
| 00-19 P.35 | Communication mode instruction selection | 0 | 0 | Incommunication mode, operating instruction and setting frequency is set by communication. |
| | | | 1 | Incommunication mode, operating instruction and setting frequency is set by external. |

Setting Operation mode selection

◆ Please refer to Section 4.3 for the detailed setting and usage.

Setting Communication mode instruction selection

◆ When 00-16=3, select communication mode:
1. If 00-19=0, operating instruction and speed instruction is set by communication;
2. If 00-19=1, operating instruction and speed instruction is set by external.

## 5.1.10 Control mode selection

➢ Select the control mode by setting 00-20(P.400).

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-20 P.400 | Control mode selection | 0 | 0 | Speed control |
| | | | 1 | Torque control |
| | | | 2 | Position control |

Setting Control mode selection

- When 00-20=0, the torque control is invalid and the inverter will do the general close-loop vector speed control; when 00-20=1, the torque control is valid and the inverter will do the torque control. When the torque control is valid, the inverter need to work in the mode of close-loop vector control and the speed encoder must be installed. And if the Torque reference is larger than the load torque, the motor will accelerate until the motor speed is equal to the speed limit. Now the inverter will switch to speed control mode to avoid accelerating the motor continually.
- When 00-20control mode selection is used in concert with digital input function, please set as the following sheet.

| 00-20 | Digital input function | | Control mode |
|---|---|---|---|
| | Switch of speed/torque control | Switch of position/speed control | |
| 0 | Not set | Not set | Speed control |
| 1 | Not set | Not set | Torque control |
| 2 | Not set | Not set | Position control |
| 0 | Setting, correspondent terminal ON | --- | Torque control |
| 0 | Setting, correspondent terminalOFF | --- | Speed control |
| 2 | --- | Setting, correspondent terminal ON | Position control |
| 2 | --- | Setting, correspondent terminal OFF | Speed control |

## 5.1.11 Motor control mode selection

- Determine the control mode of the selected AC motor inverter

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-21 P.300 | Motor control mode selection | 0 | 0 | Induction motor V/F control |
| | | | 1 | Induction motor close-loop V/F control (VF + PG) |
| | | | 2 | Induction motor simple vector control |
| | | | 3 | Induction motorsensorless vector control |
| | | | 4 | Induction motorPG vector control |
| | | | 5 | Synchronous motor PG vector control |
| | | | 6 | Synchronous motor without PG vector control |
| 00-22 P.370 | The second motor control mode selection | 99999 | 0 | Induction motor V/Fcontrol |
| | | | 1 | Induction motor V/F close-loop control (VF+PG) |
| | | | 2 | Induction motor simple vector control |
| | | | 3 | Induction motorsensorless vector control |
| | | | 4 | Induction motor PG vector control |
| | | | 5 | Synchronous motor PG vector control |
| | | | 6 | Synchronous motor without PG vector control |
| | | | 99999 | The second motor control mode is not selected. |

Setting Motor control mode

- Induction motor V/F control: user can design proportion of V/F as required and can control multiple motors simultaneously.
- Induction motor close-loop V/F control (VF + PG): user can use optional PG card with encoder for the closed-loop speed control.
- Induction motor simple vector control: The frequency will be altered due to elevated voltage and increased compensatory motor load.
- Induction motor sensorless vector control: get the optimal control by the auto-tuning of motor parameters.
- Induction motor PG vector control: besides torque increases, the speed control will be more accurate.

- Synchronous motor PG vector control: besides torque increases, the speed control will be more accurate.
- Synchronous motor without PG vector control: get the optimal control by the auto-tuning of motor parameters.

Note: 1. The motor capacity has to be at the same level or one level below of the level of the capacity of the inverter.
2. Sensorless vector control: Auto-tuning function can be used to enhance the control function. Before setting 00-21= 3 or 4, first set the motor parameters or the auto-tuning function to improve the control accuracy.
3. When 00-21=1 and the mode of close-loop V/F control (VF + PG) is selected, please make sure that the motor poles 05-02 is correct.
4. When 10-03(P.151) =1, zero-speed operation is executed under the motor closed-loop control; DC voltage brake is executed under the IM motor V/F closed-loop control.
5. When 00-22 ≠ 99999, and RTsignal is ON, the second motor parameter 05-22~05-38 is valid, please refer to Section 5.2.10 for the second function parameter.
6. RT metioned here is the function name of “multi-function digital input terminal”. Please refer to 03-00~03-05/P.80~P.84, P.86 for the function selection of multi-function digital input terminal; please refer to Section 3.5 for related wiring.

## 5.1.12 Motor types selection

- Modify the load pattern of the inverter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-23 P.186 | Motor types selection | 1 | 0 | Normal Duty (ND), apply to the fans and water pump type duty. |
| | | | 1 | Heavy Duty (HD), apply to other duties. |

Setting Motor types selection

- If setting Normal Duty (00-23=“0”), please execute the following steps. Load pattern will be switched after the steps.
  1. Set 00-23=0;
  2. Execute 00-02 to return to the default value.;
  3. Execute the reset function of 00-02.

## 5.1.13 50/60Hz switch selection

- According to different power frequency and the default motor frequency, frequency-related parameters which are 50Hz or 60Hz can be selected.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-24 P.189 | 50/60Hz switch selection | 0 | 0 | The frequency parameter default valueis 60Hz system. |
| | | 1 | 1 | The frequency parameter default valueis 50Hz system. |

Setting 50/60Hz switch selection

- If the customer would like to set frequency related parameter to 60Hzsystem (00-24=”0”), please follow the following two steps.
  1. Set 00-24=0;
  2. Set 00-02 to the factory default value (at this point, frequency-related parameters of the inverter will be reset to 60Hz.

◆ The affected parameters are as follows:

| Group | No. | Name |
|---|---|---|
| 01-03 | P.3 | Base frequency |
| 01-09 | P.20 | Accelerate/decelerate reference frequency |
| 02-09 | P.38 | 2-5 maximum operation frequency |
| 02-21 | P.39 | The maximum operation frequency of terminal 4-5 |
| 02-30 | P.508 | Reserve |
| | | |

| Group | No. | Name |
|---|---|---|
| 02-51 | P.55 | Frequency display reference when in the analog output |
| 05-03 | P.304 | Motor rated voltage |
| 05-04 | P.305 | Motor rated frequency |
| 05-06 | P.307 | Motor rated rotation speed |
| 06-03 | P.66 | Stall prevention operation reduction starting frequency |
| 10-41 | P.701 | VF separated voltage digital |

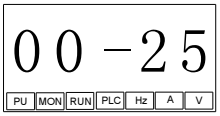
## 5.1.14 Parameter mode setting

➢ Select “order number” or “parameter group” to display parameters.

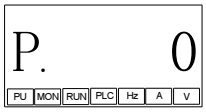
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-25<br>P.990 | Parameter mode setting | 0 | 0 | Parameter is displayed as “group mode” |
| | | | 1 | Parameter is displayed as “conventional P mode” |

Display Parameter mode setting

◆ “Parameter group” displaying




◆ “Order number” displaying




## 5.1.15 Operating mode setting

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-27<br>P.991 | Frequency mode setting | 0 | 0-1 | 0:Normal mode<br>1:Highspeed mode |

## 5.1.16 Expansion card type display

➢ This parameter is used to check the expansion card type, and cannot be modified.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 00-26<br>P.125 | Expansion card type | Read | Read | It is used to display the current expansion card type, for read only. |

Read The current expansion card type

◆ High level is for all no card status, i.e, all the bits are 1.
◆ The definition of each bit of 00-26 (P.125) is as follows:

| bit | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|---|---|---|---|---|
| | bit 3 | bit 2 | bit 1 | bit 0 |

◆ The values for all kinds of expansion cards are as the following table：

| Expansion card type | Model | Expansion card |
|---|---|---|
| Communication Expansion card | PD301 | 0 1 0 1 |
| | DN301 | 1 0 0 1 |
| | CP301 | 1 1 0 1 |
| | EP301 | 0 0 1 1 |
| I/OExpansion card | EB362R | 1 0 1 0 |
| | EB308R | 0 1 1 0 |
| PGExpansion card | PG301C | 0 0 0 0 |
| | PG301L | 0 0 0 1 |
| | PG302L | 0 0 1 0 |

For example: Insert EP301, the read-out value of 00-26(P.125) is as follows:

$0\times 2^{3} + 0\times 2^{2} + 1\times 2^{1} + 1\times 2^{0} = 3$

Note: It will display alarm if the expansion card is inserted into the wrong slot. Please refer to 7.2 Appendix 2: Alarm code list.

## 5.2 Basic parameter group01

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 01-00 | P.1 | Maximum frequency | 0.00~01-02(P.18)Hz | 120.00Hz | 79 |
| 01-01 | P.2 | Minimum frequency | 0 ~ 120.00Hz | 0.00Hz | 79 |
| 01-02 | P.18 | High-speed maximum frequency | 01-00(P.1) ~ 650.00Hz | 120.00Hz | 79 |
| 01-03 | P.3 | Base frequency | 50Hz system setting: 0 ~ 650.00Hz | 50.00Hz | 79 |
| | | | 60Hzsystem setting: 0 ~ 650.00Hz | 60.00Hz | |
| 01-04 | P.19 | Base frequency voltage | 0 ~ 1000.0V | 99999 | 79 |
| | | | 99999: Change according to the input voltage | | |
| 01-05 | P.29 | Acceleration/deceleration curve selection | 0: Linear acceleration /deceleration curve | 0 | 80 |
| | | | 1: S pattern acceleration /deceleration curve 1 | | |
| | | | 2: S pattern acceleration /deceleration curve 2 | | |
| | | | 3: S pattern acceleration /deceleration curve 3 | | |
| 01-06 | P.7 | Acceleration time | 3.7K and types below:0 ~ 360.00s/0 ~ 3600.0s | 5.00s | 80 |
| | | | 5.5K and types above:0~360.00s/0 ~ 3600.0s | 20.00s | |
| 01-07 | P.8 | Deceleration time | 3.7K and types below:0 ~ 360.00s/0 ~ 3600.0s | 5.00s | 80 |
| | | | 5.5K~7.5K types:0 ~ 360.00s/0 ~ 3600.0s | 10.00s | |
| | | | 11Kand types above:0 ~ 360.00s/0 ~ 3600.0s | 30.00s | |
| 01-08 | P.21 | Acceleration/deceleration time increments | 0: Time increment is 0.01s | 0 | 80 |
| | | | 1: Time increment is 0.1s | | |
| 01-09 | P.20 | Acceleration/deceleration reference frequency | 50Hz system setting:1.00 ~ 650.00Hz | 50.00Hz | 80 |
| | | | 60Hz system setting: 1.00 ~ 650.00Hz | 60.00Hz | |
| 01-10 | P.0 | Torque boost | 0.75K and types below: 0 ~ 30.0% | 6.0% | 82 |
| | | | 1.5K ~ 3.7K types: 0 ~ 30.0% | 4.0% | |
| | | | 5.5K ~ 7.5K types: 0 ~ 30.0% | 3.0% | |
| | | | 11K ~ 22K types: 0 ~ 30.0% | 2.0% | |
| 01-11 | P.13 | Starting frequency | 0 ~ 60.00Hz | 0.50Hz | 83 |
| 01-12 | P.14 | Load pattern selection | Applicable to constant torque loads(convey belt,etc.) | 0 | 83 |
| | | | Applicable to variable torque loads (fans and pumps, etc.) | | |
| | | | Applicable to ascending / descending loads | | |
| | | | Multipoint VF curve | | |
| | | | Special two-point VF curve | | |
| | | | V/F complete detached mode | | |
| | | | V/F semidetached mode | | |
| 01-13 | P.15 | JOG frequency | 0 ~ 650.00Hz | 5.00Hz | 86 |
| 01-14 | P.16 | JOG acceleration/ decelerationtime | 0 ~ 360.00s/0 ~ 3600.0s | 0.50s | 86 |
| 01-15 | P.28 | Output frequency filter time | 0 ~ 1000ms | 0ms | 86 |
| 01-16 | P.91 | Fequency jump 1A | 0 ~ 650.00Hz | 99999 | 87 |
| | | | 99999: invalid | | |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 01-17 | P.92 | Fequency jump 1B | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| 01-18 | P.93 | Fequency jump 2A | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| 01-19 | P.94 | Fequency jump 2B | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| 01-20 | P.95 | Fequency jump 3A | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| 01-21 | P.96 | Fequency jump 3B | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| 01-22 | P.44 | The second acceleration time | 0 ~ 360.00s/0 ~ 3600.0s<br>99999: Not selected | 99999 | 88 |
| 01-23 | P.45 | The second decelerationtime | 0 ~ 360.00s/0 ~ 3600.0s<br>99999: Not selected | 99999 | 88 |
| 01-24 | P.46 | The second torque boost | 0 ~ 30.0%<br>99999: Not selected | 99999 | 88 |
| 01-25 | P.47 | The second base frequency | 0 ~ 650.00Hz<br>99999: Not selected | 99999 | 88 |
| 01-26 | P.98 | Middle frequency 1 | 0 ~ 650.00Hz | 3.00Hz | 88 |
| 01-27 | P.99 | Output voltage 1 of middle frequency | 0 ~ 100.0% | 10.0% | 88 |
| 01-28 | P.162 | Middle frequency 2 | 0 ~ 650.00Hz<br>99999: Not selected | 99999 | 88 |
| 01-29 | P.163 | Output voltage 2 of middle frequency | 0 ~ 100.0% | 0.0% | 89 |
| 01-30 | P.164 | Middle frequency 3 | 0 ~ 650.00Hz<br>99999: Not selected | 99999 | 89 |
| 01-31 | P.165 | Output voltage 3 of middle frequency | 0 ~ 100.0% | 0.0% | 89 |
| 01-32 | P.166 | Middle frequency 4 | 0 ~ 650.00Hz<br>99999: Not selected | 99999 | 89 |
| 01-33 | P.167 | Output voltage 4 of middle frequency | 0 ~ 100.0% | 0.0% | 89 |
| 01-34 | P.168 | Middle frequency 5 | 0 ~ 650.00Hz<br>99999: Not selected | 99999 | 89 |
| 01-35 | P.169 | Output voltage 5 of middle frequency | 0 ~ 100.0% | 0.0% | 89 |
| 01-36 | P.255 | S pattern time at the beginning of acceleration | 0 ~ 25.00s/0 ~ 250.0s | 0.20s | 89 |
| 01-37 | P.256 | S pattern time at the end of acceleration | 0 ~ 25.00s/0 ~ 250.0s<br>99999: Not selected | 99999 | 89 |
| 01-38 | P.257 | S pattern time at the beginningofdeceleration | 0 ~ 25.00s/0 ~ 250.0s<br>99999: Not selected | 99999 | 89 |
| 01-39 | P.258 | S pattern time at the end of deceleration | 0 ~ 25.00s/0 ~ 250.0s<br>99999: Not selected | 99999 | 89 |

## 5.2.1 Limiting the output frequency

➢ Output frequency can be limited. Clamp the output frequency at the upper and lower limits.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-00 P.1 | Maximum frequency | 120.00Hz | 0.00 ~ 01-02(P.18)Hz | 22K and types below |
| 01-01 P.2 | Minimum frequency | 0.00Hz | 0 ~ 120.00Hz | Output minimum frequency |
| 01-02 P.18 | High-speed maximum frequency | 120.00Hz | 01-00(P.1) ~ 650.00Hz | Set when above 120Hz |

Setting Maximum frequency, high-speed maximum frequency

◆ The “maximum frequency” and the “high-speed maximum frequency” are interrelated:

1. If the target upper limit frequency is set below 01-00(P.1), use 01-00 as the maximum frequency;
2. If the target frequency limited to between 120~650Hz, use 01-02 as the maximum frequency.

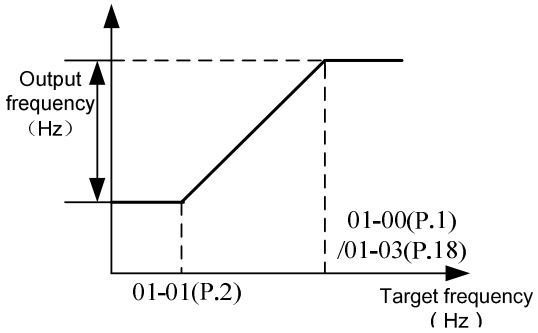
◆ If 01-00< 01-01, the steady output frequency will be clamped to01-00.

◆ When setting the target frequency in PU mode, the set frequency value cannot exceed the value of01-00.

Setting Minimum frequency

◆ If the target frequency≤01-01, the steady output frequency equals to = 01-01.

◆ If 01-01<target frequency≤01-00(01-03), the steady output frequency equals to target frequency.



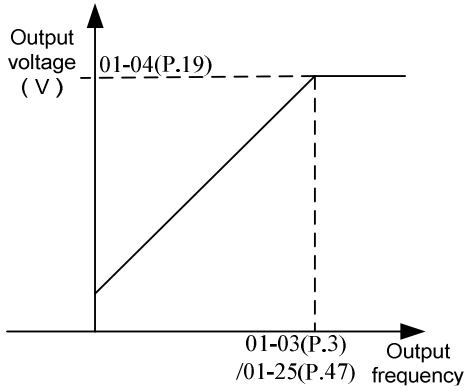

## 5.2.2 Base frequency, basefrequency voltage

➢ Use this function to adjust the inverter outputs (voltage, frequency) to match with the motor rating.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-03 P.3 | Base frequency | 50.00Hz | 0.00 ~ 650.00Hz | 50Hz system (00-24=1) |
| | | 60.00Hz | | 60Hzsystem (00-24=0) |
| 01-04 P.19 | Base frequency voltage | 99999 | 0 ~ 1000.0V | Set the base frequency voltage according to the motor rating. |
| | | | 99999 | The base frequency voltage is equal to the power source voltage. |

Setting Base frequency

- Generally set the rated frequency of the motor in 01-03.
  When the frequency on the motor rating plate is only "50 Hz", make sure to set to "50 Hz". When it is set to "60 Hz", thevoltage will drop too much, causing insufficient torque. As a result, the inverter may trip due to overload.
- When themotor operation require switching to the commercial power supply, set the commercial power supply in 01-03.




Note: Please refer to 5.2.10 The second function for the second base frequency.

Setting Base frequency voltage

- If the output frequency is lower than the base frequency, the output voltage of the inverter will increase with output frequency. If the output frequency has reached the base frequency (01-03), the output voltage will just be equal to the base frequency voltage. If the output frequency exceeds the base frequency and increase continuously, the output voltage will be clamped to the base frequency voltage.

## 5.2.3 Acceleration/deceleration time setting

- Use this function to set motor acceleration/deceleration time.

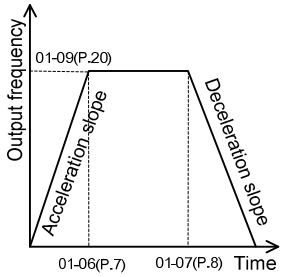
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-05 P.29 | Acceleration/deceleration curve selection | 0 | 0 | Linear acceleration /deceleration curve |
| | | | 1 | S pattern acceleration /deceleration curve 1 (Note 1) |
| | | | 2 | S pattern acceleration /deceleration curve 2 (Note 2) |
| | | | 3 | S pattern acceleration /deceleration curve 3 (Note 3) |
| 01-06 P.7 | Acceleration time | 5.00s | 0 ~ 360.00s | 3.7K and types below |
| | | 20.00s | 0 ~ 3600.0s | 5.5K and types above |
| 01-07 P.8 | Deceleration time | 5.00s | 0 ~ 360.00s 0 ~ 3600.0s | 3.7K and types below |
| | | 10.00s | | 5.5K ~ 7.5K types |
| | | 30.00s | | 11K and types above |
| 01-08 P.21 | Acceleration/deceleration time increments | 0 | 0 | Time increment is 0.01s |
| | | | 1 | Time increment is 0.1s |
| 01-09 P.20 | Acceleration/deceleration reference frequency | 50.00Hz | 1.00 ~ 650.00Hz | 50Hz system setting (00-24=1) |
| | | 60.00Hz | | 60Hz system setting(00-24=0) |

Setting Acceleration/deceleration curve selection

- Linear acceleration /deceleration curve(01-05="0")

  An acceleration slope is constructed by the combination of 01-06 and 01-09. A deceleration slope is constructed by the combination of 01-06 and 01-09.

  When the target frequency varies, it increases with the "acceleration slope" or decreases with the "deceleration slope" linearly. See the figure below:




- S pattern acceleration /deceleration curve 1(01-05="1")

  An acceleration slope is constructed by the combination of 01-06and 01-03. A deceleration slope is constructed by the combination of 01-07 and 01-03.

  The acceleration / deceleration curve has an S-shape change according to the "acceleration / deceleration slope".

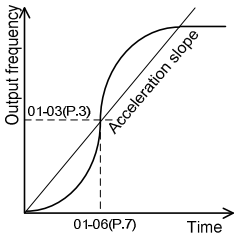
  The S-shape equation between 0 and 01-03(P.3) is:

$$f = [1 - \cos(\frac{90° \times t}{P.7})] \times P.3$$

  The S-shape equation of 01-03(P.3) or above is:

$$t = \frac{4}{9} \times \frac{P.7}{(P.3)^2} \times f^2 + \frac{5}{9} \times P.7$$

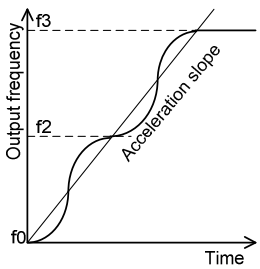
  t = time; f = output frequency




- S pattern acceleration /deceleration curve 2(01-05="2")

  An acceleration slope is formed by the combination of 01-06 and 01-09. A deceleration slope is formed by the combination of 01-07 and 01-09.

  When the target frequency varies, the acceleration curve has an S-shape ascending according to the "acceleration slope". The deceleration curve on the other hand has an S-shape deceleration according to the "deceleration slope". As shown in the figure below, when the setting value of the inverter is adjusted from f0 to f2, an S-shape acceleration is undertaken once, and the time is 01-06×(f2-f0)/01-09. Then if the frequency is set from f2 to f3, a second S-shape acceleration is experienced, and the time is 01-06×(f3-f2)/01-09.




- S pattern acceleration /deceleration curve 3(01-05="3")

  Please refer to 5.2.12 Spattern time setting.

Setting Acceleration/deceleration time increments

- When 01-08=0, minimum acceleration / deceleration time (01-06、01-07、01-14、01-22、01-23、04-35~04-42) increment is0.01s.
- When 01-08=1, minimum acceleration / deceleration time(01-06 、 01-07 、 01-14 、 01-22 、 01-23 、 04-35~04-42)increment is 0.1s.

Setting Acceleration / deceleration reference frequency

- When the output frequency of the inverter is accelerated from 0Hz to01-09, the required time is defined as “acceleration time”.
- When the output frequency of the inverter is decelerated from 0Hz to 01-09, the required time is defined as “deceleration time”.

Note: 1. S pattern acceleration /deceleration curve 1 is used when acceleration/deceleration is required for a short time until a high-speed area equal to or higher than thebase frequency, such as for the main shaft of the machine.
2. S pattern acceleration /deceleration curve2 can effectively reduce motor vibration during the acceleration / deceleration, and thus prevent the belts and gears from broken.
3. S pattern acceleration /deceleration curve3 is used to start the inverter gradually without impact.
4. Please refer to Section 5.2.10 The second function for the second acceleration/deceleration time.
5. When RT is “on”, the second function is valid. For the operation characteristics of the motor, please refer to Section 5.2.10.RT mentioned in this section is the function name of the “multi-function digital input terminal”. Please refer to 03-00~03-05 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

## 5.2.4 Torque boost**V/F**

- For an inverter controlled by V/F mode, when the motor starts up, the starting torque is usually inadequate since the output voltage of the inverter is inadequate. In this case, the output voltage can be elevated by properly setting the torque boost (01-10), and thus a better starting torque can be acquired.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-10 P.0 | Torque boost | 6.0% | 0 ~ 30.0% | 0.75K and types below |
| | | 4.0% | | 1.5K ~ 3.7K types |
| | | 3.0% | | 5.5K ~ 7.5K types |
| | | 2.0% | | 11K ~ 22K types |

Setting Torque boost

- If 01-10=6% and 01-04=220V, and when output frequency of the inverter is 0.2Hz, the output voltage is:

$$P.19 \times \left( \frac{100\% - P.0}{P.3} \times f + P.0 \right) = 220V \times \left( \frac{100\% - 6\%}{50Hz} \times 0.2Hz + 6\% \right) = 14.03V$$

- If RT is “on,” “the second torque boost” on 01-24 is valid (Note 2).

Note: 1. If the set value of 01-10 is too high, it will activate current inverter protection or the activation will be impeded.
2. Please refer to Section 5.2.10 for the second torque boost.
3. RT mentioned in this section is the function name of the “multi-function digital input terminal”. Please refer to 03-03、03-04、03-05、03-00、03-01、03-02 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

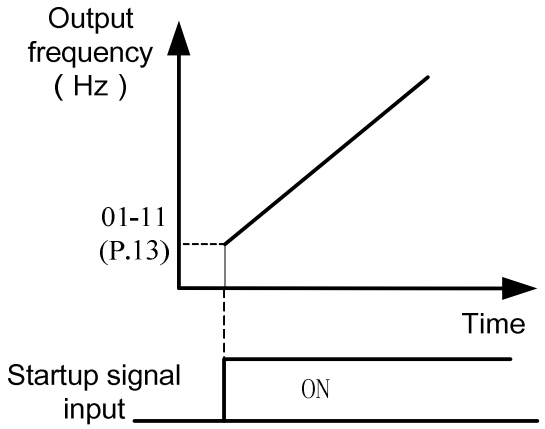
## 5.2.5 Starting frequency

➢ When the motor starts up, the instantaneous output frequency of the inverter is called “starting frequency”.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-11 P.13 | Starting frequency | 0.50Hz | 0 ~ 60.00Hz | --- |

Setting Starting frequency

◆ If the target frequency of the inverter is lower than the setting value of 01-11, the motor will not run. When the signal of the motor starts, the output frequency will go up from the value of 01-11.




## 5.2.6 Load pattern selection**V/F**

➢ Optimal output characteristics for application or load characteristics can be selected when in V/F control.

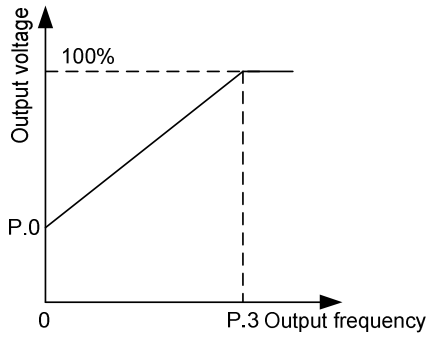
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-12 P.14 | Load pattern selection | 0 | 0 | Applicable to constant torque loads(convey belt, etc.) |
| | | | 1 | Applicable to variable torque loads (fans and pumps, etc.) |
| | | | 2、3 | Applicable to ascending / descending loads |
| | | | 4 | Multipoint VF curve |
| | | | 5 ~ 13 | Special two-point VF curve |
| | | | 14 | V/F complete detached mode |
| | | | 15 | V/F semidetached mode |

Setting Load pattern selection

◆ When 01-12 = 4, suppose that 01-04=220V, 01-26=5Hz, 01-27=10%, when the inverter is running at5Hz, the output voltage equals to 01-04×01-27 = 220V×10% = 22V.

◆ If RT is “on”, 01-24 “the second torque boost” is valid.

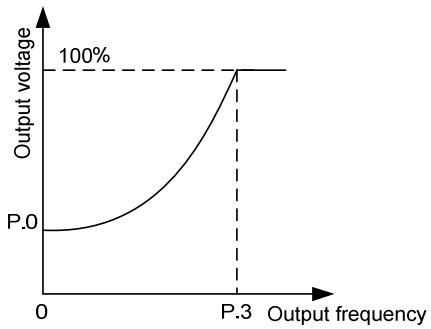
01-12 = 0




Applicable to constant torque loads

(convey belt, etc.,)

01-12 = 1



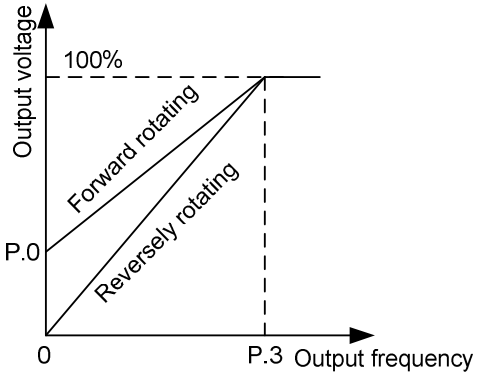

Applicable to variable torque loads

(Fans and pumps, etc.)

Curve equationof output voltage and output frequency is:

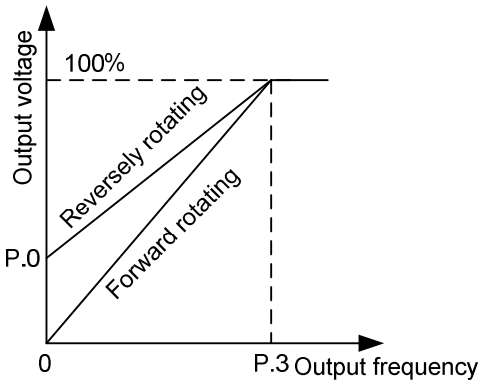
$$V = \frac{(\text{Base voltage-Base voltage*P.0}) * \text{Output frequency}^2}{\text{Base frequency}^2} + \text{Base voltage} * \text{P.0}$$

01-12 = 2



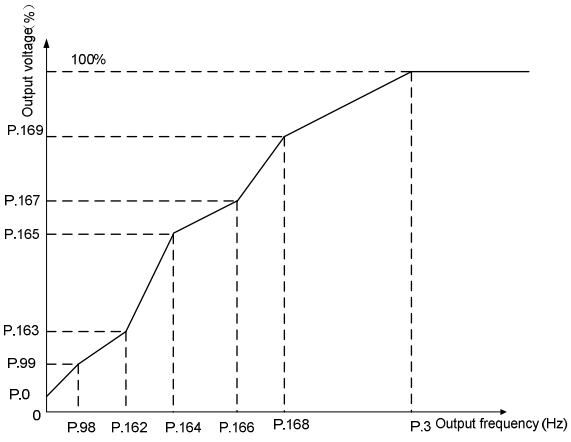

Ascending / descending loads

01-12 = 3



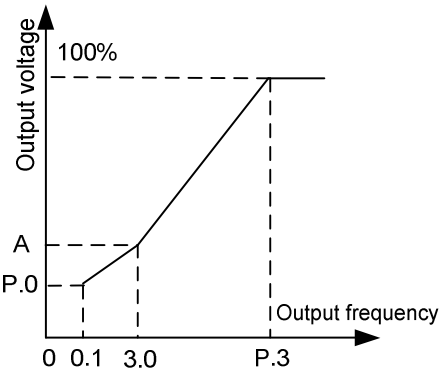

Ascending / descending loads

01-12 = 4



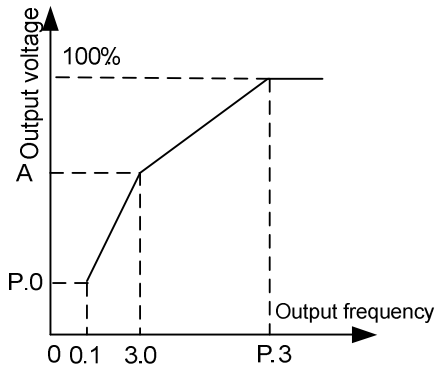

Whether it is high startup torque or descending torque, they are due to the set values (Note 1).

01-12=5



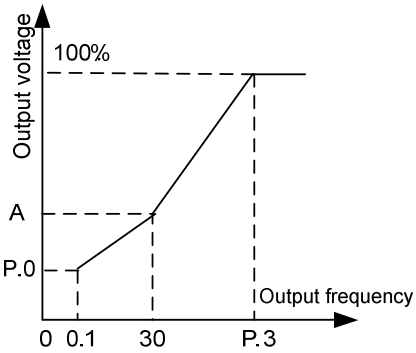

When 01-12=5, the value of A is 7.1% (Note 2).

01-12 = 6, 7, 8



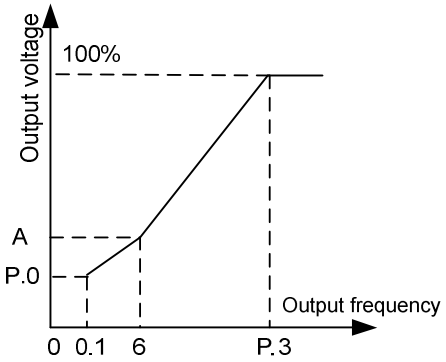

When 01-12=6, the value of A is 8.7%. When 01-12=7, the value of A is 10.4%. When01-12=8, the value of A is 12.0%.(Note 2)

01-12 = 9, 10




When 01-12=9, the value of A is 20.0%. When P.14=10, the value of A is 25.0%.(Note 2)

01-12 = 11, 12, 13




When 01-12 = 11, the value of A is 9.3%. When 01-12 = 12, the value of A is 12.7%. When 01-12 = 13, the value of A is 16.1%. (Note 2)

Note: 1. Referring to the diagrams above, set 01-26 and 01-27, if one point is needed. Set 01-26, 01-27, 01-28 and 01-29 if two points are needed. 01-26, 01-27, 01-28, 01-29, 01-30 and 01-31 if three points are needed.

2. If you set 01-12 between 5 and 13, the curve will be invalid when 01-10 is larger than the point A, where point A equals to 01-10.

- VF complete separation(01-12="14")

  In this mode, the output frequency and output voltage of the AC drive are independent. The output frequency is determined by the frequency source(00-16), and the output voltage is determined by "Voltage source for V/F separation" (10-40).For the details, please refer to Section 5.11.13 V/F complete separation.

- V/F half separation(01-12="15")

  In this mode, V and F are proportional and the proportional relationship can be set by external analog terminal or M2 terminal. The relationship between V and F are also related to the rated motor voltage and rated motor frequency.

  In this mode,the relationship between V and F is:V/F=2*X*(rated motor voltage)/(rated motor frequency).

  X is set byexternal analog terminal function, and the range is 0-100%.

Note: VF curveseparation is suitable for all kinds of variable frequency power supply occasions, but the user must be careful when setting and adjusting parameters, inappropriate settings may cause damage to the machine.

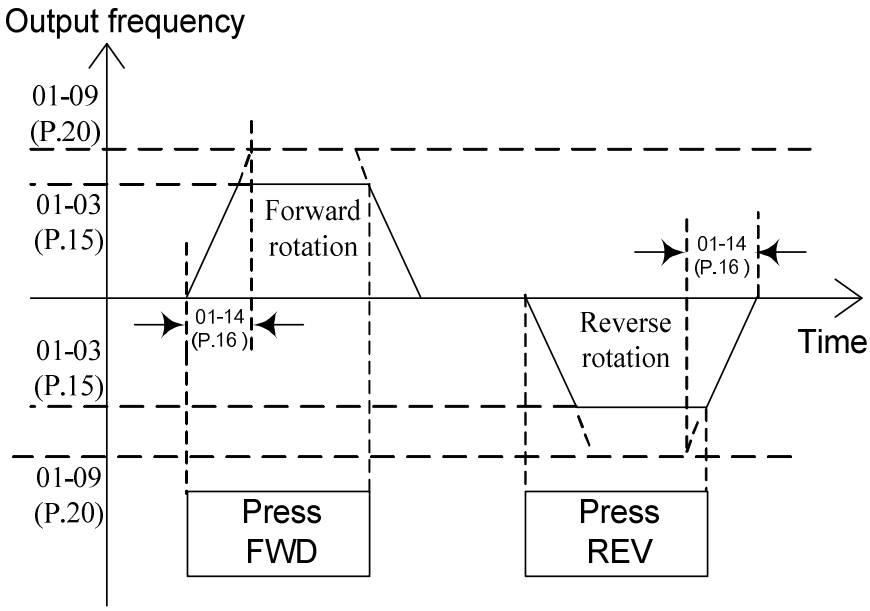
## 5.2.7 JOG operation

- The frequency and acceleration/deceleration time for JOG operation can be set. JOG operation can be used for conveyor positioning, test run, etc.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-13<br>P.15 | JOG frequency | 5.00Hz | 0 ~ 650.00Hz | --- |
| 01-14<br>P.16 | JOG acceleration/<br>decelerationtime | 0.50s | 0 ~ 360.00s/<br>0 ~ 3600.0s | 01-08=0/<br>01-08=1 |

Setting JOG operation

- In JOG mode, the output frequency is the set value of 01-13, and the acceleration / deceleration time is the set value of 01-14.




Note: Please refer to Section 4.3.3 for how to enter the JOG mode.

## 5.2.8 Output frequency filter time

- When Output frequency filter time is set, the inverter can filter out the output frequency to reduce machinevibration upon high-frequency and low-frequency is switched.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-15<br>P.28 | Output frequency filter time | 0ms | 0 ~ 1000ms | --- |

Setting Output frequency filter time

- The bigger the 01-15 is, the better the filtering effect is. But the corresponding response delay will also increase.
- If 01-15 is set to 0, the filtering function is invalid.

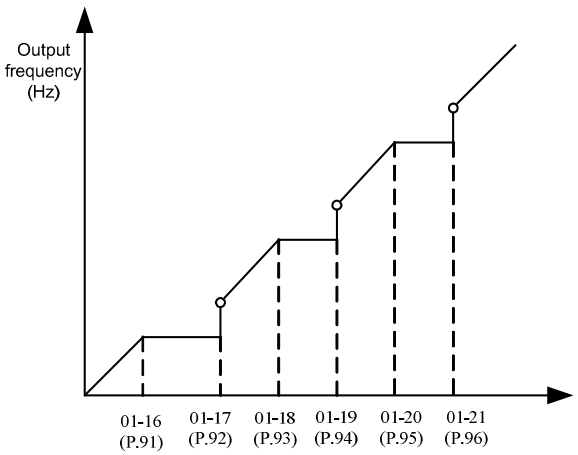
## 5.2.9 Fequency jump

- When it is desired to avoid resonance attributable to the natural frequency of a mechanical system, these parametersallow resonant frequencies to be jumped.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-16 P.91 | Fequency jump 1A | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Invalid. |
| 01-17 P.92 | Fequency jump 1B | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Invalid. |
| 01-18 P.93 | Fequency jump 2A | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Invalid. |
| 01-19 P.94 | Fequency jump 2B | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Invalid. |
| 01-20 P.95 | Fequency jump 3A | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Invalid. |
| 01-21 P.96 | Fequency jump 3B | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Invalid. |

Setting Fequency jump

- To avoid system's mechanical resonance frequency when running the motor, the inverter provides three sets of jump frequencies, namely, 01-16 and 01-17 (the first set), 01-18 and 01-19 (the second set), 01-20 and 01-21 (the third set).




- For example: assuming 01-16=45 and 01-17=50;
  If the target frequency≤45Hz, then the steady output frequency=the target frequency.
  If 45Hz≤target frequency < 50Hz, then the steady output frequency=45Hz.
  If the target frequency≥50Hz, then the steady output frequency=the target frequency.

Note: 1. During the acceleration / deceleration period, the output frequency of the inverter will still pass through the jump frequency.
2. When 01-16=99999 or 01-17=99999, the first set of frequency jump is invalid.
When 01-18=99999 or 01-19=99999, the second set of frequency jump is invalid.
When 01-20=99999 or 01-21=99999, the third set of frequency jump is invalid.

## 5.2.10 The second function

- It is appropriate for the parameters when the RT signal is ON.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-22<br>P.44 | The second acceleration time | 99999 | 0 ~ 360.00s/<br>0 ~ 3600.0s | 01-08=0/<br>01-08=1 |
| | | | 99999 | Not selected. |
| 01-23<br>P.45 | The second deceleration time | 99999 | 0 ~ 360.00s/<br>0 ~ 3600.0s | 01-08=0/<br>01-08=1 |
| | | | 99999 | Not selected. |
| 01-24<br>P.46 | The second torque boost | 99999 | 0 ~ 30.0% | --- |
| | | | 99999 | Not selected. |
| 01-25<br>P.47 | The second base frequency | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Not selected. |

Setting The second function

- When 01-08=0, minimum acceleration / deceleration time(01-22, 01-23)increment is0.01s.
- When 01-08=1, minimum acceleration / deceleration time(01-22、01-23)increment is0.1s.
- When RTis “on”, the second function is valid. For the operation characteristics of the motor, please refer to the following second function setting.

  If 01-22≠99999 and 01-23=99999, when RT is “on”, the acceleration /deceleration time is the “set value of 01-22”.

  If 01-22≠99999 and 01-24=99999, when RT is “on”,the torque boost is the “set value of 01-10”.
  If 01-22≠99999 and01-24≠99999, when RT is “on”,the torque boost is the “set value of01-24”.

  If 01-22≠99999 and 01-25=99999, when RT is “on”,the base frequency isthe “set value of 01-03”.
  If 01-22≠99999 and01-25≠99999, when RT is “on”, the base frequency is the “set value of 01-25”.

Note: RT metioned here is the function name of “multi-function digital input terminal”. Please refer to 03-03、03-04、03-05、03-00、03-01、03-02 for the function selection of multi-function digital input terminal; please refer to Section 3.5 for related wiring.

## 5.2.11 Middle frequency, output voltage of middle frequency**V/F**

- Parameters can be set when using a special motor, especially adjusting the motor torque.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-26<br>P.98 | Middle frequency 1 | 3.00Hz | 0 ~ 650.00Hz | --- |
| 01-27<br>P.99 | Output voltage 1 of middle frequency | 10.0% | 0 ~ 100.0% | --- |
| 01-28<br>P.162 | Middle frequency 2 | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Not selected. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-29<br>P.163 | Output voltage 2 of middle frequency | 0.0% | 0 ~ 100.0% | --- |
| 01-30<br>P.164 | Middle frequency 3 | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Not selected. |
| 01-31<br>P.165 | Output voltage 3 of middle frequency | 0.0% | 0 ~ 100.0% | --- |
| 01-32<br>P.166 | Middle frequency 4 | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Not selected. |
| 01-33<br>P.167 | Output voltage 4 of middle frequency | 0.0% | 0 ~ 100.0% | --- |
| 01-34<br>P.168 | Middle frequency 5 | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Not selected. |
| 01-35<br>P.169 | Output voltage 5 of middle frequency | 0.0% | 0 ~ 100.0% | --- |

Setting Middle frequency, output voltage of middle frequency

◆ Please refer to the description on01-12=4 in Section 5.2.6 Load pattern selection.

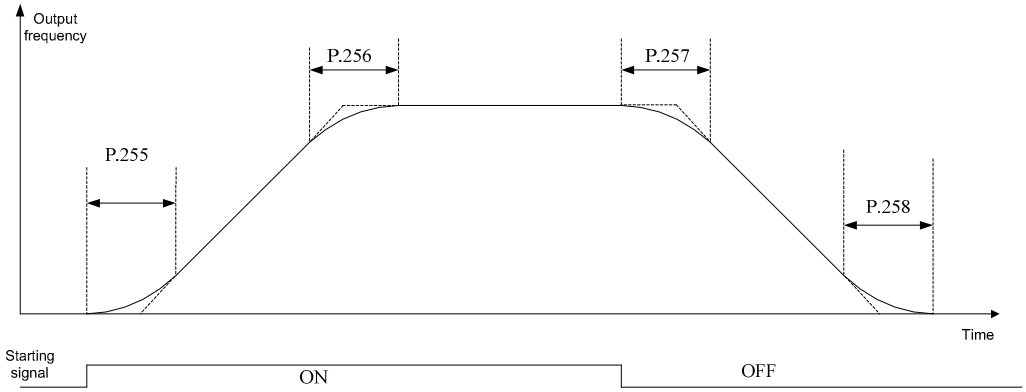
## 5.2.12 S pattern time

➢ It is used to set the acceleration time of S pattern acceleration/deceleration.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 01-36<br>P.255 | S pattern time at the beginning of acceleration | 0.20s | 0 ~ 25.00s/<br>0 ~ 250.0s | 01-08=0/<br>01-08=1 |
| 01-37<br>P.256 | S pattern time at the end of acceleration | 99999 | 0 ~ 25.00s/<br>0 ~ 250.0s | 01-08=0/<br>01-08=1 |
| | | | 99999 | Not selected. |
| 01-38<br>P.257 | S pattern time at the beginningofdeceleration | 99999 | 0 ~ 25.00s/<br>0 ~ 250.0s | 01-08=0/<br>01-08=1 |
| | | | 99999 | Not selected. |
| 01-39<br>P.258 | S pattern time at the end of deceleration | 99999 | 0 ~ 25.00s/<br>0 ~ 250.0s | 01-08=0/<br>01-08=1 |
| | | | 99999 | Not selected. |

Setting S pattern time

◆ When 01-05 = 3, “S pattern acceleration /deceleration curve 3”.



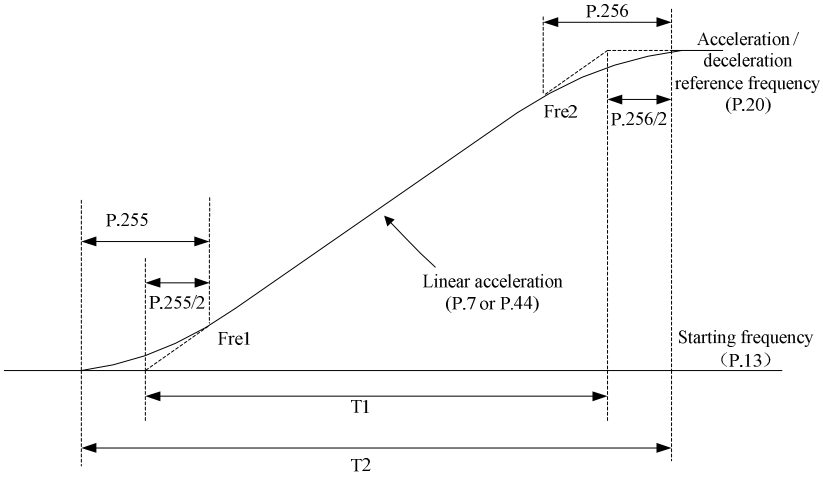

1) The parameters 01-36, 01-37, 01-38 and 01-39 are used to start the inverter gradually without impact. And varying degrees of S pattern acceleration/deceleration curve are adjusted by the values. When the S pattern acceleration/deceleration curve is started, the inverter will accelerate/decelerate with different speed according to the primary acceleration/deceleration time.

2) When S pattern acceleration/deceleration curve 3 is selected, the acceleration/ deceleration time will be longer, as follows.

3) When the selected acceleration time (01-06 or 01-22)≥01-36 and 01-37, the actual acceleration time is as follows:
The actual acceleration time = the selected acceleration time + (01-36 + 01-37)/ 2

4) When the selected deceleration time (01-07 or 01-23)≥01-38 and 01-39, the actual deceleration time is as follows:
The actual deceleration time = the selected deceleration time + (01-38 + 01-39)/ 2

◆ Example: when the parameters are initial value (60 Hz system), the actual acceleration time from 0Hz to 60Hz in accordance with S pattern acceleration/deceleration curve 3 is as follows:




The acceleration time being setT1 = (01-09 - 01-11) * 01-06 / 01-09
The actual acceleration timeT2= T1 + (01-36 + 01-37) * (01-09 - 01-11) / 2 / 01-09
So T1 = (60 - 0.5) * 5 / 60 = 4.96s (the actual acceleration time of linear acceleration)
The actual acceleration timeT2 = 4.96 + (0.2 + 0.2) * (60 - 0.5) / 2 / 60 = 5.16s

Note: All calculations of acceleration/deceleration time are based on01-09.

## 5.3 Analog input and output parameter group 02

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 02-00 | P.500 | Function selection of terminal 2-5 | 0: Non-function<br>1: Frequency reference<br>2: Torque reference<br>3: PID target value<br>4: PID feedback signal<br>5: Target tension setting<br>6: Line speed setting<br>7: Feedback line speed<br>8: Real-time curling radius<br>9: Initial curling radius<br>10: Material thickness<br>11: PTC<br>12: PT100<br>13: VF detached function<br>14: Positive torque limit<br>15: Negative torque limit<br>16: Positive/Negative torque limit<br>17: Retrogradetorque limit | 1 | 96 |
| 02-01 | P.501 | Function of terminal 4-5 | Same as 02-00 | 1 | 96 |
| 02-02 | P.504 | Reserve | Reserve | --- | 96 |
| 02-03 | P.503 | Function of input HDI | Same as 02-00 | 0 | 96 |
| 02-04 | P.54 | Function of terminal AM output | 0: Output frequency, the frequency display reference 02-51 (P.55) is 100%.<br>1: Output frequency, the frequency display reference 02-52 (P.56) is 100%.<br>2: Output DC bus voltage, the OV level is 100%.<br>3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.<br>4: Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%.<br>5: Target frequency, the frequency display reference 02-51(P.55) is 100%.<br>6: Fixed level output, voltage or current output level is set by 02-54(P.541)/02-53(P.539)<br>7: Output voltage, inverter rated voltage is 100%<br>8: Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6) | 0 | 97 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 02-04 | P.54 | Function of terminal AM output | 9: Output torque, two times motor rated torque is 100%.(Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)<br>10: Output power, two times motor rated power is 100%.<br>11: The high-speed pulse, 100.00KHz is 100%.<br>12: Motor speed, to display the level of 02-51(P.55) is 100%<br>13：PLC analog output, details please refer to SE3 embedded PLC instructions | 0 | 97 |
| 02-05 | P.537 | Reserve | --- | --- | 97 |
| 02-06 | P.185 | Proportion linkage gain | 0 ~ 100% | 0% | 98 |
| 02-07 | P.240 | Auxiliary frequency | 0: No auxiliary frequency function is available.<br>1: operation frequency = basic frequency + auxiliaryfrequency (given by the 2-5 terminal)<br>2: operation frequency = basic frequency + auxiliaryfrequency (given by the 4-5 terminal)<br>3: operation frequency = basic frequency - auxiliary frequency (given by the 2-5 terminal)<br>4: operation frequency = basic frequency - auxiliary frequency (given by the 4-5 terminal)<br>5: operation frequency = given by the terminal 2-5 as the proportion linkage signal<br>6: operation frequency = given by the terminal 4-5 as the proportion linkage signal | 0 | 99 |
| 02-08 | P.73 | 2-5 signal selection | 0: The valid range of signal sampling is 0~5V.<br>1: The valid range of signal sampling is 0~10V.<br>2: The valid range of signal sampling is 0~ -5V.<br>3: The valid range of signal sampling is 0~ -10V.<br>4: The valid range of signal sampling is -5 ~ +5V.<br>5: The valid range of signal sampling is -10 ~ +10V. | 1 | 99 |
| 02-09 | P.38 | 2-5 maximum operation frequency | 50Hz system: 1.00 ~ 650.00Hz<br>60Hz system: 1.00 ~ 650.00Hz | 50.00Hz<br>60.00Hz | 100 |
| 02-10 | P.60 | 2-5 filter time | 0 ~ 2000ms | 30ms | 100 |
| 02-11 | P.139 | The bias rate of 2-5 voltage signal | -100.0%~100.0% | 0.0% | 100 |
| 02-12 | P.192 | The minimum input positive voltage of 2-5 | 0 ~ 10.00V | 0.00V | 100 |
| 02-13 | P.193 | The maximum input positive voltage of 2-5 | 0 ~ 10.00V | 10.00V | 100 |
| 02-14 | P.194 | The percentage corresponding to the minimum positive voltage of terminal 2-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 0.0% | 100 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 02-15 | P.195 | The percentage corresponding to the maximum positive voltage of terminal 2-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 100.0% | 100 |
| 02-16 | P.512 | The minimum input negative voltage of 2-5 | 0 ~ 10.00V | 0.00V | 100 |
| 02-17 | P.513 | The maximum input negative voltage of t2-5 | 0 ~ 10.00V | 0.00V | 100 |
| 02-18 | P.510 | The percentage corresponding to the minimum negative voltage of termianl 2-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 0.0% | 100 |
| 02-19 | P.511 | The percentage corresponding to the maximum negative voltage of termianl 2-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 0.0% | 100 |
| 02-20 | P.17 | 4-5 signal selection | 0: The effective range of signal sampling is 4~20mA.<br>1: The effective range of signal sampling is 0 ~ 10V.<br>2: The effective range of signal sampling is 0 ~ 5V. | 0 | 105 |
| 02-21 | P.39 | The maximum operation frequency of terminal 4-5 | 50Hz system: 1.00 ~ 650.00Hz<br>60Hz system: 1.00 ~ 650.00Hz | 50.00Hz<br>60.00Hz | 105 |
| 02-22 | P.528 | 4-5 filter time | 0 ~ 2000ms | 30ms | 106 |
| 02-23 | P.505 | The bias rate of 4-5 current/ voltage signal | -100.0% ~ 100.0% | 0.0% | 106 |
| 02-24 | P.184 | 4-5 disconnection selection | 0: No disconnection selection is available.<br>1: Decelerate to 0Hz, the digital output terminal will set off the alarm<br>2: The inverter will stop immediately, and the panel willdisplaythe “AEr” alarm.<br>3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm. | 0 | 106 |
| 02-25 | P.198 | The minimum input current/ voltage of terminal 4-5 | 0 ~ 20.00mA | 4.00mA | 106 |
| 02-26 | P.199 | The maximum input current/ voltage of terminal 4-5 | 0 ~ 20.00mA | 20.00mA | 106 |
| 02-27 | P.196 | The percentage corresponding to the minimum input current/ voltage of terminal 4-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 0.0% | 106 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 02-28 | P.197 | The percentage corresponding to the maximum input current/ voltage of terminal 4-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 100.0% | 106 |
| 02-29 | P.531 | Reserve | Reserve | --- | --- |
| 02-30 | P.508 | Reserve | Reserve | --- | --- |
| 02-31 | P.527 | Reserve | Reserve | --- | --- |
| 02-32 | P.507 | Reserve | Reserve | --- | --- |
| 02-33 | P.545 | Reserve | Reserve | --- | --- |
| 02-34 | P.548 | Reserve | Reserve | --- | --- |
| 02-35 | P.549 | Reserve | Reserve | --- | --- |
| 02-36 | P.546 | Reserve | Reserve | --- | --- |
| 02-37 | P.547 | Reserve | Reserve | --- | --- |
| 02-38 | P.526 | HDI filter time | 0 ~ 2000ms | 10ms | 107 |
| 02-39 | P.524 | HDI input minimum frequency | 0 ~ 100.00kHz | 0.00kHz | 107 |
| 02-40 | P.525 | HDI input maximum frequency | 0 ~ 100.00kHz | 100.00 kHz | 107 |
| 02-41 | P.522 | The percentage corresponding toHDI input minimum frequency | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 0.0% | 108 |
| 02-42 | P.523 | The percentage corresponding to HDI input maximum frequency | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500= 2/14/15/16/17 ) | 100.0% | 108 |
| 02-43 | P.74 | HDO frequency multiplication coefficient | 0: Select FM function as the output function of terminal HDO.<br>1 ~ 9000: Select the square-wave pulse which is 02-43(P.74) times of running frequency as the output of terminal. | 0 | 108 |
| 02-44 | P.543 | FM output function selection | 0: Output frequency, the frequency display reference 02-51(P.55) is 100%.<br>1: Output current, the current monitoringreference02-52(P.56)is 100%.<br>2: Output DC bus voltage, the OV level is 100%.<br>3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.<br>4: Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%.<br>5: Target frequency, the frequency display reference02-51 (P.55) is 100%. | 0 | 109 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 02-44 | P.543 | FM output function selection | 6: Fixed voltage output, voltage output level is set by 02-54 (P.541).<br>7: Output voltage, the inverter rated voltage is100%.<br>8: Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)<br>9: Output torque, two times motor rated torque is 100%.(Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)<br>10: Output power, two times motor rated power is 100%.<br>11: The high-speed pulse, 100.00KHz is 100%.<br>12: Motor speed, to display the level of 02-51 (P.55) is 100%. | 0 | 109 |
| 02-45 | P.64 | AM output signal selection | 0: 0~10V voltage can be output across terminal AM-5.<br>1: Reserve<br>2: 0~20mA current can be output across AM-5.<br>3: 4~20mA current can be output across AM-5. | 0 | 110 |
| 02-46 | P.191 | AM output gain | 0 ~ 1024 | 935 | 110 |
| 02-47 | P.190 | AM output bias | 0 ~ 1024 | 0 | 110 |
| 02-48 | P.538 | Reserve | Reserve | --- | --- |
| 02-49 | P.536 | Reserve | Reserve | --- | --- |
| 02-50 | P.535 | Reserve | Reserve | --- | --- |
| 02-51 | P.55 | Frequency display reference at the analog output | 50Hz system: 1.00 ~ 650.00Hz | 50.00Hz | 111 |
| | | | 60Hz system: 1.00 ~ 650.00Hz | 60.00Hz | |
| 02-52 | P.56 | Current monitoring referenceat the analog output | 0~500.00A | According to type | 111 |
| 02-53 | P.539 | Reserve | --- | --- | 111 |
| 02-54 | P.541 | AM/FM fixed output level | 0 ~ 100.0% | 0.0% | 111 |
| 02-55 | P.592 | PT100 voltage level 1 | 0 ~ 10.00V | 5.00V | 112 |
| 02-56 | P.593 | PT100 voltage level 2 | 0 ~ 10.00V | 7.00V | 112 |
| 02-57 | P.594 | PT100 level 1starting frequency | 0 ~ 650.00Hz | 0.00Hz | 112 |
| 02-58 | P.595 | Starting PT100 level1 delay time | 0 ~ 6000s | 60s | 112 |
| 02-59 | P.187 | FM calibration parameter | 0 ~ 9998 | 450 | 112 |

## 5.3.1 Function selection of analog terminal and M2 terminal

- Input function selection of terminal 2,4 and M2

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-00 P.500 | Function selection of terminal 2-5 | 1 | 0 | Non-function |
| | | | 1 | Frequency reference |
| | | | 2 | Torque reference |
| | | | 3 | PID target value |
| | | | 4 | PID feedback signal |
| | | | 5 | Target tension setting |
| | | | 6 | Line speed setting |
| | | | 7 | Feedback line speed |
| | | | 8 | Real-time curling radius |
| | | | 9 | Initial curling radius |
| | | | 10 | Material thickness |
| | | | 11 | PTC |
| | | | 12 | PT100 |
| | | | 13 | VF detached function |
| | | | 14 | Positive torque limit |
| | | | 15 | Negative torque limit |
| | | | 16 | Positive/negative torque limit |
| | | | 17 | Retrogradetorque limit |
| 02-01 P.501 | Function of terminal 4-5 | 1 | Same as 02-00 | Same as 02-00 |
| 02-02 P.504 | Reserve | Reserve | --- | --- |
| 02-03 P.503 | Function of input HDI | 0 | Same as 02-00 | Same as 02-00 |

Setting Input function selection

- When frequency reference is selected, 0 ~ ±10V/4~20mA corresponds to 0~the maximum output frequency setting.
- HDI is sharing terminal with M2 and default to M2 terminal function,it need to set parameter 03-05/P.82 to 41、54、57 as HDI function.

Note: The default priority level of terminal function selection is 2-5 > 4-5 >M2

## 5.3.2 Function selection of analog output terminal AM

➢ Selects the data to be output via analog output terminal AM.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-04 P.54 | Function of terminal AM output | 0 | 0 | Output frequency, the frequency display reference 02-51 (P.55) is 100%. |
| | | | 1 | Output frequency, the frequency display reference 02-52 (P.56) is 100%. |
| | | | 2 | Output DC bus voltage, the OV level is 100%. |
| | | | 3 | Output the temperature rising accumulation rate of inverter, the NTC level is 100%. |
| | | | 4 | Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%. |
| | | | 5 | Target frequency, the frequency display reference 02-51(P.55) is 100%. |
| | | | 6 | Fixed level output, voltage or current output level is set by 02-54(P.541)/02-53(P.539) |
| | | | 7 | Output voltage, the inverter rated voltage is 100%. |
| | | | 8 | Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6). |
| | | | 9 | Output torque, two times motor rated torque is100%.(Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6) |
| | | | 10 | Output power, two times motor rated power is 100%. |
| | | | 11 | The high-speed pulse, 100.00KHz is 100%. |
| | | | 12 | Motor speed, to display the level of 02-51(P.55) is 100%. |
| | | | 13 | PLC analog output, details please refer to SE3 embedded PLC instructions |
| 02-05 P.537 | Reserve | --- | --- | --- |

Setting Usage of analog output terminal AM

◆ For the voltage/current calibration of terminal AM, please refer to calibration parameter in Section5.3.11Selection and handling of output terminal AM.

## 5.3.3 Proportion linkage gain

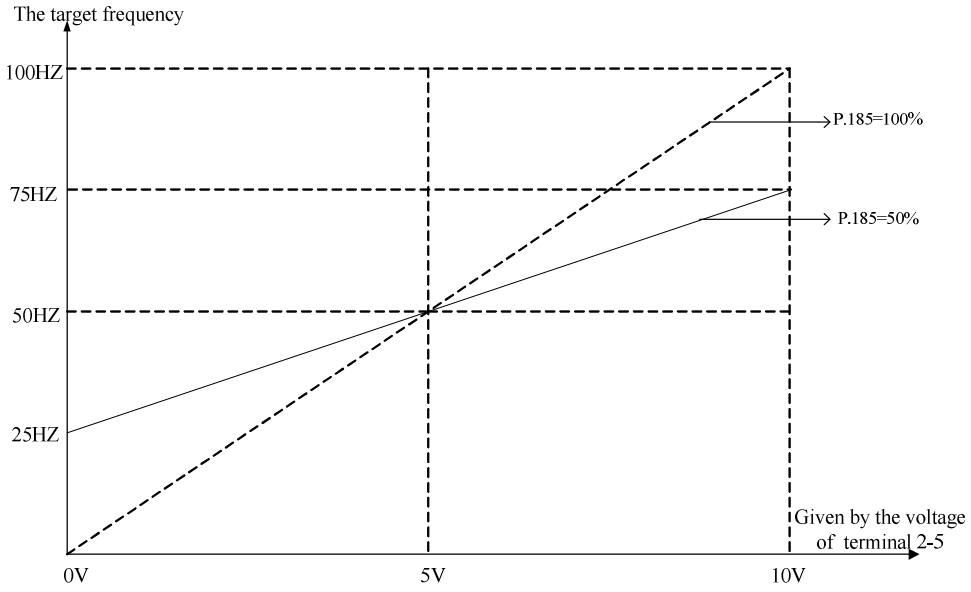
- The function is used to multiply the setting frequency by the external analog input terminal.When many inverters run proportionally, the reference frequency from the master inverter to the slave inverter can be fine tuned effectively with the function.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-06<br>P.185 | Proportion linkage gain | 0% | 0 ~ 100% | --- |

Setting Proportion linkage gain

- When the operation frequency is smaller than 01-01, the operation frequency will be equal to the minimum limited frequency 01-01. When the operation frequency is larger than 01-00, the operation frequency will be equal to the maximum limited frequency 01-00.
- After multiplying the setting frequency by the set value of 02-06, then addition and subtraction can be performed as the following shows:

  For example: When the setting frequency is 50Hz, 02-06=50% and the external analog input signal is 0~10V.




In the above figure,when 0V is given, the target frequency is 50Hz - (50Hz × 50%) = 25Hz;

when 5V is given, the target frequency is 50Hz - (50Hz × 0%) = 50Hz;

when 10V is given, the target frequency is 50Hz + (50Hz × 50%) = 75Hz.

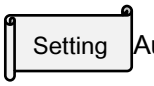
Note: 1. Please refer to the instruction of 02-07(P.240) for the proportion linkage signal input.

2. When the analog current/voltage signal of external terminal 4-5 is taken as the proportion linkage input signal, please refer to the parameter 02-20. For the frequency range setting of external analog signal, please refer to the parameters02-09, 02-21, 02-20, 02-08.

## 5.3.4 Auxiliary frequency

- It can flexibly implement fine tuning of frequency and frequency synthesis to meet different control requirements of different scenarios.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-07 P.240 | Auxiliary frequency | 0 | 0 | No auxiliary frequency function is available. |
| | | | 1 | Operation frequency = basic frequency + auxiliaryfrequency (given by the 2-5 terminal) |
| | | | 2 | Operation frequency = basic frequency + auxiliaryfrequency (given by the 4-5 terminal) |
| | | | 3 | Operation frequency = basic frequency - auxiliary frequency (given by the 2-5 terminal) |
| | | | 4 | Operation frequency = basic frequency - auxiliary frequency (given by the 4-5 terminal) |
| | | | 5 | Operation frequency = given by the terminal 2-5 as the proportion linkage signal |
| | | | 6 | Operation frequency = given by the terminal 4-5 as the proportion linkage signal |



Auxiliary frequency

- When the operation frequency is smaller than 01-01, the operation frequency will be equal to the minimum limited frequency 01-01. When the operation frequency is larger than 01-00, the operation frequency will be equal to the maximum limited frequency 01-00.

Note:1. The basic frequency is set by operation penal which is the target frequency reference source, communication or multi-speed combination.
2. Please refer to the instruction of 02-06 for the proportion linkage signal input.
3. When the analog current/voltage signal of external terminal 4-5 is taken as the proportion linkage input signal, please refer to the parameter 02-20. For the frequency range setting of external analog signal, please refer to the parameters 02-09，02-21，02-20，02-08，02-29.

## 5.3.5 Selection and handling of input terminal 2-5

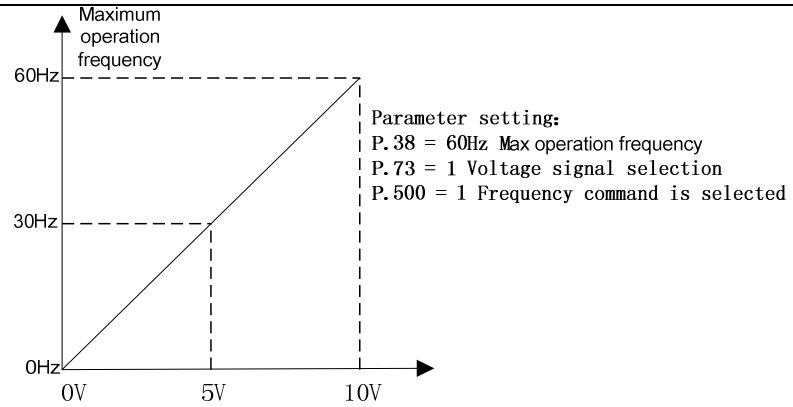
- Selects the signal specifications, frequency compensation function, and input signalpolarity, etc, viainput terminal 2-5.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-08 P.73 | 2-5 signal selection | 1 | 0 | The valid range of signal sampling is 0~5V. |
| | | | 1 | The valid range of signal sampling is 0~10V. |
| | | | 2 | The valid range of signal sampling is 0~ -5V. |
| | | | 3 | The valid range of signal sampling is 0~ -10V. |
| | | | 4 | The valid range of signal sampling is -5～+5V. |
| | | | 5 | The valid range of signal sampling is -10～+10V. |

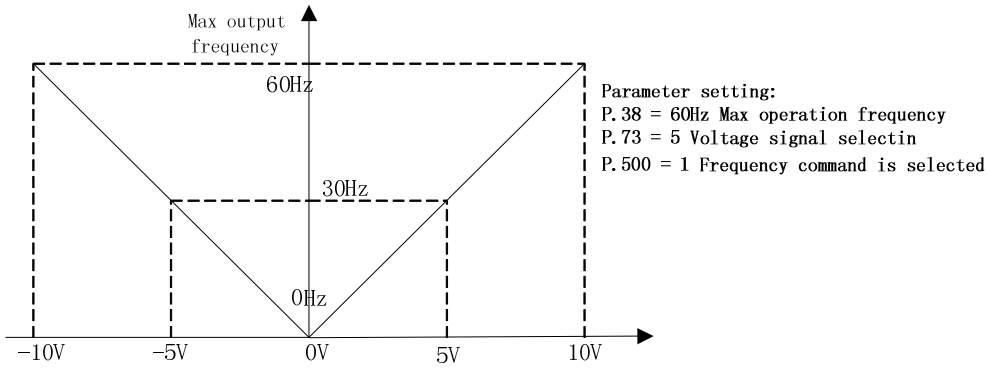
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-09 P.38 | 2-5 maximumoperation frequency | 50.00Hz | 1.00 ~ 650.00Hz | 50Hz system(00-24=1) |
| | | 60.00Hz | | 60Hz system(00-24=0) |
| 02-10 P.60 | 2-5 filter time | 30ms | 0 ~ 2000ms | --- |
| 02-11 P.139 | The bias rate of 2-5 voltage signal | 0.0% | -100.0%~ 100.0% | --- |
| 02-12 P.192 | The minimum input positive voltage of 2-5 | 0.00V | 0 ~ 10.00V | --- |
| 02-13 P.193 | The maximum input positive voltage of 2-5 | 10.00V | 0 ~ 10.00V | --- |
| 02-14 P.194 | The percentage corresponding to the minimum positive voltage of terminal 2-5 | 0.0% | -100.0% ~ 100.0% | --- |
| | | | -400.0% ~ 400.0% | ( P.500= 2/14/15/16/17 ) |
| 02-15 P.195 | The percentage corresponding to the maximum positive voltage of terminal 2-5 | 100.0% | -100.0% ~ 100.0% | --- |
| | | | -400.0% ~ 400.0% | ( P.500= 2/14/15/16/17 ) |
| 02-16 P.512 | The minimum input negative voltage of 2-5 | 0.00V | 0 ~ 10.00V | --- |
| 02-17 P.513 | The maximum input negative voltage of 2-5 | 0.00V | 0 ~ 10.00V | --- |
| 02-18 P.510 | The percentage corresponding to the minimum negative voltage of termianl 2-5 | 0.0% | -100.0% ~ 100.0% | --- |
| | | | -400.0% ~ 400.0% | ( P.500= 2/14/15/16/17 ) |
| 02-19 P.511 | The percentage corresponding to the maximum negative voltage of termianl 2-5 | 0.0% | -100.0% ~ 100.0% | --- |
| | | | -400.0% ~ 400.0% | ( P.500= 2/14/15/16/17 ) |

Setting 2-5 signal selection, 2-5 maximum operation frequency

- The setting value of 02-09 is the target frequency value of the inverter when the input signal of terminal 2-5 is 5V (10V).
- Example 1: This example is the most commonly used method of adjustment.It is used when the inverter is in the “external mode", “combined mode 2”or “combined mode 4”, and the frequency is set by terminal 2-5.




- The value of 02-08 needs to be changed if the terminal 2-5 connects to negative voltage. The frequency arithmetic is the same as positive voltage and the rotation direction is invariant.




Note: 1. In “External mode", “combined mode 2” or “combined mode 4”, the target frequency of the inverter will be determined by the signal between 2-5/4-5 terminal when RH, RM, RL and REX are all “off.” (the default priority is 2-5>4-5), please refer to 02-00、02-01

2. RH, RM, RL, REX, AU, RT and RUN mentioned in this section is the function name of the “multi-function digital input terminal”. Please refer to 03-03、03-04、03-05、03-00、03-01、03-02 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

3. The selection of range of voltage signal sampling across terminal 2-5 by parameter 02-08 will affect the parameters value of 2-5 terminal input signal.

Setting Handling of input terminal 2-5

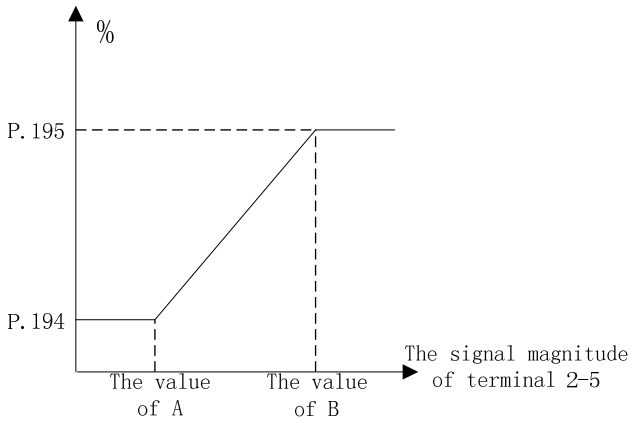
- The parameters above define the relationship between analog input voltage and the setting value what analog input represents. When the analog input voltage exceeds the maximum or minimum range of the setting value, the excess will be computed as the maximum or minimum input.

- There are two setting order when the maximum or minimum percentage is set:

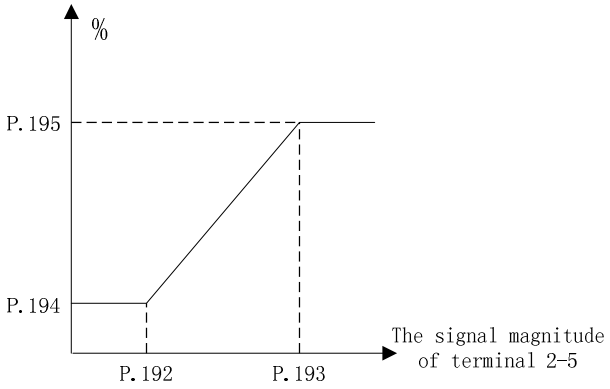
  1) If the users hope to adjust the analog input magnitude to correspond to a certain proportion relationship, the analog input need to be adjusted before setting the corresponding proportion parameters. Now the inverter will compute automatically without setting the voltage parameters. Please refer to the example 1.1.

  2) If the users skip adjusting analog input to set the proportion relationship, the proportion parameter should be set before setting the voltage parameters. Please refer to the example 1.2.

Example 1.1: Adjust the analog input voltage to the minimum value A and set the parameter 02-14. Then adjust the input voltage to the maximum value B and set the parameter 02-15. The figure is shown as follows:



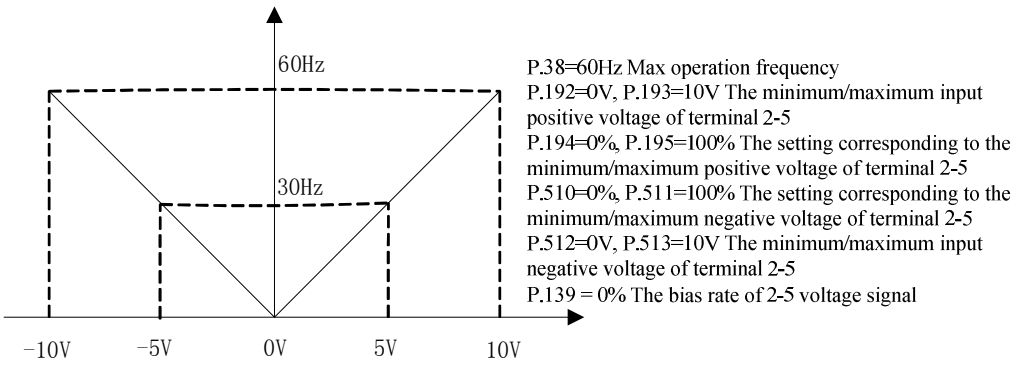

Example 1.2: Set the value of 02-14 and 02-15, then set 02-12 and 02-13. The figure is shown as follows:



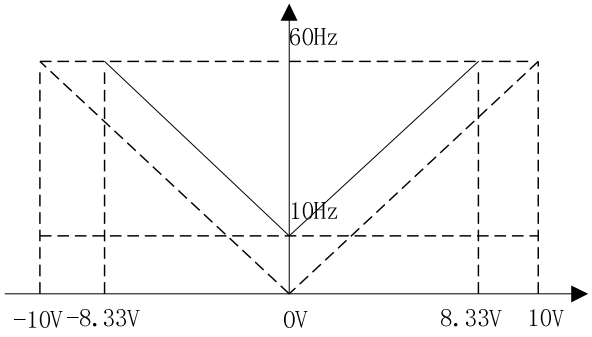

If 02-00 is set at 1, the analog input of terminal 2-5 corresponds to frequency function, that is to say the actual frequency input value is equal to the product of the proportion worked out in the above figure and 02-09 (the bias rate 02-11 is 0).

◆ The positive voltage setting can be referred to for the negative voltage setting, as above.

Example 2: This example is the most commonly used method of adjustment. It is used when the inverter is in the "external mode", "combined mode 2"or "combined mode 4", and the frequency are set by terminal 2-5.

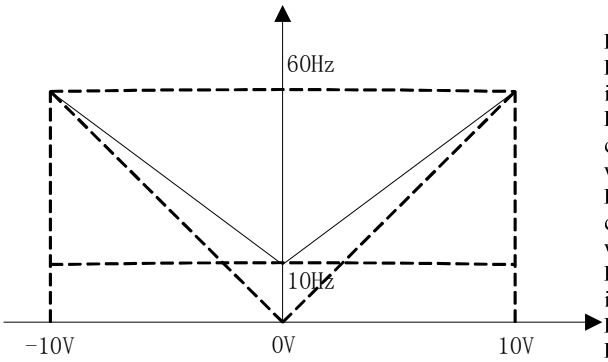



Example 3: This example is used by the industry for operating the ac motor drive. The goal is to have the set potentiometer equals to 10Hz when rotating to the far left. In other words, when activating, the lowest output of the ac motor drive has to be 10Hz. Other frequencies can be adjusted by the industry freely.



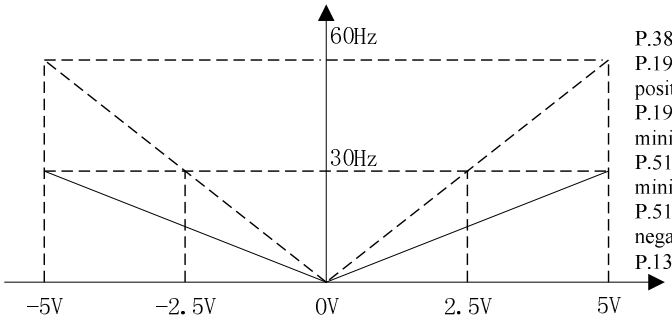

P.38=60Hz Max operation frequency
P.192=0V, P.193=8.33V The minimum/maximum input positive voltage of terminal 2-5
P.194=16.7%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=16.7%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=8.33V The minimum/maximum input negative voltage of terminal 2-5
P.194 = P.510 = 10Hz / 60Hz * 100
P.193 = P.511 = 10V * (100.0 - P.194) / 100

Example 4: This example is also frequently used by the industry. The comprehensive usage for all domain of the potentiometer setup elevates the flexibility.



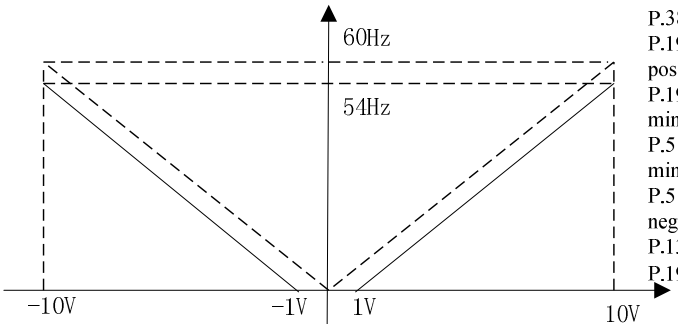

P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=16.7%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=16.7%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal
P.194 = P.510 = 10Hz / 60Hz * 100

Example 5: This example uses 0~5V to set the frequency.



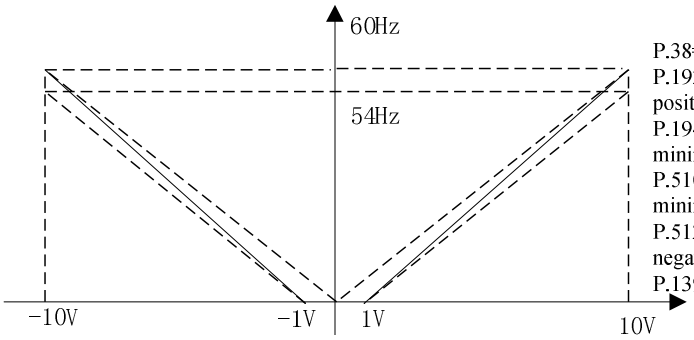

P.38=60Hz Max operation frequency
P.192=0V, P.193=5V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=50% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=50% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=5V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 6: This example is recommended to avoid using a signal that is less than 1V to set up the operation frequency of the AC motor drive under an unfavorable application environment, so that the anti-noise interference effect will be better.



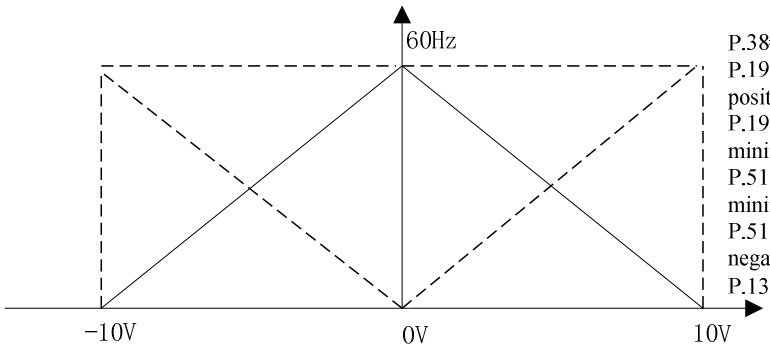

P.38=60Hz Max operation frequency
P.192=1V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=90% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=90% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=1V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal
P.195 = P.511 = 100.0 - (1V / 10V) * 100

Example 7: This example is an extension of Example 6. The wide application of this example offers the users good flexibility.



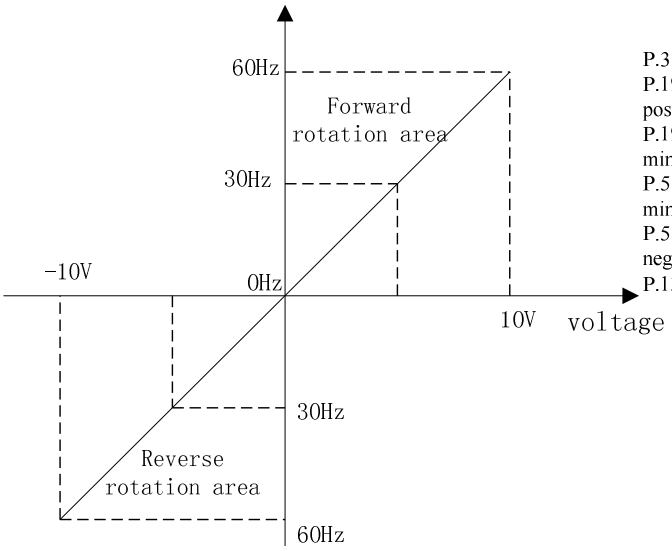

P.38=60Hz Max operation frequency
P.192=1V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=1V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 8: This example is an application of negative slop setup. The industry often uses sensors for pressure, temperature or flow control. Some of the sensors output a 10V signal at high voltage or high flow. This signal acts as a reference for the AC motor drive to decelerate or to stop. The setup presented in Example 8 can satisfy this type of application.

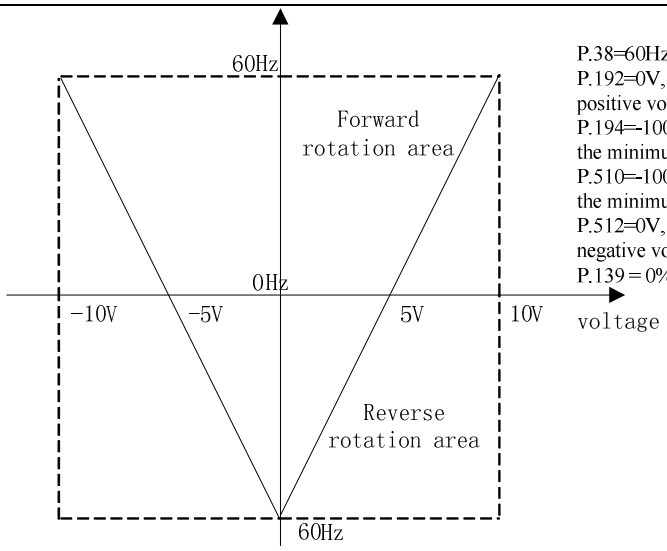



P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=100%, P.195=0% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=100%, P.511=0% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 9: This example integrates all the application of potentiometer. Together with the application of forward and reverse rotation, it fits in the system easily for assorted complicated application.

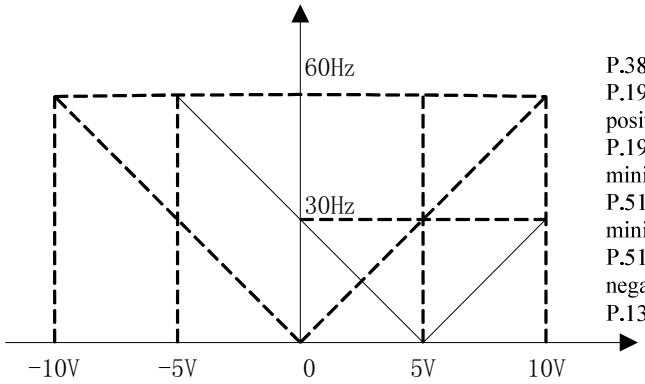



P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=-100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal




P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=-100%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=-100%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 0% The bias rate of 2-5 voltage signal

Example 10: This example is the application with bias voltage. The bias voltage is set by 02-11. When 02-11=0%, there is no bias voltage; When 02-11>0%, there is the positive bias voltage; When 02-11<0%, there is the negative voltage.




P.38=60Hz Max operation frequency
P.192=0V, P.193=10V The minimum/maximum input positive voltage of terminal 2-5
P.194=0%, P.195=100% The setting corresponding to the minimum/maximum positive voltage of terminal 2-5
P.510=0%, P.511=100% The setting corresponding to the minimum/maximum negative voltage of terminal 2-5
P.512=0V, P.513=10V The minimum/maximum input negative voltage of terminal 2-5
P.139 = 50% The bias rate of 2-5 voltage signal

Note: 1.The examples above are in the condition that 02-00 is 1. It is also applicable when 02-00 is other non-zero value. Please refer to the definition instruction of 02-00 for details.

2. The selection of range of voltage signal sampling across terminal 2-5 by parameter 02-08 will affect the parameters value of 2-5 terminal input signal in this part.

## 5.3.6 Selection and handling of input terminal 4-5

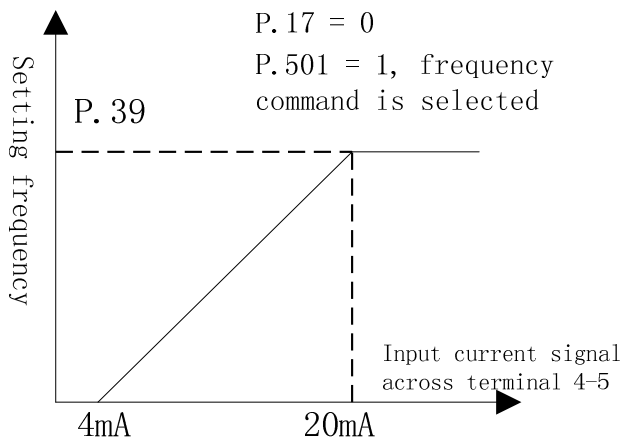
- Selects the signal specifications, frequency compensation function, etc, via input terminal 4-5.

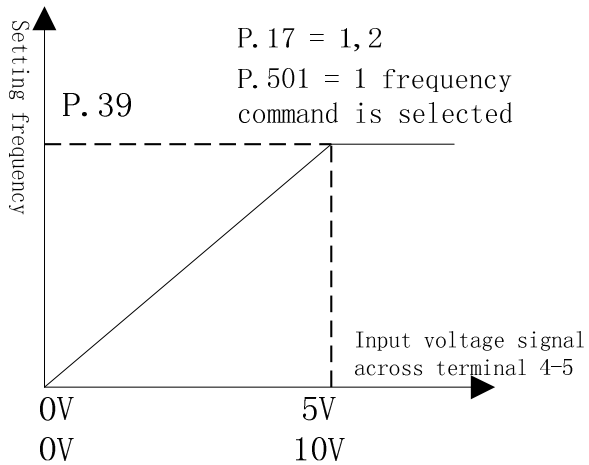
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-20 P.17 | 4-5 signal selection | 0 | 0 | The effective range of signal sampling is 4~20mA. |
| | | | 1 | The effective range of signal sampling is 0 ~ 10V. |
| | | | 2 | The effective range of signal sampling is0 ~ 5V. |
| 02-21 P.39 | The maximum operation frequency of terminal 4-5 | 50.00Hz | 1.00 ~ 650.00Hz | 50Hz syetem (00-24=1) |
| | | 60.00Hz | | 60Hz syetem (00-24=0) |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-22<br>P.528 | 4-5 filter time | 30ms | 0 ~ 2000ms | --- |
| 02-23<br>P.505 | The bias rate of 4-5 current/voltage signal | 0.0% | -100.0% ~ 100.0% | --- |
| 02-24<br>P.184 | 4-5 disconnection selection | 0 | 0 | No disconnection selection is available. |
| | | | 1 | Decelerate to 0Hz, the digital output terminal will set off the alarm |
| | | | 2 | The inverter will stop immediately, and the panel willdisplaythe “AEr” alarm. |
| | | | 3 | The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm. |
| 02-25<br>P.198 | The minimum input current/voltage of terminal 4-5 | 4.00mA | 0 ~ 20.00mA | --- |
| 02-26<br>P.199 | The maximum input current/voltage of terminal 4-5 | 20.00mA | 0 ~ 20.00mA | --- |
| 02-27<br>P.196 | The percentage corresponding to the minimum input current/ voltage of terminal 4-5 | 0.0% | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% | ( P.501= 2/14/15/16/17 ) |
| 02-28<br>P.197 | The percentage corresponding to the maximum input current/voltage of terminal 4-5 | 100.0% | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% | ( P.501= 2/14/15/16/17 ) |

Setting Selection and handling of input terminal 4-5

◆ 4-5 signal selection and the maximum operation frequency of terminal 4-5



Note:1. In “external mode”, “combined mode 2" or “combined mode 4”, if AU is “on” and 02-01=1, target frequency of the inverter will be set by the input signal across terminal 4-5. If AU is “off”, please refer to 02-00, 02-01

2. In “external mode”, “combined mode 2” or “combined mode 4”, if AU and either one of RH, RM, RL and REX are valid concurrently, multi-speed has higher priority.

3. RH, RM, RL, REX and AU mentioned in this section is the function name of the “multi-function digital input terminal”. Please refer to 03-03、03-04、03-05、03-00、03-01、03-02 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

◆ 4-5 disconnection selection

1) When 02-24 = 0, the inverter will decelerate to 0Hz when disconnected. After reconnecting the inverter, the inverter will accelerate to the corresponding frequency.

2) When 02-24 =1, the inverter will decelerate to 0Hz when disconnected. Meanwhile, the multi-function digital output terminal will set off the alarm.After reconnecting the inverter, the inverter will accelerate to the corresponding frequency. Reconnection will clear the alarm.

3) When 02-24=2, the panel will display the “AEr” alarm when disconnected. The inverter will stop immediately. Reset to clear the alarm.

4) When 02-24=3, the inverter will run continuously according to the frequency reference before the disconnection. The multi-function digital output terminal will set off the alarm. Reconnect to clear the alarm.

Note: 1. 4 - 5 bolt function applies only to current break line, please pay attention to parameter 02-20 (P. 17) set and the location of the switch SW3.

2. The function of the multi-function digital output terminals to choose, please refer to the 03-10;Related wiring, please refer to section 3.5.

◆ Input current/voltage of terminal 4-5

The setting of 4-5 terminal input current/voltage is similar to the setting of 2-5. And they also have the same effect except that the terminal 4-5 can’t give the negative voltage and the minimum input current is 4mA.

Note: Operating the 4-5 terminal function mentioned above, you must flip the switch SW3 to corresponding position at first and make sure it matches the setting value of parameter 02-20.

## 5.3.7 Selection and handling of input terminal M2

➢ Selection and handling of input terminal HDI is for digital input M2 terminal only, other digital input terminals cannot be set to HDI function.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-38<br>P.526 | HDI filter time | 10ms | 0 ~ 2000ms | --- |
| 02-39<br>P.524 | HDI input minimum frequency | 0.00kHz | 0 ~ 100.00kHz | --- |
| 02-40<br>P.525 | HDI input maximum frequency | 100.00 kHz | 0 ~ 100.00kHz | --- |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-41 P.522 | The percentage corresponding toHDI input minimum frequency | 0.0% | -100.0% ~ 100.0% | --- |
| | | | -400.0% ~ 400.0% | ( P.503= 2/14/15/16/17 ) |
| 02-42 P.523 | The percentage corresponding to HDI input maximum frequency | 100.0% | -100.0% ~ 100.0% | --- |
| | | | -400.0% ~ 400.0% | ( P.503= 2/14/15/16/17 ) |

Setting Selection and handling of input terminal HDI

- 02-38 (the HDI filter coefficient) is used to filter out the operation frequency jitter generated by component accuracy, noise or other factors. The larger the set value of 02-38 is, the better the filter ability is, and the slow response will be caused.
- HDI is sharing terminal with M2, the HDI terminal function is setting parameter 03-05/P.82 value to 41、54、57.

Note: The frequency computing method of HDI input signal is similar to 2-5 analog input, the formula is 01-00 * ( (02-40 - 02-39)*(02-42 - 02-41)/(the input frequency– 02-39) +02-41).

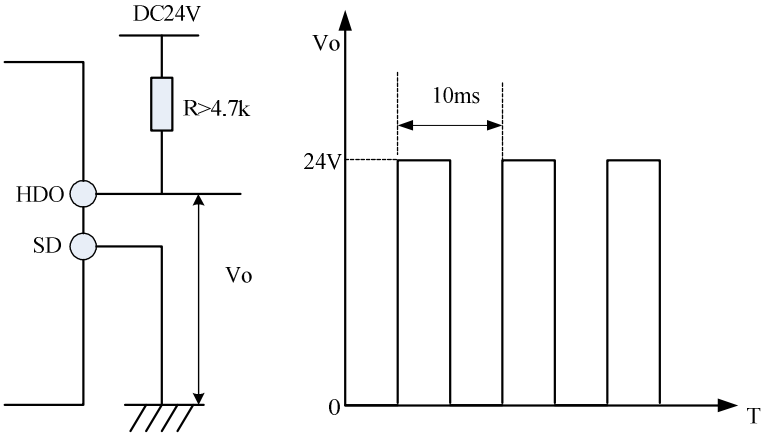
### 5.3.8 HDO frequency multiplication coefficient

- This parameter is used to set the output square-wave characteristic of output terminal HDO.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-43 P.74 | HDO frequency multiplication coefficient | 0 | 0 | 0: Select FM function as the output function of terminalHDO. |
| | | | 1 ~ 9000 | 1 ~ 9000: Select the square-wave pulse which is 02-43(P.74) times of running frequency as the output of terminal. |

Setting HDO frequency multiplication coefficient

- When 02-43 is set to 1~9000, the external terminal HDO select the frequency multiplication output function which maximum frequency is 100 kHz.
- When 02-43 is set at 5 and the instantaneous frequency of operation is 20Hz, the output pulse wave between terminal HDO and terminal SD is as following diagram:




Note: When 02-43=1, the output is one time of the running frequency. And the inverter can provide the output from 1~650Hz which precision is 1%. The bigger the value of 02-43 and the bigger the running frequency is, the worse the precision will be.

## 5.3.9 Function selection of FM output

➢ When the output of the terminal HDO is with FM function, sets the data to be output via analog output terminal FM.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-44 P.543 | FM output function selection | 0 | 0 | Output frequency, the frequency display reference 02-51(P.55) is 100%. |
| | | | 1 | Output current, the current monitoringreference02-52(P.56)is 100%. |
| | | | 2 | Output DC bus voltage, the OV level is 100%. |
| | | | 3 | Output the temperature rising accumulation rate of inverter, the NTC level is 100%. |
| | | | 4 | Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%. |
| | | | 5 | Target frequency, the frequency display reference02-51 (P.55) is 100%. |
| | | | 6 | Fixed voltage output, voltage output level is set by 02-54 (P.541). |
| | | | 7 | Output voltage, the inverter rated voltage is100%. |
| | | | 8 | Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6). |
| | | | 9 | Output torque, two times motor rated torque is 100%. |
| | | | 10 | Output power, two times motor rated power is 100%. |
| | | | 11 | The high-speed pulse, 100.00KHz is 100%. |
| | | | 12 | Motor speed, to display the level of 02-51(P.55) is 100% |

Setting Usage of analog output terminal FM

◆ For the calibration of terminal FM, please refer to 5.4.7 FM calibration parameter.

## 5.3.10 Selection and handling of output terminal AM

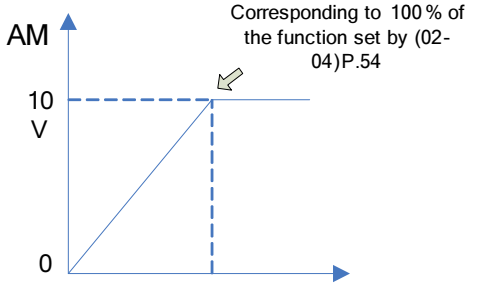
➢ It is used to adjust the analog voltage level that terminal AM outputs.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-45 P.64 | AM output signal selection | 0 | 0 | 0~10V voltage can be output across terminal AM-5. |
| | | | 1 | Reserve |
| | | | 2 | 0~20mA current can be output across AM-5. |
| | | | 3 | 4~20mA current can be output across AM-5. |
| 02-46 P.191 | AM output gain | 935 | 0 ~ 1024 | --- |
| 02-47 P.190 | AM output bias | 0 | 0 ~ 1024 | --- |

Setting Selection and handling of output terminal AM

◆ The current/voltage output of terminal AM is set by both the toggle switch SW2 on control board and 02-45. When the user need to select the output type of terminal AM, please turn the toggle switch SW2 to the corresponding type at first and then set the value of 02-45.

◆ The output of the terminal AM are shown as follows:



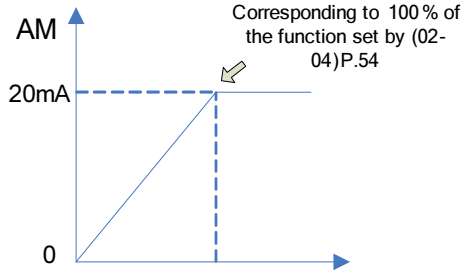




Figure 1. AM-5 output 0~10V voltageFigure 2. AM-5 output 0~20mA current

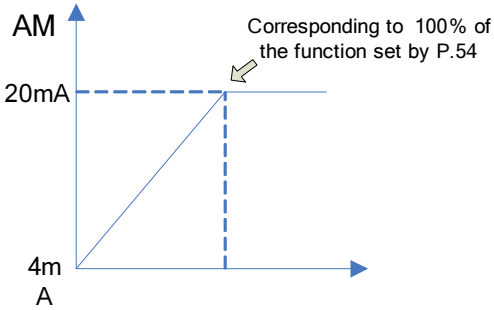



Figure 3. AM-5 output 4~20mA current

◆ For the difference on the components, header needs to be calibrated, the voltage/current calibration procedures of AM terminal:

1. Set the toggle switch SW2 to 0~10V/0~20mA, then set 02-45 at 0 or 2.
2. Insert an electric meter with a full graduation of 10V/20mA across terminal AM and terminal 5. Set 02-04 at 0., 02-51 at 60Hz.
3. Set 01-11 at 0. Start the motor. Fix the output frequency of the inverter to 0 Hz.
4. Press to adjust the value of 02-47. The screen will display the accumulated output bias voltage of AM. Press

WRITE for more than 1 second, and the pointer will move upward. Press to reduce the value of 02-47, and the screen will display the progressively decreased output bias voltage of AM. Press WRITE for more than 1second, and the pointer will move downward. When the pointer is adjusted to 0, the calibration of AM output bias voltage is completed.

5. Adjust and fix the output frequency of the inverter at 60 Hz.
6. Read the set value of 02-46, and the screen will display the current output gain of AM.
7. Press or to adjust the value of 02-46. Press WRITE for more than 1 second, and the pointer will move upward or downward. When the pointer moves to the full-scale position, the calibration is completed.

Note: When selecting the output signal of terminal AM, please pay attention to the switch of SW2. If 4~20mA output current is selected, please switch SW2 to 0~20mA.

## 5.3.11 Display referenceat the analog output

➢ It is used to set the output frequency and current display reference when in the analog output of terminal AM/FM.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-51 P.55 | Frequency display reference at the analog output | 50.00Hz | 1 ~ 650.00Hz | 50Hz system(when 00-24=1) |
| | | 60.00Hz | | 60Hz system(when 00-24=0) |
| 02-52 P.56 | Current monitoring referenceat the analog output | Note | 0 ~ 500.00A | Frame D and the types below |

Setting Display reference

◆ The setting frequency of 02-51 is 100%, which corresponds to the maximum output of AM/FM.

◆ The setting frequency of 02-52 is 100%, which corresponds to the maximum output of AM/FM.

Note: The factory value of 02-52 is determined by motor types.

## 5.3.12 AM/FM fixed output level

➢ Makes AM/FM output to be a steady output.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-53 P.539 | Reserve | --- | --- | --- |
| 02-54 P.541 | AM/FMfixed output level | 0.0% | 0 ~ 100.0% | --- |

Setting

◆ Set 02-54 to 0~100.0%, which corresponds to0~10V/20mA of AM;

For example:02-54(P.541) =50%, the output of AM is 10V*50%=5V.

## 5.3.13 PT100 level setting

➢ Sets PT100 protection level and operation frequency

| Parameter | Name | Factory Value | Setting Range | Content | |
|---|---|---|---|---|---|
| 02-55 P.592 | PT100 voltage level 1 | 5.00V | 0 ~ 10.00V | 0 | No PT100 level 1 protection. |
| | | | | 0.10V~ 10.00V | When PT100 is larger than level 1, after 02-58 (P.595) setting the time, the output frequency will decrease to 02-57(P.594). |
| 02-56 P.593 | PT100 voltage level 2 | 7.00V | 0 ~ 10.00V | 0 | No PT100 level 2 protection. |
| | | | | 0.10V~ 10.00V | When PT100 is larger than level 2, it will operate according to the setting of 06-15(P.533) |
| 02-57 P.594 | PT100 level 1 starting frequency | 0.00Hz | 0 ~ 650.00Hz | When it is over PT100 level 1, the output frequency will decrease to02-57(P.594). | |
| 02-58 P.595 | Starting PT100 level 1 delay time | 60s | 0 ~ 6000s | The operation delay time for output frequency decreasing to02-57(P.594). | |

Setting PT100 level setting

- Viaanalogvoltage input, PT100 sets the voltage input range of 2-5/4-5 is0~10V(02-08=1;02-20=1;02-29=1, please pay attention to switch the voltage/current switch on control board to the position of voltage input), and sets analog voltage input to be used in PT100 function. (02-00,02-01 is set to 12).
- When the inverter is in operation state, the input voltage of PT100 is larger than the setting value of 02-55, after 02-58 setting the time, the output frequency of the inverter will decrease to the setting frequency of 02-57.
- When the input voltage of PT100 is larger than the setting value of 02-56, it will operate according to the setting of 06-15.

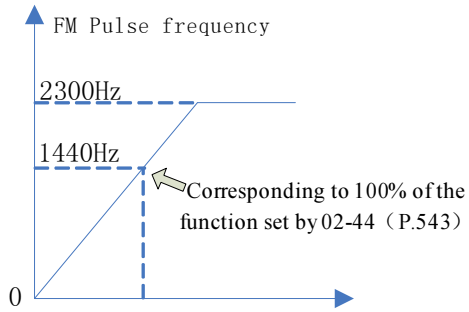
## 5.3.14 FM calibration parameter

➢ It is used to adjust the analog voltage level that terminal FM outputs.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 02-59 P.187 | FM calibration parameter | 450 | 0 ~ 9998 | --- |

Setting FM calibration parameter

- The output of the terminal HDO with FM function is shown as follows:

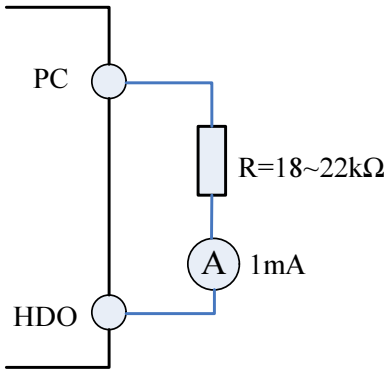



◆ For the difference on the components, header needs to be calibrated.HDO terminal calibration procedures:

1. Insert an electric meter with a full graduation or a frequency counterof 1mA across terminal HDO and terminal SD.Wiring as the following figure shown, and set 02-51 at 60Hz,02-44at 0.

2. Start the motor and fix the output frequency of the inverter to 60Hz.

3.When the motor runs steadily, read the set value of 02-59. At this point, the screen will display the FM correction index. Press to adjust the value of 02-59. The screen will display a progressively increase of the FM correction index. Press WRITE for more than 1 second, and the pointer will move upward. Press to adjust the value of 02-59 downward, and the screen will display a progressively decrease of the FM correction index. Press WRITE for more than 1 second and the pointer will move downward.



## 5.4 Digital input/ output parameter group03

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 03-00 | P.83 | STF function selection | 0: STF(the inverter runs forward)<br>1: STR(the inverter runs reverse)<br>2: RL(Multi-speed low speed)<br>3: RM(Multi-speed medium speed)<br>4: RH(multi-speed high speed)<br>5:AU( Analog terminal 4-5 priority)<br>6: The external thermal relay operation<br>7: MRS(the instantaneous stopping of the inverter output)<br>8: RT(the inverter second function)<br>9: EXT(external JOG)<br>10: STF+EXJ<br>11: STR+EXJ<br>12: STF+RT<br>13: STR+RT<br>14: STF+RL<br>15: STR+RL<br>16: STF+RM<br>17: STR+RM<br>18: STF+RH<br>19: STR+RH<br>20: STF+RL+RM<br>21: STR+RL+RM<br>22: STF+RT+RL<br>23: STR+RT+RL<br>24: STF+RT+RM<br>25: STR+RT+RM<br>26: STF+RT+RL+RM<br>27: STR+RT+RL+RM<br>28: RUN(the inverter runs forward)<br>29: STF/STR(it is used with RUN, when STF/ STR is"on", the inverter runs reverse ; when STF/STR is "off", the inverter runs forward)<br>30: RES(external reset function)<br>31: STOP(it can be used as a three-wire mode with the RUN signal or the STF-STR terminal)<br>32: REX(multi-speed set (16 levels))<br>33: PO(in "external mode", programmed operation mode is chosen)<br>34: RES_E (external reset become valid only when the alarm goes off.) | 0 | 119 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 03-00 | P.83 | STF function selection | 35: MPO (in “external mode” the manually operation cycle mode is chosen.)<br>36: TRI(triangle wave function is chosen)<br>37: GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.)<br>38: CS(Manual switch to commercial power supply)<br>39: STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation.<br>40: P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input)<br>41: PWM setting frequency<br>42: MTCLKA/MTCLKB<br>43: RUN_EN (the digital input terminal running enable)<br>44: PID_OFF (the digital input terminal stopping PID enable)<br>45: The second mode<br>46: Initial curling radius selection terminal 1<br>47: Initial curling radius selection terminal 2<br>48: Thickness selection terminal 1<br>49: Thickness selection terminal 2<br>50: Wind-up roll-down switching<br>51: Predrive reference<br>52: Torque memory<br>53: Torque memory enable<br>54: Turn counting signal (note1)<br>55: Switch speed/Torque control<br>56: Curling radius restore<br>57: High-speed pulse input function (note1)<br>58: Analog terminal 2-5 priority<br>59: Reserve<br>60: Starting/Stopping of PLC<br>61: Origin retry enable function SHOM<br>62: Origin retry setting origin ORGP<br>63: Switch position/Speed control<br>64: External switch zero-servo<br>65: External accelerate/decelerate pause<br>66: External forced stop<br>67：coil diameter calculation Stop<br>68：Single point positioning can make<br>69：Multipoint positioning can make<br>70：entire position control pulse input command can make<br>71：External torque command polarity reverse<br>99999 : Not choose in addition of terminal function | 0 | 119 |
| 03-01 | P.84 | STRfunction selection | Same as 03-00 | 1 | 120 |
| 03-02 | P.86 | RES function selection | Same as 03-00 | 30 | 120 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 03-03 | P.80 | M0 function selection | Same as 03-00 | 2 | 121 |
| 03-04 | P.81 | M1 function selection | Same as 03-00 | 3 | 121 |
| 03-05 | P.82 | M2 function selection | Same as 03-00 | 4 | 121 |
| 03-06 | P.126 | Reserve | --- | --- | 121 |
| 03-07 | P.127 | Reserve | --- | --- | 121 |
| 03-08 | P.128 | Reserve | --- | --- | 121 |
| 03-09 | P.550 | Reserve | --- | --- | 121 |
| 03-10 | P.40 | SO-SE function | 0: RUN(inverter running)<br>1: SU(reaching the output frequency)<br>2: FU(output frequency detection)<br>3: OL(overload detection)<br>4: OMD(zero current detection)<br>5: ALARM(alarm detection)<br>6: PO1(programmed operation section detection)<br>7: PO2(programmed operation periodical detection)<br>8: PO3(programmed operation pause detection)<br>9: BP(Switch between the inverter operation and the commercial power-supply operation function, inverter output)<br>10: GP(Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)<br>11：OMD1(zero current detection)<br>12～15: Reserve<br>16: Reserve<br>17: RY(the accomplishment of inverter running preparation)<br>18: Maintenance alarm detection<br>19: OL2 (Over torque alarm output)<br>20: Capacitor lifetime abnormal<br>21: Position control position attained<br>22：Tension control curl pattern detection<br>23：Power marker detection | 1 | 125 |
| 03-11 | P.85 | A-B-C function | Same as 03-10 | 5 | 125 |
| 03-12 | P.129 | Reserve | Same as 03-10 | 2 | 125 |
| 03-13 | P.130 | Reserve | Same as 03-10 | 0 | 125 |
| 03-14 | P.87 | Multi-function terminal digital input negative/positive logic | 0～1023 | 0 | 126 |
| 03-15 | P.88 | Multi-function terminal digital output negative/positive logic | 0～4095 | 0 | 126 |
| 03-16 | P.120 | Output signal delay time | 0～3600.0s | 0.0s | 127 |
| 03-17 | P.157 | Digital input terminal filter time | 0～2000ms | 4ms | 127 |
| 03-18 | P.158 | Digital input terminal power enable | 0: Digital input terminal power unable<br>1: Digital input terminal power enable | 0 | 127 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 03-20 | P.41 | Up-to-frequency sensitivity | 0 ~ 100.0% | 10.0% | 128 |
| 03-21 | P.42 | Output frequency detection for forward rotation | 0 ~ 650.00Hz | 6.00Hz | 128 |
| 03-22 | P.43 | Output frequency detection for reverse rotation | 0 ~ 650.00Hz<br>99999: Same as the setting of 03-21(P.42) | 99999 | 128 |
| 03-23 | P.62 | Zero current detection level | 0 ~ 200.0%<br>99999: Function invalid | 5.0% | 129 |
| 03-24 | P.63 | Zero current detection time | 0 ~ 100.00s<br>99999: Function invalid | 0.50s | 129 |
| 03-25 | P.551 | Expanded digital input terminal M10 | Same as 03-00 | 99999 | 129 |
| 03-26 | P.552 | Expanded digital input terminal M11 | Same as 03-00 | 99999 | 129 |
| 03-27 | P.553 | Expanded digital input terminal M12 | Same as 03-00 | 99999 | 129 |
| 03-28 | P.554 | Expanded digital input terminal M13 | Same as 03-00 | 99999 | 129 |
| 03-29 | P.555 | Expanded digital input terminal M14 | Same as 03-00 | 99999 | 129 |
| 03-30 | P.556 | Expanded digital input terminal M15 | Same as 03-00 | 99999 | 129 |
| 03-33 | P.559 | Reserve | --- | --- | --- |
| 03-34 | P.560 | Reserve | --- | --- | --- |
| 03-35 | P.561 | Reserve | --- | --- | --- |
| 03-36 | P.562 | Reserve | --- | --- | --- |
| 03-37 | P.563 | Reserve | --- | --- | --- |
| 03-38 | P.564 | Reserve | --- | --- | --- |
| 03-41 | P.567 | Expanded digital input terminal negative/ positive logic | 0 ~ 63 | 0 | 130 |
| 03-42 | P.568 | Expanded digital output terminal A10 | Same as 03-10 | 99999 | 130 |
| 03-43 | P.569 | Expanded digital output terminal A11 | Same as 03-10 | 99999 | 130 |
| 03-44 | P.570 | Expanded digital output terminal A12 | Same as 03-10 | 99999 | 130 |
| 03-45 | P.571 | Expanded digital output terminal A13 | Same as 03-10 | 99999 | 130 |
| 03-46 | P.572 | Expanded digital output terminal A14 | Same as 03-10 | 99999 | 131 |
| 03-47 | P.573 | Expanded digital output terminal A15 | Same as 03-10 | 99999 | 131 |
| 03-48 | P.574 | Expanded digital output terminal A16 | Same as 03-10 | 99999 | 131 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 03-49 | P.575 | Expanded digital output terminal A17 | Same as 03-10 | 99999 | 131 |
| 03-50 | P.576 | Reserve | --- | --- | --- |
| 03-51 | P.577 | Reserve | --- | --- | --- |
| 03-52 | P.578 | Reserve | --- | --- | --- |
| 03-53 | P.579 | Reserve | --- | --- | --- |
| 03-54 | P.580 | Reserve | --- | --- | --- |
| 03-55 | P.581 | Reserve | --- | --- | --- |
| 03-56 | P.582 | Reserve | --- | --- | --- |
| 03-57 | P.583 | Reserve | --- | --- | --- |
| 03-58 | P.584 | Reserve | --- | --- | 131 |
| 03-59 | P.585 | Monitor noumenon digital input terminal state | Read | Read | 131 |
| 03-60 | P.586 | Monitor noumenon and expanded digital output terminal state | Read | Read | 131 |
| 03-61 | P.587 | Monitor expanded digital input terminal state | Read | Read | 131 |
| 03-62 | P.588 | Monitor expanded digital output terminal state | Read | Read | 131 |

## 5.4.1 Function selection of digital input

- Use the following parameters to select or change the digital input terminal functions.Any function from 0 to 66 can be selected by each terminal (Note 1).

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-00 P.83 | STF function selection | 0 | 0 | STF(the inverter runs forward) |
| | | | 1 | STR(the inverter runs reverse) |
| | | | 2 | RL(Multi-speed low speed) |
| | | | 3 | RM(Multi-speed medium speed) |
| | | | 4 | RH(multi-speed high speed) |
| | | | 5 | AU(Analog terminal 4-5 priority) |
| | | | 6 | The external thermal relay operation |
| | | | 7 | MRS(the instantaneous stopping of the inverter output) |
| | | | 8 | RT(the inverter second function) |
| | | | 9 | EXT(external JOG) |
| | | | 10 | STF+EXJ |
| | | | 11 | STR+EXJ |
| | | | 12 | STF+RT |
| | | | 13 | STR+RT |
| | | | 14 | STF+RL |
| | | | 15 | STR+RL |
| | | | 16 | STF+RM |
| | | | 17 | STR+RM |
| | | | 18 | STF+RH |
| | | | 19 | STR+RH |
| | | | 20 | STF+RL+RM |
| | | | 21 | STR+RL+RM |
| | | | 22 | STF+RT+RL |
| | | | 23 | STR+RT+RL |
| | | | 24 | STF+RT+RM |
| | | | 25 | STR+RT+RM |
| | | | 26 | STF+RT+RL+RM |
| | | | 27 | STR+RT+RL+RM |
| | | | 28 | RUN(the inverter runs forward) |
| | | | 29 | STF/STR(it is used with RUN, when STF/ STR is"on", the inverter runs reverse ; when STF/STR is "off", the inverter runs forward) |
| | | | 30 | RES(external reset function) |
| | | | 31 | STOP(it can be used as a three-wire mode with the RUN signal or the STF-STR terminal) |
| | | | 32 | REX(multi-speed set (16 levels)) |
| | | | 33 | PO(in "external mode", programmed operation mode is chosen) |
| | | | 34 | RES_E (external reset become valid only when the alarm goes off.) |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-00 P.83 | STF function selection | 0 | 35 | MPO (in “external mode” the manually operation cycle mode is chosen.) |
| | | | 36 | TRI(triangle wave function is chosen) |
| | | | 37 | GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.) |
| | | | 38 | CS(Manual switch to commercial power supply) |
| | | | 39 | STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation. |
| | | | 40 | P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input) |
| | | | 41 | PWM setting frequency |
| | | | 42 | MTCLKA/MTCLKB |
| | | | 43 | RUN_EN (the digital input terminal running enable) |
| | | | 44 | PID_OFF (the digital input terminal stopping PID enable) |
| | | | 45 | The second mode |
| | | | 46 | Initial curling radius selection terminal 1 |
| | | | 47 | Initial curling radius selection terminal 2 |
| | | | 48 | Thickness selection terminal 1 |
| | | | 49 | Thickness selection terminal 2 |
| | | | 50 | Wind-up roll-down switching |
| | | | 51 | Predrive reference |
| | | | 52 | Torque memory |
| | | | 53 | Torque memory enable |
| | | | 54 | Turn counting signal (note1) |
| | | | 55 | Switch speed/Torque control |
| | | | 56 | Curling radius restore |
| | | | 57 | High-speed pulse input function (note1) |
| | | | 58 | Analog terminal 2-5 priority |
| | | | 59 | Reserve |
| | | | 60 | Starting/Stopping of PLC |
| | | | 61 | Home moving function SHOM |
| | | | 62 | Origin position ORGP |
| | | | 63 | Position/Speed control switch |
| | | | 64 | External switch zero-servo |
| | | | 65 | External accelerate/decelerate pause |
| | | | 66 | External forced stop |
| | | | 67 | coil diameter calculation Stop |
| | | | 68 | Single point positioning can make |
| | | | 69 | Multipoint positioning can make |
| | | | 70 | entire position control pulse input command can make |
| | | | 71 | External torque command polarity reverse |
| | | | 99999 | Not choose in addition of terminal function |
| 03-01 P.84 | STR function selection | 1 | Same as 03-00 | Same as 03-00 |
| 03-02 P.86 | RES function selection | 30 | Same as 03-00 | Same as 03-00 |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-03 P.80 | M0 function selection | 2 | Same as 03-00 | Same as 03-00 |
| 03-04 P.81 | M1 function selection | 3 | Same as 03-00 | Same as 03-00 |
| 03-05 P.82 | M2 function selection | 4 | Same as 03-00 | Same as 03-00 |
| 03-06 P.126 | Reserve | --- | --- | --- |
| 03-07 P.127 | Reserve | --- | --- | --- |
| 03-08 P.128 | Reserve | --- | --- | --- |
| 03-09 P.550 | Reserve | --- | --- | --- |

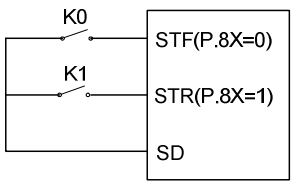
Setting Function selection of digital input

- The default value are 03-03=2(RL), 03-04=3(RM), 03-05=4(RH), 03-00=0(STF), 03-01=1(STR), 03-02=30(RES).
- If the setting of 03-01~03-03 are changed, the functions of the terminals are modified too. For example, when 03-03 is equal to 2, the M0 terminal is used for RL. When 03-03 is changed to 8, than the M0 terminal function will be changed to RT, i.e., the second function selection terminal. Take another example, if 03-00 is equal to 0, the STF terminal will be STF forward rotation function. When 03-00 is changed to 6, then STF terminal function will be changed OH, i.e., the external thermal relay terminal.
- Analog terminal 4-5 priority

  When the contact is ON, the source of external frequency will force to be4-5. (If the frequency commands are set to 4-5, 2-5 at the same time, the priority is2-5 > 4-5).
- Wiring for the external thermal relay (OH): for the conventional motor wiring, the external thermal relay is often placed at the front of the motor to prevent the motor from overheating. When the external thermal relay is separated, the alarm of the inverter will be tripped off and “OHT” will be displayed on the screen.
- The operation of the inverter can be controlled by four means (“1” for terminal close, “0" for terminal open, and X = 0, 1, 2, 3, 4, 6).

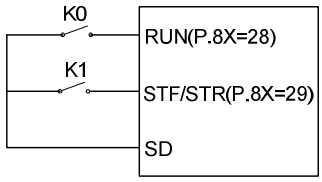
  1) Two-wire control mode 1:

| K0 | K1 | Operating Instructions |
|---|---|---|
| 0 | 0 | Stop |
| 1 | 0 | Run Forward |
| 0 | 1 | Run Reverse |
| 1 | 1 | Stop |

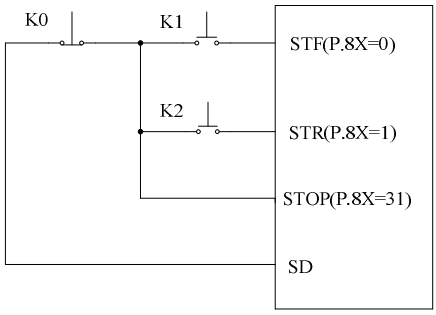


2) Two-wire control mode 2:

| K0 | K1 | Operating Instrnctions |
|---|---|---|
| 0 | 0 | Stop |
| 0 | 1 | Stop |
| 1 | 0 | Run Forward |
| 1 | 1 | Run Reverse |

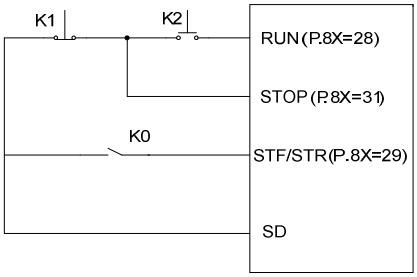



3) Three-wire control mode 1 (with self-maintenance function): K0 is for the STOP function that is normally close. When it is open, the inverter will stop. K1 and K2 is the forward and reverse signals that are normally open. They indicate that pulse signal is active, i.e., jog is valid.




- Three-wire control mode 2 (with self-maintenance function): K1 is for the STOP function that is normally close. When it is open, the inverter will stop. K2 is the RUN signal that is normally open. It indicates that pulse signal is active, i.e., jog is valid. For the direction changing signal (STF/STR), the parameter corresponds to the digital input terminals is 39. When changing the direction, stop the inverter first, RUN the inverter before activating it.

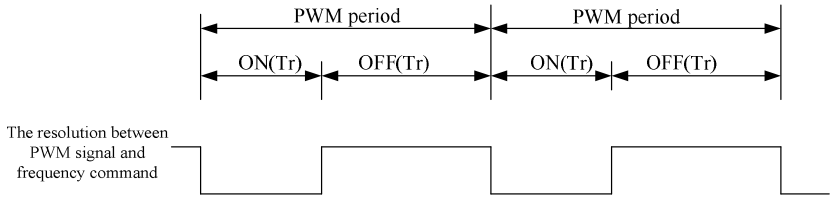
| K0 | Operating Instruction |
|---|---|
| 0 | Run Forward |
| 1 | Run Reverse |




- In “external mode" and when PO is “on”, select the programmed operation mode. At this stage, the STF terminal is the source of the start signal. When STF is “on”, the inverter begins to run in the programmed operation mode at the first section. When STF is "off”, the invert stops running, and STR becomes the pause signal source. When STR is “on”, the operation will be suspended. When STR is “off”, the operation sill be continued (continues from the suspended section).For details, please refer to 04-15, 04-27~04-42, 04-16~04-18 and 04-19~04-26.

- In the external mode, the manual operation cycle mode is selected when MPO is “on”. For details on parameter, please refer to04-19~04-26.

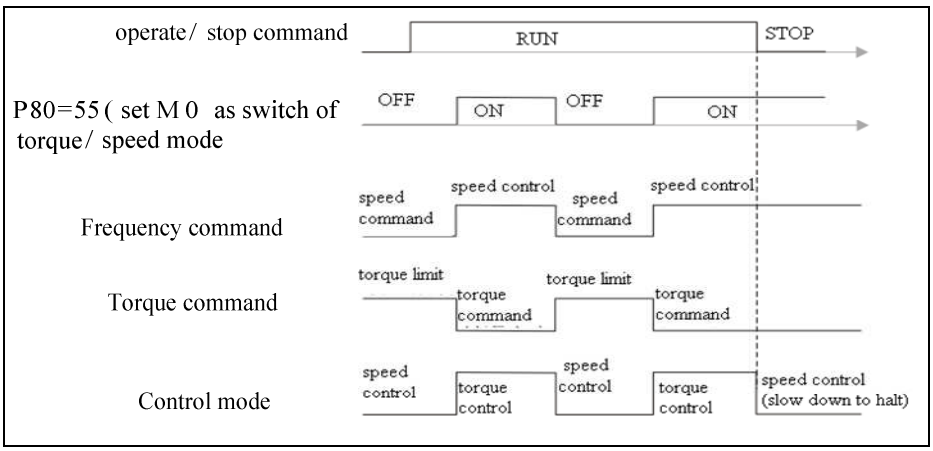
- PWM setting frequency (03-05 = 41): the inverter will measure and calculate the time of ON and OFF every PWM period as the frequency reference. (The PWM period within 0.9ms ~ 1100ms admissible)




$$\text{Frequency command (Hz)} = \frac{\text{ON time}}{\text{PWM period}} \times \text{upper limit frequency P.1 (Hz)}$$

The function is only valid for the terminal M2. Near the minimum frequency and the maximum frequency, the precision of the output frequency will reduced relative to the input signal, please avoid using on the occasion needed rigorous frequency control.

- As the high-speed pulse input terminal, M2I is used to given the target frequency, please refer to5.3.8.
- Only M0 can be set to MTCLKA function(Phase A pulse count)
- Only M1 can be set to MTCLKB function(Phase B pulse count)
- When 03-05 = 54, the function is under the tension control mode and it is used to calculate the turns of the winding shaft rotation when calculating the curling radius with the sickness accumulation method.
- Digital input terminals switch “speed/torque control”: when switch speed-control to torque-control, torque limit turns to Torque reference, and speed reference turns to speed limit. When return torque control back to speed control, Torque reference turns to torque limit, and speed limit turns to speed reference. If you operate the switch of speed control/ torque control, please be in the mode of closed-loop vector speed control (00-21=4, 5) and set 00-20=0. If you set 00-20=1 and digital input terminals=55 at the same time, the switch function will be invalid and only torque-control operates.
- Digital input terminals switch “speed/position control”,please be in the mode of closed-loop vector speed control(00-21(P.300)=4), and set00-20(P.400)=2.If you set 00-20(P.400)=0,1, and digital input terminals=63 at the same time, the position control deosn’t operate and only speed control or torque control operates.
  The figure as below:




- Analog terminal 2-5 priority

  When the contact is ON, the source of external frequency will force to be 2-5. (If the frequency commands are set to 4-5, 2-5 at the same time, the priority is 2-5 > 4-5).

- Starting/stopping of PLC

  When the contact is ON,internal PLC starts; when it is OFF, PLC stops.

- Home moving function SHOM

  When the contact is ON, as SHOM signal is activated, home moving function would be executed.

- Origin reset set origin ORGP

  ORGP origin input. When the switch of this function operates, the inverter will execute the home moving function according to 12-00, 12-01 and 12-02.

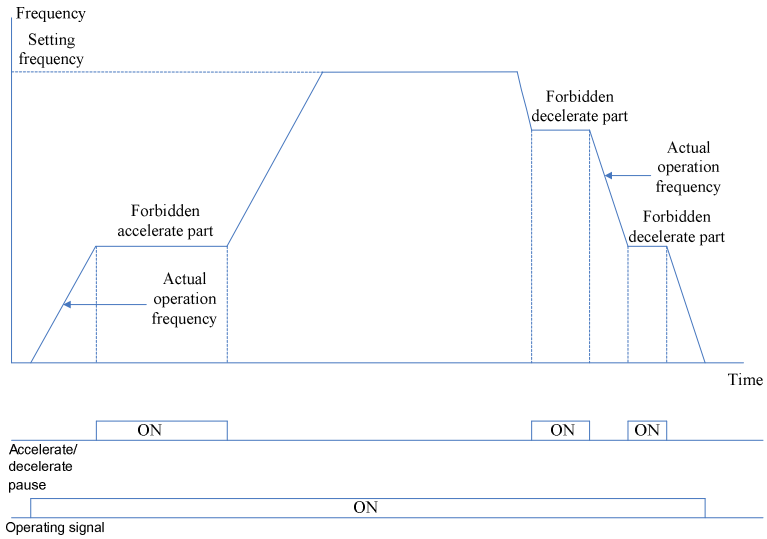
- External switch zero-servo

  When the contact is ON,zero-servo function is valid.

- The second mode

  When the contact is ON, and function and parameter 00-16(P.79)=99999, the second mode is the same which is selected,the operation instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97).

- When excuting the external accelerate/decelerate pause function, the inverter will stop accelerating or decelerating at once.When removing the instruction, the inverter will go on accelerating/decelerating from the forbidden point.




- External forced stop

  When the contact is ON,the driver will forced stop according to the setting of 00-13(P.71).

- point positioning

  Details please refer to the 5.13.4 single point positioning function.

- Multipoint positioning

  Multipoint positioning is based on single point positioning, setting function for more of the external terminals can make (03-03 = 68 , 01-04 = 69), single point positioning movement after completion of execution, if the multipoint positioning terminal can make, the frequency converter based on multistage position terminal condition (REX, RH, RM, RL) inverter circuit within 15 paragraph positioning function, don't walk deceleration curve, the number of pulses positioning multi-segment location instructions (12-21,12-23...)., please refer to the specific parameter setting 5.13.5.

- Entire pulse position control

  In a speed control based ON embedded terminal function, when the terminals ON the inverter switch for Pt position control mode, and the position control of Pt difference only lies in this mode without setting 00-20 (P.400) = 2, other are consistent).

- External torque command polarity reverse

  Through the input terminal of the on/off switch to the direction of rotation of the torque instruction.

Note:The setting valve of “41”, “54” and “57” is for M2 terminal only.
The setting valve of “42” is for M0,M1 terminal only.

## 5.4.2 Function selection of digital output

- Detect the message during the inverter operation.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-10 P.40 | SO-SE function | 1 | 0 | RUN(inverter running) |
| | | | 1 | SU(reaching the output frequency) |
| | | | 2 | FU(output frequency detection) |
| | | | 3 | OL(overload detection) |
| | | | 4 | OMD(zero current detection): when the percentage of the output current is lower than the setting value of 03-23(P.62), and exceeds a period of time (03-24(P.63)), OMD will output signal. |
| | | | 5 | ALARM(alarm detection) |
| | | | 6 | PO1(programmed operation section detection) |
| | | | 7 | PO2(programmed operation periodical detection) |
| | | | 8 | PO3(programmed operation pause detection) |
| | | | 9 | BP(Switch between the inverter operation and the commercial power-supply operation function, inverter output) |
| | | | 10 | GP(Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output) |
| | | | 11 | OMD1(zero current detection): When the inverter output frequency reaches the target frequency, and the percentage of the output current is lower than the setting value of 03-23(P.62), and exceeds a period of time (03-24(P.63) setting), OMD1 will output signal. |
| | | | 12 ~ 15 | Reserve |
| | | | 16 | Reserve |
| | | | 17 | RY(the accomplishment of inverter running preparation) |
| | | | 18 | Maintenance alarm detection |
| | | | 19 | OL2 (Over torque alarm output) |
| | | | 20 | Capacitor lifetime abnormal |
| | | | 21 | Position control position attained |
| | | | 22 | Tension control curl pattern detection |
| | | | 23 | Power marker detection |
| 03-11 P.85 | A-B-C function | 5 | Same as 03-10(P.40) | Same as 03-10(P.40) |
| 03-12 P.129 | Reserve | --- | --- | --- |
| 03-13 P.130 | Reserve | --- | --- | --- |

Setting Function selection of digital output

- For the multi-function digital output terminal SO, the default value of 03-10 is 1 which means the “SU” function. When changing the value of 03-10, the corresponding function will change as shown in the above table.
- The internal structures for multi-function digital output terminals SO -SE are “open collector output.” Please refer to

Section 3.7 and Section 3.7.6.

◆ For multi-function relay A-B-C, the default setting value of 03-11 is 5 (i.e., the alarm function). When the value of 03-11 is revised, its function will change respectively according to the function listed in the table above.

### 5.4.3 Terminal logic selection

➢ The function is bits-setting, if the bit shows 1, it means that the action of multi-function digital input terminal is negative logic; otherwise, it means that the action is positive logic.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-14 P.87 | Multi-function terminal digital input negative/positive logic | 0 | 0 ~ 1023 | --- |
| 03-15 P.88 | Multi-function terminal digital output negative/positive logic | 0 | 0 ~ 4095 | --- |

Setting Digital input/output logic

◆ The definition of each bit of 03-14(P.87) is as follows:

bit

| $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|---|---|---|---|---|---|
| RES | M2 | M1 | M0 | STR | STF |

For example: A three-wire control type needs the function of STOP to be kept open (negative logic). So if set 03-03(P.80)=31, take M0 terminal as three-wire control STOP function, and 03-03(P.80)=0, 03-01(P.84)=1, and take STF and STR terminals as default positive/negative logic function, the parameter of 03-14(P.87) should be set as follows:

bit

| $2^9$ | $2^8$ | $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

So (03-14)P.87= $0\times2^5 + 0\times2^4 + 0\times2^3 + 1\times2^2 + 0\times2^1 + 0\times2^0 = 4$

◆ The definiton of each 03-15(P.88) bit is as follows :

bit

| $2^{11}$ | $2^{10}$ | $2^9$ | $2^8$ | $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ABC17 | ABC16 | ABC15 | ABC14 | ABC13 | ABC12 | ABC11 | ABC10 | 0 | 0 | ABC | SO |
| expanded digital output | | | | | | | | | | | |

For example: 03-11(P.85)=0 (inverter is running and detecting), if positive logic output bit is set as 0, when inverter runs, multi-relay is on. When inverter stops, multi-relay is off; otherwise, if set negative logic bit as 1, when inverter runs, multi-relay is off,and when the inverter stops, multi-relay is on.

Note: When “STF” and “STR” terminals are set as negative logic, but signal is not connected with SD, with power on, inverter will input and drive motor operate. So it is dangerous, you must pay attention to it.

### 5.4.4 Output signal delay

- It is used for digital output terminal signal delay and confirmation. The delay time is confirmation time to prevent some uncertain interference.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-16<br>P.120 | Output signal delay time | 0.0s | 0 ~ 3600.0s | --- |

Setting Output signal delay

- When 03-16=0 and the setting requirements of 03-10(03-11) is met, the signal will output directly.
- When 03-16 = 0.1~3600 and the setting requirements of 03-10(03-11) is met, the signal will output after a setting delay time.

### 5.4.5 Digital input terminal filter

- It is used to select response time to the signal of digital input terminals.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-17<br>P.157 | Digital input terminal filter | 4ms | 0 ~ 2000ms | --- |

Setting Digital input terminal filter

- 03-17 is used to select response time to the signal of digital input terminals, and its action range including:STR, STF, RES, M0, M1, M2, and expanded digital input terminal except for M2 when it is input as high-speed pulse. And the actual delay time is 03-17*2ms. For example, if 03-17=100, the actual delay time is 200ms.

### 5.4.6 Digital input terminal power enable

- Selectspower enables on the digital input terminal, whether the inverter operates immediately.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-18<br>P.158 | Digital input terminal power enable | 0 | 0 | Digital input terminal power unable. |
| | | | 1 | Digital input terminal power enable. |

Setting Digital input terminal power enable

- If 03-18=1, select power enables on the digital input terminals. In this situation, if the functions of the multi-function digital input terminals before turning on the power are STF, STR, RUN and MPO, and the corresponded digital input terminals are short circuit, and then the inverter will not run immediately after turning on the power. The inverter will run only after short circuit these terminals again. When 03-18=0, make these terminal short circuit before turning on the power, and the inverter will run immediately after the power is turned on.

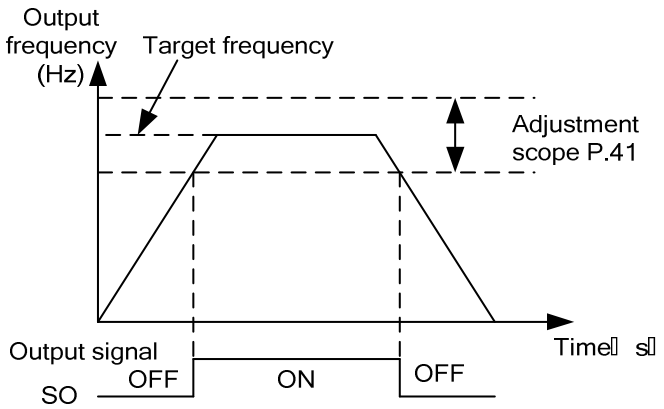
### 5.4.7 Output frequency detection

➢ Detects the inverter output frequency, and with the output signal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-20 P.41 | Up-to-frequency sensitivity | 10.0% | 0 ~ 100.0% | --- |
| 03-21 P.42 | Output frequency detection for forward rotation | 6.00Hz | 0 ~ 650.00Hz | --- |
| 03-22 P.43 | Output frequency detection for reverse rotation | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Set the same as 03-21(P.42). |

Setting Up-to-frequency sensitivity

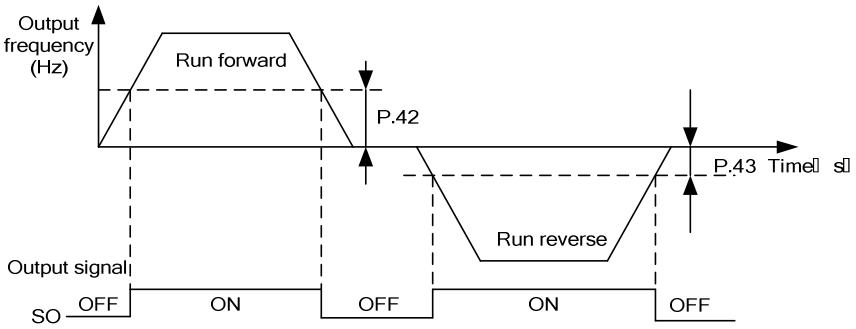
◆ If 03-20=5%, when the output frequency enters the “5% region near the target frequency”, it will send out SU signals.For example, when the target frequency is set to 60Hz and 03-20=5%, then if the output frequency is between 60±60×5%=57Hz and 63Hz, a SU signal will be sent out.




Setting Output frequency detection for forward / reverse rotation

◆ If 03-21=30 and 03-22=20, then it will send out FUsignals when the forward rotation output frequency exceeds 30Hz or when the reverse rotation output frequency exceeds 20Hz.

◆ If 03-21=30 and 03-22=99999 (factory default), then it will send out FU signals when the forward or reverse rotation output frequency exceeds 30Hz.




Note: In this paragraph, SU, FU is the function name for “multi-function digital output terminal”SO. Please refer to 03-10 ~ 03-11. For wiring, please refer to Section 3.5.

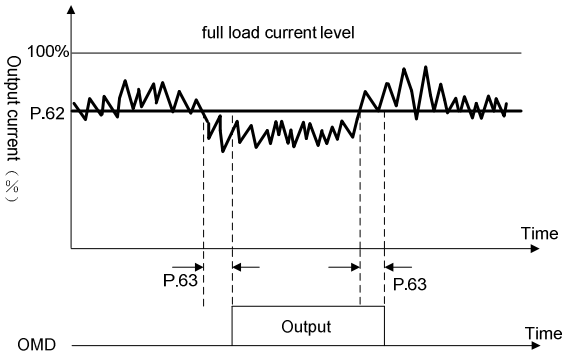
## 5.4.8 Zero current detection

➢ Detects the output frequency to the output terminal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-23 P.62 | Zero current detection level | 5.0% | 0 ~ 200.0% | --- |
| | | | 99999 | Invalid. |
| 03-24 P.63 | Zero current detection time | 0.50s | 0 ~ 100.00s | --- |
| | | | 99999 | Invalid. |

Setting Zero current detection

- Assume the inverter's rated is full-loaded, the current is 20A, 03-23=5% and 03-24=0.5s, then when the output current is smaller than 20×5%=1A and exceeding 0.5s, OMD will send out signals.See the figure below:




- If the set value of 03-23 or 03-24 is 99999, the zero current detection function is disabled.

Note: In this paragraph, OMD is the function name for “multi-function digital output terminal”. Please refer to 03-10~03-11. For wiring, please refer to Section 3.5.

## 5.4.9 Function selection of expanded digital input terminal

- Via parameter selection, changes the function of each expanded digital input terminal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-25 P.551 | Expanded digital input terminal M10 | 99999 | Same as 03-00 | Same as 03-00 |
| 03-26 P.552 | Expanded digital input terminal M11 | 99999 | Same as 03-00 | Same as 03-00 |
| 03-27 P.553 | Expanded digital input terminal M12 | 99999 | Same as 03-00 | Same as 03-00 |
| 03-28 P.554 | Expanded digital input terminal M13 | 99999 | Same as 03-00 | Same as 03-00 |
| 03-29 P.555 | Expanded digital input terminal M14 | 99999 | Same as 03-00 | Same as 03-00 |
| 03-30 P.556 | Expanded digital input terminal M15 | 99999 | Same as 03-00 | Same as 03-00 |

Setting Expanded digital input terminal

- The function is the same as the digital input function, please refer to Section 5.4.1.

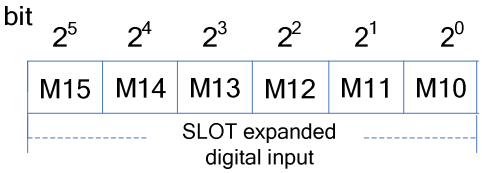
## 5.4.10 Expanded digital input terminal logic selection

➢ The function is bits-setting, if the bit shows 1, it means that the action of expanded digital input terminal is negative logic; otherwise, it means that the action is positive logic.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-41<br>P.567 | Expanded digital input terminal negative/ positive logic | 0 | 0 ~ 63 | --- |

Setting Expanded digital input terminal logic

◆ The definiton of each 03-41 (P.567) bit is as follows:




## 5.4.11 Function selection of expanded digital output terminal

➢ Detect the message during the inverter operation.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-42<br>P.568 | Expanded digital output terminal A10 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-43<br>P.569 | Expanded digital output terminal A11 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-44<br>P.570 | Expanded digital output terminal A12 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-45<br>P.571 | Expanded digital output terminal A13 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-42<br>P.568 | Expanded digital output terminal A10 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-43<br>P.569 | Expanded digital output terminal A11 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-44<br>P.570 | Expanded digital output terminal A12 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-45<br>P.571 | Expanded digital output terminal A13 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-46<br>P.572 | Expanded digital output terminal A14 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-47<br>P.573 | Expanded digital output terminal A15 | 99999 | Same as 03-10 | Same as 03-10 |
| 03-48<br>P.574 | Expanded digital output terminal A16 | 99999 | Same as 03-10 | Same as 03-10 |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-49<br>P.575 | Expanded digital output terminal A17 | 99999 | Same as 03-10 | Same as 03-10 |
| IU03-58<br>P.584 | Reserve | --- | --- | --- |

Setting Expanded digital output terminal function

- The function is the same as the digital output function, please refer to Section 5.4.2.

## 5.4.12 Digital input / output terminal monitor

- Used to monitor the operation of digital input / output terminal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 03-59<br>P.585 | Monitor noumenon input terminal state | Read | Read | --- |
| 03-60<br>P.586 | Monitor noumenon and expanded output terminal state | Read | Read | --- |
| 03-61<br>P.587 | Monitor expanded input terminal state | Read | Read | --- |
| 03-62<br>P.588 | Reserve | --- | --- | --- |

Setting Digital input / output terminal state

- For input terminal: 0 means operation, 1 means close.
- For output terminal: 0means operation, 1 means no operation.

Each bit corresponded input terminal of 03-59:

| b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | RES | M2 | M1 | M0 | STR | STF |

Each bit corresponded output terminal of 03-60:

| b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | A17 | A16 | A15 | A14 | A13 | A12 | A11 | A10 | 0 | 0 | ABC | SO |

expanded digital output

Each bit corresponded input terminal of 03-61：

| b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M15 | M14 | M13 | M12 | M11 | M10 |

expanded digital input

Example:

Input terminal:

Set 03-00 = 0(STF), forward rotation signal;03-03 = 5(M0), Analog terminal 4-5priority, other terminals are default set to the factory value. After digital input terminal STF and M0 close,the inverter operates in forward rotationaccording to the frequency given by 4-5.Each bit state of 03-59 is as follows, indicating the operation of STF and M0.

| bit | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |

So 03-59 = $1\times2^2 + 0\times2^1 + 1\times2^0 = 5$

Output terminal:

03-42(A10), RUN signal detected;03-49(A17) is set set to 2(FU output frequency detected), other terminals are default value. Insert the expansion card;after the inverter operates to the target frequency,thr state of 03-62 is as follows,indicating the output of A17 and A10.

| bit | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

So 03-60=$1\times2^{11} + 0\times2^{10} + 0\times2^9 + 0\times2^8 + 0\times2^7 + 0\times2^6 + 0\times2^5 + 1\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 0\times2^0 = 2064$

## 5.5 Multi-speed parameter group04

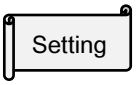
| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 04-00 | P.4 | Speed1(high speed) | 0 ~ 650.00Hz | 60.00Hz | 135 |
| 04-01 | P.5 | Speed2(mediumspeed) | 0 ~ 650.00Hz | 30.00Hz | 135 |
| 04-02 | P.6 | Speed3(low speed) | 0 ~ 650.00Hz | 10.00Hz | 135 |
| 04-03 | P.24 | Speed4 | 0 ~ 650.00Hz<br>99999: Function invalid | 99999 | 135 |
| 04-04 | P.25 | Speed5 | Same as 04-03 | 99999 | 135 |
| 04-05 | P.26 | Speed6 | Same as 04-03 | 99999 | 135 |
| 04-06 | P.27 | Speed7 | Same as 04-03 | 99999 | 135 |
| 04-07 | P.142 | Speed8 | Same as 04-03 | 99999 | 135 |
| 04-08 | P.143 | Speed9 | Same as 04-03 | 99999 | 135 |
| 04-09 | P.144 | Speed10 | Same as 04-03 | 99999 | 135 |
| 04-10 | P.145 | Speed11 | Same as 04-03 | 99999 | 135 |
| 04-11 | P.146 | Speed12 | Same as 04-03 | 99999 | 135 |
| 04-12 | P.147 | Speed13 | Same as 04-03 | 99999 | 135 |
| 04-13 | P.148 | Speed14 | Same as 04-03 | 99999 | 135 |
| 04-14 | P.149 | Speed15 | Same as 04-03 | 99999 | 135 |
| 04-15 | P.100 | Minute/second selection | 0: The minimum increment of run time is 1 minute.<br>1: The minimum increment of run time is 1 second. | 1 | 136 |
| 04-16 | P.121 | Run direction in each section | 0 ~ 255 | 0 | 136 |
| 04-17 | P.122 | Cycle selection | 0: Cycle function invalid<br>1 ~ 8: Run circularly from the settingsection. | 0 | 137 |
| 04-18 | P.123 | Acceleration/deceleration time setting selection | 0: The acceleration time is set by 01-06(P.7), the deceleration time is set by 01-07(P.8).<br>1: The acceleration and deceleration time is both determined by 04-35(P.111) ~ 04-42(P.118). | 0 | 137 |
| 04-19 | P.131 | Programmed operation mode speed 1 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-20 | P.132 | Programmed operation mode speed 2 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-21 | P.133 | Programmed operation mode speed3 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-22 | P.134 | Programmed operation mode speed 4 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-23 | P.135 | Programmed operation mode speed 5 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-24 | P.136 | Programmed operation mode speed 6 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-25 | P.137 | Programmed operation mode speed 7 | 0 ~ 650.00Hz | 0.00 Hz | 137 |
| 04-26 | P.138 | Programmed operation mode speed 8 | 0 ~ 650.00Hz | 0.00 Hz | 137 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 04-27 | P.101 | Programmed operation mode speed 1 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-28 | P.102 | Programmed operation mode speed 2 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-29 | P.103 | Programmed operation mode speed3 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-30 | P.104 | Programmed operation mode speed 4 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-31 | P.105 | Programmed operation mode speed 5 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-32 | P.106 | Programmed operation mode speed 6 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-33 | P.107 | Programmed operation mode speed 7 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| 04-34 | P.108 | Programmed operation mode speed 8 operating time | 0 ~ 6000.0s | 0.0s | 138 |
| 04-35 | P.111 | Programmed operation mode speed 1 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-36 | P.112 | Programmed operation mode speed 2 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-37 | P.113 | Programmed operation mode speed 3 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-38 | P.114 | Programmed operation mode speed 4 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-39 | P.115 | Programmed operation mode speed 5 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-40 | P.116 | Programmed operation mode speed 6 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-41 | P.117 | Programmed operation mode speed 7Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| 04-42 | P.118 | Programmed operation mode speed 8 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |

## 5.5.1 16 speeds

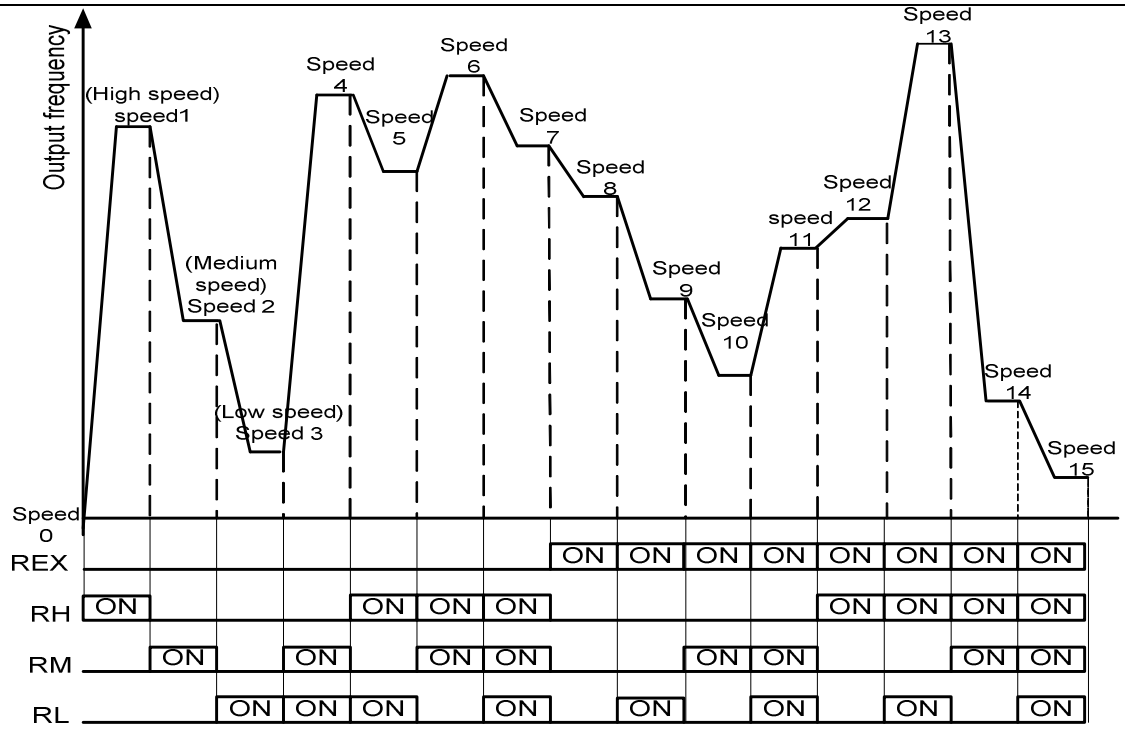
- With the combination of digital input terminal RL, RM, RH and REX, selects speed operation(the most are 16 speeds in total)

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 04-00 P.4 | Speed1(high speed) | 60.00Hz | 0 ~ 650.00Hz | --- |
| 04-01 P.5 | Speed2 (mediumspeed) | 30.00Hz | 0 ~ 650.00Hz | --- |
| 04-02 P.6 | Speed3(low speed) | 10.00Hz | 0 ~ 650.00Hz | --- |
| 04-03 P.24 | Speed4 | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | 99999: Function invalid |
| 04-04 P.25 | Speed5 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-05 P.26 | Speed6 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-06 P.27 | Speed7 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-07 P.142 | Speed8 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-08 P.143 | Speed9 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-09 P.144 | Speed10 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-10 P.145 | Speed11 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-11 P.146 | Speed12 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-12 P.147 | Speed13 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-13 P.148 | Speed14 | 99999 | Same as 04-03 | Same as 04-03 |
| 04-14 P.149 | Speed15 | 99999 | Same as 04-03 | Same as 04-03 |



16 speeds

- If all the set values of 04-03~04-06 and 04-07~04-14 are not 99999, “16-speed operation” is active. It means that with the combination of RL, RM, RH and REX, there are 16 speeds in total. For setting up the target frequency of the inverter, please refer to the figure below:




◆ Provided that the parameter set values of 04-03~04-06 and 04-07~04-14 are all 99999, the target frequency will be determined by RL, RM and RH these three speeds. See the table below (the priority of the terminals is RL>RM>RH):

| Parameter / Target frequency | 04-03= 99999 | 04-04= 99999 | 04-05= 99999 | 04-06= 99999 | 04-07= 99999 | 04-08= 99999 | 04-09= 99999 | 04-10= 99999 | 04-11= 99999 | 04-12= 99999 | 04-13= 99999 | 04-14= 99999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RL(04-02) | ○ | ○ | | ○ | ○ | ○ | | ○ | | ○ | | ○ |
| RM(04-01) | | | ○ | | | | ○ | | | | ○ | |
| RH(04-00) | | | | | | | | | ○ | | | |

For example, when04-05 = 99999, the target frequency is determined byRM(the setting value of 04-01).

Note: 1. The multi-speed is only valid in the “external mode”, “combination mode 2”or “combined mode 4”.

2.RL, RM, RH and REX mentioned in this section are the function names of the “multi-function digital input terminal”. (For example, when 03-03=2, select the M0 terminal to perform the RL (function).Please refer to 03-03、03-04、03-05、03-00、03-01、03-02 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

## 5.5.2 Programmed operation mode

➢ The application of this parameter can be used as the operation process control for general small machinery, food processing machinery and washing equipment, which can replace some traditional relays, switches, timer and other control circuit, etc.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 04-15 P.100 | Minute/second selection | 1 | 0 | The minimum increment of run time is 1 minute. |
| | | | 1 | The minimum increment of run time is 1 second. |
| 04-16 P.121 | Run direction in each section | 0 | 0～255 | 0～255 |

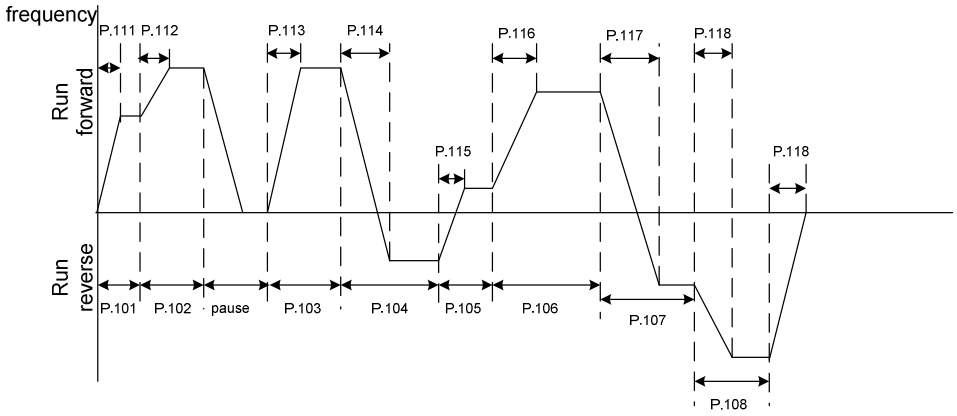
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 04-17 P.122 | Cycle selection | 0 | 0 | 0: Cycle function invalid |
| | | | 1 ~ 8 | Run circularly from the settingsection. |
| 04-18 P.123 | Acceleration/deceleration time setting selection | 0 | 0 | The acceleration time is set by 01-06(P.7), the deceleration time is set by 01-07(P.8). |
| | | | 1 | The acceleration and deceleration time is both determined by 04-35(P.111) ~ 04-42(P.118). |
| 04-19 P.131 | Programmed operation mode speed 1 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-20 P.132 | Programmed operation mode speed 2 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-21 P.133 | Programmed operation mode speed3 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-22 P.134 | Programmed operation mode speed 4 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-23 P.135 | Programmed operation mode speed 5 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-24 P.136 | Programmed operation mode speed 6 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-25 P.137 | Programmed operation mode speed 7 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-26 P.138 | Programmed operation mode speed 8 | 0.00Hz | 0 ~ 650.00Hz | --- |
| 04-27 P.101 | Programmed operation mode speed 1 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-28 P.102 | Programmed operation mode speed 2 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-29 P.103 | Programmed operation mode speed3 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-30 P.104 | Programmed operation mode speed 4 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-31 P.105 | Programmed operation mode speed 5 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-32 P.106 | Programmed operation mode speed 6 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-33 P.107 | Programmed operation mode speed 7 operating time | 0.0s | 0 ~ 6000.0s | --- |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 04-34 P.108 | Programmed operation mode speed 8 operating time | 0.0s | 0 ~ 6000.0s | --- |
| 04-35 P.111 | Programmed operation mode speed 1 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-36 P.112 | Programmed operation mode speed 2 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-37 P.113 | Programmed operation mode speed 3 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-38 P.114 | Programmed operation mode speed 4 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-39 P.115 | Programmed operation mode speed 5 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-40 P.116 | Programmed operation mode speed 6 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-41 P.117 | Programmed operation mode speed 7 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |
| 04-42 P.118 | Programmed operation mode speed 8 Acc/Dec time | 0.00s | 0 ~ 600.00s/ 0 ~ 6000.0s | --- |

Setting Programmed operation mode

◆ Programmed operation mode

1. The calculation of runtime and acceleration/deceleration time in each section is presented in the figure below:




2. The run direction is set in binary form (8-bit), and then translated to decimal form and stored in 04-16. “1” means run forward, and “0” means run reversely. The highest bit is the run direction of section 8, while the

lowest bit is the direction of the section 1.

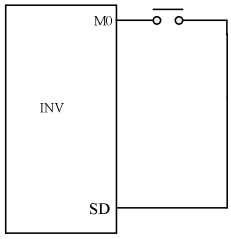
For example: Suppose that section 1 is run forward, section 2 is run reverse, section 3 is run reverse, section 4 is run forward, section 5 is run reverse, section 6 is run forward, section 7 is run forward, section 8 is run reverse, then the value in binary form is 01101001.

04-16 = 0×27+1×26+1×25+0×24+1×23+0×22+0×21+1×20 = 105

3. When 04-16=0, it will not run in circular motion.
4. When 04-17 is 1~8, it is the initial sectional speed at the beginning of the cycle.

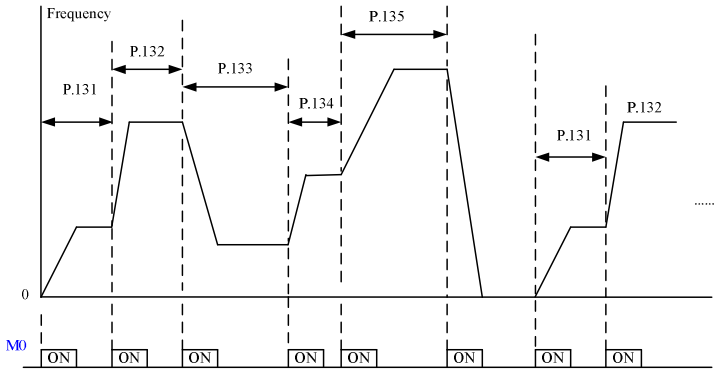
   For example: When 04-17=3, the inverter will run circularly from the third section to the eighth section after it finishes its running from the first section to the eighth section.
5. When 04-18 = 0, the acceleration time is determined by 01-06, and the deceleration time is determined by 01-07.
6. When 04-18 = 1, the acceleration time and deceleration time are both determined by 04-35~04-42.

◆ Manual operation cycle mode




Wiring diagram for manual operation cycle mode

1. Insert an impulse type switch between M0 and SD.
2. After turning on the power, according to terminals wiring, set corresponding parameter 03-03 to 35.The inverter is on standby at this point.
3. The mode of operation is shown in the figure below:




Note: 1. The inverter can run eight levels of speed in the procedure, and the frequency is determined by 04-19~04-26.

2. For the setting of 04-15~04-18 and 04-27~04-42, it is valid for programmed operation mode only, not for manual operation cycle mode; For the acceleration/deceleration time of manual operation cycle mode, please refer to the usage of 01-06, 01-07, 01-22 and 01-23.
3. If there is any section set to zero, the inverter will be on standby in this section. In other word, 04-19 has to be nonzero when this mode is selected. Like the figure above, when 04-24 is 0, regardless of the value of 04-25 and 04-26, the inverter stops when the switch is pressed for the sixth time.
4. The rotation of the manual operation cycle mode is unilateralism. It has nothing to do with 04-16 or the signals of STF and STR.
5. For the setting of 04-35~04-42, please refer to 01-08 for the usage of the acceleration/deceleration time unit.

## 5.6 Motor parameter group05

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 05-00 | P.301 | Motor parameter auto-tuning function selection | 0: Parameter auto-tuning function with no motor<br>1: Induction motor parameter auto-tuning measuring the running motor<br>2: Induction motor parameter auto-tuning measuring the stopped motor<br>3: Induction motoronline auto-tuning function<br>4: Reserve<br>5：Induction motor parameters automatic measurement [Measurement of motor is not running]<br>8: Synchronous motor parameter auto-tuning function<br>9: Synchronous motor Phase Z position auto-tuning function<br>10: Reserve | 0 | 142 |
| 05-01 | P.302 | Motor rated power | 0～650.00kW | 0.00kW | 145 |
| 05-02 | P.303 | Motor poles | 0～48 | 4 | 145 |
| 05-03 | P.304 | Motor rated voltage | 440 Voltage ：0～510V<br>220 Voltage ： 0~255V | According to voltage | 145 |
| 05-04 | P.305 | Motor rated frequency | 50Hz system: 0～650.00Hz<br>60Hz system: 0～650.00Hz | 50.00Hz<br>60.00Hz | 145 |
| 05-05 | P.306 | Motor rated current | 0~500.00A | According to type | 145 |
| 05-06 | P.307 | Motor rated rotation speed | 50Hz system: 0～65000r/min<br>60Hzsystem: 0～65000r/min | 1410r/min<br>1710r/min | 145 |
| 05-07 | P.308 | Motor excitation current | 0~500.00A | According to type | 145 |
| 05-08 | P.309 | IM motor stator resistance | 0～65000mΩ | According to type | 145 |
| 05-09 | P.310 | IM motor rotor resistance | 0～65000mΩ | According to type | 145 |
| 05-10 | P.311 | IM motor leakage inductance | 0～6500.0mH | According to type | 145 |
| 05-11 | P.312 | IM motor mutual inductance | 0～6500.0mH | According to type | 145 |
| 05-12 | P.313 | PM motor stator resistance | 0～65000mΩ | According to type | 145 |
| 05-13 | P.314 | PM motor d-axis inductance | 0～650.00mH | According to type | 145 |
| 05-14 | P.315 | PM motor q-axis inductance | 0～650.00mH | According to type | 145 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 05-15 | P.316 | PM motor Back-EMF coefficient | 0 ~ 6500.0V/krpm | According to type | 145 |
| 05-16 | P.317 | PM motor PhaseZ origin pulse compensation | 0 ~ 359.9° | 0.0° | 145 |
| 05-17 | P.318 | Rotation inertia | 0 ~ 6.5000kg.m²:5.5K/7.5KF and types below<br>0 ~ 65.000kg.m²: 7.5K/11KF~ 22K/30KF types | According to type | 145 |
| 05-18 | P.631 | Reserve | --- | --- | 147 |
| 05-19 | P.632 | Reserve | --- | --- | 147 |
| 05-22 | P.332 | The second motor rated power | 0 ~ 650.00kW<br>99999 | 99999 | 147 |
| 05-23 | P.333 | The second motor poles | 0 ~ 48<br>99999 | 99999 | 147 |
| 05-24 | P.334 | The second motor rated voltage | 440Voltage：0 ~ 510V<br>220Voltage： 0~255V<br>99999 | 99999 | 147 |
| 05-25 | P.335 | The second motor rated frequancy | 0 ~ 650.00Hz<br>99999 | 99999 | 147 |
| 05-26 | P.336 | The second motor rated current | 0~500.00A<br>99999 | 99999 | 147 |
| 05-27 | P.337 | The second motor rated rotation speed | 0 ~ 65000r/min<br>99999 | 99999 | 147 |
| 05-28 | P.338 | The second motor excitation current | 0~500.00A<br>99999 | 99999 | 147 |
| 05-29 | P.339 | The second motor (IM)stator resistance | 0 ~ 65000mΩ<br>99999 | 99999 | 147 |
| 05-30 | P.340 | The second motor (IM)rotor resistance | 0 ~ 65000mΩ<br>99999 | 99999 | 147 |
| 05-31 | P.341 | The second motor (IM)leakage inductance | 0 ~ 6500.0mH<br>99999 | 99999 | 148 |
| 05-32 | P.342 | The second motor (IM)mutual inductance | 0 ~ 6500.0mH<br>99999 | 99999 | 148 |
| 05-33 | P.343 | The second motor (PM) stator resistance | 0 ~ 65000mΩ<br>99999 | 99999 | 148 |
| 05-34 | P.344 | The second motor (PM) d-axis inductance | 0 ~ 650.00mH<br>99999 | 99999 | 148 |
| 05-35 | P.345 | The second motor (PM)q-axis inductance | 0 ~ 650.00mH<br>99999 | 99999 | 148 |
| 05-36 | P.346 | The second motor (PM) Back-EMF coefficient | 0 ~ 6500.0V/krpm<br>99999 | 99999 | 148 |
| 05-37 | P.347 | The second motor (PM) PhaseZ origin pulse compensation | 0 ~ 359.9°<br>99999 | 99999 | 148 |
| 05-38 | P.348 | The second motor rotation inertia | 0 ~ 6.5000kg.m²: 5.5K and types below<br>0 ~ 65.000kg.m²: Types from 7.5K to 22K<br>99999 | 99999 | 148 |

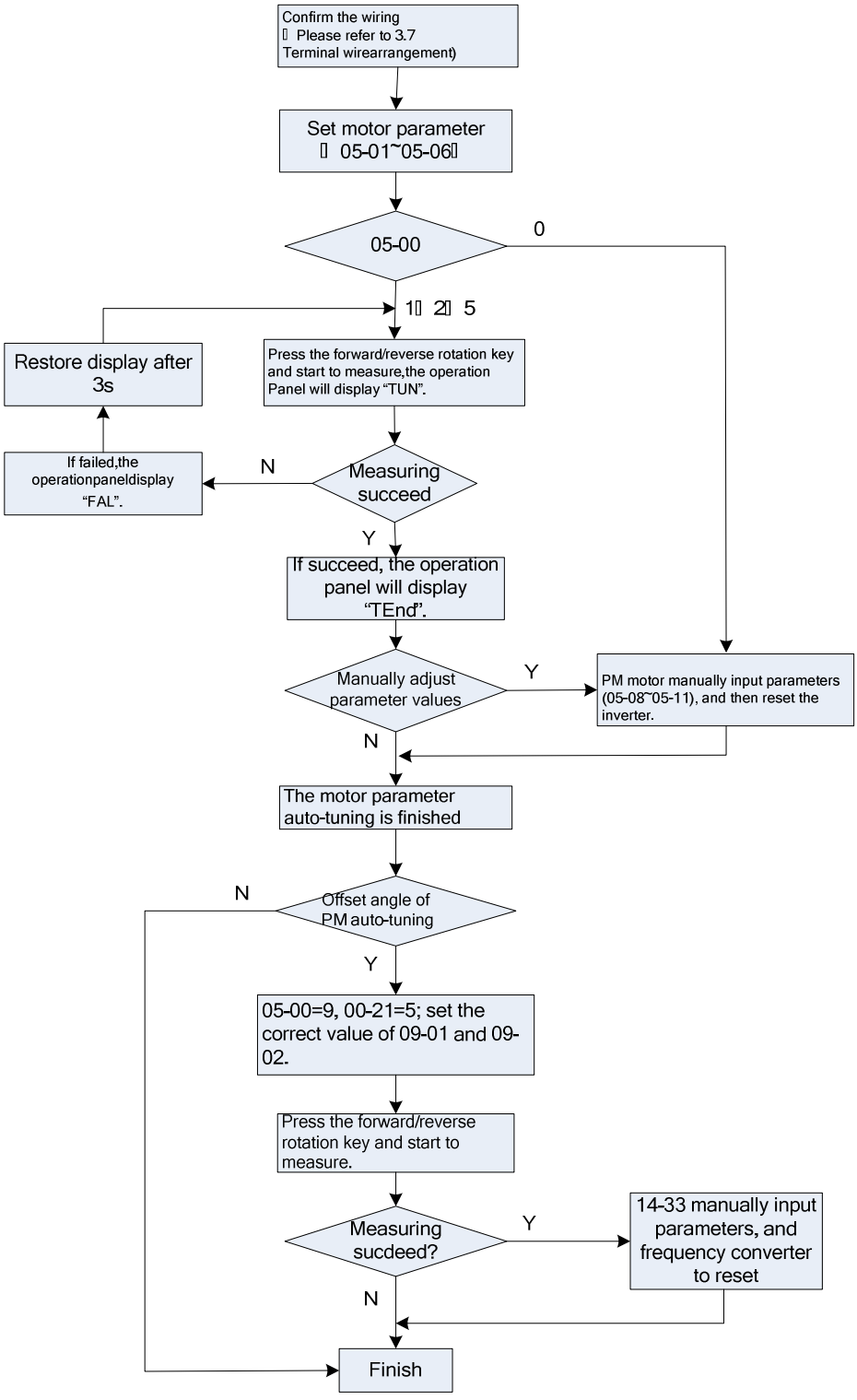
## 5.6.1 Motor parameter auto-tuning function selection

➢ Via accurate motor parameter auto-tuning function, realizes motor high-performance vector control.

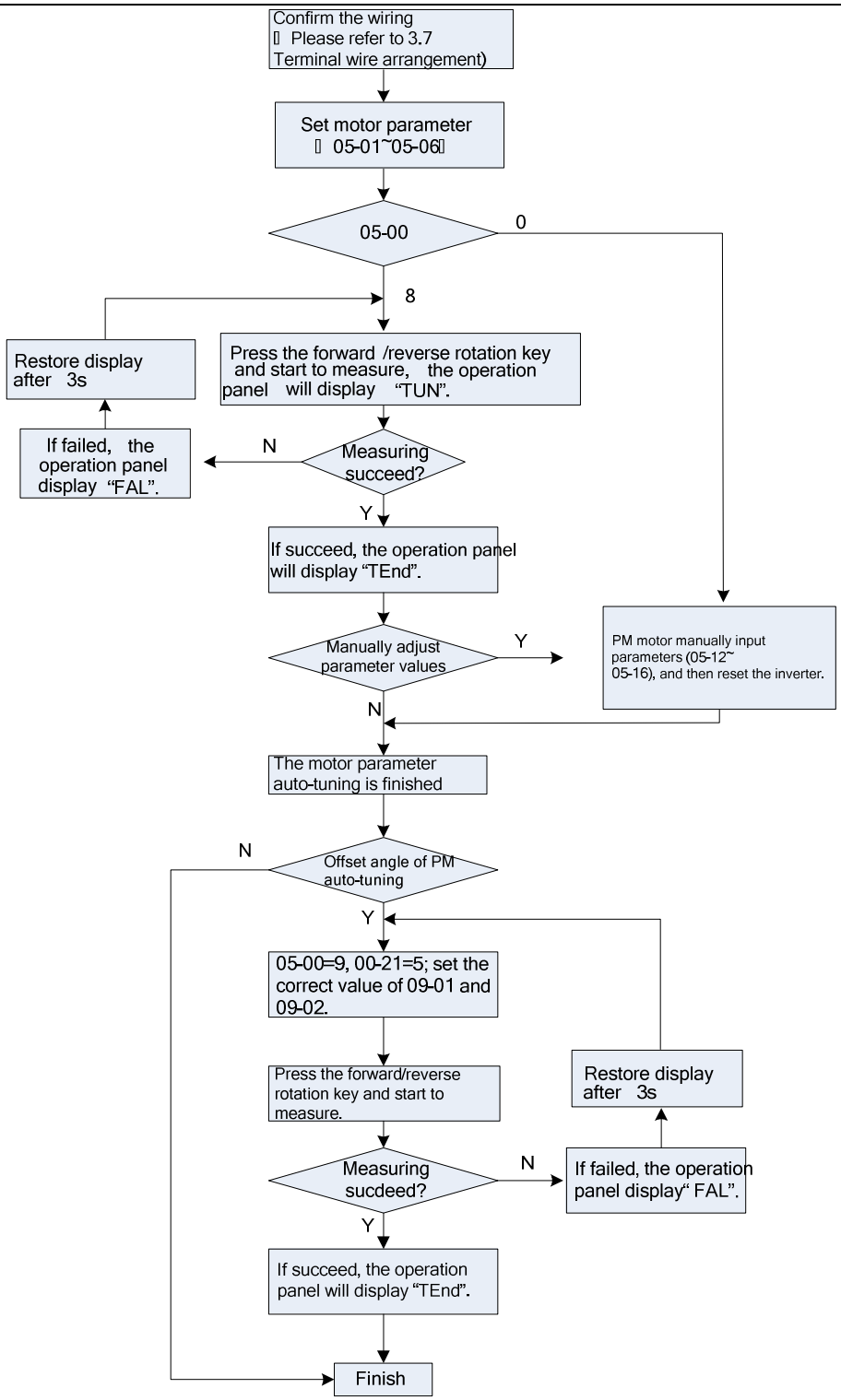
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 05-00 P.301 | Motor parameter auto-tuning function selection | 0 | 0 | Parameter auto-tuning function with no motor |
| | | | 1 | Induction motor parameter auto-tuning measuring the running motor |
| | | | 2 | Induction motor parameter auto-tuning measuring the stopped motor |
| | | | 3 | Induction motoronline auto-tuning function |
| | | | 4 | Reserve |
| | | | 5 | Induction motor parameters automatic measurement [Measurement of motor is not running] |
| | | | 8 | Synchronous motor parameter auto-tuning function |
| | | | 9 | Synchronous motor Phase Z position auto-tuning function |
| | | | 10 | Reserve |

Setting Motor parameter auto-tuning function

- When 00-21=0, no motor parameter auto-tuning function is required for normal V/F curve operation.
- For IM general magnetic vector control, please set 00-21 to 2. The frequency will be altered due to elevated voltage and increased compensatory motor load.
- For executing the IM motor parameter auto-tuning function, set 05-00 to 1 or 2 or 5 and press the forward rotation or the reverse rotation key. During the measuring process, the parameter unit will flicker and display “TUN”. If the measurement fails, the parameter unit will flicker “FAL” for three seconds and then return to normal display.
- Procedures for IM motor parameter auto-tuning are presented below:




- When setting 00-21 to 5 or 6, please make sure to correctly set PM motor parameterand execut the PM motor parameter auto-tuning function to ensure the stability and dynamic responsiveness of control.
- When setting 00-21 to 5, if change the encoder or the motor UVWwiting order, please make sure to set 05-00 to 9, excuting PM motor Phase Z auto-tuning function.
- Procedures for PM motor parameter auto-tuning are presented below:




◆ If high accuracy sensorless control is required by IM motor, set 05-00 to 3 for sensorless vector control.

Note: 1. The motor capacity has to be at the same level or one level below of the level of the capacity of the inverter.

2. For the IM motor auto-tuning function, if motor operation is permitted, set 05-00 to 1 (dynamic measurement). At this point, the load has to be separated from the motor. If the load environment does not permit auto-tuning, set 05-00 to 2 (static measurement) if motoring is running.

3. IM motor sensorless vector control: auto-tuning function can be used to enhance the control function. Before setting 05-00 to 3 or 4, first set the motor parameters or the auto-tuning function to improve the control accuracy.

4. When 05-00=1 and the mode of close-loop V/F control (VF + PG) is selected, please make sure that the motor poles 05-02 is correct.

## 5.6.2 Motor parameter

- The standard parameters of the adaptable motor have been configured inside the inverter. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 05-01 P.302 | Motor rated power | 0.00kW | 0 ~ 650.00kW | --- |
| 05-02 P.303 | Motor poles | 4 | 0 ~ 48 | --- |
| 05-03 P.304 | Motor rated voltage | 380/440V | 0 ~ 510V | 440V voltage |
| | | 220V | 0 ~ 255V | 220V voltage |
| 05-04 P.305 | Motor rated frequency | 50.00Hz | 0 ~ 650.00Hz | 50Hz system (when 00-24=1) |
| | | 60.00Hz | | 60Hz system (when 00-24=0) |
| 05-05 P.306 | Motor rated current | According to type | 0 ~ 500.00A | --- |
| 05-06 P.307 | Motor rated rotation speed | 1410r/min | 0 ~ 65000r/min | 50Hz system (when 00-24=1) |
| | | 1710r/min | | 60Hz system (when 00-24=0) |
| 05-07 P.308 | Motor excitation current | According to type | 0 ~ 500.00A | --- |
| 05-08 P.309 | IM motor stator resistance | According to type | 0 ~ 65000mΩ | --- |
| 05-09 P.310 | IM motor rotor resistance | According to type | 0 ~ 65000mΩ | --- |
| 05-10 P.311 | IM motor leakage inductance | According to type | 0 ~ 6500.0mH | --- |
| 05-11 P.312 | IM motor mutual inductance | According to type | 0 ~ 6500.0mH | --- |
| 05-12 P.313 | PM motor stator resistance | According to type | 0 ~ 65000mΩ | --- |
| 05-13 P.314 | PM motor d-axis inductance | According to type | 0 ~ 650.00mH | --- |
| 05-14 P.315 | PM motor q-axis inductance | According to type | 0 ~ 650.00mH | --- |
| 05-15 P.316 | PM motor Back-EMF coefficient | According to type | 0 ~ 6500.0V/krpm | --- |
| 05-16 P.317 | PM motor Phase Z origin pulse compensation | 0.0° | 0 ~ 359.9° | --- |
| 05-17 P.318 | Rotation inertia | According to type | 0 ~ 6.5000kg.m² | 5.5K/7.5KF and types below |
| | | | 0 ~ 65.000kg.m² | 7.5K/11KF~ 22K/30KF types |

Setting Motor parameter

- When the IM motor can be fully separated from the load, select 05-00=1. When the motor is running, the motor parameter will carry out auto-tuning. Then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter: 05-07~05-11.
- When the motor cannot be fully separated from the load, select 05-07=2. When the motor is stopped, the motor parameter will carry out auto-tuning. Then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter: 05-07~05-11.
- The users can use the motor's nameplate to calculate the two parameters. The motor nameplate parameters used in the calculation are: rated voltage U, rated current $I$ , rated frequency $f$ and power factor $\eta$ .
- The calculation of motor idling excitation current and of motor mutual induction is presented below: $L_\delta$ is motor leakage induction.

  Idling current: $I_0 = I \times \sqrt{1-\eta^2}$

  Mutual inductance calculation: $$L_m = \frac{U}{2\sqrt{3} \cdot \pi \cdot f \cdot I_0} - L_\delta$$

  $I_0$ is the idling current, $L_m$ is mutual inductance, $L_\delta$ is leakage inductance.
- When executing PMmotor parameter auto-tuning function, set 05-00 to 8, then press FWD or REV on the keyboard panelfor the inverter to automatically calculate the following parameter:05-12~05-16.
- When executingPM motor Phase Zposition auto-tuning function, be sure to make the motor fully separated from the load,and set 05-00 to 9, then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter:05-16.
- When executing PM motor rotation inertia auto-tuning function, set 05-00 to 10, then press FWD or REV on the keyboard panel for the inverter to automatically calculate the following parameter:05-17.

Note: 1.When the inverter is used with a motor of a different level, verify the input motor's nameplate parameter 05-01~05-06.The vector control method is heavily dependent upon motor parameters. To achieve a good control performance, the controlled motor's correct parameters have to be acquired.

2. Before executing PM motor Phase Z position auto-tuning function, please first execute PM motor parameterauto-tuning function, and then correctly set the value of 09-01 and 09-02. If there is motor vibration when tuning, please decrease the setting value of 11-00.
3. When any or many values of 05-01~05-11 are manually revised, reset the inverter to reload the new values of the parameters.

## 5.6.3 Motor inertia auto-tuning

- It is applicable in tension control open–loop torque mode.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 05-18<br>P.631 | Inertia self-learning setting T1 | 30.0% | 0 ~<br>05-19(P.632)% | --- |
| 05-19<br>P.632 | Inertia self-learning setting T2 | 60.0% | 05-18(P.631) ~<br>100.0% | --- |

Setting Motor inertia auto-tuning

- When the tension control adopts the open loop torque mode, during the system acceleration/deceleration, additional torque shall be provided to overcome the rotation inertia of the whole system. Otherwise, too small tension upon wind-up acceleration and too large tension upon deceleration, or too large tension upon roll-down acceleration and too small tension upon deceleration will be caused.
- For the instruction of 05-18 and 05-19, please refer to the instruction part of 05-00=4.

## 5.6.4 The second motor parameter

- Via setting the second motor parameter, cooperating with the digital input terminal, starts the second motor parameter auto-tuning function.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 05-22<br>P.332 | The second motor rated power | 99999 | 0 ~ 650.00kW | --- |
| | | | 99999 | Not selected. |
| 05-23<br>P.333 | The second motor poles | 99999 | 0 ~ 48 | --- |
| | | | 99999 | Not selected. |
| 05-24<br>P.334 | The second motor rated voltage | 99999 | 0 ~ 510V | 440 Voltage |
| | | | 0~255V | 220 Voltage |
| | | | 99999 | Not selected. |
| 05-25<br>P.335 | The second motor rated frequancy | 99999 | 0 ~ 650.00Hz | --- |
| | | | 99999 | Not selected. |
| 05-26<br>P.336 | The second motor rated current | 99999 | 0~500.00A | --- |
| | | | 99999 | Not selected. |
| 05-27<br>P.337 | The second motor rated rotation speed | 99999 | 0 ~ 65000r/min | --- |
| | | | 99999 | Not selected. |
| 05-28<br>P.338 | The second motor excitation current | 99999 | 0~500.00A | --- |
| | | | 99999 | Not selected. |
| 05-29<br>P.339 | The second motor (IM)stator resistance | 99999 | 0 ~ 65000mΩ | --- |
| | | | 99999 | Not selected. |
| 05-30<br>P.340 | The second motor (IM)rotor resistance | 99999 | 0 ~ 65000mΩ | --- |
| | | | 99999 | Not selected. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 05-31<br>P.341 | The second motor (IM)leakage inductance | 99999 | 0 ~ 6500.0mH | --- |
| | | | 99999 | Not selected. |
| 05-32<br>P.342 | The second motor (IM)mutual inductance | 99999 | 0 ~ 6500.0mH | --- |
| | | | 99999 | Not selected. |
| 05-33<br>P.343 | The second motor (PM) stator resistance | 99999 | 0 ~ 65000mΩ: | 22K and types below |
| | | | 99999 | Not selected. |
| 05-34<br>P.344 | The second motor (PM) d-axis inductance | 99999 | 0 ~ 650.00mH | According to type |
| | | | 99999 | Not selected. |
| 05-35<br>P.345 | The second motor (PM)q-axis inductance | 99999 | 0 ~ 650.00mH | According to type |
| | | | 99999 | Not selected. |
| 05-36<br>P.346 | The second motor (PM) Back-EMF coefficient | 99999 | 0 ~ 6500.0V/krpm | According to type |
| | | | 99999 | Not selected. |
| 05-37<br>P.347 | The second motor (PM) PhaseZ origin pulse compensation | 99999 | 0 ~ 359.9° | --- |
| | | | 99999 | Not selected. |
| 05-38<br>P.348 | The second motor rotation inertia | 99999 | 0 ~ 6.5000kg.m$^2$ | 5.5K and types below |
| | | | 0 ~ 65.000kg.m$^2$ | Types from 7.5K to 22K |
| | | | 99999 | Not selected. |

Setting The second motor parameter

- When 00-22 ≠ 99999, RT signal is ON, the second motor parameters 05-22~05-38 are valid, please refer to Section 5.2.10 for the second function parameter.
- For the usage of the second motor parameter, please refer to 05-01~05-17 motor parameter setting.

## 5.7 Protection parameter group06

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 06-00 | P.9 | Electronic thermal relay capacity | 0~500.00A | 0.00A | 153 |
| 06-01 | P.22 | Stall prevention operation level | 0 ~ 400.0% | 150.0% | 153 |
| 06-02 | P.23 | Compensation factor at level reduction | 0 ~ 150.0%<br>99999: Stall prevention operation level is the setting value of 06-01(P.22). | 99999 | 153 |
| 06-03 | P.66 | Stall prevention operation reduction starting frequency | 50Hz system: 0 ~ 650.00Hz | 50.00Hz | 153 |
| | | | 60Hz system: 0 ~ 650.00Hz | 60.00Hz | |
| 06-04 | P.220 | Current stall selection of time of acceleration and deceleration | 0: According to the current time of Acc/Dec<br>1: According to the first time of Acc/Dec<br>2: According to the second time of Acc/Dec<br>3:Automatically calculate the best time of accerelation/deceleration | 3 | 154 |
| 06-05 | P.30 | Regenerative brake function selection | 0: If regenerative brake duty is fixed at 3%, parameter 06-06(P.70) will be invalid.<br>1: The regenerative brake duty is the value of 06-06(P.70). | 0 | 155 |
| | | | 2：External brake unit protection function（D framework and the above models） | 2 | |
| 06-06 | P.70 | Special regenerative brake duty | 0 ~ 100.0% | 0.0% | 155 |
| 06-07 | P.263 | Decrease carrier protection setting | 0: Rated carrier frequency, limit load current according to the setting carrier.<br>1: Rated current, limit carrier according to the load current and temperature. | 0 | 155 |
| 06-08 | P.155 | Over torque detection level | 0 ~ 200.0% | 0.0% | 157 |
| 06-09 | P.156 | Over torque detection time | 0.1 ~ 60.0s | 1.0s | 157 |
| 06-10 | P.260 | Over torque detection selection | 0: The OL2 alarm is not reported after the over torque detection, and the inverter keeps running.<br>1: The OL2 alarm is reported after the over torque detection, and the inverter stops. | 1 | 157 |
| 06-11 | P.160 | Stall level when restart | 0 ~ 150.0% | 100.0% | 158 |
| 06-12 | P.245 | Cooling fan operation | 0: The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops.<br>1: Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too. | 0 | 158 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 06-12 | P.245 | Cooling fan operation | 2: The fan will be turned on if the temperature of the heat sink is higher than 40℃. When the power is turned off, the fan will be turned off, too.<br>3: The fan will be turned on when the temperature of the heat sink is higher than 60℃. When it is lower than 40℃, the fan will be turned off. | 0 | 158 |
| 06-13 | P.281 | Input phase failure protection | 0: No Phase Failure Protection<br>1: Phase failure protection, the parameter unit will display the “IPF” alarm and the output stops.(FrameA/B have no phase-failure protcet function) | 0 | 159 |
| 06-14 | P.287 | SCP Short circuit protection function | 0: No the output end short-circuits protection function.<br>1: If outputend is short, the parameter unit will display the “SCP” alarm and the output stops. | 1 | 159 |
| 06-15 | P.533 | The process mode of PTC alarm | 0: Alarm and continue to run<br>1: Alarm and decelerate to stop<br>2: Alarm and stop freely<br>3: No alarm | 0 | 159 |
| 06-16 | P.534 | The percentage of PTC level | 0 ~ 100.0% | 0.0% | 159 |
| 06-17 | P.261 | Maintenance alarm function | 0: No maintenance alarm<br>1 ~ 9998day: Used to set time when maintenance alarm sends out signal | 0 | 160 |
| 06-18 | P.280 | Short circuit detection when starting | 0: No short circuit detection when starting<br>1: Short circuit detection when starting | 0 | 160 |
| 06-19 | P.282 | Operation GF detection level | 0~100.0% | 50.0% | 160 |
| 06-20 | P.262 | Output phase failure protection | 0: No output phase failure protection selection<br>1: Output phase failure protection, the parameter unit will display the “LF” abnormal alarm and the inverter will stop the output. | 0 | 161 |
| 06-21 | P.705 | Low voltage level | 155 ~ 220V: 220V inverter type<br>310 ~ 440V: 440V inverter type | 155V<br>310V | 161 |
| 06-22 | P.706 | Regenerative brake operation level | 205 ~ 400V: 220V inverter type<br>410 ~ 800V: 440V inverter type | 360V<br>720V | 161 |
| 06-23 | P.707 | Voltage stall level | 205 ~ 400V: 220V inverter type<br>410 ~ 800V: 440V inverter type | 380V<br>760V | 162 |
| 06-24 | P.708 | Capacitor lifetime detection | 0: No capacitor lifetime detection.<br>1: When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit. | 0 | 162 |

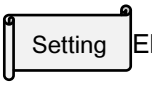
| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 06-25 | P.709 | Capacitor lifetime detection level | 0 ~ 100.0% | 100.0% | 162 |
| 06-26 | P.710 | Capacitor lifetime detection result | 0: No abnormal signal.<br>1: Electrolytic capacitor abnormal. | Read | 162 |
| 06-27 | P.292 | Accumulative motor operation time (minutes) | 0 ~ 1439min | 0min | 163 |
| 06-28 | P.293 | Accumulative motor operation time (days) | 0 ~ 9999day | 0day | 163 |
| 06-29 | P.296 | Accumulative motor power time (minutes) | 0 ~ 1439min | 0min | 163 |
| 06-30 | P.297 | Accumulative motor power time (days) | 0 ~ 9999day | 0day | 163 |
| 06-31 | P.298 | Output power (low 16 position) | Read | Read | 163 |
| 06-32 | P.299 | Output power (high 16 position) | Read | Read | 163 |
| 06-40 | P.288 | Alarm code query | 0 ~ 12 | 1 | 164 |
| 06-41 | P.289 | Alarm code display | Read | Read | 164 |
| 06-42 | P.290 | Alarm message query | 0 ~ 10 | 0 | 164 |
| 06-43 | P.291 | Alarm message display | Read | Read | 164 |
| 06-44 | P.740 | E1 | Read | Read | 165 |
| 06-45 | P.741 | E2 | Read | Read | 165 |
| 06-46 | P.742 | E3 | Read | Read | 165 |
| 06-47 | P.743 | E4 | Read | Read | 165 |
| 06-48 | P.744 | E5 | Read | Read | 165 |
| 06-49 | P.745 | E6 | Read | Read | 165 |
| 06-50 | P.746 | E7 | Read | Read | 165 |
| 06-51 | P.747 | E8 | Read | Read | 165 |
| 06-52 | P.748 | E9 | Read | Read | 165 |
| 06-53 | P.749 | E10 | Read | Read | 165 |
| 06-54 | P.750 | E11 | Read | Read | 166 |
| 06-55 | P.751 | E12 | Read | Read | 166 |
| 06-56 | P.752 | E1 alarm output frequency | Read | Read | 166 |
| 06-57 | P.753 | E1 alarm output current | Read | Read | 166 |
| 06-58 | P.754 | E1 alarm output voltage | Read | Read | 166 |
| 06-59 | P.755 | E1 alarm the temperature rising accumulation rate | Read | Read | 166 |
| 06-60 | P.756 | E1 alarm PN voltage | Read | Read | 166 |
| 06-61 | P.757 | E1 alarm the time of the inverter has run | Read | Read | 166 |
| 06-62 | P.758 | E1 alarm the inverter operation status code | Read | Read | 166 |
| 06-63 | P.759 | E1 alarm(years/months) | Read | Read | 166 |
| 06-64 | P.760 | E1 alarm (days/hours) | Read | Read | 166 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 06-65 | P.761 | E1 alarm(minutes/seconds) | Read | Read | 166 |
| 06-70 | P.766 | E2 alarm output frequency | Read | Read | 167 |
| 06-71 | P.767 | E2 alarm output current | Read | Read | 167 |
| 06-72 | P.768 | E2 alarm output voltage | Read | Read | 167 |
| 06-73 | P.769 | E2 alarm the temperature rising accumulation rate | Read | Read | 167 |
| 06-74 | P.770 | E2 alarm PN voltage | Read | Read | 167 |
| 06-75 | P.771 | E2 alarm the time of inverter has run | Read | Read | 167 |
| 06-76 | P.772 | E2 alarm the inverter operation status code | Read | Read | 167 |
| 06-77 | P.773 | E2 alarm (years/months) | Read | Read | 167 |
| 06-78 | P.774 | E2 alarm (days/hours) | Read | Read | 167 |
| 06-79 | P.775 | E2 alarm(minutes/seconds) | Read | Read | 167 |

## 5.7.1 Electronic thermal relay capacity

- The “electronic thermal relay” uses the program of the inverter to simulate a thermal relay for preventing the motor from overheating.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-00<br>P.9 | Electronic thermal relay capacity | 0.00A | 0~500.00A | --- |



Electronic thermal relay capacity

- Please set 06-00 as the rated current of the motor at its rated frequency. The rated frequency of a squirrel-cage inductive motor made in different countries and areas is different. Please refer to the nameplate instruction on the motor.
- If 06-00=0, the electronic thermal relay is invalid.
- In case the calculated heat by the electronic thermal relay exceeds the upper limit, an alarm will go off and the parameter unit screen will display $\mathit{rHn}$, and the output will be stopped.

Note: 1. After the inverter is reset; the thermal accumulating record of the electronic thermal relay will be reset to zero. Please pay attention in this area.
2. When two or more motors are connected to the inverter, they cannot be protected by the electronic thermal relay. Install an external thermal relay for each motor.
3. When a special motor is employed, the electronic thermal relay is no longer valid. Install an external thermal relay for each motor.
4. About wiring for an external thermal relay, please refer to 03-00~03-05.

## 5.7.2 Current stalling protection

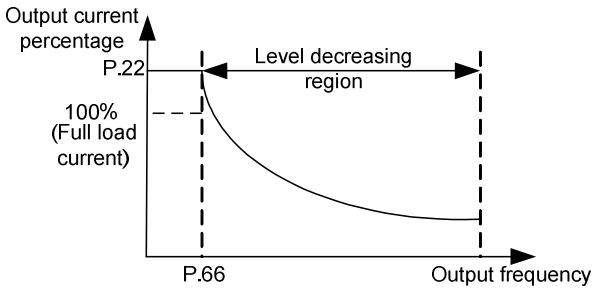
- This function monitors the output current and automatically changes the output frequency to prevent the inverter fromtripping due to overcurrent, overvoltage, etc. It can also limit the stall prevention and fast-response current limitoperation during acceleration/deceleration and power/regenerative driving.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-01<br>P.22 | Stall prevention operation level | 150.0% | 0 ~ 400.0% | --- |
| 06-02<br>P.23 | Compensation factor at level reduction | 99999 | 0 ~ 150.0% | --- |
| | | | 99999 | Stall prevention operation level is the setting value of 06-01(P.22). |
| 06-03<br>P.66 | Stall prevention operation reduction starting frequency | 50.00Hz | 0 ~ 650.00Hz | 50Hz system (when 00-24=1) |
| | | 60.00Hz | | 60Hz system (when 00-24=0) |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-04 P.220 | Current stall selection of time of acceleration and deceleration | 3 | 0 | According to the current time of Acc/Dec |
| | | | 1 | According to the first time of Acc/Dec |
| | | | 2 | According to the second time of Acc/Dec |
| | | | 3 | Automatically calculate the best time of accerelation/ deceleration. |

Setting Current stalling protection

- When the motor starts or target frequency is adjusted (increasing) under a heavy load, the motor speed is often unable to follow the output frequency closely. If the motor speed is lower than the output frequency, the output current will increase to improve the output torque. However, if the difference between the output frequency and the motor speed is too great, the motor torque will decrease, a phenomenon known as “stall”.

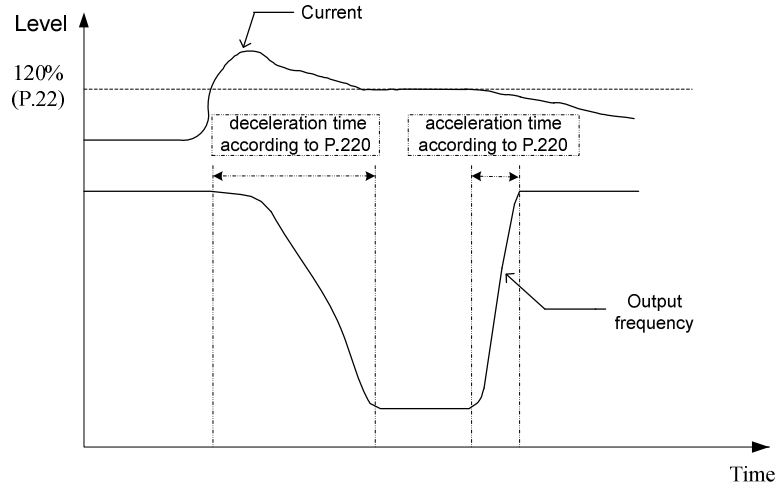



Calculation formula for stall prevention operation level:

$$\text{Level percentage}=A+B\times\frac{\text{P.22-A}}{\text{P.22-B}}\times\frac{\text{P.23-100}}{100}$$

$$A=\frac{\text{P.66}\times\text{P.22}}{\text{Output frequency}} \qquad B=\frac{\text{P.66}\times\text{P.22}}{400}$$

- During heavy load periods, the output current of the inverter will increase. Once the output current exceeds the curve in the diagram below, the inverter will decrease the output frequency according to the time of Dec of 06-04. After the motor attains the output frequency (at this moment, the output current of the inverter will decrease accordingly), and accelerates to the original output frequency according to the time of Acc of 06-04 (stall output frequency), then continue to increase the output frequency.




The current in the figure refers to the current amplitude

Note: 1.When 00-21=3 for sensorless vector control is selected from 00-21 control method, 06-01 will be used for the torque limited horizontal operation.
2. When 06-04=2, if 01-22 is not set, acceleration time is 01-07; if 01-23 is not set, deceleration time is 01-07.

## 5.7.3 Regenerative brake

- When performing frequent start and stop operation, usage rate of the regenerative brake can be increased by usingthe brake resistor or the brake unit.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-05 P.30 | Regenerative brake function selection | 0 (Types below Frame D) | 0 | If regenerative brake duty is fixed at 3%, parameter 06-06(P.70) will be invalid. |
| | | | 1 | The regenerative brake duty is the value of 06-06(P.70). |
| 06-06 P.70 | Special regenerative brake duty | 0.0% | 0 ~ 100.0% | --- |

Setting Regenerative brake

- At the moment of the inverter output frequency switching from high to low, the rotation speed of the motor will be higher than the output frequency of the inverter due to load inertia, resulting in generator effect. This effect will cause a high voltage between the main-circuit terminals (+/P) and (-/N), which will damage the inverter. Therefore, a proper brake resistor shall be mounted between terminals +/P and PR to dissipate the feedback energy.
- There is a built-in transistor inside the inverter. The conducting time ratio of the transistor is called “regenerative brake duty”. The higher the regenerative brake duty is, the more energy the brake resistor consumes, and the stronger the brake capability is.

Note: 1. In occasions where frequency starts or stops, a high capacity brake resistor is required.
2. Please refer to Section 3.6.3 for brake resistor selection.

## 5.7.4 Decrease carrier protection setting

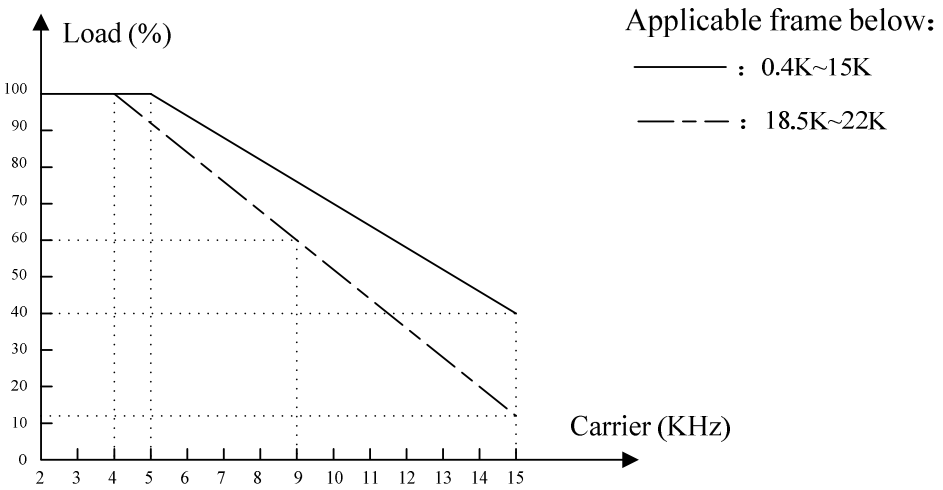
- Select decrease carrier or decrease rated current protection.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-07 P.263 | Decrease carrier protection setting | 0 | 0 | Rated carrier frequency, limit load current according to the setting carrier. |
| | | | 1 | Rated current, limit carrier according to the load current and temperature. |

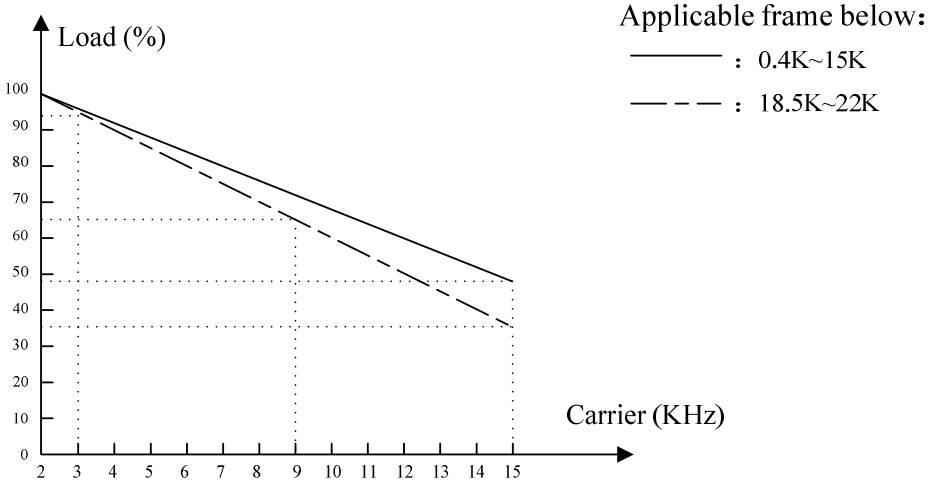
Setting Decrease carrier protection

- 06-07=0, constant carrier frequency, decrease the rated current according to the carrier frequency setting in accordance with curve, to avoid IGBT module overheated.The derating curve is as follows:

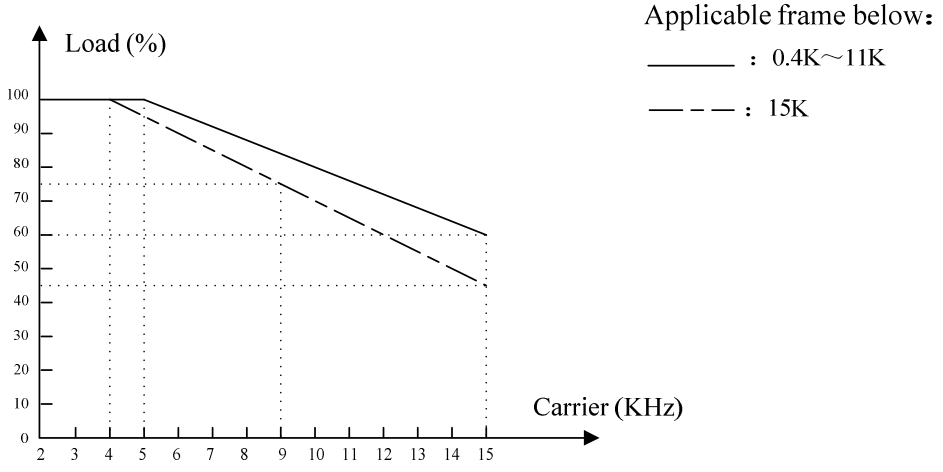
**440V type heavy duty (HD)**



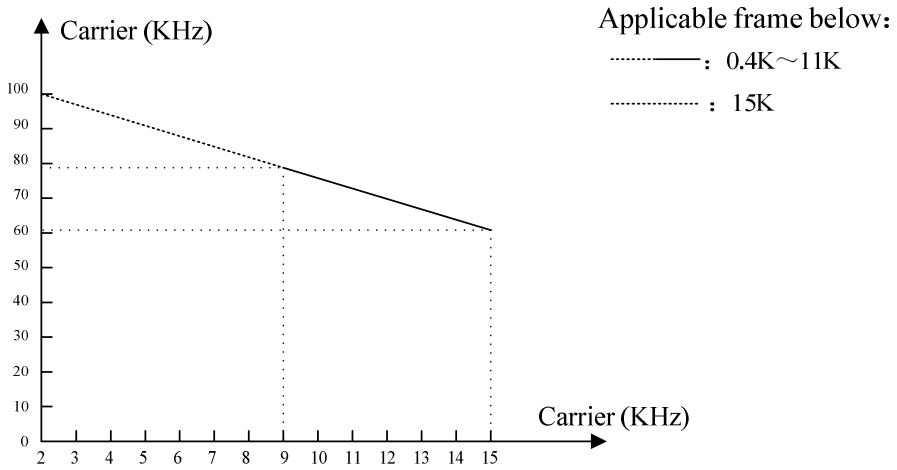

**440V type normal duty (ND)**




**220V type heavy duty (HD)**



**220V type normal duty (ND)**




- 06-07=1, constant rated current, auto decrease operating carrier frequency accordingto the IGBT moduletemperature to avoid IGBT module overheated.
  The rules are as follows:when the IGBT module temperature is over 80℃, auto decrease carrier frequency to the carrier value when the duty is 100% shown as the figure above; when the temperature is lower than 70℃, the operating carrier will auto increase to the setting value of 00-11.

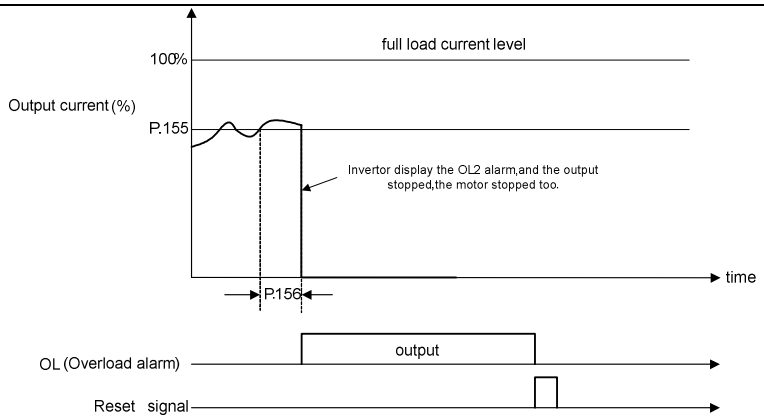
## 5.7.5 Over torque detection

- The output current detection function can be used for purposes suchas overtorque detection.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-08 P.155 | Over torque detection level | 0.0% | 0 | No over torque detection. |
| | | | 0.1~200% | Over torque detection. |
| 06-09 P.156 | Over torque detection time | 1.0s | 0.1 ~ 60.0s | --- |
| 06-10 P.260 | Over torque detection selection | 1 | 0 | The OL2 alarm is not reported after the over torque detection, and the inverter keeps running. |
| | | | 1 | The OL2 alarm is reported after the over torque detection, and the inverter stops. |

Setting Over torque detection

- When the value of 06-08 is nonzero, the function of over torque detection is selected.
- When the output current exceeds the detection level of over torque (06-08) and the detection time of over torque (06-09), then inverter alarm OL2 will go off and the inverter will stop the operation. If multi-function digital outputs terminal SO-SE(03-10), multi-function relay A-B-C(03-11) are set as over-torque alarm (set the value to 19), then the inverter will send out signals; if multi-function digital outputs terminal SO-SE(03-10), multi-function relay A-B-C(03-11) are set as over-load alarm (set the value to 3),and 06-10(P.260)=1,then the inverter will send out signals. For details, please refer to 03-10~ 03-11 in Chapter 5.




## 5.7.6 Stall level when restart

➢ Set the stall prevention operation level when restart via 06-11.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-11<br>P.160 | Stall level when restart | 100.0% | 0 ~ 150.0% | When restarting, stall prevention operation level. |

Setting Stall level when restart

◆ During the restarting process, when the output frequecncy is larger than the setting value of 06-11(P.160), the inverter is in current stall state.

## 5.7.7 Cooling fan operation

➢ Control the run/stop condition of the fan and the alarm output mode.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-12<br>P.245 | Cooling fan operation | 0 | 0 | The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops. |
| | | | 1 | Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too. |
| | | | 2 | The fan will be turned on if the temperature of the heat sink is higher than 40℃. When the power is turned off, the fan will be turned off, too. |
| | | | 3 | The fan will be turned on when the temperature of the heat sink is higher than 60℃. When it is lower than 40℃, the fan will be turned off. |

Setting Cooling fan operation

◆ Each bit of 06-12 is used to the assignedrun/stop condition.

***Example:*** If “Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too” then 06-12 should be set to 1.

Note: Proper setting for decreasing the fan operating time according to the inverter installing condition can extend the fan lifetime.

## 5.7.8 Input phase failure protection

➢ Set input phase failure protection to be valid / invalid.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-13 P.281 | Input phase failure protection | 0 | 0 | No Phase Failure Protection |
| | | | 1 | Phase failure protection, the parameter unit will display the "IPF" alarm and the output stops.(Frame A/B do not have IPF function) |

Setting Input phase failure protection

◆ When 06-13=1, input phase failure protection is valid; when input power is out of phase or three phases are in imbalance, the inverter will output alarm IPF, Frame A/B do not have IPF function.

## 5.7.9 SCP Short circuit protection function

➢ Sets SCP short circuit protection function valid or invalid.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-14 P.287 | SCP Short circuit protection function | 1 | 0 | No the output end short-circuits protection function. |
| | | | 1 | If outputend is short, the parameter unit will display the "SCP" alarm and the output stops. |

Setting SCP Short circuit protection function

◆ Set 06-14 to 0 to cancel the output end short-circuits protection function.

◆ Set 06-14 to1, short circuit protection function is valid; the inverter will output "SCP" alarm when detecting the SCP short circuit.

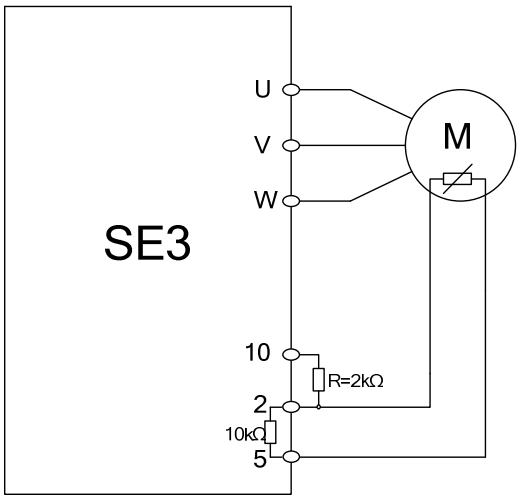
## 5.7.10 PTC protection selection

➢ The setting defines how the drive will operate after PTC detection.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-15 P.533 | The process mode of PTC alarm | 0 | 0 | Alarm and continue to run |
| | | | 1 | Alarm and decelerate to stop |
| | | | 2 | Alarm and stop freely |
| | | | 3 | No alarm |
| 06-16 P.534 | The percentage of PTC level | 0.0% | 0 | NO PTC alarm |
| | | | 0.1%~100.0% | The motion level of PTC function, 100% corresponds to the maximum analog input. |

Setting PTC level

- It needs to set 2-5/4-5 analog input function 02-00~02-01 to 11 (P.T.C. thermistor input value).It is used to set the PTC level, and the corresponding value for 100% is maxanalog input value.




PTC Electronic input wiring diagram

## 5.7.11 Maintenance alarm function

- The inverter cumulative operating time outputs the maintenance alarm output signal after setting the time.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-17 P.261 | Maintenance alarm function | 0 | 0 | No maintenance alarm |
| | | | 1 ~ 9998day | Used to set time whenmaintenancealarm sends out signal |

Setting Maintenance alarm function

- When multi-function digital output terminal (03-10,03-11) equals to 18, maintenance alarm is detecting. It means that when the inverter runs for the days that reach the parameter 06-17 set value of maintenance alarm time, the multi-function digital output terminal SO-SE or multi-function relay will send out signal.

## 5.7.12 Short circuit protection

- Control the startor end of the short circuit detection and set the detection level

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-18 P.280 | Short circuit detection when starting | 0 | 0 | No Short circuit detection when starting when starting |
| | | | 1 | Short circuit detection when starting |
| 06-19 P.282 | Short circuit detection when in the operation | 50.0% | 0~100% | 22K and types below |
| | | 70.0% | | |

Setting Short circuit protection

- Short circuit detection when starting is only carried out when the starting signal is input into the inverter.
- 06-18 is used to set short circuit detection when starting or not, 06-19 is used to set short circuit detection when in the operation.

- If short circuit detection when starting is selected, and detects a current short to ground exceeded 50% of rated current, the inverter will stop output and display GF alarm.
- If in the operation, detecting the current short to ground which is over the setting value of 06-19, the inverter will stop output and display GF alarm.

### 5.7.13 Output phase failure protection

- Control the start or end of output phase failure protectionvia the parameter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-20<br>P.262 | Output phase failure protection | 0 | 0 | No output phase failure protection selection |
| | | | 1 | Output phase failure protection, the parameter unit will display the “LF” abnormal alarm and the inverter will stop the output. |

Setting Output phase failure protection

- The inverter output phase failure protection: when 06-20=“1”, output phase failure, the inverter will display “LF”; when 06-20=“0”, the function will be canceled.

### 5.7.14 Low voltage protection

- Control the low voltage levelvia the parameter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-21<br>P.705 | Low voltage level | 155V | 155～220V | 220V type |
| | | 310V | 310～440V | 440V type |

Setting Low voltage level

- When the inverter input voltage is too low, which leads to the DC bus voltage lower than the setting value of 06-21, the inverter enters into the low voltage protection state, itwill stop output and free to stop.

### 5.7.15 Regenerative brake operation level

- Set regenerative brake operation levelvia the parameter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-22<br>P.706 | Regenerative brake operation level | 360V | 205～400V | 220V type |
| | | 720V | 410～800V | 440V type |

Setting Regenerative brake operation level

- 06-22 is the regenerative brake (brake resistor) operation level. WhenDC (PN) bus voltage is over the setting value of 06-22, the regenerative brake (brake resistor) operation starts.

## 5.7.16 Voltage stall level

- Set voltage stall operation level.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-23 P.707 | Voltage stall level | 380V | 205～400V | 220V type |
| | | 760V | 410～800V | 440V type |

Setting Voltage stall level

- When the inverter output voltage is over the setting value of 06-23(P.707), it is in the voltage stall state.

## 5.7.17 Capacitor lifetime detection

- Main circuit electrolytic capacitor deterioration and capacity decreasing may occur. This function is used to detect the current capacitor lifetime which is regardedas thereplacement standard.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-24 P.708 | Capacitor lifetime detection | 0 | 0,1 (3，7，8，9) | 0: No capacitor lifetime detection. When it is set to 1, and the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit. When power on again and the setting value is 3, it means the detection is finished. |
| 06-25 P.709 | Detection percentage | 100.0% | 0～100.0% | Detect the percentage of the capacitor value and the factory decetion value. |
| 06-26 P.710 | Capacitorlifetime detection result | Read | 0 | No abnoamal signal. |
| | | | 1 | Electrolytic capacitor abnormal.(the capacitor value is less than the 85% of factory value) |

Setting Capacitor lifetime detection

- The degree of deterioration of the main circuit capacitor can be diagnosed on the monitor.

| 06-24 | Content | Remarks |
|---|---|---|
| 0 | No capacitor lifetime detection. | Initial value. |
| 1 | Start to detect. | When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit. |
| 3 | Capacitor lifetime detection is finished. | Display only, setting invalid. |
| 7 | Control mode is not correct cannot be detected （Not V/F mode） | |
| 8 | End of mandatory testing process（B，F，H） | |
| 9 | Error in the test（A，C，G，E） | |

The capacitor lifetime detectionpercentage 06-25 is the value bytheoretical calculation, so the result can be only as the reference.

When the factory capacitor detection value is 100.0%, and 06-25 is less than 80%, 06-26=“1”, it will output capacitor lifetime abnormal signal via the digital input terminals (set 03-10 and 03-11 to 20).

- The detection steps are as follows:
  1. Check that the motor is connected.

2. Set 06-24 to 1 in the stop state and cut off the power.
3. The inverter applies DC voltage to the motor to measure the capacitor capacity while theinverter is OFF.
4. After confirming that the power lamp is OFF, turn ON the power again.
5. Check that "3" is set in 06-24, read 06-25, and check the deterioration degree of the maincircuit capacitor.

◆ Under thefollowing conditions, measurement cannot beperformed correctly.

1. Terminals P/N is connected to DC power supply.
2. The power supply is switched ON during measurement.
3. The motor is not connected to the inverter.
4. The motor is running (coasting).
5. Capacitance detection alarm
6. The inverter output is shut off with the MRS signal.
7. The motor capacity is smaller than the inverter capacity by two ranks or more.
8. The start command is given while measuring.

Note:1. The capacitor temperature will affects the capacity; please wait three hours or longer after turning OFF.

2. Capacitor lifetime detection can only be operated under V/F mode.

3.Frame A and B do not do capacitor lifetime detection

## 5.7.18 Time record function

➢ It is used to record the inverter accumulative operation time.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-27 P.292 | Accumulative motor operation time (minutes) | 0 min | 0 ~ 1439min | --- |
| 06-28 P.293 | Accumulative motor operation time (days) | 0 day | 0 ~ 9999day | --- |
| 06-29 P.296 | Accumulative motor power time (minutes) | 0 min | 0 ~ 1439min | --- |
| 06-30 P.297 | Accumulative motor power time (days) | 0day | 0 ~ 9999day | --- |

Setting Time record function

◆ 06-27 is about the accumulative motor operation time in minutes. The updated value cannot be modified by executing 00-02 or power shutdown. To clear the accumulated time, make06-27=0.

◆ 06-28 is about the accumulative motor operation time in days. The updated value cannot be modified by executing 00-02 or power shutdown. To clear the accumulated time, make 06-28=0.

## 5.7.19 Output power calculation

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-31 P.298 | Output power (low 16 position) | Read | Read | Have two decimal,read,can be written 0 |
| 06-32 P.299 | Output power (high 16 position) | Read | Read | Read,can be written 0 |

Output power value is06-32* $2^{16}$ + 06-31，,the unit is KWH。

## 5.7.20 Alarm query function

- This function provides the users with information on the 12 alarm codes mentioned earlier.

| Parameter | Name | Factory Value | Setting Range | Content | |
|---|---|---|---|---|---|
| 06-40 P.288 | Alarm code query | 1 | 0 ~ 12 | The value of 06-40 (P.288), 1~12, corresponds to the abnormal codes of 06-41(P.289)'s alarm E1~E12. | |
| 06-41 P.289 | Alarm code display | Read | Read | | |
| 06-42 P.290 | Alarm message query | 0 | 0 ~ 10 | Alarm message of No. 06-40 (P.288) | When 06-42(P.290)=1, 06-43(P.291)corresponds to the frequency when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290)=2, 06-43(P.291) corresponds to the current when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290)=3, 06-43(P.291) corresponds to the output voltage when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290)=4, 06-43(P.291) corresponds to the accumulation rate of temperature increase when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290)=5, 06-43(P.291) corresponds to the (+/P)-(-/N) voltage when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290) =6, 06-43(P.291) corresponds to the length of time the inverter has run before the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290)=7, 06-43(P.291) corresponds to the operation status code when the No.06-40(P.288)alarm goes off. |
| 06-43 P.291 | Alarm message display | Read | Read | | When 06-42(P.290) = 8, 06-43(P.291) corresponds to the year and month when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290) = 9, 06-43(P.291) corresponds to the day and hour when the No.06-40(P.288)alarm goes off.<br>When 06-42(P.290) = 10, 06-43(P.291) corresponds to the minute and second when the No.06-40(P.288)alarm goes off. |

Setting Alarm query function

- This paragraph provides the users with parameter-related information on alarm codes for frequency, current, voltage, as well as the 12 alarm codes mentioned earlier. If 00-02 operation is executed, the abnormal codes and the status messages for the occurred alarms recorded by this set of parameters will be all cleared.

◆ If both 06-40and 06-42 are 0, 06-41 and 06-43 will be displayed as 0.

Abnormal code corresponded alarm condition:

| Abnormal code | Alarm type | Abnormal code | Alarm type | Abnormal code | Alarm type | Abnormal code | Alarm type | Abnormal code | Alarm type |
|---|---|---|---|---|---|---|---|---|---|
| 00 | No alarm | 32 | OV1 | 49 | THN | 82 | IPF | 144 | OHT |
| 16 | OC1 | 33 | OV2 | 50 | NTC | 97 | OLS | 160 | OPT |
| 17 | OC2 | 34 | OV3 | 64 | EEP | 98 | OL2 | 179 | SCP |
| 18 | OC3 | 35 | OV0 | --- | --- | --- | --- | 192 | CPU |
| 19 | OC0 | 48 | THT | 66 | PID | 129 | AErr | 193 | CPR |
| 209 | PG1 | 210 | PG2 | 211 | PG3 | 212 | bEb | 213 | PTC |
| 51 | NTC2 | 52 | NTC3 | 53 | NTC4 | 54 | NTC5 | 55 | NTC6 |
| 56 | NTC7 | 57 | NTC8 | 216 | dv1 | 217 | dv2 | 215 | dv3 |
| 214 | dv4 | 84 | LF | 85 | HDC | 86 | ADE | 113 | rAE |
| 128 | GF | --- | --- | 195 | EbE1 | --- | --- | --- | --- |
| 209 | PG1 | 210 | PG2 | 211 | PG3 | 212 | bEb | 213 | PTC |
| 208 | PG0 | 161 | PUE | 162 | CbE | | | | |

Note:Set 06-42(P.290) to 8,9,10, selecting 06-43(P.291) display alarmyear and month, day and hour, minute and second is valid only when PU302 is used as an option board. If PU302 is used, these thress selections are invalid.

## 5.7.21 Alarm code query

➢ This function is used to monitor the latest 12 alarm codes.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-44 P.740 | The first (the latest) alarm code E1 | Read | Read | --- |
| 06-45 P.741 | The second alarm code E2 | Read | Read | --- |
| 06-46 P.742 | The third alarm code E3 | Read | Read | --- |
| 06-47 P.743 | The fourth alarm code E4 | Read | Read | --- |
| 06-48 P.744 | The fifth alarm code E5 | Read | Read | --- |
| 06-49 P.745 | The sixth alarm code E6 | Read | Read | --- |
| 06-50 P.746 | The seventh alarm code E7 | Read | Read | --- |
| 06-51 P.747 | The eighth alarm code E8 | Read | Read | --- |
| 06-52 P.748 | The nineth alarm code E9 | Read | Read | --- |
| 06-53 P.749 | The tenth alarm code E10 | Read | Read | --- |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-54 P.750 | The eleventh alarm code E11 | Read | Read | --- |
| 06-55 P.751 | The twelve alarm code E12 | Read | Read | --- |

Setting Alarm code

◆ For the alarm corresponded alarm code, please refer to Section 5.7.19.

## 5.7.22 The latest alarm message (E1)

➢ Record the details on the latesterror and analyse whether abnormal conditions happen on the inverter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-56 P.752 | E1 alarm output frequency | Read | Read | --- |
| 06-57 P.753 | E1 alarm output current | Read | Read | --- |
| 06-58 P.754 | E1 alarm output voltage | Read | Read | --- |
| 06-59 P.755 | E1 alarm the temperature rising accumulation rate | Read | Read | --- |
| 06-60 P.756 | E1 alarm PN voltage | Read | Read | --- |
| 06-61 P.757 | E1 alarm the time of the inverter has run | Read | Read | --- |
| 06-62 P.758 | E1 alarm the inverter operation status code | Read | Read | --- |
| 06-63 P.759 | E1 alarm (years/months) | Read | Read | --- |
| 06-64 P.760 | E1 alarm (days/hours) | Read | Read | --- |
| 06-65 P.761 | E1 alarm (minutes/seconds) | Read | Read | --- |

Note: Set 06-63(P.759)~06-65(P.761) to display the alarm year and month, day and hour, minute and secondwhich is valid only when PU302 is used as an option board in alarm. If PU302 is used, these thress selections are invalid.

## 5.7.23 The second alarm message (E2)

- Record the details on the second error and analyse whether abnormal conditions happen on the inverter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 06-70 P.766 | E2 alarm output frequency | Read | Read | --- |
| 06-71 P.767 | E2 alarm output current | Read | Read | --- |
| 06-72 P.768 | E2 alarm output voltage | Read | Read | --- |
| 06-73 P.769 | E2 alarm the temperature rising accumulation rate | Read | Read | --- |
| 06-74 P.770 | E2 alarm PN voltage | Read | Read | --- |
| 06-75 P.771 | E2 alarm the time of inverter has run | Read | Read | --- |
| 06-76 P.772 | E2 alarm the inverter operation status code | Read | Read | --- |
| 06-77 P.773 | E2 alarm (years/months) | Read | Read | --- |
| 06-78 P.774 | E2 alarm (days/hours) | Read | Read | --- |
| 06-79 P.775 | E2 alarm (minutes/seconds) | Read | Read | --- |

Note: Set 06-77(P.773)~06-79(P.775) to display the alarm year and month, day and hour, minute and second which is valid only when PU302 is used as an option board in alarm. If PU302 is used, these thress selections are invalid.

## 5.8 Communication parameter group 07

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 07-00 | P.33 | COM1 Communication protocol selection | 0: Modbus protocol<br>1: Shihlin protocol<br>2：PLC protocol（Effective when using the shilin built-in PLC） | 1 | 171 |
| 07-01 | P.36 | COM1 Converter stations | 0～254 | 0 | 171 |
| 07-02 | P.32 | COM1 Serial communication baud rate | 0: Baud rate:4800bps<br>1: Baud rate:9600bps<br>2: Baud rate:19200bps<br>3: Baud rate:38400bps<br>4: Baud rate:57600bps<br>5: Baud rate:115200bps | 1 | 171 |
| 07-03 | P.48 | COM1 data length | 0: 8bit<br>1: 7bit | 0 | 171 |
| 07-04 | P.49 | COM1 length of the stop bit | 0: 1bit<br>1: 2bit | 0 | 171 |
| 07-05 | P.50 | COM1Parity check selection | 0: No parity verification<br>1: Odd<br>2: Even | 0 | 171 |
| 07-06 | P.51 | COM1 CR/LFselection | 1: CR only<br>2: Both CR and LF | 1 | 171 |
| 07-07 | P.154 | COM1 Modbus communication format | 0: 1, 7, N, 2 (Modbus, ASCII)<br>1: 1, 7, E, 1 (Modbus, ASCII)<br>2: 1, 7, O, 1 (Modbus, ASCII)<br>3: 1, 8, N, 2 (Modbus, RTU)<br>4: 1, 8, E, 1 (Modbus, RTU)<br>5: 1, 8, O, 1 (Modbus, RTU) | 4 | 171 |
| 07-08 | P.52 | COM1 Number of communication retries | 0～10 | 1 | 171 |
| 07-09 | P.53 | COM1Communication check time interval | 0～999.8s: Use the set value for the communication overtime test.<br>99999: No communication overtime test. | 99999 | 171 |
| 07-10 | P.153 | COM1Communication error handling | 0: Warn and call to stop<br>1: No warning and keep running | 1 | 171 |
| 07-11 | P.34 | Communication EEPROM write selection | 0: When parameter write is performed, write them to RAM and EEPROM<br>1: When parameter write is performed, write them to RAM only. | 0 | 188 |
| 07-15 | P.800 | CANopen slave address | 0～127 | 0 | 189 |
| 07-16 | P.801 | CANopen speed | 0: 1Mbps<br>1: 500Kbps<br>2: 250K/280KFbps | 0 | 189 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 07-16 | P.801 | CANopen speed | 3: 125Kbps<br>4: 100Kbps<br>5: 50 Kbps | 0 | 189 |
| 07-17 | P.802 | CANopen communication status | 0: Node reset state<br>1: Com reset state<br>2: Boot up state<br>3: Pre operation state<br>4: Operation state<br>5: Stop state | 0 | 189 |
| 07-18 | P.803 | CANopen control status | 0: Not ready for use state<br>1: Inhibit start state<br>2: Ready to switch on state<br>3: Switched on state<br>4: Enable operation state<br>7: Quick stop active state<br>13: Err reaction activation state<br>14: Error state | 0 | 189 |
| 07-25 | P.810 | PUCommunication protocol selection | 0：Modbus protocol<br>1：shilin protocol<br>2：PLC protocol（Effective when using the shilin built-in PLC） | 1 | 171 |
| 07-26 | P.811 | PUconverter stations | 0～254 | 0 | 171 |
| 07-27 | P.812 | PUSerial communication baud rate | 0：Baud rate 4800bps<br>1：Baud rate 9600bps<br>2：Baud rate 19200bps<br>3：Baud rate 38400bps<br>4：Baud rate 57600bps<br>5：Baud rate 115200bps | 1 | 172 |
| 07-28 | P.813 | PU data length | 0：8bit<br>1：7bit | 0 | 172 |
| 07-29 | P.814 | PU stop bit | 0：1bit<br>1：2bit | 0 | 172 |
| 07-30 | P.815 | PU Parity check option | 0：no odd-even check<br>1：odd check<br>2：even check | 0 | 172 |
| 07-31 | P.816 | PU CR/LFchoose | 1：only CR<br>2：CR,LF Both | 1 | 172 |
| 07-32 | P.817 | PU Modbus communication format | 0：1、7、N、2 (Modbus, ASCII)<br>1：1、7、E、1 (Modbus, ASCII)<br>2：1、7、O、1 (Modbus, ASCII)<br>3：1、8、N、2 (Modbus, RTU)<br>4：1、8、E、1 (Modbus, RTU)<br>5：1、8、O、1 (Modbus, RTU) | 4 | 172 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 07-33 | P.818 | PU Communication exception permit number | 0 ~ 10 | 1 | 172 |
| 07-34 | P.819 | PU Communication between permissible time | 0 ~ 999.8s：To set data communication timeout inspection<br>99999：No time out inspection | 99999 | 172 |
| 07-35 | P.820 | PUCommunication error handling | 0：Alarm and stop idling<br>1：no alarm and keep on running | 1 | 172 |
| 07-41 | P.826 | Outside enlarge communication cartoon - exception permit number | 0 ~ 10 | 1 | 172 |
| 07-42 | P.827 | Outside enlarge communication cartoon - error handling | 0：Alarm and stop idling<br>1：no alarm and keep on running | 1 | 172 |
| 07-43 | P.828 | Outside enlarge communication cartoon dispatch interval allowable time | 0 ~ 999.8s： set data communication timeout inspection<br>99999：No timeout inspection | 99999 | 172 |
| 07-44 | P.829 | EP301 Communication expansion card version number | read | read | 189 |
| 07-45 | P.830 | IP allocation | 0：calm IP<br>1：move IP | 0 | 190 |
| 07-46 | P.831 | IP Add 1 | 0~255 | 192 | 190 |
| 07-47 | P.832 | IP Add 2 | 0~255 | 168 | 190 |
| 07-48 | P.833 | IP Add 3 | 0~255 | 2 | 190 |
| 07-49 | P.834 | IP Add 4 | 0~255 | 102 | 190 |
| 07-50 | P.835 | Subnet mask 1 | 0~255 | 255 | 190 |
| 07-51 | P.836 | Subnet mask 2 | 0~255 | 255 | 190 |
| 07-52 | P.837 | Subnet mask 3 | 0~255 | 255 | 190 |
| 07-53 | P.838 | Subnet mask 4 | 0~255 | 0 | 190 |
| 07-54 | P.839 | default gateway 1 | 0~255 | 192 | 190 |
| 07-55 | P.840 | default gateway 2 | 0~255 | 168 | 190 |
| 07-56 | P.841 | default gateway 3 | 0~255 | 2 | 190 |
| 07-57 | P.842 | default gateway 4 | 0~255 | 100 | 190 |

## 5.8.1 Shihlin protocol and Modbusprotocol

- Parameter settings and monitoring are possible by using the inverter RS-485 terminals and the position machine link communication.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 07-00 P.33 | COM1 Communication protocol selection | 1 | 0 | Modbus protocol |
| | | | 1 | Shihlin protocol |
| | | | 2 | PLC protocol ( Effective when using the shilin built-in PLC ) |
| 07-01 P.36 | COM1 Inverter station number | 0 | 0 ~ 254 | The number of inverters is practically determined by the wiring method and impedance matching. If Modbus protocol is used, please set the value to a nonzero value. |
| 07-02 P.32 | COM1 Serial communication Baud rate selection | 1 | 0 | Baud rate:4800bps |
| | | | 1 | Baud rate:9600bps |
| | | | 2 | Baud rate:19200bps |
| | | | 3 | Baud rate:38400bps |
| | | | 4 | Baud rate:57600bps |
| | | | 5 | Baud rate:115200bps |
| 07-03 P.48 | COM1 Data length | 0 | 0 | 8bit |
| | | | 1 | 7bit |
| 07-04 P.49 | COM1 Stop bit length | 0 | 0 | 1bit |
| | | | 1 | 2bit |
| 07-05 P.50 | COM1 Parity check selection | 0 | 0 | No parity verification |
| | | | 1 | Odd |
| | | | 2 | Even |
| 07-06 P.51 | COM1 CR/LFselection | 1 | 1 | CR only |
| | | | 2 | Both CR and LF |
| 07-07 P.154 | COM1 Modbus communication format | 4 | 0 | 1, 7, N, 2 (Modbus, ASCII) |
| | | | 1 | 1, 7, E, 1 (Modbus, ASCII) |
| | | | 2 | 1, 7, O, 1 (Modbus, ASCII) |
| | | | 3 | 1, 8, N, 2 (Modbus, RTU) |
| | | | 4 | 1, 8, E, 1 (Modbus, RTU) |
| | | | 5 | 1, 8, O, 1 (Modbus, RTU) |
| 07-08 P.52 | COM1 Number of communication retries | 1 | 0 ~ 10 | If the frequency of communication error exceeds the setting value of 07-08(P.52), and 07-10(P.153) is set to 0, the alarm will go off and display OPT. |
| 07-09 P.53 | COM1 Communication check time interval | 99999 | 0 ~ 999.8s | Use the set value for the communication overtime test. |
| | | | 99999 | No communication overtime test. |
| 07-10 P.153 | COM1Communication error handling | 1 | 0 | Warn and call to stop |
| | | | 1 | No warning and keep running |
| 07-25 P.810 | PUCommunication protocol selection | 1 | 0 | Modbus protocol |
| | | | 1 | shilin protocol |
| | | | 2 | PLC protocol ( Effective when using the shilin built-in PLC ) |
| 07-26 P.811 | PU converter stations | 0 | 0 ~ 254 | Actual implementation sets is determined by the wiring way and impedance matching.When using the Modbus protocol please its value is set to non-zero value. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 07-27 P.812 | PU Serial communication baud rate | 1 | 0 | Baud rate 4800bps |
| | | | 1 | Baud rate 9600bps |
| | | | 2 | Baud rate 19200bps |
| | | | 3 | Baud rate 38400bps |
| | | | 4 | Baud rate 57600bps |
| | | | 5 | Baud rate 115200bps |
| 07-28 P.813 | PU data length | 0 | 0 | 8bit |
| | | | 1 | 7bit |
| 07-29 P.814 | PU stop bit | 0 | 0 | 8bit |
| | | | 1 | 7bit |
| 07-30 P.815 | PU Parity check option | 0 | 0 | no odd-even check |
| | | | 1 | odd check |
| | | | 2 | even check |
| 07-31 P.816 | PU CR/LFchoose | 1 | 1 | 1 : only CR |
| | | | 2 | 2 : CR,LF Both |
| 07-32 P.817 | PU Modbus communication format | 4 | 0 | 1、7、N、2 (Modbus, ASCII) |
| | | | 1 | 1、7、E、1 (Modbus, ASCII) |
| | | | 2 | 1、7、O、1 (Modbus, ASCII) |
| | | | 3 | 1、8、N、2 (Modbus, RTU) |
| | | | 4 | 1、8、E、1 (Modbus, RTU) |
| | | | 5 | 1、8、O、1 (Modbus, RTU) |
| 07-33 P.818 | PU Communication exception permit number | 1 | 0 ~ 10 | When communications error more than 7-33 (P. 818) value, and 07-35 (P. 820) to 0, is called different police PUE. |
| 07-34 P.819 | PU Communication between permissible time | 99999 | 0 ~ 999.8s | To set data communication timeout inspection |
| | | | 99999 | No time out inspection |
| 07-35 P.820 | PU Communication error handling | 1 | 0 | Alarm and stop idling |
| | | | 1 | no alarm and keep on running |
| 07-41 P.826 | Outside enlarge communication cartoon - exception permit number | 1 | 0 ~ 10 | When communication error more than the setpoint of 07-41 (P. 826), and 07-42 (P. 827) to 0, is called different police CbE. |
| 07-42 P.827 | Outside enlarge communication cartoon - error handling | 1 | 0 | Alarm and stop idling |
| | | | 1 | no alarm and keep on running |
| 07-43 P.828 | Outside enlarge communication cartoon dispatch interval allowable time | 99999 | 0 ~ 999.8s | set data communication timeout inspection |
| | | | 99999 | No timeout inspection |

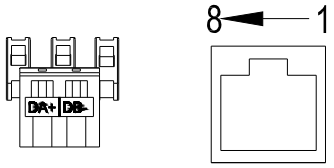
Setting Shihlin protocol and Modbus protocol

- When the communication parameters are revised, please reset the inverter.
- The SE3 inverters have two communication protocols for selection, namely, Shihlin protocol and Modbus protocol. Parameter 07-02, 07-01, 07-08, 07-09 and 07-10 are suitable for both protocols. 07-03~07-06 is only suitable for the Shihlin protocol, while 07-07 is only suitable for the Modbus protocol. Please refer to communication protocols for more details.

Note: 1. The number of inverters is practically determined by the wiring method and impedance matching. If Modbus protocol is used, please set the value to a nonzero value.
2.If the frequency of communication error exceeds the setting value of 07-08(P.52), and 07-10(P.153) is set to 0, the alarm will go off and display OPT.
3. Modbus protocol. Displayed according to the starting bit, the data bit, parity check bit, and the stop bit. N: no parity check. E: 1-bit parity check. O: 1-bit odd parity check.

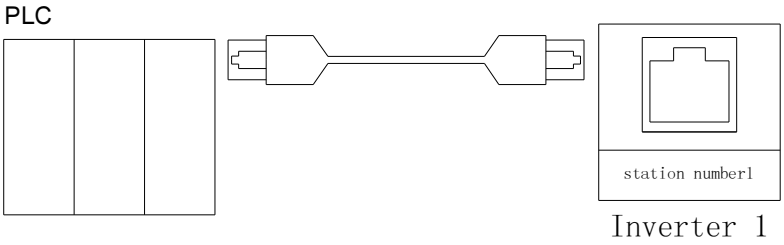
✓ SE3 RS-485Communication interface constituents and wiring

1. SE3 RS-485 communication interface terminal arrangement ( COM1 )

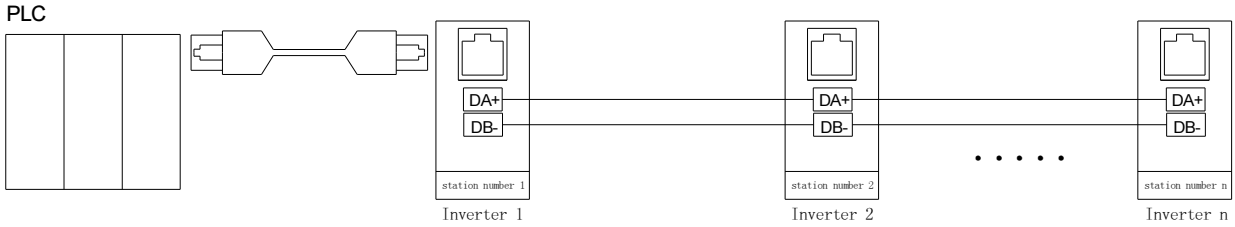



RJ45x2 PIN introduction
1, 2, 3, 6:Reserve
4:DB-
5:DA+
7:+5V
8:GND

2. Communication between the position machine and single inverter (take PLC as an example).



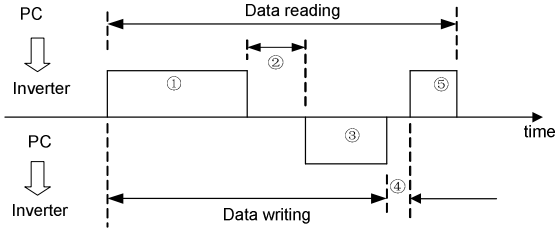

3. Communication between the position machine and multiple inverters (take PLC as an example).




4. SE3 series inverters support Shihlin communication protocol and MODBUS communication protocol.

✓ Shihlin communication protocol

1. Automatically switch the position machine and the inverter to ASCII codes (hexadecimal) for communication.
2. Please follow the following steps for data communication between the position machine and the inverter.




The above steps concerning communication actions and communication data format are explained below:

| No. | Action content | | Operation reference | Frequency write-in | Parameter write-in | Inverter reset | Monitoring | Parameters Read-out |
|---|---|---|---|---|---|---|---|---|
| ① | Use the position machine's user procedure to send communication request to the inverter. | | A | A | A | A | B | B |
| ② | Inverter data processing time | | Yes | Yes | Yes | No | Yes | Yes |
| ③ | Inverter's replay data (check data ① error) | No error(Accept the request) | C | C | C | No | E | E |
| | | Error exists (Refuse the request) | D | D | D | No | D | D |
| ④ | Position machine's processing delay time | | No | No | No | No | No | No |
| ⑤ | Reply from the position machine regarding reply data ③ (Check data ③ error) | No error (No processing) | No | No | No | No | C | C |
| | | Error exists (Output ③) | No | No | No | No | F | F |

①Data of the communication request sent by the position machine to the inverter.

| Format | Data number | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| A (Data write-in) | ENQ *1) | Inverter station number | | Reference code | | Waiting time *2) | Data | | | | Check code Sum check*7) | | End symbol*3) | |
| B (Data read-out) | ENQ *1) | Inverter station number | | Reference code | | Waiting time *2) | Check code Sum check*7) | | Endsymbol*3) | | | | | |

③Inverter reply data

Data write-in

| Format | Data number | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| C(No data error) | ACK*1) | Inverter station number | | End symbol*3) | | |
| D(With data error) | NAK*1) | Inverter station number | | Error code*5) | End symbol*3) | |

Data read-out

| Format | Data number | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| E(No data error) | STX*1) | Inverter station number | | Data read-out | | | | Unit *4) | ETX | Check code Sum check*7) | | End symbol *3) | |
| D(With data error) | NAK*1) | Inverter station number | | Error code *5) | End symbol *3) | | | | | | | | |

⑤Reply data from the position machine to the inverter during data read-out.

| Format | Data number | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| C(No data error) | ACK*1) | Inverter station number | | End symbol *3) | |
| F(With data error) | NAK*1) | Inverter station number | | End symbol *3) | |

*1) Control code

| Signal | ASCIICode | Content | Signal | ASCIICode | Content |
|---|---|---|---|---|---|
| NUL | H00 | NULL(Empty) | ACK | H06 | Acknowledge(No data error) |
| STX | H02 | Start of Text(Data begin) | LF | H0A | Line Feed(Change line) |
| ETX | H03 | End of Text(Data end) | CR | H0D | Carriage Return |
| ENQ | H05 | Enquiry(Communication request) | NAK | H15 | Negative Acknowledge(Data errors) |

*2) Set the waiting time from 0 to 15 with a 10ms unit. Example: 5 --->50ms.

*3) End symbol (CR, LF codes)

When carrying out data communication from the position machine to the inverter, CR and LF codes at the end of the text are automatically set according to method of the position machine. At this time, the inverter has to be set according to the position machine, too. If only CR is selected, only one register will be occupied; if both CR and LF are selected, two registers will be occupied.

*4) Unit: 0---> Unit 1, 1---> Unit 0.1, 2---> Unit 0.01, 3---> Unit 0.001

*5) Error code:

| Error code | Error item | Communication error and abnormality |
|---|---|---|
| H01 | Error | The parity check of the data received by the inverter is different from the parity check set initially. |
| H02 | Sum Check Error | The Sum Check calculated by the inverter according to the received data is different from the received Sum Check. |
| H03 | Communication protocol error | The syntax of the data received by the inverter has errors. The data is not completely received during the assigned period of time. CR and LF codes are different from the initial setting. |
| H04 | Frame error | The stop bit of the data received by the inverter does not match to the stop bit set initially. |
| H05 | Overflow error | When the inverter is receiving data, the position machine sends the next set of data before the inverter finishes receiving the current one. |
| H0A | Abnormal mode | The running inverter or the operation of the inverter disqualifies the requirements of the mode setting. |
| H0B | Reference code error | The user assigns a reference code that cannot be processed by the inverter. |
| H0C | Data range error | When setting the parameters and frequencies, the set values are outside the set range of the data. |

*6) When the parameter has the characteristics of 99999, the write-in or read-out of 99999 will be replaced by HFFFF.

*7)Request the sum check code

The converted ASCII codes of the data are summed up in binary digit format. The lower bits (the lower eight bits) of the result (the sum) converted into ASCII binary digits (hexadecimal) are termed as the Sum Check Code.

✓ Communication example:

Example 1. The position machine sends a forward rotation reference to the inverter:

Step 1: Use the position machine to send a FA reference in Format A:

| ENQ | Inverter station number 0 | Reference code HFA | Waiting time | Data H0002 | Check code Sum Check | CR |
|---|---|---|---|---|---|---|
| H05 | H30 H30 | H46 H41 | H30 | H30 H30 H30 H32 | H44 H39 | H0D |

Sum Check calculation is: H30 + H30 + H46 + H41+H30+H30+H30+H30+H32=H1D9, take the lower eight bits D9 to convert to ASCII code H44 and H39.

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine in Format C:

| ACK | Inverter station number 0 | CR |
|---|---|---|
| H06 | H30 H30 | H0D |

Example 2. The position machine sends a stop rotation reference to the inverter:

Step 1: Use the position machine to send a FA reference in Format A:

| ENQ | Inverter station number 0 | Reference code HFA | Waiting time | Data H0000 | Check code Sum Check | CR |
|---|---|---|---|---|---|---|
| H05 | H30 H30 | H46 H41 | H30 | H30 H30 H30 H30 | H44 H37 | H0D |

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine in Format C:

| ACK | Inverter station number 0 | CR |
|---|---|---|
| H06 | H30 H30 | H0D |

Example 3. The read-out value of the position machine 02-15(P.195):

Step1: The position machine sends the write-in page break reference to the inverter using Format A:

| ENQ | Inverter station number 0 | Reference code HFF | Waiting time | Data H0001 | Check code Sum Check | CR |
|---|---|---|---|---|---|---|
| H05 | H30 H30 | H46 H46 | H30 | H30 H30 H30 H31 | H44 H44 | H0D |

02-15(P.195)is on page 1

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine in Format C:

| ACK | Inverter station number 0 | CR |
|---|---|---|
| H06 | H30 H30 | H0D |

Step 3: The position machine requests the inverter for reading the value 02-15(P.195)using Format B:

| ENQ | Inverter station number 0 | Reference code H5F | Waiting time | Check code Sum Check | CR |
|---|---|---|---|---|---|
| H05 | H30 H30 | H35 H46 | H30 | H30 H42 | H0D |

First 195 minus 100 equals to 95, then convert 95 to H5F hexadecimal digits. Next convert 5 and into H35 and H46, respectively, in ASCII code.

Step 4: Once the inverter receives and processes the data without error, the value of 02-15(P.195) will be sent to the position machine in Format E:

| STX | Inverter station number 0 | Read-out data H1770(60Hz) | Unit | ETX | Check code Sum Check | CR |
|---|---|---|---|---|---|---|
| H02 | H30 H30 | H31 H37 H37 H30 | H32 | H03 | H36 H31 | H0D |

Example 4. Change the content of 02-15(P.195) to 50 (the original factory setting is 60).

Step 1 to 2: Omitted (Same as Step 1 to 2 of Example 3);

Step 3: The position machine requests the inverter to write 50 in 02-15(P.195) in Format A:

| ENQ | Inverter station number 0 | Reference code HDF | Waiting time | Data H1388 | Check code Sum Check | CR |
|---|---|---|---|---|---|---|
| H05 | H30 H30 | H44 H46 | H30 | H31 H33 H38 H38 | H45 H45 | H0D |

⇩⇩

First, 195 minus 100 equals to 95; Concert 95 to H5F hexadecimal digits, H5F+H80=HDF

because the smallest unit of 02-15(P.195) is 0.01, 50 x 100 = 5000; then convert 5000 to hexadecimal digits H13888; Then covert 1, 3, 8 and 8 to ASCII codes for transmission.

Step 4: After receiving and processing the data without error, the inverter will send a reply to the position machine in Format C:

| ACK | Inverter station number 0 | CR |
|---|---|---|
| H06 | H30 H30 | H0D |

Example 5. Write 500 into 02-15(P.195) (this parameter range is set from 0 to 400)

Step 1 to 2: Omitted (same as Step 1 and 2 of Example 3);

Step 3: The position machine requests the inverter to write 500 into02-15(P.195) in Format A:

| ENQ | Inverter station number 0 | Reference code HDF | Waiting time | Data HC350 | SUM CHECK | CR |
|---|---|---|---|---|---|---|
| H05 | H30 H30 | H44 H46 | H30 | H43 H33 H35 H30 | H46 H35 | H0D |

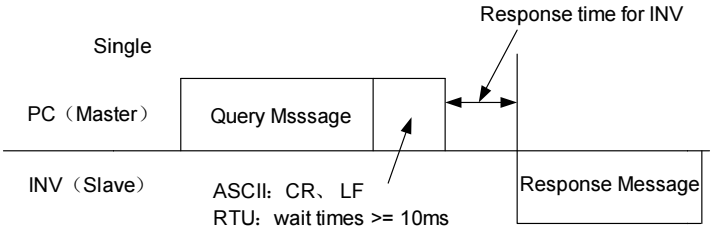
Step 4: After the inverter receives and processes the information, because the data exceed the set range of 02-15(P.195), the data range is incorrect. The inverter will reply the error to the position machine in Format D:

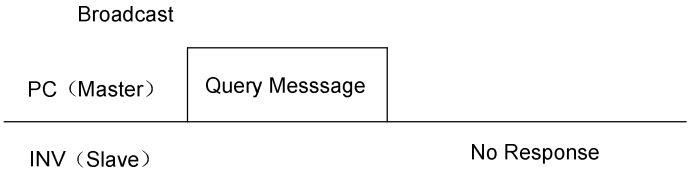
| NAK | Inverter station number 0 | Error code H0C | CR |
|---|---|---|---|
| H15 | H30 H30 | H43 | H0D |

Note: Examples above adopt P mode to read and write parameter 02-15(P.195), if Parameter group mode is needed, please notice the differences on pages and parameter number. Please refer to the list of communication references.

- ✓ MODBUS communication protocol
- ✓ Message format

MODBUS serial transmission can be divided into two types:ASCII(American Standard Code for Information Interchange) and RTU(Remote Terminal Unit).






(1) Query

Position machine (main address) sends messages to the inverter of the assigned address (from the address).

(2) Normal Response

After receiving the query from the Master, the Slave will execute the requested function and ask the Master to send the normal response.

(3) Error Response

When receiving invalid function codes, address or data, the inverter will send the response to the Master.

(4) Broadcast

The Master will assign the address 0, and the slave will send the message to all the Slaves. Once receiving a message from the Master, all the Slaves will execute the requested function without responding to the Master.

✓ Communication format:

Basically, the Master will send Query Message to the inverter, which will send the response message to the Master. The address and function codes are duplicated for regular communication. Bit 7 of functional code during abnormal communication is positioned as “1” (=H80). The data bate is set to be the error code.

✓ Message constituents:

| Format | Start | ①Address | ②Function | ③Data | ④Error check | Stop |
|---|---|---|---|---|---|---|
| ASCII | H3A | 8bits | 8bits | n×8bits | 2×8bits | 0D 0A |
| RTU | >=10ms | | | | | >=10ms |

| Message | Content |
|---|---|
| ①Address message set | Setting range: 0~254.0 is the broadcasting address; 1~254 are the equipment (inverter) address.<br>The setup of 07-01 is based on the equipment address. The set up is carried out when the main equipment sends messages to the equipment and when the equipment sends reply message to the main equipment. |
| ②Function message set | Only three functions have been done so far. The equipment carries out actions according to the request from the equipment. The main equipment sets functional codes excluded from the table below. The equipment returns error response. It is determined by the response from the equipment; regular function codes are the response for regular responses; H80 + function codes are the response for error responses. |
| ③Data message set | Changes, including the starting address, the number of the write-in or read-out registers, and the write-in data, are made according to the function codes. |
| ④Error check message set | ASCII is the check method for LRC, while RTU is the check method for CRC. |

| Function name | Function code | Function description |
|---|---|---|
| Read multiple registers | H03 | Read slave machine’s continuous register content. |
| Write single register | H06 | Write data into slave machine’s single register. |
| Function diagnosis | H08 | Function diagnosis<br>(only for communication calibration) |
| Write multiple registers | H10 | Write data into slave machine’s multiple registers. |

ASCII mode's LRC check value calculation:

LRC check is simpler and it is used in the ASCII mode for checking the content of the message domain, excluding the colon at the beginning and the line change enter symbol at the end. It only sums up all the data to be transmitted according to the bite (not the ASCII code). If the result is greater than H100 of the hexadecimal digit, remove the exceeded part (e.g., if the result is H136 of the hexadecimal digit, then take H36 only) and add one.

RTU mode, CRC check value calculation:

1．Add one hexadecimal digit register. All the digits are 1.

2．Carry out XOR calculation for the higher bit of the hexadecimal digit register and the eight bits. The calculated result is entered to the hexadecimal digit register.

3．Shift this hexadecimal digit register one bit to the right.

4．If the right shifted bit (the marked bit) is 1, then polynomial 1010000000000001 and this register will carry out the XOR calculation. If the right shifted bit is 0, then it will return to 3.

5．Repeat 3 and 4 until 8 bits are shifted.

6．The other eight bits and the hexadecimal register carry out the XOR calculation.

7．Repeat 3~6 until all the bytes of the text carry out the XOR calculation with the hexadecimal register and was shifted for eight times.

8．The hexadecimal register content is the 2-byte CRC error checking, and it is added to the highest valid bit of the text. When CRC is added to the message, lower bytes are added first, followed by the higher bytes.

✓ Communication format:

1. Data read-out (H03)

| Mode | Start | Address*1) | Function*2) | Start Address*3) | Number of register*4) | Check | Stop |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 2byte | 2byte | 2byte | >=10ms |

Regular response

| Mode | Start | Address*1) | Function*2) | Read-out data number *5) | Read-out data*6) | | Check | Stop |
|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 2char | 4char | …2N×8bit | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 1byte | 2byte | …N×8bit | 2byte | >=10ms |

| Message | Content |
|---|---|
| *1)Address | Set up the address for the to-be delivered message; 0 for invalid. |
| *2)Function code | H03 |
| *3)Starting address | Set up the address of the register for reading the message. |
| *4)Number of register | Set up the number of register for reading. Maximum number: 20. |
| *5)Amount of data to be read | Twice the amount of *4) |
| *6)Data to-be read | Set the data for *4); the data will be read according to the descending sequence |

2. Data write-in (H06)

| Mode | Start | Address*1) | Function*2) | Start Address*3) | Write-in data*4) | Check | Stop |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 2byte | 2byte | 2byte | >=10ms |

Regular response

| Mode | Start | Address*1) | Function*2) | Start Address*3) | Write-in data*4) | Check | Stop |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 2byte | 2byte | 2byte | >=10ms |

| Message | Content |
|---|---|
| *1)Address | Set up the address for the to-be delivered message. |
| *2)Function code | H06 |
| *3)Starting address | Set up the starting address of the register to be engaged in the write-in function. |
| *4)Write-in data | Write the data in the assigned register. The data have to be 16bit (fixed). |

Note: Regular response content and the inquired message are the same.

3. Write multiple registers (H10)

| Mode | Start | Address*1) | Function*2) | Start Address*3) | Number of register *4) | Data*5) | Write-in data *6) | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 4char | …2N×8bit | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 2byte | 2byte | 1byte | 2byte | …N×16bit | 2byte | >=10ms |

Regular response

| Mode | Start | Address*1) | Function*2) | Start Address*3) | Number of register *4) | Check | Stop |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 2byte | 2byte | 2byte | >=10ms |

| Message | Content |
|---|---|
| *1)Address | Set up the address for the to-be delivered message. |
| *2)Function code | H10 |
| *3)Starting address | Set up the starting address of the register to be engaged in the write-in function. |
| *4)Number of register | Set up the number of register for reading. Maximum number: 20. |
| *5) Amount of data | The range should be 2 ~ 24. Set Twice the amount of *4). |
| *6)Write-in data | Set the assigned data in *4), write the data according to the sequence of the Hi byte and the Lo byte and the data of the starting address: According to the order of the data of the starting address +1, data of the starting address +2…, etc. |

4. Function Diagnosis (H08)

By sending query information and getting the same query information back (the function of the subroutine code H00), it can do communication calibration.

The subroutine code H00 (for inquiring the return of data)

The query information

| Mode | Start | Address*1) | Function*2) | Subroutine *3) | Data *4) | Check | End |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 0D 0A |
| RTU | >=10ms | 1byte | 1byte | 2byte | 2byte | 2byte | >=10ms |

Normal response

| Mode | Start | Address*1) | Function*2) | Subroutine *3) | Data *4) | Check | End |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 4char | 4char | 2char | 0D 0A |
| RTU | >=10ms | 1byte | 1byte | 2byte | 2byte | 2byte | >=10ms |

Setting of the query information

| Message | Content |
|---|---|
| *1)Address | Set the address for the information to be sent to, not able to radio communications(0 invalid) |
| *2)Function code | H08 |
| *3)Subroutine code | H0000 |
| *4)Data | If the data is 2 byte, it can be set arbitrarily. Set range from H0000 to HFFFF. |

5. Error response

Carry out error response according to the error in the function, address and data of the query message received by the equipment.

There will be no errors if one or more addresses can be operated when they are accessed by the function code H03 or H10.

| Mode | Start | Address*1) | Function*2)<br>H80+function | Error code * 3) | Check | End |
|---|---|---|---|---|---|---|
| ASCII | H3A | 2char | 2char | 2char | 2char | 0D 0A |
| RTU | >=10ms | 8bit | 8bit | 8bit | 2byte | >=10ms |

| Message | Content |
|---|---|
| *1) Address | Set up the address for the to-be delivered message. |
| *2) Function code | The function code set for the main equipment + H80 |
| *3)Error code | Set the codes listed in the table below. |

The list of error codes:

| Source | Code | Meaning | Remarks |
|---|---|---|---|
| Slave reply | H01 | Invalid function code | Set up function codes that cannot be handled by the equipment in the query message sent by the main equipment. Function codes that are not H03, H06, H08 and H10 (temporarily). |
| | H02 | Invalid data address | Set up addresses that cannot be handled by the equipment in the query message sent by the main equipment (Asides from the addresses listed in the address table of the register; preserve the parameters, prohibit parameter reading, prohibit parameter writing). |
| | H03 | Invalid data value | Set up data that cannot be handled by the equipment in the query message sent by the main equipment (parameters written outside the range, exist assigned mode, other errors, etc.) |

Note: When performing multi-parameter reading, reading a preserved parameter is not a mistake.

Data sent to the main equipment will be tested by the inverter for the following mistakes, but the inverter will make no response for any detected error.

The list of the error test items:

| Error item | Error content |
|---|---|
| Parity error | The parity test for data received by the inverter is different from the parity test set at the initial stage. |
| Frame error | The stop byte of the data received by the inverter mismatches the stop byte set at the initial stage. |
| Overflow error | When the inverter is receiving data, the position machine sends the next set of data before the inverter finishes receiving the current one. |
| Error test | The LRC/CRC calculated by the inverter according to the received data is different from the received LRC/CRC. |

✓ Communication example:

Example 1. The operation mode written by the communication is the CU (communication) mode.

Step 1: The position machine modifies the mode of the inverter.

| Mode | Starting | Address | Function | Starting address | | Write-in data | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H36 | H31H30 | H30 H30 | H30 H30 | H30 H30 | H45 H39 | 0D 0A |
| RTU | >=10ms | 01 | 06 | 10 | 00 | 00 | 00 | 8D 0A | >=10ms |

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

| Mode | Starting | Address | Function | Starting address | | Write-in data | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H36 | H31H30 | H30 H30 | H30 H30 | H30 H30 | H45 H39 | 0D 0A |
| RTU | >=10ms | 01 | 06 | 10 | 00 | 00 | 00 | 8D 0A | >=10ms |

Example 2. Read the parameter 02-15(P.195) value by the position machine

Step 1: The position machine sends message to the inverter for reading the value of 02-15(P.195).The address of 02-15(P.195) is H00C3.

| Mode | Starting | Address | Function | Starting address | | Number of registers | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H33 | H30H30 | H43 H33 | H30 H30 | H30 H31 | H33 H38 | 0D 0A |
| RTU | >=10ms | 01 | 03 | 00 | C3 | 00 | 01 | 74 36 | >=10ms |

Step 2: Once the message is received and processed without mistake, the inverter will send the content of 02-15(P.195) to the position machine.

| Mode | Starting | Address | Function | Number of data read | Read-out data | | Check | Stop |
|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H33 | H30 H32 | H31 H37 | H37 H30 | H37 H33 | 0D 0A |
| RTU | >=10ms | 01 | 03 | 02 | 17 | 70 | B6 50 | >=10ms |

Because the decimal form of H1770 is 6000 and the unit of 02-15(P.195) is 0.01, 02-15(P.195) is 60 (6000 x 0.01 = 60).

Example 3. Change the content of 02-15(P.195) to 50.

Step 1: The position machine sends message to the inverter for writing 50 into 02-15(P.195).

| Mode | Starting | Address | Function | Starting address | | Write-in data | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H36 | H30H30 | H43 H33 | H31 H33 | H38 H38 | H39 H42 | 0D 0A |
| RTU | >=10ms | 01 | 06 | 00 | C3 | 13 | 88 | 74 A0 | >=10ms |

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

| Mode | Starting | Address | Function | Starting address | | Write-in data | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H36 | H30H30 | H43 H33 | H31 H33 | H38 H38 | H39 H42 | 0D 0A |
| RTU | >=10ms | 01 | 06 | 00 | C3 | 13 | 88 | 74 A0 | >=10ms |

Example 4. Read the values of parameters 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6,01-06~01-07/P.7~P.8, 06-00(P.9),10-00~10-01/P.10~P.11 by the position machine.

Step 1: The position machine sends message to the inverter for reading the value of01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11. Starting address is H0000.

| Mode | Starting | Address | Function | Starting address | | Number of registers | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H33 | H30H30 | H30 H30 | H30 H30 | H30 H43 | H46 H30 | 0D 0A |
| RTU | >=10ms | 01 | 03 | 00 | 00 | 00 | 0C | 45 CF | >=10ms |

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

| Mode | Starting | Address | Function | Number of data read | Read-out data | Check | Stop |
|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H30 H33 | H31 H38 | …12×4 char | 2char | 0D 0A |
| RTU | >=10ms | 01 | 03 | 18 | …12×2 byte | 2byte | >=10ms |

Example 5. Rewrite the values of parameters 01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9), 10-00~10-01/P.10~P.11 by the inverter

Step 1: The position machine sends message to the inverter for writing the value of01-10(P.0), 01-00(P.1), 01-01(P.2), 01-03(P.3), 04-00~04-02/P.4~P.6, 01-06~01-07/P.7~P.8, 06-00(P.9),10-00~10-01/P.10~P.11.

| Mode | Starting | Address | Function | Startingaddress | | Number of registers | | Data volume | Write-in data | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H31 H30 | H30 H30 | H30 H30 | H30 H30 | H30 H43 | H31 H38 | …N×4 char | 2char | 0D 0A |
| RTU | >=10ms | 01 | 10 | 00 | 00 | 00 | 0C | 18 | …N×2byte | 2byte | >=10ms |

Step 2: After receiving and processing the data without error, the inverter will send a reply to the position machine:

| Mode | Starting | Address | Function | Startingaddress | | Number of registers | | Check | Stop |
|---|---|---|---|---|---|---|---|---|---|
| ASCII | H3A | H30 H31 | H31 H30 | H30H30 | H30 H30 | H30 H30 | H30 H43 | H45 H33 | 0D 0A |
| RTU | >=10ms | 01 | 10 | 00 | 00 | 00 | 0C | 00 18 | >=10ms |

Note: Examples above adopt P mode to read and write parameter 02-15(P.195), if Parameter Group mode is needed, please notice the differences on address. Please refer to the list of communication references.

◆ The list of communication references

The following references and data are set for carrying out assorted operation control and monitoring.

| Item | Shihlin protocol reference code | Modbus reference code | Modbusaddress | Data content and function description |
|---|---|---|---|---|
| Operation mode read-out | H7B | H03 | H1000 | H0000: communication mode;<br>H0001: external mode;<br>H0002: JOG Mode;<br>H0003: combination mode 1;<br>H0004: combination mode 2;<br>H0005: combination mode 3;<br>H0006: combination mode 4;<br>H0007: combination mode 5;<br>H0008: PUMode;<br>b15 b14～b12 b11～b8 b7～b0<br>1 \| Setting value of 00-18 \| Setting value of 00-17 \| 00000000 :<br>the second operation mode. |
| Operation mode write-in | HFB | H06/H10 | | |
| Inverter status monitoring | H7A | H03 | H1001 | H0000~H00FF<br>b15: during tuning<br>b14:during inverter resetting<br>b13, b12: Reserve<br>b11:inverter EO status<br>b10:PLC operating |

<table>
<tr><th colspan="2">Item</th><th>Shihlin protocol reference code</th><th>Modbus reference code</th><th>Modbusaddress</th><th colspan="2">Data content and function description</th></tr>
<tr><td colspan="2">Inverter status monitoring</td><td>H7A</td><td>H03</td><td>H1001</td><td colspan="2">b9:inverter undervoltage<br>b8:inverter voltage stall<br>b7: abnormality occurred<br>b6: frequency test<br>b5: reserve<br>b4: overloaded<br>b3: reached the frequency<br>b2: during reverse rotation<br>b1: during forward rotation<br>b0: during rotation</td></tr>
<tr><td rowspan="2">Target frequency write-in</td><td>EEPROM</td><td>HEE</td><td rowspan="2">H06/H10</td><td>H1009</td><td colspan="2" rowspan="2">H0000~ HFDE8: 0~650Hz</td></tr>
<tr><td>RAM</td><td>HED</td><td>H1002</td></tr>
<tr><td colspan="2">Special monitor select codes read out</td><td>H7D</td><td>H03</td><td rowspan="2">H1013</td><td colspan="2" rowspan="2">H0000~H0010:monitor selected information.<br>Special monitor select read out codes as described in the special monitoring code table (H0009 is reserved)</td></tr>
<tr><td colspan="2">Special monitor select codes write in</td><td>HF3</td><td>H06/H10</td></tr>
<tr><td colspan="2">Monitor the external operation condition</td><td>H7C</td><td>H03</td><td>H1012</td><td colspan="2">H0000~H000F:<br><table><tr><th>b15~b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr><tr><td>0000 0000 0000</td><td>MRS</td><td>STR</td><td>STF</td><td>RES</td></tr></table></td></tr>
<tr><td colspan="2">Inverter reset</td><td>HFD</td><td>H06/<br>H10</td><td>H1101</td><td colspan="2">H9696: function of 00-02=2/P.997=1.<br>When communicating with the position machine, resetting the inverter will cause the inverter to be incapable of sending data back to the position machine.</td></tr>
<tr><td colspan="2" rowspan="9">Parameter delete</td><td rowspan="9">HFC</td><td rowspan="9">H06/<br>H10</td><td rowspan="3">H1104</td><td>H5A5A</td><td rowspan="9">For details, please refer to the parameter restoration status table.</td></tr>
<tr><td>H5566</td></tr>
<tr><td>H5959</td></tr>
<tr><td>H1103</td><td>H9966</td></tr>
<tr><td rowspan="3">H1106</td><td>H9696</td></tr>
<tr><td>H99AA</td></tr>
<tr><td>H9A9A</td></tr>
<tr><td>H1105</td><td>H55AA</td></tr>
<tr><td>H1102</td><td>HA5A5</td></tr>
<tr><td colspan="2">Parameter read-out</td><td>H00~H63</td><td>H03</td><td rowspan="2">P mode:<br>H0000~H0513<br><br>Parameter group mode:<br>H2710~H2D4F</td><td colspan="2" rowspan="2">1. The data range and the position of the decimal point, please refer to the parameter table..<br>2. In P mode, the Modbus address of each parameter corresponds to the hexadecimal digit of the parameter number. For example, the Modbus address of 04-26(P.138) is H008A.<br>3. In parameter group mode, the Modbus address of each parameter corresponds tothe parameter number+ the hexadecimal digit of 10000, such as the Modbus address of04-26(P.138) is 0x28BA.</td></tr>
<tr><td colspan="2">Parameter write-in</td><td>H80~HE3</td><td>H06/<br>H10</td></tr>
</table>

| Item | Shihlin protocol reference code | Modbus reference code | Modbusaddress | Data content and function description |
|---|---|---|---|---|
| Line speed feedback read-out | --- | H03 | H100A | H0000~HFDE8 |
| Line speed feedback write-in | | H06/H10 | | |
| Line speed target value read-out | --- | H03 | H100B | H0000~HFDE8 |
| Line speed target value write-in | | H06/H10 | | |
| Tension reference read-out | --- | H03 | H100C | H0000~H7530 |
| Tension reference write-in | | H06/H10 | | |
| Torque reference read-out | --- | H03 | H100D | H0000~H0FA0 (0~400.0%)<br>HF060~HFFFF(-400.0%~0) |
| Torque reference write-in | | H06/H10 | | |
| Loopback test for asynchronous serial communication | --- | H08 | H0000 (sub function code for loopback test) | The content value is arbitrary (H0000~HFFFF) |
| Operation reference write-in | HFA | H06/<br>H10 | H1001 | H0000~HFFFF<br>b8~b15: reserve.<br>b7: inverter emergency stop (MRS)<br>b6: the second function (RT)<br>b5: high speed (RH)<br>b4: medium speed (RM)<br>b3: low speed (RL)<br>b2: reverse rotation (STR)<br>b1: forward rotation (STF)<br>b0: reserve. |
| Monitor the INV real-time data | --- | H03 | H1014~H1027 | The corresponding monitoring value of each Modbus address is as follows:<br>H1014: digital input terminal input state.<br>H1015: digital input terminal output state.<br>H1016: 2-5 terminal input voltage<br>H1017: 4-5 terminal input current/voltage<br>H1018: AM-5 terminal output voltage/current<br>H1019: DC bus voltage<br>H101A: the electronic thermal accumulation rate of inverter<br>H101B: inverter output power<br>H101C: the temperature rising accumulation rate of inverter<br>H101D: the NTC temperature accumulation of inverter<br>H101E: the electronic thermal accumulation rate of motor<br>H101F: target pressure when PID control<br>H1020: feedback pressure when PID control<br>H1021: rotating speed fed back by PG<br>H1022: M2 terminal input frequency |

| Item | | Shihlin protocol reference code | Modbus reference code | Modbusaddress | Data content and function description |
|---|---|---|---|---|---|
| Monitor the INV real-time data | | --- | H03 | H1014~H1027 | H1023: reserve<br>H1024: reserve<br>H1025: output torque of inverter<br>H1026: reserve<br>H1027: EP301 Communication expansion card version number<br>H1028: power factor<br>H1029: power cumulative value |
| Page change for parameter reading and writing | Read | H7F | --- | --- | P mode:<br>H0000: P.0~P.99;<br>H0001: P.100~P.199;<br>H0002: P.200~P.299;<br>H0003: P.300~P.399;<br>H0004: P.400~P.499;<br>H0005: P.500~P.599;<br>H0006: P.600~P.699<br>H0007: P.700~P.799<br>H0008: P.800~P.899<br>H0009: P.900~P.999<br>H000A: P.1000~P.1099<br>H000B: P.1100~P.1199<br>H000C: P.1200~P.1299<br>Parameter group mode:<br>H0064: 00-00~00-99;<br>H0065: 01-00~01-99;<br>H0066: 02-00~02-99;<br>H0067: 03-00~03-99;<br>H0068: 04-00~04-99;<br>H0069: 05-00~05-99;<br>H006A: 06-00~06-99<br>H006B: 07-00~07-99<br>H006C: 08-00~08-99 |
| | Write | HFF | | | |

| Item | | | Shihlin protocol reference code | Modbus reference code | Modbusaddress | Data content and function description |
|---|---|---|---|---|---|---|
| Page change for parameter reading and writing | | Read | H7F | --- | --- | H006D: 09-00~09-99<br>H006E: 10-00~10-99<br>H006F: 11-00~11-99<br>H0070: 12-00~12-99<br>H0071: 13-00~13-99<br>H0072: 14-00~14-99<br>H0073: 15-00~15-99 |
| | | Write | HFF | | | |
| Monitoring | Frequency setup | EEPROM | H73 | H03 | H1009<br>H1002 | H0000~HFDE8(two decimal points when 00-08=0; one decimal point when non-zero) |
| | | RAM | H6D | | | |
| | Output frequency | | H6F | | H1003 | H0000~H9C40(same as above) |
| | Output current | | H70 | | H1004 | H0000~HFFFF(two decimal points) |
| | Output voltage | | H71 | | H1005 | H0000~HFFFF(two decimal points) |
| | Abnormal content | | H74 | | H1007 | H0000~HFFFF: Abnormal codes from the last two times<br>H74/H1007: Error code 1 and 2;<br>b15 b8 b7 b0<br>Error code 2 \| Error code 1<br>H75/H1008: Error code 3 and 4;<br>b15 b8 b7 b0<br>Error code 4 \| Error code 3<br>For abnormal codes, please refer to the abnormal code list in the abnormal record parameter06-40~06-43. |
| | | | H75 | | H1008 | |

◆ The table of the parameter recovery

| Data content | Parameter Poperation | Communication Parameter P (Note 1) | Table 1 (Note2) | Table 2 (Note2) | User registered parameter | Other P parameters | Error codes |
|---|---|---|---|---|---|---|---|
| H5A5A | 00-02=4(P.999=1) | o | x | x | o | o | x |
| H5566 | 00-02=5(P.999=2) | o | x | o | x | o | x |
| H5959 | 00-02=6(P.999=3) | o | x | x | x | o | x |
| H9966 | 00-02=3(P.998=1) | o | x | o | o | o | x |
| H9696 | Communication 999 1 | x | x | x | o | o | x |
| H99AA | Communication 999 2 | x | x | o | x | o | x |
| H9A9A | Communication 999 3 | x | x | x | x | o | x |
| H55AA | Communication 998 | x | x | o | o | o | x |
| HA5A5 | 00-02=1(P.996=1) | x | x | x | x | x | o |

Note: 1. Communication P parameters includes 07-02(P.32), 07-00(P.33), 07-01(P.36), 07-03(P.48)~ 07-09(P.53), 00-16(P.79), 07-10(P.153) and 07-07(P.154).

2. For the table 1 and table 2, please refer to Section 5.1.2.

◆ The table of the special monitor code

| Information | Content | Unit |
|---|---|---|
| H0000 | Monitor the digital input terminal input port state. | 注 1 |
| H0001 | Monitor the digital output terminal output port state. | 注 2 |
| H0002 | Monitor the voltage which can be input across terminal 2-5. | 0.01V |
| H0003 | Monitor the voltage/current which can be input across terminal 4-5. | 0.01A/0.01V |
| H0004 | Monitor the voltage which can be output across terminal AM-5. | 0.01V |
| H0005 | Monitor the DC bus voltage value. | 0.1V |
| H0006 | Monitor the electronic thermal accumulation rate | --- |
| H0007 | The temperature rising accumulation rate of inverter | 0.01 |
| H0008 | The inverter output power | 0.01kW |
| H0009 | Inverter NTC temperature accumulation | 0.01 |
| H000A | The electronic thermal accumulation rate of motor | --- |
| H000B | Target pressure when PID control | 0.1% |
| H000C | Feedback pressure when PID control | 0.1% |
| H000D | The rotating speed fed back by PG | 0.01Hz |
| H000E | The input frequency of terminal M2 | 0.01kHz |
| H000F | Reserve | --- |
| H0010 | Reserve | 0.01V |
| H0011 | The inverter output torque | 0.1% |
| H0012 | Reserve | 0.01V |
| H1013 | Communication expansion card version number | --- |

Note: 1. Details of the digital input terminal input port state.

| b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | RES | M2 | M1 | M0 | STR | STF |

2. Details of the digital output terminal output port state.

| b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | A17 | A16 | A15 | A14 | A13 | A12 | A11 | A10 | 0 | 0 | ABC | SO |

expanded digital output

## 5.8.2 Communication EEPROM write selection

➢ Use thisfunction if parameter settings are changed frequently.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 07-11 P.34 | Communication EEPROM write selection | 0 | 0 | Parameter values written by communication are written to the EEPROM and RAM. |
| | | | 1 | Parameter values written by communication are written to the RAM. |

Setting Communication EEPROM write selection

◆ When parameter write is performed via the RS-485 terminal, the parameters storage device can be changed from EEPROM + RAM to RAM only.

◆ When changing the parameter values frequently, set "1" in 07-11(P.34) Communication EEPROM write selection. The life of the EEPROM will be shorter if parameter write is performed frequently with the settingunchanged from "0"(EEPROM write).

Note: Turning OFF the inverter's power supply clears the modified parameter settings when 07-11(P.34) = "1 (write only to RAM)". Therefore, theparameter values at next power-ON are the values last stored in EEPROM.

## 5.8.3 Canopen protocol

➢ The relative settings for Canopen communication expanded board

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 07-15 P.800 | CANopen slave address | 0 | 0 ~ 127 | --- |
| 07-16 P.801 | CANopen speed | 0 | 0 | 1Mbps |
| | | | 1 | 500Kbps |
| | | | 2 | 250K/280KFbps |
| | | | 3 | 125Kbps |
| | | | 4 | 100Kbps |
| | | | 5 | 50Kbps |
| 07-17 P.802 | CANopen communication status | 0 | 0 | Node reset state |
| | | | 1 | Com reset state |
| | | | 2 | Boot up state |
| | | | 3 | Pre operation state |
| | | | 4 | Operation state |
| | | | 5 | Stop state |
| 07-18 P.803 | CANopen control status | 0 | 0 | Not ready for use state |
| | | | 1 | Inhibit start state |
| | | | 2 | Ready to switch on state |
| | | | 3 | Switched on state |
| | | | 5 | Enable operation state |
| | | | 7 | Quick stop active state |
| | | | 13 | Err reaction activation state |
| | | | 14 | Error state |

Setting Canopen protocol

◆ Parameters07-17 and 07-18 are for read only, which are usedto monitor the state of Canopen communication expanded board.

## 5.8.4 Communication expansion card version number

➢ To show the current software communication expansion card program version number

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 07-44 P.829 | EP301 Communication expansion card version number | read | read | To show the current software communication expansion card program version number,read only |

## 5.8.5 Ethernet communication

➢ Using EP301 communication expansion card related Settings

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 07-45 P.830 | IP configuration | 0 | 0 | IP state |
| | | | 1 | IP move |
| 07-46 P.831 | IP address 1 | 192 | 0~255 | |
| 07-47 P.832 | IP address 2 | 168 | 0~255 | |
| 07-48 P.833 | IPaddress 3 | 2 | 0~255 | |
| 07-49 P.834 | IPaddress 4 | 102 | 0~255 | |
| 07-50 P.835 | Subnet mask 1 | 255 | 0~255 | |
| 07-51 P.836 | Subnet mask 2 | 255 | 0~255 | |
| 07-52 P.837 | Subnet mask 3 | 255 | 0~255 | |
| 07-53 P.838 | Subnet mask 4 | 0 | 0~255 | |
| 07-54 P.839 | Default gateway 1 | 192 | 0~255 | |
| 07-55 P.840 | Default gateway 2 | 168 | 0~255 | |
| 07-56 P.841 | Default gateway 3 | 2 | 0~255 | |
| 07-57 P.842 | Default gateway 4 | 100 | 0~255 | |

Setting Ethernet communication Settings

◆ At 07-45 ~ 07-57 on the number of parameters, please refer to the EP301 EtherNet communication expansion card specifications.

## 5.9 PID parameter group08

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 08-00 | P.170 | PID function selection | 0: PID function non-selected<br>0X: Parameter 08-03(P.225) sets target value.<br>1X: Take the input of terminal 2-5 as target source<br>2X: Take the input of terminal 4-5 as target source<br>3X: Reserve<br>4X: Take the input of terminal M2 as target source<br>X1: Take the input of terminal 2-5 as feedback source<br>X2: Take the input of terminal 4-5 as feedback source<br>X3: Reserve | 0 | 193 |
| 08-01 | P.171 | PID feedback control method | 0: Negative feedback control.<br>1: Positive feedback control. | 0 | 193 |
| 08-02 | P.241 | Sampling period by PID | 0 ~ 60000ms | 20ms | 193 |
| 08-03 | P.225 | PID target value panel reference | 0 ~ 100.0% | 20.0% | 193 |
| 08-04 | P.172 | Proportion gain | 0.1% ~ 1000.0% | 20.0% | 193 |
| 08-05 | P.173 | Integral time | 0 ~ 60.00s | 1.00s | 193 |
| 08-06 | P.174 | Differential time | 0 ~ 10000ms | 0ms | 194 |
| 08-07 | P.175 | Abnormal deviation | 0 ~ 100.0% | 0.0% | 194 |
| 08-08 | P.176 | Exception duration time | 0 ~ 600.0s | 30.0s | 194 |
| 08-09 | P.177 | Exception handling mode | 0: Free stop<br>1: Decelerate and stop<br>2: Continue to run when the alarm goes off | 0 | 194 |
| 08-10 | P.178 | Sleep detects deviation | 0 ~ 100.0% | 0.0% | 194 |
| 08-11 | P.179 | Sleep detects duration time | 0 ~ 255.0s | 1.0s | 194 |
| 08-12 | P.180 | Revival level | 0 ~ 100.0% | 90.0% | 194 |
| 08-13 | P.181 | Outage level | 0 ~ 120.00Hz | 40.00Hz | 194 |
| 08-14 | P.182 | Integral upper limit | 0 ~ 200.0% | 100.0% | 194 |
| 08-15 | P.183 | Deceleration step length with stable pressure | 0 ~ 10.00Hz | 0.50Hz | 194 |
| 08-16 | P.221 | Reserve | --- | --- | 194 |
| 08-17 | P.222 | Reserve | --- | --- | 194 |
| 08-18 | P.223 | Reserve | --- | --- | 194 |
| 08-19 | P.224 | Reserve | --- | --- | 194 |
| 08-20 | P.641 | PID proportion Gain P2 | 0.1% ~ 1000.0% | 20.0% | 197 |
| 08-21 | P.642 | Integral time I2 | 0 ~ 60.00s | 1.00s | 197 |
| 08-22 | P.643 | Differential time D2 | 0 ~ 10000ms | 0ms | 197 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 08-23 | P.644 | Auto adjustment for PID parameters | 0:Adjust according to the feedback deviation value<br>1: Adjust according to the curling radius.<br>2: Adjust according to the operation frequency<br>3: Adjust according to the operation frequency | 0 | 197 |
| 08-24 | P.711 | PID target signal filter time | 0 ~ 650.00s | 0.00s | 198 |
| 08-25 | P.712 | PID feedback signal filter time | 0 ~ 60.00s | 0.00s | 198 |
| 08-26 | P.713 | PIDoutput signal filter time | 0 ~ 60.00s | 0.00s | 198 |
| 08-27 | P.714 | PID deviation control limit | 0 ~ 100.00% | 0.00% | 199 |
| 08-28 | P.715 | Integral separated property | 0: Integral not separated<br>1: Integral separated | 0 | 199 |
| 08-29 | P.716 | Integral separated point | 0 ~ 100.00% | 50.00% | 199 |
| 08-30 | P.717 | PID differential limit | 0 ~ 100.00% | 0.10% | 199 |
| 08-31 | P.718 | PID output in forward directiondeviation limit | 0 ~ 100.00% | 100.0% | 200 |
| 08-32 | P.719 | PID output in reverse direction deviation limit | 0 ~ 100.00% | 100.0% | 200 |
| 08-33 | P.720 | PID parameter switchover operation selection | 0: No PID parameter switchover.<br>1: PID parameter switchover based ondeviation. | 0 | 200 |
| 08-34 | P.721 | PID parameter switchover deviation lower limit | 0 ~ 100.00% | 20.00% | 200 |
| 08-35 | P.722 | PID parameter switchover deviation upper limit | 0 ~ 100.00% | 80.00% | 200 |
| 08-36 | P.723 | PID wire-break operation selection1 | 0: When PID wire-break, select to no need to operate to the upper limit value.<br>1: When PID wire-break, select to need to operate to the upper limit value. | 1 | 201 |
| 08-39 | P.726 | PID operation at stop | 0: No PID operation at stop.<br>1: PID Stop operation | 0 | 201 |
| 08-40 | P.727 | PID enable reverse run operation | 0: PID reverse run is not allowed.<br>1: PID reverse run is allowed. | 0 | 201 |
| 08-41 | P.728 | PID in reverse direction integral limit | 0 ~ 100.0% | 0.0% | 201 |
| 08-42 | P.729 | PID minimum output frequency | 0 ~ 10.00Hz | 0.00Hz | 201 |

## 5.9.1 PID function selection

- Process control such as flow rate, air volume or pressure are possible on the inverter.A feedback system can be configured and PID control can be performed using the digital input signal or parametersetting value as the set point, and the digital input signal as the feedback value.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-00 P.170 | PID function selection | 0 | 0 | PID function non-selected |
| | | | 0x | Parameter 08-03(P.225) sets target value. |
| | | | 1x | Take the input of terminal 2-5 as target source |
| | | | 2x | Take the input of terminal 4-5 as target source |
| | | | 3x | Reserve |
| | | | 4x | Take the input of terminal M2 as target source |
| | | | x1 | Take the input of terminal 2-5 as feedback source |
| | | | x2 | Take the input of terminal 4-5 as feedback source |
| | | | x3 | Reserve |
| 08-01 P.171 | PID feedback control method | 0 | 0 | Negative feedback control. |
| | | | 1 | Positive feedback control. |

Setting PID function selection

- During the operation of PID control, the frequency displayed on the screen is the output frequency of the inverter.
- For input signal filtering of terminal 2-5 and terminal 4-5, please refer to the instructions for02-10.

Note: When selecting the target source and feedback source, please pay attention to the setting of 08-00and 02-00~02-01, the terminals' priority are 2-5 > 4-5.

## 5.9.2 PID parameter group 1

- Auto-agjusting of process control can be easily performed by user via setting PID parameter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-02 P.241 | Sampling period by PID | 20ms | 0~6000ms | The parameter is the sampling period for feedback signal. The adjuster computes once every sampling period. The longer the sampling period, the slower the response. |
| 08-03 P.225 | PID target value panel reference | 20% | 0~100% | The target value is set by 08-03(P.225) when the ten-digit of 08-00 (P.170) value is 0, and the single-digit is not 0. |
| 08-04 P.172 | Proportion gain | 20.0% | 0.1% ~ 1000.0% | This gain determines the proportion controller's impact on feedback deviation. The greater the gain, the faster the impact. Yet a gain that is too big will cause vibration. |
| 08-05 P.173 | Integral time | 1.00s | 0 ~ 60.00s | This parameter is use to set integral controller's integral time. When the integral gain is too big, the integral effect will be too weak to eliminate steady deviation. When the integral gain is too small, the system vibration frequency will increase, and therefore the system may be unstable. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-06 P.174 | Differential time | 0ms | 0 ~ 10000ms | This gain determines deviation controller's impact on the amount of change of the deviation. Appropriate deviation time can reduce the overshooting between the proportion controller and the integral controller. Yet when the deviation time is too large, system vibration may be induced. |
| 08-07 P.175 | Abnormal deviation | 0.0% | 0 ~ 100.0% | --- |
| 08-08 P.176 | Exception duration time | 30.0s | 0 ~ 600.0s | --- |
| 08-09 P.177 | Exception handling mode | 0 | 0 | Free stop |
| | | | 1 | Decelerate and stop |
| | | | 2 | Continue to run when the alarm goes off |
| 08-10 P.178 | Sleep detects deviation | 0.0% | 0 ~ 100.0% | --- |
| 08-11 P.179 | Sleep detects duration time | 1.0s | 0 ~ 255.0s | --- |
| 08-12 P.180 | Revival level | 90.0% | 0 ~ 100.0% | --- |
| 08-13 P.181 | Outage level | 40.00Hz | 0 ~ 120.00Hz | --- |
| 08-14 P.182 | Integral upper limit | 100.0% | 0 ~ 200.0% | When the deviation value accumulated with the integral time, an upper limit for deviation accumulation should be set. For example, the upper integral limit of frequency is equal to 01-03 * 08-14. |
| 08-15 P.183 | Deceleration step length with stable pressure | 0.50Hz | 0 ~ 10.00Hz | When the feedback pressure satisfies the deviation value for stopping the machine and the set time (in seconds) for stopping the machine for detection is reached, the inverter will take the 08-15 (P.183) step to reduce the frequency. |
| 08-16 P.221 | Reserve | --- | --- | --- |
| 08-17 P.222 | Reserve | --- | --- | --- |
| 08-18 P.223 | Reserve | --- | --- | --- |
| 08-19 P.224 | Reserve | --- | --- | --- |

Setting PID parameter group 1

◆ Simulation of the feedback signal correction :

Please refer to 5.3.5 ~ 5.3.8 analog input selection and processing parts.

1. Users do not need to feedback signal correction

Example 1：The user does not answer the feedback signal

First set proportion parameter 02-14 (P. 194) = 0%, 02-15 (P. 195) = 100%;

02-12 set voltage parameters (P. 192) = 0, 02-13 (P. 193) = 7.

Example 2：Users choose 4-5 terminals to 0 to 20 ma feedback signals

First set proportion parameter 02-27 (P. 196) = 0%, 02-28 (P. 197) = 100%;

To set the current parameter 02-25 (P. 198) = 0, 02-26 (P. 199) = 2.

2.Users need to feedback signal correction

Example 3：User feedback range 0~10kg（2 to 5 analog input）

Adjust the feedback signal to 0 kg, write parameters 02-14 (P. 194) = 0%

Adjust the feedback signal to 10 kg, write parameters 02-15 (P. 195) = 100%

Note：1. If the user wants to by adjusting the size of the analog input corresponding to a certain proportion relations, need to adjust good analog input first, then set the corresponding proportion parameter, this time without setting voltage parameter, frequency converter will calculate itself.If the user to skip regulating the relationship between analog input to set the proportion will be expected to set a good first proportion parameters, voltage parameter Settings again.

2. Users such as case 3 that case, must be the actual feedback signal.

3 In the process of PID correction, the correction value must be the upper and lower limits of the selected signal.

4. If you use a 4-5 terminals for the target source or source of feedback, please be sure to first set 02-20 value and collocation of SW3 switch, choose 4-5 terminal voltage/current signal is, to other actions.

◆ The instruction for the target pressure given by external analog terminal:

1. When the target value is set by terminal2-5(02-00 = 1X)

   When 02-08 = 0, the given range is 0~5V corresponding to 0~100%;

   When 02-08 = 1, the given range is 0~10V corresponding to 0~100%.

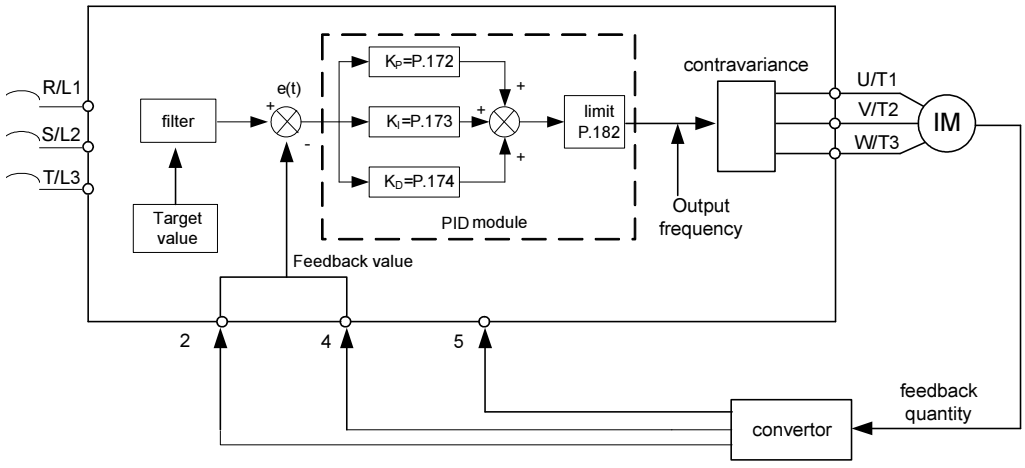
2. When the target value is set by terminal 4-5(02-01 = 2X)

   The given range is 4~20mA corresponding to 0~100%.

   Example: Set 08-00 = 1, 08-01 = 0.

   It indicates that the PID target value is given by the current of terminal4-5(4~20mA).

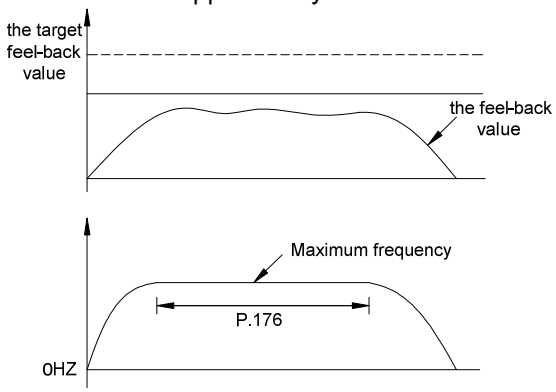
   If 8mA is given by the user, the corresponding given proportion is (8-4)/ (20-4) * 100.0= 25.0




◆ When the output frequency reaches the value of 01-03 * 08-14, the feedback value will be less than the product of the target value multiplying 08-07. In addition, when the duration lasts more than the set value of 08-08, PID will be considered as abnormal and handled according to the set value of 08-09.

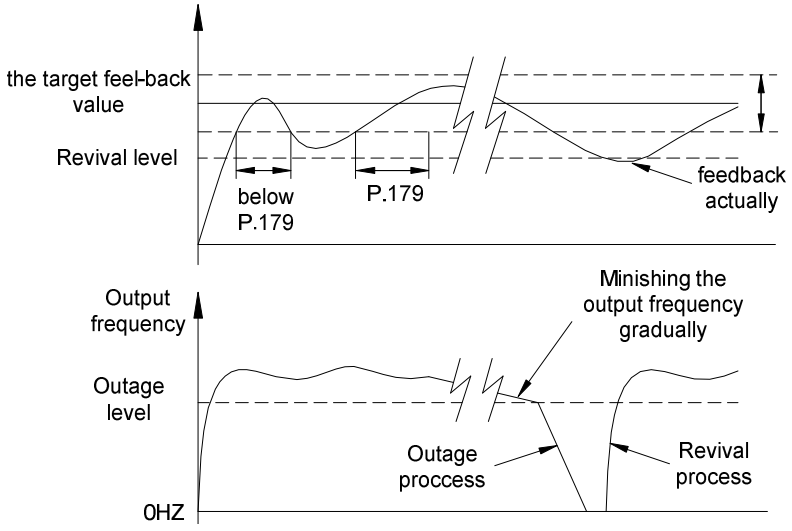
For example, when 08-07=60%, 08-08=30s, 08-09=0,01-03=50Hz and 08-14= 100%, the output frequency

reaches 50Hz, and the feedback value is lower than 60% of the target feedback value for 30 seconds continuously, alarm will be display and the inverter will be stopped freely.



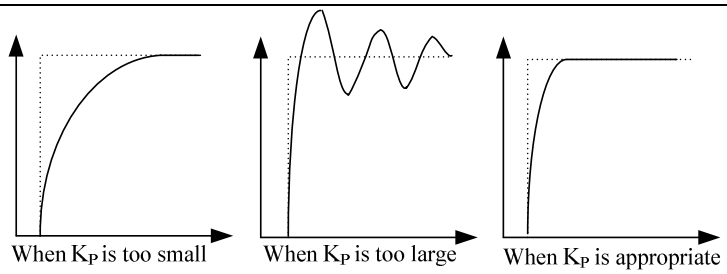

◆ If 08-10 is set to 0, then the set values of 08-11, 08-12, 08-13 and 08-15 are invalid. If the setting value of 08-10 is nonzero, than PID's sleep function will be activated. When the absolute value of the deviation between the feedback value and the target feedback value is less than the sleep detected deviation value for the duration of 08-11's sleep detection time, the inverter will steadily reduce the output frequency. Once the output frequency of the inverter is less than the machine stop level of 08-13, the inverter will decelerate and stop. When the feedback value is lower than the wake-up level, the output frequency of the inverter will again be controlled by PID.

For example, if 08-10=5%, 08-11=1.0s, 08-12=90%, 08-13=40Hz, and 08-15=0.5Hz, and when the feedback value is at a stable zone, i.e., larger than 95% of the target feedback value but less than 105% of the target feedback value, the inverter at the stable zone will reduce the output frequency by 0.5Hz/second. When the output frequency of the inverter is less than 40Hz, the inverter will directly decelerate and stop. When the feedback value lower than 90% of the target feedback value, the inverter will wake up and the output frequency will again be controlled by PID.

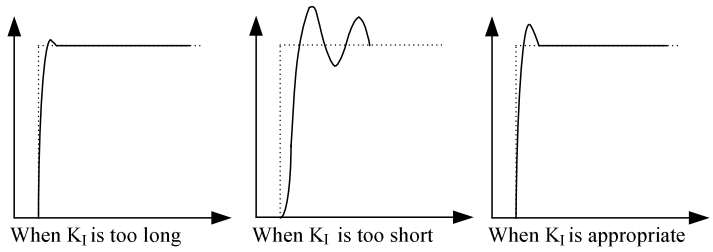



◆ PID gain simple setting:

1. After changing target, response is slow ---Increase P-gain ($K_P$ =08-04)
   response is quick but unstable ---Decrease P-gain ($K_P$ =08-04)




2. Target and feedback do not become equal ---Decrease Integration time ($K_I$ =08-05)
become equal after unstable vibration ---Increase Integration time ($K_I$ =08-05)




◆ Even after increasing $K_P$, response is still slow ---Increase D-gain ($K_D$ =08-06)
It is still unstable ---Decrease D-gain ($K_D$ =08-06)

Note: 1. When 08-09=2, the panel has no alarm display but the multi-function output terminal has alarm detection. To turn off the alarm, reset 00-02 or turn down the power.
2. When selecting the target source and feedback source, please pay attention to the setting of 08-00 and 02-00~02-02, the terminals' priority are 2-5>4-5.

## 5.9.3 PID parameter group2

➢ This group of parameters is only related to the close loop speed mode.

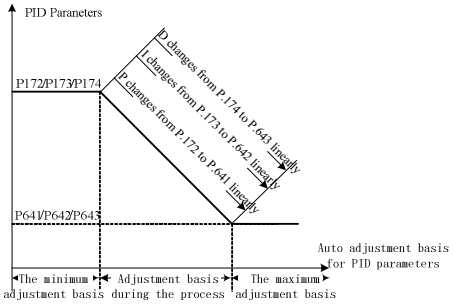
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-20<br>P.641 | PID proportion Gain P2 | 20.0% | 0.1% ~ 1000.0% | This gain determines the proportion controller's impact on feedback deviation. The greater the gain, the faster the impact. Yet a gain that is too big will cause vibration. |
| 08-21<br>P.642 | Integral time I2 | 1.00s | 0 ~ 60.00s | This parameter is use to set integral controller's integral time. When the integral gain is too big, the integral effect will be too weak to eliminate steady deviation. When the integral gain is too small, the system vibration frequency will increase, and therefore the system may be unstable. |
| 08-22<br>P.643 | Differential time D2 | 0ms | 0 ~ 10000ms | This gain determines differential controller's impact on the amount of change of the deviation. Appropriate differential time can reduce the overshooting between the proportion controller and the integral controller. Yet when thedifferential time is too large, system vibration may be induced. |
| 08-23<br>P.644 | Auto adjustment for PID parameters | 0 | 0 | Adjust according to the feedback deviation value |
| | | | 1 | Adjust according to the curling radius. |
| | | | 2 | Adjust according to the operation frequency. |
| | | | 3 | Adjust according to the line speed. |

Setting PID parameter group2

- 08-23 is the auto adjustment basis for PID parameters..

1. When 08-23=0, he adjustment is according to the feedback deviation value.IOnly the first group of PID parameters is used, and the second group is inactive.
2. When08-23=1, the adjustment is according to the curling radius. The first group of PID parameters is used for empty roll, while the second group of PID parameters is used for full roll. The PID parameters change continuously during the process.
3. When 08-23=2, the adjustment is according to the operation frequency. This first group of PID parameters is used upon zero speed, while the second group of parameters is used upon maximum frequency. The PID parameters change continuously during the process.
4. When 08-23=3, the adjustment is according to the line speed. This first group of PID parameters is used upon zero speed, while the second group of parameters is used upon maximum line speed. The PID parameters change continuously during the process.

- The relationship between PID auto adjustment basis and PID parameters is shown as following diagram:




## 5.9.4 PID filter setting

- Filter function setting can help to reduce interference on the systemyet slow the response.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-24 P.711 | PID target signal filter time | 0.00s | 0 ~ 650.00s | Set PID targetsignal low-pass filter time constant |
| 08-25 P.712 | PID feedback signal filter time | 0.00s | 0 ~ 60.00s | Set PID feedbacksignal low-pass filter time constant |
| 08-26 P.713 | PIDoutput signal filter time | 0.00s | 0 ~ 60.00s | Set PID outputsignal low-pass filter time constant |

Setting PID filter time constant

- 08-24is used to set PID target signal filter timeconstant, which can reduce the impact caused by PID target signal sudden setting change on the system.
- 08-25is used to setPID feedback signal filter timeconstant, which can reduce the impact caused byfeedback signal, but will slow the response of the process closed-loop system.
- 08-26is used to set PIDoutput signal filter timeconstant, which can help to weaken sudden change of the PID output frequency, but will slow the response of the process closed-loop system.

## 5.9.5 PID deviation control limit

- If the deviation between PID target and PID feedback is smaller than the value of08-27, PID output frequency keeps unchanged.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-27<br>P.714 | PID deviation control limit | 0.00% | 0 ~ 100.00% | If the deviation between PID target and PID feedback is smaller than the value of 08-27, PID control stops. |

Setting PID deviation limit

- 08-27 is used to set PID deviation control limit, if the deviation between PID target and PID feedback is smaller than the value of 08-27, PID control stops. The small deviation between PID target and PID feedback will make the output frequency stabilize, effective for some closed-loop control applications.

## 5.9.6 PID integral property

- PIDIntegral separated function can helpto reduce the PID overshoot effectively.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-28<br>P.715 | Integral separated property | 0 | Integral not separated | Set the integral function is valid |
| | | 1 | Integral separated | |
| 08-29<br>P.716 | Integral separated point | 50.00% | 0 ~ 100.00% | Set the deviationbetween target and feedback in integral separated function. |

Setting PID integral separated function

- When 08-28 is set to 1, integral separated function is valid, when the deviation between PID target and PID feedback is larger than the value of 08-29, only PID proportion and differential operate, which canhelp to reduce the PID overshoot.

## 5.9.7 PID differential limit

- In PID control, differential may cause system oscillation, generally limit differential to a small range.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-30<br>P.717 | PID differential limit | 0.10% | 0 ~ 100.00% | Set PID differential limit |

Setting PID differential limit

- In PID control, the differential operation is sensitive and may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.08-27is used to set the PID differential output range.

## 5.9.8 PID outputdeviation limit

- PID output deviation limit setting can controlthe change of PID outputs and stabilize the running of the inverter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-31 P.718 | PID output in forward directiondeviation limit | 100.00% | 0 ~ 100.00% | Set the deviation limit calculated by two PID outputs |
| 08-32 P.719 | PID output in reverse direction deviation limit | 100.00% | 0 ~ 100.00% | |

Setting PID output deviation limit

- This function is used to limit the deviation between two PID outputs to suppress the rapid change of PID output and stabilize the running of the inverter.

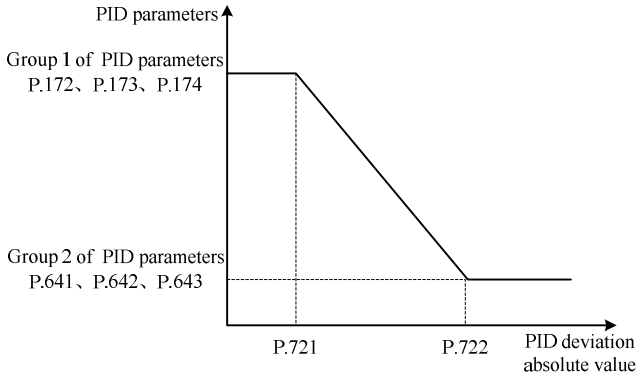
## 5.9.9 PID parameter switchover

- Two groups of PID parametersare required when one group of PID parameters cannot satisfy the requirement of the whole running process.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-33 P.720 | PID parameter switchover operation selection | 0 | 0 | No swithcover |
| | | | 1 | According to the deviation switch PID |
| 08-34 P.721 | PID parameter switchover deviation lower limit | 20.00% | 0 ~ 100.00% | When deviationis smaller than the value of 08-34, Group 1 of PID parameters operate.<br>When deviationis larger than the value of 08-35, Group 2 of PID parameters operate.<br>When the deviation is between 08-35and 08-34, PID parameters linear change. |
| 08-35 P.722 | PID parameter switchover deviation upper limit | 80.00% | 0 ~ 100.00% | |

Setting PID parameter switchover

- In some applications, PID parameters switchover is required when one group of PID parameters cannot satisfy the requirement of the whole running process. Two groups of PID parameters can switch automaticaccording to deviation, as the figure shows below:




## 5.9.10 PIDmalfunction selection

- When in PIDmalfunction, 08-39 and 08-40 will show different operation to apply for different applications.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-36<br>P.723 | PID wire-break operation selection1 | 1 | 0 ~ 1 | 0: When PID wire-break, select to no need to operate to the upper limit value.<br>1: When PID wire-break, select to need to operate to the upper limit value. |
| 08-39<br>P.726 | PID operation at stop | 0 | 0: PID operation at stop<br>1: No PID operation at stop | It is used to select whether to operate PID in the state of stop. |

Setting PID malfunction selection

- 08-36 is used to select PID wire-breakoperation. In general, once detecting PID loss, the inverter will output alarm.
- 08-39 is used to select PID operation at stop. In general, it will operate PID in the state of stop.

## 5.9.11 PID reverse run operation selection

- It is used to set whether reverse run is allowed when PID calculation is negative

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 08-40<br>P.727 | PID enable reverse run operation | 1 | 0: PID not allow the reverse<br>1: PID Allow the reversal | Set PID function whether inverter reverse run is allowed |
| 08-41<br>P.728 | PID in reverse direction integral limit | 0.0% | 0 ~ 100.0% | Used to set PID in reverse direction integral limit. Set it to 0 when reverse run operation is not allowed. |
| 08-42<br>P.729 | PID minimum output frequency | 0.00Hz | 0 ~ 10.00Hz | Used to set the minimum value of PID output. |

Setting PID reverse run operation selection

- When PID reverse run is allowed, 08-41 should be set to a value larger than 0, generally it is set to 100.0%. When PIDreverse run is not allowed, 08-41 is set to 0.
- 08-42 is used to PIDcalculation minimum output frequency, when the output is smaller than the value, the inverter output stops.

# 5.10 PG feedback parameter group 09

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 09-00 | P.349 | PG type selection | 0: ABZ<br>1: ABZ (Synchronous motor decicated)<br>2: Resolver 1x Synchronous motor standard encoder<br>3: ABZ/UVW Synchronous motor standard encoder | 0 | 204 |
| 09-01 | P.350 | Number 1 of the encoder pulses | 0 ~ 20000 | 1024 | 204 |
| 09-02 | P.351 | Encoder input mode setup 1 | 0: No function<br>1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.<br>2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.<br>3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.<br>4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation. | 0 | 204 |
| 09-03 | P.352 | PG abnormality detection time | 0 ~ 100.0s | 1.0s | 206 |
| 09-04 | P.353 | Over-speed detection frequency | 0 ~ 30.00Hz | 4.00Hz | 206 |
| 09-05 | P.354 | Over-speed detection time | 0 ~ 100.0s | 1.0s | 206 |
| 09-06 | P.355 | Number 2 of the encoder pulses | 0 ~ 20000 | 2500 | 206 |
| 09-07 | P.356 | Encoder input mode 2 | 0:No function<br>1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.<br>2:Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.<br>3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.<br>4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation. | 0 | 206 |
| 09-08 | P.357 | Dividing frequency output setting | 1 ~ 255 | 1 | 207 |
| 09-09 | P.358 | Dividing frequency filter coefficient | 0 ~ 255 | 0 | 207 |
| 09-10 | P.359 | Electronic gear ratio | 0 ~ 300.00 | 1.00 | 208 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 09-11 | P.360 | Prevent reverse rotation detection pulse number | 0 ~ 65535 | 0 | 208 |
| 09-12 | P.361 | Rse reverotation detection number | 0 ~ 65535 | 0 | 208 |
| 09-13 | P.124 | Expansion card version | Read | Read | 208 |
| 09-14 | P.363 | Phase Z adjust margin | 0.0°Do not adjust<br>0.1°~360.0°：Phase Z impulse adjust | 15.0° | 209 |
| 09-15 | P.364 | Phase Z DV1/DV2 alarm-enabled | 0：Phase Z DV1/DV2 alarm is not valid<br>1：Phase Z DV1/DV2 alarm is valid | 1 | 209 |
| 09-16 | P.386 | PG302 Hardware break line detection | 0：Break line detection is invalid<br>1：Break line detection is effective | 1 | 206 |

## 5.10.1 PG type selection

- PG is short for Pulse Generator.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-00 P.349 | PG type selection | 0 | 0 | 0: ABZ |
| | | | 1 | 1: ABZ (Synchronous motor decicated) |
| | | | 2 | 2: Resolver 1x Synchronous motor standard Encoder |
| | | | 3 | 3: ABZ/UVW Synchronous motor standard Encoder |

Setting PG type selection

- Please set the the value of 09-00(P.349) properly according to the type of motor and PG board.
- PM motor with ordinary ABZ photoelectric encoder, should set up the 09-00 (P. 349) = 0, frequency converter based on 11-08 (P. 328) set the choose pull in way or the high frequency pulse vibration mode for PM motor rotor initial magnetic pole position to start the PM motor.
- PM motor with province line UVW photoelectric encoder, should set up the 09-00 (P. 349) = 1, the encoder will be on electricity for the first time, a PM motor rotor magnetic pole position information, start PM motor frequency converter according to the initial magnetic pole position, if there are different P of the frequency converter, inverter electrical action again, be sure to do otherwise PM motor drive.
- PM motors with rotating transformer, should set the 09-00 (P. 349) = 2, the inverter will each time on electrical or reset, read the PM motor rotor magnetic pole position information, frequency converter according to the initial magnetic pole position to start the PM motor.

## 5.10.2 PG1 parameter

- It is used to select the input mode of PG1 encoder.

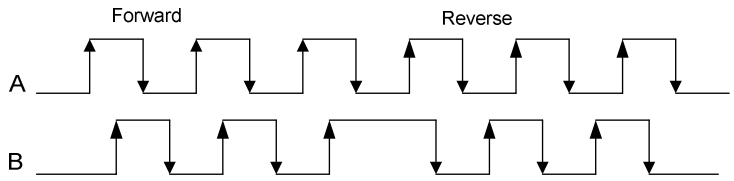
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-01 P.350 | Number 1 of the encoder pulses | 1024 | 0 ~ 20000 | --- |
| 09-02 P.351 | Encoder input mode setup 1 | 0 | 0 | No function |
| | | | 1 | Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation. |
| | | | 2 | Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation. |
| | | | 3 | Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation. |
| | | | 4 | Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation. |

Setting PG1 parameter

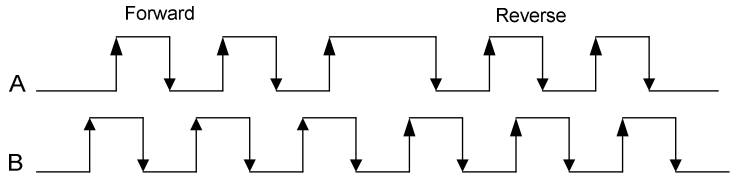
- 09-01 and 09-02 are used to set the encoder signal which connects to the A1/B1 interface on PG board. When the closed loop controls, the encoder signal for feedback can only be connected to the A1/B1 on PG board.09-01is applied for setting up the number of pulses to be generated by the encoder per revolution of the motor. That is, the number of pulses generated by one cycle of Phase A/Phase B.
- 09-02 is applied for setting up the encoder's input mode. The following encoder input modes are used as some examples:

0: No function.

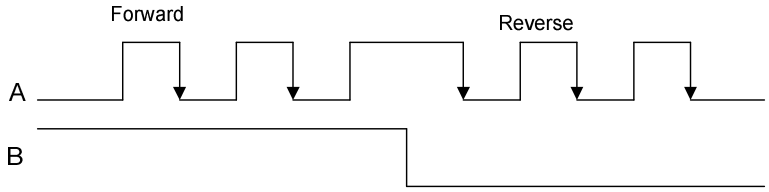
1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.



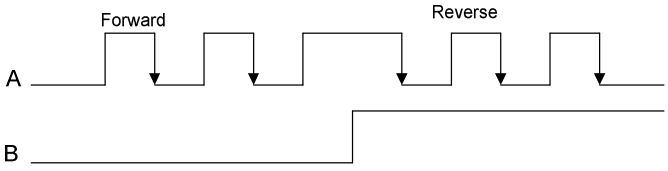

2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.




3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.




4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation.




Note: 1. If closed-loop control is selected but 09-02=0, then the inverter will display alarm PG1 and stop the operation.
2. PG card does not work with encoder wiring wrong or encoder, shows different p PG and stop working.
3. When 00-21=1, execute the IM motor V/F closed-loop control; when 00-21=4, execute the IM motor closed-loop vector control. When 00-21=5, execute the PM motor closed-loop vector control.
4. When 10-03=1, zero-speed operation is executed under the closed-loop control; DC voltage brake is executed under the V/F closed-loop control.

## 5.10.3 PG abnormality detection

- It is the detection standard when the abnormality occurrs in PG feedback control.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-03 P.352 | PG abnormality detection time | 1.0s | 0 ~ 100.0s | PG wire-breakdetection time setting |
| 09-04 P.353 | Over-speed detection frequency | 4.00Hz | 0 ~ 30.00Hz | Motor over-speed detectionfrequencythreshold setting |
| 09-05 P.354 | Over-speed detection time | 1.0s | 0 ~ 100.0s | Motor over-speed detection time setting |
| 09-16 P.386 | PG302 Hard ware break line detection | 1 | 0 | Break line detection is invalid |
| | | | 1 | Break line detection is effective |

Setting PG abnormality detection

- When carrying out PG feedback control, if the detected frequency is 0, and with duration longer than the time set by 09-03, and then the PG card's feedback signal is abnormal. The inverter will display alarm PG2 and stop the operation. If PG signal abnormal (zero speed) detection time 09-03 is set to 0, then there is no PG card feedback signal abnormal function, i.e., no alarm PG2.
- When carrying out PG feedback control, if the difference between the detected frequency and the output frequency exceeds 09-04, and with duration longer than the set time of 09-05, then the speed deviation is too big. The inverter will display alarm PG3 and stop the operation. If PG over-speed detection time 09-05 is set to 0, then alarm PG3 function is not available.

## 5.10.4 PG2 parameter

- It is used to select the input mode of PG2 encoder.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-06 P.355 | Number 2 of the encoder pulses | 2500 | 0 ~ 20000 | It is used to set the encoder signal which connects to the A2/B2 interface on PG03. |
| 09-07 P.356 | Encoder input mode 2 | 0 | 0 | No function |
| | | | 1 | Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation. |
| | | | 2 | Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation. |
| | | | 3 | Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation. |
| | | | 4 | Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation. |

Setting PG2 parameter

- When using the PG card, 09-06 is applied for setting up the number of pulses to be generated by the encoder per

revolution of the motor. That is, the number of pulses generated by one cycle of Phase A/Phase B.

- Parameter 09-07is applied for setting up the encoder's input mode.For the encoder's input mode, please refer to parameter 09-02.
- In speed mode, when 09-07 is not set to 0, the frequency command is the pulse input of A2/B2(target frequency(0.01Hz)=pulse frequency(Hz) /09-06*09-10); After the inverter starts, the actual rotation direction of the motor is determined by the value of 09-07, forward/reverse command and A2/B2 phases.
- In position mode, when 09-07 is not set to 0, the position command is the pulse input of A2/B2(target position=A2B2 pulse number*09-10);After the inverter starts, the actual rotation direction of the motor is determined by the value of 09-07, forward/reverse command and A2/B2 phases.
- When frequency command or position command is from the pulse input of A2/B2, the actual rotation direction of the motor is as the figure below:

| Rotation command | 09-07 (P.356) | A2B2 pulse train | Actual rotation direction of the motor |
|---|---|---|---|
| FWD | 1、3 | A2ahead ofB2 | Forward |
| | | B2ahead ofA2 | Reverse |
| | 2、4 | A2ahead ofB2 | Reverse |
| | | B2ahead ofA2 | Forward |
| REV | 1、3 | A2ahead ofB2 | Reverse |
| | | B2ahead ofA2 | Forward |
| | 2、4 | A2ahead ofB2 | Forward |
| | | B2ahead ofA2 | Reverse |

## 5.10.5 Dividing frequency output function

- The multiple setting for PG board feedback and output.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-08 P.357 | Dividing frequency output setting | 1 | 1 ~ 255 | The multiple setting for PGcardfeedback and output |
| 09-09 P.358 | Dividing frequency filter coefficient | 0 | 0 ~ 255 | The setting of PGcard dividing frequency filter coefficient |

Setting Dividing frequency output function

- 09-08is the multiple setting for the feedback and output of PG card. If the feedback is 1024PPR and 09-08 is set to 2, the output of PG OUT (pulse output) on PG card is 512PPR.

## 5.10.6 Electronic gear ratio

- Electronic gear ratio setting for the pulse input of A2/B2 of PG301 card.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-10 P.359 | Electronic gear ratio | 1.00 | 0 ~ 300.00 | --- |

Setting Electronic gear ratio

◆ For the usage of 09-10, please refer to 09-07.

## 5.10.7 Reverse rotation detection

➢ The relative settings for PM motor prevent reverse rotation

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-11 P.360 | Prevent reverse rotation detection pulse number | 0 | 0 ~ 65535 | PM motor prevent reverse rotation detection pulse number setting. |
| 09-12 P.361 | Reverse rotation detection number | 0 | 0 ~ 65535 | PM motor reverse rotation detection number setting. |

Setting Reverse rotation detection

◆ 09-11 is used to set prevent reverse rotation detection pulse number. When the motor rotates continuously for the pulse number of 09-11 at the opposite direction of the speed command, it will output prevent reverse rotation detection alarm dv4.Set 09-11 to 0 for applications where the direction of the load is the opposite of the speed command, which will cancel prevent reverse rotation detection alarm. It is valid only in PM motor close-loop vector control mode.

◆ 09-12is used to set reverse rotation detectionnumber. When detecting continuously for the number of 09-12 that the direction of acceleration is opposite to the speed command, it will output reverse rotation detection alarm dv3. When 09-12=0, it will cancel reverse rotation detection alarm.It is valid only in PM motor close-loop vector control mode.

## 5.10.8 Expansion card version information

➢ It is used to display the current firmware version or type of the inverter/expansion card.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-13 P.124 | Expansion card version | Read | Read | It is used to display the current firmware version or type of the inverter/Expansion card which is readable only. |

## 5.10.9 PG card phase Z adjust degrees

➢ PhaseZadjusting caneliminate the cumulative error of AB phase

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-14 P.363 | PhaseZadjust degrees | 15.0° | 0.0° | Don't adjust |
| | | | 0.1°~360.0° | PhaseZ pulse adjust |

Setting Z phase adjust degrees

- Judge pulses deviation value of AB phase between two phasesZ. Theoretically, the deviation value is 09-01（P.350）（or 4*09-01（P.350））,Convert Angle is 360° mechanical point of view. When the deviation value decreasing the 09-01 (P. 350) (or 4 * 09-01 (P. 350) is less than 9-14 (P. 363) and the deviation value is greater than the 09-04 (P. 363), which can adjust the phase Z，or can not.
- When the signal of phase Z is destroyed by the external,please the 09-14（P.363）set 0.

Note: It is valid,only with the VC model of PM motro and the place medel of IM motro.

## 5.10.10 PG card phase ZDV1/DV2 alarm-enabled

- Select phaseZ DV1,DV2 alarm is or isn't valid

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 09-15 P.364 | PhaseZDV1/DV2 alarm enable | 1 | 0 | PhaseZDV1/DV2 alarm enable is not valid |
| | | | 1 | PhaseZDV1/DV2 alarm enable is valid |

Setting PhaseZDV1/DV2 alarm enable

- DV1 is phaseZ pulse lose alarm，DV2 is phaseZ noise detectin alarm, When 05-15（P.364）is 0,can cancel DV1，DV2 alarm.

Note:It is valid only 00-21（P.300）=5

# 5.11 Application parameter group 10

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 10-00 | P.10 | DC injection brake operation frequency | 0 ~ 120.00Hz | 3.00Hz | 215 |
| 10-01 | P.11 | DC injection brake operation time | 0 ~ 60.0s | 0.5s | 215 |
| 10-02 | P.12 | DC injection brake operation voltage | 0 ~ 30.0%: 7.5K and types below | 4.0% | 215 |
| | | | 0 ~ 30.0%: 11K ~ 22K types | 2.0% | |
| 10-03 | P.151 | Zero-speed control function selection | 0: There is no output at zero-speed. | 0 | 215 |
| | | | 1: The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode. | | |
| | | | 2: The zero-servo running is carried out in close-loop vector mode. | | |
| 10-04 | P.152 | Voltage at zero-speed control | 0 ~ 30.0%: 7.5K and types below | 4.0% | 216 |
| | | | 0 ~ 30.0%: Types from 11K to 22K | 2.0% | |
| 10-05 | P.242 | DC injection brake function before start | 0: DC injection brake function is not available before starting. | 0 | 216 |
| | | | 1: DC brake injection function is selected before starting. | | |
| 10-06 | P.243 | DC injection brake time before start | 0 ~ 60.0s | 0.5s | 216 |
| 10-07 | P.244 | DC injection brake voltage before start | 0 ~ 30.0%: 7.5K (included) and types below | 4.0% | 216 |
| | | | 0 ~ 30.0%: 11K ~ 22K types | 2.0% | |
| 10-08 | P.150 | Restart mode selection | XX0: No frequency search. | 0 | 217 |
| | | | XX1: Direct frequency search | | |
| | | | XX2: Decrease voltage mode | | |
| | | | X0X: Power on once. | | |
| | | | X1X: Start each time. | | |
| | | | X2X: Only instantaneous stop and restart | | |
| | | | 0XX: No rotationdirection detection. | | |
| | | | 1XX: Rotation direction detection. | | |
| | | | 2XX:00-15(P.78)=0, rotation direction detection ; 00-15(P.78)=1/2, no rotation direction detection. | | |
| 10-09 | P.57 | Restart coasting time | 0 ~ 30.0s | 99999 | 217 |
| | | | 99999: No restart function. | | |
| 10-10 | P.58 | Restart cushion time | 0 ~ 60.0s: 7.5K (included)and types below. | 5.0s | 217 |
| | | | 0 ~ 60.0s: 11K ~ 22K types | 10.0s | |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 10-11 | P.61 | Remote setting functionselection | 0: No remote setting function.<br>1: Remote setting function, frequency setup storage is available.<br>2: Remote setting function, frequency setup storage is not available.<br>3: Remote setting function, frequency setup storage is notavailable,the remote setting frequency is cleared by STF/STR “turn off”. | 0 | 219 |
| 10-12 | P.65 | Retry selection | 0: Retry is invalid.<br>1: Over-voltageoccurs, the inverter will perform the retry function.<br>2: Over-currentoccurs,the inverter will perform the retry function.<br>3: Over-voltage or over-currentoccurs, the inverter will perform the retry function.<br>4: All the alarms have the retry function. | 0 | 221 |
| 10-13 | P.67 | Number of retries at alarm occurrence | 0: Retry is invalid.<br>1 ~ 10: The setting value of 10-13(P.67) isexceeded, the inverter will not perform the retry function. | 0 | 221 |
| 10-14 | P.68 | Retry waiting time | 0 ~ 360.0s | 1.0s | 221 |
| 10-15 | P.69 | Retry accumulation time at alarm | Read | 0 | 221 |
| 10-16 | P.119 | The dead time of positive and reverse rotation | 0 ~ 3000.0s | 0.0s | 222 |
| 10-17 | P.159 | Energy-saving control function | 0: Normal running mode.<br>1: Energy-saving running mode. | 0 | 222 |
| 10-18 | P.229 | Dwell function selection | 0: None.<br>1: Backlash compensation function.<br>2: Acceleration and deceleration interrupt waiting function. | 0 | 223 |
| 10-19 | P.230 | Dwellfrequency at acceleration | 0 ~ 650.00Hz | 1.00Hz | 223 |
| 10-20 | P.231 | Dwelltime at acceleration | 0 ~ 360.0s | 0.5s | 223 |
| 10-21 | P.232 | Dwellfrequency at deceleration | 0 ~ 650.00Hz | 1.00Hz | 223 |
| 10-22 | P.233 | Dwelltime at deceleration | 0 ~ 360.0s | 0.5s | 223 |
| 10-23 | P.234 | Triangular wave function selection | 0: None.<br>1: External TRIis turned on,triangular wave function will be valid.<br>2: The triangular wave function is effective at any given time. | 0 | 224 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 10-24 | P.235 | Maximum amplitude | 0 ~ 25.0% | 10.0% | 225 |
| 10-25 | P.236 | Amplitude compensation for deceleration | 0 ~ 50.0% | 10.0% | 225 |
| 10-26 | P.237 | Amplitude compensation for acceleration | 0 ~ 50.0% | 10.0% | 225 |
| 10-27 | P.238 | Amplitude acceleration time | 0 ~ 360.00s/0 ~ 3600.0s | 10.00s | 225 |
| 10-28 | P.239 | Amplitude deceleration time | 0 ~ 360.00s/0 ~ 3600.0s | 10.00s | 225 |
| 10-29 | P.247 | MC switchover interlock time | 0.1 ~ 100.0s | 1.0s | 226 |
| 10-30 | P.248 | Start waiting time | 0.1 ~ 100.0s | 0.5s | 226 |
| 10-31 | P.249 | Switchover frequency from inverter to commercial power supply frequency | 0 ~ 60.00Hz<br>99999: No automatic switchover order. | 99999 | 226 |
| 10-32 | P.250 | Automatic switchover frequency range | 0 ~ 10.00Hz: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation.<br>99999: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops. | 99999 | 226 |
| 10-33 | P.273 | Power failure stop selection | 0: Power failure time deceleration-to-stop function disabled.<br>1: No undervoltage avoidance (Ifan undervoltage or power failureoccurs, the motordecelerates to a stop.)<br>2: No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.)<br>11: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.)<br>12: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.) | 0 | 229 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 10-34 | P.274 | Subtracted frequency at deceleration start | 0 ~ 20.00Hz | 3.00Hz | 229 |
| 10-35 | P.275 | Subtraction starting frequency | 0 ~ 120.00Hz: When output frequency ≥ 10-35(P.275), The motor decelerates from the “output frequency - 10-34(P.274)” ; When output frequency < 10-35(P.275), deceleration from output frequency | 50.00Hz | 229 |
| | | | 99999: The motor decelerates from the “output frequency - 10-34(P.274)” | | |
| 10-36 | P.276 | Power-failure deceleration time 1 | 0 ~ 360.00s/0 ~ 3600.00s | 5.00s | 229 |
| 10-37 | P.277 | Power-failure deceleration time 2 | 0 ~ 360.00s/0 ~ 3600.00s: Set the Dec time starting at10-38(P.278)anddownward. | 99999 | 229 |
| | | | 99999:Set the Dec time to the setting frequency of 10-38(P.278). | | |
| 10-38 | P.278 | Power failure deceleration time switchover frequency | 0 ~ 650.00Hz | 50.00Hz | 229 |
| 10-39 | P.279 | UV avoidance voltage gain | 0 ~ 200.0% | 100.0% | 229 |
| 10-40 | P.700 | VF separated voltage source | 0: Given by digital 10-41(P.701). | 0 | 230 |
| | | | 1: Given by analog or HDI pulse. | | |
| 10-41 | P.701 | VF separated voltage digital | 0 ~ 440.00V/0~220.00V | According to voltage | 230 |
| 10-42 | P.702 | VF separated voltage Acc time | 0 ~ 1000.0s | 0.0s | 230 |
| 10-43 | P.703 | VFseparated voltage Dec time | 0 ~ 1000.0s | 0.0s | 230 |
| 10-44 | P.704 | VF separated Stop selection | 0: Frequency/voltage independentlydecreases to 0. | 0 | 230 |
| | | | 1: After the voltage decreases to 0, frequency decreases. | | |
| 10-45 | P.267 | Regeneration and avoidance operation selection | 0: Regeneration avoidance function is invalid. | 0 | 231 |
| | | | 1: Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action) | | |
| | | | 2: Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action) | | |
| | | Regeneration and avoidance operation selection | 11:Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272)) | | |
| | | | 12: Regeneration and avoidance function only in constant speed(Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272)) | | |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 10-46 | P.268 | Regeneration and avoidance DC bus voltage level | 155 ~ 400V: 220V types | 380V | 231 |
| | | | 310 ~ 800V: 440V types | 760V | |
| 10-47 | P.269 | DC bus voltage detection sensitivity at deceleration | 0: Disables regeneration avoidance due to bus voltage change rate. | 0 | 231 |
| | | | 1 ~ 5: Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity. | | |
| 10-48 | P.270 | Regeneration and avoidance frequency compensation value | 0 ~ 10.00Hz: Set the limit value of frequency which rises at activation of regeneration avoidance function. | 6.00Hz | 231 |
| | | | 99999: Frequency limit invalid. | | |
| 10-49 | P.271 | Regeneration avoidance voltage gaincoefficient | 0 ~ 400.0%/0 ~ 40.0% | 100.0% | 232 |
| 10-50 | P.272 | Regeneration avoidance frequency gain coefficient | 0 ~ 400.0%/0 ~ 40.0% | 100.0% | 232 |
| 10-51 | P.264 | Overexcitation deceleration | 0: Overexcitation deceleration is invalid. | 0 | 232 |
| | | | 1: Overexcitation deceleration is valid. | | |
| 10-52 | P.265 | Overexcitation current level | 0 ~ 200.0% | 150.0% | 232 |
| 10-53 | P.266 | Overexcitation gain | 1.00 ~ 1.40 | 1.10 | 232 |
| 10-54 | P.362 | Short-circuit brake time at PM motor start | 0~60.0s | 0.0s | 233 |
| 10-55 | P.780 | PLC Action choice | 0:PLCFunction invalid | 0 | 233 |
| | | | 1:PLCFunction effective,PLC RUN signal from the external terminal input signal or 10-56 (P.781)。 | | |
| | | | 2 : PLCFunction effective,PLC RUNsignal from the external terminal input signal | | |
| 10-56 | P.781 | PLC run | 0: No effect | 0 | 233 |
| | | | 1: PLC RUN | | |
| 10-57 | P.782 | PLC Program erase | 0: invalid | 0 | 233 |
| | | | 1: Erase the PLC program, after the success of the erasure parameter value is 0 | | |
| 10-58 | P.783 | PLC Monitor choosing component | 0~326 | 0 | 233 |
| 10-59 | P.784 | PLC Component monitoring value | Read | Read | 233 |

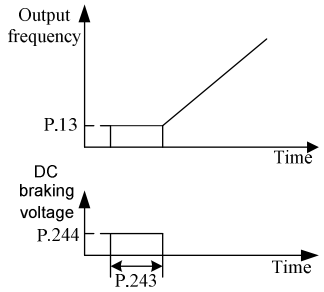
## 5.11.1 DC injection brake

➢ Timing to stop or braking torque can be adjusted by applying DC voltage to the motor to prevent the motor shaft to turn at the time of stopping motor.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-00<br>P.10 | DC injection brake operation frequency | 3.00Hz | 0 ~ 120.00Hz | --- |
| 10-01<br>P.11 | DC injection brake operation time | 0.5s | 0 ~ 60.0s | --- |
| 10-02<br>P.12 | DC injection brake operation voltage | 4.0% | 0 ~ 30.0% | 7.5K and types below |
| | | 2.0% | | 11K ~ 22K types |

Setting DC injection brake

- After a stop signal is put in (please refer to Chapter 4 for the primary operation of motor activation and stop), the output frequency of the inverter will decrease gradually. In case the output frequency reaches the “DC injection brake operation frequency (10-00),” the DC injection brake will be activated.
- During DC injection brake, a DC voltage will be injected into the motor windings by the inverter, which is used to lock the motor rotor. This voltage is called “DC injection brake operation voltage (10-02)”. The larger the 10-02 is, the higher the DC brake voltage is, and the stronger the brake capability is.
- The DC brake operation will last a period (the set value of 10-01) to overcome the motor inertia.
- See the figure below:




Note: 1. To achieve the optimum control characteristics, 10-01 and 10-02 should be set properly.
2. If any of 10-00, 10-01 and 10-02 is set to 0, DC injection brake will not operate, i.e., the motor will coast to stop.

## 5.11.2 Zero-speed/zero-servo control

➢ Zero-speed/ zero-servo function selection

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-03<br>P.151 | Zero-speed control function selection | 0 | 0 | There is no output at zero-speed. |
| | | | 1 | The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode. |
| | | | 2 | The zero-servo running is carried out in close-loop vector mode. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-04 P.152 | Voltage at zero-speed control | 4.0% | 0 ~ 30.0% | 7.5K and types below |
| | | 2.0% | | Types from 11K to 22K |

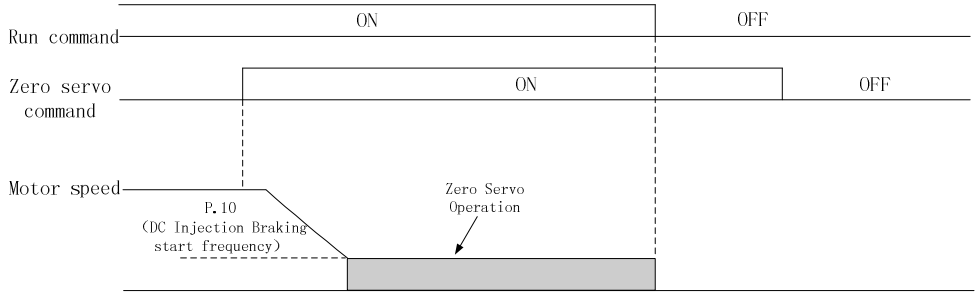
Setting Zero-speed control

- Make sure that 01-11 (start frequency) is set to zero when using this function.

Note: 1. Suppose that 10-04 = 6%, and then the output voltage of zero speed is 6% of base frequency voltage 01-04.
2. For V/F, V/F close-loop control, and close-loop vector control mode, please refer to the motor control mode parameter 00-21, 00-22.

Setting Zeroservo

- The zero servo function is a position loop that can keep the motor to stop at any position point (origin) and lock the motor by external force at a certain position.
- When zero servo is active, once the motor speed falls below the level set in parameter 10-00, the drive goes into the zero servo mode and holds the current position. When the input assigned to trigger the Zero Servo function is released and the run command is still present, the motor reaccelerates.
- Zero servo operation:




Note: Avoid using zero servo to lock 100% load for long periods, as this can trigger a fault. If such loads need to be held in place for long periods, either make sure the current is less than 50% of the drive rated current during Zero Servo, or use a larger capacity drive.

## 5.11.3 DC injection brake before start

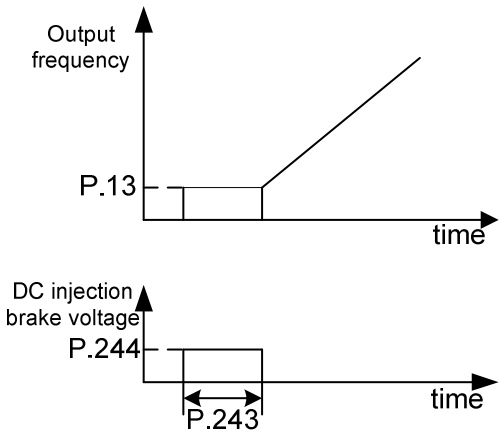
- The motor may be in the rotation status due to external force or itself inertia. If the drive is used with the motor at this moment, it may cause motor damage or drive protection due to over current.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-05 P.242 | DC injection brake function before start | 0 | 0 | DC injection brake function is not available before starting. |
| | | | 1 | DC brake injection function is selected before starting. |
| 10-06 P.243 | DC injection brake time before start | 0.5s | 0 ~ 60.0s | --- |
| 10-07 P.244 | DC injection brake voltage before start | 4.0% | 0 ~ 30.0% | 7.5K (included) and types below |
| | | 2.0% | | 11K ~ 22K types |

Setting DC injection brake before start

◆ If 10-05=0, DC injection brake function is not available before starting. If 10-05=1, DC brake injection function is selected before starting. When the output frequency reaches the starting frequency 01-11, a DC voltage (the set value of 10-07) will be injected into the motor windings by the inverter, which is used to lock the motor rotor. The DC brake operation will last a period (the set value of 10-06) before the motor starts.

See the figure below:




Note: This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

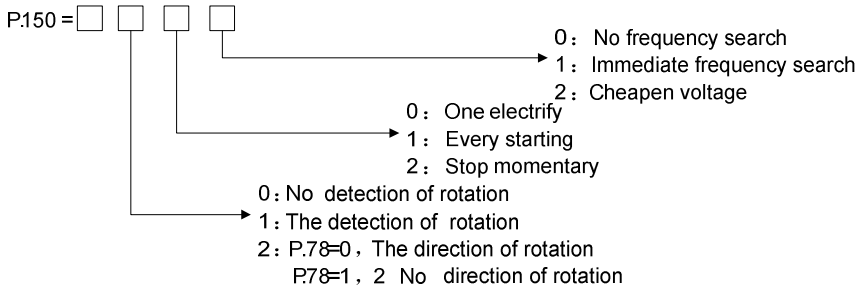
## 5.11.4 Restart mode selection

➢ Select the best start mode according to the different load.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-08 P.150 | Restart mode selection | 0 | xx0 | No frequency search. |
| | | | xx1 | Direct frequency search |
| | | | xx2 | Decrease voltage mode |
| | | | x0x | Power on once. |
| | | | x1x | Start each time. |
| | | | x2x | Only instantaneous stop and restart |
| | | | 0xx | No rotationdirection detection. |
| | | | 1xx | Rotation direction detection. |
| | | | 2xx | 00-15(P.78)=0, rotation direction detection. |
| | | | | 00-15(P.78)=1/2, no rotation direction detection. |
| 10-09 P.57 | Restart coasting time | 99999 | 0 ~ 30.0s | --- |
| | | | 99999 | No restart function. |
| 10-10 P.58 | Restart cushion time | 5.0s | 0 ~ 60.0s | 7.5K (included) and types below. |
| | | 10.0s | | 11K ~ 22K types |

Setting Restart mode selection

◆ There are four digits in 10-08, and every digit has a different meaning and relevant position as following:




Note: 1. When one needs an instant restart function, 10-08 must be set.

2. When 10-08 is nonzero, linear acceleration / deceleration curve is the default.

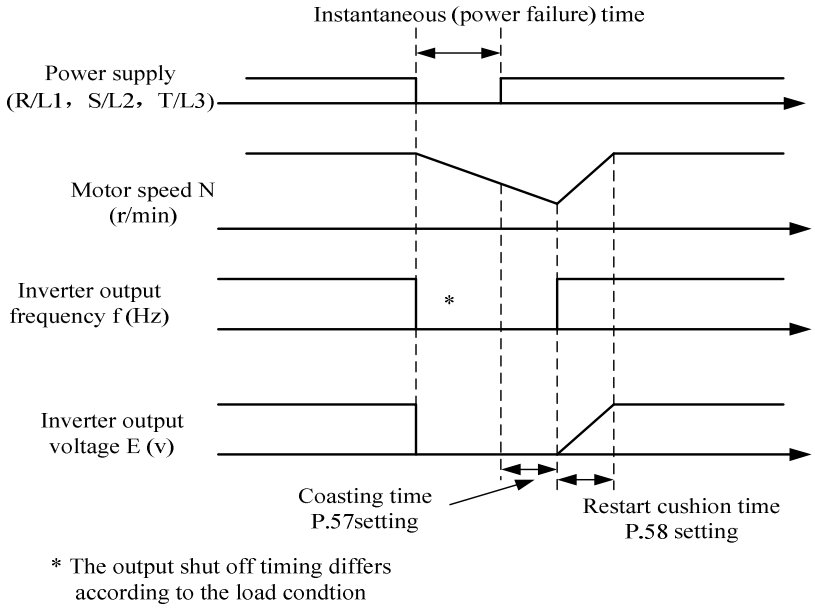
3. The direction detection position of 10-08 is only valid for direct frequency search.

4. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

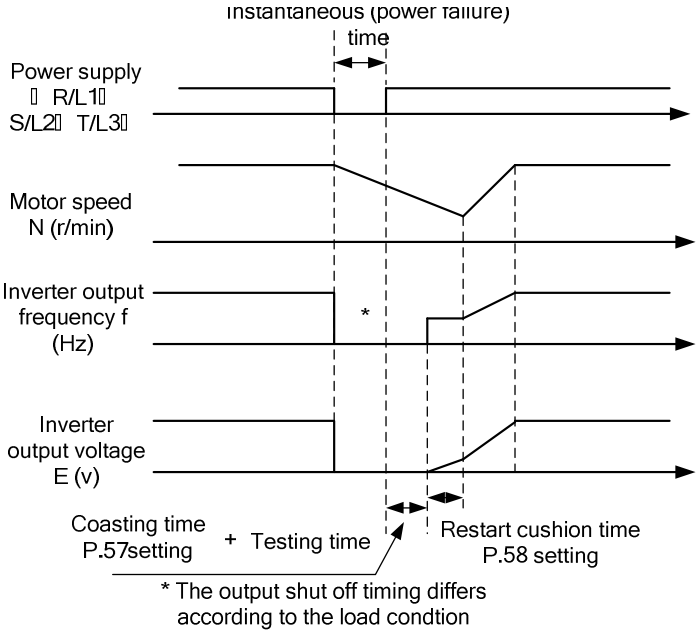
Setting Restart

- Once the driving power is interrupted while the motor is still running, voltage output will be stopped instantly. When the power is recovered and 10-09=99999, the inverter will not restart automatically. When 10-09=0.1~30, the motor will coast for a while (the set value of 10-09) before the inverter restarts the motor automatically.
- Once the motor is restarted automatically, the output frequency of the inverter will be the target frequency, but the output voltage will be zero. Then the voltage will be increased gradually to the expected voltage value. The period for voltage increase is called “Restart cushion time (10-10)”.
- No frequency search again to start the action

  Restart action has nothing to do with the free running speed of the motor, but remains a moment to stop in front of the target frequency, slowly increase the voltage of the voltage reduction.




- Frequency search again to start the action
- Restart, the need for offline automatic tuning.



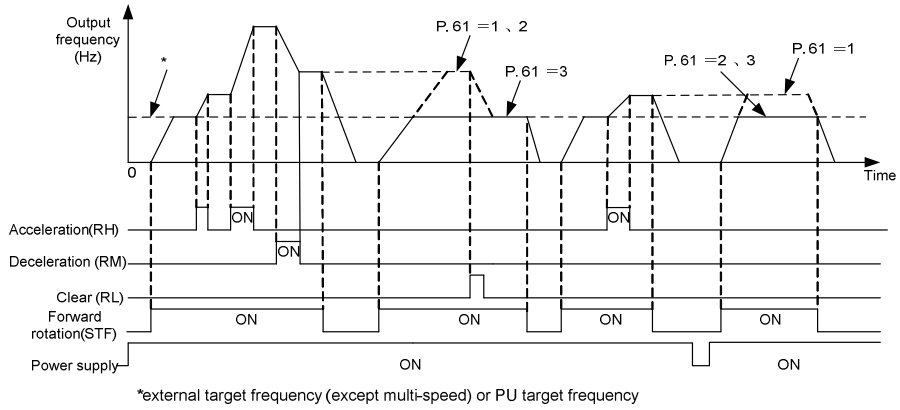

## 5.11.5 Remote setting function selection

- If the operation box is located away from the control box, one can use contact signals to perform variable-speed operation without using analog signals

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-11 P.61 | Remote setting function selection | 0 | 0 | No remote setting function. |
| | | | 1 | Remote setting function, frequency setup storage is available. |
| | | | 2 | Remote setting function, frequency setup storage is not available. |
| | | | 3 | Remote setting function, frequency setup storage is notavailable,the remote setting frequency is cleared by STF/STR “turn off”. |

Setting Remote setting function

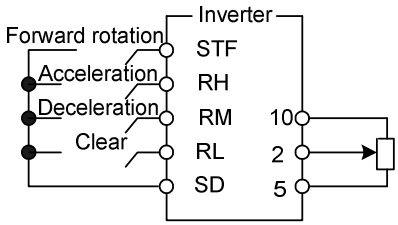
- If the operation box is located away from the control box, one can use contact signals to perform variable-speed operation without using analog signals under the external mode, combined mode 1 and combined mode 5.



- Remote setting function

1. Whether the remote setting function is valid and whether the frequency setting storage function in the remote setting mode is used or not are determined by 10-11.

   Set 10-11=1~3 (valid remote setting function), the function of terminal RM, RH and RL will be changed to acceleration (RH), deceleration (RM) and clear (RH).See the following figure:




2. In the remote setting, the output frequency of the inverter is: (frequency setting by RH/RM operation + external setting frequency other than multi-speeds/PU setting frequency)

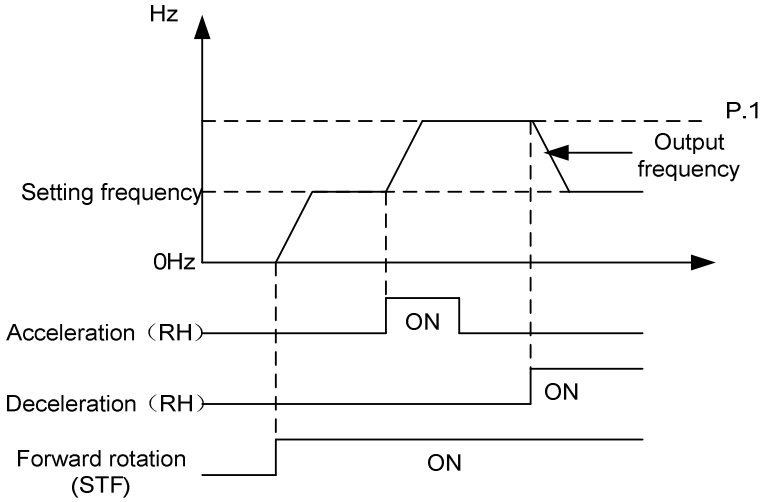
- Frequency setting storage condition

The frequency setting storage function is to store the remote-set frequency (frequency set by RH/RM operation) in memory (EEPROM). Once the power supply is cut off and turned on again, the inverter can start running again at the remote-set frequency (10-11=1).

<Frequency setting storage condition>

1. It is the frequency when the start signal (STF/STR) is “off”.
2. When the signal RH (acceleration) and RM (deceleration) are both “off” and “on”, the remote-set frequency is stored every minute. (Current frequency set value and the last frequency set value are compared ever minute. If they are different, then the current frequency set value is written in the memory. If RL is on, write-in will unavailable).

Note: 1. The frequency can be varied by RH (acceleration) and RM (deceleration) between 0 and (the maximum frequency – frequency set by the main speed). The output frequency is limited by 01-00.




2. When the acceleration or deceleration signal is “on”, the acceleration / deceleration time will be determined by the set value of 01-06 (the first acceleration time) and 01-07 (the first deceleration time).
3. When RT signal is “on” and 01-22≠99999 (the second acceleration time), 01-23≠99999 (the second deceleration time), the acceleration / deceleration time will be determined by the set value of 01-22 and 01-23.
4. When the start signal (STF/STR) is “off” and RH (acceleration) / RM (deceleration) is “on”, the target frequency will also change.

5. When the start signal (STF/STR) becomes “off”, make the frequency setting storage function invalid (10-11=2, 3) if the frequency has to be changed continuously through RH/RM. If the frequency setting storage function is valid (10-11=1), the life of EEPROM will be shortened by frequent EEPROM data writing.
6. RH, RM and RL mentioned in this chapter are function names of “multi-function digital input terminal”. If the functions of the terminals are changed, other functions are likely to be affected. Please verify the functions of the terminals before changing the options and functions of the multi-function digital input terminal (please refer to 03-00~03-05, 03-06 and 03-09). For wiring, please refer to Section 3.5.

## 5.11.6 Retry selection

- This function allows the inverter to reset itself and restart at fault indication. Theretry generating protective functions can be also selected.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-12 P.65 | Retry selection | 0 | 0 | Retry is invalid. |
| | | | 1 | Over-voltageoccurs, the inverter will perform the retry function. |
| | | | 2 | Over-currentoccurs,the inverter will perform the retry function. |
| | | | 3 | Over-voltage or over-currentoccurs, the inverter will perform the retry function. |
| | | | 4 | All the alarms have the retry function. |
| 10-13 P.67 | Number of retries at alarm occurrence | 0 | 0 | Retry is invalid. |
| | | | 1 ~ 10 | The setting value of 10-13(P.67) is exceeded, the inverter will not perform the retry function. |
| 10-14 P.68 | Retry waiting time | 1.0s | 0 ~ 360.0s | --- |
| 10-15 P.69 | Retry accumulation time at alarm | 0 | Read | --- |

Setting Retry selection

- When an alarm goes off, a “retry" will take place to restore the previous setting.
- Inverter's retry is performed conditionally. When the alarm goes off and the inverter has an automatic retry, the re-occurrence of alarm going off before a set time is called a “continuous alarm”. If continuous alarms happen for more than a set time, there is a significant malfunction. In this case, manual trouble shooting is necessary. The inverter at this point will perform no more the retry function. The number of Pre-defined occurrence is called “number of retries at abnormality (10-13)”.
- If none of the alarm belongs to "continuous alarms”, the inverter will perform retry for unlimited times.
- The period from the moment of alarm to that of retry is defined as “retry waiting time”.
- For each time a retry happens, the value of 10-15 will be increased by one automatically. Therefore, the number of 10-15 read from the memory indicates the number of retries that have occurred.

◆ If 10-15 is rewritten with 0, the number of retry executed is cleared.

Note: The inverter will perform retry only after the retry waiting time of 10-14.Therefore when using this function, please be aware of the possible danger when operating the inverter.

## 5.11.7 The dead time of positive and reverse rotation

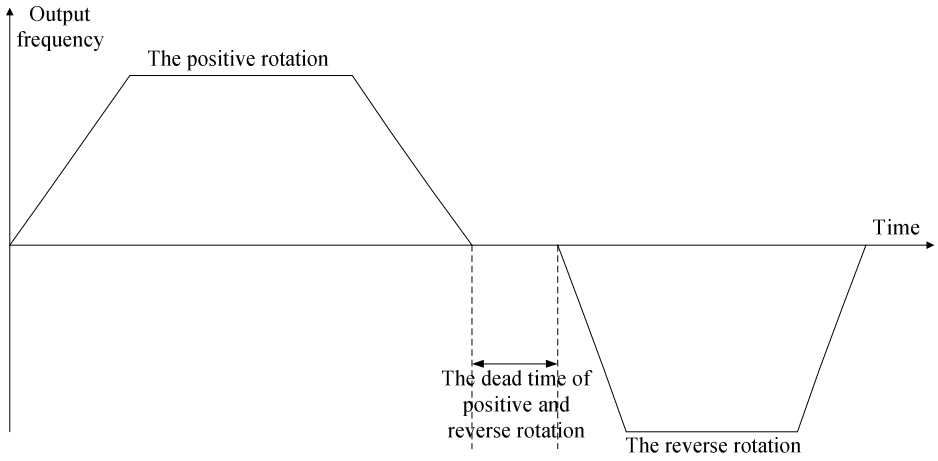
➢ Set the waiting or holding time after the output frequency outputs to 0Hz when the positive and reverse rotation is switching.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-16 P.119 | The dead time of positive and reverse rotation | 0.0s | 0 | Without the function. |
| | | | 0.1~3000.0s | The waiting or holding time after the output frequency decreases to 0 when the positive and reverse rotation is switching. |

Setting The dead time of positive and reverse rotation

◆ When the inverter is running and receive the reverse rotation reference, the output frequency will decrease to 0 in the process of switching from the current rotation direction to the opposite rotation direction. The dead time of positive and reverse rotation is the waiting or holding time after the output frequency decreases to 0.

The diagram is as follows:




## 5.11.8 Energy-saving control function**V/F**

➢ Under the energy-saving running mode, the inverter will control the output voltage automatically in order to reduce the output power losses to the minimum when the inverter is run at a constant speed.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-17 P.159 | Energy-saving control function | 0 | 0 | Normal running mode. |
| | | | 1 | Energy-saving running mode. |

Setting Energy-saving mode

- Under the energy-saving running mode, the inverter will control the output voltage automatically in order to reduce the output power losses to the minimum when the inverter is run at a constant speed.

Note: 1. This function is valid only in the V/F mode(00-21="0").
2. After selecting the energy-saving running mode, the deceleration time may be longer than the setting value. In addition, the properties of the regular torque load will produce abnormal voltage more easily. Please slightly prolong the deceleration time.
3.For big load purposes or machines with frequent acceleration/deceleration, the energy-saving effect may be poor.

## 5.11.9 Dwell function **V/F**

- The backlash measures that stop acceleration/deceleration by the frequency or time set with parameters ataccelerationdeceleration can be set.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-18 P.229 | Dwell function selection | 0 | 0 | None. |
| | | | 1 | Backlash compensation function. |
| | | | 2 | Acceleration and deceleration interrupt waiting function. |
| 10-19 P.230 | Dwellfrequency at acceleration | 1.00Hz | 0 ~ 650.00Hz | Set the stopping frequency and time of Dwell function. |
| 10-20 P.231 | Dwelltime at acceleration | 0.5s | 0 ~ 360.0s | |
| 10-21 P.232 | Dwellfrequency at deceleration | 1.00Hz | 0 ~ 650.00Hz | Set the stopping frequency and time of Dwell function. |
| 10-22 P.233 | Dwelltime at deceleration | 0.5s | 0 ~ 360.0s | |

Setting Dwell function

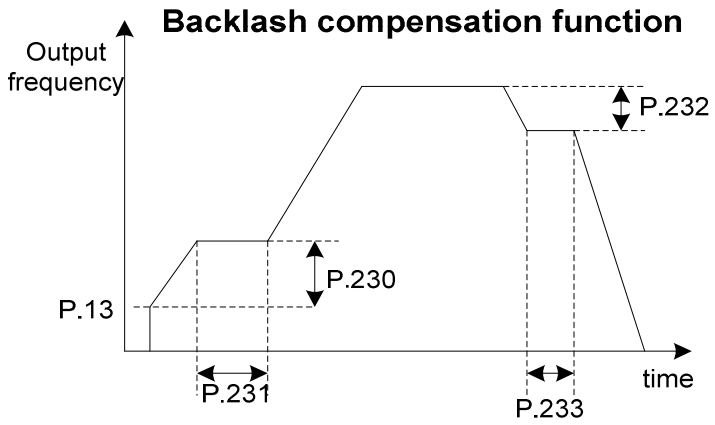
- Backlash compensation(10-18="1")

Reduction gears have an engagement gap and a dead zone between forward and reverse rotation. This dead zone is called backlash, and the gap disables a mechanical system from following motor rotation.

More specifically, a motor shaft develops excessive torque when the direction of rotation changes or when constant-speed operation shifts to deceleration, resulting in a sudden motor current increase or regenerative status.

To avoid backlash, acceleration/deceleration is temporarily stopped. Set the acceleration/deceleration stopping frequency and time in 10-18 ~ 10-22.

Shown as the figure below:

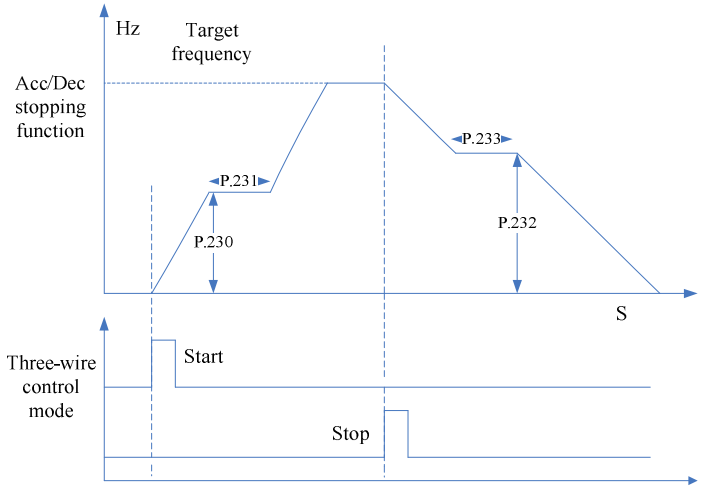



Note: The setting of the backlash compensation will only prolong the acceleration/deceleration time during the period of interruption.

◆ Acceleration and deceleration interrupt waiting function(10-18="2")

When 10-18=2, start acceleration and deceleration interrupt waiting function. When accelerating to the frequency set by 10-19, wait for the time set by 10-20 and then accelerate to the target. When decelerating to the frequency set by 10-21, wait for the time set by 10-22, and then decelerate to the target.

Shown as the figure below:




Note: The setting of the backlash compensation will only prolong the acceleration/deceleration time during the period of interruption.

## 5.11.10 Triangular wave function**V/F**

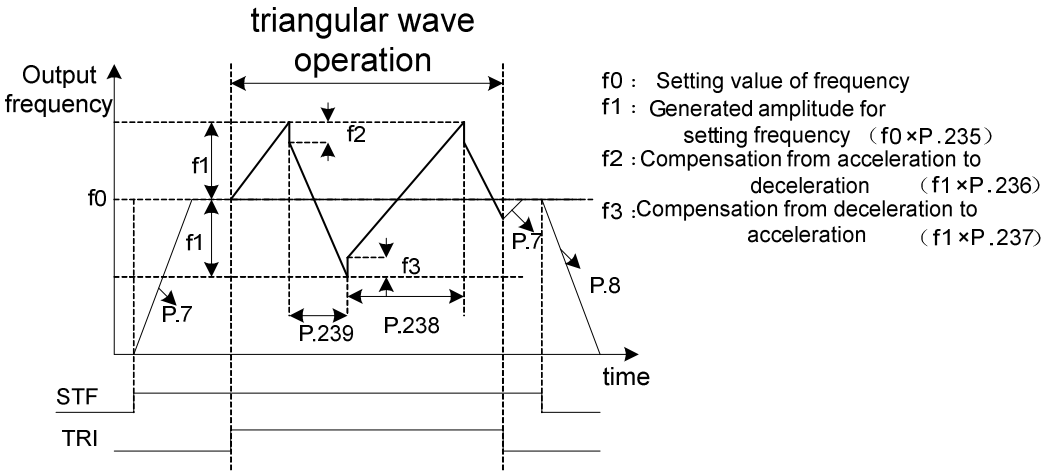
➢ The triangular wave operation, which oscillates the frequency at a constant cycle, is available.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-23 P.234 | Triangular wave function selection | 0 | 0 | 0: None. |
| | | | 1 | External TRIis turned on,triangular wave function will be valid. |
| | | | 2 | The triangular wave function is effective at any given time. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-24<br>P.235 | Maximum amplitude | 10.0% | 0 ~ 25.0% | --- |
| 10-25<br>P.236 | Amplitude compensation for deceleration | 10.0% | 0 ~ 50.0% | --- |
| 10-26<br>P.237 | Amplitude compensation for acceleration | 10.0% | 0 ~ 50.0% | --- |
| 10-27<br>P.238 | Amplitude acceleration time | 10.00s | 0 ~ 360.00s/<br>0 ~ 3600.0s | When 01-08=0, the unit of 10-27(P.238) and 10-28(P.239) is 0.01s. |
| 10-28<br>P.239 | Amplitude deceleration time | 10.00s | 0 ~ 360.00s/<br>0 ~ 3600.0s | When 01-08=1, the unit of 10-27(P.238) and 10-28(P.239) is 0.1s. |

Setting Triangular wave function

- If 10-23 “Triangular wave function selection” is “1” and triangular wave operation signal (TRI) is turned on, triangular wave function will be valid. Set any parameter in 03-00~03-05 “Input terminal selection function” to “36” and then assign the TRI signal for the external terminal.
- If 10-23 “triangular wave function selection” is equal to “2,” the triangular wave function is effective at any given time.




Note: 1. During the movement of the triangular wave, the output frequency is limited by the maximum and the minimum frequency.

2. If the amplitude compensation, i.e., 10-25 and 10-26, is too big, over-voltage will be tripped off and the stall prevention action will be executed automatically. Consequently, the setting method will not be carried out.

3. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

## 5.11.11 Commercial power supply frequency operation function

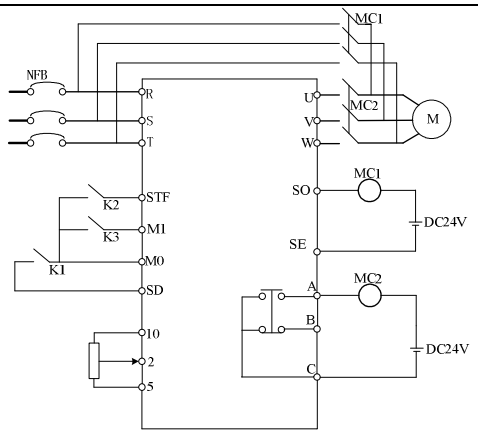
- The inverter contains control function for switching between the commercial power supply operation andinverter operation. Therefore, interlock operation of the magnetic contactor for switching can be easily performed bysimply inputting start, stop, and automatic switching selection signals.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-29<br>P.247 | MC switchover interlock time | 1.0s | 0.1 ~ 100.0s | --- |
| 10-30<br>P.248 | Start waiting time | 0.5s | 0.1 ~ 100.0s | --- |
| 10-31<br>P.249 | Switchover frequency from inverter to commercial power supply frequency | 99999 | 0 ~ 60.00Hz | --- |
| | | | 99999 | No automatic switchover order. |
| 10-32<br>P.250 | Automatic switchover frequency range | 99999 | 0 ~ 10.00Hz | When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation. |
| | | | 99999 | When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops. |

Setting Commercial power supply frequency operation function

- 10-31 is used to switch the frequency from inverter operation to commercial power supply operation. Between starting and 10-31 inverter operation, an output frequency greater than 10-31 will automatically change the inverter operation to commercial power supply operation. When 10-31 is set to 99999, there is no automatic switchover.
- When 10-32≠99999, automatic switchover is valid during the operation (10-31≠99999). After the inverter operation is switched bypass operation, if the frequency reference is lower than (10-31-10-32), the operation will be switched to inverter operation and run by the frequency of the frequency reference. Inverter activation when the inverter start reference (STF/STR) is turned off, the operation is also switched to the inverter operation.
- When 10-32=99999, it is valid during automatic switchover operation (10-31≠99999). When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation and the motor will decelerate until it stops.
- Examples for the commercial power supply frequency switchover function:

  1. Assume that 03-03 = 37, 03-04 = 38, 03-10 = 10 and 03-11= 9. The wiring diagram is presented below:



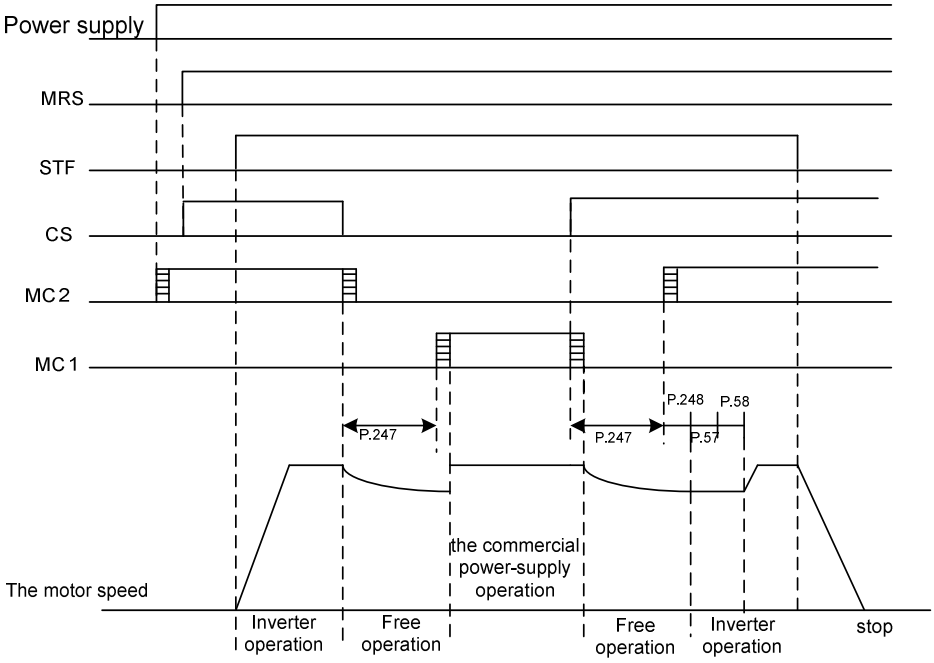

Please be cautious of the capacity of the output terminals. The used terminals vary according to the setup of 03-10、03-11、03-12 and 03-13 (output terminal function selection).When 10 is selected for the output terminal function, connect the relay that drives the commercial power supply frequency operation. When 9 is selected for the output terminal function, connect the relay that drives the inverter operation. When 37 is selected for the digital input terminal function, commercial power-supply operation switchover function is selected. When 38 is selected for the input terminal function, commercial power supply frequency operation switchover signal CS is selected.

Warning:

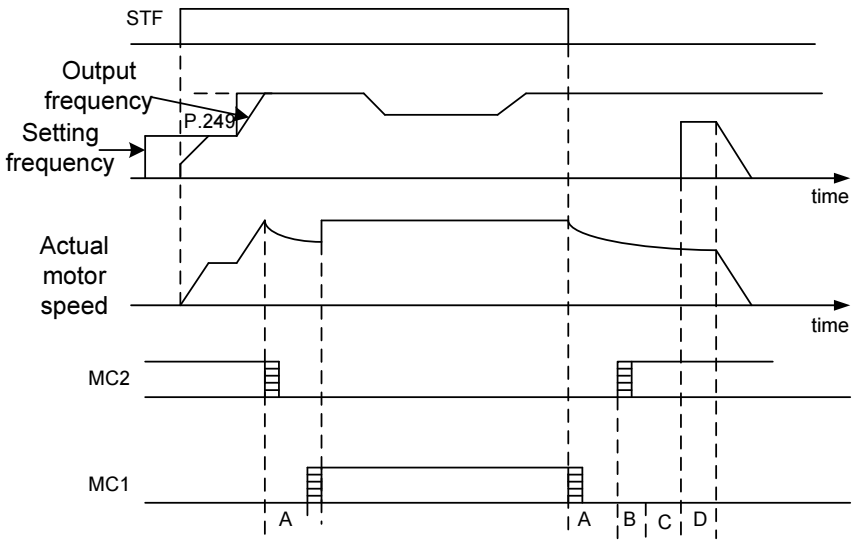
1. MC1 and MC2 must be mechanically interlocked; the running direction of the inverter operation and the commercial power supply operation should be consistent.
2. Use the commercial power operation switchover function under the external operation mode.
3. STF/STR is effective when the CS signal is ON.

◆ Here are some typical sequence diagrams for the switchover of the commercial power supply frequency:

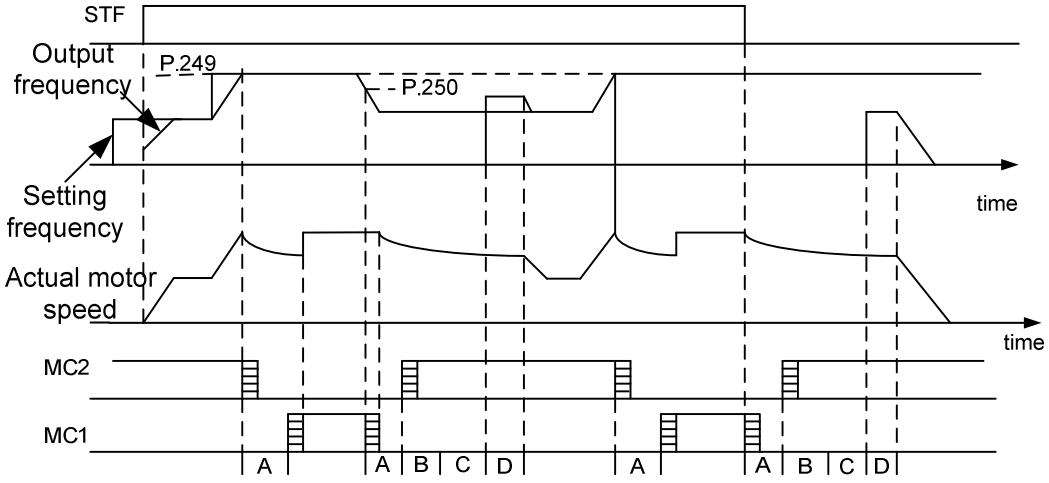
1. No action sequence for the automatic switchover sequence (10-31 = 99999).




2. With action sequence for the automatic switchover sequence(10-31 ≠ 99999, 10-32 = 99999).




3. With action sequence for the automatic switchover sequence series (10-31 ≠ 99999, 10-32 ≠ 99999)




During the automatic switchover, A: 10-29 MC switchover interlocking time; B: 10-30 starting waiting time; C: 10-09 restarting free operation time; D: 10-10 restarting elevating time.

Note: 1. When the motor runs at 50Hz (or 60Hz), the commercial power supply will offer a more efficient operation than the inverter will. Moreover, during the inverter maintenance/inspection period, the commercial power supply circuit should be installed to prevent the motor from being stopped for too long.

2. To prevent the inverter from setting off the over-current alarm when changing between the inverter operation and the commercial power supply operation, the interlock measure has to be taken. Once the motor stops, it will be activated via the inverter. Switchover and interlock can be carried out through the inverter and a complicated commercial power supply if commercial power supply switchover sequence function that can send out the signal for electromagnetic contactor actions is used.

3. This function is only valid under the V/F mode; i.e., it is effective when 00-21=0.

## 5.11.12 Power failure stopfunction

- When the inverter power comes to a sudden failure, regenerative power can maintain the inverter output to deceleration stop.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-33 P.273 | Power failure stop selection | 0 | 0 | Power failure time deceleration-to-stopfunction disabled. |
| | | | 1 | No undervoltage avoidance (Ifan undervoltage or power failureoccurs, the motordecelerates to a stop.) |
| | | | 2 | No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.) |
| | | | 11 | Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.) |
| | | | 12 | Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motorre-accelerates if the power restores during the deceleration to stop.) |
| 10-34 P.274 | Subtracted frequency at deceleration start | 3.00Hz | 0 ~ 20.00Hz | Normally, the motor runs at the initial value as it is. However,adjust to suit the size of the load specification (moment of inertia, torque). |
| 10-35 P.275 | Subtraction starting frequency | 50.00Hz | 0 ~ 120.00Hz | When output frequency≥10-35(P.275), The motor decelerates from the “output frequency - 10-34(P.274)” ; When output frequency < 10-35(P.275), deceleration from output frequency |
| | | | 99999 | The motor decelerates from the “output frequency - 10-34 (P.274)” |
| 10-36 P.276 | Power-failure deceleration time 1 | 5.00s | 0 ~ 360.00s/0 ~ 3600.00s | Set the time from the deceleration start to the 10-38(P.278) set frequency. |
| 10-37 P.277 | Power-failure deceleration time 2 | 99999 | 0 ~ 360.00s/0 ~ 3600.00s | Set the deceleration time for the frequency range starting at 10-38(P.278) and downward. |
| | | | 99999 | Same as 10-36(P.276) |
| 10-38 P.278 | Power failure deceleration time switchover frequency | 50.00Hz | 0 ~ 650.00Hz | Set the frequency at which the slope during deceleration switches from the 10-36(P.276) setting to the 10-37(P.277) setting. |
| 10-39 P.279 | UV avoidance voltage gain | 100.0% | 0 ~ 200.0% | Adjust the response level for undervoltage avoidance operation. |

Setting Power failure stop function

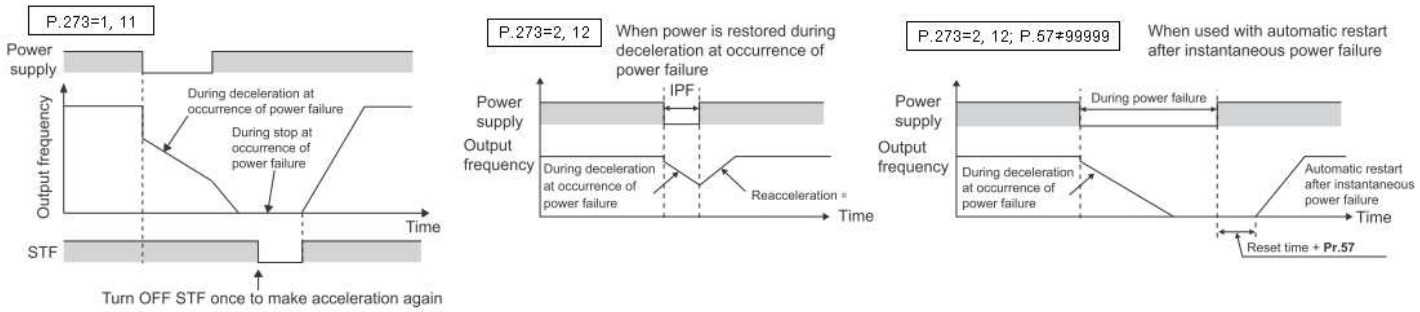
- When 10-33 is set to 1 or 11, (and 10-09=99999), the inverter decelerates to a stop at a power failure; When 10-33is set to2 or 12, the inverter decelerates to a stop at a power failure. During deceleration after power comes back ON, the inverter accelerates again.

  Set 10-34 according to the value of load inertia. If load inertia is larger, then 10-34 should be set to a smaller value to produce enough regenerative power, usually 3.00Hz is enough.

  The motor decelerates for the time set to 10-36.(The deceleration time setting is the timeit takes for the motor to stop from 01-09 Acceleration/deceleration reference frequency.)

  10-38 is the switch frequency between power-failure deceleration time 1 and power-failure deceleration time 2;If10-37 is not set, the motor still decelerates for the time set to 10-36.

10-39 is the UV avoidance voltage gain when 10-33=11 or 12; if 10-33=11 or 12, 10-39 is invalid.




◆ Undervoltage avoidance function(10-33=11,12):

When setting 10-33=11 or 12, frequency is decreased to prevent an undervoltage from occurring duringdeceleration at occurrence of power failure.

Adjust the downward frequency slope and the response level via 10-39 UV avoidance voltage gain. Setting a largevalue improves the response to the bus voltage. But when load inertia is larger, regenerative power is also larger, please set a smaller value to 10-39.

Note:1. Power failure time deceleration-to-stopfunction is only applicable for V/F control mode.
2. Power failure time deceleration-to-stopfunction can not be used when bus power supply

## 5.11.13 VF complete separation

➢ Voltage given mode, voltage acceleration/deceleration time and voltage deceleration mode in VF complete separation.

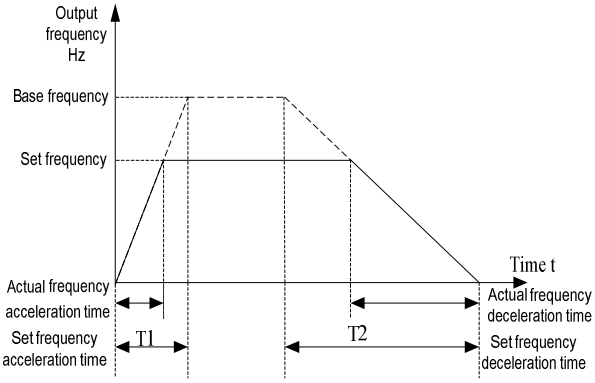
| Parameter | Name | Factory Value | Setting Range | Content | |
|---|---|---|---|---|---|
| 10-40 P.700 | VF separated voltage source | 0 | 0 | Given by digital 10-41(P.701). | |
| | | | 1 | Given by analog or HDI pulse. | |
| 10-41 P.701 | VF separated voltage digital | 380/440V | 0 ~ 440V | 440V voltage | 50Hz (when 00-24=1) / 60Hz (when 00-24=0) system setting |
| | | 220V | 0 ~ 220V | 220Vvoltage | |
| 10-42 P.702 | VF separated voltage Acc time | 0.0s | 0 ~ 1000.0s | Time for voltage accelerating from 0 to motor rated voltage. | |
| 10-43 P.703 | VFseparated voltage Dec time | 0.0s | 0 ~ 1000.0s | Time for voltage decelerating from motor rated voltage to 0. | |
| 10-44 P.704 | VF separated Stop selection | 0 | 0 | Frequency/voltage independentlydecreases to 0. | |
| | | | 1 | After the voltage decreases to 0, frequency decreases. | |

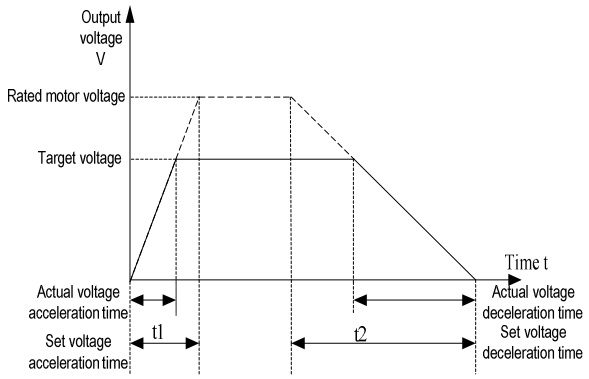
Setting VF complete separation

◆ Parameter 10-40~10-44 are valid only when 01-12=14.VF complete separation is applicable to induction heating, inverse power supply and torque motor control.

◆ The voltage source for V/F complete separation is set in the same way as the frequency source, it can be set by digital or external analog terminal or M2 terminal.

◆ Frequency acceleration time of V/F complete separationindicates the time accelerates from 0 to base frequency (01-06).Frequency deceleration timeindicates the time decelerates from base frequency to0 (01-07); voltage acceleration time of VF complete separationindicates the time accelerates from 0 to the rated motor voltage. t1 (10-42). Voltage deceleration time of VF complete separation indicates the time decelerates from the rated motor voltage to0. t2 (10-43).




- Using 10-41 to set digital voltage, the setting value of voltage cannot be over the motor rated voltage.
- When the setting voltage acceleration time is less than frequency acceleration time or voltage deceleration time is more thanfrequency deceleration time, voltage stall or current stall may occur during acceleration/ deceleration, which leads to alarm. So it is suggested that 10-42 > 01-06 and 10-43 < 01-07.

## 5.11.14 Regeneration and avoidance function

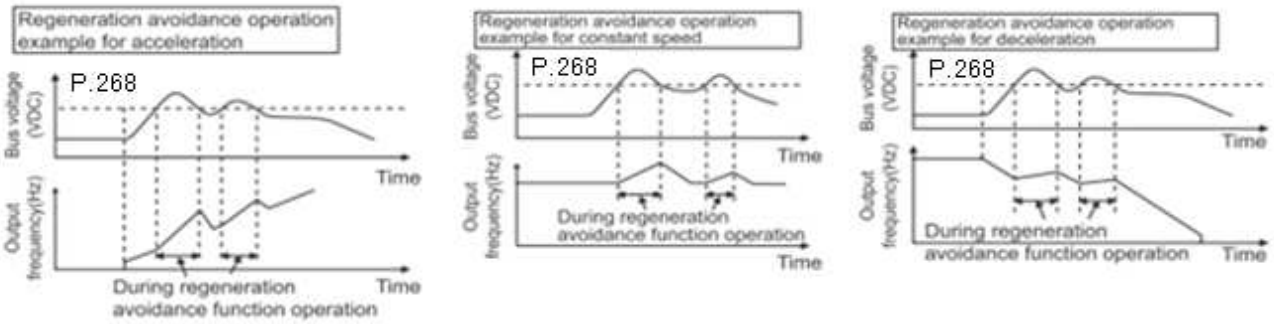
- When the inverter load inertia is larger, PN voltage will increase affected by regenerative power during deceleration or other process, and OV alarm occurs. This function can keep PN voltage on the fixed level and prevent PN level from increasing to OV level via adjusting the inverter output frequency and voltage.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-45 P.267 | Regeneration and avoidance operation selection | 0 | 0 | Regeneration avoidance function is invalid. |
| | | | 1 | Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action) |
| | | | 2 | Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action) |
| | | | 11 | Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272)) |
| | | | 12 | Regeneration and avoidance function only in constant speed (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272)) |
| 10-46 P.268 | Regeneration and avoidance DC bus voltage level | 380V | 155 ~ 400V | 220V types |
| | | 760V | 310 ~ 800V | 440V types |
| 10-47 P.269 | DC bus voltage detection sensitivity at deceleration | 0 | 0 | Disables regeneration avoidance due to bus voltage change rate. |
| | | | 1 ~ 5 | Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity. |
| 10-48 P.270 | Regeneration and avoidance frequency compensation value | 6.00Hz | 0 ~ 10.00Hz | Set the limit value of frequency which rises at activation of regeneration avoidance function. |
| | | | 99999 | Frequency limit invalid. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-49 P.271 | Regeneration avoidance voltage gaincoefficient | 100.0% | 0 ~ 400.0%/0 ~ 40.0% | Set range and 10-45 (P. 267) set point, 10-45 (P. 267) > 10, set the range of 0 ~ 40.00%, 0-45 (P. 267) < 10, set the range of 0 ~ 400.0%. Avoid actions should response speed adjusting regeneration.Increase the set point, will improve the response of busbar voltage change.The output frequency is likely to be unstable.Even reduce 10-49 set point (P. 271), or failing to reduce vibration, please reduce 10-50 set point (P. 272). |
| 10-50 P.272 | Regeneration avoidance frequency gain coefficient | 100.0% | 0 ~ 400.0%/0 ~ 40.0% | |

Setting Regeneration and avoidance function

- Function of regeneration and avoidance: When the regenerative status is serious, the DC bus voltage rises and an overvoltage alarm OV may occur. The function is to improve the output frequency of inverter and decrease the DC bus voltage for avoiding alarm OV when overvoltage happens (as the following shows).




## 5.11.15 Overexcitation deceleration function

- Overexcitation decelerationincreases the flux during deceleration to increase the motor loss, so that deceleration time can be decreased without a braking resistor.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-51 P.264 | Overexcitation deceleration | 0 | 0 | Overexcitation deceleration is invalid. |
| | | | 1 | Overexcitation deceleration is valid. |
| 10-52 P.265 | Overexcitation current level | 150.0% | 0 ~ 200.0% | When the output current is above the setting level in overexcitation deceleration, overexcitation gain will auto-decrease. |
| 10-53 P.266 | Overexcitation gain | 1.10 | 1.00 ~ 1.40 | --- |

Setting Overexcitation deceleration function

- Overexcitation deceleration(10-51=1)

  Overexcitation control can suppress the increasing of DC bus voltage. The larger overexcitation gain is, the stronger suppressing effect is.

  When the voltage stall occurs in overexcitation deceleration, it is necessary to prolong the deceleration time or increase the overexcitation gain10-53.

When the current stall occurs in overexcitation deceleration, it is necessary to prolong the deceleration time or decrease the overexcitation gain 10-53.

Note: 1. As regenerative energy is mainly dissipated as heat in the motor, the motor temperature will rise if overexcitation deceleration is applied frequently.
2. When a run command is entered during overexcitation deceleration, overexcitation operation is cancelled and the drive will reaccelerate to the specified speed.
3. When PM motor is used, overexcitation deceleration function is invalid.

## 5.11.16 Short-circuit brakefunctionat PM motor start

- This parameter can be used in OLV/PM. For the setting of motor control mode, please refer to 00-21(P.300) and 00-22(P.370).

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-54 P.362 | Short-circuit brake time at PM motor start | 0.0s | 0.0 ~ 60.0s | --- |

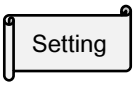
◆ Parameter 10-54 sets the time for short-circuit brake operation at start. By shorting all three motor phases, it produces a braking torque in the motor and can be used to stop a coasting motor before starting it again.

Note: Short Circuit Braking cannot prevent a PM motor from being rotated by an external force. To prevent the load from rotating the motor, use DC Injection.

## 5.11.17 Built-in PLC

- Setting of the parameters for the built-in PLC functions

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 10-55 P.780 | PLC Action choice | 0 | 0 | PLC Function invalid |
| | | | 1 | PLC Function effective, PLC RUN Signals from external terminal input or 10-56 (P. 780). |
| | | | 2 | PLC Function invalid,PLC RUN signal from the external terminal input signal. |
| 10-56 P.781 | PLC RUN/STOP control | 0 | 0 | No effect |
| | | | 1 | PLC RUN |
| 10-57 P.782 | PLC Program erase | 0 | 0 | Invalid |
| | | | 1 | Erase the PLC program, after the success of the erasure parameter value is 0 |
| 10-58 P.783 | PLC Monitor choosing component | 0 | 0~326 | PLC Component monitoring type selection |
| 10-59 P.784 | PLC Component monitoring value | Read | Read | PLCComponent state monitoring |



Built-in PLC

◆ In external input terminals M0, M1, M2, and STF, STR,RES and external expansion board EB308R or EB362R option in the input terminal of a terminal set its corresponding function to PLC_ON_STOP corresponding

parameter value is 60 which can control the RUN signal of PLC.About the external input terminal and expand the use of digital input terminals, refer to 5.4.

◆ P. 780 = 1 PLC running state

| P.781 | External PLC_ON_STOP signal | PLC state |
|---|---|---|
| 0 | 0 | STOP |
| 1 | 0 | RUN |
| 0 | 1 | RUN |
| 1 | 1 | RUN |

◆ P.780 = 2 PLC running state

| External PLC_ON_STOP signal | PLC state |
|---|---|
| 0 | STOP |
| 1 | RUN |

◆ P. 783 choose monitor PLC element types, P. 784 has a value of the current state monitor PLC component, as shown in the table.

| P.783 | P.784 | P.783 | P.784 |
|---|---|---|---|
| 1 | X0~X17(Name of octal) | 20 | T0~T7（ place） |
| 2 | X20~X25(Name of octal) | 21 | C0~C7（ place） |
| 3 | Y0~Y17(Name of octal) | 22 | M8000~M8015 |
| 4 | Y20~Y23(Name of octal) | 23 | M8016~M8031 |
| 5 | M0~M15 | 24 | M8032~M8047 |
| 6 | M16~M31 | 25 | M8048~M8063 |
| 7 | M32~M47 | 26 | M8064~M8079 |
| 8 | M48~M63 | 27~52 | keep |

| P.783 | P.784 | P.783 | P.784 |
|---|---|---|---|
| 9 | M64~M79 | 53~60 | T0~T7 Set value (word) |
| 10 | M80~M95 | 61~68 | keep |
| 11 | M96~M111 | 69~76 | C0~C7 Set value |
| 12 | M112~M127 | 77~84 | keep |
| 13 | M128~M143 | 85~92 | T0~T7 Set value (word) |
| 14 | M144~M159 | 93~100 | keep |
| 15 | M160~M175 | 101~108 | C0~C7 Set value (word) |
| 16 | M176~M191 | 109~116 | keep |
| 17 | M192~M207 | 117~164 | D0~D47 |
| 18 | M208~M223 | 165~326 | D8000~D8161 |
| 19 | M224~M239 | | |

## 5.12 Speed and torque control parameter group 11

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 11-00 | P.320 | Speed control proportion coefficient 1 | 0 ~ 2000.0 | 100 | 237 |
| 11-01 | P.321 | Speed control integral time 1 | 0 ~ 20.00s | 0.30s | 237 |
| 11-02 | P.322 | PI coefficient switching frequency 1 | 11-25 ( P.414 ) ~ 11-05 ( P.325 ) Hz | 5.00Hz | 237 |
| 11-03 | P.323 | Speed control proportion coefficient 2 | 0 ~ 2000.0 | 100 | 237 |
| 11-04 | P.324 | Speed control integral time 2 | 0 ~ 20.00s | 0.30s | 237 |
| 11-05 | P.325 | PI coefficient switching frequency 2 | 11-02(P.322) ~ 650.00Hz | 10.00 | 237 |
| 11-06 | P.326 | Current control proportion coefficient | 0 ~ 20 | 0 | 237 |
| 11-07 | P.327 | PM motor types | 0: SPM<br>1: IPM | 0 | 238 |
| 11-08 | P.328 | PM initial motor position detection selection | 0: Pull in.<br>1: High frequency pulse | 0 | 238 |
| 11-09 | P.329 | PMmotor acceleration id | 0 ~ 200% | 80% | 238 |
| 11-10 | P.330 | PM motor constant speed id | 0 ~ 200% | 0% | 238 |
| 11-11 | P.331 | PM motor estimatedrotation speed filter time | 0 ~ 1000ms | 2ms | 238 |
| 11-12 | P.401 | Torque reference | -400.0 ~ 400.0% | 0.0% | 239 |
| 11-13 | P.402 | Speed limit | -120% ~ 120% | 0% | 239 |
| 11-14 | P.403 | Speed limit bias | 0 ~ 120% | 10% | 239 |
| 11-15 | P.404 | Torque filter time | 0 ~ 1000ms | 0ms | 239 |
| 11-16 | P.405 | Torque setting source | 0: Given by the11-12(P.401).<br>1: Given by the analog or pulse input.<br>2: Given by the communication mode. | 0 | 239 |
| 11-17 | P.406 | Selection of speed limit | 0:The speed is limited according to 11-13(P.402) and 11-14(P.403)<br>1: Frequency reference source(it is decided according to00-16(P.79)) | 0 | 239 |
| 11-18 | P.407 | Unidirectional speed limit bias | 0: Unidirectional speed limit bias is invalid.<br>1: Unidirectional speed limit bias is valid. | 1 | 239 |
| 11-19 | P.408 | Forward motor torque limit | 0 ~ 400.0% | 200.0% | 240 |
| 11-20 | P.409 | Reverse regenerative torque limit | 0 ~ 400.0% | 200.0% | 240 |
| 11-21 | P.410 | Reverse motor torque limit | 0 ~ 400.0% | 200.0% | 240 |
| 11-22 | P.411 | Forward regenerative torque limit | 0 ~ 400.0% | 200.0% | 240 |
| 11-23 | P.412 | Zero velocity ratio | 0~2000.0 | 100.0 | 237 |
| 11-24 | P.413 | Zero speed integration time | 0~20.00s | 0.30s | 237 |
| 11-25 | P.414 | Zero speed switching frequency | 0~11-02 ( P.322 ) Hz | 5.00Hz | 237 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 11-26 | P.415 | IM motor estimate rotataional speed filtering time | 0-100.00s | 0 | 237 |
| 11-30 | P.371 | The second motor speed control proportion coefficient 1 | 0 ~ 2000.0<br>99999 | 100.0 | 241 |
| 11-31 | P.372 | The second motor Speed control integral time1 | 0 ~ 20.00s<br>99999 | 0.30s | 241 |
| 11-32 | P.373 | The second motor PI coefficient switchingfrequency 1 | 0 ~ 11-35 (P.376)Hz<br>99999 | 5.00Hz | 241 |
| 11-33 | P.374 | The second motor speed control proportion coefficient 2 | 0 ~ 2000.0<br>99999 | 100.0 | 241 |
| 11-34 | P.375 | The second motor Speed control integral time 2 | 0 ~ 20.00s<br>99999 | 0.30s | 239 |
| 11-35 | P.376 | The second motor PI coefficient switching frequency 2 | 11-32(P.373)~650.00Hz<br>99999 | 10.00Hz | 242 |
| 11-36 | P.377 | The second motor current control proportion coefficient | 0 ~ 20<br>99999 | 0 | 242 |
| 11-37 | P.378 | The second PM motor types | 0: SPM<br>1: IPM<br>99999 | 0 | 242 |
| 11-38 | P.379 | The second PM initial motor position detection selection | 0: Pull in.<br>1: High frequency pulse<br>99999 | 0 | 242 |
| 11-39 | P.380 | The second PM motor acceleration id | 0 ~ 200%<br>99999 | 80% | 242 |
| 11-40 | P.381 | The second PM motor constant speed id | 0 ~ 200%<br>99999 | 0% | 242 |
| 11-41 | P.382 | The second PM motor estimated rotation speed filter time | 0 ~ 1000ms<br>99999 | 2ms | 242 |
| 11-42 | P.365 | Reserve | --- | --- | 243 |
| 11-43 | P.366 | PM motor speed estimation observer Kp | 0 ~ 65000 | 10 | 243 |
| 11-44 | P.367 | PM motor speed estimation observer Ki | 0 ~ 65000 | 376 | 243 |
| 11-45 | P.383 | PM Zero speed motor current loop bandwidth coefficient | 0 ~ 100 | 40 | 243 |
| 11-46 | P.384 | PMMotor current loop bandwidth coefficient at low speed | 0 ~ 100 | 40 | 243 |
| 11-47 | P.385 | PMMotor current loop bandwidth coefficient at a high speed | 0 ~ 100 | 40 | 243 |

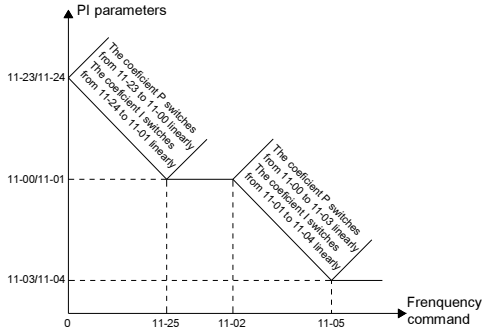
## 5.12.1 Control parameter

➢ Speed loop PI parameters vary with running frequencies of the inverter.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-00 P.320 | Speed control proportion coefficient 1 | 100.0 | 0 ~ 2000.0 | --- |
| 11-01 P.321 | Speed control integral time 1 | 0.30s | 0 ~ 20.00s | --- |
| 11-02 P.322 | PI coefficient switching frequency 1 | 5.00Hz | 11-25 ( P.414 ) ~ 11-05 ( P.325 ) Hz | --- |
| 11-03 P.323 | Speed control proportion coefficient 2 | 100.0 | 0 ~ 2000.0 | --- |
| 11-04 P.324 | Speed control integral time 2 | 0.30s | 0 ~ 20.00s | --- |
| 11-05 P.325 | PI coefficient switching frequency 2 | 5.00Hz | 11-02(P.322) ~ 650.00Hz | --- |
| 11-06 P.326 | Current control proportion coefficient | 0 | 0 ~ 20 | This parameter decides the response characteristics of IM motor torque control. |
| 11-23 P.412 | Zero velocity ratio | 100.0 | 0~2000.0 | --- |
| 11-24 P.413 | Zero speed integration time | 0.30s | 0~20.00s | --- |
| 11-25 P.414 | Zero speed switching frequency | 5.00Hz | 0~11-02 ( P.322 ) Hz | --- |
| 11-26 P.415 | IM motor estimate rotataional speed filtering time | 0 | 0-100.00s | --- |

Setting Control parameter

◆ 11-00 and 11-01 are the PI adjusting parameter when the running frequency is less than the switching frequency 1 (11-02). 11-03 and 11-04 are the PI adjusting parameter when the running frequency is greater than the switching frequency 2 (11-05). When the running frequency is between the switching frequency 1 and the switching frequency 2, the two PI parameters switch linearly. See the figure below:




◆ 11-00 or 11-03/11-23 is used to set the proportion gain of speed control.(Set the value slightly larger to better follow changes on the speed reference and to reduce speed change due to external interference.)

◆ 11-01 or 11-04/11-24 is used to set the integral time of speed control.(Due to external interference-generated speed change, set the value smaller to shorten the time spent on returning to the original speed.)

◆ When 11-06 is set to 100%, the max output torque corresponding to the vector control is the motor rated torque.

◆ 11-06 set IM the proportion coefficient of motor current control (to set the value to a few bigger, changes for the current instruction follow sex will get better)

Note: 1. Use 11-00 or 11-03/11-23 to increase the set value of speed control gain can elevate the effecting time. But a set value too high can generate vibration and noises.

2. Reduce speed control integral coefficient 11-01 or 11-04/11-24 to shorten the time required to go back to the original speed. But if the value is too small, overshoot can happen.

3. 11-06 value increases, the current regulator increased responsiveness, but the value is too large, current control oscillation, there will be a larger electromagnetic noise.

Setting Adjuster parameter

- When the setting value of 11-06 increases, the current adjuster response level improves. But when the setting value is too large, the current loop shocks， and the electromagnetic noise becomes louder.

## 5.12.2 PM motor setting

- The parameters setting below can improve the VC and SVC control characteristic of PM motor.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-07 P.327 | PM motor types | 0 | 0 | SPM |
| | | | 1 | IPM |
| 11-08 P.328 | PM initial motor position detection selection | 0 | 0 | Pull in. |
| | | | 1 | High frequency pulse |
| 11-09 P.329 | PMmotor acceleration id | 80% | 0～200% | PM motor acceleration id given, valid only when 00-21=6 |
| 11-10 P.330 | PM motor constant speed id | 0% | 0～200% | PM motor constant speed id given, valid only when 00-21=6 |
| 11-11 P.331 | PM motor estimatedrotation speed filter time | 2ms | 0～1000ms | PM motor estimated rotation speed filter timecoefficient, valid only when 00-21=6 |

Setting PM motor control setting

- 11-08 is used to select how the rotor position is detected at PM motor start.In the mode of PM motor close-loop vector control, the inverter performs a magnetic pole search the first time it starts the motor. After that, rotor position is calculated from the PG encoder signal and saved until the inverter power is switched off.

  When 11-08=0, detect the initial magnetic pole position of the rotor by using the pull-in method, at this point, the motor cannot start with heavy duty, or it may fail to start.

  When 11-08=1, detect the initial magnetic pole position of the rotor by using the high frequency pulse vibration method, electromagnetic noise may be generated from the motor at start.

  11-09 is the current for pulling in the pole when PM motor starts. 05-05(the motor rated current) is set to 100%, setting the pull-in current during acceleration/deceleration, adjustments to this setting may help in the following situations:

  Increase this setting when a large amount of starting torque is required.Lower this setting if there is excessive current during acceleration.

- 11-10 is used to make the directionof pole position of PM motor during operation more effective, the current for pulling in, 05-05(the motor rated current) is set to 100%, set the d-axis current during operation at a constant speed. Please make adjustment in the following situations:

- Increase this setting when hunting occurs or the motor speed is unstable while running at a constant speed.If there is too much current when driving a normal load at a constant speed, then reduce this setting value.

- 11-11 is PM motor speed observerfilter time coefficient. Usually, it is not necessary to adjust.

## 5.12.3 Torque control parameter

➢ Used to select the inverter speed control or torque control.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-12 P.401 | Torque reference | 0.0% | -400.0 ~ 400.0% | Torque reference |
| 11-13 P.402 | Speed limit | 0.0% | -120% ~ 120% | Speed limit of the torque control, is valid when 11-17( P.406 ) =0,speed limit value correspond 05-04 ( P.305 ) when it is setted to100% |
| 11-14 P.403 | Speed limit bias | 10% | 0 ~ 120% | Bias value correspond the setting value of P.305 when it is setted to100% |
| 11-15 P.404 | Torque filter time | 0ms | 0 ~ 1000ms | Torque filter parameter |
| 11-16 P.405 | Torque setting source | 0 | 0 | Given by the11-12(P.401). |
| | | | 1 | Given by the analog or pulse input. |
| | | | 2 | Given by the communication mode. |
| 11-17 P.406 | Selection of speed limit | 0 | 0 | The speed is limited according to 11-13(P.402) and 11-14(P.403) |
| | | | 1 | Frequency reference source(it is decided according to00-16(P.79)) |
| 11-18 P.407 | Unidirectional speed limit bias | 1 | 0 | Unidirectional speed limit bias is invalid. |
| | | | 1 | Unidirectional speed limit bias is valid. |

Setting Torque control parameter

◆ 11-12is used to set the torque reference, the actual torque reference = 11-12*the motor rated torque;according to the motor rated torque method: $T(\text{N.M})=\frac{P(\text{W})}{\omega(\text{rad/s})}$,P(W) is on the basis of05-01, ω(rad/s)can be worked out according to the parameter 05-06: $\frac{2\pi\times P.307}{60}(\text{rad/s})$.

◆ Input value polarity

The direction of motor output torque depends on the polarity of the Torque reference and it has nothing to do with Run command. The following sheet shows the relationship among Torque reference, Run command, motor run direction and inverter run indication lamp.

| Item | Torque reference | | Run command | |
|---|---|---|---|---|
| | + | - | FWD | REV |
| motor run direction | Forward | Reverse | Has nothing to do with run command | |
| Inverter run indication lamp | Has nothing to do with torque reference direction and motor run direction | | FWD light on | REV light on |

- 11-15is the torque filter coefficient. When a bigger coefficient is set, the control will be stable, but the control response will be worse. When the coefficient is too small, the response will be quick, but the control can be unstable. If the best setting value is unknown, you can adjust the setting value appropriately according to the level of unstable control and response delay.

- When 11-16=1, the torque is given by the analog or pulse input. The maximum value of analog and pulse setting correspond to the motor rated torque. When 11-16=2, the torque is given by the communication mode. There are two ways to set the torque by communication mode, one is changing the value of 11-12when 11-16 is set to 0, and another is setting by the Modbuscommunication addressH100D when 11-16 is set to 2. When the Modbus communication address H100D is set to -10000~10000, it represents -100%~100% of the motor rated torque.

- Speed limit and speed limit bias of torque control

  When 11-17=0，limit speed of torque control according to 11-13 and 11-14；When 11-17=1，limit speed of torque control according to frequency source, which is set by 00-16.

  A bias can be added to the speed limit using parameter 11-14 and parameter 11-18 determines how the speed limit bias is applied. The following sheet shows the setting relationship, and “frequency” in sheet refers to the frequency reference set by frequency source which is set by 00-16.

| | Operating condition | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Run command | Forward | Reverse | Forward | Reverse | Forward | Reverse | Forward | Reverse |
| Torque reference direction | + | + | - | - | + | + | - | - |
| Speed Limit Direction | + | - | - | + | - | + | + | - |
| Normal operation direction | Forward | | Reverse | | Forward | | Reverse | |
| Normal speed limit (11-18=0,11-17=0) | 11-13 + 11-14 | 11-13 + 11-14 | 11-13 + 11-14 | 11-13 + 11-14 | 11-14 | 11-14 | 11-14 | 11-14 |
| Normal speed limit (11-18=1,11-17=0) | 11-13 | 11-13 | 11-13 | 11-13 | 11-14 | 11-14 | 11-14 | 11-14 |
| Normal speed limit (11-18=0,11-17=1) | Frequency + 11-14 | Frequency + 11-14 | Frequency + 11-14 | Frequency + 11-14 | 11-14 | 11-14 | 11-14 | 11-14 |
| Normal speed limit (11-18=1,11-17=1) | Frequency | Frequency | Frequency | Frequency | 11-14 | 11-14 | 11-14 | 11-14 |

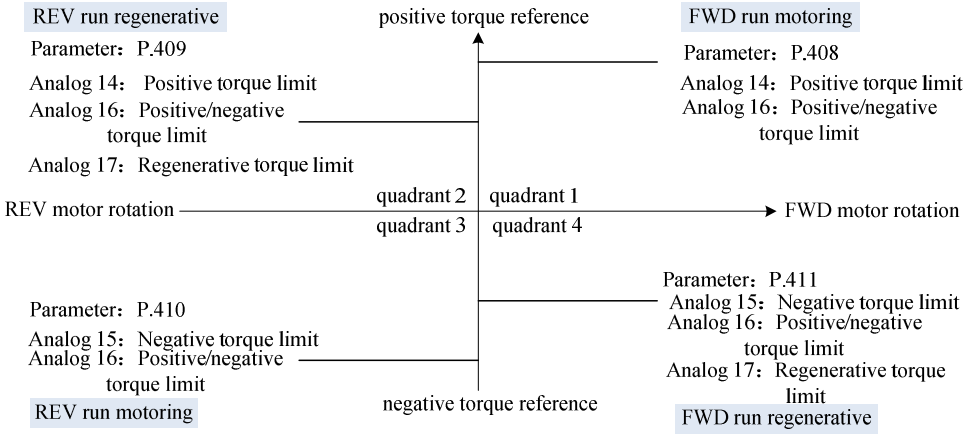
## 5.12.4 Torque limit

- Set the torque limit values of the four quadrants via parameters.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-19 P.408 | Forward motor torque limit | 200.0% | 0～400.0% | Set the torque limit of the first quadrant. |
| 11-20 P.409 | Reverse regenerative torque limit | 200.0% | 0～400.0% | Set the torque limit of the second quadrant. |
| 11-21 P.410 | Reverse motor torque limit | 200.0% | 0～400.0% | Set the torque limit of the third quadrant. |
| 11-22 P.411 | Forward regenerative torque limit | 200.0% | 0～400.0% | Set the torque limit of the fourth quadrant. |

Setting Fourquadrants torque limit function

- 11-19~11-22 are set to 100.0%, corresponding to vector control, the inverter max output torque is the motor rated torque.
- The motor rated torque calculating method: $T(N.M)=\frac{P(W)}{\omega(rad/s)}$, P(W) is on the basis of 05-01, ω(rad/s)can be worked out according to the parameter05-06(P.307): $\frac{2\pi\times P.307}{60}(rad/s)$.
- See the figure below for four quadrants torque limit:




- Among the torque limit set by parameter, the torque limit set by analog and the inverter output current limit set by 06-01, the minimum torque limit is valid.

## 5.12.5 The second motor control parameter

- Realize the second motor driving function via setting the second motor control parameter with digital input terminal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-30 P.371 | The second motor speed control proportion coefficient 1 | 100.0 | 0 ~ 2000.0<br>99999 | --- |
| 11-31 P.372 | The second motor Speed control integral time 1 | 0.30s | 0 ~ 20.00s<br>99999 | --- |
| 11-32 P.373 | The second motor PI coefficient switchingfrequency 1 | 5.00Hz | 0 ~ 11-35 (P.376)Hz<br>99999 | --- |
| 11-33 P.374 | The second motor speed control proportion coefficient 2 | 100.0 | 0 ~ 2000.0<br>99999 | --- |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-34 P.375 | The second motor Speed control integral time 2 | 0.30s | 0～20.00s<br>99999 | --- |
| 11-35 P.376 | The second motor PI coefficient switching frequency 2 | 10.00Hz | 11-32(P.373)~650.00 Hz<br>99999 | --- |
| 11-36 P.377 | The second motor current control proportion coefficient | 0 | 0～20<br>99999 | --- |

Setting The second motor control parameter

- When 00-22 ≠ 99999 and RT signal is ON, the second motor control parameter11-30~11-36 are valid. Forthe second function parameter, please refer to Section 5.2.10.
- Please refer to 05-22~05-38 for the second motor parameter.
- For the parameter setting, please refer to 11-00~11-06 parameter function.

## 5.12.6 The second PM motor setting

- Realize the second PMmotor driving function via setting the second PMmotor control parameter with digital input terminal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-37 P.378 | The second PM motor types | 0 | 0 | SPM |
| | | | 1 | IPM |
| | | | 99999 | --- |
| 11-38 P.379 | The second PM initial motor position detection selection | 0 | 0 | Pull in. |
| | | | 1 | High frequency pulse |
| | | | 99999 | --- |
| 11-39 P.380 | The second PM motor acceleration id | 80% | 0～200% | --- |
| | | | 99999 | |
| 11-40 P.381 | The second PM motor constant speed id | 0% | 0～200% | --- |
| | | | 99999 | |
| 11-41 P.382 | The second PM motor estimated rotation speed filter time | 2ms | 0～1000ms | --- |
| | | | 99999 | |

Setting PM motor control parameter

- When 00-22 ≠ 99999, and RT signal is ON, second motor control parameter11-30~11-36are valid. For the second function parameter, please refer to Section5.2.10.
- Please refer to 05-22~05-38 for the second motor parameter.
- For the parameter setting, please refer to 11-07~11-11parameter function.

## 5.12.7 PM motor speed estimation observer parameters

➢ By setting the PM motor speed estimation observer parameters, it can improve the stability of the PM motor SVC mode.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-42<br>P.365 | Reserve | -- | | |
| | | | | |
| 11-43<br>P.366 | PM motor speed estimation observer Kp | 10 | 0 ~ 65000 | --- |
| 11-44<br>P.367 | PM motor speed esti mation observer Ki | 376 | 0 ~ 65000 | --- |

Setting PM motor SVC mode speed estimation observer parameters

◆ Setting a PM motor SVC model (00-21 = 6), if the motor run abnormal, you can manually adjust 11-43, 11-44 , eventually making PM motor SVC mode stable operation.

## 5.12.8 PM Motor current loop controller parameters

➢ By setting PM current loop controller parameters, adjustable current loop responsiveness

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 11-45<br>P.383 | PM Zero speed motor current loop bandwidth coefficient | 40 | 0~100 | --- |
| 11-46<br>P.384 | PMMotor current loop bandwidth coefficient at low speed | 40 | 0 ~ 100 | --- |
| 11-47<br>P.385 | PMMotor current loop bandwidth coefficient at a high speed | 40 | 0 ~ 100 | --- |

Setting PM Motor current loop controller parameters

◆ Current loop bandwidth between the zero speed and low speed, high speed switching and switching speed loop controller parameters is consistent;

◆ Accordance with the requirements of responsive adjustment in 11-45, 46, 11-11-47, the setting, the greater the current loop response faster, but may be volatile, low electromagnetic noise lead to the motor.

# 5.13 Position control parameter 12

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 12-00 | P.420 | Homing mode | 0 ~ 2123 | 0 | 246 |
| 12-01 | P.421 | The first high speed of Homing | 0 ~ 650.00Hz | 10.00Hz | 246 |
| 12-02 | P.422 | The second high speed of Homing | 0 ~ 650.00Hz | 2.00Hz | 246 |
| 12-03 | P.423 | The origin pulse offset | -30000~30000 | 0 | 246 |
| 12-04 | P.424 | Position instruction source | 0: External pulse.<br>1: Relative position.<br>2: Absolute position. | 0 | 249 |
| 12-05 | P.425 | Position control proportion gain | 0 ~ 65535 | 10 | 249 |
| 12-06 | P.426 | Position control feed forward gain | 0 ~ 65535 | 0 | 249 |
| 12-07 | P.427 | Position control feed forward low pass filter time | 0 ~ 65535ms | 100ms | 249 |
| 12-08 | P.428 | External pulse position control speed limit | 0 ~ 650.00Hz | 10.00Hz | 249 |
| 12-09 | P.429 | Position reaching margin | 0 ~ 65535 | 10 | 249 |
| 12-10 | P.430 | Zero servo gain | 0 ~ 100 | 5 | 251 |
| 12-11 | P.431 | Single point positioning location | 0~65535 | 0 | 251 |
| 12-12 | P.432 | Frequency of single point locating | 0~650.00Hz | 0.00Hz | 251 |
| 12-13 | P.433 | Zero velocity threshold | 0~650.00Hz | 0.50Hz | 249 |
| 12-14 | P.434 | Position command response options | 0~2 | 0 | 249 |
| 12-20 | P.450 | Number of turns position command1 | -30000~30000 | 0 | 252 |
| 12-21 | P.451 | Number of pulses position command1 | -30000~30000 | 0 | 252 |
| 12-22 | P.452 | Number of turns position command2 | -30000~30000 | 0 | 252 |
| 12-23 | P.453 | Number of pulses position command2 | -30000~30000 | 0 | 252 |
| 12-24 | P.454 | Number of turns position command3 | -30000~30000 | 0 | 252 |
| 12-25 | P.455 | Number of pulses position command3 | -30000~30000 | 0 | 252 |
| 12-26 | P.456 | Number of turns position command4 | -30000~30000 | 0 | 252 |
| 12-27 | P.457 | Number of pulses position command4 | -30000~30000 | 0 | 252 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 12-28 | P.458 | Number of turns position command5 | -30000~30000 | 0 | 252 |
| 12-29 | P.459 | Number of pulses position command5 | -30000~30000 | 0 | 252 |
| 12-30 | P.460 | Number of turns position command6 | -30000~30000 | 0 | 253 |
| 12-31 | P.461 | Number of pulses position command6 | -30000~30000 | 0 | 253 |
| 12-32 | P.462 | Number of turns position command7 | -30000~30000 | 0 | 253 |
| 12-33 | P.463 | Number of pulses position command7 | -30000~30000 | 0 | 253 |
| 12-34 | P.464 | Number of turns position command8 | -30000~30000 | 0 | 253 |
| 12-35 | P.465 | Number of pulses position command8 | -30000~30000 | 0 | 253 |
| 12-36 | P.466 | Number of turns position command9 | -30000~30000 | 0 | 253 |
| 12-37 | P.467 | Number of pulses position command9 | -30000~30000 | 0 | 253 |
| 12-38 | P.468 | Number of turns position command10 | -30000~30000 | 0 | 253 |
| 12-39 | P.469 | Number of pulses position command10 | -30000~30000 | 0 | 253 |
| 12-40 | P.470 | Number of turns position command11 | -30000~30000 | 0 | 253 |
| 12-41 | P.471 | Number of pulses position command11 | -30000~30000 | 0 | 253 |
| 12-42 | P.472 | Number of turns position command12 | -30000~30000 | 0 | 253 |
| 12-43 | P.473 | Number of pulses position command12 | -30000~30000 | 0 | 253 |
| 12-44 | P.474 | Number of turns position command13 | -30000~30000 | 0 | 253 |
| 12-45 | P.475 | Number of pulses position command13 | -30000~30000 | 0 | 253 |
| 12-46 | P.476 | Number of turns position command14 | -30000~30000 | 0 | 253 |
| 12-47 | P.477 | Number of pulses position command14 | -30000~30000 | 0 | 253 |
| 12-48 | P.478 | Number of turns position command15 | -30000~30000 | 0 | 253 |
| 12-49 | P.479 | Number of pulses position command15 | -30000~30000 | 0 | 253 |

## 5.13.1 Homing mode

➢ Set the Homing position of position control via Homing mode.

<table>
<tr><th>Parameter</th><th>Name</th><th>Factory Value</th><th>Setting Range</th><th>Content</th></tr>
<tr><td>12-00<br>P.420</td><td>Homing mode</td><td>0</td><td>0 ~ 2123</td><td>Homing mode setting:<br><table><tr><td>u</td><td>x</td><td>y</td><td>z</td></tr></table><br><table><tr><td>u</td><td>0: Close Homing mode.<br>1: When the power is ON, Homing mode operates automatically.<br>2: Set the terminal to SHOM function, homing function starts.</td></tr><tr><td>x</td><td>0: After checking point, the motor decelerates to point.<br>1: After checking point, the motor decelerates to stop at the forwarding direction.</td></tr><tr><td>y</td><td>0: When in Homing mode, return to search for Z-pulse.<br>1: No return when in Homing mode, forward run and search for Z-pulse.<br>2: When in Homing mode, locate in searcher point or Z-pulse.</td></tr><tr><td>z</td><td>0: Forward run to home. Set ORGPas check point.<br>1: Reverse run to home. Set ORGPas check point.<br>2: Forward run and search for Z-pulse as check point.<br>3: Reverse run and search for Z-pulse as check point.</td></tr></table></td></tr>
<tr><td>12-01<br>P.421</td><td>The first high speed of Homing</td><td>10.00Hz</td><td>0 ~ 650.00Hz</td><td>---</td></tr>
<tr><td>12-02<br>P.422</td><td>The second high speed of Homing</td><td>2.00Hz</td><td>0 ~ 650.00Hz</td><td>---</td></tr>
<tr><td>12-03<br>P.423</td><td>Home position shift pulse</td><td>0</td><td>-30000~30000</td><td>---</td></tr>
</table>

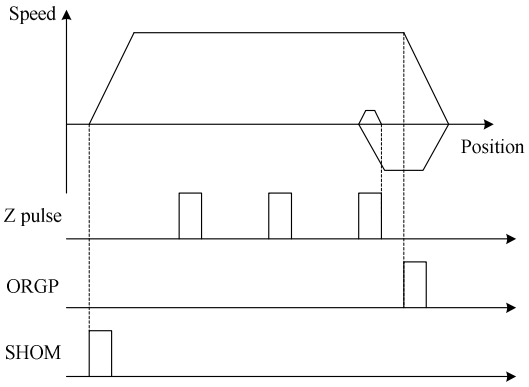
Setting Homing mode

◆ Homing mode setting table(√represents setting is available, ×represents setting is unavailable)

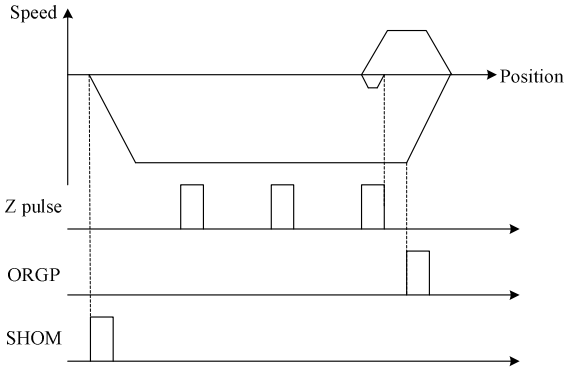
| y \ z | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | √ | √ | × | × |
| 1 | √ | √ | × | × |
| 2 | √ | √ | √ | √ |

◆ Take u=2, x=0 as example, speed of Homing corresponded position sequence Diagram:

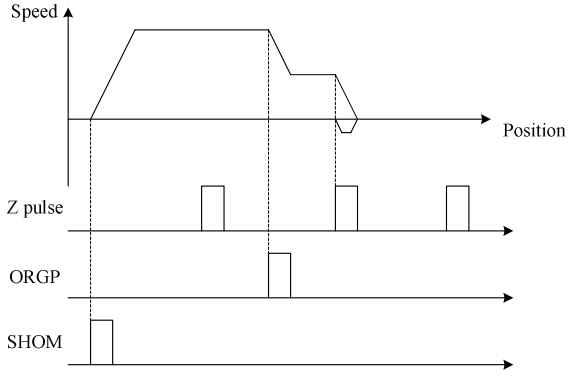
1. y=0、z=0



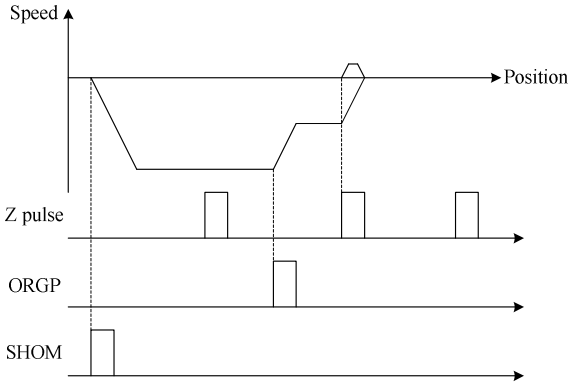

2. y=0、z=1



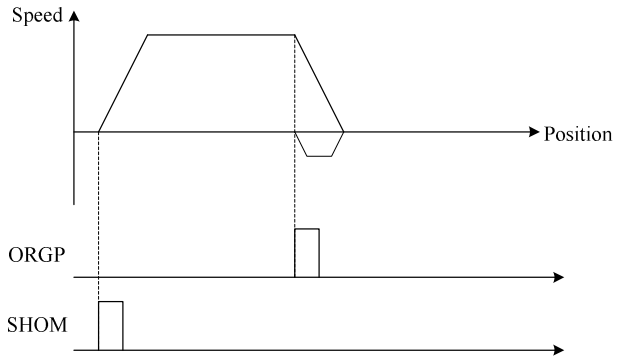

3. y=1、z=0



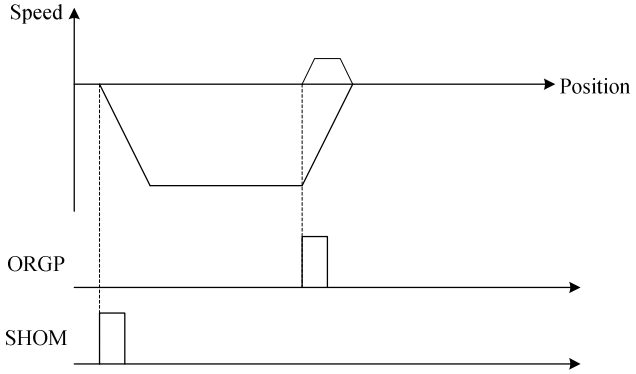

4. y=1、z=1



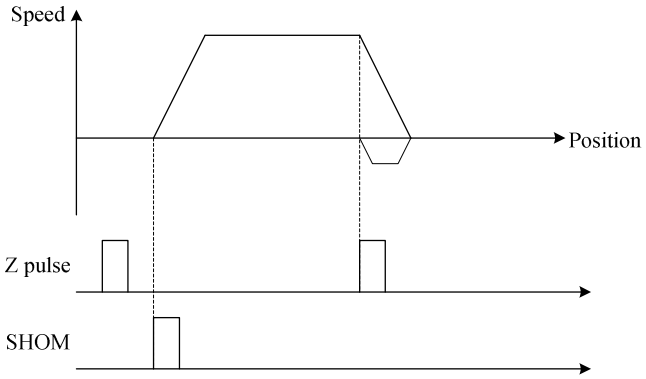
5. y=2、z=0



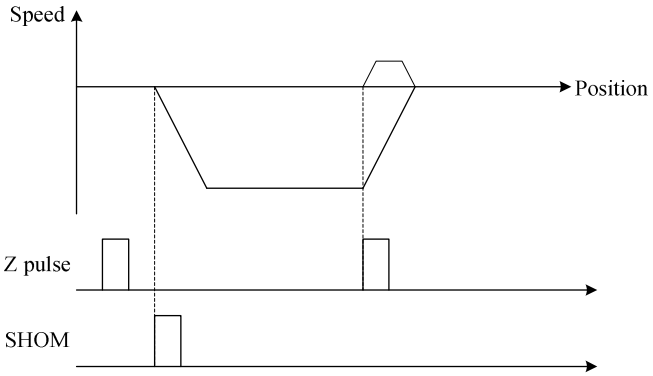

6. y=2、z=1




7. y=2、z=2




8. y=2、z=3




◆ Origin of pulse offset: according to the motor forward direction set origin pulse offset pulse number

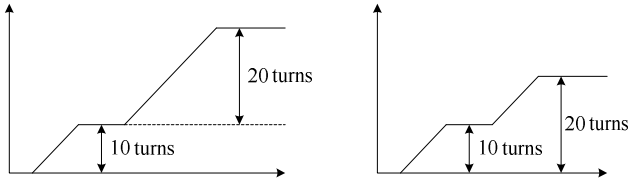
## 5.13.2 Position control parameter

➢ Realize high accuracy position control function via setting with PG vector control mode.

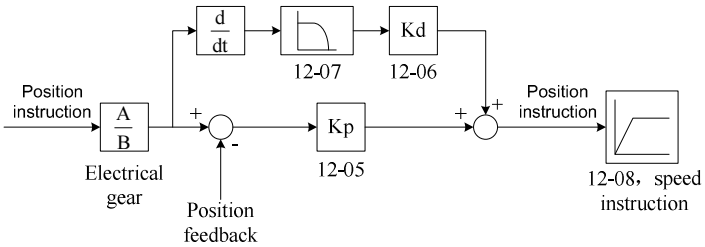
| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 12-04 P.424 | Position instruction source | 0 | 0 | Position instruction source comes from external pulse. |
| | | | 1 | Position instruction source comes from the parameter (relative position). |
| | | | 2 | Position instruction source comes from the parameter (absolute position). |
| 12-05 P.425 | Position control proportion gain | 10 | 0 ~ 65535 | Increase setting can improve the response of position control, but may cause overshoot. |
| 12-06 P.426 | Position control feed forward gain | 0 | 0 ~ 65535 | Increase setting can improve the response of position control, but may cause overshoot. |
| 12-07 P.427 | Position control feed forward low pass filter time | 100ms | 0 ~ 65535ms | --- |
| 12-08 P.428 | External pulse position control speed limit | 10.00Hz | 0 ~ 650.00Hz | --- |
| 12-09 P.429 | Position reaching margin | 40 | 0 ~ 65535 | --- |
| 12-13 P.433 | Zero velocity threshold | 0.50Hz | 0~650.00Hz | --- |
| 12-14 P.434 | Position command response options | 0 | 0~2 | --- |

Setting Position control function

- When 12-04=0, position instruction is given by the pulse of A2/B2.(For the pulse given, please refer to 09-07 Encoder input mode 2)
- When 12-04=1, 2, position instruction is given by 12-20~12-49, 1 stands for relative position, 2 stands for absolute position. See the figure below:

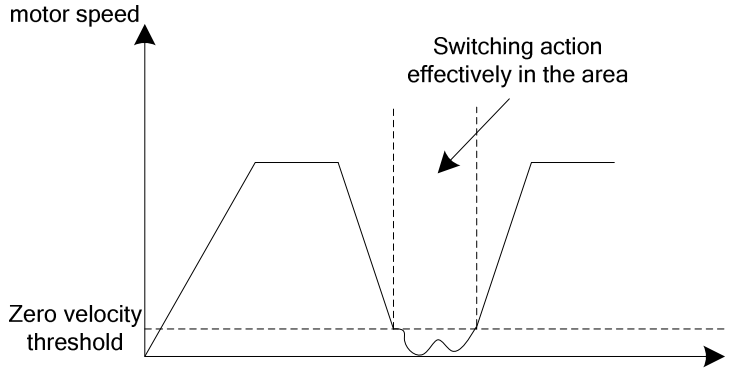



- Position control diagram




- When position instruction source comes from the parameter, the position control speed limit is decided by multi-speed instruction.
- The difference between the motor actual position and position command is smaller than the setting value of the position attained margin12-09(P.429), which is regarded as position attained. If the function setting of multi-function digital output terminal is 21, the multi-function digits will output signals.

- Zero velocity threshold: when the motor speed is less than 12-13 (P. 433), multi-function input terminal state (position/speed switching action) is effective.

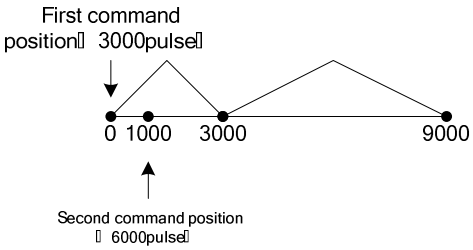



- Position command response

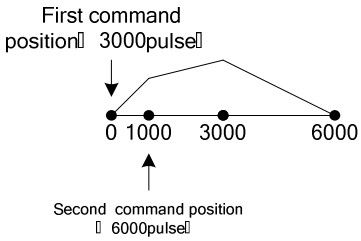
Pr position mode, the position command response

The relative position 12-04 (P. 424) = 1:

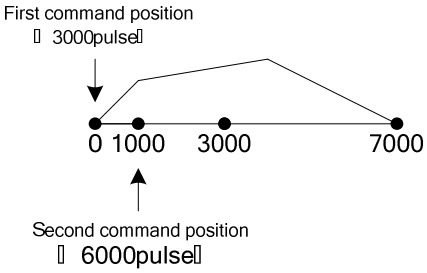
12-14(P.434)=0：




12-14(P.434)=1：

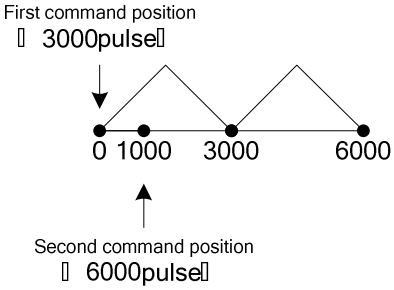



12-14(P.434)=2

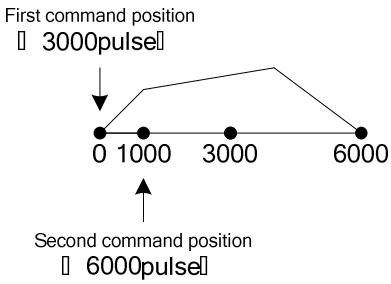



Absolute position 12-04 (P. 424) = 2:

12-14(P.434)=0：




12-14(P.434)=1：




Note:1. Please refer to 03-10~03-11 for function selection and purposes of the multi-function digital output terminal. For related wiring, please refer to Section 3.5.

2. Please refer to 03-00~03-05 for function selection and purposes of the multi-function digital input terminal. For related wiring, please refer to Section 3.5.

## 5.13.3 Zero servo

➢ Adjusts the responsiveness of the zero servo position loop via setting zero servo gain.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 12-10<br>P.430 | Zero servo gain | 5 | 0 ~ 100 | --- |

Setting Zero servo

◆ Parameter 12-10 adjusts the responsiveness of the zero servo position loop. Increase the value if the response is too slow and the deviation from the zero position rises too high when load is applied. Decrease the value if vibrations occur during zero servo operation.

## 5.13.4 Single point positioning function

➢ Single point positioning belongs to the category of position control, but with the application of existing Pt, completely independent Pr position mode.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 12-11<br>P.431 | Single point positioning location | 0 | 0~65535 | --- |
| 12-12<br>P.432 | Frequency of single point locating | 0.00Hz | 0~650.00Hz | --- |

Setting Single point positioning

◆ Single point positioning is in speed control mode, through external terminal function embedded in a motor rotor finally stopped to control the amount of the Angle of the position control function, function as shown in the figure below:

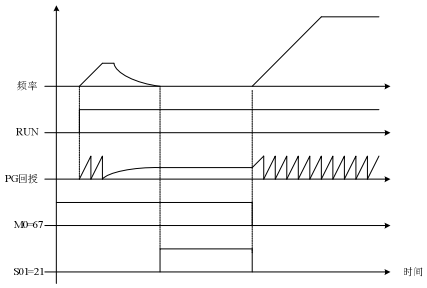



Figure 1.1 single point positioning can make before operation

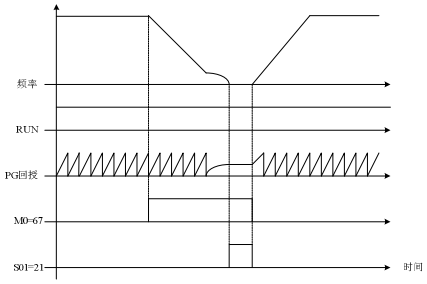



Figure 1.2 single point positioning can make during operation

As shown in the above, the single point positioning function can be described as follows:

In closed loop speed mode, set the external terminals can function as the single point positioning make (example 03-03 (P. 80) = 68), when M0 terminal OFF, is pure speed mode, when M0 terminal ON inverter from the current operating frequency curve acceleration and deceleration, run to locate frequency parameters (12-12 set), located in the frequency of operation, until the Z phase was detected, will switch to the value is set to 12-11 position control of the target location (position control process not deceleration curve), the position control gain (12-05 (P. 425)), arriving position output terminal and position allowance (12-09 (P. 429)) and Pt, Pr position mode share.

## 5.13.5 Position command

- Set the position command value in position control mode via parameter with the digital input terminal state.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 12-20 P.450 | Number of turns position command1 | 0 | -30000~30000 | |
| 12-21 P.451 | Number of pulses position command1 | 0 | -30000~30000 | |
| 12-22 P.452 | Number of turns position command2 | 0 | -30000~30000 | |
| 12-23 P.453 | Number of pulses position command2 | 0 | -30000~30000 | |
| 12-24 P.454 | Number of turns position command3 | 0 | -30000~30000 | |
| 12-25 P.455 | Number of pulses position command3 | 0 | -30000~30000 | |
| 12-26 P.456 | Number of turns position command4 | 0 | -30000~30000 | |
| 12-27 P.457 | Number of pulses position command4 | 0 | -30000~30000 | |
| 12-28 P.458 | Number of turns position command5 | 0 | -30000~30000 | |
| 12-29 P.459 | Number of pulses position command5 | 0 | -30000~30000 | |

| Terminal state | | | | Target position | | | upper limit of frequency |
|---|---|---|---|---|---|---|---|
| REX | RH | RM | RL | Rotation turns+ number of pulses | | | |
| 0 | 0 | 0 | 0 | | | | 0 |
| 0 | 1 | 0 | 0 | Position1 | 12-20 | 12-21 | Speed 1 |
| 0 | 0 | 1 | 0 | Position2 | 12-22 | 12-23 | Speed 2 |
| 0 | 0 | 0 | 1 | Position3 | 12-24 | 12-25 | Speed 3 |
| 0 | 0 | 1 | 1 | Position4 | 12-26 | 12-27 | Speed 4 |
| 0 | 1 | 0 | 1 | Position5 | 12-28 | 12-29 | Speed 5 |
| 0 | 1 | 1 | 0 | Position6 | 12-30 | 12-31 | Speed 6 |
| 0 | 1 | 1 | 1 | Position7 | 12-32 | 12-33 | Speed 7 |
| 1 | 0 | 0 | 0 | Position8 | 12-34 | 12-35 | Speed 8 |
| 1 | 0 | 0 | 1 | Position9 | 12-36 | 12-37 | Speed 9 |
| 1 | 0 | 1 | 0 | Position10 | 12-38 | 12-39 | Speed 10 |
| 1 | 0 | 1 | 1 | Position11 | 12-40 | 12-41 | Speed 11 |
| 1 | 1 | 0 | 0 | Position12 | 12-42 | 12-43 | Speed 12 |
| 1 | 1 | 0 | 1 | Position13 | 12-44 | 12-45 | Speed 13 |
| 1 | 1 | 1 | 0 | Position14 | 12-46 | 12-47 | Speed 14 |
| 1 | 1 | 1 | 1 | Position15 | 12-48 | 12-49 | Speed 15 |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 12-30<br>P.460 | Number of turns position command6 | 0 | -30000~30000 | Same as 12-20 (P.450) |
| 12-31<br>P.461 | Number of pulses position command6 | 0 | -30000~30000 | |
| 12-32<br>P.462 | Number of turns position command7 | 0 | -30000~30000 | |
| 12-33<br>P.463 | Number of pulses position command7 | 0 | -30000~30000 | |
| 12-34<br>P.464 | Number of turns position command8 | 0 | -30000~30000 | |
| 12-35<br>P.465 | Number of pulses position command8 | 0 | -30000~30000 | |
| 12-36<br>P.466 | Number of turns position command9 | 0 | -30000~30000 | |
| 12-37<br>P.467 | Number of pulses position command9 | 0 | -30000~30000 | |
| 12-38<br>P.468 | Number of turns position command10 | 0 | -30000~30000 | |
| 12-39<br>P.469 | Number of pulses position command10 | 0 | -30000~30000 | |
| 12-40<br>P.470 | Number of turns position command11 | 0 | -30000~30000 | --- |
| 12-41<br>P.471 | Number of pulses position command11 | 0 | -30000~30000 | --- |
| 12-42<br>P.472 | Number of turns position command12 | 0 | -30000~30000 | --- |
| 12-43<br>P.473 | Number of pulses position command12 | 0 | -30000~30000 | --- |
| 12-44<br>P.474 | Number of turns position command13 | 0 | -30000~30000 | --- |
| 12-45<br>P.475 | Number of pulses position command13 | 0 | -30000~30000 | --- |
| 12-46<br>P.476 | Number of turns position command14 | 0 | -30000~30000 | --- |
| 12-47<br>P.477 | Number of pulses position command14 | 0 | -30000~30000 | --- |
| 12-48<br>P.478 | Number of turns position command15 | 0 | -30000~30000 | --- |
| 12-49<br>P.479 | Number of pulses position command15 | 0 | -30000~30000 | --- |

Setting Position command

- When 12-04=1, 2, set terminal function to REX, RH, RM and RL, and the position command is decided by parameter and digital input terminal state.
- The position control acceleration/deceleration time is set by 01-06 and 01-07.
- The position command comes from the parameter position control, and the motor operation direction is decided by position command and forward/reverse rotation command. The target position is related to parameter 09-02 Encoder input type1.

For example: set 09-01 to 1024, the encoder number of pulses 1 is 1024; Set 12-20 to 1,number of turns position command1 is 1 turn; Set 12-21 to 1024, number of pulses position command1 is 1024,

If 09-02=1 or 2, encoder input type 1 is Phase A/B pulse input, the position command is: 1 turn + 1/4 turn.

If 09-02=3 or 4, encoder input type 1 is Phase A pulse input, Phase B is a direction input, position command is: 1 turn+1 turn.

Note: RL, RM, RH and REX here are the function names of "Multi-function digital input terminal". Please refer to 03-03、03-04、03-05、03-00、03-01 and 03-02 for function selection and purposes of the multi-function digital input terminal.For related wiring, please refer to Section 3.5.

## 5.14 Special adjustment parameter group13

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 13-00 | P.89 | Slip compensation coefficient | 0 ~ 10 | 0 | 256 |
| 13-01 | P.246 | Modulation coefficient | 0.90 ~ 1.20 | 1.00 | 256 |
| 13-02 | P.285 | Low frequency vibration inhibition factor | 0 ~ 8 | 5 | 256 |
| 13-03 | P.286 | High frequency vibration inhibition factor | XX00 ~ XX15<br>00XX ~15XX | 509 | 256 |

## 5.14.1 Slip compensation V/F

- This parameter can be used to set compensation frequency and reduce the slip to close the setting speed when the motor runs in the rated current to raise the speed control accuracy.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 13-00 P.89 | Slip compensation coefficient | 0 | 0 ~ 10 | 0: Slip compensation is forbidden.<br>10: The compensation value is 3% of the target frequency. |

Note:1.This function is only valid under the V/F mode(00-21="0").
2. During slip compensation, the output frequency may be larger than the setting frequency.

## 5.14.2 Modulation coefficient

- It is used to determine the ratio between the maximum output voltage and the input voltage.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 13-01 P.246 | Modulation coefficient | 1.00 | 0.90 ~ 1.20 | The maximum output voltage ="13-01"× the input voltage |

Setting Modulation coefficient

- The users can use this parameter to obtain an output voltage that is higher than the input voltage.
- But the output voltage waveform at this point will generate distortion and contain assorted harmonics. It may also increase the motor torque harmonics and noises.

## 5.14.3 Vibration inhibition

- Inhibit the great vibration of inverter output current and motor rotation speed and the motor vibration.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 13-02 P.285 | Low frequency vibration inhibition factor | 5 | 0 ~ 8 | If motor vibration is generated at lower frequency, adjust the set value of 13-02. |
| 13-03 P.286 | High frequency vibration inhibition factor | 509 | XX00~XX15<br>00XX~15XX | If motor vibration is generated at higher frequency, adjust the set value of 13-03. Gradually increase the set value by the unit of 1.<br>13-03 two high and low two set the range of 0 ~ 15 |

Setting Vibration inhibition factor

- For the actual application, use the vibration-generating frequency that is lower or higher than half of the motor rated frequency to determine whether the occurred vibration is a low-frequency vibration or a high-frequency vibration. i.e:
  If the rated frequency on the name plate of the motor is 50Hz,

And the vibration-generating frequency is lower than 25Hz, then this is a low-frequency vibration.

On the other hand, if the vibration-generating frequency is higher than 25Hz, then this is a high-frequency vibration.

Note: When the motor load is light, current flow may happen at certain specific operation frequency. This situation may cause the motor to vibrate slightly. The user can neglect it if this trivial vibration has no impact on the application.

## 5.15 Tension control parameter group 14

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 14-00 | P.600 | The tension control selection | 0: The tension control is invalid<br>1: Open-loop torque control mode(in the mode of close-loop vector control)<br>2: Close-loop speed control mode<br>3: Close-loop torque control mode (in the mode of close-loop vector control)<br>4: Constant line speed control mode. | 0 | 261 |
| 14-01 | P.601 | The curling mode | 0: Wind-up<br>1: Roll-down | 0 | 261 |
| 14-02 | P.602 | Selection of inverse take-up during roll-down | 0: Active inverse material take-up is not allowed during startup.<br>1: Active inverse material take-up is allowed. | 0 | 261 |
| 14-03 | P.603 | Mechanical transmission ratio | 0 ~ 300.00 | 1.00 | 261 |
| 14-04 | P.604 | Tension setting source | 0: The parameter 14-05(P.605) setting.<br>1: The analog value or PULSE input setting.<br>2: Communication setting. | 0 | 262 |
| 14-05 | P.605 | Tension setting | 0 ~ 30000N | 0N | 262 |
| 14-06 | P.606 | Maximum tension | 0 ~ 30000N | 0N | 262 |
| 14-07 | P.607 | Zero-speed tension increase | 0 ~ 50.0% | 0.0% | 262 |
| 14-08 | P.608 | Zero-speed threshold | 0 ~ 30.00Hz | 0.00Hz | 262 |
| 14-09 | P.609 | Tension taper | 0 ~ 100.0% | 0% | 262 |
| 14-10 | P.654 | Taper compensation correction | 0 ~ 10000mm | 0mm | 262 |
| 14-11 | P.610 | Curling radius calculation method selection | 0: Calculation through line speed.<br>1: Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card.<br>2: Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal M2<br>3: Analog value or pulse input. | 0 | 263 |
| 14-12 | P.650 | Curling radius memory control when calculation through thickness accumulation | 0: It does not memorize the curling radius when turning off the power or stopping calculating the curling radius.<br>1: It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate. | 0 | 263 |
| 14-13 | P.611 | Maximum curling radius | 0 ~ 10000mm | 500mm | 263 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 14-14 | P.612 | Winding shaftdiameter | 0 ~ 10000mm | 100mm | 263 |
| 14-15 | P.613 | Initial curling radius source | 0: Initial curling radius is set by the parameter 14-16(P.614) ~ 14-18(P.616).<br>1: Initial curling radius is set by the analog value. | 0 | 263 |
| 14-16 | P.614 | Initial curling radius1 | 1 ~ 10000mm | 100mm | 263 |
| 14-17 | P.615 | Initial curling radius 2 | 1 ~ 10000mm | 100mm | 263 |
| 14-18 | P.616 | Initial curling radius 3 | 1 ~ 10000mm | 100mm | 263 |
| 14-19 | P.617 | Curling radius filtering time | 0 ~ 1000ms | 0ms | 263 |
| 14-20 | P.618 | Current value of curling radius | 0 ~ 10000mm | 0mm | 264 |
| 14-21 | P.619 | Number of pulses each turn | 1 ~ 60000 | 1 | 264 |
| 14-22 | P.620 | Number of turns each layer | 1 ~ 10000 | 1 | 264 |
| 14-23 | P.621 | Material thickness setting source | 0: The material thickness is set by the parameter 14-24(P.622) ~ 14-27(P.625).<br>1: The material thickness is set by the analog value. | 0 | 264 |
| 14-24 | P.622 | Material thickness0 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| 14-25 | P.623 | Material thickness1 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| 14-26 | P.624 | Material thickness2 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| 14-27 | P.625 | Material thickness3 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| 14-28 | P.626 | Maximum thickness | 0.01 ~ 100.00mm | 1.00mm | 264 |
| 14-29 | P.627 | Line speed inputsource | 0: No line speed input.<br>1: The analog value or pulse input<br>2: The communication setting. | 0 | 266 |
| 14-30 | P.628 | Maximum line speed | 0.1 ~ 6500.0m/min | 1000.0m/ min | 266 |
| 14-31 | P.629 | Minimum line speed for calculation R. | 0.1 ~ 6500.0m/min | 200.0m/ min | 266 |
| 14-32 | P.630 | Actual line speed | 0 ~ 6500.0m/min | 0.0m/min | 266 |
| 14-33 | P.633 | Mechanical inertia compensationcoefficient | 0 ~ 65535 | 0 | 267 |
| 14-34 | P.634 | Material density | 0 ~ 60000kg/ $m^3$ | 0kg/ $m^3$ | 267 |
| 14-35 | P.635 | Material width | 0 ~ 60000mm | 0mm | 267 |
| 14-36 | P.636 | Fiction compensation coefficient | 0 ~ 50.0% | 0.0% | 267 |
| 14-37 | P.637 | Material supplyinterrupt auto detection function | 0: Material supply interrupt auto detection is inactive.<br>1: Material supply interrupt auto detection function1<br>2:Material supply interrupt auto detection function 2<br>3:Material supply interrupt auto detection function 3 | 0 | 267 |
| 14-38 | P.638 | Auto detection minimum line speed | 0.1 ~ 6500.0m/min | 200.0m/ mn | 267 |
| 14-39 | P.639 | Auto detection error range | 0.1 ~ 100.0% | 10.0% | 268 |

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 14-40 | P.640 | Auto detection judgment delay | 0.1 ~ 60.0s | 2.0s | 268 |
| 14-41 | P.645 | Pre-drive speed gain | -50.0% ~ 50.0% | 0.0% | 268 |
| 14-42 | P.646 | Pre-drive torque increase | -50.0% ~ 50.0% | 0.0% | 268 |
| 14-43 | P.647 | Pre-drive torque delay time | 0 ~ 65535ms | 0ms | 268 |
| 14-44 | P.656 | Line speed setting source | 0: The line speed setting is invalid.<br>1: The line speed is obtained by analog value or pulse input.<br>2: The line speed is obtained by communication mode. | 0 | 270 |
| 14-45 | P.657 | Line speed setting | 0 ~ 6500.0m/min | 0.0m/min | 270 |
| 14-46 | P.658 | Tension closed-loop limite amplitude of benchmark | 0:amplitude limitingis based on the motor rated power<br>1:amplitude limitingis based on system real-time line speed | 0 | 270 |
| 14-47 | P.659 | Tension in closed-loop limite amplitude of the bias | 0.0% ~ 100.0% | 0.0% | 270 |

## 5.15.1 Tension control mode selection

➢ Select the control method for tension control.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-00 P.600 | The tension control selection | 0 | 0 | The tension control is invalid |
| | | | 1 | Open-loop torque control mode(in the mode of close-loop vector control) |
| | | | 2 | Close-loop speed control mode |
| | | | 3 | Close-loop torque control mode (in the mode of close-loop vector control) |
| | | | 4 | Constant line speed control mode. |
| 14-01 P.601 | The curling mode | 0 | 0 | Wind-up |
| | | | 1 | Roll-down |
| 14-02 P.602 | Selection of inverse take-up during roll-down | 0 | 0 | Active inverse material take-up is not allowed during startup. |
| | | | 1 | Active inverse material take-up is allowed. |
| 14-03 P.603 | Mechanical transmission ratio | 1.00 | 0 ~ 300.00 | Mechanical transmission ratio |

Setting Tension control mode

- When 14-00=0, the tension control is inactive, and the inverter is used as general inverter.
- When 14-00=1, the open-loop torque control mode is active. The inverter controls the constant tension through controlling the motor output torque. No tension feedback is required. The speed encoder must be installed when the inverter works in the mode of close-loop vector control.
- When 14-00=2, the close-loop speed control mode is active. The controlling result is to make the tension (position) feedback signal stable at the value given by PID.

  Close loop means that the tension (position) detection feedback forms a close loop for adjustment. Speed control mode means that the inverter realizes the control by adjusting the output frequency according to the feedback signal. This mode can work in any motor control mode, that is to say00-21 can be set to 0~4.
- When 14-00=3, the close-loop torque control mode is active. The tension feedback close-loop adjustment is added on the basis of open-loop tension control. The tension signal fed back by the tension detection device and the tension setting value constitute the PID close-loop adjustment which is used to adjust the inverter output Torque reference. The control method of it works in the mode of close-loop vector control method, and the speed encoder must be installed.
- When 14-00=4, the constant line speed control method is active. It is a special application to realize constant line speed control without PID adjustment, which is more stable than general close-loop control and applicable to the filed requiring smooth operation rather than fast line speed adjustment. This mode can work in any motor control mode, that is to say 00-21 can be set to 0~4.
- 14-01 is used to select the curling mode which can be combined with the switching terminal of wind-up and roll-down. If the switching terminal of wind-up and roll-down is inactive, the set of actual curling mode is the same with the function mode. If it is valid, the set of the actual curling mode is the same with the switching terminal of

wind-up and roll-down.

- 14-02 is used to select whether support active take-up of material through inverse running of motor. If “not allowed” is selected, during the roll-down control, the inverter can only output torque when material is running forward. During the roll-down, the frequency for inverse take-up can be limited by setting the upper limit frequency.
- 14-03 is the mechanical transmission ratio. Mechanical transmission ratio=motor rotation speed/winding shaft rotation speed, the mechanical transmission ratio must be correctly set during the tension control.

## 5.15.2 Tension setting

- The parameters in this part are only applicable in open–loop torque mode. Close–loop speed mode is set by PID setting source.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-04 P.604 | Tension setting source | 0 | 0 | The parameter 14-05(P.605) setting. |
| | | | 1 | The analog value or PULSE input setting. |
| | | | 2 | Communication setting. |
| 14-05 P.605 | Tension setting | 0N | 0 ~ 30000N | --- |
| 14-06 P.606 | Maximum tension | 0N | 0 ~ 30000N | --- |
| 14-07 P.607 | Zero-speed tension increase | 0.0% | 0 ~ 50.0% | --- |
| 14-08 P.608 | Zero-speed threshold | 0.00Hz | 0 ~ 30.00Hz | --- |
| 14-09 P.609 | Tension taper | 0.0% | 0 ~ 100.0% | --- |
| 14-10 P.654 | Taper compensation correction | 0mm | 0 ~ 10000mm | --- |

Setting Tension setting

- The parameters in this part are only applicable in open–loop torque mode.
- When 14-04=0, the tension is set by the parameter14-05.
- When 14-04=1, the tension is set by the analog value or pulse input terminal. If set the tension through this mode, the maximum tension 14-06 must be set. In general, the maximum value set by analog value and set in maximum pulse both correspond to the maximum tension. The pulse can be set by terminal M2.
- When 14-04=2, the tension is set by communication. If perform the control with upstream equipment, the tension can be set by communication. There are two ways to realize communication setting of tension: 1) Change value of 14-05, then 14-04 shall be set to 0; 2) Set the tension through Modbuscommunication address H100C, 14-04 shall be set to 2 and the Modbuscommunication address H100Cshall be set from 0 to 30000.
- 14-07is the zero-speed tension increase. It is used to set the tension of the system when it is at zero-speed. It is mainly for overcoming static friction when startup or keep certain tension when the system is at zero-speed. If the control tension is small and it is hard to start, it is allowed to properly increase the setting value of the parameter.

- 14-08is the zero-speed threshold. When the running speed of the inverter is below the set speed of the parameter, it is considered that the inverter is under zero-speed operation status.
- 14-09is the tension taper. The parameter is only used for wind-up control. For the wind-up control, sometimes, it is needed to reduce the tension while increasing the curling radius to ensure a good curling of the material.
- Formula of tension taper: $F=F0*\{1-K*[1-(D0+D1)/(D+D1)]\}$
- Wherein, F is the actual tension, F0 is the setting tension, D0 is the diameter of winding shaft, D is the actual curling radius, D1 is the taper compensation correction of 14-10 set tension, and K is the tension taper.
- 14-10is the taper compensation correction of tension which can relay the reduction curvature of tension.

### 5.15.3 Curling radius calculation

- The output torque is controlled by curling radius in open–loop torque mode.The output frequency corresponded to line speed is gained by curling radius in close–loop speed mode.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-11 P.610 | Curling radius calculation method selection | 0 | 0 | Calculation through line speed. |
| | | | 1 | Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card. |
| | | | 2 | Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal M2. |
| | | | 3 | Analog value or pulse input. |
| 14-12 P.650 | Curling radius memory control when calculation through thickness accumulation | 0 | 0 | It does not memorize the curling radius when turning off the power or stopping calculating the curling radius. |
| | | | 1 | It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate. |
| 14-13 P.611 | Maximum curling radius | 500mm | 1 ~ 10000mm | --- |
| 14-14 P.612 | Winding shaft diameter | 100mm | 1 ~ 10000mm | --- |
| 14-15 P.613 | Initial curling radius sourceInitial curling radius source | 0 | 0 | Initial curling radius is set by the parameter 14-16(P.614) ~ 14-18(P.616). |
| | | | 1 | Initial curling radius is set by the analog value. |
| 14-16 P.614 | Initial curling radius1 | 100mm | 1 ~ 10000mm | --- |
| 14-17 P.615 | Initial curling radius 2 | 100mm | 1 ~ 10000mm | --- |
| 14-18 P.616 | Initial curling radius 3 | 100mm | 1 ~ 10000mm | --- |
| 14-19 P.617 | Curling radius filtering time | 0ms | 0 ~ 1000ms | --- |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-20 P.618 | Current value of curling radius | 0mm | 0 ~ 10000mm | --- |
| 14-21 P.619 | Number of pulses each turn | 1 | 1 ~ 60000 | --- |
| 14-22 P.620 | Number of turns each layer | 1 | 1 ~ 10000 | --- |
| 14-23 P.621 | Material thickness setting source | 0 | 0 | The material thickness is set by the parameter 14-24(P.622) ~ 14-27(P.625). |
| | | | 1 | The material thickness is set by the analog value. |
| 14-24 P.622 | Material thickness0 | 0.01mm | 0.01 ~ 100.00mm | --- |
| 14-25 P.623 | Material thickness1 | 0.01mm | 0.01 ~ 100.00mm | --- |
| 14-26 P.624 | Material thickness2 | 0.01mm | 0.01 ~ 100.00mm | --- |
| 14-27 P.625 | Material thickness3 | 0.01mm | 0.01 ~ 100.00mm | --- |
| 14-28 P.626 | Maximum thickness | 1.00mm | 0.01 ~ 100.00mm | --- |

Setting Curling radius calculation

- In every tension control method, the curling radius is needed to be calculated. The curling radius can be acquired through the curling radius calculation module built in the inverter or through the external curling radius sensor.
- 14-11=0, the calculation through line speed: the curling radius is calculated by the system current line speed and the inverter output frequency. The equation is as follows:

  $D = (i \times V) / (\pi \times n)$

  Wherein D is the curling radius, iis the mechanical transmission ratio, V is the line speed, n is the motor speed.

  When the system operation speed is slow, the line speed of material and the output frequency of the inverter will be low. Then a little detection error will cause a big error in the curling radius calculation, so that a lowest line speed 14-31 must be set. When the line speed of material is lower than 14-31, the curling radius is stopped to calculate and the current value of curling radius remains unchanged. The value should be set below the normal working line speed.
- 14-11=1, the calculation of thickness accumulation: the curling radius is worked out through the encoder on the motor side and the gear feedback. In this condition, connect the pulse signal to A1/B1 on PG card and set the encoder input mode setup (09-02), the mechanical transmission ratio (14-03), the number of pulses per revolution of the encoder (09-01), the number of turns each layer (14-22) and the material thickness (14-24).
- 14-11=2, the calculation through thickness accumulation: the curling radius is worked out through the encoder on the winding shaft. In this condition, connect the pulse signal to the terminal HDI of the inverter and calculate the curling radius through the number of pulses each turn (14-21), the number of turns each layer (14-22) and the material thickness 0 (14-24).

- 14-11=3, when testing the curling radius with curling radius test sensor, the input channel of curling radius sensor can be the analog value or the pulse input.
- 14-13 is used to set the maximum curling radius. When 14-11=3, the parameter must be set and the maximum of the analog value or pulse signal corresponds to the set value of the parameter 14-13.
- 14-14is used to set the winding shaft diameter. The curling radius calculated by the curling radius calculation module of the inverter is limited by 14-13 and 14-14.
- 14-15is used to select the input channel of initial curling radius.

1. When 14-15=0, the initial curling radius is set by the parameter 14-16~14-18. The initial value of curling radius can be determined through two multi-function digital input terminals, the selection of initial curling radius is as follows:

| Digital input terminal 1 | Digital input terminal 2 | Initial curling radius source |
|---|---|---|
| 0 | 0 | 14-14 |
| 0 | 1 | 14-16 |
| 1 | 0 | 14-17 |
| 1 | 1 | 14-18 |

2. When 14-15=1, the initial curling radius is determined by the analog value. When the initial curling radius does not count from the hollow curling radius, the initial curling radius can be selected by the digital input terminal. For wind-up control, the system default initial curling radius is the diameter of winding shaft (14-14). For roll-down control, the system default initial curling radius is the maximum curling radius (14-13).

- 14-19 is used to set the curling radius filtering coefficient to avoid fast change of curling radius calculation (or input) result.
- 14-20is used to display the current curling radius in real time. It is able to know the current actual curling radius through the parameter.
- Only when 14-11=1 or 14-11=2, the parameters 14-21~14-28 are related to the parameter.

1. 14-21represents pulse number when winding shaft turns a round. It needs to be set when 14-11=2.
2. 14-22shows the rounds of winding shaft turning after the material wraps one layer. It is used for wire.
3. When the material thickness is analog input (14-23=1), the maximum analog input corresponds to the set value of 14-28.
4. When 14-23 =0, the system default material thickness is determined by the parameter 14-24. The different material thickness source can also be selected by the combination of digital input terminals and 14-24~14-27, the selection relationship is as follows:

| Digital input terminal 1 | Digital input terminal 2 | Initial thickness source |
|---|---|---|
| 0 | 0 | 14-24 |
| 0 | 1 | 14-25 |
| 1 | 0 | 14-26 |
| 1 | 1 | 14-27 |

## 5.15.4 Line speed input

- If the curling radius source selects line speed calculation or tension control mode as the close-loop speed control, it is required to obtain correct line speed signal.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-29 P.627 | Line speed inputsource | 0 | 0 | No line speed input. |
| | | | 1 | The analog value or pulse input |
| | | | 2 | The communication setting. |
| 14-30 P.628 | Maximum line speed | 1000.0 m/min | 0.1 ~ 6500.0m/min | Maximum line speed |
| 14-31 P.629 | Minimum line speed for calculation R. | 200.0 m/min | 0.1 ~ 6500.0m/min | Minimum line speed for calculation R. |
| 14-32 P.630 | Actual line speed | 0.0 m/min | 0 ~ 6500.0m/min | Actual line speed |

Setting Line speed input

- If the curling radius source selects line speed calculation or tension control mode as the close-loop speed control, it is required to obtain correct line speed signal. In general, the convenient way for obtaining line speed is through analog output of operation frequency of traction (constant speed) inverter. The operation frequency of traction inverter corresponds with the line speed in linear. It only needs to set the maximum line speed (14-30) to the corresponding line speed of maximum frequency of operation frequency of traction (constant speed) inverter.
- 14-29is used to select the way or channel for obtaining line speed.
  1. When 14-29=0, no line speed is input.
  2. When the line speed is obtained through the analog value or pulse input (14-29=1), the maximum line speed 14-30 must be correctly set. The maximum value of analog or pulse input corresponds with the maximum line speed.
  3. When the line speed is obtained through the communication method (14-29=2), it is set by the Modbuscommunication address H100A and the setting range is 0.1~6500.0m/min.
- 14-31is used to set the minimum speed for starting calculation of curling radius. When the inverter detects that the line speed is lower than the value, inverter will stop curling radius calculation. Correct setting of the value will effectively avoid great deviation of curling radius calculation when the speed is reduced. In general, the value shall be set to over 20% of maximum line speed.
- 14-32is used to display the actual line speed in real time. The current actual line speed can be known by the parameter.

## 5.15.5 Tension compensation

- It is only relevant to the open-loop torque mode.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-33 P.633 | Mechanical inertia compensation coefficient | 0 | 0 ~ 65535 | Mechanical inertia compensation coefficient |
| 14-34 P.634 | Material density | 0kg/m$^3$ | 0 ~ 60000kg/m$^3$ | Material density |
| 14-35 P.635 | Material width | 0mm | 0 ~ 60000mm | Material width |
| 14-36 P.636 | Fiction compensation coefficient | 0.0% | 0 ~ 50.0% | Fiction compensation coefficient |

Setting Tension compensation

- When the tension control adopts the open loop torque mode, during the system acceleration/deceleration, additional torque shall be provided to overcome the rotation inertia of the whole system. Otherwise, too small tension upon wind-up acceleration and too large tension upon deceleration, or too large tension upon roll-down acceleration and too small tension upon deceleration will be caused.
- 14-33 is used to set the mechanical inertia compensation coefficient. It is used to compensate the rotation inertia of the system, including inertia of the motor, rotation system and the shaft. Such inertias are fixed and independent of the curling radius. This parameter can be obtained automatically by the system inertia self learning or manually set based on the actual working situation.
- 14-34 and 14-35 are relevant to the material inertia compensation. The inverter will automatically calculate the material inertia compensation value according to the parameter and the curling radius.
- 14-36is used to set the friction compensation coefficient. Take wind-up as an example. Because of the frictional resistance, the material tension reduces, which is more obvious upon small roll, and the tension will be nonlinear. This situation can be improved by setting the parameter.

## 5.15.6 Material supply interrupt detection

- It is an auxiliary function, and not in all situations can the material supply interrupt be detected effectively.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-37 P.637 | Material supply interrupt auto detection function | 0 | 0 | Material supply interrupt auto detection is inactive. |
| | | | 1 | Material supply interrupt auto detection function 1 |
| | | | 2 | Material supply interrupt auto detection function 2 |
| | | | 3 | Material supply interrupt auto detection function 3 |
| 14-38 P.638 | Auto detection minimum line speed | 200.0 m/min | 0.1 ~ 6500.0m/min | Material supply interrupt auto detection minimum line speed. |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-39<br>P.639 | Auto detection error range | 10.0% | 0.1 ~ 100.0% | Material supply interrupt auto detection error range. |
| 14-40<br>P.640 | Auto detection judgment delay | 2.0s | 0.1 ~ 60.0s | Material supply interrupt auto detection judgment delay. |

Setting Material supply interrupt detection

- The group of parameters is used for the inverter to automatically detect the material supply interrupt. It is an auxiliary function. Only when line speed is use for curling radius calculation can the inverter have the material supply interrupt detection basis. And not in all situations can the material supply interrupt be detected effectively. If good result can not be achieved after proper effort, set 14-37 to 0.
- If the system line speed is higher than 14-38, and the abnormal change of the curling radius (the variation range of the curling radius calculated in the current corresponding to the last one is too large) exceeds the setting range of 14-39, and the lasting time of the abnormal change of the curling radius exceeds the delay time set by 14-40, the inverter reports material supply interrupt failure (bEb).

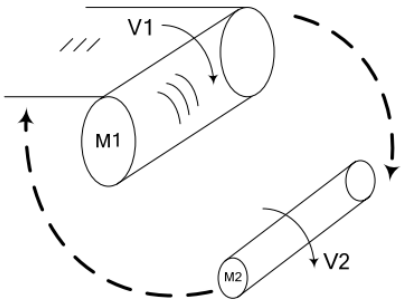
## 5.15.7 Pre-drive control

- Roll alternationduring operation can avoid causing too large shock.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-41<br>P.645 | Pre-drive speed gain | 0.0% | -50.0% ~ 50.0% | Pre-drive speed gain |
| 14-42<br>P.646 | Pre-drive torque increase | 0.0% | -50.0% ~ 50.0% | Pre-drive torque increase proportion |
| 14-43<br>P.647 | Pre-drive torque delay time | 0ms | 0 ~ 65535ms | Pre-drive torque increase delay time |

Setting Pre-drive control

- The diagram of auto roll alternation is as follows, there are two inverters to control the replacing upper roll and replacing lower roll.




M1 is “replacing lower roll”, M2 is “replacing upper roll” or “pre-drive roll”

- To enhance productivity, generally, the winding shaft will be switched without stopping the machine (auto winding up and rolling down the material). To realize the smooth and well-off auto roll alternation and avoid causing too large shock, it is necessary to rotate the wind-up roll (roll-down roll) in advance and the rotating line speed shall be consistent with the line speed of the materials in operation (V1≈V2). This is the pre-drive function.

- Auto roll alternation control logic

  On the occasion of continuous working, the auto roll alternation control logic is used to alternate the roll smoothly to enhance productivity. The auto roll alternation function is realized with the cooperation of the control signal provided by external controller. Wherein, the motion of B, C and D is only active when the replacing lower roll inverter works in the close loop vector control mode (00-21=4).

  1. Pre-drive process

     When the replacing upper roll inverter receives the pre-drive reference, no matter what value 14-00 is set, it will operate according to the matching frequency calculated by the given line speed and the initial curling radius until the line speed of replacing upper roll is consistent with the system line speed. When the pre-drive signal disappears, the control mode switches to the setting tension control mode.

  2. Torque memory signal

     Before replacing the roll, the torque memory signal makes the replacing lower roll inverter remember the current output torque for the use of later process.

  3. Torque memory enable

     When the replacing upper roll has contacted with the material and the replacing lower roll hasn't been replaced, no matter which torque control mode is adopted, the replacing lower roll inverter will be switched to the torque control mode by the torque memory enable signal. The given Torque reference is the torque remembered by the previous inverter.

  4. Torque increase function

     When the torque memory enable signal is valid, the inverter will control the torque according to the memory torque. After the setting torque increase delay time, the output torque will increase according to the setting torque increase proportion to keep a large line tension at the moment for easy cutting off.

     At the end of roll alternation, the pre-drive signal of the replaced upper roll inverter is revoked. Then the replaced upper roll inverter operates in the setting tension control mode. The process of roll alternation is end after the replacing lower roll inverter stops.

- The pre-drive reference, torque memory signal and torque memory enable signal mentioned above in the point 3 are realized all by setting the corresponding function of digital input terminals.

- 14-41is use to set the pre-drive speed gain. For meeting the technological requirements and revising the line speed error, it can be adjusted on the basis of synchronous matching frequency. The adjustment formula:

  V2 = V1 * (1 + 14-41).

  When 14-41<0, the line speed of pre-drive roll will be lower than the material line speed.

- In the process of auto roll alternation, when the torque memory enable signal is valid, the replacing lower roll inverter will control the torque according to the memory torque at first. And then after the delay time set by 14-43, the output torque will be increased according to the torque increase proportion set by 14-42.

## 5.15.8 Constant line speed mode

- In constant line speed control mode(14-00="4"), it is used to select the method for acquiring the target speed of constant line speed.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 14-44 P.656 | Line speed setting source | 0 | 0 | Parameter 14-45(P.657) setting |
| | | | 1 | The line speed is obtained by analog value or pulse input. |
| | | | 2 | The line speed is obtained by communication mode. |
| 14-45 P.657 | Line speed setting | 0.0 m/min | 0 ~ 6500.0m/min | Line speed setting value |

Setting Line speed setting source

- When 14-44=0, line speed is set by parameter 14-45.
- The line speed is obtained by analog value or pulse input.(14-44="1")

  The maximum line speed 14-30(P.628) must be set correctly now. The maximum of analog value or pulse input corresponds to the maximum line speed.
- The line speed is obtained by communication mode.(14-44="2")

  It is set by the Modbuscommunication address H100B which setting range is0~6500.0m/min.

## 5.15.9 Tension closed-loop limiter

- The closed-loop speed control mode (14-00 = "2"), is used to select the PID regulator output limit benchmark and limiting bias.

| Group | Parameter Number | Nam e | Setting Range | content |
|---|---|---|---|---|
| 14-46 P.658 | Tension closed-loop limite amplitude of benchmark | 0 | 0:amplitude limitingis based on the motor rated power | --- |
| | | | 1:amplitude limitingis based on system real-time line speed | --- |
| 14-47 P.659 | Tension in closed-loop limite amplitude of the bias | 0.0% | 0.0% ~ 100.0% | --- |

- Under the closed-loop speed control mode, PID regulator limiter bias is set by the 14-47. If this parameter is set to 0, when the system is zero velocity, the controller will not work. So setting bias is appropriate, which can avoid this problem.

## 5.16 User parameter group15

| Group | Parameter Number | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| 15-00 | P.900 | User registered parameter1 | P mode: 0 ~ 1299<br>Parameter group mode: 00-00~15-99 | 99999 | 272 |
| 15-01 | P.901 | User registered parameter2 | | 99999 | 272 |
| 15-02 | P.902 | User registered parameter3 | | 99999 | 272 |
| 15-03 | P.903 | User registered parameter4 | | 99999 | 272 |
| 15-04 | P.904 | User registered parameter5 | | 99999 | 272 |
| 15-05 | P.905 | User registered parameter6 | | 99999 | 272 |
| 15-06 | P.906 | User registered parameter7 | | 99999 | 272 |
| 15-07 | P.907 | User registered parameter8 | | 99999 | 272 |
| 15-08 | P.908 | User registered parameter9 | | 99999 | 272 |
| 15-09 | P.909 | User registered parameter10 | | 99999 | 272 |
| 15-10 | P.910 | User registered parameter11 | | 99999 | 272 |
| 15-11 | P.911 | User registered parameter12 | | 99999 | 272 |
| 15-12 | P.912 | User registered parameter13 | | 99999 | 272 |
| 15-13 | P.913 | User registered parameter14 | | 99999 | 272 |
| 15-14 | P.914 | User registered parameter15 | | 99999 | 272 |
| 15-15 | P.915 | User registered parameter16 | | 99999 | 272 |
| 15-16 | P.916 | User registered parameter17 | | 99999 | 272 |
| 15-17 | P.917 | User registered parameter18 | | 99999 | 272 |
| 15-18 | P.918 | User registered parameter19 | | 99999 | 272 |
| 15-19 | P.919 | User registered parameter20 | | 99999 | 273 |

## 5.16.1 User registered parameter

- The user parameter group is used to register the parameter numbers for the parameters which do not need to be restoredto the factory value.

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 15-00 P.900 | User registered parameter 1 | 99999 | P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99 | --- |
| 15-01 P.901 | User registered parameter 2 | 99999 | | --- |
| 15-02 P.902 | User registered parameter 3 | 99999 | | --- |
| 15-03 P.903 | User registered parameter 4 | 99999 | | --- |
| 15-04 P.904 | User registered parameter 5 | 99999 | | --- |
| 15-05 P.905 | User registered parameter 6 | 99999 | | --- |
| 15-06 P.906 | User registered parameter 7 | 99999 | | --- |
| 15-07 P.907 | User registered parameter 8 | 99999 | P mode: 0 ~ 1299 Parameter group mode: 00-00~15-99 | --- |
| 15-08 P.908 | User registered parameter 9 | 99999 | | --- |
| 15-09 P.909 | User registered parameter 10 | 99999 | | --- |
| 15-10 P.910 | User registered parameter 11 | 99999 | | --- |
| 15-11 P.911 | User registered parameter 12 | 99999 | | --- |
| 15-12 P.912 | User registered parameter 13 | 99999 | | --- |
| 15-13 P.913 | User registered parameter 14 | 99999 | | --- |
| 15-14 P.914 | User registered parameter 15 | 99999 | | --- |
| 15-15 P.915 | User registered parameter 16 | 99999 | | --- |
| 15-16 P.916 | User registered parameter 17 | 99999 | | --- |
| 15-17 P.917 | User registered parameter 18 | 99999 | | --- |
| 15-18 P.918 | User registered parameter 19 | 99999 | | --- |

| Parameter | Name | Factory Value | Setting Range | Content |
|---|---|---|---|---|
| 15-19<br>P.919 | User registered parameter 20 | 99999 | P mode:<br>0 ~ 1299<br>Parameter group mode:<br>00-00~15-99 | --- |

Setting User registered parameter

- The parameters in this group will not be restored to the factory value when executing 00-02=5/6.
- The parameter values set in this group are the parameter numbers that user need to register. The parameter values with registered number will not be restored to the factory value when 00-02=5/6.
- For the setting of restoring the factory value, please refer to Section 5.1.2 for the parameter management part.

Note: please pay attention to "order number" or "parameter set" mode of registration parameters, the difference between. Such as the need to registration parameter no. 01-06 (P. 7), "order number", registration number parameters for p. 7, set p. 900 = 7;In "parameter set" mode, the parameters of the registration number of 01-06, set 15-00 = 106.Note: please pay attention to "order number" or "parameter set" mode of registration parameters, the difference between.
Such as the need to registration parameter no. 01-06 (P. 7), "order number", registration number parameters for p. 7, set p. 900 = 7;In "parameter set" mode, the parameters of the registration number of 01-06, set 15-00 = 106.

# 6. INSPECTION AND MAINTENANCE

## 6.1 Inspection item

### 6.1.1 Daily inspection item

- The inverter is a unit mainly consisting of semiconductor devices.Daily inspection must be performed to prevent anyfault from occurring due to the adverse effects of the operating environment, such as temperature, humidity, dust, dirt andvibration, changes in the parts with time, service life, and other factors.

1. Check whether the surrounding conditions are normal (including temperature, humidity, dust density, etc.) at the place of the installation.
2. Check whether the power supply voltage is normal (the voltage between R/L1, S/L2 and T/L3).
3. Check whether the wiring is secured (whether the external wiring for the main-circuit board and thecontrol-board terminal are secured).
4. Check whether the cooling system is normal (whether there's any abnormal noise during the operation and whether the wiring is well secured).
5. Check whether the indicator lamp is normal (whether the indicator lamp of the control board and of the parameter unit and the LED monitor of the parameter unit are normal).
6. Check whether the operation is as expected.
7. Check whether there is any abnormal vibration, noise or odor during the operation.
8. Check whether there is any leakage from the filter capacitor.

Notice Be careful in inspection!

### 6.1.2 Periodical inspection items

- Check the areas inaccessible during operation and requiring periodic inspection.

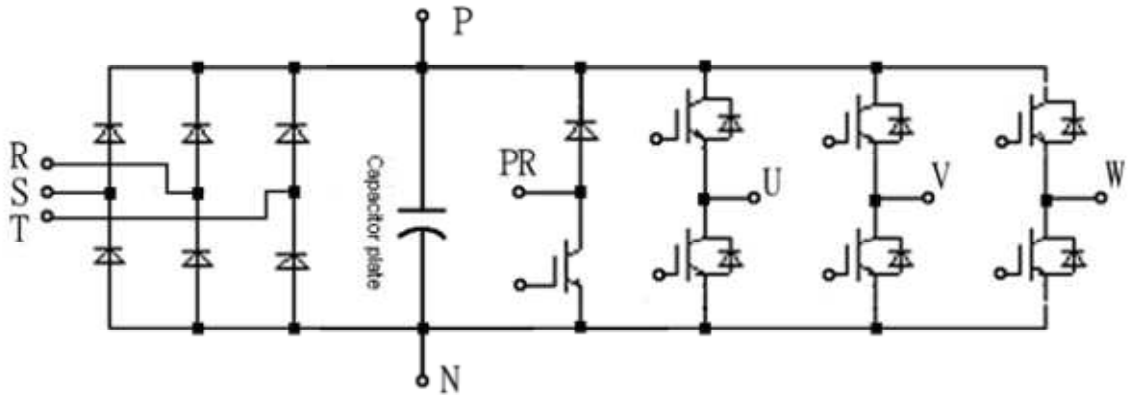
1. Check the connectors and wiring (whether the connectors and wiring between the main-circuit board and control board are secured and without damage).
2. Check whether the components on the main-circuit board and the control board are overheated.
3. Check whether the electrolytic capacitors on the main-circuit board and control board have leakage.
4. Check the IGBT module on the main-circuit board.
5. Clean the dust and foreign substance on the circuit board.
6. Check the insulation resistor.
7. Check whether the cooling system is normal (whether the wiring of fan is secured; clean the air filter, etc.)
8. Check the screws and belts.
9. Check the external wires and the terminal banks for damage.

Notice Be careful in inspection!

## 6.1.3 Checking the converter and inverter modules

- Before conducting test, first dismount the external wires from the main-circuit terminals(R/L1、S/L2、T/L3、U/T1、V/T2、W/T3). Then set the multi-meter to the ohm-testing position.

| | Positive voltage | Negative voltage | Normal result | | Positive voltage | Negative voltage | Normal result |
|---|---|---|---|---|---|---|---|
| Terminal mark | R/L1 | +/P | Conductive | Terminal mark | U/T1 | +/P | Conductive |
| | S/L2 | +/P | Conductive | | V/T2 | +/P | Conductive |
| | T/L3 | +/P | Conductive | | W/T3 | +/P | Conductive |
| | +/P | R/L1 | Non-conductive | | +/P | U/T1 | Non-conductive |
| | +/P | S/L2 | Non-conductive | | +/P | V/T2 | Non-conductive |
| | +/P | T/L3 | Non-conductive | | +/P | W/T3 | Non-conductive |
| | R/L1 | -/N | Non-conductive | | U/T1 | -/N | Non-conductive |
| | S/L2 | -/N | Non-conductive | | V/T2 | -/N | Non-conductive |
| | T/L3 | -/N | Non-conductive | | W/T3 | -/N | Non-conductive |
| | -/N | R/L1 | Conductive | | -/N | U/T1 | Conductive |
| | -/N | S/L2 | Conductive | | -/N | V/T2 | Conductive |
| | -/N | T/L3 | Conductive | | -/N | W/T3 | Conductive |




Note: The diagram above takes Frame A as an example.

## 6.1.4 Cleaning

- Always run the inverter in a clean status.
- Use a soft brush to remove the dustand sundry on the fan blade, fan cover, and radiator, keeping the inverter in good heat dissipation.
- Gently wipe dirty areas of the cover with a soft cloth immersed in neutral detergent.

Note: 1. Do not use solvent, such as acetone, benzene, toluene and alcohol, as these will cause the inverter surface paint to peel off.

2. The display, etc. of the parameter unit (PU302) are vulnerable to detergent and alcohol. Therefore,avoid using them for cleaning.

## 6.1.5 Replacement of parts

- The inverter consists of many electronic parts such as semiconductor devices.
- The following parts may deteriorate with age because of their structures or physical characteristics, leading to reduced performance or fault of the inverter. For preventive maintenance, the parts must be replaced periodically.
- Use the life check function as a guidance of parts replacement.

| Part name | Estimated lifespan | Description |
|---|---|---|
| Cooling fan | 2 years | For the axle of a fan, the standard lifetime is about 10 – 35 thousand hours. Assuming that the fan operates 24 hours per day, the fan should be replaced every 2 years. |
| Filter capacitor | 5 years | The filter capacitor is an electrolytic capacitor that deteriorates with time. The deterioration speed is contingent on the ambient conditions. Generally, it should be replaced every 5 years. |
| Relay | --- | If bad contact occurs, please replace it immediately. |

Note: 1. Please send the inverters to the factory fore complement replacement.
2. For the replacement of cooling fan, please refer to Section 3.10.

# 6.2 Measurement of main circuit voltages, currents and powers

## 6.2.1 Selection of instruments for measurement

- Since the voltages and currents on the inverter input sides and output sides include harmonics, measurement datadepends on the instruments used and circuits measured.When instruments for commercial frequency are used for measurement, measure the circuits with the followinginstruments.

| | Voltage(V) | Current(A) | Power(kW) |
|---|---|---|---|
| Input side(R/L1, S/L2, T/L3) | Moving-iron type | Moving-iron type | Electrodynamic type |
| DC side(+/P, -/N) | Moving-coil type | --- | --- |
| Output side(U/T1, V/T2, W/T3) | Rectifier type | Moving-iron type | Electrodynamic type |

Note: 1. Please pay attention to the instrumentrange and polarity;
2. Look out for safety.

## 6.2.2 Measurement of voltages

- Inverter input side

  As the input side voltage has a sine wave and it is extremely small in distortion, accurate measurement can be made with anordinary AC meter.

- Inverter output side

  Since the output side voltage has a PWM-controlled rectangular wave, always use a rectifier type voltmeter.
  A needle typetester cannot be used to measure the output side voltage as it indicates a value much greater than the actual value.
  A moving-iron type meter indicates an effective value which includes harmonics and therefore the value is larger than that of thefundamental wave.
  The value monitored on the parameter unit is the inverter-controlled voltage itself. Hence, that value isaccurate and it is recommended to monitor values (analog output) using the parameter unit.

## 6.2.3 Measurement of currents

- Use moving-iron type meters on both the input and output sides of the inverter. However, if the carrier frequency exceeds 5kHz, do not use that meter since an overcurrent losses produced in the internal metal parts of the meter will increase and themeter may burn out. In this case, use an approximate-effective value type.

- Since current on the inverter input side tends to be unbalanced, measurement of three phases is recommended. Correctvalue cannot be obtained by measuring only one or two phases. On the other hand, the unbalanced ratio of each phase of theoutput side current should be within 10%.

- When a clamp ammeter is used, always use an effective value detection type. A mean value detection type produces a largeerror and may indicate an extremely smaller value than the actual value. The value monitored on the parameter unit isaccurate if the output frequency varies, and it is recommended to monitor values (provide analog output) using the parameter unit.

## 6.2.4 Measurement of power

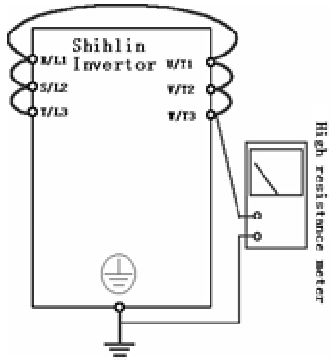
- Use digital power meters (for inverter) for the both of inverter input and output side. Alternatively, measure using electrodynamic type single-phase wattmeters for the both of inverter input and output side in two-wattmeter or three-wattmeter method. As the current is liable to be imbalanced especially in the input side, it is recommended to use the three-wattmeter method.

## 6.2.5 Measurement of frequency

- The factory setting of HDO terminal is FM function, a pulse train proportional to the output frequency is output across the pulse trainoutput terminals HDO and SD of the inverter.This pulse train output can be counted by a frequency counter, or a meter (moving-coil type voltmeter) can be used to read the mean value of the pulse train output voltage.
- Please refer to Section 5.3.9.

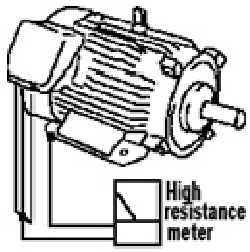
## 6.2.6 Measurement of insulation resistance

- Inverter insulation resistance
  1. Before measuring the inverter insulation resistance,first dismount the “wiring of all the main-circuit terminals” and the “control board.” Then execute the wiring as shown in the right picture.
  2. The measurement is only suitable for the main circuit.It is prohibited to use a high-resistance meter for measuring terminals on the control board.
  3. The value of the insulation resistance shall be greater than 5MΩ.




Note: Please use a 500 VDC megger.

- Motor insulation resistance
  1. Before the measurement, please dismount the motor, and execute the wiring as shown in the diagram on the right.
  2. The value of the insulation resistance shall be greater than 5MΩ.




Note: Please use a suitable megger.

## 6.2.7 Hi-pot test

- Do not conduct a hi-pot test. Deterioration may occur on theinternal semiconductor components of the inverter.

# 7. APPENDIX

## 7.1 Appendix 1 Parameter table

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.0 | 01-10 | Torque boost | 0.75K types: 0 ~ 30.0% | 6.0% | 82 |
| | | | 1.5K ~ 3.7K types: 0 ~ 30.0% | 4.0% | |
| | | | 5.5K ~ 7.5K types: 0 ~ 30.0% | 3.0% | |
| | | | 11K ~ 22K types: 0 ~ 30.0% | 2.0% | |
| P.1 | 01-00 | Maximum frequency | 22K and types below: 0.00 ~ 01-02(P.18)Hz | 120HZ | 79 |
| P.2 | 01-01 | Minimum frequency | 0 ~ 120.00Hz | 0.00Hz | 79 |
| P.3 | 01-03 | Base frequency | 50Hz system setting: 0 ~ 650.00Hz | 50.00Hz | 79 |
| | | | 60Hzsystem setting: 0 ~ 650.00Hz | 60.00Hz | |
| P.4 | 04-00 | Speed1(high speed) | 0 ~ 650.00Hz | 60.00Hz | 135 |
| P.5 | 04-01 | Speed2(mediumspeed) | 0 ~ 650.00Hz | 30.00Hz | 135 |
| P.6 | 04-02 | Speed3(low speed) | 0 ~ 650.00Hz | 10.00Hz | 135 |
| P.7 | 01-06 | Acceleration time | 3.7Kandtypesbelow:0~360.00s/0~3600.0s | 5.00s | 80 |
| | | | 5.5Kandtypesabove:0~360.00s/0~3600.0s | 20.00s | |
| P.8 | 01-07 | Deceleration time | 3.7Kandtypesbelow:0~360.00s/0~3600.0s | 5.00s | 80 |
| | | | 5.5K~7.5K types:0~360.00s/0~3600.0s | 10.00s | |
| | | | 11K andtypesabove:0~360.00s/0~3600.0s | 30.00s | |
| P.9 | 06-00 | Electronic thermal relay capacity | 0~500.00A | 0.00A | 153 |
| P.10 | 10-00 | DC injection brake operation frequency | 0 ~ 120.00Hz | 3.00Hz | 215 |
| P.11 | 10-01 | DC injection brake operation time | 0 ~ 60.0s | 0.5s | 215 |
| P.12 | 10-02 | DC injection brake operation voltage | 0 ~ 30.0%: 7.5K and types below | 4.0% | 215 |
| | | | 0 ~ 30.0%: 11K ~ 22K types | 2.0% | |
| P.13 | 01-11 | Starting frequency | 0 ~ 60.00Hz | 0.50Hz | 83 |
| P.14 | 01-12 | Load pattern selection | 0: Applicable to constant torque loads(convey belt, etc.) | 0 | 83 |
| | | | 1: Applicable to variable torque loads (fans and pumps, etc.) | | |
| | | | 2, 3: Applicable to ascending / descending loads. | | |
| | | | 4: Multipoint VF curve. | | |
| | | | 5 ~ 13: Special two-point VF curve. | | |
| | | | 14: V/F complete detached mode | | |
| | | | 15: V/F semidetached mode | | |
| P.15 | 01-13 | JOG frequency | 0 ~ 650.00Hz | 5.00Hz | 86 |
| P.16 | 01-14 | JOG acceleration/ decelerationtime | 0 ~ 360.00s/0 ~ 3600.0s | 0.50s | 86 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.17 | 02-20 | 4-5 signal selection | 0: The effective range of signal sampling is 4~20mA.<br>1: The effective range of signal sampling is 0 ~ 10V.<br>2: The effective range of signal sampling is 0 ~ 5V. | 0 | 105 |
| P.18 | 01-02 | High-speed maximum frequency | 01-00(P.1) ~ 650.00Hz | 120.00Hz | 79 |
| P.19 | 01-04 | Base frequency voltage | 0 ~ 1000.0V<br>99999: Change according to the input voltage | 99999 | 79 |
| P.20 | 01-09 | Acceleration/deceleration reference frequency | 50Hz system setting: 1.00 ~ 650.00Hz<br>60Hz system setting: 1.00 ~ 650.00Hz | 50.00Hz<br>60.00Hz | 80 |
| P.21 | 01-08 | Acceleration/deceleration time increments | 0: Time increment is 0.01s<br>1: Time increment is 0.1s | 0 | 80 |
| P.22 | 06-01 | Stall prevention operation level | 0 ~ 400.0% | 150.0% | 153 |
| P.23 | 06-02 | Compensation factor at level reduction | 0 ~ 150.0%<br>99999: Stall prevention operation level is the setting value of 06-01(P.22). | 99999 | 153 |
| P.24 | 04-03 | Speed 4 | 0 ~ 650.00Hz<br>99999: Function invalid | 99999 | 135 |
| P.25 | 04-04 | Speed 5 | Same as 04-03 | 99999 | 135 |
| P.26 | 04-05 | Speed 6 | Same as 04-03 | 99999 | 135 |
| P.27 | 04-06 | Speed 7 | Same as 04-03 | 99999 | 135 |
| P.28 | 01-15 | Output frequency filter time | 0 ~ 1000ms | 0ms | 86 |
| P.29 | 01-05 | Acceleration/deceleration curve selection | 0: Linear acceleration /deceleration curve<br>1: S pattern acceleration /deceleration curve 1<br>2: S pattern acceleration /deceleration curve 2<br>3: S pattern acceleration /deceleration curve 3 | 0 | 80 |
| P.30 | 06-05 | Regenerative brake function selection | 0: If regenerative brake duty is fixed at 3%, parameter06-06(P.70) will be invalid.<br>1: The regenerative brake duty is the value of 06-06(P.70).<br>2: External braking unit protection function (D framework and the above models) | 0<br>2 | 155 |
| P.31 | 00-12 | Soft-PWM carrier operation selection | 0: None Soft-PWM operation<br>1: When 00-11(P.72)< 5, Soft-PWM is valid (only apply to V/F control ) | 0 | 70 |
| P.32 | 07-02 | COM1 Serial communication Baud rate selection | 0: Baud rate:4800bps<br>1: Baud rate:9600bps<br>2: Baud rate:19200bps<br>3: Baud rate:38400bps<br>4: Baud rate:57600bps<br>5: Baud rate:115200bps | 1 | 171 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.33 | 07-00 | COM1 Communication protocol selection | 0: Modbus protocol<br>1: Shihlin protocol<br>2：PLC protocol（Effective when using the shilin built-in PLC） | 1 | 171 |
| P.34 | 07-11 | Communication EEPROM write selection | 0: When parameter write is performed, write them to RAM and EEPROM.<br>1: When parameter write is performed, write them to RAM only. | 0 | 188 |
| P.35 | 00-19 | Communication mode instruction selection | 0: Incommunication mode, operating instruction and setting frequency is set by communication.<br>1: Incommunication mode, operating instruction and setting frequency is set by external. | 0 | 72 |
| P.36 | 07-01 | COM1 Inverter station number | 0～254 | 0 | 171 |
| P.37 | 00-08 | Speed display | 0: Display output frequency(the mechanical speed is not displayed)<br>0.1~5000.0<br>1~50000 | 0 | 69 |
| P.38 | 02-09 | 2-5 maximum operation frequency | 50Hz system: 1.00～650.00Hz<br>60Hz system: 1.00～650.00Hz | 50.00Hz<br>60.00Hz | 100 |
| P.39 | 02-21 | The maximum operation frequency of terminal 4-5 | 50Hz system: 1.00～650.00Hz<br>60Hz system: 1.00～650.00Hz | 50.00Hz<br>60.00Hz | 105 |
| P.40 | 03-10 | SO-SE function | 0: RUN(inverter running)<br>1: SU(reaching the output frequency)<br>2: FU(output frequency detection)<br>3: OL(overload detection)<br>4: OMD(zero current detection)<br>5: ALARM(alarm detection)<br>6: PO1(programmed operation section detection)<br>7: PO2(programmed operation periodical detection)<br>8: PO3(programmed operation pause detection)<br>9: BP(Switch between the inverter operation and the commercial power-supply operation function, inverter output)<br>10: GP(Switch between the inverter operation and the commercial power-supply operation function,commercial power-supply output)<br>11: OMD1(zero current detection)<br>12～15: Reserve<br>16: Reserve<br>17: RY(the accomplishment of inverter running preparation)<br>18: Maintenance alarm detection<br>19: OL2 (Over torque alarm output) | 1 | 125 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.40 | 03-10 | SO-SE function | 20: Capacitor lifetime abnormal<br>21: Position control position attained<br>22：Tension control curl pattern detection<br>23：Power marker detection | 1 | 125 |
| P.41 | 03-20 | Up-to-frequency sensitivity | 0～100.0% | 10.0% | 128 |
| P.42 | 03-21 | Output frequency detection for forward rotation | 0～650.00Hz | 6.00Hz | 128 |
| P.43 | 03-22 | Output frequency detection for reverse rotation | 0～650.00Hz<br>99999: Same as the setting of 03-21(P.42) | 99999 | 128 |
| P.44 | 01-22 | The second acceleration time | 0～360.00s/0～3600.0s<br>99999: Not selected | 99999 | 88 |
| P.45 | 01-23 | The second deceleration time | 0～360.00s/0～3600.0s<br>99999: Not selected | 99999 | 88 |
| P.46 | 01-24 | The second torque boost | 0～30.0%<br>99999: Not selected | 99999 | 88 |
| P.47 | 01-25 | The second base frequency | 0～650.00Hz<br>99999: Not selected | 99999 | 88 |
| P.48 | 07-03 | COM1 Data length | 0: 8bit<br>1: 7bit | 0 | 171 |
| P.49 | 07-04 | COM1 Stop bit length | 0: 1bit<br>1: 2bit | 0 | 171 |
| P.50 | 07-05 | COM1 Parity check selection | 0: No parity verification<br>1: Odd<br>2: Even | 0 | 171 |
| P.51 | 07-06 | COM1 CR/LFselection | 1: CR only<br>2: Both CR and LF | 1 | 171 |
| P.52 | 07-08 | COM1 Number of communication retries | 0～10 | 1 | 171 |
| P.53 | 07-09 | COM1 Communication check time interval | 0～999.8s: Use the set value for the communication overtime test.<br>99999: No communication overtime test. | 99999 | 171 |
| P.54 | 02-04 | Function of terminal AM output | 0: Output frequency, the frequency display reference 02-51 (P.55) is 100%.<br>1: Output frequency, the frequency display reference 02-52 (P.56) is 100%.<br>2: Output DC bus voltage, the OV level is 100%.<br>3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.<br>4: Output the electronic thermal rate of the inverter, the electronic thermal relay running (06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (06-00(P.9)=0) is 100%.<br>5: Target frequency, the frequency display reference 02-51(P.55) is 100%. | 0 | 97 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.54 | 02-04 | Function of terminal AM output | 6: Fixed level output, voltage or current output level is set by 02-54(P.541)/02-53(P.539) | 0 | 97 |
| | | | 7: Output voltage, the inverter rated voltage is 100% | | |
| | | | 8: Excitation current, the motor rated current is 100%. (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6) | | |
| | | | 9: Output torque, two times motor rated torque is 100%.(Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6) | | |
| | | | 10: Output power, two times motor rated power is 100%. | | |
| | | | 11: The high-speed pulse, 100.00KHz is 100%. | | |
| | | | 12: Motor speed, to display the level of 02-51(P.55) is 100% | | |
| | | | 13：PLC analog output, details please refer to SE3 embedded PLC instructions | | |
| P.55 | 02-51 | Frequency display reference at the analog output | 50Hz system: 1.00～650.00Hz | 50.00Hz | 111 |
| | | | 60Hz system: 1.00～650.00Hz | 60.00Hz | |
| P.56 | 02-52 | Current monitoring reference at the analog output | 0~500.00A | According to type | 111 |
| P.57 | 10-09 | Restart coasting time | 0～30.0s | 99999 | 217 |
| | | | 99999: No restart function. | | |
| P.58 | 10-10 | Restart cushion time | 0～60.0s: 7.5K (included) and types below. | 5.0s | 217 |
| | | | 0～60.0s: 11K～55K types | 10.0s | |
| P.59 | 00-10 | Reserve | Reserve | --- | --- |
| P.60 | 02-10 | 2-5 filter time | 0～2000ms | 30ms | 100 |
| P.61 | 10-11 | Remote setting functionselection | 0: No remote setting function. | 0 | 219 |
| | | | 1: Remote setting function, frequency setup storage is available. | | |
| | | | 2: Remote setting function, frequency setup storage is not available. | | |
| | | | 3: Remote setting function, frequency setup storage is notavailable,the remote setting frequency is cleared by STF/STR “turn off”. | | |
| P.62 | 03-23 | Zero current detection level | 0～200.0% | 5.0% | 129 |
| | | | 99999: Function invalid | | |
| P.63 | 03-24 | Zero current detection time | 0～100.00s | 0.50s | 129 |
| | | | 99999: Function invalid | | |
| P.64 | 02-45 | AM output signal selection | 0: 0~10V voltage can be output across terminal AM-5. | 0 | 110 |
| | | | 1: Reserve | | |
| | | | 2: 0~20mA current can be output across AM-5. | | |
| | | | 3: 4~20mA current can be output across AM-5. | | |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.65 | 10-12 | Retry selection | 0: Retry is invalid.<br>1: Over-voltage occurs, the inverter will perform the retry function.<br>2: Over-currentoccurs,the inverter will perform the retry function.<br>3: Over-voltage or over-currentoccurs, the inverter will perform the retry function.<br>4: All the alarms have the retry function. | 0 | 221 |
| P.66 | 06-03 | Stall prevention operation reduction starting frequency | 50Hz system: 0 ~ 650.00Hz<br>60Hz system: 0 ~ 650.00Hz | 50.00Hz<br>60.00Hz | 153 |
| P.67 | 10-13 | Number of retries at alarm occurrence | 0: Retry is invalid.<br>1 ~ 10: The setting value of 10-13(P.67) is exceeded, the inverter will not perform the retry function. | 0 | 221 |
| P.68 | 10-14 | Retry waiting time | 0 ~ 360.0s | 1.0s | 221 |
| P.69 | 10-15 | Retry accumulation time at alarm | Read | 0 | 221 |
| P.70 | 06-06 | Special regenerative brake duty | 0 ~ 100.0% | 0.0% | 155 |
| P.71 | 00-13 | Idling braking / DC braking | 0: Idling braking<br>1: DC braking | 1 | 70 |
| P.72 | 00-11 | Carrier frequency | 1~15 kHz | 5 kHz | 70 |
| P.73 | 02-08 | 2-5 signal selection | 0: The valid range of signal sampling is 0~5V.<br>1: The valid range of signal sampling is 0~10V.<br>2: The valid range of signal sampling is 0~ -5V.<br>3: The valid range of signal sampling is 0~ -10V.<br>4: The valid range of signal sampling is -5 ~ +5V.<br>5: The valid range of signal sampling is -10 ~ +10V. | 1 | 99 |
| P.74 | 02-43 | HDO frequency multiplication coefficient | 0: Select FM function as the output function of terminal HDO.<br>1 ~ 9000: Select the square-wave pulse which is 02-43(P.74) times of running frequency as the output of terminal. | 0 | 108 |
| P.75 | 00-14 | Stop function selection | 0: Press STOP button and stop the operation only in the PU and H2 mode<br>1: Press STOP button and stop the operation in all mode. | 1 | 70 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.77 | 00-03 | Selection of parameterswrite protection | 0: Parameters can be written only when the motor stops.<br>1: Parameters cannot be written.<br>2: Parameters can also be written when the motor is running.<br>3: Parameters cannot be written when in password protection. | 0 | 64 |
| P.78 | 00-15 | Forward/reverse rotation prevention selection | 0: Forward rotation and reverse rotation are both permitted.<br>1: Reverse rotation is prohibited (Press the reverse reference to decelerate and stop the motor).<br>2: Forward rotation is prohibited (Press the forward rotation reference to decelerate and stop the motor). | 0 | 71 |
| P.79 | 00-16 | Operation mode selection | 0: “PU mode”, “external mode” and “Jog mode” are interchangeable.<br>1: “PU mode” and “JOG mode” are interchangeable.<br>2: “External mode” only<br>3: “Communication mode” only<br>4: “Combined mode 1”<br>5: “Combined mode 2”<br>6: “Combined mode 3”<br>7: “Combined mode 4<br>8: “Combined mode 5”<br>99999: The second operation mode, operating instruction is set by 00-18(P.109), the target frequency is set by 00-17(P.97) | 0 | 72 |
| P.80 | 03-03 | M0 function selection | Same as 03-00 | 2 | 121 |
| P.81 | 03-04 | M1 function selection | Same as 03-00 | 3 | 121 |
| P.82 | 03-05 | M2 function selection | Same as 03-00 | 4 | 121 |
| P.83 | 03-00 | STF function selection | 0: STF(the inverter runs forward)<br>1: STR(the inverter runs reverse)<br>2: RL(Multi-speed low speed)<br>3: RM(Multi-speed medium speed)<br>4: RH(multi-speed high speed)<br>5: Analog terminal 4-5 priority<br>6: The external thermal relay operation<br>7: MRS(the instantaneous stopping of the inverter output)<br>8: RT(the inverter second function)<br>9: EXT(external JOG) | 0 | 119 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.83 | 03-00 | STF function selection | 10: STF+EXJ<br>11: STR+EXJ<br>12: STF+RT<br>13: STR+RT<br>14: STF+RL<br>15: STR+RL<br>16: STF+RM<br>17: STR+RM<br>18: STF+RH<br>19: STR+RH<br>20: STF+RL+RM<br>21: STR+RL+RM<br>22: STF+RT+RL<br>23: STR+RT+RL<br>24: STF+RT+RM<br>25: STR+RT+RM<br>26: STF+RT+RL+RM<br>27: STR+RT+RL+RM<br>28: RUN(the inverter runs forward)<br>29: STF/STR(it is used with RUN, when STF/ STR is"on", the inverter runs reverse ; when STF/STR is "off", the inverter runs forward)<br>30: RES(external reset function)<br>31: STOP(it can be used as a three-wire mode with the RUN signal or the STF-STR terminal)<br>32: REX(multi-speed set (16 levels))<br>33: PO(in "external mode", programmed operation mode is chosen)<br>34: RES_E (external reset become valid only when the alarm goes off.)<br>35: MPO (in "external mode" the manually operation cycle mode is chosen.)<br>36: TRI(triangle wave function is chosen)<br>37: GP_BP (Automatic switchover frequency between inverter and commercial power-supply operation.)<br>38: CS(Manual switch to commercial power supply)<br>39: STF/STR +STOP (The motor has a reverse rotation when the RUN signal is on. When the RUN signal is off, stop the motor and then run the motor for forward rotation.<br>40: P_MRS (the inverter output instantaneously stops, The MRS is pulse signal input) | 0 | 119 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.83 | 03-00 | STF function selection | 41: PWM setting frequency<br>42: MTCLKA/MTCLKB<br>43: RUN_EN (the digital input terminal running enable)<br>44: PID_OFF (the digital input terminal stopping PID enable)<br>45: The second mode<br>46: Initial curling radius selection terminal 1<br>47: Initial curling radius selection terminal 2<br>48: Thickness selection terminal 1<br>49: Thickness selection terminal 2<br>50: Wind-up roll-down switching<br>51: Predrive reference<br>52: Torque memory<br>53: Torque memory enable<br>54: Turn counting signal (note1)<br>55: Switch speed/Torque control<br>56: Curling radius restore<br>57: High-speed pulse input function (note1)<br>58: Analog terminal 2-5 priority<br>59: Reserve<br>60: Starting/Stopping of PLC<br>61: Origin retry enable function SHOM<br>62: Origin retry setting origin ORGP<br>63: Switch position/Speed control<br>64: External switch zero-servo<br>65: External accelerate/decelerate pause<br>66: External forced stop<br>67：coil diameter calculation Stop<br>68：Single point positioning can make<br>69：Multipoint positioning can make<br>70：entire position control pulse input command can make<br>71：External torque command polarity reverse<br>99999 : Not choose in addition of terminal function | 0 | 119 |
| P.84 | 03-01 | STR function selection | Same as 03-00 | 1 | 120 |
| P.85 | 03-11 | A-B-C function | Same as 03-10 | 5 | 125 |
| P.86 | 03-02 | RES function selection | Same as 03-00 | 30 | 120 |
| P.87 | 03-14 | Multi-function terminal digital input negative/positive logic | 0 ~ 1023 | 0 | 126 |
| P.88 | 03-15 | Multi-function terminal digital output negative/positive logic | 0 ~ 4095 | 0 | 126 |
| P.89 | 13-00 | Slip compensation coefficient | 0 ~ 10 | 0 | 256 |
| P.90 | 00-00 | The inverter model | Read | Read | 61 |
| P.91 | 01-16 | Fequency jump 1A | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.92 | 01-17 | Fequency jump 1B | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| P.93 | 01-18 | Fequency jump 2A | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| P.94 | 01-19 | Fequency jump 2B | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| P.95 | 01-20 | Fequency jump 3A | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| P.96 | 01-21 | Fequency jump 3B | 0 ~ 650.00Hz<br>99999: invalid | 99999 | 87 |
| P.97 | 00-17 | The second target frequency selection | 0: Frequency set by parameter unit<br>1: Frequency set by Communication RS485<br>2: Frequency set by the analog<br>3: Frequency set by communication Expansion card<br>4: Frequency set by PG board A2B2<br>5: Frequency set by HDIpulse | 0 | 72 |
| P.98 | 01-26 | Middle frequency 1 | 0 ~ 650.00Hz | 3.00Hz | 88 |
| P.99 | 01-27 | Output voltage 1 of middle frequency | 0 ~ 100.0% | 10.0% | 88 |
| P.100 | 04-15 | Minute/second selection | 0: The minimum increment of run time is 1 minute.<br>1: The minimum increment of run time is 1 second. | 1 | 136 |
| P.101 | 04-27 | Programmed operation mode speed 1 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| P.102 | 04-28 | Programmed operation mode speed 2 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| P.103 | 04-29 | Programmed operation mode speed3 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| P.104 | 04-30 | Programmed operation mode speed 4 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| P.105 | 04-31 | Programmed operation mode speed 5 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| P.106 | 04-32 | Programmed operation mode speed 6 operating time | 0 ~ 6000.0s | 0.0s | 137 |
| P.107 | 04-33 | Programmed operation mode speed 7 operating time | 0 ~ 6000.0s | 0.0s | 137 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.108 | 04-34 | Programmed operation mode speed 8 operating time | 0 ~ 6000.0s | 0.0s | 138 |
| P.109 | 00-18 | The second start signal selection | 0: Operating signal set by parameter unit<br>1: Operating signal set by digital input terminal<br>2: Operating signal set by Communication RS485<br>3: Operating signal set by communication expansion card | 0 | 72 |
| P.110 | 00-06 | Parameter unit monitoring selection | X0: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the output frequency.<br>X1: When the inverter starts, the screen of the parameter unit displays the target frequency.<br>X2: When the inverter starts, the parameter unit enters the monitoring mode automatically, and the screen displays the current pressure and feedback pressure of the constant pressure system.<br>0X：Boot screen to monitor model output frequency<br>1X：Boot screen to set the target frequency mode<br>2X：Boot screen to monitor model of output curren<br>3X：Boot screen to monitor mode of the output voltage | 1 | 68 |
| P.111 | 04-35 | Programmed operation mode speed 1 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.112 | 04-36 | Programmed operation mode speed 2 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.113 | 04-37 | Programmed operation mode speed 3 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.114 | 04-38 | Programmed operation mode speed 4 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.115 | 04-39 | Programmed operation mode speed 5 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.116 | 04-40 | Programmed operation mode speed 6 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.117 | 04-41 | Programmed operation mode speed 7Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.118 | 04-42 | Programmed operation mode speed8 Acc/Dec time | 0 ~ 600.00s/0 ~ 6000.0s | 0.00s | 138 |
| P.119 | 10-16 | The dead time of positive and reverse rotation | 0 ~ 3000.0s | 0.0s | 222 |
| P.120 | 03-16 | Output signal delay time | 0 ~ 3600.0s | 0.0s | 127 |
| P.121 | 04-16 | Run direction in each section | 0 ~ 255 | 0 | 136 |
| P.122 | 04-17 | Cycle selection | 0: Cycle function invalid<br>1 ~ 8: Run circularly from the settingsection. | 0 | 137 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.123 | 04-18 | Acceleration/deceleration time setting selection | 0: The acceleration time is set by 01-06(P.7), the deceleration time is set by 01-07(P.8).<br>1: The acceleration and deceleration time is both determined by 04-35(P.111) ~ 04-42(P.118). | 0 | 137 |
| P.124 | 09-13 | Expansion card version | Read | Read | 208 |
| P.125 | 00-26 | Expansion card type | Read | Read | 75 |
| P.126 | 03-06 | Reserve | Same as 03-00 | 5 | 121 |
| P.127 | 03-07 | Reserve | Same as 03-00 | 8 | 121 |
| P.128 | 03-08 | Reserve | Same as 03-00 | 7 | 121 |
| P.129 | 03-12 | Reserve | Same as 03-10 | 2 | 125 |
| P.130 | 03-13 | Reserve | Same as 03-10 | 0 | 125 |
| P.131 | 04-19 | Programmed operation mode speed 1 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.132 | 04-20 | Programmed operation mode speed 2 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.133 | 04-21 | Programmed operation mode speed3 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.134 | 04-22 | Programmed operation mode speed 4 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.135 | 04-23 | Programmed operation mode speed 5 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.136 | 04-24 | Programmed operation mode speed 6 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.137 | 04-25 | Programmed operation mode speed 7 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.138 | 04-26 | Programmed operation mode speed 8 | 0 ~ 650.00Hz | 0.00Hz | 137 |
| P.139 | 02-11 | The bias rate of 2-5 voltage signal | -100.0%~100.0% | 0.0% | 100 |
| P.142 | 04-07 | Speed8 | Same as 04-03 | 99999 | 135 |
| P.143 | 04-08 | Speed9 | Same as 04-03 | 99999 | 135 |
| P.144 | 04-09 | Speed10 | Same as 04-03 | 99999 | 135 |
| P.145 | 04-10 | Speed11 | Same as 04-03 | 99999 | 135 |
| P.146 | 04-11 | Speed12 | Same as 04-03 | 99999 | 135 |
| P.147 | 04-12 | Speed13 | Same as 04-03 | 99999 | 135 |
| P.148 | 04-13 | Speed14 | Same as 04-03 | 99999 | 135 |
| P.149 | 04-14 | Speed15 | Same as 04-03 | 99999 | 135 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.150 | 10-08 | Restart mode selection | XX0: No frequency search.<br>XX1: Direct frequency search<br>XX2: Decrease voltage mode<br>X0X: Power on once.<br>X1X: Start each time.<br>X2X: Only instantaneous stop and restart<br>0XX: No rotationdirection detection.<br>1XX: Rotation direction detection.<br>2XX:00-15(P.78)=0, rotation direction detection ; 00-15(P.78)=1/2, no rotation direction detection. | 0 | 217 |
| P.151 | 10-03 | Zero-speed control function selection | 0: There is no output at zero-speed.<br>1: The zero-speed running is carried out in close-loop vector control (00-21/22=4) mode; DC voltage breaking is carried out in V/F close-loop control (00-21/22=1) mode.<br>2: The zero-servo running is carried out in close-loop vector mode. | 0 | 215 |
| P.152 | 10-04 | Voltage at zero-speed control | 0 ~ 30.0%: 7.5K and types below<br>0 ~ 30.0%: Types from 11K~22K | 4.0%<br>2.0% | 216 |
| P.153 | 07-10 | COM1Communication error handling | 0: Warn and call to stop<br>1: No warning and keep running | 1 | 171 |
| P.154 | 07-07 | COM1 Modbus communication format | 0: 1、7、N、2 (Modbus, ASCII)<br>1: 1、7、E、1 (Modbus, ASCII)<br>2: 1、7、O、1 (Modbus, ASCII)<br>3: 1、8、N、2 (Modbus, RTU)<br>4: 1、8、E、1 (Modbus, RTU)<br>5: 1、8、O、1 (Modbus, RTU) | 4 | 171 |
| P.155 | 06-08 | Over torque detection level | 0 ~ 200.0% | 0.0% | 157 |
| P.156 | 06-09 | Over torque detection time | 0.1 ~ 60.0s | 1.0s | 157 |
| P.157 | 03-17 | Digital input terminal filter time | 0 ~ 2000ms | 4ms | 127 |
| P.158 | 03-18 | Digital input terminal power enable | 0: Digital input terminal power unable<br>1: Digital input terminal power enable | 0 | 127 |
| P.159 | 10-17 | Energy-saving control function | 0: Normal running mode.<br>1: Energy-saving running mode. | 0 | 222 |
| P.160 | 06-11 | Stall level when restart | 0 ~ 150.0% | 100.0% | 158 |
| P.161 | 00-07 | Multi-function display | 0: Output voltage (V)<br>1: Inverter voltage between (+/P) and (-/N) terminals. (V)<br>2: Temperature rising accumulation rate of inverter (%)<br>3: Target pressure of the constant pressure system (%) | 0 | 68 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.161 | 00-07 | Multi-function display | 4: Feedback pressure of the constant pressure system (%)<br>5: Operation frequency (Hz)<br>6: Electronic thermal accumulation rate (%)<br>7: Signal value (V) of 2-5 simulating input terminals.<br>8: Signal value (mA) of 4-5 simulating input terminals (mA/V).<br>9: Output power (kW).<br>10: Motor speed. (Hz)<br>11:Positive and reverse rotation signal. Then 1 represents positive rotation, 2 represents reverse rotation, and 0 represents stopping state.<br>12: NTC temperature (℃)<br>13: Electronic thermal accumulation rate of motor (%)<br>14: Reserve.<br>15: Input frequency of terminal M2. (kHz)<br>16: Real-time curling radius value. (mm)<br>17: Real-time line speed. (m/min)<br>18: Output torque of inverter (%)<br>19: Digital terminal input state<br>20: Digital terminal output state<br>21: Actual working carrier frequency<br>22: Reserve.<br>23: Synchronousmotor rotor pole position<br>24：Current target frequency<br>25：PTC Enter the percentage<br>26：Target pressure and feedback the constant pressure system<br>27：motor speed<br>28：Power factor<br>29：Power cumulative value (KWH)<br>30：PG feedback frequency | 0 | 68 |
| P.162 | 01-28 | Middle frequency 2 | 0～650.00Hz<br>99999: Not selected | 99999 | 88 |
| P.163 | 01-29 | Output voltage 2 of middle frequency | 0～100.0% | 0.0% | 89 |
| P.164 | 01-30 | Middle frequency 3 | 0～650.00Hz<br>99999: Not selected | 99999 | 89 |
| P.165 | 01-31 | Output voltage 3 of middle frequency | 0～100.0% | 0.0% | 89 |
| P.166 | 01-32 | Middle frequency 4 | 0～650.00Hz<br>99999: Not selected | 99999 | 89 |
| P.167 | 01-33 | Output voltage 4 of middle frequency | 0～100.0% | 0.0% | 89 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.168 | 01-34 | Middle frequency 5 | 0 ~ 650.00Hz<br>99999: Not selected | 99999 | 89 |
| P.169 | 01-35 | Output voltage 5 of middle frequency | 0 ~ 100.0% | 0.0% | 89 |
| P.170 | 08-00 | PID function selection | 0: PID function non-selected<br>0X: Parameter 08-03(P.225) sets target value.<br>1X: Take the input of terminal 2-5 as target source<br>2X: Take the input of terminal 4-5 as target source<br>3X: Reserve<br>4X: Take the input of terminal M2 as target source<br>X1: Take the input of terminal 2-5 as feedback source<br>X2: Take the input of terminal 4-5 as feedback source<br>X3: Reserve | 0 | 193 |
| P.171 | 08-01 | PID feedback control method | 0: Negative feedback control.<br>1: Positive feedback control. | 0 | 193 |
| P.172 | 08-04 | Proportion gain | 0.1% ~ 1000.0% | 20.0% | 193 |
| P.173 | 08-05 | Integral time | 0 ~ 60.00s | 1.00s | 193 |
| P.174 | 08-06 | Differential time | 0 ~ 10000ms | 0ms | 194 |
| P.175 | 08-07 | Abnormal deviation | 0 ~ 100.0% | 0.0% | 194 |
| P.176 | 08-08 | Exception duration time | 0 ~ 600.0s | 30.0s | 194 |
| P.177 | 08-09 | Exception handling mode | 0: Free stop<br>1: Decelerate and stop<br>2: Continue to run when the alarm goes off | 0 | 194 |
| P.178 | 08-10 | Sleep detects deviation | 0 ~ 100.0% | 0.0% | 194 |
| P.179 | 08-11 | Sleep detects duration time | 0 ~ 255.0s | 1.0s | 194 |
| P.180 | 08-12 | Revival level | 0 ~ 100.0% | 90.0% | 194 |
| P.181 | 08-13 | Outage level | 0 ~ 120.00Hz | 40.00Hz | 194 |
| P.182 | 08-14 | Integral upper limit | 0 ~ 200.0% | 100.0% | 194 |
| P.183 | 08-15 | Deceleration step length with stable pressure | 0 ~ 10.00Hz | 0.50Hz | 194 |
| P.184 | 02-24 | 4-5 disconnection selection | 0: No disconnection selection is available.<br>1: Decelerate to 0Hz, the digital output terminal will set off the alarm<br>2: The inverter will stop immediately, and the panel willdisplaythe “AEr” alarm.<br>3: The inverter will run continuously according to the frequency reference before the disconnection. The digital output terminal will set off the alarm. | 0 | 106 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.185 | 02-06 | Proportion linkage gain | 0 ~ 100% | 0% | 98 |
| P.186 | 00-23 | Motor types selection | 0: Normal Duty (ND), apply to the fans and water pump type duty.<br>1: Heavy Duty (HD), apply to other duties. | 1 | 74 |
| P.187 | 02-59 | FM calibration parameter | 0 ~ 9998 | 450 | 112 |
| P.188 | 00-01 | Firmware version | Read | Read | 61 |
| P.189 | 00-24 | 50Hz/60Hz switch selection | 0: The frequency parameter default valueis60Hz system.<br>1: The frequency parameter default valueis 50Hz system. | 0<br>1 | 74 |
| P.190 | 02-47 | AM output bias | 0 ~ 1024 | 0 | 110 |
| P.191 | 02-46 | AM output gain | 0 ~ 1024 | 935 | 110 |
| P.192 | 02-12 | The minimum input positive voltage of 2-5 | 0 ~ 10.00V | 0.00V | 100 |
| P.193 | 02-13 | The maximum input positive voltage of 2-5 | 0 ~ 10.00V | 10.00V | 100 |
| P.194 | 02-14 | The percentage corresponding to the minimum positive voltage of terminal 2-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 0.0% | 100 |
| P.195 | 02-15 | The percentage corresponding to the maximum positive voltage of terminal 2-5 | -100.0% ~ 100.0%<br>-400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 100.0% | 100 |
| P.196 | 02-27 | The percentage corresponding to the minimum input current/ voltage of terminal 4-5 | -100.0 ~ 100.0%<br>-400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 0.0% | 106 |
| P.197 | 02-28 | The percentage corresponding to the maximum input current/ voltage of terminal 4-5 | -100.0 ~ 100.0%<br>-400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 100.0% | 106 |
| P.198 | 02-25 | The minimum input current/ voltage of terminal 4-5 | 0 ~ 20.00mA | 4.00mA | 106 |
| P.199 | 02-26 | The maximum input current/ voltage of terminal 4-5 | 0 ~ 20.00mA | 20.00 mA | 106 |
| P.220 | 06-04 | Current stall selection of time of acceleration and deceleration | 0: According to the current time of Acc/Dec<br>1: According to the first time of Acc/Dec<br>2: According to the second time of Acc/Dec<br>3:Automatically calculate the best time of accerelation/deceleration | 3 | 154 |
| P.221 | 08-16 | Reserve | --- | --- | 194 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.222 | 08-17 | Reserve | --- | --- | 194 |
| P.223 | 08-18 | Reserve | --- | --- | 194 |
| P.224 | 08-19 | Reserve | --- | --- | 194 |
| P.225 | 08-03 | PID targer value panel reference | 0 ~ 100.0% | 20.0% | 193 |
| P.229 | 10-18 | Dwell function selection | 0: None.<br>1: Backlash compensation function.<br>2: Acceleration and deceleration interrupt waiting function. | 0 | 223 |
| P.230 | 10-19 | Dwellfrequency at acceleration | 0 ~ 650.00Hz | 1.00Hz | 223 |
| P.231 | 10-20 | Dwelltime at acceleration | 0 ~ 360.0s | 0.5s | 223 |
| P.232 | 10-21 | Dwellfrequency at deceleration | 0 ~ 650.00Hz | 1.00Hz | 223 |
| P.233 | 10-22 | Dwelltime at deceleration | 0 ~ 360.0s | 0.5s | 223 |
| P.234 | 10-23 | Triangular wave function selection | 0: None.<br>1: External TRIis turned on,triangular wave function will be valid.<br>2: The triangular wave function is effective at any given time. | 0 | 224 |
| P.235 | 10-24 | Maximum amplitude | 0 ~ 25.0% | 10.0% | 225 |
| P.236 | 10-25 | Amplitude compensation for deceleration | 0 ~ 50.0% | 10.0% | 225 |
| P.237 | 10-26 | Amplitude compensation for acceleration | 0 ~ 50.0% | 10.0% | 225 |
| P.238 | 10-27 | Amplitude acceleration time | 0 ~ 360.00s/0 ~ 3600.0s | 10.00s | 225 |
| P.239 | 10-28 | Amplitude deceleration time | 0 ~ 360.00s/0 ~ 3600.0s | 10.00s | 225 |
| P.240 | 02-07 | Auxiliary frequency | 0: No auxiliary frequency function is available.<br>1: operation frequency = basic frequency + auxiliaryfrequency (given by the 2-5 terminal)<br>2: operation frequency = basic frequency + auxiliaryfrequency (given by the 4-5 terminal)<br>3: operation frequency = basic frequency - auxiliary frequency (given by the 2-5 terminal)<br>4: operation frequency = basic frequency - auxiliary frequency (given by the 4-5 terminal)<br>5: operation frequency = given by the terminal 2-5 as the proportion linkage signal<br>6: operation frequency = given by the terminal 4-5 as the proportion linkage signal | 0 | 99 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.241 | 08-02 | Sampling period by PID | 0 ~ 60000ms | 20ms | 193 |
| P.242 | 10-05 | DC injection brake function before start | 0: DC injection brake function is not available before starting.<br>1: DC brake injection function is selected before starting. | 0 | 216 |
| P.243 | 10-06 | DC injection brake time before start | 0 ~ 60.0s | 0.5s | 216 |
| P.244 | 10-07 | DC injection brake voltage before start | 0 ~ 30.0%: 7.5K (included) and types below<br>0 ~ 30.0%: 11K ~ 22Ktypes | 4.0%<br>2.0% | 216 |
| P.245 | 06-12 | Cooling fan operation | 0: The fan will be turned on when running. The fan will be turned off 30 seconds after inverter stops.<br>1: Turning on the power will turn on the fan. When the power is turned off, the fan will be off, too.<br>2: The fan will be turned on if the temperature of the heat sink is higher than 40℃. When the power is turned off, the fan will be turned off, too.<br>3: The fan will be turned on when the temperature of the heat sink is higher than 60℃. When it is lower than 40℃, the fan will be turned off. | 0 | 158 |
| P.246 | 13-01 | Modulation coefficient | 0.90 ~ 1.20 | 1.00 | 256 |
| P.247 | 10-29 | MC switchover interlock time | 0.1 ~ 100.0s | 1.0s | 226 |
| P.248 | 10-30 | Start waiting time | 0.1 ~ 100.0s | 0.5s | 226 |
| P.249 | 10-31 | Switchover frequency from inverter to commercial power supply frequency | 0 ~ 60.00Hz<br>99999: No automatic switchover order. | 99999 | 226 |
| P.250 | 10-32 | Automatic switchover frequency range | 0 ~ 10.00Hz: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to commercial power supply operation, the operation will be changed to the inverter operation.<br>99999: When the inverter start reference (STF/STR) is turned off after the operation is changed from inverter operation to | 99999 | 226 |
| P.255 | 01-36 | S pattern time at the beginning of acceleration | 0 ~ 25.00s/0 ~ 250.0s | 0.20s | 89 |
| P.256 | 01-37 | S pattern time at the end of acceleration | 0 ~ 25.00s/0 ~ 250.0s<br>99999: Not selected | 99999 | 89 |
| P.257 | 01-38 | S pattern time at the beginningofdeceleration | 0 ~ 25.00s/0 ~ 250.0s<br>99999: Not selected | 99999 | 89 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.258 | 01-39 | S pattern time at the end of deceleration | 0 ~ 25.00s/0 ~ 250.0s<br>99999: Not selected | 99999 | 89 |
| P.259 | 00-09 | Custom decimal display | 0: Speed display selection unit is 1<br>1: Speed display selection unit is 0.1<br>0X: Value of electricity is zero<br>1X: Value of electricity is a small digit | 1 | 69 |
| P.260 | 06-10 | Over torque detection selection | 0: The OL2 alarm is not reported after the over torque detection, and the inverter keeps running.<br>1: The OL2 alarm is reported after the over torque detection, and the inverter stops. | 1 | 157 |
| P.261 | 06-17 | Maintenance alarm function | 0: No maintenance alarm<br>1 ~ 9998day: Used to set time whenmaintenancealarm sends out signal | 0 | 160 |
| P.262 | 06-20 | Output phase failure protection | 0: No output phase failure protection selection<br>1: Output phase failure protection, the parameter unit will display the “LF” abnormal alarm and the inverter will stop the output. | 0 | 161 |
| P.263 | 06-07 | Decrease carrier protection setting | 0: Rated carrier frequency, limit load current according to the setting carrier.<br>1: Rated current, limit carrier according to the load current and temperature. | 0 | 155 |
| P.264 | 10-51 | Overexcitation deceleration | 0: Overexcitation deceleration is invalid.<br>1: Overexcitation deceleration is valid. | 0 | 232 |
| P.265 | 10-52 | Overexcitation current level | 0 ~ 150.0% | 100.0% | 232 |
| P.266 | 10-53 | Overexcitation gain | 1.00 ~ 1.40 | 1.10 | 232 |
| P.267 | 10-45 | Regeneration and avoidance operation selection | 0: Regeneration avoidance function is invalid.<br>1: Regeneration avoidance function is always valid.(Automatic mode, automatic calculation for Acc/Dec speed of action)<br>2: Regeneration avoidance function is valid only during a constant speed operation(Automatic mode, automatic calculation for Acc/Dec speed of action)<br>11:Regeneration and avoidance function is effective in running (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272))<br>12: Regeneration and avoidance function only in constant speed (Manual mode, Acc/Dec speed of action is set by 10-49(P.271) and 10-50(P.272)) | 0 | 231 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.268 | 10-46 | Regeneration and avoidance DC bus voltage level | 155 ~ 400V: 220V types | 380V | 231 |
| | | | 310 ~ 800V: 440V types | 760V | |
| P.269 | 10-47 | DC bus voltage detection sensitivity at deceleration | 0: Disables regeneration avoidance due to bus voltage change rate. | 0 | 231 |
| | | | 1 ~ 5: Set the sensitivity to detect the bus voltage change rate. Larger number, higher sensitivity. | | |
| P.270 | 10-48 | Regeneration and avoidance frequency compensation value | 0 ~ 10.00Hz: Set the limit value of frequency which rises at activation of regeneration avoidance function. | 6.00Hz | 231 |
| | | | 99999: Frequency limit invalid. | | |
| P.271 | 10-49 | Regeneration avoidance voltage gaincoefficient | 0 ~ 200.0% | 100.0% | 232 |
| P.272 | 10-50 | Regeneration avoidance frequency gain coefficient | 0 ~ 200.0% | 100.0% | 232 |
| P.273 | 10-33 | Power failure stop selection | 0: Power failure time deceleration-to-stopfunction disabled. | 0 | 229 |
| | | | 1: No undervoltage avoidance (Ifan undervoltage or power failureoccurs, the motordecelerates to a stop.) | | |
| | | | 2: No undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.) | | |
| | | | 11: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop.) | | |
| | | | 12: Undervoltage avoidance (If an undervoltage or power failure occurs, the motor decelerates to a stop. Motor re-accelerates if the power restores during the deceleration to stop.) | | |
| P.274 | 10-34 | Subtracted frequency at deceleration start | 0 ~ 20.00Hz | 3.00Hz | 229 |
| P.275 | 10-35 | Subtraction starting frequency | 0 ~ 120.00Hz: When output frequency≥ 10-35(P.275), The motor decelerates from the “output frequency - 10-34(P.274)” ; When output frequency < 10-35(P.275), deceleration from output frequency | 50.00Hz | 229 |
| | | | 99999: The motor decelerates from the “output frequency - 10-34(P.274)” | | |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.276 | 10-36 | Power-failure deceleration time 1 | 0 ~ 360.00s/0 ~ 3600.00s | 5.00s | 229 |
| P.277 | 10-37 | Power-failure deceleration time 2 | 0 ~ 360.00s/0 ~ 3600.00s: Set the Dec time starting at10-38(P.278)and downward.<br>99999:Set the Dec time to the setting frequency of 10-38(P.278). | 99999 | 229 |
| P.278 | 10-38 | Power failure deceleration time switchover frequency | 0 ~ 650.00Hz | 50.00Hz | 229 |
| P.279 | 10-39 | UV avoidance voltage gain | 0 ~ 200.0% | 100.0% | 229 |
| P.280 | 06-18 | Short circuit detection when starting | 0: No short circuit detection when starting<br>1: Short circuit detection when starting | 0 | 160 |
| P.281 | 06-13 | Input phase failure protection | 0: No Phase Failure Protection<br>1: Phase failure protection, the parameter unit will display the “IPF” alarm and the output stops. | 0 | 159 |
| P.282 | 06-19 | Operation GF detection level | 0~100.0% | 50.0% | 160 |
| P.285 | 13-02 | Low frequency vibration inhibition factor | 0 ~ 8 | 5 | 256 |
| P.286 | 13-03 | High frequency vibration inhibition factor | XX00 ~ XX15<br>00XX ~15XX | 509 | 256 |
| P.287 | 06-14 | SCP Short circuit protection function | 0: No the output end short-circuits protection function.<br>1: If outputend is short, the parameter unit will display the “SCP” alarm and the output stops. | 1 | 159 |
| P.288 | 06-40 | Alarm code query | 0 ~ 12 | 1 | 164 |
| P.289 | 06-41 | Alarm code display | Read | Read | 164 |
| P.290 | 06-42 | Alarm message query | 0 ~ 10 | 0 | 164 |
| P.291 | 06-43 | Alarm message display | Read | Read | 164 |
| P.292 | 06-27 | Accumulative motor operation time (minutes) | 0 ~ 1439min | 0min | 163 |
| P.293 | 06-28 | Accumulative motor operation time (days) | 0 ~ 9999day | 0day | 163 |
| P.294 | 00-04 | Decryption parameter | 0~65535 | 0 | 64 |
| P.295 | 00-05 | Password setup | 2~65535 | 0 | 64 |
| P.296 | 06-29 | Accumulative motor power time (minutes) | 0 ~ 1439min | 0min | 163 |
| P.297 | 06-30 | Accumulative motor power time (days) | 0 ~ 9999day | 0day | 163 |
| P.298 | 06-31 | Output power (low 16 position) | Read | Read | 163 |
| P.299 | 06-32 | Output power (high 16 position) | Read | Read | 163 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.300 | 00-21 | Motor control mode selection | 0: Induction motor V/F control<br>1: Induction motor close-loop V/F control (VF + PG)<br>2: Induction motor simple vector control<br>3: Induction motorsensorless vector control<br>4: Induction motor PG vector control<br>5: Synchronous motor PG vector control<br>6: Synchronous motor without PG vector control | 0 | 73 |
| P.301 | 05-00 | Motor parameter auto-tuning function selection | 0: Parameter auto-tuning function with no motor<br>1: Induction motor parameter auto-tuning measuring the running motor<br>2: Induction motor parameter auto-tuning measuring the stopped motor<br>3: Induction motoronline auto-tuning function<br>4: Reserve<br>5 : Induction motor parameters automatic measurement [Measurement of motor is not running]<br>8: Synchronous motor parameter auto-tuning function<br>9: Synchronous motor Phase Z position auto-tuning function<br>10: Reserve | 0 | 142 |
| P.302 | 05-01 | Motor rated power | 0 ~ 650.00kW | 0.00kW | 145 |
| P.303 | 05-02 | Motor poles | 0 ~ 48 | 4 | 145 |
| P.304 | 05-03 | Motor rated voltage | 440 Voltage ：0 ~ 510V<br>220 Voltage ： 0~255V | According to voltage | 145 |
| P.305 | 05-04 | Motor rated frequency | 50Hz system: 0 ~ 650.00Hz<br>60Hz system: 0 ~ 650.00Hz | 50.00Hz<br>60.00Hz | 145 |
| P.306 | 05-05 | Motor rated current | 0~500.00A | According to type | 145 |
| P.307 | 05-06 | Motor rated rotation speed | 50Hz system: 0 ~ 65000r/min<br>60Hzsystem: 0 ~ 65000r/min | 1410 r/min<br>1710 r/min | 145 |
| P.308 | 05-07 | Motor excitation current | 0~500.00A | According to type | 145 |
| P.309 | 05-08 | IM motor stator resistance | 0 ~ 65000mΩ | According to type | 145 |
| P.310 | 05-09 | IM motor rotor resistance | 0 ~ 65000mΩ | According to type | 145 |
| P.311 | 05-10 | IM motor leakage inductance | 0 ~ 6500.0mH | According to type | 145 |
| P.312 | 05-11 | IM motor mutual inductance | 0 ~ 6500.0mH | According to type | 145 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.313 | 05-12 | PM motor stator resistance | 0～65000mΩ | According to type | 145 |
| P.314 | 05-13 | PM motor d-axis inductance | 0～650.00mH | According to type | 145 |
| P.315 | 05-14 | PM motor q-axis inductance | 0～650.00mH | According to type | 145 |
| P.316 | 05-15 | PM motor Back-EMF coefficient | 0～6500.0V/krpm | According to type | 145 |
| P.317 | 05-16 | PM motor PhaseZ origin pulse compensation | 0～359.9° | 0.0° | 145 |
| P.318 | 05-17 | Rotation inertia | 0～6.5000kg.m²:5.5K and types below<br>0～65.000kg.m²: 7.5K~ 22K types | According to type | 145 |
| P.320 | 11-00 | Speed control proportion coefficient 1 | 0～2000.0 | 100.0 | 237 |
| P.321 | 11-01 | Speed control integral time1 | 0～20.00s | 0.30s | 237 |
| P.322 | 11-02 | PI coefficient switching frequency 1 | 11-25（P.414）～11-05（P.325）Hz | 5.00Hz | 237 |
| P.323 | 11-03 | Speed control proportion coefficient 2 | 0～2000.0 | 100.0 | 237 |
| P.324 | 11-04 | Speed control integral time 2 | 0～20.00s | 0.30s | 237 |
| P.325 | 11-05 | PI coefficient switching frequency 2 | 11-02 (P.322)～650.00Hz | 10.00Hz | 237 |
| P.326 | 11-06 | Current control proportion coefficient | 0～20 | 0 | 237 |
| P.327 | 11-07 | PM motor types | 0: SPM<br>1: IPM | 0 | 238 |
| P.328 | 11-08 | PM initial motor position detection selection | 0: Pull in.<br>1: High frequency pulse | 0 | 238 |
| P.329 | 11-09 | PMmotor acceleration id | 0～200% | 80% | 238 |
| P.330 | 11-10 | PM motor constant speed id | 0～200% | 0% | 238 |
| P.331 | 11-11 | PM motor estimatedrotation speed filter time | 0～1000ms | 2ms | 238 |
| P.332 | 05-22 | The second motor rated power | 0～650.00kW<br>99999 | 99999 | 147 |
| P.333 | 05-23 | The second motor poles | 0～48<br>99999 | 99999 | 147 |
| P.334 | 05-24 | The second motor rated voltage | 440Voltage：0～510V<br>220Voltage： 0~255V<br>99999 | 99999 | 147 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.335 | 05-25 | The second motor rated frequancy | 0 ~ 650.00Hz<br>99999 | 99999 | 147 |
| P.336 | 05-26 | The second motor rated current | 0~500.00A: Types below Frame D<br>99999 | 99999 | 147 |
| P.337 | 05-27 | The second motor rated rotation speed | 0 ~ 65000r/min<br>99999 | 99999 | 147 |
| P.338 | 05-28 | The second motor excitation current | 0~500.00A<br>99999 | 99999 | 147 |
| P.339 | 05-29 | The second motor (IM)stator resistance | 0 ~ 65000mΩ<br>99999 | 99999 | 147 |
| P.340 | 05-30 | The second motor (IM)rotor resistance | 0 ~ 65000mΩ<br>99999 | 99999 | 147 |
| P.341 | 05-31 | The second motor (IM)leakage inductance | 0 ~ 6500.0mH<br>99999 | 99999 | 148 |
| P.342 | 05-32 | The second motor (IM)mutual inductance | 0 ~ 6500.0mH<br>99999 | 99999 | 148 |
| P.343 | 05-33 | The second motor (PM) stator resistance | 0 ~ 65000mΩ<br>99999 | 99999 | 148 |
| P.344 | 05-34 | The second motor (PM) d-axis inductance | 0 ~ 650.00mH<br>99999 | 99999 | 148 |
| P.345 | 05-35 | The second motor (PM)q-axis inductance | 0 ~ 650.00mH<br>99999 | 99999 | 148 |
| P.346 | 05-36 | The second motor (PM) Back-EMF coefficient | 0 ~ 6500.0V/krpm<br>99999 | 99999 | 148 |
| P.347 | 05-37 | The second motor (PM) PhaseZ origin pulse compensation | 0 ~ 359.9°<br>99999 | 99999 | 148 |
| P.348 | 05-38 | The second motor rotation inertia | 0 ~ 6.5000kg.m$^2$: 5.5K and types below<br>0 ~ 65.000kg.m$^2$: Typesfrom 7.5K~22K<br>99999 | 99999 | 148 |
| P.349 | 09-00 | PG type selection | 0: ABZ<br>1: ABZ (Synchronous motor decicated)<br>2: Resolver 1x Synchronous motor standard encoder<br>3: ABZ/UVW Synchronous motor standard encoder | 0 | 204 |
| P.350 | 09-01 | Number 1 of the encoder pulses | 0 ~ 20000 | 1024 | 204 |
| P.351 | 09-02 | Encoder input mode setup 1 | 0: No function<br>1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.<br>2: Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation. | 0 | 204 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.351 | 09-02 | Encoder input mode setup 1 | 3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.<br>4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation. | 0 | 204 |
| P.352 | 09-03 | PG abnormality detection time | 0 ~ 100.0s | 1.0s | 206 |
| P.353 | 09-04 | Over-speed detection frequency | 0 ~ 30.00Hz | 4.00Hz | 206 |
| P.354 | 09-05 | Over-speed detection time | 0 ~ 100.0s | 1.0s | 206 |
| P.355 | 09-06 | Number 2 of the encoder pulses | 0 ~ 20000 | 2500 | 206 |
| P.356 | 09-07 | Encoder input mode 2 | 0:No function<br>1: Phase A/B pulse train, Phase A is 90° ahead of Phase B and is forward rotation.<br>2:Phase A/B pulse train, Phase B is 90° ahead of Phase A and is forward rotation.<br>3: Phase A is a pulse train. Phase B is a direction sign. L is reverse rotation and H is forward rotation.<br>4: Phase A is a pulse train. Phase B is a direction sign. L is forward rotation and H is reverse rotation. | 0 | 206 |
| P.357 | 09-08 | Dividing frequency output setting | 1 ~ 255 | 1 | 207 |
| P.358 | 09-09 | Dividing frequency filter coefficient | 0 ~ 255 | 0 | 207 |
| P.359 | 09-10 | Electronic gear ratio | 0 ~ 300.00 | 1.00 | 208 |
| P.360 | 09-11 | Prevent reverse rotation detection pulse number | 0 ~ 65535 | 0 | 208 |
| P.361 | 09-12 | Reverse rotation detection number | 0 ~ 65535 | 0 | 208 |
| P.362 | 10-54 | Short-circuit brake time at PM motor start | 0~60.0s | 0.0s | 233 |
| P.363 | 09-14 | Phase Z adjust margin | 0.0°Do not adjust<br>0.1°~360.0°：Phase Z impulse adjust | 15.0° | 209 |
| P.364 | 09-15 | Phase Z DV1/DV2 alarm-enabled | 0：Phase Z DV1/DV2 alarm is not valid<br>1：Phase Z DV1/DV2 alarm is valid | 1 | 209 |
| P.365 | 11-42 | Reserve | | | 243 |
| P.366 | 11-43 | PM motor speed estimation observer Kp | 0 ~ 65000 | 10 | 243 |
| P.367 | 11-44 | PM motor speed estimation observer Ki | 0 ~ 65000 | 376 | 243 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.370 | 00-22 | The second motor control mode selection | 0: Induction motor V/Fcontrol<br>1: Induction motor V/F close-loop control (VF+PG)<br>2: Induction motor simple vector control<br>3: Induction motorsensorless vector control<br>4: Induction motor PG vector control<br>5: Synchronous motor PG vector control<br>6: Synchronous motor without PG vector control<br>99999: The second motor control mode is not selected. | 99999 | 73 |
| P.371 | 11-30 | The second motor speed control proportion coefficient 1 | 0 ~ 2000.0<br>99999 | 100.0 | 241 |
| P.372 | 11-31 | The second motor Speed control integral time1 | 0 ~ 20.00s<br>99999 | 0.30s | 241 |
| P.373 | 11-32 | The second motor PI coefficient switchingfrequency 1 | 0 ~ 11-35 (P.376)Hz<br>99999 | 5.00Hz | 241 |
| P.374 | 11-33 | The second motor speed control proportion coefficient 2 | 0 ~ 2000.0<br>99999 | 100.0 | 241 |
| P.375 | 11-34 | The second motor Speed control integral time 2 | 0 ~ 20.00s<br>99999 | 0.30s | 242 |
| P.376 | 11-35 | The second motor PI coefficient switching frequency 2 | 11-32(P.373)~650.00Hz<br>99999 | 10.00Hz | 242 |
| P.377 | 11-36 | The second motor current control proportion coefficient | 0 ~ 20<br>99999 | 0 | 242 |
| P.378 | 11-37 | The second PM motor types | 0: SPM<br>1: IPM<br>99999 | 0 | 242 |
| P.379 | 11-38 | The second PM initial motor position detection selection | 0: Pull in.<br>1: High frequency pulse<br>99999 | 0 | 242 |
| P.380 | 11-39 | The second PM motor acceleration id | 0 ~ 200%<br>99999 | 80% | 242 |
| P.381 | 11-40 | The second PM motor constant speed id | 0 ~ 200%<br>99999 | 0% | 242 |
| P.382 | 11-41 | The second PM motor estimated rotation speed filter time | 0 ~ 1000ms<br>99999 | 2ms | 242 |
| P.383 | 11-45 | PMZero speed motor current loop bandwidth coefficient | 0 ~ 100 | 40 | 243 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.384 | 11-46 | PM Motor current loop bandwidth coefficient at low speed | 0 ~ 100 | 40 | 243 |
| P.385 | 11-47 | PMMotor current loop bandwidth coefficient at a high speed | 0 ~ 100 | 40 | 243 |
| P.386 | 09-16 | PG302 Hardware break line detection | 0 : Break line detection invalid<br>1 : Break line detection effective | 1 | 206 |
| P.400 | 00-20 | Control mode selection | 0: Speed control<br>1: Torque control<br>2: Position control | 0 | 72 |
| P.401 | 11-12 | PM motor estimatedrotation speed filter time | -400.0 ~ 400.0% | 0.0% | 239 |
| P.402 | 11-13 | Torque reference | -120% ~ 120% | 0% | 239 |
| P.403 | 11-14 | Speed limit bias | 0 ~ 120% | 10% | 239 |
| P.404 | 11-15 | Torque filter time | 0 ~ 1000ms | 0ms | 239 |
| P.405 | 11-16 | Torque setting source | 0: Given by the11-12(P.401).<br>1: Given by the analog or pulse input.<br>2: Given by the communication mode. | 0 | 239 |
| P.406 | 11-17 | Selection of speed limit | 0:The speed is limited according to 11-13(P.402) and 11-14(P.403)<br>1: Frequency reference source(it is decided according to00-16(P.79)) | 0 | 239 |
| P.407 | 11-18 | Unidirectional speed limit bias | 0: Unidirectional speed limit bias is invalid.<br>1: Unidirectional speed limit bias is valid. | 1 | 239 |
| P.408 | 11-19 | Forward motor torque limit | 0 ~ 400.0% | 200.0% | 240 |
| P.409 | 11-20 | Reverse regenerative torque limit | 0 ~ 400.0% | 200.0% | 240 |
| P.410 | 11-21 | Reverse motor torque limit | 0 ~ 400.0% | 200.0% | 240 |
| P.411 | 11-22 | Forward regenerative torque limit | 0 ~ 400.0% | 200.0% | 240 |
| P.412 | 11-23 | Zero velocity ratio | 0~2000.0 | 100.0 | 237 |
| P.413 | 11-24 | Zero speed integration time | 0~20.00s | 0.30s | 237 |
| P.414 | 11-25 | Zero speed switching frequency | 0~11-02 ( P.322 ) Hz | 5.00Hz | 237 |
| P.415 | 11-26 | IM motor estimate rotataional speed filtering time | 0-100.00 | 0 | 237 |
| P.420 | 12-00 | Homing mode | 0 ~ 2123 | 0 | 246 |
| P.421 | 12-01 | The first high speed of Homing | 0 ~ 650.00Hz | 10.00Hz | 246 |
| P.422 | 12-02 | The second high speed of Homing | 0 ~ 650.00Hz | 2.00Hz | 246 |
| P.423 | 12-03 | origin pulse offset | -30000~30000 | 0 | 246 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.424 | 12-04 | Position instruction source | 0: External pulse.<br>1: Relative position.<br>2: Absolute position. | 0 | 249 |
| P.425 | 12-05 | Position control proportion gain | 0 ~ 65535 | 10 | 249 |
| P.426 | 12-06 | Position control feed forward gain | 0 ~ 65535 | 0 | 249 |
| P.427 | 12-07 | Position control feed forward low pass filter time | 0 ~ 65535ms | 100ms | 249 |
| P.428 | 12-08 | External pulse position control speed limit | 0 ~ 650.00Hz | 10.00Hz | 249 |
| P.429 | 12-09 | Position reaching margin | 0 ~ 65535 | 40 | 249 |
| P.430 | 12-10 | Zero servo gain | 0 ~ 100 | 5 | 251 |
| P.431 | 12-11 | Single point positioning location | 0~65535 | 0 | 251 |
| P.432 | 12-12 | Frequency of single point locating | 0~650.00Hz | 0.00Hz | 251 |
| P.433 | 12-13 | Zero velocity threshold | 0~650.00Hz | 0.50Hz | 249 |
| P.434 | 12-14 | Position command response options | 0~2 | 0 | 249 |
| P.450 | 12-20 | Number of turns position command1 | -30000~30000 | 0 | 252 |
| P.451 | 12-21 | Number of pulses position command1 | -30000~30000 | 0 | 252 |
| P.452 | 12-22 | Number of turns position command2 | -30000~30000 | 0 | 252 |
| P.453 | 12-23 | Number of pulses position command2 | -30000~30000 | 0 | 252 |
| P.454 | 12-24 | Number of turns position command3 | -30000~30000 | 0 | 252 |
| P.455 | 12-25 | Number of pulses position command3 | -30000~30000 | 0 | 252 |
| P.456 | 12-26 | Number of turns position command4 | -30000~30000 | 0 | 252 |
| P.457 | 12-27 | Number of pulses position command4 | -30000~30000 | 0 | 252 |
| P.458 | 12-28 | Number of turns position command5 | -30000~30000 | 0 | 252 |
| P.459 | 12-29 | Number of pulses position command5 | -30000~30000 | 0 | 252 |
| P.460 | 12-30 | Number of turns position command6 | -30000~30000 | 0 | 253 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.461 | 12-31 | Number of pulses position command6 | -30000~30000 | 0 | 253 |
| P.462 | 12-32 | Number of turns position command7 | -30000~30000 | 0 | 253 |
| P.463 | 12-33 | Number of pulses position command7 | -30000~30000 | 0 | 253 |
| P.464 | 12-34 | Number of turns position command8 | -30000~30000 | 0 | 253 |
| P.465 | 12-35 | Number of pulses position command8 | -30000~30000 | 0 | 253 |
| P.466 | 12-36 | Number of turns position command9 | -30000~30000 | 0 | 253 |
| P.467 | 12-37 | Number of pulses position command9 | -30000~30000 | 0 | 253 |
| P.468 | 12-38 | Number of turns position command10 | -30000~30000 | 0 | 253 |
| P.469 | 12-39 | Number of pulses position command10 | -30000~30000 | 0 | 253 |
| P.470 | 12-40 | Number of turns position command11 | -30000~30000 | 0 | 253 |
| P.471 | 12-41 | Number of pulses position command11 | -30000~30000 | 0 | 253 |
| P.472 | 12-42 | Number of turns position command12 | -30000~30000 | 0 | 253 |
| P.473 | 12-43 | Number of pulses position command12 | -30000~30000 | 0 | 253 |
| P.474 | 12-44 | Number of turns position command13 | -30000~30000 | 0 | 253 |
| P.475 | 12-45 | Number of pulses position command13 | -30000~30000 | 0 | 253 |
| P.476 | 12-46 | Number of turns position command14 | -30000~30000 | 0 | 253 |
| P.477 | 12-47 | Number of pulses position command14 | -30000~30000 | 0 | 253 |
| P.478 | 12-48 | Number of turns position command15 | -30000~30000 | 0 | 253 |
| P.479 | 12-49 | Number of pulses position command15 | -30000~30000 | 0 | 253 |
| P.500 | 02-00 | Function selection of terminal 2-5 | 0: Non-function<br>1: Frequency reference<br>2: Torque reference<br>3: PID target value<br>4: PID feedback signal | 1 | 96 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.500 | 02-00 | Function selection of terminal 2-5 | 5: Target tension setting<br>6: Line speed setting<br>7: Feedback line speed<br>8: Real-time curling radius<br>9: Initial curling radius<br>10: Material thickness<br>11: PTC<br>12: PT100<br>13: VF detached function<br>14: Positive torque limit<br>15: Negative torque limit<br>16: Positive/Negative torque limit<br>17: Retrogradetorque limit | 1 | 96 |
| P.501 | 02-01 | Function of terminal 4-5 | Same as 02-00 | 1 | 96 |
| P.503 | 02-03 | Function of input HDI | Same as 02-00 | 0 | 96 |
| P.504 | 02-02 | Reserve | Reserve | --- | 96 |
| P.505 | 02-23 | The bias rate of 4-5 current/voltage signal | -100.0% ~ 100.0% | 0.0% | 106 |
| P.507 | 02-32 | Reserve | --- | --- | --- |
| P.508 | 02-30 | Reserve | --- | --- | --- |
| P.510 | 02-18 | The percentage corresponding to the minimum negative voltage of termianl 2-5 | -100.0 ~ 100.0%<br>400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 0.0% | 100 |
| P.511 | 02-19 | The percentage corresponding to the maximum negative voltage of termianl 2-5 | -100.0 ~ 100.0%<br>400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 0.0% | 100 |
| P.512 | 02-16 | The minimum input negative voltage of 2-5 | 0 ~ 10.00V | 0.00V | 100 |
| P.513 | 02-17 | The maximum input negative voltage of t2-5 | 0 ~ 10.00V | 0.00V | 100 |
| P.522 | 02-41 | The percentage corresponding toHDI input minimum frequency | -100.0% ~ 100.0%<br>400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 0.0% | 108 |
| P.523 | 02-42 | The percentage corresponding to HDI input maximum frequency | -100.0% ~ 100.0%<br>400.0% ~ 400.0% ( P.500 = 2/14/15/16/17 ) | 100.0% | 108 |
| P.524 | 02-39 | HDI input minimum frequency | 0 ~ 100.00kHz | 0.00kHz | 107 |
| P.525 | 02-40 | HDI input maximum frequency | 0 ~ 100.00kHz | 100.00kHz | 107 |
| P.526 | 02-38 | HDI filter time | 0 ~ 2000ms | 10ms | 107 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.527 | 02-31 | Reserve | --- | --- | --- |
| P.528 | 02-22 | 4-5 filter time | 0 ~ 2000ms | 30ms | 106 |
| P.531 | 02-29 | Reserve | --- | --- | --- |
| P.533 | 06-15 | The process mode of PTC alarm | 0: Alarm and continue to run<br>1: Alarm and decelerate to stop<br>2: Alarm and stop freely<br>3: No alarm | 0 | 159 |
| P.534 | 06-16 | The percentage of PTC level | 0 ~ 100.0% | 0.0% | 159 |
| P.535 | 02-50 | Reserve | Reserve | --- | --- |
| P.536 | 02-49 | Reserve | Reserve | --- | --- |
| P.537 | 02-05 | Reserve | --- | --- | 97 |
| P.538 | 02-48 | Reserve | Reserve | --- | --- |
| P.539 | 02-53 | Reserve | --- | --- | 111 |
| P.541 | 02-54 | AM/FM fixed output level | 0 ~ 100.0% | 0.0% | 111 |
| P.543 | 02-44 | FM output function selection | 0: Output frequency, the frequency display reference 02-51(P.55) is 100%.<br>1: Output current, the current monitoringreference02-52(P.56)is 100%.<br>2: Output DC bus voltage, the OV level is 100%.<br>3: Output the temperature rising accumulation rate of inverter, the NTC level is 100%.<br>4: Output the electronic thermal rate of the inverter: The electronic thermal relay running (when 06-00(P.9)≠0) or the electronic thermal relay of the inverter's IGBT module running (when 06-00(P.9)=0) is 100%.<br>5: Target frequency, the frequency display reference02-51 (P.55) is 100%.<br>6: Fixed voltage output, voltage output level is set by 02-54 (P.541).<br>7: Output voltage, the inverter rated voltage is100%.<br>8: Fixed voltage output, voltage output level is set by 02-54 (P.541). (Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)<br>9: Output torque, two times motor rated torque is 100%.(Valid only when 00-21(P.300) or 00-22(P.370) is set to 3~6)<br>10: Output power, two times motor rated power is 100%.<br>11: The high-speed pulse, 100.00KHz is 100%.<br>12: Motor speed, to display the level of 02-51 (P.55) is 100%. | 0 | 109 |
| P.545 | 02-33 | Reserve | --- | --- | --- |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.546 | 02-36 | Reserve | --- | --- | --- |
| P.547 | 02-37 | Reserve | --- | --- | --- |
| P.548 | 02-34 | Reserve | --- | --- | --- |
| P.549 | 02-35 | Reserve | --- | --- | --- |
| P.550 | 03-09 | Reserve | --- | --- | 121 |
| P.551 | 03-25 | Expanded digital input terminal M10 | Same as 03-00 | 99999 | 129 |
| P.552 | 03-26 | Expanded digital input terminal M11 | Same as 03-00 | 99999 | 129 |
| P.553 | 03-27 | Expanded digital input terminal M12 | Same as 03-00 | 99999 | 129 |
| P.554 | 03-28 | Expanded digital input terminal M13 | Same as 03-00 | 99999 | 129 |
| P.555 | 03-29 | Expanded digital input terminal M14 | Same as 03-00 | 99999 | 129 |
| P.556 | 03-30 | Expanded digital input terminal M15 | Same as 03-00 | 99999 | 129 |
| P.559 | 03-33 | Reserve | --- | --- | --- |
| P.560 | 03-34 | Reserve | --- | --- | --- |
| P.561 | 03-35 | Reserve | --- | --- | --- |
| P.562 | 03-36 | Reserve | --- | --- | --- |
| P.563 | 03-37 | Reserve | --- | --- | --- |
| P.564 | 03-38 | Reserve | --- | --- | --- |
| P.567 | 03-41 | Expanded digital input terminal negative/ positive logic | 0 ~ 63 | 0 | 130 |
| P.568 | 03-42 | Expanded digital output terminal A10 | Same as 03-10 | 99999 | 130 |
| P.569 | 03-43 | Expanded digital output terminal A11 | Same as 03-10 | 99999 | 130 |
| P.570 | 03-44 | Expanded digital output terminal A12 | Same as 03-10 | 99999 | 130 |
| P.571 | 03-45 | Expanded digital output terminal A13 | Same as 03-10 | 99999 | 130 |
| P.572 | 03-46 | Expanded digital output terminal A14 | Same as 03-10 | 99999 | 130 |
| P.573 | 03-47 | Expanded digital output terminal A15 | Same as 03-10 | 99999 | 130 |
| P.574 | 03-48 | Expanded digital output terminal A16 | Same as 03-10 | 99999 | 130 |
| P.575 | 03-49 | Expanded digital output terminal A17 | Same as 03-10 | 99999 | 131 |
| P.576 | 03-50 | Reserve | --- | --- | --- |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.577 | 03-51 | Reserve | --- | --- | --- |
| P.578 | 03-52 | Reserve | --- | --- | --- |
| P.579 | 03-53 | Reserve | --- | --- | --- |
| P.580 | 03-54 | Reserve | --- | --- | --- |
| P.581 | 03-55 | Reserve | --- | --- | --- |
| P.582 | 03-56 | Reserve | --- | --- | --- |
| P.583 | 03-57 | Reserve | --- | --- | --- |
| P.584 | 03-58 | Reserve | --- | --- | 131 |
| P.585 | 03-59 | Monitor noumenon digital input terminal state | Read | Read | 131 |
| P.586 | 03-60 | Monitor noumenon and expanded output terminal state | Read | Read | 131 |
| P.587 | 03-61 | Monitor expanded digital input terminal state | Read | Read | 131 |
| P.588 | 03-62 | Reserve | Read | Read | 131 |
| P.592 | 02-55 | PT100 voltage level 1 | 0 ~ 10.00V | 5.00V | 112 |
| P.593 | 02-56 | PT100 voltage level 2 | 0 ~ 10.00V | 7.00V | 112 |
| P.594 | 02-57 | PT100 level 1starting frequency | 0 ~ 650.00Hz | 0.00Hz | 112 |
| P.595 | 02-58 | Starting PT100 level1 delay time | 0 ~ 6000s | 60s | 112 |
| P.600 | 14-00 | The tension control selection | 0: The tension control is invalid<br>1: Open-loop torque control mode(in the mode of close-loop vector control)<br>2: Close-loop speed control mode<br>3: Close-loop torque control mode (in the mode of close-loop vector control)<br>4: Constant line speed control mode. | 0 | 261 |
| P.601 | 14-01 | The curling mode | 0: Wind-up<br>1: Roll-down | 0 | 261 |
| P.602 | 14-02 | Selection of inverse take-up during roll-down | 0: Active inverse material take-up is not allowed during startup.<br>1: Active inverse material take-up is allowed. | 0 | 261 |
| P.603 | 14-03 | Mechanical transmission ratio | 0 ~ 300.00 | 1.00 | 261 |
| P.604 | 14-04 | Tension setting source | 0: The parameter 14-05(P.605) setting.<br>1: The analog value or PULSE input setting.<br>2: Communication setting. | 0 | 262 |
| P.605 | 14-05 | Tension setting | 0 ~ 30000N | 0N | 262 |
| P.606 | 14-06 | Maximum tension | 0 ~ 30000N | 0N | 262 |
| P.607 | 14-07 | Zero-speed tension increase | 0 ~ 50.0% | 0.0% | 262 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.608 | 14-08 | Zero-speed threshold | 0 ~ 30.00Hz | 0.00Hz | 262 |
| P.609 | 14-09 | Tension taper | 0 ~ 100.0% | 0.0% | 262 |
| P.610 | 14-11 | Curling radius calculation method selection | 0: Calculation through line speed.<br>1: Calculation through thickness accumulation (the encoder on side of the motor), the pulse signal is connected to the A1/B1 on PG card.<br>2: Calculation through thickness accumulation (the encoder on the side of curling shaft), the pulse signal is connected to the terminal M2.<br>3: Analog value or pulse input. | 0 | 263 |
| P.611 | 14-13 | Maximum curling radius | 1 ~ 10000mm | 500mm | 263 |
| P.612 | 14-14 | Winding shaft diameter | 0 ~ 10000mm | 100mm | 263 |
| P.613 | 14-15 | Initial curling radius source | 0: Initial curling radius is set by the parameter 14-16(P.614) ~ 14-18(P.616).<br>1: Initial curling radius is set by the analog value. | 0 | 263 |
| P.614 | 14-16 | Initial curling radius1 | 1 ~ 10000mm | 100mm | 263 |
| P.615 | 14-17 | Initial curling radius 2 | 1 ~ 10000mm | 100mm | 263 |
| P.616 | 14-18 | Initial curling radius 3 | 1 ~ 10000mm | 100mm | 263 |
| P.617 | 14-19 | Curling radius filtering time | 0 ~ 1000ms | 0ms | 263 |
| P.618 | 14-20 | Current value of curling radius | 0 ~ 10000mm | 0mm | 264 |
| P.619 | 14-21 | Number of pulses each turn | 1 ~ 60000 | 1 | 264 |
| P.620 | 14-22 | Number of turns each layer | 1 ~ 10000 | 1 | 264 |
| P.621 | 14-23 | Material thickness setting source | 0: The material thickness is set by the parameter 14-24(P.622) ~ 14-27(P.625).<br>1: The material thickness is set by the analog value. | 0 | 264 |
| P.622 | 14-24 | Material thickness0 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| P.623 | 14-25 | Material thickness1 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| P.624 | 14-26 | Material thickness2 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| P.625 | 14-27 | Material thickness3 | 0.01 ~ 100.00mm | 0.01mm | 264 |
| P.626 | 14-28 | Maximum thickness | 0.01 ~ 100.00mm | 1.00mm | 264 |
| P.627 | 14-29 | Line speed inputsource | 0: No line speed input.<br>1: The analog value or pulse input<br>2: The communication setting. | 0 | 266 |
| P.628 | 14-30 | Maximum line speed | 0.1 ~ 6500.0m/min | 1000.0 m/min | 266 |
| P.629 | 14-31 | Minimum line speed for calculation R. | 0.1 ~ 6500.0m/min | 200.0 m/min | 266 |
| P.630 | 14-32 | Actual line speed | 0 ~ 6500.0m/min | 0.0m/min | 266 |
| P.631 | 05-18 | Reserve | --- | --- | 146 |
| P.632 | 05-19 | Reserve | --- | --- | 146 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.633 | 14-33 | Mechanical inertia compensation coefficient | 0 ~ 65535 | 0 | 267 |
| P.634 | 14-34 | Material density | 0 ~ 60000kg/m³ | 0kg/m³ | 267 |
| P.635 | 14-35 | Material width | 0 ~ 60000mm | 0mm | 267 |
| P.636 | 14-36 | Fiction compensation coefficient | 0 ~ 50.0% | 0.0% | 267 |
| P.637 | 14-37 | Material supply interrupt auto detection function | 0: Material supply interrupt auto detection is inactive.<br>1: Material supply interrupt auto detection function1<br>2: Material supply interrupt auto detection function 2<br>3: Material supply interrupt auto detection function 3 | 0 | 267 |
| P.638 | 14-38 | Auto detection minimum line speed | 0.1 ~ 6500.0m/min | 200.0 m/min | 267 |
| P.639 | 14-39 | Auto detection errorrange | 0.1 ~ 100.0% | 10.0% | 268 |
| P.640 | 14-40 | Auto detection judgment delay | 0.1 ~ 60.0s | 2.0s | 268 |
| P.641 | 08-20 | PID proportion Gain P2 | 0.1% ~ 1000.0% | 20.0% | 197 |
| P.642 | 08-21 | Integral time I2 | 0 ~ 60.00s | 1.00s | 197 |
| P.643 | 08-22 | Differential time D2 | 0 ~ 10000ms | 0ms | 197 |
| P.644 | 08-23 | Auto adjustment for PID parameters | 0: PID parameters 1 are active.<br>1: Adjust according to the curling radius.<br>2: Adjust according to the operation frequency<br>3: Adjust according to the operation frequency | 0 | 197 |
| P.645 | 14-41 | Pre-drive speed gain | -50.0% ~ 50.0% | 0.0% | 268 |
| P.646 | 14-42 | Pre-drive torque increase | -50.0% ~ 50.0% | 0.0% | 268 |
| P.647 | 14-43 | Pre-drive torque delay time | 0 ~ 65535ms | 0ms | 268 |
| P.650 | 14-12 | Curling radius memory control when calculation through thickness accumulation | 0: It does not memorize the curling radius when turning off the power or stopping calculating the curling radius.<br>1: It memorizes previous calculation value when turning off the power or stopping calculating the curling radius, it takes the memorized curling radius as initialvalue whenre-turning on the power or beginning to calculate. | 0 | 263 |
| P.654 | 14-10 | Taper compensation correction | 0 ~ 10000mm | 0mm | 262 |
| P.656 | 14-44 | Line speed setting source | 0: The line speed setting is invalid.<br>1: The line speed is obtained by analog value or pulse input.<br>2: The line speed is obtained by communication mode. | 0 | 270 |
| P.657 | 14-45 | Line speed setting | 0 ~ 6500.0m/min | 0.0m/min | 270- |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.658 | 14-46 | Tension closed-loop limite amplitude of benchmark | 0:amplitude limitingis based on the motor rated power | 0 | 270 |
| P.659 | 14-47 | Tension in closed-loop limite amplitude of the bias | 1:amplitude limitingis based on system real-time line speed<br>0.0% ~ 100.0% | 0.0% | 270 |
| P.700 | 10-40 | VF separated voltage source | 0: Given by digital 10-41(P.701).<br>1: Given by analog or HDI pulse. | 0 | 230 |
| P.701 | 10-41 | VF separated voltage digital | 0 ~ 440.00V/0~220.00V | According to voltage | 230 |
| P.702 | 10-42 | VF separated voltage Acc time | 0 ~ 1000.0s | 0.0s | 230 |
| P.703 | 10-43 | VFseparated voltage Dec time | 0 ~ 1000.0s | 0.0s | 230 |
| P.704 | 10-44 | VF separated Stop selection | 0: Frequency/voltage independentlydecreases to 0.<br>1: After the voltage decreases to 0, frequency decreases. | 0 | 230 |
| P.705 | 06-21 | Low voltage level | 155 ~ 220V: 220V inverter type<br>310 ~ 440V: 440V inverter type | 155V<br>310V | 161 |
| P.706 | 06-22 | Regenerative brake operation level | 205 ~ 400V: 220V inverter type<br>410 ~ 800V: 440V inverter type | 360V<br>720V | 161 |
| P.707 | 06-23 | Voltage stall level | 205 ~ 400V: 220V inverter type<br>410 ~ 800V: 440V inverter type | 380V<br>760V | 162 |
| P.708 | 06-24 | Capacitor lifetime detection | 0: No capacitor lifetime detection.<br>1: When the power is OFF, start to detect the lifetime of electrolytic capacitor on main circuit. | 0 | 162 |
| P.709 | 06-25 | Capacitor lifetime detection level | 0 ~ 100.0% | 100.0% | 162 |
| P.710 | 06-26 | Capacitor lifetime detection result | 0: No abnormal signal.<br>1: Electrolytic capacitor abnormal. | Read | 162 |
| P.711 | 08-24 | PID target signal filter time | 0 ~ 650.00s | 0.00s | 198 |
| P.712 | 08-25 | PID feedback signal filter time | 0 ~ 60.00s | 0.00s | 198 |
| P.713 | 08-26 | PIDoutput signal filter time | 0 ~ 60.00s | 0.00s | 198 |
| P.714 | 08-27 | PID deviation control limit | 0 ~ 100.00% | 0.00% | 199 |
| P.715 | 08-28 | Integral separated property | 0: Integral not separated<br>1: Integral separated | 0 | 199 |
| P.716 | 08-29 | Integral separated point | 0 ~ 100.00% | 50.00% | 199 |
| P.717 | 08-30 | PID differential limit | 0 ~ 100.00% | 0.10% | 199 |
| P.718 | 08-31 | PID output in forward directiondeviation limit | 0 ~ 100.00% | 100.00% | 200 |
| P.719 | 08-32 | PID output in reverse direction deviation limit | 0 ~ 100.00% | 100.00% | 200 |

| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.720 | 08-33 | PID parameter switchover operation selection | 0: No PID parameter switchover.<br>1: PID parameter switchover based ondeviation. | 0 | 200 |
| P.721 | 08-34 | PID parameter switchover deviation lower limit | 0 ~ 100.00% | 20.00% | 200 |
| P.722 | 08-35 | PID parameter switchover deviation upper limit | 0 ~ 100.00% | 80.00% | 200 |
| P.723 | 08-36 | PID wire-break operation selection1 | 0: When PID wire-break, select to no need to operate to the upper limit value.<br>1: When PID wire-break, select to need to operate to the upper limit value. | 1 | 201 |
| P.726 | 08-39 | PID operation at stop | 0: No PID operation at stop.<br>1: PID Stop operation | 0 | 201 |
| P.727 | 08-40 | PID enable reverse run operation | 0: PID reverse run is not allowed.<br>1: PID reverse run is allowed. | 0 | 201 |
| P.728 | 08-41 | PID in reverse direction integral limit | 0 ~ 100.0% | 0.0% | 201 |
| P.729 | 08-42 | PID minimum output frequency | 0 ~ 10.00Hz | 0.00Hz | 201 |
| P.740 | 06-44 | E1 | Read | Read | 165 |
| P.741 | 06-45 | E2 | Read | Read | 165 |
| P.742 | 06-46 | E3 | Read | Read | 165 |
| P.743 | 06-47 | E4 | Read | Read | 165 |
| P.744 | 06-48 | E5 | Read | Read | 165 |
| P.745 | 06-49 | E6 | Read | Read | 165 |
| P.746 | 06-50 | E7 | Read | Read | 165 |
| P.747 | 06-51 | E8 | Read | Read | 165 |
| P.748 | 06-52 | E9 | Read | Read | 165 |
| P.749 | 06-53 | E10 | Read | Read | 165 |
| P.750 | 06-54 | E11 | Read | Read | 166 |
| P.751 | 06-55 | E12 | Read | Read | 166 |
| P.752 | 06-56 | E1 alarm output frequency | Read | Read | 166 |
| P.753 | 06-57 | E1 alarm output current | Read | Read | 166 |
| P.754 | 06-58 | E1 alarm output voltage | Read | Read | 166 |
| P.755 | 06-59 | E1 alarm the temperature rising accumulation rate | Read | Read | 166 |
| P.756 | 06-60 | E1 alarm PN voltage | Read | Read | 166 |
| P.757 | 06-61 | E1 alarm the time of the inverter has run | Read | Read | 166 |
| P.758 | 06-62 | E1 alarm the inverter operation status code | Read | Read | 166 |
| P.759 | 06-63 | E1 alarm(years/months) | Read | Read | 166 |
| P.760 | 06-64 | E1 alarm (days/hours) | Read | Read | 166 |
| P.761 | 06-65 | E1 alarm(minutes/seconds) | Read | Read | 166 |

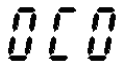
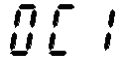
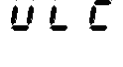
| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.766 | 06-70 | E2 alarm output frequency | Read | Read | 167 |
| P.767 | 06-71 | E2 alarm output current | Read | Read | 167 |
| P.768 | 06-72 | E2 alarm output voltage | Read | Read | 167 |
| P.769 | 06-73 | E2 alarm the temperature rising accumulation rate | Read | Read | 167 |
| P.770 | 06-74 | E2 alarm PN voltage | Read | Read | 167 |
| P.771 | 06-75 | E2 alarm the time of inverter has run | Read | Read | 167 |
| P.772 | 06-76 | E2 alarm the inverter operation status code | Read | Read | 167 |
| P.773 | 06-77 | E2 alarm (years/months) | Read | Read | 167 |
| P.774 | 06-78 | E2 alarm (days/hours) | Read | Read | 167 |
| P.775 | 06-79 | E2 alarm(minutes/seconds) | Read | Read | 167 |
| P.780 | 10-55 | PLC Action choice | 0:PLCFunction invalid<br>1:PLCFunction effective,PLC RUN signal from the external terminal input signal or 10-56 (P.781)。<br>2 : PLCFunction effective,PLC RUNsignal from the external terminal input signal | 0 | 233 |
| P.781 | 10-56 | PLC Run | 0: No effect<br>1: PLC RUN | 0 | 233 |
| P.782 | 10-57 | PLC erase | 0: invalid<br>1: Erase the PLC program, after the success of the erasure parameter value is 0 | 0 | 233 |
| P.783 | 10-58 | PLC Monitor choosing component | 0~326 | 0 | 233 |
| P.784 | 10-59 | PLCComponent monitoring value | Read | Read | 233 |
| P.800 | 07-15 | CANopen slave address | 0 ~ 127 | 0 | 189 |
| P.801 | 07-16 | CANopen speed | 0: 1Mbps<br>1: 500Kbps<br>2: 250Kbps<br>3: 125Kbps<br>4: 100Kbps<br>5: 50 Kbps | 0 | 189 |
| P.802 | 07-17 | CANopen communication status | 0: Node reset state<br>1: Com reset state<br>2: Boot up state<br>3: Pre operation state<br>4: Operation state<br>5: Stop state | 0 | 189 |
| P.803 | 07-18 | CANopen control status | 0: Not ready for use state<br>1: Inhibit start state<br>2: Ready to switch on state<br>3: Switched on state<br>4: Enable operation state<br>7: Quick stop active state | 0 | 189 |

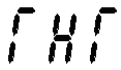
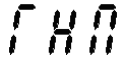
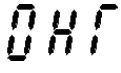
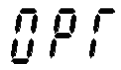
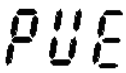
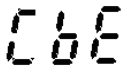
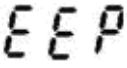
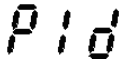
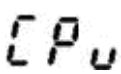
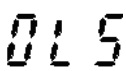
| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.803 | 07-18 | CANopen control status | 13: Err reaction activation state<br>14: Error state | 0 | 189 |
| P.810 | 07-25 | PUCommunication protocol selection | 0：Modbus protocol<br>1：shilin protocol<br>2：PLC protocol（Effective when using the shilin built-in PLC） | 1 | 171 |
| P.811 | 07-26 | PUconverter stations | 0～254 | 0 | 171 |
| P.812 | 07-27 | PUSerial communication baud rate | 0：Baud rate 4800bps<br>1：Baud rate 9600bps<br>2：Baud rate 19200bps<br>3：Baud rate 38400bps<br>4：Baud rate 57600bps<br>5：Baud rate 115200bps | 1 | 172 |
| P.813 | 07-28 | PU data length | 0：8bit<br>1：7bit | 0 | 172 |
| P.814 | 07-29 | PU stop bit | 0：1bit<br>1：2bit | 0 | 172 |
| P.815 | 07-30 | PU Parity check option | 0：no odd-even check<br>1：odd check<br>2：even check | 0 | 172 |
| P.816 | 07-31 | PU CR/LFchoose | 1：only CR<br>2：CR,LF Both | 1 | 172 |
| P.817 | 07-32 | PU Modbus communication format | 0：1、7、N、2 (Modbus, ASCII)<br>1：1、7、E、1 (Modbus, ASCII)<br>2：1、7、O、1 (Modbus, ASCII)<br>3：1、8、N、2 (Modbus, RTU)<br>4：1、8、E、1 (Modbus, RTU)<br>5：1、8、O、1 (Modbus, RTU) | 4 | 172 |
| P.818 | 07-33 | PU Communication exception permit number | 0～10 | 1 | 172 |
| P.819 | 07-34 | PU Communication between permissible time | 0～999.8s：To set data communication timeout inspection<br>99999：No time out inspection | 99999 | 172 |
| P.820 | 07-35 | PUCommunication error handling | 0：Alarm and stop idling<br>1：no alarm and keep on running | 1 | 172 |
| P.826 | 07-41 | Outside enlarge communication cartoon - exception permit number | 0～10 | 1 | 172 |
| P.827 | 07-42 | Outside enlarge communication cartoon - error handling | 0：Alarm and stop idling<br>1：no alarm and keep on running | 1 | 172 |
| P.828 | 07-43 | Outside enlarge communication cartoon dispatch interval allowable time | 0～999.8s：set data communication timeout inspection<br>99999：No timeout inspection | 99999 | 172 |

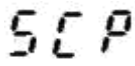
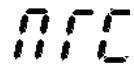
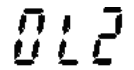
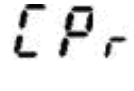
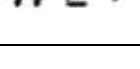
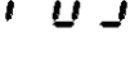
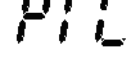
| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.829 | 07-44 | EP301 Communication expansion card version number | read | read | 189 |
| P.830 | 07-45 | IP allocation | 0 : calm IP<br>1 : move IP | 0 | 190 |
| P.831 | 07-46 | IP Add 1 | 0~255 | 192 | 190 |
| P.832 | 07-47 | IP Add 2 | 0~255 | 168 | 190 |
| P.833 | 07-48 | IP Add 3 | 0~255 | 2 | 190 |
| P.834 | 07-49 | IP Add 4 | 0~255 | 102 | 190 |
| P.835 | 07-50 | Subnet mask 1 | 0~255 | 255 | 190 |
| P.836 | 07-51 | Subnet mask 2 | 0~255 | 255 | 190 |
| P.837 | 07-52 | Subnet mask 3 | 0~255 | 255 | 190 |
| P.838 | 07-53 | Subnet mask 4 | 0~255 | 0 | 190 |
| P.839 | 07-54 | default gateway 1 | 0~255 | 192 | 190 |
| P.840 | 07-55 | default gateway 2 | 0~255 | 168 | 190 |
| P.841 | 07-56 | default gateway 3 | 0~255 | 2 | 190 |
| P.842 | 07-57 | default gateway 4 | 0~255 | 100 | 190 |
| P.900 | 15-00 | User registered parameter1 | P mode: 0 ~ 1299<br>Parameter group mode: 00-00~15-99 | 99999 | 272 |
| P.901 | 15-01 | User registered parameter2 | | 99999 | 272 |
| P.902 | 15-02 | User registered parameter3 | | 99999 | 272 |
| P.903 | 15-03 | User registered parameter4 | | 99999 | 272 |
| P.904 | 15-04 | User registered parameter5 | | 99999 | 272 |
| P.905 | 15-05 | User registered parameter6 | | 99999 | 272 |
| P.906 | 15-06 | User registered parameter7 | | 99999 | 272 |
| P.907 | 15-07 | User registered parameter8 | | 99999 | 272 |
| P.908 | 15-08 | User registered parameter9 | | 99999 | 272 |
| P.909 | 15-09 | User registered parameter10 | | 99999 | 272 |
| P.910 | 15-10 | User registered parameter11 | | 99999 | 272 |
| P.911 | 15-11 | User registered parameter12 | | 99999 | 272 |
| P.912 | 15-12 | User registered parameter13 | | 99999 | 272 |
| P.913 | 15-13 | User registered parameter14 | | 99999 | 272 |
| P.914 | 15-14 | User registered parameter15 | | 99999 | 272 |
| P.915 | 15-15 | User registered parameter16 | | 99999 | 272 |
| P.916 | 15-16 | User registered parameter17 | | 99999 | 272 |

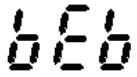
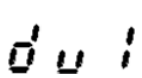
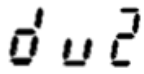
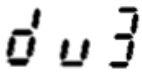
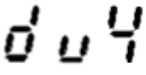
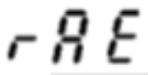
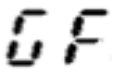
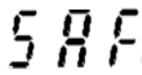
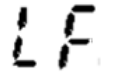
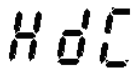
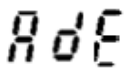
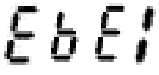
| Parameter Number | Group | Name | Setting Range | Factory Value | Page |
|---|---|---|---|---|---|
| P.917 | 15-17 | User registered parameter18 | P mode: 0 ~ 1299<br>Parameter group mode: 00-00~15-99 | 99999 | 272 |
| P.918 | 15-18 | User registered parameter19 | | 99999 | 272 |
| P.919 | 15-19 | User registered parameter20 | | 99999 | 273 |
| P.990 | 00-25 | Parameter mode setting | 0: Parameter is displayed as “group mode”<br>1: Parameter is displayed as “conventional P mode” | 1 | 75 |
| P.991 | 00-27 | Frequency mode setting | 0: Normal mode<br>1:High speed mode | 0 | 75 |
| P.996 ~ P.999 | 00-02 | Parameter restoration | 0: Non-function<br>1: Alarm history clear (P.996=1)<br>2: Inverter reset (P.997=1)<br>3: Restoring all parameters to default values (P.998=1)<br>4: Restoring some parameters to default values1 (P.999=1)<br>5: Restoring some parameters to default values2 (P.999=2)<br>6: Restoring some parameters to default values3 (P.999=3) | 0 | 62 |

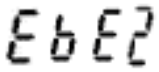
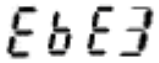
## 7.2 Appendix 2 Alarm code list

| Code | Screen display | Cause | Troubleshooting |
|---|---|---|---|
| **ERROR** | | 1. Under-voltage for power supply<br>2. The reset function “RES” is on<br>3. Bad connection between the parameter unit and main machine<br>4. Internal circuit malfunction<br>5. Wrong CPU operation | 1. Provide a normal power supply<br>2. Shut off “RES”<br>3. Ensure firm connection between the parameter unit and the main machine<br>4. Replace the inverter.<br>5. Restart the inverter |
| **OC0**<br>Over-current when stop |  | The output current is two times larger than the rated current of the inverter. | Please restart the inverter. If the alarm repeated, please send the inverter back to the factory. |
| **OC1**<br>Over-current during acceleration |  | | 1. In case the time for acceleration or deceleration is too short, extend it as necessary.<br>2. Avoid abrupt increase of load.<br>3. Check Terminals U/T1, V/T2 and W/T3 for short circuit. |
| **OC2**<br>Over-current at constant speed |  | | |
| **OC3**<br>Over-current during deceleration |  | | |
| **OV0**<br>Over-voltage when stop |  | Over-voltage between Terminals P and N. | Check whether the power supply is normal or abnormal. |
| **OV1**<br>Over-voltage during acceleration |  | | 1. In case the time for acceleration or deceleration is too short, extend it as necessary.<br>2. Check the brake resistor between Terminals +/P and PR for loose connection.<br>3. Check whether the values of 06-05(P.30) and 06-06(P.70)are correct or not. |
| **OV2**<br>Over-voltage at constant speed |  | | |
| **OV3**<br>Over-voltage during deceleration |  | | |

| Code | Screen display | Cause | Troubleshooting |
|---|---|---|---|
| **THT** Overheated IGBT module |  | IGBT module thermal accumulation relay operation | Avoid prolonged inverter operation when overloaded. |
| **THN** MotorOverheated |  | Electronic thermal electricity act | 1. Check the 06-00 (P. 9) value, whether it is right (outside of motor for reference)<br>2. Lighten load |
| **OHT** External thermal relay operation |  | External thermal relay operation | 1. Check whether the capacity of the external thermal relay and of the motor coordinates well.<br>2. Reduce the load. |
| **OPT** Abnormal peripheral devices |  | 1. Abnormal communication; Exceeding the number of communication retries<br>2. Interrupted communication; Exceeding the permitted communication time interval | Correctly set the communication parameters. |
| **PUE** PUCommunication mouth peripheral anomalies |  | | |
| **CbE** Outside enlarge communication mouth peripheral anomalies |  | | |
| **EEP** Abnormal memory |  | ROM malfunction | Send the inverter back to the factory if this type of alarm happens frequently. |
| **PID** Abnormal PID |  | 1. Insufficient inverter and motor capacity<br>2. PID target value or feedback value set unreasonably<br>3. Peripheral devices malfunction | 1. Enlarge the inverter and motor capacity.<br>2. Check the feedback gain setup. Reset the target value according to the feedback.<br>3. Check the system's peripheral feedback devices (e.g., sensors, potentiometer) and whether the wiring is correct. |
| **CPU** Abnormal CPU |  | Serious peripheral electromagnetic interference | Reduce peripheral interference. |
| **OLS** Stall prevention and protection |  | Over-loaded motor | 1. Reduce motor load.<br>2. Increase 06-01(P.22) value. |

| Code | Screen display | Cause | Troubleshooting |
|---|---|---|---|
| **SCP** Short circuit over-current |  | Output-end short circuit | Check whether the inverter output has short circuit (e.g., the motor wiring). |
| **NTC** Overheated module |  | The temperature of the inverter IGBT module is too high. | 1. Reduce the environment temperature and improve the air condition.<br>2. Check whether the fan of the inverter is running normally. |
| | | | Confirm whether the rectifier side of the relay is pull-in. |
| **OL2** Abnormal over-torque |  | 1. Over-loaded motor<br>2. 06-08(P.155),06-09 (P.156) set unreasonably. | 1. Reduce motor load.<br>2. Adjust the set value of 06-08(P.155), 06-09(P.156) properly. |
| **IPF** Abnormal power supply input | | Abnormal power supply input | Check whether power supply input is normal. |
| **CPR** Abnormal CPU |  | Abnormal CPU procedures | 1. Check the wiring.<br>2. Check the parameter setup.<br>3. Reduce peripheral interference. |
| **AEr** Abnormal 4-5 terminal |  | Abnormal disconnection of 4-5 terminal's analog output | Please refer to the description for02-24(P.184) |
| **PG0** PG cartoon - error |  | PG Abnormal communication | 1. Check the PG card connection with encoder<br>2. Confirm whether the encoder can work normally |
| **PG1** Abnormal encoder model |  | Abnormal encoder model | Check the set value of 09-02(P.351). |
| **PG2** Abnormal PG card feedback signals |  | Abnormal PG card feedback signals | Please refer to the feedback control parameter description for 09-01~09-05 / P.350~P.354. |
| **PG3** Too large speed deviation under closed-loop control |  | Too large speed deviation under closed-loop control | Please refer to the feedback control parameter description for 09-01~09-05/P.350~P.354. |
| **PTC** Overheated motor |  | Overheated motor | 1. Reduce motor load<br>2. Amend 06-16(P.534) |

| Code | Screen display | Cause | Troubleshooting |
|---|---|---|---|
| **BEB**<br>Material line breaking |  | Material line breaking | Detect whether the material feedback signal line is broken. |
| **DV1**<br>Z pulse fault |  | 1. PG encoder is notconnected, not wired properly<br>2. Encoder is damaged | Make sure the PG encoder is properly connected and all shielded lines are properly grounded. |
| **DV2**<br>Z pulse noise detection |  | 1. PG cable is not wired properly. Noise interference along the PG cable.<br>2. PG option card or encoder is damaged | 1. Separate the PG cable lines from the source of the noise.<br>2. Make sure the PG encoder is properly connected and all shielded lines are properly grounded. |
| **DV3**<br>Inversion detection |  | 1. Z pulse position default.<br>2. 09-02(P.351) setting dufault<br>3. PG cable is not wired properly. Noise interference along the PG cable. | 1. Start auto-tuning on Z pulse.<br>2. Set 09-02(P.351) correctly.<br>3. Make sure the PG encoder is properly connected and all shielded lines are properly grounded. |
| **DV4**<br>Inversion prevention detection |  | | |
| **rAE**<br>Relay operation abnormal |  | Relay on the main circuit is abnormal. | Return it to the factory for repair. |
| **GF** |  | Output ground fault | Please check whether motor ground short circuit is normal or not. |
| **SAF**<br>Safety circuit abnormal |  | Safety circuit is disconnected. | 1. Please check whether the short circuit jump piece between S1-SC is firmly connected;<br>2. When using the safety stop function, please check safety ralay unit and the wire connection. |
| **LF** |  | Three- phase output abnormal | Please check whether UVWthree-phase output normal or not. |
| **HDC**<br>Hardware detection error |  | Error in hardware detection | Return it to the factory for repair. |
| **ADE**<br>Three-phase current sampling abnormal |  | Error in three-phase current sampling circuit. | Return it to the factory for repair. |
| **EbE1**<br>Expansion card abnormal |  | Inverter automatically detects the first results are not consistent with the result next time | Check the connection of the expansion card. |

| Code | Screen display | Cause | Troubleshooting |
|---|---|---|---|
| **EbE2** Expansion card abnormal |  | Inverter automatically detects the first results are not consistent with the result next time | Check the connection of the expansion card. |
| **EbE3** Expansion card abnormal |  | Inverter automatically detects the first results are not consistent with the result next time | Check the connection of the expansion card. |

# 7.3 Appendix 3 Troubles and solutions

| Troubles | Check points | |
|---|---|---|
| Motionless motor | Main circuit | •Check whether the power supply voltage between Terminals R/L1, S/L2 and T/L3 is normal.<br>•Check whether the Power light is on.<br>•Check whether the wiring between the inverter and the motor is correct. |
| | Load | •Check whether the load is too heavy.<br>•Check whether the motor rotor is locked. |
| | Parameters Setting | •Check whether the starting frequency (01-11(P.13)) is set too big.<br>•Check whether the operation mode (00-16(P.79)) is correct.<br>•Check whether the maximum frequency (01-00(P.1)) is zero.<br>•Check whether the reverse rotation prevention (00-15(P.78))is restricted.<br>•Check whether the bias and gain (02-12~02-15, 02-25~02-28 / P.192~P.199) setting is correct.<br>•Check that the frequency jump (01-16~01-21 / P.91~P.96) setting is correct. |
| | Control circuit | •Check whether the output stop signal "MRS" is ON. (Related parameter 03-00~03-05/P.80~P.84, P.86))<br>•Check whether the "RES" function is ON. (Related parameter 03-00~03-05/P.80~P.84, P.86)<br>•Check whether the external thermal relay is operating or not.<br>•Check whether the reset has been performed or not after the set-off of the alarm (the ALARM light in on).<br>•Check whether the voltage/current signals are correctly wired.<br>•Check whether the functions of STF and STR are correct. (Related parameter03-00~03-05/P.80~P.84, P.86)<br>•Check whether the wiring for the control circuit is disconnected or has a poor contact. |
| Reversed motor rotation | •Check whether the phase sequence of output terminals U/T1, V/T2 and W/T3 is correct.<br>•Check whether the start signal (STF and STR) are connected correctly. | |
| Failure to increase the rotation speed of the motor | •Check whether the load is too heavy.<br>•Check whether the stall prevention level (06-01(P.22)) is correct.<br>•Check whether the torque boost (01-10(P.0)) is set too high.<br>•Check whether the maximum frequency (01-00(P.1)) is effective. | |
| Unsmoothed acceleration / deceleration | •Check whether the acceleration / deceleration time (01-06(P.7), 01-07(P.8)) is correct.<br>•Check whether the acceleration / deceleration curve selection (01-05(P.29)) is correct.<br>•Check whether the voltage / current input signals are affected by noises. | |
| Overlarge motor current | •Check whether the load is too heavy.<br>•Check whether the capacity of the inverter and of the motor are well matched.<br>•Check whether the torque boost (01-10(P.0)) is set too high. | |
| Speed variation during the operation | •Check whether the voltage / current input signals are affected by noises.<br>•Check whether the load varies.<br>•Check whether the wiring length of the main circuit is too long. | |

# 7.4 Appendix 4 Optional equipment

## 7.4.1 Communication card

➢ PD301: Profibus communication card

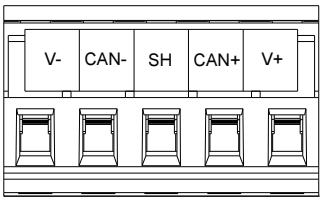
| Terminal form | Terminal name | Function name | Description |
|---|---|---|---|
| DB9 | 1 | --- | --- |
| | 2 | --- | --- |
| | 3 | Rxd/Txd-P | Receive/transmit data-P |
| | 4 | CNTR-P 2) | Control-P |
| | 5 | DGND | Data ground |
| | 6 | VP 1) | Positive voltage |
| | 7 | --- | --- |
| | 8 | Rxd/Txd-N | Receive/transmit data-N |
| | 9 | --- | --- |
| 1) The signal is only needed in bus cable endpoint station. | | | |
| 2) The signal is alternative. | | | |

◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | PD301 | PD301card | LNKPD301 |

➢ N301: Devicenet communication card

◆ Devicenet ports definition

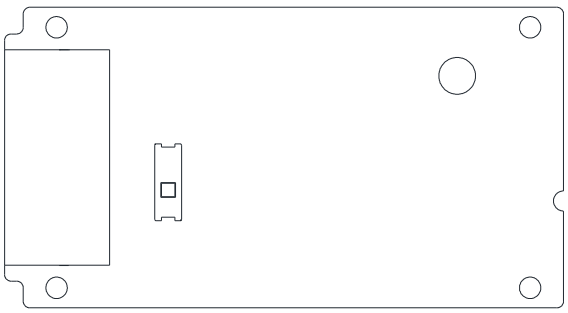



| Terminal | Signal | Description |
|---|---|---|
| V+ | V+ | DC24V |
| CAN+ | CAN+ | Positive Signal wire |
| SH | SHIELD | Ground wire |
| CAN- | CAN- | Complex signal wire |
| V- | V- | 0V |

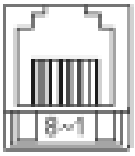
◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | DN301 | DN301card | LNKDN301 |

➢ CP301: Canopencommunication card



◆ RJ-45Pin Definition



Socket

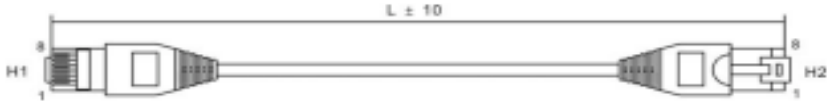
| Pin | Symbol | Description |
|---|---|---|
| 1 | CAN_H | CAN_Hbus line (dominant high) |
| 2 | CAN_L | CAN_L bus line (dominant low) |
| 3 | CAN_GND | Ground /0V/V- |
| 7 | CAN_GND | Ground /0V/V- |

◆ Function and specification

| | |
|---|---|
| Connector | RJ-45 |
| Port | 2 Port |
| Transmission | CAN |
| Transmission | Using CAN standard line |
| Transmission | 1M 500k 250K/280KF 125k 100k 50k |
| Protocol | CANopen Protocol |

◆ CANopen communication wiring

Type: LNKCBLxxT (xx stands for01,03,05)

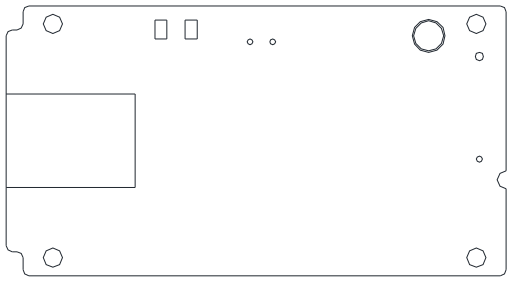



| Item No. | Part No. | L(mm) |
|---|---|---|
| 1 | LNKCBL01T | 1000 |
| 2 | LNKCBL03T | 3000 |
| 3 | LNKCBL05T | 5000 |

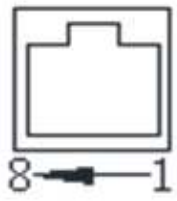
◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | CP301 | CP301card | LNKCP301 |

➢ EP301：Canopen communication card



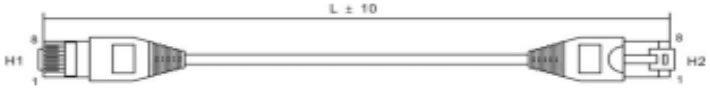
◆ Electric specification



| Terminal form | Terminal name | Function name | Description |
|---|---|---|---|
| RJ45 | 1 | Tx+ | transmit data + |
| | 2 | Tx- | transmit data - |
| | 3 | RX+ | Receive data + |
| | 4 | --- | --- |
| | 5 | --- | --- |
| | 6 | RX- | Receive data - |
| | 7 | --- | --- |
| | 8 | --- | --- |

◆ CANopen communication wiring

Type：LNKCBLxxT (xx stands 01,03,05)



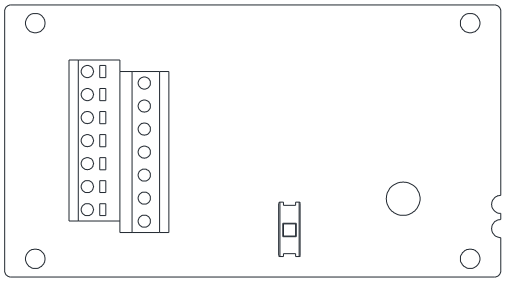

| Item No. | Part No. | L(mm) |
|---|---|---|
| 1 | LNKCBL01T | 1000 |
| 2 | LNKCBL03T | 3000 |
| 3 | LNKCBL05T | 5000 |

◆ Ordering code：

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | EP301 | EP301 card | LNKEP301 |

## 7.4.2 I/O card

➢ EB362R

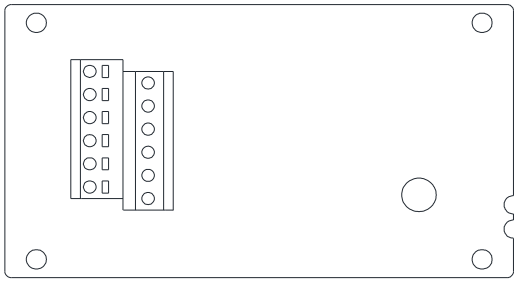


| Terminal form | Terminal name | Function instructions | Terminal specification |
|---|---|---|---|
| Switch signal input | M10 | There are totally 6 multi-function expanded control terminals. (Sink/Source can be switched) | Input impedance: 4.7 kΩ<br>Action current: 5mA<br>Voltage range: 10~28VDC<br>Maximum frequency: 1kHz |
| | M11 | | |
| | M12 | | |
| | M13 | | |
| | M14 | | |
| | M15 | | |
| Relay output | A10, C10 | Multi-function relay outputs 2 groups;<br>A-C is the normally open contact | Maximum voltage: 30VDC or 250VAC<br>Maximum current: Resistive load: 5A NO<br>Inductive load: 2A NO<br>(cosΦ=0.4) |
| | A11, C11 | | |
| Public terminal | SD | The common terminal of Terminal M10~M15(SINK). | ---- |
| | PC | The common terminal of Terminal M10~M15 (SOURCE). | Output voltage: 24VDC±20%<br>Maximum current: 200mA(share with control board) |

◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | EB362R | EB362Rcard | LNKEB362R |

➢ EB308R



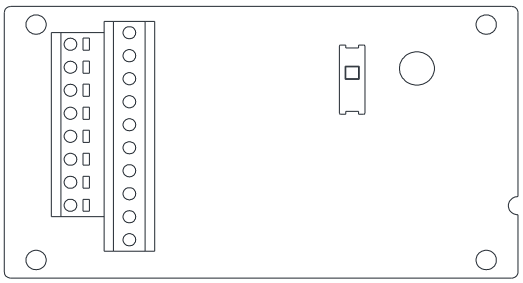
| Terminal form | Terminal name | Function instructions | Terminal specification |
|---|---|---|---|
| Relay outputs | A10, C1 | Multi-function relay outputs 8 groups;<br>A-C is the normally open contact. | Maximum voltage: 30VDC or 250VAC<br>Maximum current: Resistive load:5A NO<br>Inductive load: 2A NO<br>(cosΦ=0.4) |
| | A11, C1 | | |
| | A12, C2 | | |
| | A13, C2 | | |
| | A14, C3 | | |
| | A15, C3 | | |
| | A16, C4 | | |
| | A17, C4 | | |

◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | EB308R | EB308Rcard | LNKEB308R |

## 7.4.3 PG card

➢ PG301C



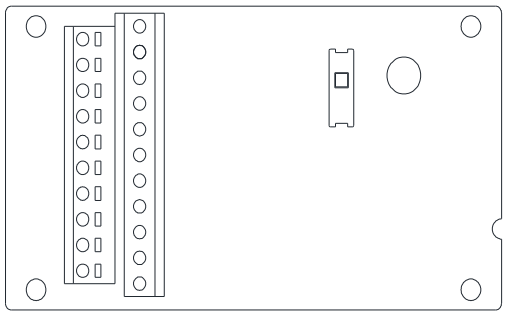
| Terminal | Terminal Symbols | Function instruction | Terminal specification |
|---|---|---|---|
| Input | A1、B1、Z1 | The input of the encoder signal supports open collector, voltage, line drive and push-pull input type. | Maximum frequency: 500KP/Sec |
| | $\overline{A1}$、$\overline{B1}$、$\overline{Z1}$ | | |
| | A2、B2 | The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type. | Maximum frequency: 500KP/Sec |
| | $\overline{A2}$、$\overline{B2}$ | | |

| Terminal | Terminal Symbols | Function instruction | Terminal specification |
|---|---|---|---|
| Output | A1O | The open collector dividing frequency output is 1~255 times dividing frequency. The maximum output current is 50mA. | Maximum frequency: 500KP/Sec<br>Maximum current: 50mA<br>It can switch pull-up resistors under different voltages. |
| | B1O | | |
| | Z1O | | |
| | DCM | | |
| Power | 12V | 12V Power | Voltage: ±5%<br>Current: 200mA MAX |
| | 5V | 5V Power | |
| | DCM | Power grounding | |

◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | PG301C | PG301Ccard | SNKPG301C |

➢ PG301L

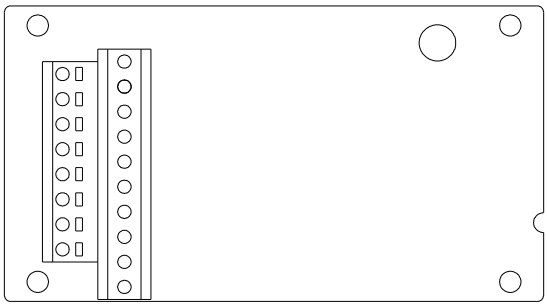


| Terminal | Terminal Symbols | Function instruction | Terminal specification |
|---|---|---|---|
| Input | A1、B1、Z1 | The input of the encoder signal supports open collector, voltage, line drive and push-pull input type. | Maximum frequency: 500KP/Sec |
| | $\overline{A1}$、$\overline{B1}$、$\overline{Z1}$ | | |
| | A2、B2 | The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type. | Maximum frequency: 500KP/Sec |
| | $\overline{A2}$、$\overline{B2}$ | | |
| Output | AO、BO、ZO | The line-drive dividing frequency output is 1 ~ 255 times dividing frequency. | Maximum output voltage: 5V<br>Maximum current: 50mA<br>Maximum frequency: 500KP/Sec |
| | $\overline{AO}$、$\overline{BO}$、$\overline{ZO}$ | | |
| Power | 12V | 12V Power | Voltage: ±5%<br>Current: 200mA MAX |
| | 5V | 5V Power | |
| | DCM | Power grounding | |

◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | PG301L | PG301Lcard | LNKPG301L |

➢ PG302L



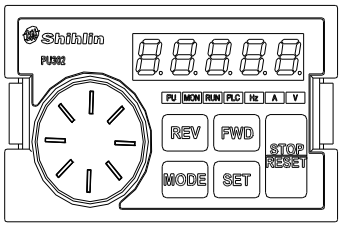
| Terminal | Name | Function instruction | Terminal specification |
|---|---|---|---|
| Input | S1、S2 | Resolver signal input | 3.5±0.175Vrms，10kHz |
| | $\overline{S3}$、$\overline{S4}$ | | |
| | A2、B2 | The input of pulse signal connects to the upper controller and supports open collector, voltage, line drive and push-pull input type, the maximum is 500K. | Maximum frequency: 500KP/Sec |
| | $\overline{A2}$、$\overline{B2}$ | | |
| Output | AO、BO、ZO | The line-drive dividing frequency output is 1～255 times dividing frequency. | Maximum output voltage: 5V<br>Maximum current: 50mA<br>Maximum frequency: 500KP/Sec |
| | $\overline{AO}$、$\overline{BO}$、$\overline{ZO}$ | | |
| Power | R1-R2 | Resolver power output | 7Vrms, 10KHz |

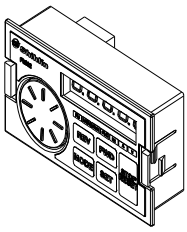
◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | PG302L | PG302Lcard | LNKPG302L |

## 7.4.4 Parameter unit

➢ PU302 appearance

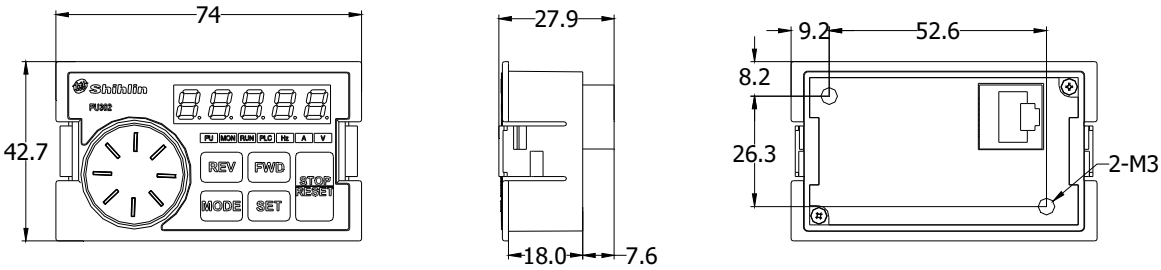


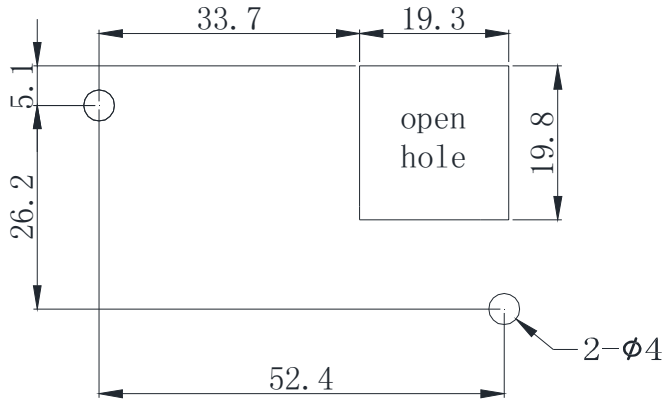
◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | PU302 | LED parameter unit | LNKPU302 |

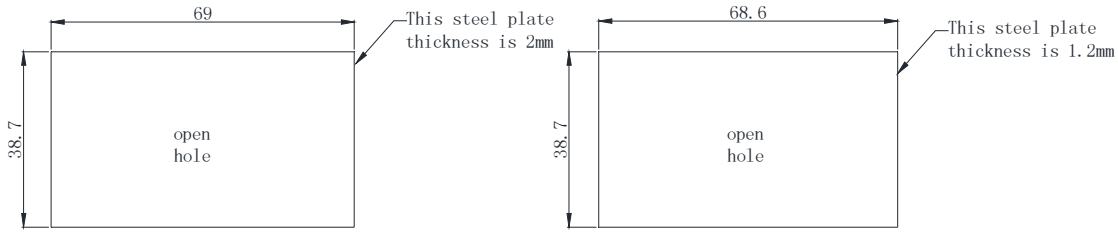
- Appearance and dimensions



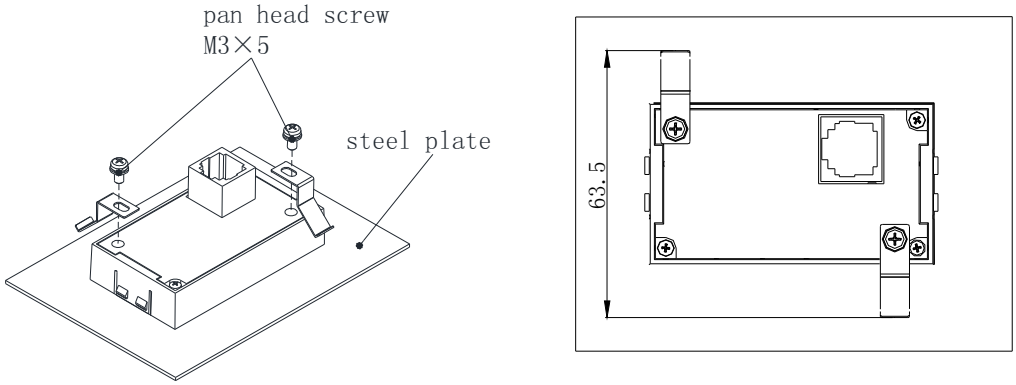

- Recommended screw installation size




- Recommended buckle installation size



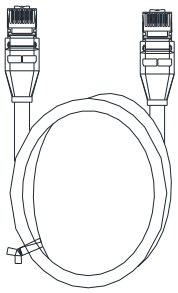

- Snap mounting




*Allowable error:±0.15mm

*If customer cutout accuracy cannot meet the allowable error, please purchase SMK301 (Snap Mounting Kit) for installation.

## 7.4.5 Data transmission line

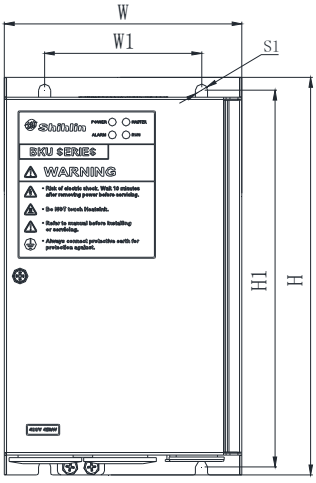


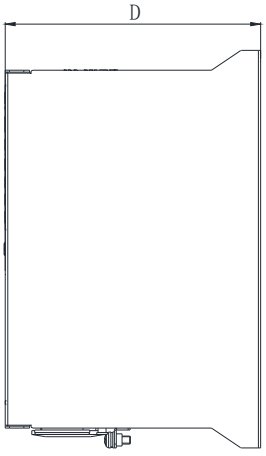
◆ Ordering code:

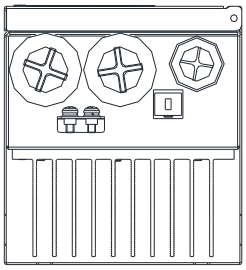
| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | CBL01T | The data transmission line (1 m) | LNKCBL01T |
| 2 | CBL03T | The data transmission line (3 m) | LNKCBL03T |
| 3 | CBL05T | The data transmission line (5 m) | LNKCBL05T |

## 7.4.6 BKU Brake unit

➢ BKU



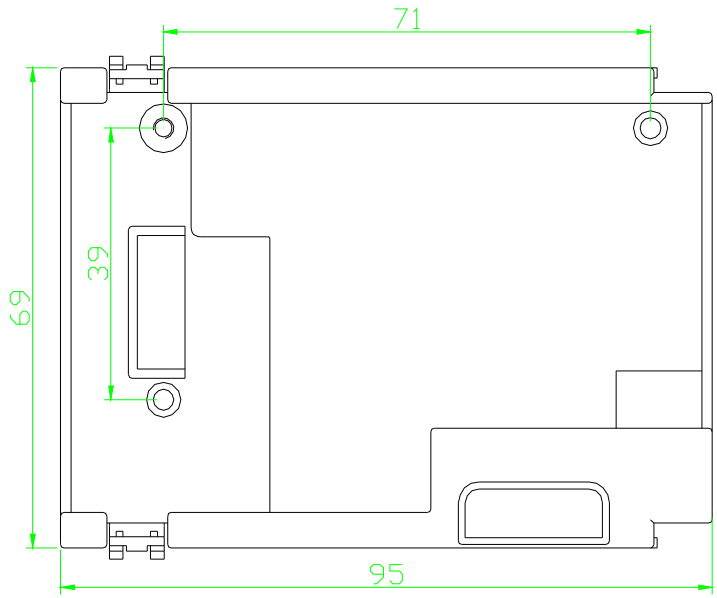



| Terminal | | Name | Function instruction | Terminal specification | H1 | D | S1 |
|---|---|---|---|---|---|---|---|
| A | BKU-020-37K | 121 | 80 | 200 | 189.5 | 130 | 6.4 |
| | BKU-040-45K | | | | | | |
| B | BKU-020-110K | 233.5 | 193.5 | 343 | 329 | 190 | 6.4 |
| | BKU-020-160K | | | | | | |

◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | BKU-020-37K | 200V 37KW Brake unit | LNKBKU02037K |
| 2 | BKU-020-110K | 200V 110KW Brake unit | LNKBKU020110K |
| 3 | BKU-020-160K | 200V 160KW Brake unit | LNKBKU020160K |
| 4 | BKU-040-45K | 400V 45KW Brake unit | LNKBKU04045K |

## 7.4.7 Expansion card mounting base




◆ Ordering code:

| NO. | Type | Name | Ordering Code |
|---|---|---|---|
| 1 | CMK301 | Expansion card mounting base | LNKCMK301 |

# 7.5 Appendix 5 European Specification Compatibility Description

**This inverter qualifies the CE label. Specifications:**
**Low Voltage Directive 0014/35/EC & Electromagnetic Compatibility Directive 2014/301/EC.**

1. Electromagnetic compatibility command (EMC):

(1). EMC compatibility description:

For system integration, inverter is not a functionally independent device unit. It is usually a unit in the control box. It is combined with other devices to control a machine or equipment. Therefore, our company does not consider that all the EMC commands should be directly applied on the inverter. As a result, the CE label of this inverter is not extensible.

(2). Compatibility:

The inverter does not need to cover all the EMC commands. Yet, for certain machine equipment that needs to use EMC commands and the inverter, the machine has to be equipped with CE label. In addition, the company can provide the electromagnetic inspection data and operation manual that covers the required electromagnetic compatibility specifications for a quick and easy installation of the machine equipment of this inverter.

(3). Installation outline:

Please follow the following notes for installing the inverter:

*Use a noise filter qualifying the EU standard to coordinate with the inverter.

*The wire between the motor and the inverter has to be stored in shielded cable or metal tube. In addition, ground the motor terminal and the inverter terminal together. Please shorten the wire as much as possible.

*Please put this inverter in a metal cabinet that is already grounded. It can prevent radiation interference.

*The line-to-line noise filter at the power source terminal and the online magnetic iron core at the control row are used for suppressing noises.

All the signals and the EU-qualified filter specifications are described in details in the operation manual. Please contact your agent.

2. Low-voltage command (LVD):

(1). Low-voltage command compatibility description:

This inverter is compatible with low-voltage commands.

(2). Compatibility:

Our company qualifies the low-voltage command specification.

(3). Description:

*Do not rely on leakage protection only for preventing electric shocks. Grounding is required for the protection.

*Ground each inverter individually (do not connect more than two (including two) ground cables).

*Please use non-fuse switch and electromagnetic contactor that qualify EN or IEC specifications.

*Please use the inverter under an environment of over-voltage level-3condition with contamination level 2 or better.

*For the style and dimensions of the input- and output-end of the inverter cable, please refer to the specifications listed in the operation manual.

# 8. REVISION RECORD

| Published Date | Edition of the Manual | Revision Content |
|---|---|---|
| 2017.10 | V1.00 | First Edition |

Version: V1.00