

# EV100 Series

User manual



# Kinco



## Introduction

Thank you for purchasing and using the general-purpose inverter of EV100 series of multi-functions and high performance.

Please read carefully the operation manual before putting the inverter to use so as to correctly install and operate the inverter, give full play to its functions and ensure the safety. Please keep the operation manual handy for future reference, maintenance, inspection and repair.

Due to the inverter of a kind of electrical and electronic product it must be installed, tested and adjusted with parameters by specialized engineering persons of motors.

The marks of "⚠ Warning" "⚡ Danger" and other symbols in the manual remind you of the safety and prevention cautions during the handling, installation, running and inspection. Please follow these instructions to make sure the safe use of the inverter. In case of any doubt please contact our local agent for consultation. Our professional persons are willing and ready to serve you.

The manual is subject to change without notice.

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# Chapter 1 Safety Cautions

## 1-1 Confirmation on receiving

### **Warning**

The inverter has been strictly and well packed before ex-work. Inconsideration of various factors during the transportation special attention should be paid to the following points before the assembly and installation. If there is anything abnormal please notify the dealer or the relevant people of our company.

- Check if the inverter has got any damage or deformation during the transportation and handling.
- Check if there is one piece of EV100 series inverter and one copy of the instruction manual available when unpacking it.
- Check the information on the nameplate to see if the specifications meet your order (Operating voltage and KVA value).
- Check if there is something wrong with the inner parts, wiring and circuit board.
- Check if each terminal is tightly locked and if there is any foreign article inside the inverter.
- Check if the operator buttons are all right.
- Check if the optional components you ordered are contained.
- Check if there is a certificate of qualification and a warranty card.

## 1-2 Transportation and installation

### **Warning**

- When carrying products, use correct lifting gear to prevent injury.
- Do not stack the inverter boxes higher than the number

recommended.

- Ensure that installation position and material can withstand the weight of the inverter. Install according to the information in the instruction manual.
- Do not install or operate the inverter if it is damaged or has parts missing.
- When carrying the inverter, do not hold it by the front cover or setting dial. It may fall or fail.
- Do not stand or rest heavy objects on the product.
- Check the inverter mounting orientation is correct.
- Prevent other conductive bodies such as screws and metal fragments or other flammable substance such as oil from entering the inverter.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- Use the inverter under the following environmental conditions. Otherwise, the inverter may be damaged.

Ambient temperature:  $-10^{\circ}\text{C}\sim 40^{\circ}\text{C}$  (non-freezing) .

Ambient humidity: 95% RH or less (non-condensing)

Ambient environment: indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt, free from direct sunlight)

Vibration: max. 0.5G

- Please make sure that the screws are fixed, fastened firmly in accordance with the stipulations of the instruction manual, to prevent the inverter falling.
- If two or more inverters are installed in a control cabinet, please install them according to the information in the instruction manual, and it is required to keep enough space and install extra cooling fans to keep the air in the cabinet flowing freely to keep the temperature inside the cabinet lower than  $40^{\circ}\text{C}$ . Overheating may cause inverter fault, fire or other accidents.
- Due to the inverter of a kind of electrical and electronic product it must be installed, tested and adjusted with parameters by specialized engineering persons of motors.

## 1-3 Wiring and Junction

### **Warning**

- Please do not damage the wires. Let the wires bear weight or be clamped may damage the wires and cause an electric shock.
- Do not install a power factor correction capacitor or surge suppressor/radio noise filter (capacitor type filter ) on the inverter output side.
- Do not install switch devices such as the air switch and contactor on the inverter output side, if it is for technologic demand, please ensure that the inverter is switching without output.
- Wrong wiring might lead to damage of the inverter. The control signal lines must be kept fully away from the main circuit to protect them from noise.

### **Danger**

- Please ensure that the power is off before junction.
- The wiring work shall be done by qualified electricians.
- Please wire the wires in accordance with the specifications stipulated in the instruction manual.
- The grounding connection shall be done correctly and in accordance with relative regulations in the instruction manual, otherwise it may cause an electric shock or fire.
- Please use independent power supply for the inverter, never use the same power supply with strong interference equipment like electric welder.
- Please do not touch the bottom plate with wet hand, otherwise you may get an electric shock.
- Please do not touch the terminals directly, do not connect the inverter's input or output terminals to the inverter's shell, otherwise you may get an electric shock.
- Please make sure that the voltage of the power supply and the voltage of the inverter are same, otherwise it may cause the

inverter fault or personnel injury.

- The power supply cables must be connected to R,S,T. Never connect the power cable to the U,V,W of the inverter. Doing so will damage the inverter.
- Please do not conduct pressure resistance test to the inverter, otherwise it may cause the inverter's internal fault.
- Please install accessories such as brake units, brake resistors in accordance with the regulations of the instruction manual, otherwise it may cause the inverter fault or fire.
- Please ensure that the screws of the terminals are firmly locked, otherwise it may cause the inverter fault.

## 1-4 Power-on, Test operation

### **Warning**

- While power is on or when the inverter is running, do not open the front cover. Otherwise you may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Before starting operation, confirm and adjust the parameters. A failure to do so may cause some machines to make unexpected motions.
- It is recommended to undertake test runs with no load.
- Please provide an emergency stop switch when the "stop" function setting is unavailable.
- Do not use the inverter input side magnetic contactor to start/stop the inverter, otherwise it may affect the life of the inverter.

### **Danger**

- When fault restart function is set, please do not approach the equipment because the equipment may automatically restart after

the running stop.

- Make sure that the specification and rating match the system requirements. Exceeding their use range can cause motor and machine fault.
- Please do not change the parameter settings of inverter casually during running.
- While power is on or for some time after power-off, do not touch the inverter as it is hot and you may get burnt.
- Perform setting dial and key operations with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Please do not link or withdraw motors during the inverter running, otherwise it may cause inverter protection or fault.

## 1-5 Inspection and Maintenance

### **Warning**

- Please ensure that the power supply and the power indicating light is off before inspecting and maintaining. Otherwise you may get an electric shock.
- For prevent damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.
- Do not carry out a megger (insulation resistance) test on the control circuit of the inverter.

### **Danger**

- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Please do check, maintenance and replacement of the components according to the appointed methods in the instruction manual, strictly prohibit modifying by yourself. If you do so, you may get an electric shock and injury or the inverter may get damaged.

## 1-6 Emergency stop

### **Danger**

- Provide a safety backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter fails.
- When the breaker on the inverter input side trips, check for the wiring fault (short circuit), damage to internal parts of the inverter, etc. Identify the cause of the trip, then remove the cause and power on the breaker.
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.

## 1-7 Disposing of the inverter

### **Warning**

Treat as industrial waste. Do not burn it up!

# Chapter 2 Product Introduction

## 2-1 Unpacking Confirmation

In unpacking, please confirm the following:

- Check whether the model type of the inverter is in accordance with your order.
- Check whether the inverter is damaged and related accessories are included.

If you find an omission or disagreement, please contact the suppliers.

## 2-2 Inverter model description

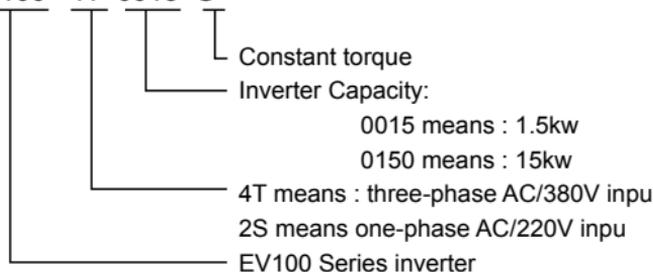
MODEL: EV1004T0015G

INPUT: 3PH 380V 50Hz/60Hz  
 OUTPUT: 3PH 380V 4.0A 150% 60S  
 FREQ RANGE: 0.1-400Hz 1.5KW



1201150001

Model: EV100 4T 0015 G



## 2-3 Product Specifications

| Items                  |   | EV100   |
|------------------------|---|---|
| Power Supply           | Rated voltage, Frequency                | Three-phase 380V 50/60Hz;<br>One-phase 220V 50/60Hz   |
|                        | Voltage Range                           | 380V: 330 ~ 440V;<br>220V: 170V ~ 240V  |
| Output                 | Voltage Range                           | 380V: 0 ~ 380V;<br>220V: 0 ~ 220V   |
|                        | Frequency Range                         | 0.10 ~ 400.00Hz   |
| Control method         |   | V/F control , Space vector control,   |
| Indication             |   | Operating status/Alarm definition/interactive guidance: eg, frequency setting, the output frequency/current, DC bus voltage, the temperature and so on.   |
| Control Specifications | Output Frequency Range                  | 0.10Hz ~ 400.00Hz   |
|                        | Frequency Setting Resolution            | Digital input: 0.01 Hz, analog input: 0.1% of maximum output frequency  |
|                        | Output Frequency Accuracy               | 0.01Hz  |
|                        | V/F Control                             | Setting V/F curve to satisfy various load requirements.   |
|                        | Torque Control                          | Auto increase: auto raise torque by loading condition; Manual increase: enable to set 0.0~20.0% of raising torque.  |
|                        | Multifunctional Input Terminal          | Eight multi-function input terminals, realizing functions including fifteen section speed control, program running, four-section acceleration/ deceleration speed switch, UP/DOWN function and emergency stop and other functions |
|                        | Multifunctional Output Terminal         | 3 multi-function output terminals for displaying of running, zerospeed, counter, external abnormality, program operation and other information and warnings.  |
|                        | Acceleration/ deceleration Time Setting | 0 ~ 6000s acceleration/deceleration time can be set individually.   |

| Items                       |                              | EV100  |
|-----------------------------|------------------------------|--|
| Other Functions             | PID Control                  | Built-in PID control   |
|                             | RS485                        | Standard RS485 communication function (MODBUS)   |
|                             | Frequency Setting            | Analog input: 0 to 10V, 0 to 20mA can be selected;<br>Digital input: Input using the setting dial of the operation panel or RS485or UP/DOWN. |
|                             | Multi-speed                  | Eight multifunction input terminals, 15 section speed can be set   |
|                             | Automatic voltage regulation | Automatic voltage regulation function can be selected  |
|                             | Counter                      | Built-in 2 group of counters   |
| Protection/Warning Function | Overload                     | 150%, 60second (Constant torque); 120%, 60second (variable torque)   |
|                             | Over Voltage                 | Over voltage protection can be set.  |
|                             | Under Voltage                | Under voltage protection can be set.   |
|                             | Other Protections            | Overheat, output shortcircuit, over current, and parameter lock and so on.   |
| Environment                 | Ambient Temperature          | -10°C to 40°C (non-freezing)   |
|                             | Ambient Humidity             | Max. 95% (non-condensing)  |
|                             | Altitude                     | Lower than 1000m   |
|                             | Vibration                    | Max. 0.5G  |
| Structure                   | Cooling Mode                 | Forced air cooling   |
|                             | Protective Structure         | IP 20  |
| Installation                | Mode                         | Below 160KW: Wall Mounted<br>185~ 315KW: Wall Mounted or In Cabinet<br>Above 350KW: In Cabinet   |

## Operation Instruction of EV100 Series Inverter

| Model           | Input                                | Output Power | Capacity (KVA) | Output Current (A) | Overload Capacity (60s) (A) | Application Motor kW |
|-----------------|--------------------------------------|--------------|----------------|--------------------|-----------------------------|----------------------|
| EV100-2S-0004-G | One or three phase<br>220V • 50/60Hz | 0.4          | 1.0            | 2.5                | 3.75                        | 0.4                  |
| EV100-2S-0007-G | One or three phase<br>220V • 50/60Hz | 0.75         | 2.0            | 5                  | 7.5                         | 0.75                 |
| EV100-2S-0015-G | One or three phase<br>220V • 50/60Hz | 1.5          | 2.8            | 7                  | 10.5                        | 1.5                  |
| EV100-2S-0022-G | One or three phase<br>220V • 50/60Hz | 2.2          | 4.5            | 11                 | 16.5                        | 2.2                  |
| EV100-2S-0037-G | Three-phase<br>380V • 50/60Hz        | 3.7          | 7.2            | 16.5               | 45.75                       | 3.7                  |
| EV100-4T-0007-G | Three-phase<br>380V • 50/60Hz        | 0.75         | 2.2            | 2.7                | 4.05                        | 0.75                 |
| EV100-4T-0015-G | Three-phase<br>380V • 50/60Hz        | 1.5          | 3.2            | 4                  | 6                           | 1.5                  |
| EV100-4T-0022-G | Three-phase<br>380V • 50/60Hz        | 2.2          | 4.0            | 5                  | 7.5                         | 2.2                  |
| EV100-4T-0037-G | Three-phase<br>380V • 50/60Hz        | 3.7          | 6.8            | 8.6                | 12.9                        | 3.7                  |
| EV100-4T-0055-G | Three-phase<br>380V • 50/60Hz        | 5.5          | 10             | 12.5               | 18.75                       | 5.5                  |
| EV100-4T-0075-G | Three-phase<br>380V • 50/60Hz        | 7.5          | 14             | 17.5               | 26.25                       | 7.5                  |
| EV100-4T-0110-G | Three-phase<br>380V • 50/60Hz        | 11           | 19             | 24                 | 36                          | 11                   |
| EV100-4T-0150-G | Three-phase<br>380V • 50/60Hz        | 15           | 26             | 33                 | 45                          | 15                   |
| EV100-4T-0185-G | Three-phase<br>380V • 50/60Hz        | 18.5         | 32             | 40                 | 60                          | 18.5                 |
| EV100-4T-0220-G | Three-phase<br>380V • 50/60Hz        | 22           | 37             | 47                 | 70.5                        | 22                   |
| EV100-4T-0300-G | Three-phase<br>380V • 50/60Hz        | 30           | 52             | 65                 | 97.5                        | 30                   |
| EV100-4T-0370-G | Three-phase<br>380V • 50/60Hz        | 37           | 64             | 80                 | 120                         | 37                   |

| Model           | Input                         | Output Power | Capacity (KVA) | Output Current (A) | Overload Capacity (60s) (A) | Application Motor kW |
|-----------------|-------------------------------|--------------|----------------|--------------------|-----------------------------|----------------------|
| EV100-4T-0450-G | Three-phase<br>380V • 50/60Hz | 45           | 72             | 90                 | 126                         | 45                   |
| EV100-4T-0550-G | Three-phase<br>380V • 50/60Hz | 55           | 84             | 110                | 165                         | 55                   |
| EV100-4T-0750-G | Three-phase<br>380V • 50/60Hz | 75           | 115            | 152                | 228                         | 75                   |
| EV100-4T-0900-G | Three-phase<br>380V • 50/60Hz | 90           | 135            | 176                | 264                         | 90                   |
| EV100-4T-1100-G | Three-phase<br>380V • 50/60Hz | 110          | 160            | 210                | 315                         | 110                  |
| EV100-4T-1320-G | Three-phase<br>380V • 50/60Hz | 132          | 190            | 255                | 382.5                       | 132                  |
| EV100-4T-1600-G | Three-phase<br>380V • 50/60Hz | 160          | 230            | 305                | 457.5                       | 160                  |
| EV100-4T-1850-G | Three-phase<br>380V • 50/60Hz | 185          | 260            | 340                | 510                         | 185                  |
| EV100-4T-2000-G | Three-phase<br>380V • 50/60Hz | 200          | 290            | 380                | 570                         | 200                  |
| EV100-4T-2200-G | Three-phase<br>380V • 50/60Hz | 220          | 320            | 425                | 637.5                       | 220                  |
| EV100-4T-2500-G | Three-phase<br>380V • 50/60Hz | 250          | 365            | 480                | 720                         | 250                  |
| EV100-4T-2800-G | Three-phase<br>380V • 50/60Hz | 280          | 427            | 530                | 795                         | 280                  |
| EV100-4T-3150-G | Three-phase<br>380V • 50/60Hz | 315          | 460            | 600                | 900                         | 315                  |
| EV100-4T-3500-G | Three-phase<br>380V • 50/60Hz | 350          | 516            | 650                | 975                         | 350                  |
| EV100-4T-4000-G | Three-phase<br>380V • 50/60Hz | 400          | 600            | 720                | 1080                        | 400                  |
| EV100-4T-4500-G | Three-phase<br>380V • 50/60Hz | 450          | 638            | 790                | 1185                        | 450                  |
| EV100-4T-5000-G | Three-phase<br>380V • 50/60Hz | 500          | 725            | 860                | 1290                        | 500                  |

| Model           | Input                         | Output Power | Capacity KVA) | Output Current (A) | Overload Capacity (60s) (A) | Application Motor kW |
|-----------------|-------------------------------|--------------|---------------|--------------------|-----------------------------|----------------------|
| EV100-4T-5600-G | Three-phase<br>380V • 50/60Hz | 560          | 812           | 970                | 1455                        | 560                  |

## 2-5 Product storage

The inverter must be put in the packaging box before installation. If the inverter is not used for the moment, during the storage, please pay attention those as below:

1. The products must be placed in the location with dry and without dust and dirt.
2. The relative humidity of the environment is within 0~95%, and without condensing.
3. The storage temperature of the environment must be within the range of -26°C to +65°C.
4. There are no corrosive gas and liquids in the storage environment, and the product is away from direct sunlight.

It is better not to store the inverter for long time. Long time storage of the inverter will lead to the deterioration of electrolytic capacity. If it needs to be stored for a long time make sure to power it up one time within a year and the power-up time should be at least above five hours. When powered up the voltage must be increased slowly with a voltage regulator to the rated voltage value.

## Chapter 3

# Installation of the Inverter

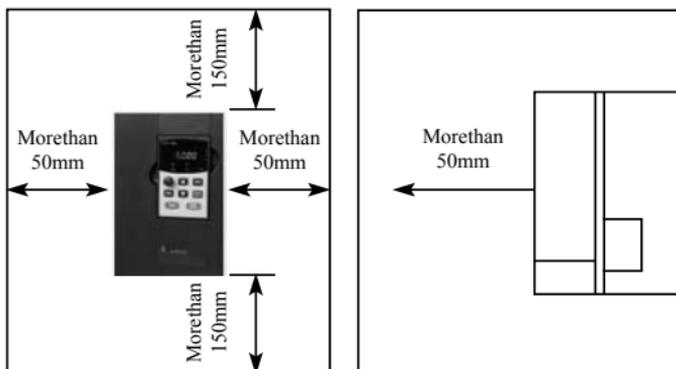
### 3-1 Installation environment and requirements

Environment of installation has direct effect on the inverter's life. If the inverter is used in the environment that does not accord with the allowed range of the operation instruction, and may lead to the inverter protection or fault.

About the inverter's installation environment, please ensure it is in accordance with the following condition:

- (1) Environment temperature from  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$
- (2) Environment humidity 0~95% without condensing
- (3) Away from direct sunlight
- (4) The environment does not contain corrosive gas and liquid
- (5) The environment does not contain dust, floating fiber and metal dust.
- (6) Far away from radioactive materials and combustible substances
- (7) Far away from electromagnetic interference sources (as welder, high-powered machines)
- (8) The installation surface shall be firm. Without vibration, the vibration cannot be avoided, please add anti-vibration spacer to reduce vibration.
- (9) Please install the inverter to a location where it is good for ventilation, inspection and maintenance, and away from heating unit (as brake resistor).
- (10) Preserved enough space for inverter installation, especially for multiple inverters installation, please pay attention to the laying position of the inverter, and install an extra cooling fan to keep the environment temperature lower than  $45^{\circ}\text{C}$ .

① Single inverter installation

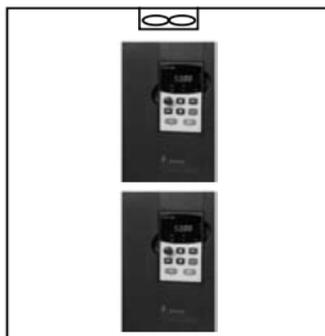


② Multiple inverters installed in one control cabinet.

Please pay attention: When encasing the multiple inverters, install them in paralld as a cooling measure.

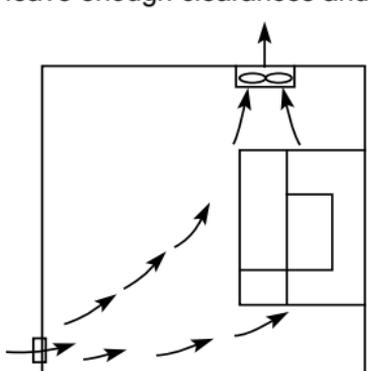


Favorable placing

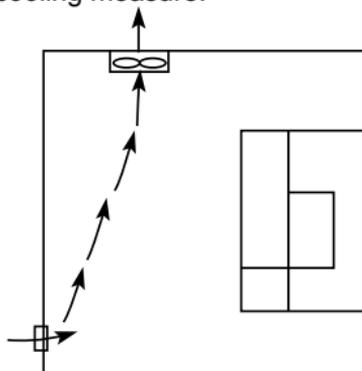


Unfavorable placing

③ If multiple inverters are installed in one control cabinet, please leave enough clearances and take cooling measure.

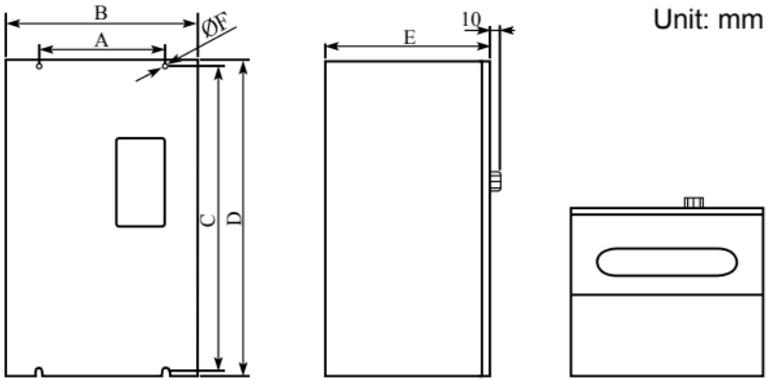


Correct installation position of the fan



Incorrect installation position of the fan

## 3-2 Inverter outline dimension drawings



| Model           | A   | B   | C   | D   | E   | F |
|-----------------|-----|-----|-----|-----|-----|---|
| EV100-2S-0004-G | 117 | 125 | 162 | 170 | 140 | 5 |
| EV100-2S-0007-G |     |     |     |     |     |   |
| EV100-2S-0015-G |     |     |     |     |     |   |
| EV100-2S-0022-G |     |     |     |     |     |   |
| EV100-2S-0037-G | 105 | 120 | 208 | 225 | 140 | 5 |
| EV100-4T-0007-G | 117 | 125 | 162 | 170 | 140 | 5 |
| EV100-4T-0015-G |     |     |     |     |     |   |
| EV100-4T-0022-G |     |     |     |     |     |   |
| EV100-4T-0037-G | 105 | 120 | 208 | 225 | 140 | 5 |
| EV100-4T-0055-G | 168 | 185 | 248 | 260 | 170 | 6 |
| EV100-4T-0075-G |     |     |     |     |     |   |
| EV100-4T-0110-G | 195 | 210 | 310 | 330 | 190 | 6 |
| EV100-4T-0150-G |     |     |     |     |     |   |
| EV100-4T-0185-G | 262 | 277 | 390 | 410 | 189 | 5 |
| EV100-4T-0220-G |     |     |     |     |     |   |
| EV100-4T-0300-G |     |     |     |     |     |   |
| EV100-4T-0370-G | 200 | 300 | 485 | 455 | 212 | 5 |
| EV100-4T-0450-G | 200 | 300 | 538 | 560 | 236 | 9 |
| EV100-4T-0550-G |     |     |     |     |     |   |
| EV100-4T-0750-G | 250 | 380 | 625 | 650 | 252 | 9 |
| EV100-4T-0900-G |     |     |     |     |     |   |
| EV100-4T-1100-G |     |     |     |     |     |   |

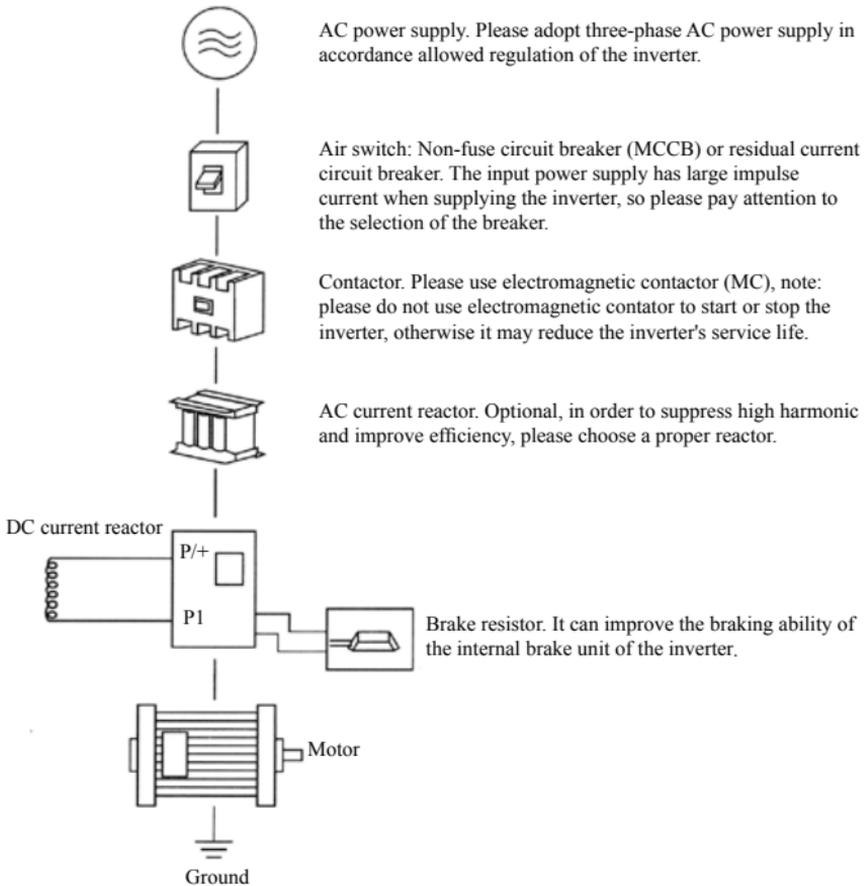
Operation Instruction of EV100 Series Inverter

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| Model           | A   | B   | C    | D    | E   | F  |
|-----------------|-----|-----|------|------|-----|----|
| EV100-4T-1320-G | 250 | 430 | 810  | 850  | 336 | 13 |
| EV100-4T-1600-G |     |     |      |      |     |    |
| EV100-4T-1850-G | 370 | 500 | 820  | 860  | 360 | 13 |
| EV100-4T-2000-G |     |     |      |      |     |    |
| EV100-4T-2200-G |     |     |      |      |     |    |
| EV100-4T-2500-G | 460 | 630 | 926  | 960  | 380 | 13 |
| EV100-4T-2800-G |     |     |      |      |     |    |
| EV100-4T-3150-G |     |     |      |      |     |    |
| EV100-4T-3500-G | 553 | 600 | 1678 | 1700 | 560 | 16 |
| EV100-4T-4000-G |     |     |      |      |     |    |
| EV100-4T-4500-G |     |     |      |      |     |    |
| EV100-4T-5000-G | 670 | 900 | 355  | 2030 | 600 | 16 |
| EV100-4T-5600-G |     |     |      |      |     |    |

# Chapter 4 Wiring

The wiring of the inverter can be divided into main circuit and control circuit.



## 4-1 Main Circuit Wiring

### 4-1-1 Peripheral Devices Description

#### (1) AC power supply

Use within the permissible power supply specifications of the inverter.

#### (2) Moulded case circuit breaker: (MCCB)

When the power supply voltage is low or the input terminal short circuit occurs, the breaker can provide protection, during inspection, maintenance or the inverter is not running, you can cut off the breaker to separate the inverter from the power supply.

#### (3) Magnetic contractor(MC)

The contractor can turn on and turn off the power of the inverter to ensure safety.

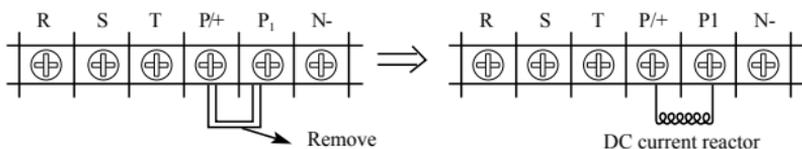
#### (4) AC current reactor

a: Suppress high harmonic to protect the inverter.

b: Improve the power efficiency.

#### (5) DC current reactor

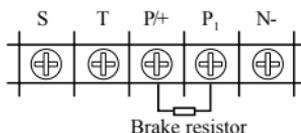
The DC current reactor has the same function as AC current reactor. Please remove the jumper across terminals P1 - P/+ and connect the DC reactor.



#### (6) Brake resistor

When the motor is braking, the resistor can avoid DC bus high voltage of the inverter, and improve the braking ability of the internal brake unit.

15KW or less the brake unit is built-in, please confirm it.



To select the brake resistor, please refer to section 4, chapter 9: Applied Braking resistor specification.

### 4-1-2 Main Circuit Wiring Notice

The EV100 series is a highly reliable product, but incorrect peripheral circuit making or operation/handling method may shorten the product life or damage the product.

Before starting operation, always recheck the following items.

(1) Use crimping terminals with insulation sleeve to wire the power supply and motor.

(2) Application of supply power to the output terminals (U,V,W) of the inverter will damage the inverter. Never perform such wiring.

(3) After wiring, wire offcuts must not be left in the inverter.

Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

(4) This inverter must be earthed. Earthing must conform to the requirements of national and local safety regulations and electrical codes.

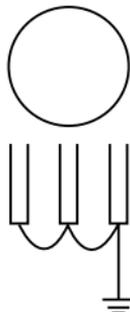
(5) Use the thickest possible earth cable.

(6) The grounding point should be as near as possible to the inverter, and the ground wire length should be as short as possible.

(7) Where possible, use independent earthing for the inverter. If independent earthing is impossible, use joint earthing ( I , II ) where the inverter is connected with the other equipment at an earthing point. Joint earthing as in ( III ) must be avoided as inverter is connected with the other equipment by a common earth cable.



Correct  
I



Correct  
II



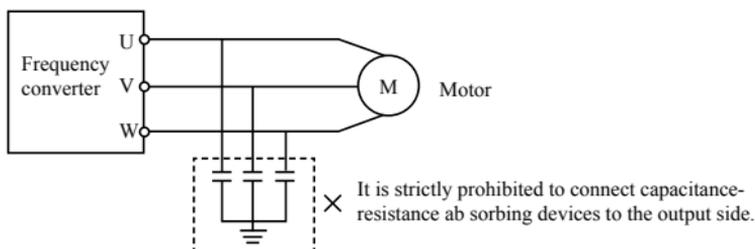
Incorrect  
III

(8) To prevent a malfunction due to noise, keep the signal cables more than 10 cm away from the power cables.

(9) The overall wiring length should be 100 m maximum.

Especially for long distance wiring, the fast-response current limit function may be reduced or the equipment connected to the inverter output side may malfunction or become faulty under the influence of a charging current due to the stray capacity of the wiring. therefore, note the overall wiring length

(10) Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the inverter output side.



(11) Before starting wiring or other work after the inverter is operated, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.

(12) Electromagnetic wave interference

The input/output (main circuit) of inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. In this case, set the EMC filter valid to minimize interference.

(13) Across P/+ and PR terminals, connect only an external regenerative brake discharge resistor. Do not connect a mechanical brake.

#### 4-1-3 Peripheral Devices Specifications

Check the motor capacity of the inverter you purchased. Appropriate peripheral devices must be selected according to the capacity. Refer to the following list and prepare appropriate peripheral devices:

| Applicable Inverter Type | Input voltage | Motor Output (kW) | Main Circuit Cable Type (mm <sup>2</sup> ) | Breaker Selection (A) | Input Side Magnetic contractor (A) |
|--------------------------|---------------|-------------------|--|-----------------------|------------------------------------|
| EV100-2S-0004-G          | 220V          | 0.4               | 2.5  | 16                    | 12                                 |
| EV100-2S-0007-G          | 220V          | 0.75              | 2.5  | 16                    | 12                                 |
| EV100-2S-0015-G          | 220V          | 1.5               | 2.5  | 32                    | 18                                 |
| EV100-2S-0022-G          | 220V          | 2.2               | 4  | 32                    | 18                                 |
| EV100-4T-0007-G          | 380V          | 0.75              | 2.5  | 16                    | 12                                 |
| EV100-4T-0015-G          | 380V          | 1.5               | 2.5  | 16                    | 12                                 |
| EV100-4T-0022-G          | 380V          | 2.2               | 2.5  | 16                    | 12                                 |
| EV100-4T-0037-G          | 380V          | 3.7               | 2.5  | 16                    | 12                                 |
| EV100-4T-0055-G          | 380V          | 5.5               | 4  | 32                    | 18                                 |
| EV100-4T-0075-G          | 380V          | 7.5               | 6  | 40                    | 30                                 |
| EV100-4T-0110-G          | 380V          | 11                | 6  | 63                    | 35                                 |
| EV100-4T-0150-G          | 380V          | 15                | 10   | 63                    | 35                                 |
| EV100-4T-0185-G          | 380V          | 18.5              | 10   | 100                   | 80                                 |
| EV100-4T-0220-G          | 380V          | 22                | 16   | 100                   | 80                                 |
| EV100-4T-0300-G          | 380V          | 30                | 25   | 160                   | 100                                |
| EV100-4T-0370-G          | 380V          | 37                | 25   | 160                   | 100                                |
| EV100-4T-0450-G          | 380V          | 45                | 35   | 200                   | 180                                |
| EV100-4T-0550-G          | 380V          | 55                | 35   | 200                   | 180                                |
| EV100-4T-0750-G          | 380V          | 75                | 70   | 250                   | 180                                |
| EV100-4T-0900-G          | 380V          | 90                | 70   | 310                   | 250                                |

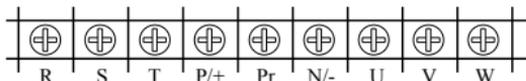
| Applicable Inverter Type | Input voltage | Motor Output (kW) | Main Circuit Cable Type (mm <sup>2</sup> ) | Breaker Selection (A) | Input Side Magnetic contractor (A) |
|--------------------------|---------------|-------------------|--|-----------------------|------------------------------------|
| EV100-4T-1100-G          | 380V          | 110               | 95   | 400                   | 300                                |
| EV100-4T-1320-G          | 380V          | 132               | 150  | 400                   | 400                                |
| EV100-4T-1600-G          | 380V          | 160               | 185  | 600                   | 400                                |

\*The above data are for reference only.

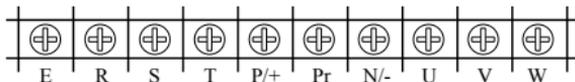
#### 4-1-4 Specification of main circuit terminal

For different models, the arrangement of main circuit terminals is shown below:

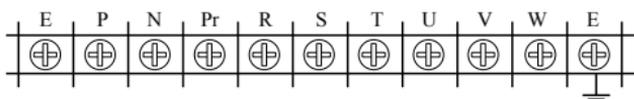
1. Model G, three-phase 380V/0.75~3.7kW:



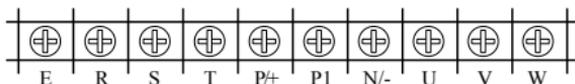
2. Model G (380V/5.5~7.5kW) with plastic cover, and model P (7.5kW) with plastic cover:



3. Model G (380V/11~15kW) with plastic cover, and model P (11~18.5kW) with plastic cover:



4. Model G, three-phase 380V/18.5~110kW with metal cover:



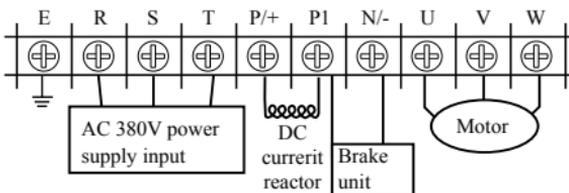
## 5. Model G, three-phase 380V/132--315kw:

|          |    |   |   |   |
|----------|----|---|---|---|
| ⊕<br>P/+ | P1 | U | V | W |
| ⊖<br>N/- | R  | S | T |   |

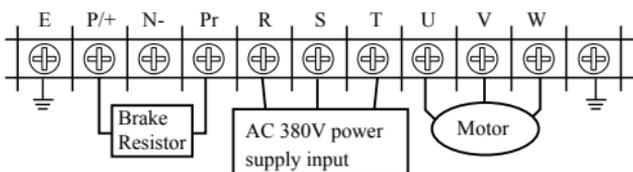
| Terminal Symbol | Terminal Name             | Description  |
|-----------------|---------------------------|--|
| R,S,T           | AC power input            | Connect to the commercial power supply.  |
| U,V,W           | Inverter output           | Connect a three-phase motor.   |
| P/+,N/-         | Brake unit connection     | Connect the brake unit, power regeneration common inverter, high power factor inverter or power regeneration inverter.                                 |
| P/+,P1          | DC reactor connection     | For A18.5kw or more, remove the jumper across terminals P/+--P1 and connect DC reactor (For the A200kw or more, a DC reactor is supplied as standard.) |
| P1,Pr           | Brake resistor connection | Connect brake resistor.  |
| ⊕ E             | Earth (ground)            | For earthing (grounding) the inverter chassis. Must be earthed (grounded).   |

## Cable connection examples

1. Model G with three-phase 380V/18.5~110kW and steel casing, the cable connection is shown as below:

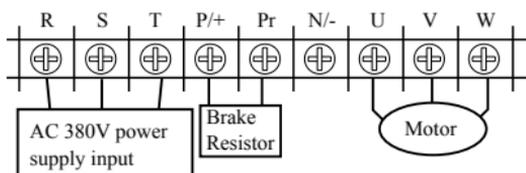


2. Model G with three-phase 380V/11~15kW and plastic casing, the cable connection is shown as below:



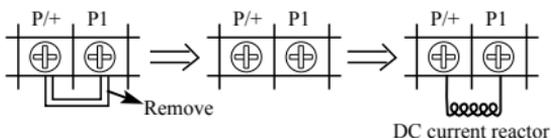
Note: The grounding terminal is on the casing next to the main circuit terminal, and it is a fix screw on the casing steel marked with  $\perp$ ;

3. Model G with three-phase 380V/0.75~3.7kW, the cable connection is shown as below:

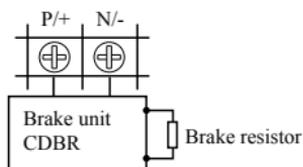


Note: The grounding terminal is on the casing next to the main circuit terminal, and it is a fixed screw on the casing marked with  $\perp$ ;

4. DC reactor connection



- a. remove the short connecting sheet
- b. connect DC reactor between P/+ and P1



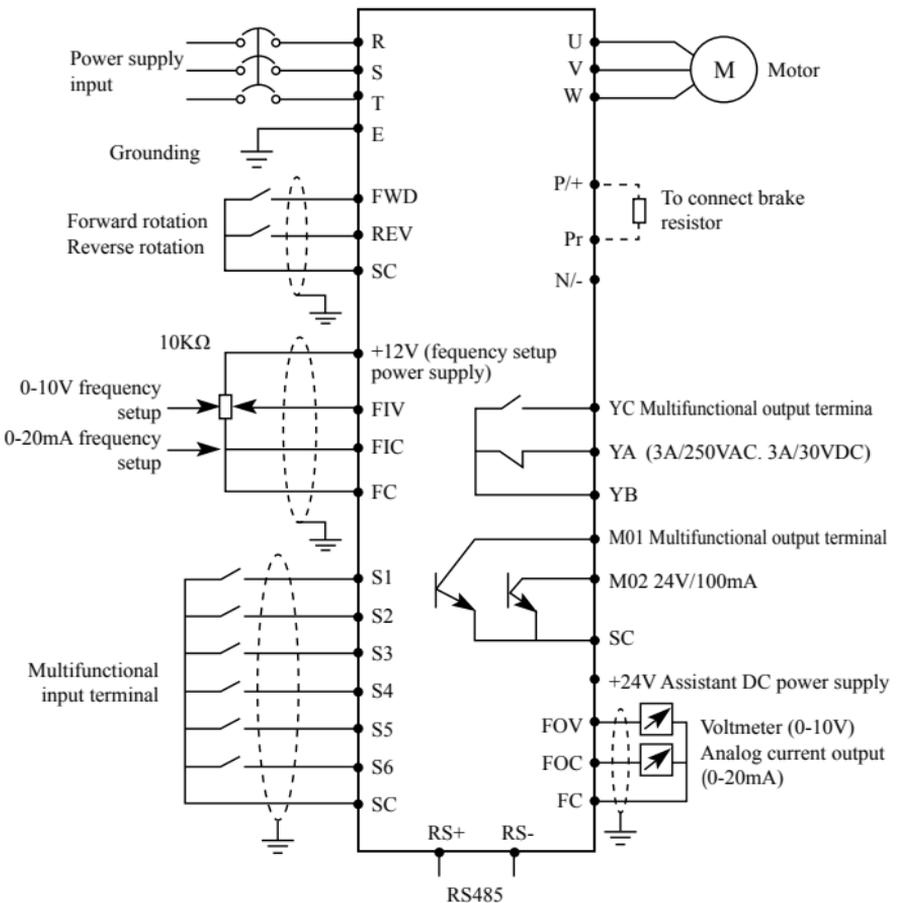
## ④ Method of connect brake unit (apply to 18.5kW or more.)

Due to different definitions of the brake unit terminal given by different producers, please refer to relative instructions when using it.

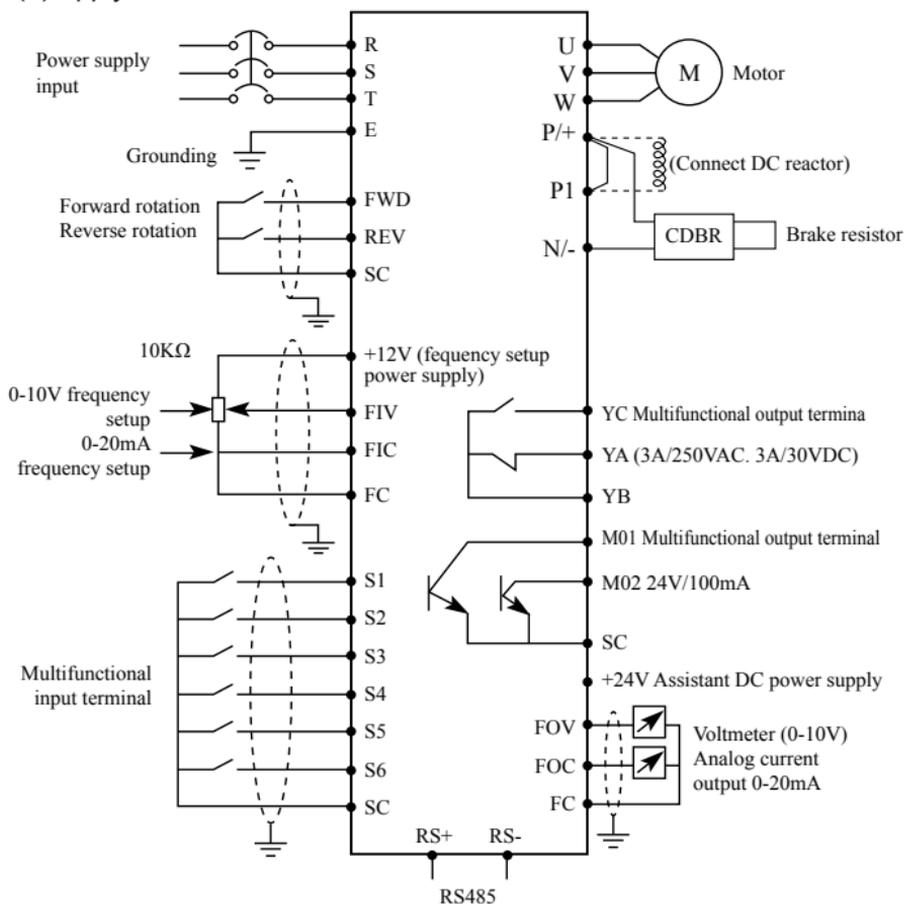
## 4-2 Control circuit terminal

### 4-2-1 Basic wiring diagram

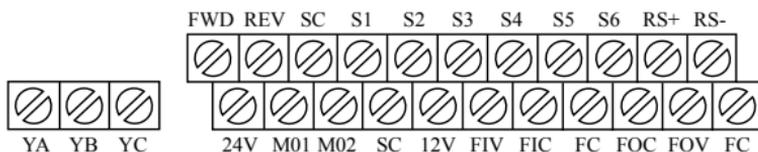
(1) Apply to 15kW or less



(2) Apply to 18.5kW or more



**4-2-2 Control terminals layout (0.4~560kW)**



**4-2-3 Control circuit terminals description**

Indicates that terminal functions can be selected using F3.15 to F3.29.(I/O terminal function selection)

(1) Input signals

| Type              | Terminal Symbol | Terminal Name                  | Description  | Refer to page |
|-------------------|-----------------|--------------------------------|--|---------------|
| Contact Input     | FWD             | Forward rotation start         | Turn on the FWD signal to start forward rotation and turn it off to stop. (multifunctional input terminal)   | 39            |
|                   | REV             | Reverse rotation start         | Turn on the REV signal to start reverse rotation and turn it off to stop. (multifunctional input terminal)   | 39            |
|                   | S1              |                                | multifunctional input terminal 1   | 39            |
|                   | S2              |                                | multifunctional input terminal 2   | 39            |
|                   | S3              |                                | multifunctional input terminal 3   | 39            |
|                   | S4              |                                | multifunctional input terminal 4   | 39            |
|                   | S5              |                                | multifunctional input terminal 5   | 39            |
|                   | S6              |                                | multifunctional input terminal 6   | 39            |
| Frequency setting | +10V            | Frequency setting power supply | Frequency setting power supply. (FIV, FIC)   | 38            |
|                   | FIV             | Frequency setting(voltage)     | Inputting 0 to 10VDC provides the maximum output frequency at 10V and makes input and output proportional.   | 38            |
|                   | FIC             | Frequency setting(current)     | Inputting 0 to 20mADC provides the maximum output frequency at 20mA and makes input and output proportional. | 38            |
|                   | FC              | Frequency setting common       | Common terminal for terminals FIV, FIC, +10V, and analog output terminal FOV, FOC                            | 38            |

## (2) Output signals

| Type           | Terminal Symbol | Terminal Name                                    | Description                 | Refer to page |
|----------------|-----------------|--|-----------------------------|---------------|
| Contact output | MO1             | Multifunction output terminal (optical coupling) | Permissible load 24VDC 0.1A | 40            |

| Type           | Terminal Symbol | Terminal Name                                    | Description   | Refer to page |
|----------------|-----------------|--|---|---------------|
| Contact output | MO2             | Multifunction output terminal (optical coupling) | Permissible load 24VDC 0.1A   | 40            |
| Contact output | YA              | Relay out 1                                      | Abnormal: No conduction across YA-YB (Across YB-YC continuity), Nor-mal: No conduction across YC-YB (Across YB-YA continuity).<br>Contact capacity: 250VAC/3A, 30VDC/3A | 40            |
|                | YB              |  |   |               |
|                | YC              |  |   |               |
| Contact output | KA              | Relat out 2                                      | 1changeover contact output.<br>Contact capacity: 250VAC/3A, 30VDC/3A  | 40            |
|                | KB              |  |   |               |
|                | SC              | Common terminals                                 | Common terminal for terminals FWD, REV, S1~S6, MO1, MO2   | 40            |
| Analog output  | FOV             | Analog voltage output                            | Output signal 0 to 10VDC, permissible load current 1mA. The output signal is proportional to the output frequency.  | 40            |
|                | FOC             | Analog current output                            | Output signal 0 to 20mADC. The output signal is proportional to the output frequency.   | 40            |

### (3) Communication

|       |     |                            |  |    |
|-------|-----|----------------------------|--|----|
| RS485 | RS+ | Frequency setting(current) | With the RS+, RS-, connector, communication can be made through RS486. | 46 |
|       | RS_ | Frequency setting common   |  | 46 |

### 4-2-4 Wiring instructions

(1) Use shielded or twisted cables for connection to the control circuit terminals and run them away from the main and power

circuits (including the 200V relay sequence circuit).

(2) Use two or more parallel micro-signal contacts or twin contacts to prevent a contact faults when using contact inputs since the control circuit input signals are micro-currents.

(3) Do not apply a voltage to the contact input terminals of the control circuit .

(4) Always apply a voltage to the alarm output terminals (YA, YB, YC, MO1, MO2) via a relay coil, lamp, etc.

(5) It is recommended to use the cables of 0.75m m<sup>2</sup> gauge for connection to the control circuit terminals.

(6) The wiring length should be 30m maximum.

# Chapter 5 Operation

## 5-1 Operation panel

The state indicator lights can respectively display current, voltage, frequency and so on.

Potentiometer /Display state switch

Reverse rotation option

Forward rotation option



Main display area: it can display items as,setup procedure,running frequency,output voltage,current, abnormality

Figures modification key&Ascending key and descending key

Function selection key

Shift/Enter key

Stop/Fault reset key

### 5-1-1 Key function description

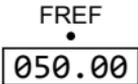
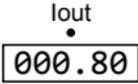
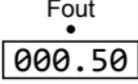
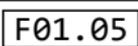
| Key Symbol | Function description  |
|------------|---|
|            | Function selection key, to select and use function menu   |
|            | Figures modification key, to modify function code and parameter   |
|            | Shift key or Enter key<br>Quick press to switch figures, press-and-hold to confirm setup  |
|            | ① Potentiometer of Keypad, when the frequency is set up as controlled by potentiometer of Keypad, to rotate the potentiometer to get different frequency.<br>② Display switch, to press gently to display different monitor information |

| Key Symbol  | Function description  |
|---|---|
|  | Stop command key (application on Keypad control state), fault reset key |
|  | Forward rotation command key  |
|  | Reverse rotation command key  |

### 5-1-2 LED indicator light description

| Indicator light Symbol | Indicator light state | Description                                |
|------------------------|-----------------------|--|
| DRV                    | Lighted               | The inverter is on running state.          |
| RDY                    | Lighted               | The inverter is on standby state.          |
| FREF                   | Lighted               | Display area displays setup frequency.     |
| Fout                   | Lighted               | Display area displays output frequency.    |
| Iout                   | Lighted               | Display area displays output current.      |
| FWD                    | Lighted               | The inverter is in forward rotation state. |
| REV                    | Lighted               | The inverter is in reverse rotation state. |
| STOP                   | Lighted               | The inverter is stopped and no output.     |

### 5-1-3 Displays description

| Item | Display   | Description  |
|------|---|--|
| 1    |  | Display: Setup frequency 50.00Hz                             |
| 2    |  | Display: Output current 0.8A                                 |
| 3    |  | Display: Output frequency 0.5Hz                              |
| 4    |  | Display: Parameter F1.50                                     |
| 5    | END   | Display: Parameter setup modified and confirmed successfully |
| 6    | OC 1  | Display: Fault code, over current during acceleration        |

## 5-2 Operation panel operation instruction

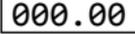
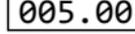
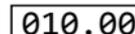
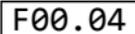
(1) Parameter setup, (taking modifying F1.04 reverse valid setup as example)

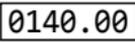
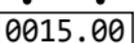
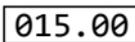
| Program | Key name   | Display  | Description  |
|---------|--|--|--|
| 1       | Power on   | RDY<br>●<br>00000                                  | ① To display frequency setting picture (initializing picture)<br>② The inverter is on standby state.       |
| 2       | Press   | RDY<br>●<br>F0000                                  | To enter the parameter setup state, and the first letter blinks (means modifiable item)                    |
| 3       | Press  4 times  | RDY<br>●<br>F00.04                                 | The value "0" has been changed to "4".   |
| 4       | Quickly press <br>2 times (quick press means shift.)  | RDY<br>●<br>F00.04                                 | The flashing is shifted 2 positions to the left.<br>Note: "Quick press" means press time within 2 seconds. |
| 5       | Press  1 time  | RDY<br>●<br>F01.04                                 | The value "0" has been changed to "1".   |
| 6       | Press and hold    | RDY<br>●<br>00001                                  | Display: "1"   |
| 7       | Press <br> | RDY<br>●<br>00000                                  | To change "1" to "0"   |
| 8       | Press and hold    | After flashing END, it displays "F01.05"<br>F01.05 | To confirm that the value "F1.04" has been modified  |
| 9       | Press   | RDY<br>●<br>00000                                  | To return to the original display picture  |

Notice: Press  to abandon modification and directly return to the main picture state.

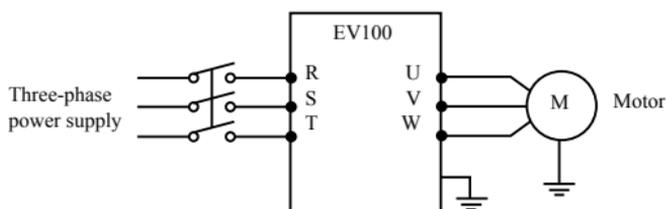
## (2) Different state displays and inquiry

Assume that the parameter is set up: The Keypad control the inverter to start and stop (F1.02=0), and the frequency is given by the potentiometer of the Keypad (F1.01=3).

| Program | Key name  | Display  | Description  |
|---------|---|--|--|
| 1       | Power on  | RDV FREF<br>● ●<br>   | Frequency setting display state  |
| 2       | Rotate           | RDV FREF<br>● ●<br>   | Frequency setting 5.0Hz  |
| 3       |                  | RDV FREF<br>● ●<br>   | Forward running of the frequency is turned on.   |
| 4       | Press  1 time    | RDV Fout<br>● ●<br>  | To shift to actual output frequency display picture  |
| 5       | Rotate         | RDV Fout<br>● ●<br> | To modify frequency setting, the actual output frequency has been changed from 5Hz to 15Hz |
| 6       | Press  1 time  | RDV Iout<br>● ●<br> | To shift to output current display picture, the output current now is 10.00A               |
| 7       | Press  1 time  | RDV<br>●<br>        | To shift to output voltage state, the actual output voltage now is 20.00                   |
| 8       | Press  2 times | RDV<br>●<br>        | To shift to parameter setup state  |
| 9       | Press          | RDV<br>●<br>        | To select code F00.04 for modifying access parameter                                       |

| Program | Key name  | Display  | Description  |
|---------|---|--|--|
| 10      | Press and hold<br> | RDV<br>•<br>        | To display F00.04 which means the running rotation speed is 15Hz |
| 11      | Press              | RDV FREF<br>• •<br> | To return to main display picture, the frequency setting is 15Hz |
| 12      | Press              | RDV FREF<br>• •<br> | To stop the inverter, the frequency setting is 15Hz              |

Notice: Through shift key you can monitor frequency setting, output frequency, output current, output voltage during the running of the



inverter, the display of the main picture can be customized by your actual need, and you can modify it through F0.00 setup, at the same time you can monitor relative display contents through F0.01-F0.18.

### 5-3 The inverter simple running and its relative items

#### 5-3-1 Setup, installation and wiring

The figure below is the simplest wire connection for running.

#### 5-3-2 Wiring inspection

According to the wiring requirements of the inverter, to check whether there are errors, after confirming there is no mistake, turn on the power supply to set up parameters.

#### 5-3-3 Parameter setup of the inverter

The basic parameter setup of the running of inverter must have

frequency setting and running signal source setup, for they can start the inverter on one hand, and indicate the running speed of the inverter on the other hand.

Set up parameter F1.01 and F1.02 according to the requirements, about the setting -up method, see section 5-2.

#### **5-3-4 Running**

Confirm that there is no mistake in wiring and parameter setup according to the requirements

Assume F1.01=3 (the frequency source coming from the potentiometer of Keypad)

F1.02=0 (the running signal source coming from the Keypad)

Press FWD to start the inverter, then to rotate the potentiometer, the inverter accelerations gradually.

Press STOP to stop the inverter

Notice: Observe the running state of the motor during running, if an abnormality occurs, please stop running immediately (to press STOP key) and turn off the power and check it.

## Chapter 6

# Table of Function Parameters

This chapter explains the “PARAMETERS” for use of this product.  
Always read this instructions before use.

Parameter list

| Function          | Parameters | Name                                     | Setting Range | Minimum Setting increments | Initial value | Refer To Page |
|-------------------|------------|--|---------------|----------------------------|---------------|---------------|
| Monitor functions | F0.00      | Main display data selection              | 0-32          | 1                          | 1             | 49            |
|                   | F0.01      | Display the set frequency.               | Read only     | ----                       | ----          | 50            |
|                   | F0.02      | Display the output frequency             | Read only     | ----                       | ----          | 50            |
|                   | F0.03      | Display the output current               | Read only     | ----                       | ----          | 50            |
|                   | F0.04      | Display the motor speed.                 | Read only     | ----                       | ----          | 50            |
|                   | F0.05      | Display the DC bus voltage value.        | Read only     | ----                       | ----          | 50            |
|                   | F0.06      | Display the temperature of inverter.     | Read only     | ----                       | ----          | 50            |
|                   | F0.07      | Display PID                              | Read only     | ----                       | ----          | 50            |
|                   | F0.10      | Alarm record 1                           | Read only     | ----                       | ----          | 51            |
|                   | F0.11      | Alarm record 2                           | Read only     | ----                       | ----          | 51            |
|                   | F0.12      | Alarm record 3                           | Read only     | ----                       | ----          | 51            |
|                   | F0.13      | Alarm record 4                           | Read only     | ----                       | ----          | 51            |
|                   | F0.14      | The frequency setting in the last alarm. | Read only     | ----                       | ----          | 51            |
|                   | F0.15      | The output frequency in last alarm.      | Read only     | ----                       | ----          | 51            |
|                   | F0.16      | The output current in last alarm.        | Read only     | ----                       | ----          | 51            |
|                   | F0.17      | The output voltage in last alarm.        | Read only     | ----                       | ----          | 51            |
|                   | F0.18      | The output DC bus voltage in last alarm. | Read only     | ----                       | ----          | 51            |

## Chapter 6 Table of Function Parameters

| Function          | Parameters                   | Name  | Setting Range   | Minimum Setting increments | Initial value     | Refer To Page |
|-------------------|------------------------------|---|---|----------------------------|-------------------|---------------|
| Monitor functions | F1.00                        | Digital frequency setting   | 0.00—Maximum frequency  | 0.01                       | 0.00              | 52            |
|                   | F1.01                        | Frequency setting selection   | 0: Digital frequency setting (F1.00)<br>1: Analog voltage (0—10VDC)<br>2: Analog current (0—20mADC )<br>3: Setting dial (Operation panel)<br>4 UP/DOWN frequency setting<br>5: RS485 communication frequency setting<br>6: Analog combination | 1                          | 0                 | 53            |
| Basic functions   | F1.02                        | Start signal selection  | 0: Operation panel (FWD/REV/STOP)<br>1: I/O terminal<br>2: Communication (RS485)  | 1                          | 0                 | 56            |
|                   | F1.03                        | "stop" key lock operation selection   | 0: "Stop"key lock mode invalid<br>1: "Stop" key lock mode valid   | 1                          | 1                 | 58            |
|                   | F1.04                        | Reverse rotation prevention selection   | 0: Reverse rotation disallowed<br>1: Reverse rotation allowed   | 1                          | 1                 | 59            |
|                   | F1.05                        | Maximum frequency   | Minimum frequency~400.00Hz  | 0.01                       | 0.00              | 59            |
|                   | F1.06                        | Minimum frequency   | 0.00~maximum frequency  | 0.01                       | 0.00              | 60            |
|                   | F1.07                        | Acceleration time 1   | 0~6000.0s   | 0.1                        | Depends on models | 60            |
|                   | F1.08                        | Deceleration time 1   | 0~6000.0s   | 0.1                        |                   | 60            |
|                   | F1.09                        | V/F maximum voltage   | V/F intermediate voltage ~ 500.0 V  | 0.1                        | 400.0             | 60            |
|                   | F1.10                        | V/F base frequency  | V/F intermediate frequency ~ max. frequency   | 0.01                       | 50.00             | 60            |
|                   | F1.11                        | V/F intermediate voltage  | V/F minimum voltage ~ V/F maximum voltage   | 0.1                        | Changing          | 60            |
|                   | F1.12                        | V/F intermediate frequency  | V/F minimum frequency ~ V/F base frequency  | 0.01                       | 2.50              | 61            |
|                   | F1.13                        | V/F minimum voltage   | 0~V/F intermediate voltage  | 0.1                        | 15.0              | 61            |
|                   | F1.14                        | V/F minimum frequency   | 0~V/F intermediate frequency  | 0.01                       | 1.25              | 61            |
|                   | F1.15                        | Carrier frequency   | 1.0K-15.0K  | 0.1                        | Changing          | 63            |
|                   | F1.16                        | Automatic carrier line up   | Reserved  | 1                          | 0                 | *             |
| F1.17             | Initialization of parameters | 8: Initialization of Factory Setting<br>5: Follows are the initialization parameters of inverter: |   |                            | 64                |               |

| Function        | Parameters | Name  | Setting Range  | Minimum Setting increments | Initial value | Refer To Page |
|-----------------|------------|---|--|----------------------------|---------------|---------------|
| Basic functions | F1.17      | Initialization of parameters                                  | F0.00=11 Panel only shows the output frequency.<br>F1.01=3 Frequency setup option: Keyboard POT.<br>F1.07=90 Acceleration time 1 is 90 seconds.<br>F1.08=120 Deceleration time 1 is 120 seconds.<br>F4.09=100 Limitation for acceleration torque is 100%.<br>F4.10=100 Limitation for torque of constant speed is 100%.<br>F6.21=1 The selection of alarm when FIC is not effective.<br>F1.02=1 Running setup option: IO terminal.<br>F4.11=1 Preventing over voltage in deceleration option: valid.<br>F1.18=1 Locked up of parameters. | 1                          | 0             | 64            |
|                 | F1.18      | Parameter lock  | 0: Unlock parameters<br>1: Lock up parameters  | 1                          | 0             | 64            |
|                 | F1.19      | Frequency setting resolution (setting dial (Operation panel)) | 0: 0.01Hz<br>1: 0.1Hz<br>2: 1.0Hz<br>3: 2.0Hz  | 0                          | 1             |               |
|                 | F1.20      | Analog combinations   | 0: FIV set frequency + FIC Set frequency (Hz)<br>1: the main speed setting frequency (Hz) * compensation (%)   | 1                          | 0             | 55            |
|                 | F1.21      | FIV low-end compensation                                      | 0% ~ 200%  | 1                          | 0             | 55            |
|                 | F1.22      | FIVHigh-end compensation                                      | 0% ~ 200%  | 1                          | 100           | 55            |
|                 | F2.00      | Start mode selection  | 0: regular start<br>1: restart after inspection  | 1                          | 0             | 64            |
|                 | F2.01      | Stop mode selection   | 0: deceleration to a stop<br>1: coasting   | 1                          | 0             | 65            |
|                 | F2.02      | Starting frequency  | 0.10~10.00Hz   | 0.01                       | 0.5           | 66            |
|                 | F2.03      | Stopping frequency  | 0.10~10.00Hz   | 0.01                       | 0.5           | 66            |
|                 | F2.04      | DC injection brake operation current (start)                  | 0~150% rated motor current   | 1%                         | 100%          | 68            |
|                 | F2.05      | DC injection brake operation time (start)                     | 0~25.0S  | 0.1                        | 0             | 68            |

## Chapter 6 Table of Function Parameters

| Function        | Parameters | Name  | Setting Range                            | Minimum Setting increments | Initial value | Refer To Page |
|-----------------|------------|---|--|----------------------------|---------------|---------------|
| Basic functions | F2.06      | DC injection brake operation current (stop) | 0~150% rated motor current               | 1%                         | 100%          | 68            |
|                 | F2.07      | DC injection brake operation time (stop)    | 0~25.0S                                  | 0.1                        | 0             | 68            |
|                 | F2.08      | Torque boost                                | 0~20.0%                                  | 1                          | 5%            | 68            |
|                 | F2.09      | Rated motor voltage                         | 0~500.0V                                 | 0.1                        | 380.0         | 68            |
|                 | F2.10      | Rated motor current                         | 0 -- current of system                   | 0.1                        | Changing      | 68            |
|                 | F2.11      | No load current ratio of motor              | 0-100%                                   | 0.1                        | 40%           | 68            |
|                 | F2.12      | Rated motor rotation speed                  | 0-6000r/min                              | 1                          | 1420          | 68            |
|                 | F2.13      | Number of motor poles                       | 0-20                                     | 1                          | 4             | 68            |
|                 | F2.14      | Rated motor slip                            | 0~10.00Hz                                | 0.01                       | 2.50          | 68            |
|                 | F2.15      | Rated motor frequency                       | 0-400.00 Hz                              | 0.01                       | 50.00         | 69            |
|                 | F2.16      | Resistance of stator                        | 0-100Ω                                   | 0.01                       | 0             | 69            |
|                 | F2.17      | Resistance of rotor                         | 0-100Ω                                   | 0.01                       | 0             | 69            |
|                 | F2.18      | Self inductance of rotor                    | 0-1.000H                                 | 0.01                       | 0             | 69            |
|                 | F2.19      | Mutual inductance of rotor                  | 0-1.000H                                 | 0.01                       | 0             | 70            |
|                 | F2.20      | torque compensation filter time             | 0—10s                                    | 0.01s                      | 0.10          |               |
|                 | F2.21      | Emergency stop mode                         | 0: coasting<br>1: deceleration to a stop | 0                          | 0             |               |
| I/O functions   | F3.00      | FIV minimum voltage input                   | 0~FIV maximum voltage                    | 0.1                        | 0             | 70            |
|                 | F3.01      | FIV maximum voltage input                   | FIV minimum voltage~10V                  | 0.1                        | 10.0          | 70            |
|                 | F3.0 2     | FIV input filter time                       | 0~25.0S                                  | 0.1                        | 1.0           | 70            |
|                 | F3.03      | FIC minimum current input                   | 0~FIC maximum current                    | 0.1                        | 0             | 71            |
|                 | F3.04      | FIC maximum current input                   | FIC minimum current input~20mA           | 0.1                        | 20.0          | 71            |
|                 | F3.05      | FIC input filter time                       | 0~25.0S                                  | 0.1                        | 1.0           | 71            |
|                 | F3.06      | FOV minimum voltage output                  | 0~FOV maximum voltage                    | 0.1                        | 0             | 72            |

## Operation Instruction of EV100 Series Inverter

| Function      | Parameters        | Name  | Setting Range  | Minimum Setting increments | Initial value | Refer To Page |
|---------------|-------------------|---|--|----------------------------|---------------|---------------|
| I/O functions | F3.07             | FOV maximum voltage output  | FOV maximum voltage output~10V   | 0.1                        | 10.0          | 72            |
|               | F3.08             | FOC minimum current output  | 0~FOC maximum current  | 0.1                        | 0             | 72            |
|               | F3.09             | FOC maximum current output  | FOC minimum current~20mA   | 0.1                        | 20.0          | 72            |
|               | F3.10             | Frequency of low analog   | 0~600.00   |                            | 0.00          | 73            |
|               | F3.11             | Direction of low analog   | 0/1  | 1                          | 0             | 73            |
|               | F3.12             | Frequency of high analog  | 0~600.00   | 0.01HZ                     | 50.00         | 73            |
|               | F3.13             | Direction of high analog  | 0/1  | 1                          | 0             | 73            |
|               | F3.14             | Analog input reverse selection  | 0/1  | 1                          | 0             | 73            |
|               | F3.15             | Input terminal FWD (0~32)   | 0: Invalid<br>1: Jog<br>2: Jog Forward<br>3: Jog reverse<br>4: Forward/ reverse  | 1                          | 6             | 75            |
|               | F3.16             | Input terminal REV (0~32)   | 5: Run<br>6: Forward<br>7: Reverse<br>8: Stop<br>9: Multi-speed 1<br>10: Multi-speed 2<br>11: Multi-speed 3<br>12: Multi-speed 4 | 1                          | 7             | 75            |
|               | F3.17             | Input terminal S1 (0~32)  | 13: Acceleration/Deceleration terminal 1<br>14: Acceleration/Deceleration terminal 2   | 1                          | 1             | 75            |
|               | F3.18             | Input terminal S2 (0~32)  | 15: Frequency increase signal (UP)<br>16: Frequency decrease signal (DOWN)<br>17: Emergency stop signal                          | 1                          | 18            | 75            |
|               | F3.19             | Input terminal S3 (0~32)  | 18: Inverter reset signal<br>19: PID in running<br>20: PLC in running  | 1                          | 15            | 75            |
|               | F3.20             | Input terminal S4 (0~32)  | 21: Start signal for timer 1<br>22: Start signal for timer 2<br>23: Counter pulse signal   | 1                          | 16            | 75            |
|               | F3.21 (0~32)      | Input terminal S5   | 24: Counter reset signal<br>25: Memory clear   | 1                          | 8             | 75            |
| F3.22 (0~32)  | Input terminal S6 | 26: Start winding operation<br>27: Frequency selection 1<br>28: Frequency selection 2 | 1  | 9                          | 75            |               |

## Chapter 6 Table of Function Parameters

| Function      | Parameters            | Name  | Setting Range   | Minimum Setting increments | Initial value | Refer To Page |
|---------------|-----------------------|---|---|----------------------------|---------------|---------------|
| I/O functions | F3.23                 | Output terminal M01 (0~32)  | 0: Invalid<br>1: In running<br>2: Frequency reached<br>3: Alarm<br>4: Zero speed<br>5: Frequency 1 reached<br>6: Frequency 2 reached<br>7: Acceleration<br>8: Deceleration  | 1                          | 01            | 81            |
|               | F3.24                 | Output terminal M01 (0~32)  | 9: Indication for under voltage<br>10: Timer 1 reached<br>11: Timer 2 reached<br>12: Indication for completion of phase<br>13: Indication for completion of procedure<br>14: PID maximum<br>15: PID minimum<br>16: 4-20mA disconnection<br>17: Overload | 1                          | 02            | 81            |
|               | F3.25                 | Alarm output terminal YA, YB, YC (0~32)<br>Add: KA, KB F3.28 (0~32) | 18: Over torque<br>26: Winding operation completed<br>27: Counter reached<br>28: Intermediate counter reached<br>29: Water supply by constant voltage<br>"1" turn on<br>"0" turn off  | 1                          | 03            | 81            |
|               | F3.26                 | Output terminal FOV (0~7)   | 0: Frequency output<br>1: current output<br>2: Dc bus voltage<br>3: Ac voltage  | 1                          | 0             | 84            |
|               | F3.27                 | Output terminal FOC (0~7)   | 4: Pulse output , 1pulse/Hz<br>5: 2pulses/Hz<br>6: 3 pulses/Hz<br>7: 6 pulses/Hz  | 1                          | 1             | 84            |
|               | Secondary application | F4.00   | Jog frequency setting   | 0.00~maximum frequency     | 0.01          | 5.00          |
| F4.01         |                       | Acceleration time 2   | 0~6000.0S   | 0.1S                       | 10.0          | 85            |
| F4.02         |                       | Deceleration time 2   | 0~6000.0S   | 0.1S                       | 10.0          | 85            |
| F4.03         |                       | Acceleration time 3   | 0~6000.0S   | 0.1S                       | 20.0          | 85            |
| F4.04         |                       | Deceleration time 3   | 0~6000.0S   | 0.1S                       | 20.0          | 85            |
| F4.05         |                       | Acceleration time 4/Jog acceleration time                           | 0~6000.0S   | 0.1S                       | 2.0           | 85            |

## Operation Instruction of EV100 Series Inverter

| Function              | Parameters | Name  | Setting Range          | Minimum Setting increments | Initial value | Refer To Page |
|-----------------------|------------|---|------------------------|----------------------------|---------------|---------------|
| Secondary application | F4.06      | Deceleration time 4/Jog deceleration time         | 0~6000.0S              | 0.1S                       | 2.0           | 85            |
|                       | F4.07      | Designated value of counter                       | 0~65000                | 1                          | 100           | 86            |
|                       | F4.08      | Intermediate value of counter                     | 0~65000                | 1                          | 50            | 86            |
|                       | F4.09      | Limitation of acceleration torque                 | 0~200%                 | 1%                         | 150%          | 86            |
|                       | F4.10      | Limitation of constant speed torque               | 0~200%                 | 1%                         | 00            | 87            |
|                       | F4.11      | Over voltage prevention selection in deceleration | 0/1                    | 1                          | 1             | 87            |
|                       | F4.12      | Automatic Voltage regulation selection            | 0~2                    | 1                          | 1             | 88            |
|                       | F4.13      | Automatic - energy - saving selection             | 0~100%                 | 1%                         | 00            | 88            |
|                       | F4.14      | DC Braking voltage                                | Depends on models      | 0.1                        | 800.0         | 88            |
|                       | F4.15      | Braking duty                                      | 40~100%                | 1                          | 50%           | 89            |
|                       | F4.16      | Restart after instant power off                   | 0~1                    | 1                          | 0             | 90            |
|                       | F4.17      | Allowable time of power cut                       | 0~10s                  | 1                          | 5.0S          | 91            |
|                       | F4.18      | Flank restart Current limited level               | 0~200%                 | 1                          | 150%          | 91            |
|                       | F4.19      | Flank restart time                                | 0~10s                  | 1                          | 50            | 91            |
|                       | F4.20      | Fault restart times                               | 0~5s                   | 1                          | 0             | 92            |
|                       | F4.21      | Delay time for restart after fault                | 0~100                  | 2                          | 2             | 92            |
|                       | F4.22      | Over torque action                                | 0~3                    | 1                          | 0             | 92            |
|                       | F4.23      | Over torque detection level                       | 0~200%                 | 1                          | 00            | 92            |
|                       | F4.24      | Over torque detection time                        | 0~20.0S                | 0.1                        | 00            | 93            |
|                       | F4.25      | Reaching Frequency 1                              | 0.00~maximum frequency | 0.01                       | 100           | 93            |
|                       | F4.26      | Reaching Frequency 2                              | 0.00~maximum frequency | 0.01                       | 5.0           | 93            |
|                       | F4.27      | Timer 1 setting                                   | 0~6000.0S              | 0.1                        | 0             | 93            |

## Chapter 6 Table of Function Parameters

| Function              | Parameters    | Name   | Setting Range  | Minimum Setting increments | Initial value | Refer To Page |
|-----------------------|---------------|--|--|----------------------------|---------------|---------------|
| Secondary application | F4.28         | Timer 2 setting                                  | 0~6000.0S  | 1                          | 0             | 94            |
|                       | F4.29         | Constant-speed torque limiting time              | 0~6000.0S  | 0.1                        | Changing      | 94            |
|                       | F4.30         | Width of arrival of frequency in hysteretic loop | 0.00-2.00  | 0.01                       | 0.50          | 94            |
|                       | F4.31         | Jump frequency 1                                 | 0.00~maximum frequency   | 0.01                       | 0             | 94            |
|                       | F4.32         | Jump frequency 2                                 | 0.00~maximum frequency   | 0.01                       | 0             | 94            |
|                       | F4.33         | Jump frequency hysteresis loop width             | 0.00-2.00  | 0.01                       | 0.50          |               |
|                       | F4.34         | UP/DOWN frequency step                           | 0~10.00Hz  | 0.01                       | 0.1           |               |
|                       | F4.35         | UP/DOWN frequency Memory options                 | 0: memory<br>1: No Memory  | 1                          | 0             | 95            |
|                       | F5.00         | PLC memory mode                                  | 0~1  | 1                          | 0             | 95            |
|                       | F5.01         | PLC starting mode                                | 0~1  | 1                          | 0             | 96            |
|                       | F5.02         | PLC running mode                                 | 0: PLC stops after running for one cycle<br>1: PLC stop mode, it stops after running for one cycle<br>2: PLC cycle running<br>3: PLC stop mode, cycle running mode<br>4: PLC operates at the last frequency after running for one cycle. | 1                          | 0             | 96            |
|                       | F5.03         | Multi-speed 1                                    | 0.00~maximum frequency   | 0.01                       | 10.0          | 96            |
|                       | F5.04         | Multi-speed 2                                    | 0.00~maximum frequency   | 0.01                       | 15.00         | 96            |
|                       | F5.05         | Multi-speed 3                                    | 0.00~maximum frequency   | 0.01                       | 20.00         | 97            |
|                       | F5.06         | Multi-speed 4                                    | 0.00~maximum frequency   | 0.01                       | 25.00         | 97            |
| F5.07                 | Multi-speed 5 | 0.00~maximum frequency                           | 0.01   | 30.00                      | 97            |               |
| F5.08                 | Multi-speed 6 | 0.00~maximum frequency                           | 0.01   | 35.00                      | 97            |               |
| F5.09                 | Multi-speed 7 | 0.00~maximum frequency                           | 0.01   | 40.00                      | 97            |               |
| F5.10                 | Multi-speed 8 | 0.00~maximum frequency                           | 0.01   | 45.00                      | 97            |               |
| F5.11                 | Multi-speed 9 | 0.00~maximum frequency                           | 0.01   | 50.00                      | 97            |               |

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| Function      | Parameters              | Name                  | Setting Range          | Minimum Setting increments | Initial value | Refer To Page |
|---------------|-------------------------|-----------------------|------------------------|----------------------------|---------------|---------------|
| PLC operation | F5.12                   | Multi-speed 10        | 0.00~maximum frequency | 0.01                       | 10.00         | 97            |
|               | F5.13                   | Multi-speed 11        | 0.00~maximum frequency | 0.01                       | 10.00         | 97            |
|               | F5.14                   | Multi-speed 12        | 0.00~maximum frequency | 0.01                       | 10.00         | 97            |
|               | F5.15                   | Multi-speed 13        | 0.00~maximum frequency | 0.01                       | 10.00         | 97            |
|               | F5.16                   | Multi-speed 14        | 0.00~maximum frequency | 0.01                       | 10.00         | 97            |
|               | F5.17                   | Multi-speed 15        | 0.00~maximum frequency | 0.01                       | 10.00         | 97            |
|               | F5.18                   | PLC operation time 1  | 0~65000s               | 1S                         | 100           | 97            |
|               | F5.19                   | PLC operation time 2  | 0~65000s               | 1S                         | 100           | 97            |
|               | F5.20                   | PLC operation time 3  | 0~65000s               | 1S                         | 100           | 97            |
|               | F5.21                   | PLC operation time 4  | 0~65000s               | 1S                         | 100           | 97            |
|               | F5.22                   | PLC operation time 5  | 0~65000s               | 1S                         | 100           | 97            |
|               | F5.23                   | PLC operation time 6  | 0~65000s               | 1S                         | 0             | 97            |
|               | F5.24                   | PLC operation time 7  | 0~65000s               | 1S                         | 0             | 97            |
|               | F5.25                   | PLC operation time 8  | 0~65000s               | 1S                         | 0             | 97            |
|               | F5.26                   | PLC operation time 9  | 0~65000s               | 1S                         | 0             | 97            |
|               | F5.27                   | PLC operation time 10 | 0~65000s               | 1S                         | 0             | 97            |
|               | F5.28                   | PLC operation time 11 | 0~65000s               | 1S                         | 0             | 98            |
|               | F5.29                   | PLC operation time 12 | 0~65000s               | 1S                         | 0             | 98            |
|               | F5.30                   | PLC operation time 13 | 0~65000s               | 1S                         | 0             | 98            |
|               | F5.31                   | PLC operation time 14 | 0~65000s               | 1S                         | 0             | 98            |
| F5.32         | PLC operation time 15   | 0~65000s              | 1S                     | 0                          | 98            |               |
| F5.33         | PLC operation direction | 0~32767               | 1                      | 0                          |               |               |
| F5.34         | Open wound              | 0: close 1: open      | 0                      | 0                          |               |               |

## Chapter 6 Table of Function Parameters

| Function      | Parameters                  | Name  | Setting Range  | Minimum Setting increments | Initial value         | Refer To Page          |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|---------------|-----------------------------|---|--|----------------------------|-----------------------|------------------------|---|---|---------------------------|---|---|-----------------------------|---|---|---------------------------|---|---|------------------------------------|--|---|-----|
| PLC operation | F5.36                       | multi-function terminal frequency setup mode selection      | 0: Close the multi-function terminal frequency setup mode.<br>1: Open the multi-function terminal frequency setup mode. <table border="1" style="margin-top: 10px; width: 100%;"> <thead> <tr> <th>Frequency selection 1</th> <th>Frequency selection 2</th> <th>Frequency setting Mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>FIC analog current Output</td> </tr> <tr> <td>0</td> <td>1</td> <td>RS485 communication setting</td> </tr> <tr> <td>1</td> <td>0</td> <td>FIV analog voltage Output</td> </tr> <tr> <td>1</td> <td>1</td> <td>Keypad potentiometer input setting</td> </tr> </tbody> </table> | Frequency selection 1      | Frequency selection 2 | Frequency setting Mode | 0 | 0 | FIC analog current Output | 0 | 1 | RS485 communication setting | 1 | 0 | FIV analog voltage Output | 1 | 1 | Keypad potentiometer input setting |  | 0 | 101 |
|               | Frequency selection 1       | Frequency selection 2                                       | Frequency setting Mode   |                            |                       |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | 0                           | 0   | FIC analog current Output  |                            |                       |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | 0                           | 1   | RS485 communication setting  |                            |                       |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | 1                           | 0   | FIV analog voltage Output  |                            |                       |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | 1                           | 1   | Keypad potentiometer input setting   |                            |                       |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | F6.00                       | PID starting mode   | 0: PID disable<br>1: PID start<br>2: PID start by external terminal  | 1                          | 0                     | 101                    |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | F6.01                       | PID operation mode selection                                | 0: Negative feedback mode<br>1: Positive feedback mode   | 1                          | 0                     | 101                    |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | F6.02                       | PID action set point  | 0: figure mode (F6.04)<br>1: FIV                      2: FIC   | 1                          | 0                     | 102                    |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | F6.03                       | PID feedback value selection                                | 0: FIV                      1: FIC<br>2: FIV - FIC            3: FIC - FIV   | 1                          | 0                     | 102                    |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | F6.04                       | PID figure target value setting                             | 0.0~100.0%   | 0.1%                       | 0.0%                  | 103                    |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
|               | F6.05                       | PID upper limit alarm value                                 | 0~100.0%   | 1%                         | 100%                  | 104                    |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
| F6.06         | PID lower limit alarm value | 0~100.0%  | 1%   | 0%                         | 104                   |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
| F6.07         | PID proportional band       | 0.0~200.0%  | 0.1%   | 100%                       | 104                   |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
| F6.08         | PID integral time           | 0.0~200.0 S.0 means closed                                  | 0.1s   | 0.1s                       | 105                   |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
| F6.09         | PID differential time       | 0.00.0~20.00 S.0 means closed                               | 0.1s   | 0.0                        | 105                   |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
| F6.10         | PID action step-length      | 0.00~1.00Hz   | 0.01   | 0.10Hz                     | 106                   |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |
| F6.11         | PID standby frequency       | 0.00~120.0Hz (0.00Hz) 0.00Hz means sleep function is closed | 0.01   | 0.00Hz                     | 105                   |                        |   |   |                           |   |   |                             |   |   |                           |   |   |                                    |  |   |     |

## Operation Instruction of EV100 Series Inverter

| Function      | Parameters | Name                               | Setting Range  | Minimum Setting increments | Initial value | Refer To Page |
|---------------|------------|------------------------------------|--|----------------------------|---------------|---------------|
| PLC operation | F6.12      | PID standby duration               | 0~200s   | 1S                         | 10s           | 105           |
|               | F6.13      | PID wake-up value                  | 0~100%   | 1%                         | 0             | 105           |
|               | F6.14      | PID corresponding value of display | 0~10000  | 1                          | 1000          | 106           |
|               | F6.15      | PID digit of display               | 1~5  | 1                          | 1             | 106           |
|               | F6.16      | PID decimal digits of display      | 0~4  | 1                          | 1             | 106           |
|               | F6.17      | PID upper limit frequency          | 0~max. frequency   | 0.01                       | 48.00         |               |
|               | F6.18      | PID lower limit frequency          | 0~max. frequency   | 0.01                       | 20.00         |               |
|               | F6.19      | PID working mode                   | 0: Always work (PID function open)<br>1: When feedback reaches upper limit (F6.05), it will work at Min-frequency. When feedback reaches lower limit(F6.06), PID will begin to work.   | 1                          | 0             |               |
|               | F6.21      | FIC lost Alarm Selection           | 0: There will be no alarm when FIC is not effective.<br>1: When FIC is not effective, there will be alarming signals, and produce the protection of "20". In this time, there is no change of frequency, PID is closed. When FIC is effective, PID returns to work, and alarm is closed.<br>2: When FIC is not effective, there will be alarming signals, and output will be stopped. "200" is the alarming signal for FIC is not effective when inverter is in the condition of stopping. |                            | 0             |               |
|               | F6.21      | FIC lost Alarm Selection           | "201" is the alarming signal for FIC is not effective when inverter is in the condition of accelerating.<br>"202" is the alarming signal for FIC is not effective when inverter is in the condition of deceleration.<br>"203" is the alarming signal for FIC is not effective when inverter is in the condition of running.  |                            | 0             | 108           |

## Chapter 6 Table of Function Parameters

| Function             | Parameters   | Name  | Setting Range  | Minimum Setting increments | Initial value | Refer To Page |
|----------------------|--|---|--|----------------------------|---------------|---------------|
| RS-485 Communication | F7.00  | Communication speed                                   | 0: 4800bps<br>1: 9600 bps<br>2: 19200 bps<br>3: 38400 bps  |                            | 0             | 107           |
|                      | F7.01  | Communication mode                                    | 0: 8N1 FOR ASC<br>1: 8E1 FPR ASC<br>2:8O1 FOR ASC<br>3: 8N1 FOR RTU<br>4:8E1 FOR RTU<br>5: 8O1 FOR RTU |                            |               | 107           |
|                      | F7.02  | Communication address                                 | 0~240  | 1                          | 0             | 108           |
|                      | F7.03  | Handling of communication failures                    | 0: No alarm and continue operation<br>1: No alarm, stop at stop mode<br>2: alarm, stop by stop mode    | 1                          | 0             |               |
|                      | F7.04  | Time of Communications timeout                        | 0.0~100.0S   | 0.1                        | 1.0           |               |
| Advanced application | F8.00  | Advanced application parameter lock                   | 0: Locked<br>1: Unlocked   | 1                          | 111           | 114           |
|                      | F8.01  | System 50Hz/60Hz setting                              | 0~50Hz 1~60Hz  | 1                          | 0             | 114           |
|                      | F8.02  | Constant torque or variable torque selction           | 0: Constant torque<br>1: Variable torque   | 1                          | 0/1           | 115           |
|                      | F8.03  | Over-voltage protection setting                       | changing   | 1                          | changing      | 115           |
|                      | F8.04  | Under-voltage protection setting                      | changing   | 1                          | changing      | 115           |
|                      | F8.05  | Over-temperature protection setting                   | 40~120℃  | 1                          | 85/95℃        | 115           |
|                      | F8.06  | Current display filter time                           | 0~10.0   | 0.1                        | 2.0           | 113           |
|                      | F8.07  | 0-10V analogue output low end calibration coefficient | 0-65535  | 1                          | -             | 116           |
|                      | F8.08  | 0-10V analog output high end calibration coefficient  | 0-65535  | 1                          | -             | 116           |
| F8.09                | 0-20mA analogue output low end calibration coefficient | 0-65535   | 1  | -                          | 116           |               |

| Function             | Parameters | Name  | Setting Range             | Minimum Setting increments | Initial value | Refer To Page |
|----------------------|------------|---|---------------------------|----------------------------|---------------|---------------|
| Advanced application | F8.10      | 0-20mA analog output high end calibration coefficient | 0-65535                   | 1                          | -             | 116           |
|                      | F8.11      | Compensation frequency point for dead time            | 0.00~maximum frequency    | 0.01                       | 0.00          |               |
|                      | F8.12      | UP/DOWN frequency Memory options                      | 0: memory<br>1: No Memory | 1                          | 0             |               |

# Chapter 7

## Detailed Explanations of Functional Parameters

### 7-1 Parameters for monitoring

| Parameters | Name   | Setting Range | Description  |
|------------|--|---------------|--|
| F0.00      | Main display data selection<br>(Initial value: 00)<br>Setting range (00-32)  | 00            | Displays the set frequency   |
|            |  | 01            | Displays the inverter output frequency   |
|            |  | 02            | Displays the inverter output current   |
|            |  | 03            | Displays the motor speed   |
|            |  | 04            | Displays the DC bus voltage  |
|            |  | 05            | Displays the inverter temperature  |
|            |  | 09            | Displays record of last faults (1)   |
|            |  | 10            | Displays record of last faults (2)   |
|            |  | 11            | Displays record of last faults (3)   |
|            |  | 12            | Displays record of last faults (4)   |
|            |  | 13            | Displays the recently set frequency of the inverter when the fault occurred    |
|            |  | 14            | Displays the recently output frequency of the inverter when the fault occurred |
|            |  | 15            | Displays the recently output current of the inverter when the fault occurred   |
|            |  | 16            | Displays the recently output voltage of the inverter when the fault occurred   |
| 17         | Displays the recently DC bus voltage of the inverter when the fault occurred |               |  |
| 18         | Displays the recently temperature of the inverter when the fault occurred    |               |  |

User can set the initial display of the inverter through parameter F0.00 . For example, in order to monitor rotation speed through the operation panel , user can set parameter F0.00 to “03”. Initial value of F0.00 is “00”, therefore , if not been changed, inverter will display the set frequency .

|       |  |
|-------|--|
| F0.01 | Display the set frequency                  |
|       | It displays the set frequency of inverter. |

You can monitor the set frequency of inverter by examining the content of this parameter.

|       |   |
|-------|---|
| F0.02 | Display the output frequency                          |
|       | It displays the present output frequency of inverter. |

You can monitor the present output frequency of the inverter by examining parameter F0.02.

|       |   |
|-------|---|
| F0.03 | Display the output current                  |
|       | It displays the output current of inverter. |

You can monitor the actual output current by examining parameter F0.03.

|       |   |
|-------|---|
| F0.04 | Display the motor speed                         |
|       | It displays the actual rotation speed of motor. |

You can monitor the actual rotation speed of motor by examining parameter F0.04.

|       |  |
|-------|--|
| F0.05 | Display the DC bus voltage value                               |
|       | It displays the voltage of DC bus in main circuit of inverter. |

You can monitor the actual voltage of DC bus by examining parameter F0.05.

|       |   |
|-------|---|
| F0.06 | Display temperature of inverter                 |
|       | It displays the actual temperature of inverter. |

You can monitor the actual temperature of inverter by examining

parameter F0.06, which will help you make judgment on the running condition of inverter.

|       |  |
|-------|--|
| F0.10 | Alarm record 1                                 |
| F0.11 | Alarm record 2                                 |
| F0.12 | Alarm record 3                                 |
| F0.13 | Alarm record 4                                 |
|       | It records the latest four faults of inverter. |

You can check the conditions of latest four faults by examining F0.10 to F0.13. These four parameters can help user make judgment on the running condition of inverter and find the cause of fault and eliminate hidden trouble.

|       |   |
|-------|---|
| F0.14 | Displays the recently set frequency of the inverter when the fault occurred   |
| F0.15 | Displays the recently output frequency of the inverter when the fault occurred  |
| F0.16 | Displays the recently output current of the inverter when the fault occurred  |
| F0.17 | Displays the recently output voltage of the inverter when the fault occurred  |
| F0.18 | Displays the recently DC bus voltage of the inverter when the fault occurred  |
|       | They display the detailed status when the latest fault occurs. You can check the actual frequency setting, actual output frequency, actual output voltage, and dc voltage of main circuit in inverter by examining these parameters respectively. |

You can check the detailed status when the latest fault occurs by examining the content of F0.14--F0.18. You can examine the frequency setting, actual output frequency, and actual output current, actual output voltage, DC bus voltage of main circuit. According to the above data, you can analyze the cause of fault and find a solution quickly, which will help maintenance personnel in repair work.

For EV100 series inverter, you can use parameter "F.00" to set the main display data. It's also possible to monitor the data directly

through the parameters “F0.01~F0.18”.

You may monitor the data by pressing the switching key as shown in below table:

| Procedure | Press key  | Display                    | Explanation  |
|-----------|--|----------------------------|--|
| 1         | Turn on power  | RDV FREF<br>• •<br>0015.00 | ① Inverter is in standby mode.<br>② The keypad displays frequency setting. FREE light is on, which means that the keypad is displaying frequency setting   |
| 2         | Press             | RDV FREF<br>• •<br>0015.00 | Start inverter<br>① Inverter is in running and DRV light is on.<br>② The image displays frequency setting.<br>Forward light is on; inverter is in Forward state.                                       |
| 3         | Press  for once   | RDV FREF<br>• •<br>0015.00 | Switch display; stop switching when actual output frequency is displayed. Inverter is in Forward running state.<br>② The actual output frequency is 15.00Hz.<br>③ Fout light is on.                    |
| 4         | Press  for once  | RDV Iout<br>• •<br>010.00  | Switch display; stop switching when actual output current is displayed.<br>① The actual current output is 10A<br>② Iout lamp is on, which means that the current image displays actual output current. |
| 5         | Press  for once | RDV<br>•<br>0140.00        | Switch display; stop switching when actual output voltage is displayed.<br>① The actual output voltage is 140V.  |
| 6         | Press  for once | RDV<br>•<br>020.00         | Switch to keypad<br>① Return to keypad which displays frequency setting.<br>② The frequency setting is 20.00Hz   |

## 7-2 Basic parameters

| F1.00 | Digital frequency setting (Initial value: 0.00Hz) |                        |      |      |
|-------|---|------------------------|------|------|
|       | Setting range                                     | 0.00-Maximum frequency | Unit | 0.01 |

When F1.01 is set to 0, inverter works in Digital frequency setting mode. The frequency value is set by F1.00.

During running, you can change frequency by modifying the content of parameter F1.00 or by pressing “▲” key or “▼” key to change frequency. If you change frequency by modifying F1.00, when the inverter stops running or when power is off, the modified content can be remembered.

If you change frequency by pressing “▲” key or “▼” key, when the inverter stops running or power is off, the modified content will not be remembered; instead the original F1.00 will be remembered. When the inverter is started next time, it will operate at the original value of F1.00.

| F1.01 | Frequency setting selection |  | Initial value : 0 |   |
|-------|-----------------------------|--|-------------------|---|
|       | Setting range               | 0-5  | Unit              | 1 |
|       | Explanation                 | 0: Digital frequency setting (F1.00)<br>1: Analog voltage (0—10VDC)<br>2: Analog current (0—20mADC )<br>3. Setting dial (Operation panel)<br>4. UP/DOWN frequency setting<br>5: RS485 communication frequency setting<br>6: Analog combination |                   |   |

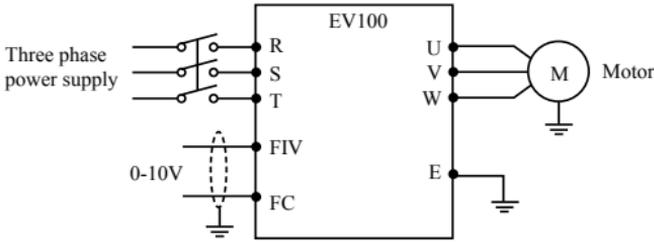
Frequency setting selection can be used to decide the output frequency of inverter.

#### 0: Digital frequency setting

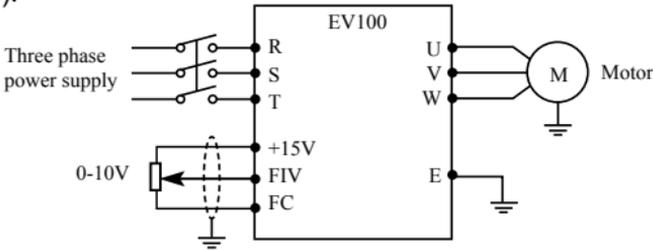
The output frequency of inverter is decided by F1.00. Generally speaking, you can change output frequency by pressing the “▲” or “▼” key on Keypad. Refer to F1.00 for details.

#### 1: Analog voltage mode (0~10VDC)

The output frequency of inverter is decided by external voltage signal (0-10V), which is put into inverter through FIV terminal. There are two modes of external voltage signal: one is setting signal ranging from 0 to 10V; the other is setting by potentiometer. Refer to the following diagram for connection method.



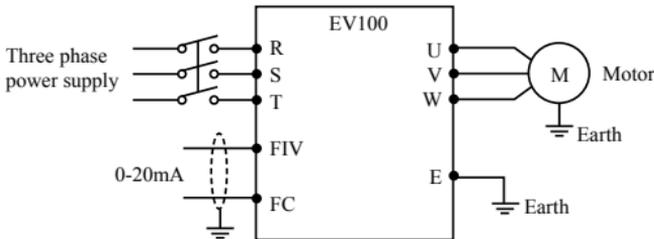
Explanation: control the output frequency through terminal FIV/ FC (0~10V).



Explanation: control output frequency of inverter by FIV voltage signal sent by external POT (10k Ω)

2: Analog current mode (0~20mA DC)

The output frequency of inverter is decided by external current signal (0-20mA). Control the output frequency of inverter by external terminal FIC.



3: Setting dial mode (Operation panel)

You can control the running of H3400 series inverter by the POT knob on Keypad.

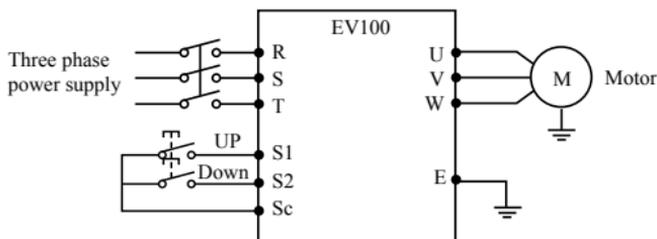
Pay attention to the POT knob in Keypad which enables you to switch between monitoring images.

Turn the : change the output frequency

Press the : switch the display

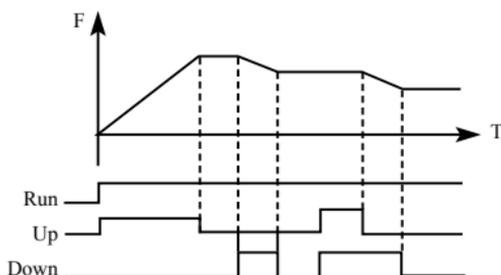
#### 4 UP/DOWN setting mode

The output frequency of inverter is controlled by external UP/DOWN terminals. External terminals can be selected from F3.15 to F3.22, been selected one of external terminals as UP/DOWN. When UP is valid, the frequency will go up. When DOWN is valid, the frequency will go down. When UP and DOWN are both valid, the frequency will remain the same.



Parameter: F3.17=15, S1 terminal will be set in UP mode.

F3.18=16, S2 terminal will be set in DOWN mode.



Explanation: when UP is valid (UP is closed), frequency will go up. When DOWN is valid (DOWN is closed), frequency will go down.

#### 6. Analog combination

1) Overlay function of analog:

F1.01 = 6, and F1.20 = 0, the set frequency = FIV set frequency + FIC set the frequency

2) Analog multiplication function:

F1.01 = 6, and F1.20 = 1, the set frequency = FIC main speed setting frequency (Hz) \* FIV compensation (%)

① FIC as the main speed setting frequency. FIC input 4.0 ~ 20.0mA (or 1 ~ 5V), you can set F3.03 = 0 to 0.0-20.0mA (or 0-5V). When

the input voltage is 0 ~ 10V, the input voltage received through the 250 ohm FIC, the FIC voltage into a 0 ~ 5V.

② FIV compensation input voltage 0 ~ 10V, the corresponding compensation amount for the F1.21 ~ F1.22.

For example: Suppose 0 ~ 5V FIC is the main speed setting corresponding frequencies were 10Hz ~ 50Hz, FIV 0 ~ 10V amount of compensation the amount of compensation is 50% ~ 150%, the output range is 10Hz\*50% ~ 50 Hz\*150%.

| F1.02 | Start signal selection |  | Initial value : 0 |   |
|-------|------------------------|--|-------------------|---|
|       | Setting range          | 0-2  | Unit              | 1 |
|       | Explanation            | 0: Operation panel (FWD/REV/STOP)<br>1: I/O terminal<br>2: Communication (RS485) |                   |   |

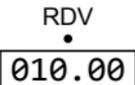
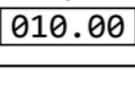
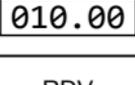
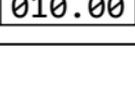
Start signal selection are used to set running signal source.

0: Operation panel (FWD/REV/STOP)

Operation panel gives the running signal. The running of inverter

can be controlled by the “” key (Forward) and “” (reverse)

key on the operation panel. Press “” key to stop running of inverter.

| Procedure | Press key   | Display  | Explanation   |
|-----------|---|--|---|
| 1         | Power ON  | RDV<br> | ① the set frequency is 10.0Hz   |
| 2         |  | RDV<br> | ① Inverter is in running mode.<br>② Inverter is in forward running mode.<br>③ The output frequency is 10.00Hz                   |
| 3         |  | RDV<br> | ① Inverter is in reverse running mode.<br>② Switch between forward and reverse of inverter<br>③ The output frequency is 10.00Hz |
| 4         |  | RDV<br> | ① Inverter stops running<br>② Inverter is in standby mode.  |

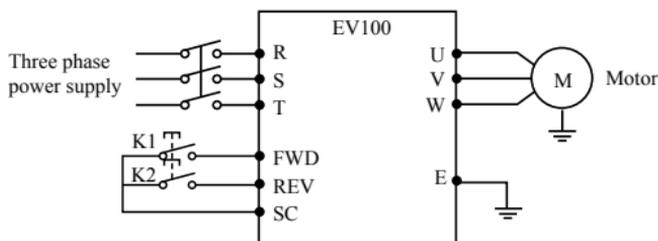
1: I/O terminal

In the initial setting, the forward/reverse rotation signals are used as start and stop signals. Turn on either of the forward and reverse rotation signals to start the motor in the corresponding direction. If both are turned off (or on) during operation, the inverter decelerates to a stop (or Keep the original running condition)

You can make two-wire type or three-wire type control mode by using I/O terminal

① Two-wire type

A two-wire type connection is shown below:



Parameter: F1.02=1    F3.15=6    F3.16=7

Operation Instruction of NT3000 Series Inverter

Actuating explanation:

| Input Status |     | Status of inverter                  |
|--------------|-----|-------------------------------------|
| K1           | K2  |                                     |
| ON           | OFF | Forward                             |
| OFF          | OFF | Stop                                |
| OFF          | ON  | Reverse                             |
| ON           | ON  | Keep the original running condition |

② Three-wire type

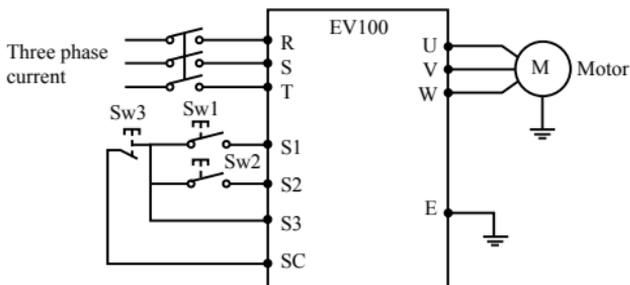
A three-wire type connection is shown below.

The start self-holding selection becomes valid when the STOP signal is turned on. In this case, the forward/reverse rotation signal functions only as a start signal.

If the start signal(S1/S2) is turned on and then off, the start signal is held and makes a start. When changing the direction of rotation,

turn S1(S2) on once and then off.

The stop the inverter, turning off the STOP signal once decelerates it to a stop.



Use S1, S2, or S3 as input terminal for external signal

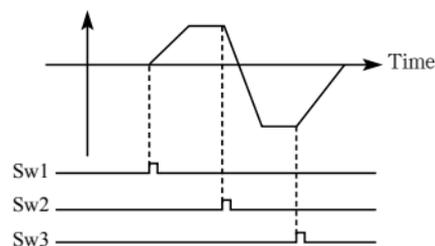
Parameter: F3.17=6 S1 is in forward

F3.18=7 S2 is in reverse

F3.19=9 S3 is in stop mode

F1.02=1 external terminal input

Output frequency



## 2: RS485 mode

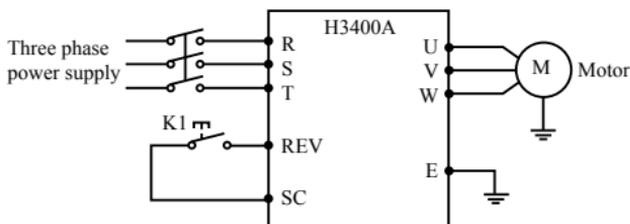
Inverter can receive command and exchange data with computer by serial communication.

|       |                                     |   |                  |   |
|-------|-------------------------------------|---|------------------|---|
| F1.03 | "stop" key lock operation selection |   | Initial value: 1 |   |
|       | Setting range                       | 0-1   | Unit             | 1 |
|       | Explanation                         | 0: "Stop"key lock mode invalid<br>1: "Stop" key lock mode valid |                  |   |

The "STOP" key operation of the operation panel can be made invalid to prevent unexpected stop.

Set "0" in F1.03, then press "ENTER" for 2s to make the "STOP" key operation invalid, and "STOP" key can not stop running of inverter

Set “1” in F1.03, then press “ENTER” for 2s to make the “STOP” key operation valid, and “STOP” key can stop running of inverter



| Procedure | Input                    | Explanation                    |
|-----------|--------------------------|--------------------------------|
| 1         | K1 close                 | Reverse of inverter is started |
| 2         | (K1 open) press stop key | Inverter stops                 |
| 3         | K1 open                  | Running signal is removed      |
| 4         | K1 close                 | Reverse of inverter is started |

| F1.04 | Reverse prevention setting |   | Initial value: 1 |   |
|-------|----------------------------|---|------------------|---|
|       | Setting range              | 0-1   | Unit             | 1 |
|       | Explanation                | 0: Reverse prohibited<br>1: Reverse allowed |                  |   |

Many devices only allow rotation in single direction. In this case, you can set the machine in single rotation mode by this parameter.

0: Reverse prohibited

Reverse of motor is prohibited. When F1.04 is set at reverse prohibited, switch between Forward and reverse is invalid.

1: Reverse allowed

Reverse of motor is enabled, switching between forward and reverse is valid.

| F1.05 | Max. frequency |                                  | Initial value: 50.00 |  |
|-------|----------------|----------------------------------|----------------------|--|
|       | Setting range  | Min. output frequency ~ 400.00Hz |                      |  |

The output frequency range of inverter is 0.1~400.00Hz. Therefore, inverter can drive the motor higher than 50/60Hz, which could cause mechanical damage or accident.

This parameter is to limit the inverter output frequency in order to

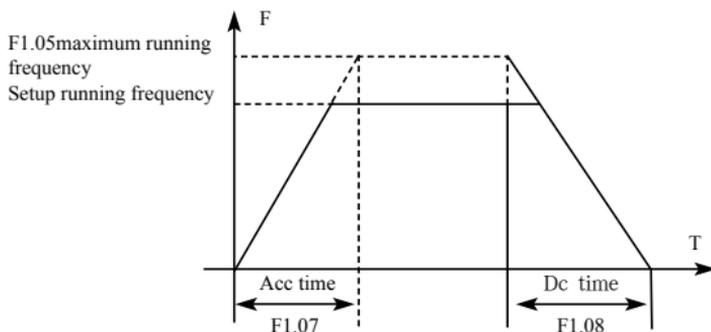
prevent motor operating at too higher speed.

|       |                |                       |  |
|-------|----------------|-----------------------|--|
| F1.06 | Min. frequency | Initial value: 0.00   |  |
|       | Setting range  | 0.00 ~ max. frequency |  |

This parameter is to set the minimum output frequency of the inverter. If the setting frequency is lower than the Min. frequency, inverter will output on the Min. frequency. In some application, this function could avoid motor overheating due to the low speed operation.

|       |               |                       |  |
|-------|---------------|-----------------------|--|
| F1.07 | Acc time      | Initial value: change |  |
| F1.08 | Dec time      | Initial value: change |  |
|       | Setting range | 0.1~6000.0s           |  |

Acc time refers to the time for inverter to reach the max. frequency from 0.00Hz. Dec time refers to the time for inverter to lower to 0.00Hz from max. frequency.



The Default Acc/Dec time is the primary Acc time/ Dec. time. Other Acc time or Dec time can be selected via external terminal.

|       |                           |   |           |
|-------|---------------------------|---|-----------|
| F1.09 | V/F maximum voltage       | Initial value: 380                          |           |
|       | Setting range             | V/F intermediate voltage~500.00             | Unit 0.01 |
| F1.10 | V/F fundamental frequency | Initial value: 50                           |           |
|       | Setting range             | V/F intermediate frequency ~ max. frequency | Unit 0.01 |
| F1.11 | V/F intermediate voltage  | Initial value: change                       |           |
|       | Setting range             | V/F minimum voltage ~ V/F maximum voltage   | Unit 0.1  |

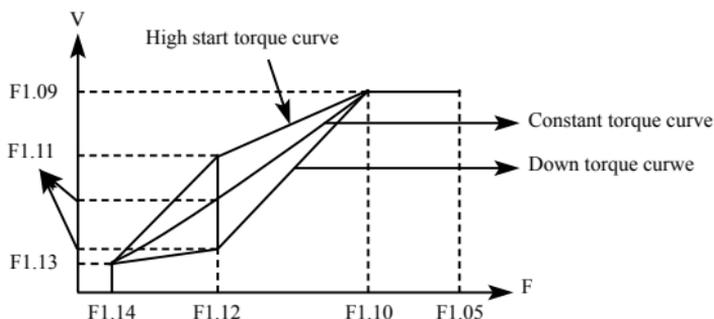
|       |                            |   |                     |
|-------|----------------------------|---|---------------------|
| F1.12 | V/F intermediate frequency |   | Initial value: 2.5  |
|       | Setting range              | V/F minimum frequency ~ V/F fundamental frequency | Unit 0.01           |
| F1.13 | V/F minimum voltage        |   | Initial value: 15   |
|       | Setting range              | 0.0 ~ V/F intermediate voltage                    | Unit 0.1            |
| F1.14 | V/F minimum frequency      |   | Initial value: 1.25 |
|       | Setting range              | 0.0 ~ V/F intermediate frequency                  | Unit 0.01           |

Parameters from F1.09 to F1.14 determine the V/F curve of inverter. Set corresponding V/F curves according to different loads.

Constant torque curve: application for constant torque load, output voltage and output frequency are in linear relation.

Down (variable) torque curve: application for variable torque load, like fan and pump. Load will increase with the increase of rotation speed.

High start torque curve: application for heavy load and load need high starting torque.



F1.09: V/F maximum voltage, V/F maximum voltage can be set according to the motor connected. Generally, it will be set at the rated voltage of motor. When motor is very near to inverter, usually within 30m, it should be set at a higher value.

F1.10: V/F fundamental frequency

V/F fundamental frequency, please set it at the running voltage frequency of motor. Generally, do not change V/F fundamental frequency setting; or else, it is very likely to damage motor.

F1.11: V/F intermediate voltage

Set V/F intermediate voltage according to the specific load. Improper setup can cause over current of motor or insufficient torque output, or even cause inverter protection. Increasing the value of F1.11 can increase output torque and output current. Please monitor output current while changing the value of F1.11. While changing the value of F1.11, adjust the value slowly until the necessary output torque is reached. Too higher setting may cause inverter protection or fault.

#### F1.12: V/F intermediate frequency

V/F intermediate frequency determines the intermediate point of V/F curve. Improper setup can cause insufficient torque or over current protection of inverter. Generally, do not change the setup value of this parameter while using.

#### F1.13: V/F minimum voltage

V/F minimum voltage setup is relevant to start torque to a certain extend. Increasing the value of this parameter properly can increase the torque of starting, it can also cause over current. Generally, it's not necessary to change the value of F1.13.

#### F1.14: V/F minimum frequency

V/F minimum frequency determines the initial point of V/F curve, it is the minimum value in V/F curve.

Please refer to the following table for the specific Default setting of each model:

| parameter<br>Model | F1.07 | F1.08 | F1.11 | F1.15 |
|--------------------|-------|-------|-------|-------|
| EV100-2S-0004-G    | 7     | 7     | 15    | 10    |
| EV100-2S-0007-G    | 8     | 8     | 14    | 10    |
| EV100-2S-0015-G    | 9     | 9     | 14    | 9     |
| EV100-2S-0022-G    | 10    | 10    | 13    | 9     |
| EV100-2S-0037-G    | 8     | 8     | 27    | 10    |
| EV100-4T-0007-G    | 9     | 9     | 26    | 9     |
| EV100-4T-0015-G    | 10    | 10    | 25    | 8     |

| Model \ parameter | F1.07 | F1.08 | F1.11 | F1.15 |
|-------------------|-------|-------|-------|-------|
| EV100-4T-0022-G   | 12    | 12    | 24    | 8     |
| EV100-4T-0037-G   | 15    | 15    | 23    | 7     |
| EV100-4T-0055-G   | 18    | 18    | 22    | 6     |
| EV100-4T-0075-G   | 20    | 20    | 22    | 5     |
| EV100-4T-0110-G   | 22    | 22    | 20    | 5     |
| EV100-4T-0150-G   | 28    | 28    | 20    | 4     |
| EV100-4T-0185-G   | 30    | 30    | 19    | 4     |
| EV100-4T-0220-G   | 35    | 35    | 18    | 4     |
| EV100-4T-0300-G   | 38    | 38    | 18    | 4     |
| EV100-4T-0370-G   | 40    | 40    | 17    | 4     |
| EV100-4T-0450-G   | 45    | 45    | 17    | 3     |
| EV100-4T-0550-G   | 50    | 50    | 16    | 3     |
| EV100-4T-0750-G   | 60    | 60    | 16    | 2     |
| EV100-4T-0900-G   | 80    | 80    | 15    | 2     |
| EV100-4T-1100-G   | 100   | 100   | 15    | 2     |

| F1.15 | Carrier frequency         | Factory Setting |
|-------|---------------------------|-----------------|
|       | Setting range 1-15 unit 1 |                 |

Carrier frequency decides the switching frequency of internal power module. The factory setting of inverters with different capacity are different because will affect motor noise, motor heating and disturbance.

| Carrier frequency F1.15 | Motor Noise | Motor Heating | Disturbance |
|-------------------------|-------------|---------------|-------------|
| Small → Big             | Big → Small | Small → Big   | Small → Big |

Therefore, when the environment demands running without noise, you shall increase the value of F1.15, the maximum load of inverter

will decrease. If motor is far from inverter, you shall lower the value of F1.15 so as to lower the leakage current between wires and wire to ground.

When the environment temperature or motor load is high, you shall lower the value of F1.15 to reduce the heating of the inverter. Refer to table in F1.14 for the factory set of F1.15.

|       |                              |                                 |                  |  |
|-------|------------------------------|---------------------------------|------------------|--|
| F1.17 | Initialization of parameters |                                 | Initial value: 0 |  |
|       | Setting range 0-8            | Unit: 1                         |                  |  |
|       | Explanation                  | 8: Initialization of parameters |                  |  |

When the parameter setup is not proper or when false running leads to improper setup of parameter, you can set F1.17 at 08 to restore all parameters to the Factory Setting, and then you can set them again according to actual need.

Attention: when locked up of parameters is valid, that is when F1.18=1, you cannot carry out initialization of parameters and change them. Please unlock first, and then set these parameters.

|       |                              |             |                  |  |
|-------|------------------------------|-------------|------------------|--|
| F1.18 | Initialization of parameters |             | Initial value: 0 |  |
|       | Setting range 0-1            | Unit: 1     |                  |  |
|       | Explanation                  | 0: Unlocked |                  |  |

1: Locked

You can lock the parameter by F1.18 to prevent unexpected change of the inverter setup.

When F1.18 is valid, all the other parameters except F1.00 (main frequency setting) cannot be changed.

### 7-3 Parameters of basic applications

|       |                      |     |   |                  |  |
|-------|----------------------|-----|---|------------------|--|
| F2.00 | Start mode selection |     |   | Initial value: 0 |  |
|       | Setting range        | 0-1 | Unit  | 1                |  |
|       | Explanation          |     | 0: Start at start frequency<br>1: Tracing start |                  |  |

There are two start modes for EV100 series inverter. You can

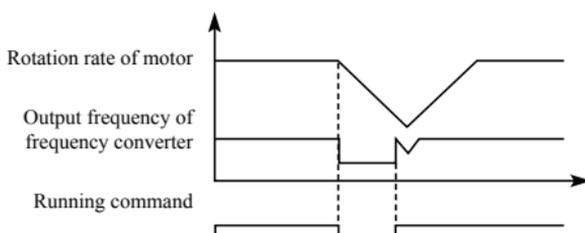
choose from the two by setup of parameter F2.00 and the condition of machinery.

0: Start at start frequency

Most loads do not have special requirement in start. Inverter output from the start frequency.

1: Tracing start

Tracing start is application for start after fault reset or instantaneous power failure. Using tracing start function, inverter can automatically detect the rotation speed and rotation direction of motor, the output the starting frequency and voltage accordingly.



Attention: when inverter starts in tracing start mode, inverter will have speed tracing in the sequence of high to low frequency.

High current is likely in start, it is also possible to cause current.

Therefore, you need to have over current level setup (4.09 setup).

The specific value depends on the load.

In addition, when the value of 4.09 is too low, it may lead to a long start time. If over current in the speed tracing, inverter will pause the speed tracing.

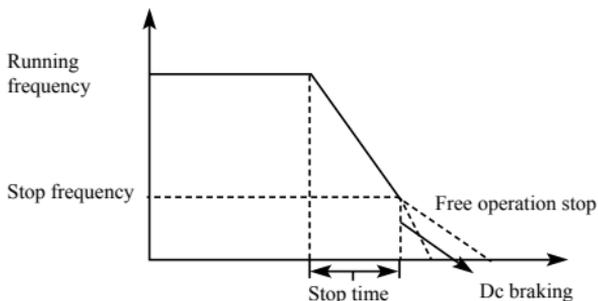
|       |                     |   |      |   |
|-------|---------------------|---|------|---|
| F2.01 | Stop mode selection | Initial value: 0                            |      |   |
|       | Setting range       | 0-1   | Unit | 1 |
|       | Explanation         | 0: Deceleration to stop<br>1: Coasting stop |      |   |

You can choose a suitable stop mode according to the actual load.

0: Deceleration to stop

Once inverter receives stop command, it will reduce the output frequency according to the deceleration time.

With regard to stop mode after stop frequency is reached, you can



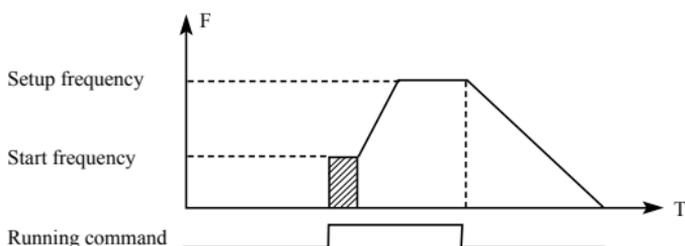
choose DC injection brake and other options. If you do not choose DC injection braking, it will stop in coasting stop mode.

### 1: Coasting stop

When inverter receives stop command, it will stop frequency output and it will have free running with load until it stops.

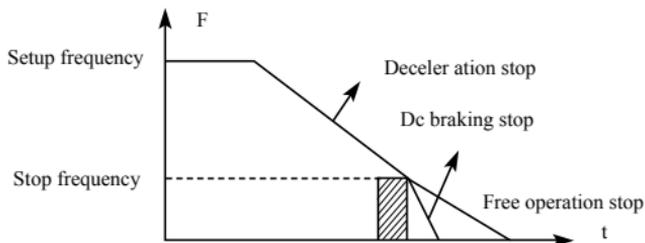
|       |                         |                    |      |      |
|-------|-------------------------|--------------------|------|------|
| F2.02 | Start frequency setting | Initial value: 0.5 |      |      |
|       | Setting range           | 0.10-10.00         | Unit | 0.01 |

Start frequency is the initial frequency when inverter starts. For device with heavy load or requires large starting torque, increasing start frequency can make start easier. However, if the start frequency is too high, it may cause over current protection.



|       |                        |                      |      |        |
|-------|------------------------|----------------------|------|--------|
| F2.03 | Stop frequency setting | Initial value: 0.5Hz |      |        |
|       | Setting range          | 0.10-10.00Hz         | Unit | 0.01Hz |

When inverter receives stop command, it reduce the output frequency until the stop frequency, then it will start coasting stop or DC injection brake stop according to the setting .

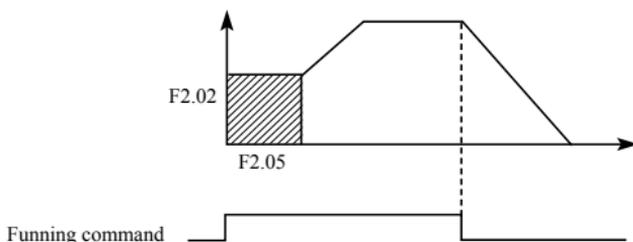


|       |                             |       |      |                    |  |
|-------|-----------------------------|-------|------|--------------------|--|
| F2.04 | Dc braking current in start |       |      | Initial value: 100 |  |
|       | Setting range               | 0-150 | Unit | 1                  |  |
| F2.05 | Dc braking time in start    |       |      | Initial value: 0   |  |
|       | Setting range               | 0-250 | Unit | 1                  |  |

Dc braking in start is application for fan in stop mode and moving load. Because before inverter starts, motor is in free running mode and the rotation direction is unknown. It is easy to cause over current protection in start. Therefore, before start, you shall use DC injection brake to stop the motor in advance.

Dc braking current in start is the ratio of rated current of inverter, adjusting F2.04 can have different braking torques. While setting value of parameter, you can adjust it from low to high until a sufficient braking torque is reached according to the actual load.

Dc braking time is the period DC injection brake lasts. When it is 0, DC injection brake is invalid.



|       |                            |       |      |                    |  |
|-------|----------------------------|-------|------|--------------------|--|
| F2.06 | Dc braking current in stop |       |      | Initial value: 100 |  |
|       | Setting range              | 0-150 | Unit | 1                  |  |
| F2.07 | Dc braking time in stop    |       |      | Initial value : 0  |  |
|       | Setting range              | 0-250 | Unit | 1                  |  |

Dc braking in stop is application for load which has requirement on braking.

Dc braking current in stop is the ratio of rated current of inverter.

Adjusting this parameter can have different braking torques.

Dc braking time in stop is the period DC injection brake mode lasts.

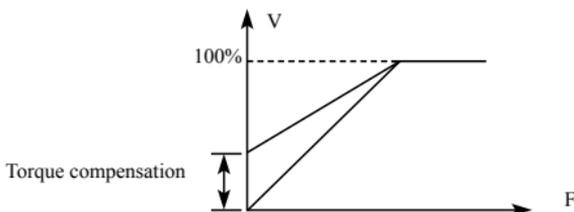
When it is 0, DC injection brake is invalid.

Refer to the explanations of F2.03, F2.04 and F2.05 for relevant details.

|       |               |         |      |                   |  |
|-------|---------------|---------|------|-------------------|--|
| F2.08 | Torque boost  |         |      | Initial value: 5% |  |
|       | Setting range | 0.1-20% | Unit | 0.1               |  |

Adjusting parameter F2.08 can increase voltage and obtain higher torque.

Attention: Too big setting may cause motor overheating. Increase the setting step by step until you get the requested starting torque.



|       |                                |          |      |                        |  |
|-------|--------------------------------|----------|------|------------------------|--|
| F2.09 | Rated motor voltage            |          |      | Initial value: 380.00V |  |
|       | Setting range                  | 0-500.00 | Unit | 0.01                   |  |
| F2.10 | Rated Motor current            |          |      | Initial value: *       |  |
|       | Setting range                  |          | Unit | 0.1                    |  |
| F2.11 | No load current ratio of motor |          |      | Initial value: 40      |  |
|       | Setting range                  | 0-100    | Unit | 1                      |  |
| F2.12 | Rated motor rotation speed     |          |      | Initial value: 1420    |  |
|       | Setting range                  | 0-6000   | Unit | 1                      |  |
| F2.13 | Number of motor poles          |          |      | Initial value: 4       |  |
|       | Setting range                  | 0-10     | Unit | 1                      |  |
| F2.14 | Rated motor slip               |          |      | Initial value: 2.5     |  |
|       | Setting range                  | 0-100    | Unit | 0.1                    |  |

Please set above parameters according to the motor rating.

#### F2.09 Rated voltage motor

Please set rated voltage of motor according to voltage value on motor nameplate.

#### F2.10 Rated motor current

Please set rated current of motor according to the current value on nameplate. If the running current exceeds the value of rated current, inverter will trip to protect the motor.

#### F2.11 No load current ratio of motor

The value of rated no load current of motor can affect slip compensation. Rated no load current is the percentage of motor current.

#### F2.12 Rated motor rotation speed

The value of parameter F1.12 is the rotation speed at 50Hz. It is related to rotation speed display. Generally, it shall be set according to the value on nameplate.

To display the actual rotation speed of motor, you can set parameter F2.12 at the actual rotation speed at 50Hz.

#### F2.13 Number of motor poles

Set the number of pole pairs of motor by adjusting this parameter according to the value on nameplate

#### F2.14 Rated motor slip

When inverter drives motor, slip will increase when load increase. Adjusting F2.14 can compensation the slip and make motor speed close to the synchronization speed.

|       |                          |             |      |                     |  |
|-------|--------------------------|-------------|------|---------------------|--|
| F2.15 | Rated motor frequency    |             |      | Initial value: 50Hz |  |
|       | Setting range            | 0.00-400.00 | Unit | 0.01                |  |
| F2.16 | Resistance of stator     |             |      | Initial value: 0    |  |
|       | Setting range            | 0-100.00    | Unit | 0.01                |  |
| F2.17 | Resistance of rotor      |             |      | Initial value: 0    |  |
|       | Setting range            | 0-100.00    | Unit | 0.01                |  |
| F2.18 | Self inductance of rotor |             |      | Initial value: 0    |  |
|       | Setting range            | 0-1.000     | Unit | 0.001               |  |

|       |                            |         |      |                  |  |
|-------|----------------------------|---------|------|------------------|--|
| F2.19 | Mutual inductance of rotor |         |      | Initial value: 0 |  |
|       | Setting range              | 0-1.000 | Unit | 0.001            |  |

The above parameters are parameters of motor.

#### F2.15 Rated frequency of motor

Please set rated frequency of motor according to motor nameplate.

#### F2.16 Resistance of stator

#### F2.17 Resistance of rotor

#### F2.18 Self inductance of rotor

#### F2.19 Mutual inductance of rotor

Set the above parameters according to the actual condition of motor.

### 7-4 Parameters for input and output application

|       |                           |                             |      |                     |  |
|-------|---------------------------|-----------------------------|------|---------------------|--|
| F3.00 | FIV minimum voltage input |                             |      | Initial value: 0    |  |
|       | Setting range             | 0~FIV maximum voltage input | Unit | 0.1                 |  |
| F3.01 | FIV maximum voltage input |                             |      | Initial value: 10.0 |  |
|       | Setting range             | FIV minimum voltage input~0 | Unit | 0.1                 |  |
| F3.02 | FIV input filter time     |                             |      | Initial value: 1.0  |  |
|       | Setting range             | 0-25.0                      | Unit | 1                   |  |

#### F3.00 FIV minimum voltage input

FIV minimum voltage input value is related to frequency of lowest analogue input. Voltage command below this value is deemed as invalid command.

#### F3.01 FIV maximum voltage input

FIV maximum voltage input value is related to frequency of highest analogue input. For voltage higher than this value, the machine will still operate at this value.

The value of F3.00 and that of F3.01 decide the range of input voltage.

#### F3.02 Input filter time

Value of input filter time decides the response speed of inverter to analogue change. With the increase of value of F3.02, the inverter

will get slower for responding to analogue change.

|       |                           |                                |      |                     |  |
|-------|---------------------------|--------------------------------|------|---------------------|--|
| F3.03 | FIC minimum current input |                                |      | Initial value: 0    |  |
|       | Setting range             | 0~FIC maximum current input    | Unit | 0.1                 |  |
| F3.04 | FIC maximum current input |                                |      | Initial value: 20.0 |  |
|       | Setting range             | FIC minimum current input-20.0 | Unit | 0.1                 |  |
| F3.05 | FIC input filter time     |                                |      | Initial value: 1.0  |  |
|       | Setting range             | 0-25.0                         | Unit | 0.1                 |  |

### F3.03: FIC minimum current input

FIC minimum current input is related to frequency of lowest analogue input. Inverter will deem current signal below value of F3.03 as invalid.

### F3.04: FIC maximum current input

FIC maximum current input is related to frequency of highest analogue input. For current command higher than value of F3.04, inverter will operate at the value.

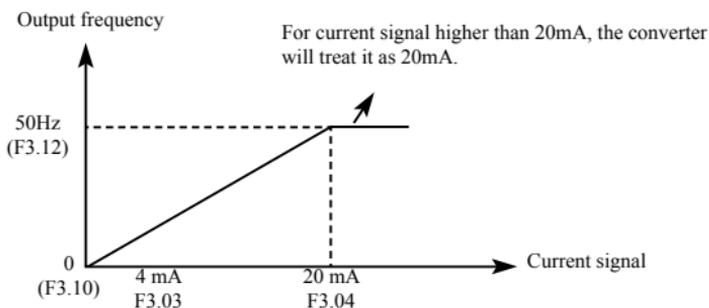
### F3.05: FIC input filter time

FIC input filter time decides how fast inverter responds to analogue change. With the increase of value of F3.05, inverter will respond more and more slowly to analogue change. The output of inverter will be relatively stable.

Refer to explanations of F3.00 to F3.02 for relevant parameters.

If the external input is voltage signal, refer to F3.00-F3.02. If the external input is current signal, refer to F3.03-F3.05.

For example, if the output signal of upper computer is 4-20mA, the corresponding frequency shall be within the range of 0-50Hz.



Parameters: F3.03=4 F3.04=20 F3.10= 0 F3.12= 50

|       |                            |                                 |      |                     |  |
|-------|----------------------------|---------------------------------|------|---------------------|--|
| F3.06 | FOV minimum voltage output |                                 |      | Initial value: 0    |  |
|       | Setting range              | 0-FOV maximum voltage output    | Unit | 0.1                 |  |
| F3.07 | FOV maximum voltage output |                                 |      | Initial value: 10.0 |  |
|       | Setting range              | FOV minimum voltage output-10.0 | Unit | 0.1                 |  |

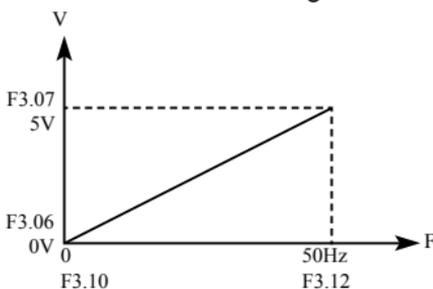
The value of F3.06 and that of F3.07 decide the range of output voltage of FOV terminal.

F3.06 FOV minimum voltage output is related to frequency of lowest analogue output.

F3.07 FOV maximum voltage output is related to frequency of highest analogue output. You can connect voltmeters of various measurement ranges by setting parameter F3.06 and F3.07.

For example, use a frequency meter with input voltage of 0-5V and measurement range of 0-50Hz to monitor the output frequency of inverter.

Then you need to set them like the following: F3.06-F3.07=5.



|       |                            |                                 |      |                     |  |
|-------|----------------------------|---------------------------------|------|---------------------|--|
| F3.08 | FOC minimum current output |                                 |      | Initial value: 0    |  |
|       | Setting range              | 0-FOC maximum current output    | Unit | 0.1                 |  |
| F3.09 | FOC maximum current output |                                 |      | Initial value: 20.0 |  |
|       | Setting range              | FOC minimum current output-20.0 | Unit | 0.1                 |  |

F3.08 and F3.09 decides the range of output current of FOC terminal. F3.08 and F3.09 correspond to frequency of lowest analogue output and frequency of highest analogue output respectively. Refer to explanations of F3.06 and F3.07 for relevant parameters.

|       |                            |   |      |                     |  |
|-------|----------------------------|---|------|---------------------|--|
| F3.10 | Frequency of low analog    |   |      | Initial value: 0.00 |  |
|       | Setting range              | 0.0-600.00  | Unit | 0.01                |  |
| F3.11 | Direction of of low analog |   |      | Initial value: 0    |  |
|       | Setting range              | 0-1   | Unit | 1                   |  |
|       | Explanation                | 0: Positive direction<br>1: Negative direction  |      |                     |  |
| F3.12 | Frequency of high analog   |   |      | Initial value: 50   |  |
|       | Setting range              | 0.00-600.00   | Unit | 0.01                |  |
| F3.13 | Direction of high analog   |   |      | Initial value: 0    |  |
|       | Setting range              | 0-1   | Unit | 1                   |  |
|       | Explanation                | 0: Positive direction<br>1: Negative direction  |      |                     |  |
| F3.14 | Analogue reverse options   |   |      | Initial value: 0    |  |
|       | Setting range              | 0-1   | Unit | 1                   |  |
|       | Explanation                | 0: No reverse at negative bias voltage<br>1: Reverse allowed at negative bias voltage |      |                     |  |

The parameter group of F3.10-F3.14 decides the running condition of analogue, including output frequency and direction. According to actual need of user, they can form various control curves.

#### F3.10 Frequency of low analog

Frequency of lower analogue decides the output frequency of lowest analogue input, corresponding to analogue minimum voltage (current) input.

#### F3.11 Direction of low analog

Direction of lower analogue decides the running condition at low frequency, whether it is Forward or reverse.

#### F3.12 Frequency of high analog

Analogue high-end frequency determines high-end output frequency, and is corresponding to analogue maximum voltage (current) input.

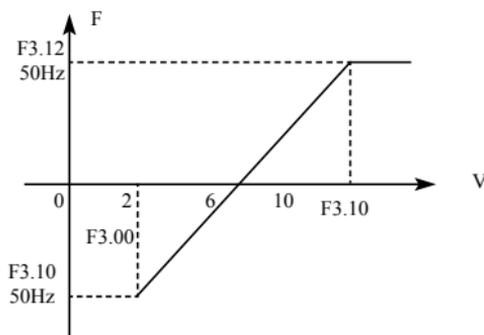
#### F3.13 Direction of high analog

Analogue high-end direction determines whether the running status of high-end frequency is forward or reverse.

### F3.14 Analog input reverse selection

Analogue reverse selection determines running status of analog negative bias voltage, satisfied curve needed by customer can be constituted by using above parameter.

Example 1: upper computer output 2-10 V signal to control inverter, 50Hz reverse to 50Hz forward running.



Introduction: F3.00=2 FIV minimum voltage input: 2V (inverter regards signals below 2V as invalid signals);

F3.01=10 FIV maximum voltage input: 10V (signals over 10V are regarded and handled as 10V);

F3.10=50 Analogue low-end frequency: 50Hz;

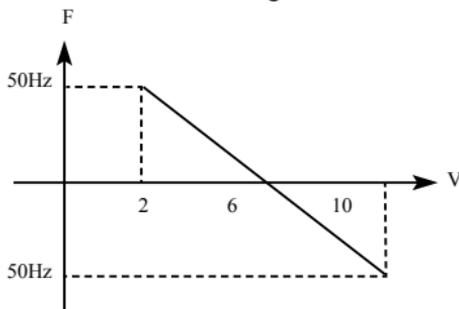
F3.11=1 Analogue low-end direction: 1 (reverse);

F3.12=50 Analogue high-end frequency: 50Hz;

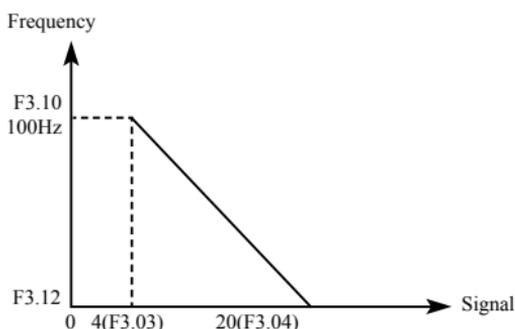
F3.13=0 Analogue high-end direction: 0 (Forward);

F3.14=1 Analogue reverse selection: 1 (negative bias voltage can be reversed).

Attention: In various curves, switching instructions of forward and reverse remain effective, when forward and reverse are switched, the curve will be reversed, and the diagram of curve is as follows:



Example 2, upper computer output 4-20mA, and controls running of inverter Output frequency is 100Hz-0Hz



Parameter: F3.3=4 FIC minimum current input

F3.04=20 FIC maximum current input

F3.10=100.00 analogue low-end frequency

F3.11=0 analogue low-end direction (Forward)

F3.12=0 analogue high-end frequency

F3.14=0 analogue high-end direction (Forward)

Special inverted curve can be constituted by using F3.10-F3.14.

Introduction: signal input below 4mA is regarded as invalid signal by inverter.

|       |   |   |  |   |
|-------|---|---|--|---|
| F3.15 | Multifunction input terminal---FWD terminal | Default value 6   |  |   |
| F3.16 | Multifunction input terminal---REV terminal | Default value 7   |  |   |
| F3.17 | Multifunction input terminal---S1 terminal  | Default value 1   |  |   |
| F3.18 | Multifunction input terminal---S2 terminal  | Default value 18  |  |   |
| F3.19 | Multifunction input terminal---S3 terminal  | Default value 15  |  |   |
| F3.20 | Multifunction input terminal---S4 terminal  | Default value 16  |  |   |
| F3.21 | Multifunction input terminal---S5 terminal  | Default value 8   |  |   |
| F3.22 | Multifunction input terminal---S6 terminal  | Default value 9   |  |   |
|       | Range                                       | 0-32  | Unit   | 1 |
|       | Settings                                    | 0: Invalid<br>2: Jog Forward<br>4: Forward/ reverse<br>6: Forward | 1: Jog<br>3: Jog reverse<br>5: Running<br>7: Reverse |   |

|  |          |  |
|--|----------|--|
|  | Settings | <p>8: Stop<br/>           9: Multi-speed selection 1<br/>           10: Multi-speed selection 2<br/>           11: Multi-speed selection 3<br/>           12: Multi-speed selection 4<br/>           13: Acceleration/ deceleration selection 1<br/>           14: Acceleration/ deceleration selection 2<br/>           15: Frequency increasing signal Up<br/>           16: Frequency decreasing signal Down<br/>           17: Coasting stop<br/>           18: Fault reset<br/>           19: PID function enable<br/>           20: PLC function enable<br/>           21: Timer 1 start up<br/>           22: Timer 2 start up<br/>           23: Counter pulse input<br/>           24: Counter reset<br/>           25: PLC memory clear<br/>           26: Winding operation start</p> |
|--|----------|--|

0: Invalid

Set as empty terminal, no function

1: Jog

Set as JOG (inching), usually used in trial running, common inching is operated by 5Hz,

2: Jog Forward

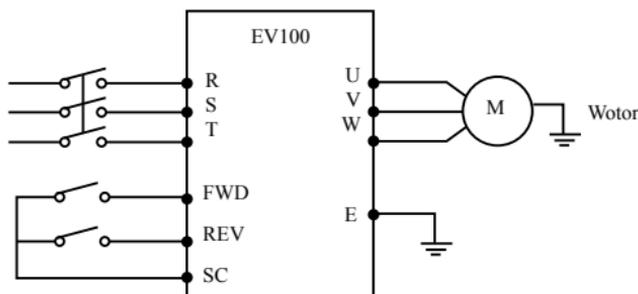
Set as JOG forward.

3: Jog reverse

Set as JOG reverse.

4: Forward/ reverse

Set as forward/ reverse switching, when the terminal is defined to be valid, running status reverse.



Parameter: F1.02=1, F3.15=6, F3.16=4

| Terminal status |     | Running condition |
|-----------------|-----|-------------------|
| FWD             | REV |                   |
| ON              | OFF | Forward           |
| ON              | ON  | Reverse           |
| OFF             | OFF | Stop              |

**5: Running**

Set terminal as running signal.

**6: Forward**

When terminal is valid, motor run forward.

**7: Reverse**

When terminal is valid, motor run reverse.

**8: Stop**

When terminal is valid, motor run reverse.

**9: Multi-speed 1**
**10: Multi-speed 2**
**11: Multi-speed 3**
**12: Multi-speed 4**

15-speed can be selected by terminal multi-speed 1, 2, 3 and 4 as below table:

| Multi-function terminal |               |               |               | Status and explanation   |
|-------------------------|---------------|---------------|---------------|--|
| Multi-speed 1           | Multi-speed 2 | Multi-speed 3 | Multi-speed 4 |  |
| 0                       | 0             | 0             | 0             | Primary frequency, Primary frequency is determined by F1.00 or potentiometer |
| 1                       | 0             | 0             | 0             | Multi-speed 1 (F5.03)  |
| 0                       | 1             | 0             | 0             | Multi-speed 2 (F5.04)  |
| 1                       | 1             | 0             | 0             | Multi-speed 3(F5.05)   |
| 0                       | 0             | 1             | 0             | Multi-speed 4 (F5.06)  |
| 1                       | 0             | 1             | 0             | Multi-speed 5 (F5.07)  |
| 0                       | 1             | 1             | 0             | Multi-speed 6 (F5.08)  |
| 1                       | 1             | 1             | 0             | Multispeed 7(F5.09)  |

| Multi-function terminal |               |               |               | Status and explanation |
|-------------------------|---------------|---------------|---------------|------------------------|
| Multi-speed 1           | Multi-speed 2 | Multi-speed 3 | Multi-speed 4 |                        |
| 0                       | 0             | 0             | 1             | Multi-speed 8 (F5.10)  |
| 1                       | 0             | 0             | 1             | Multi-speed 9 (F5.11)  |
| 0                       | 1             | 0             | 1             | Multi-speed 10 (F5.12) |
| 1                       | 1             | 0             | 1             | Multi-speed 11 (F5.13) |
| 0                       | 0             | 1             | 1             | Multi-speed 12 (F5.14) |
| 1                       | 0             | 1             | 1             | Multi-speed 13 (F5.15) |
| 0                       | 1             | 1             | 1             | Multi-speed 14 (F5.16) |
| 1                       | 1             | 1             | 1             | Multi-speed 15 (F5.17) |

Remarks: 0: terminal invalid 1: terminal invalid

13: acceleration/ deceleration selection 1

14: acceleration/ deceleration selection 2

4 kinds of acceleration/ deceleration times can be selected by acceleration/ deceleration selection terminal 1and 2.

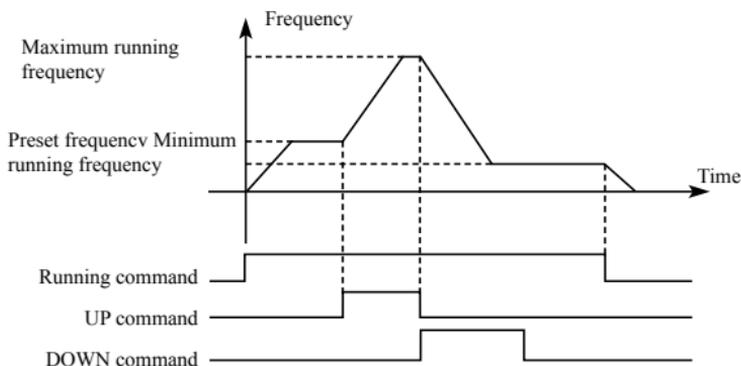
| Multi-function terminal                |  | Acceleration/ deceleration status and result     |
|--|--|--|
| Acceleration/ deceleration selection 1 | Acceleration/ deceleration selection 2 |  |
| 0                                      | 0                                      | Acceleration/ deceleration time 1 (F1.07, F1.08) |
| 1                                      | 0                                      | Acceleration/ deceleration time 2 (F4.01, F4.02) |
| 0                                      | 1                                      | Acceleration/ deceleration time 3 (F4.03, F4.04) |
| 1                                      | 1                                      | Acceleration/ deceleration time 4 (F4.05, F4.06) |

15. Frequency increasing signal (Up signal)

When this terminal is valid, the frequency increases at a constant speed, until operative frequency is highest.

16. Frequency decreasing signal (Down signal)

When this terminal is valid, the frequency decreases at a constant speed, until operative frequency is lowest.



Attention: Inverter will not memorize the frequency setting changed by “UP” and “DOWN” signal. When power is turned off and reset again, inverter still memorizes the set value in F1.00.

### 17: Coasting stop

When this terminal is valid, inverter coasting to stop.

### 18. Fault reset

Reset the inverter when alarm occurs, this terminal function is same to that of the RESET key on the Keypad.

### 19. PID function enable

When this contact closes, PID function is enabled. When F6.01 is set as 2, PID is invalid when this contact is disconnected.

### 20. PLC function enable

When this contact closes, PLC function starts up, and corresponding PLC function opens.

### 21. Timer 1 starts up

### 22. Timer 2 starts up

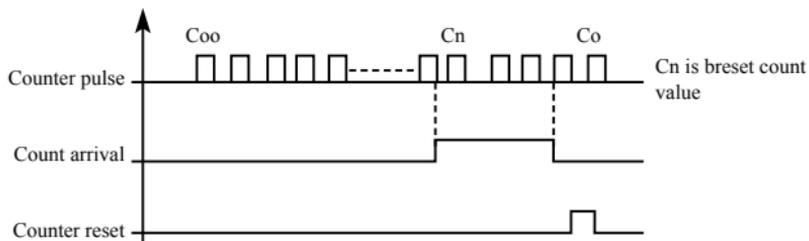
When this contact closes, timer starts up and begins timing, when the timer reaches set value, corresponding multifunction output contacting action.

### 23. Counter pulse input

This terminal may accept pulse signals of no more than 250 Hz.

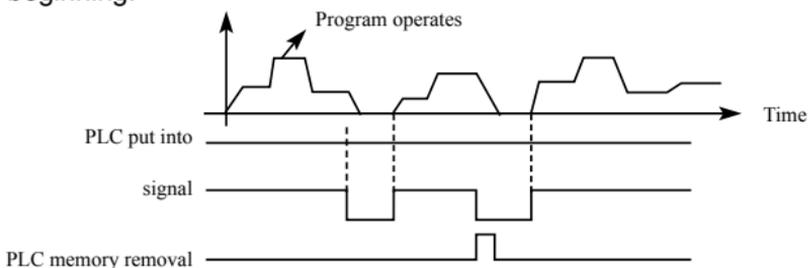
### 24. Counter resetting

The counted values may be reset and cleared through this terminal.



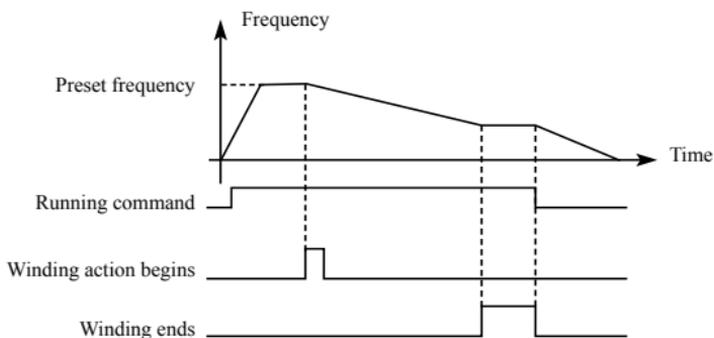
### 25. PLC memory removal

In the running process of PLC program, owing to fault or stopping, inverter will record status of the program automatically, after the fault is cured and the inverter is switched on again, the inverter will continue running according to the program, when memory removal is valid, program may be reset, and inverter operates from the beginning.



### 26. Winding function enable

When this signal is valid, winding function is enabled.



Introduction:

- ① Winding function is activated, and winding begins;
- ② Winding operation complete, inverter output according to the

frequency that winding is completed. The multifunction terminal output the winding complete signal;

③ Inverter stops, the winding complete signal reset.

|       |                            |   |      |   |
|-------|----------------------------|---|------|---|
| F3.23 | Output terminal M01        | Default value 01  |      |   |
| F3.24 | Output terminal M02        | Default value 02  |      |   |
| F3.25 | Output terminal YA, YB, YC | Default value 03  |      |   |
|       | Range                      | 0-32  | Unit | 1 |
|       | Setting                    | 0: Invalid<br>1: In running<br>2: Frequency reached<br>3: In fault<br>4: Zero-speed<br>5: Frequency 1 reached<br>6: Frequency 2 reached<br>7: Accelerating<br>8: Decelerating<br>9: Under voltage<br>10: Timer 1 reached<br>11: Timer 2 reached<br>12: Indication for completion of phase<br>13: Indication for completion of procedure<br>14: PID upper limit<br>15: PID lower limit<br>16: 4-20mA cable open<br>17: Overload<br>18: Over torque<br>26: Winding function complete<br>27: Counter reached<br>28: Intermediate counter reached |      |   |

0: Invalid

Set as invalid terminal, prevent false operation.

1. In running

Terminal is defined to be in running, when inverter is output, this terminal is ON.

2. Frequency reached

When frequency arrives at setting value, this contact is ON

3. In fault

When inverter detects abnormal existing, this contact is ON.

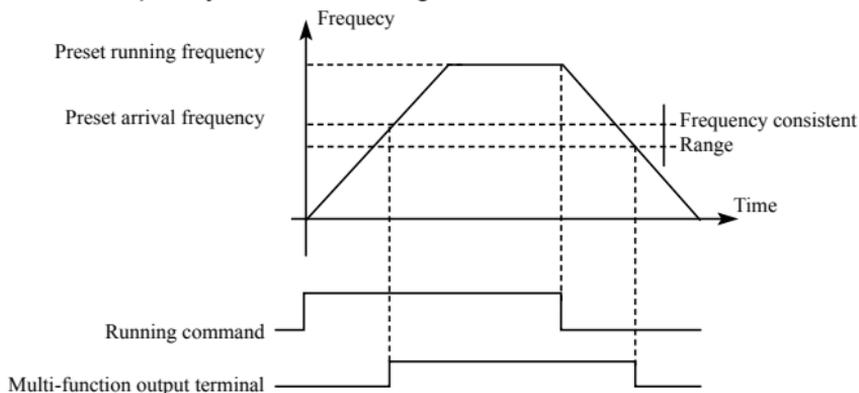
4. Zero-speed

When frequency output by inverter is less than start-up frequency, this contact is ON.

5. Frequency 1 reached

6. frequency 2 reached

When frequency arrives at setting value, this contact is ON.

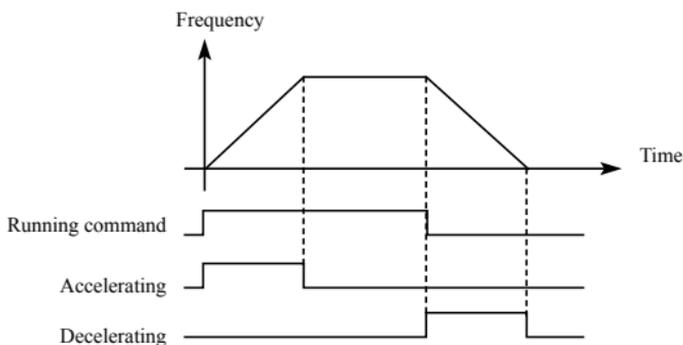


7: Accelerating

When inverter is in the status of accelerating, this contact is ON.

8: Decelerating

When inverter is in the status of decelerating, this contact is ON.



9. Under voltage alarming

When inverter detects that DC bus voltage is lower than setting value, this contact is ON and alarm. Under voltage alarming setting value can be changed through advanced application parameter group.

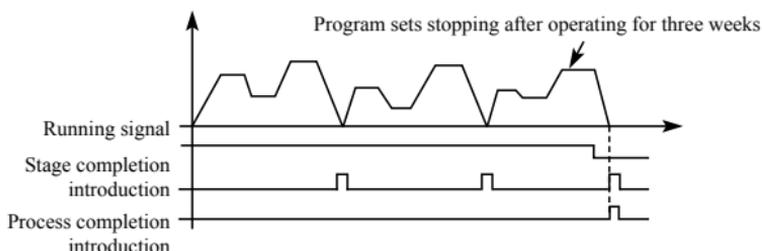
10: Timer 1 reached

11: Timer 2 reached

When inverter arrives at setting value, this contact is ON, when timer start-up signal is removed, this contact is reset.

### 12: Stage completion indication

In the PLC operation mode, inverter output this pulse signal when inverter finished a section of program.



### 13. Process completion indication

In the PLC operation mode, inverter output this pulse signal when inverter finished the entire program.

### 14. PID upper limit

When PID feedback quantity exceeds setting value of upper limit, this contact is ON.

### 15: PID lower limit

When PID feedback quantity is lower than setting value, this contact is ON.

### 16: 4-20mA cable open

When FIC input signal is disconnected, this contact is ON and alarms.

### 17: Overload detection

When inverter detects that motor overloads, this contact is ON.

### 18: Over torque detection

When inverter detects over torque, this contact is ON.

### 26: Winding function complete

When winding function is complete, this contact is ON. When inverter stops, this contact is reset.

### 27: Set counter reached

When inverter implements external counter, and when count value arrives at setting value (F4.25), this contact is ON.

### 28: Middle counter reached

When inverter counts, if count value arrives at setting value (F4.26), this contact is ON.

|       |                     |   |      |                 |  |
|-------|---------------------|---|------|-----------------|--|
| F3.26 | Output terminal FOV |   |      | Default value 0 |  |
|       | Setting range       | 0-7   | Unit | 1               |  |
| F3.27 | Output terminal FOC |   |      | Default value 1 |  |
|       | Setting             | 0: Output frequency<br>1: Output current<br>2: Direct voltage<br>3: Alternating voltage |      |                 |  |

### F3.26 output terminal FOV

FOV terminal may output 0-10V voltage, output may be setting in range of 0-10V through F3.06 and F3.07 and being corresponding to output frequency, output current, direct voltage, alternating voltage and so on.

### F3.27 output terminal FOC

FOC terminal may output 0-20m current, output range may be setting by F3.08 and F3.09 and being corresponding to output frequency, output current, direct voltage, alternating voltage and so on.

0: Output frequency:

Current (voltage) output is corresponding to Min. output frequency~max. frequency.

1: Output current

Current (voltage) output is corresponding to 0~2×inverter rated current.

2: Direct voltage

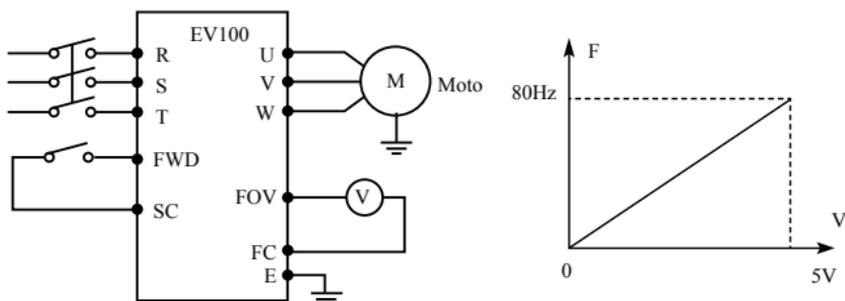
Current (voltage) output is corresponding to 0~1000V.

3: Alternating voltage

Current (voltage) output is corresponding to 0~510V.

For example: select a frequency meter of 0~5V, supervise output frequency, setting the Min. output frequency of inverter as 0.00Hz, the highest output frequency is 80Hz.

Then:



Parameter: F1.05=80.00 Max. frequency

F1.06=0.00 Min. output frequency

F3.06=0.00 FOV minimum voltage output

F3.07=5.00 FOV maximum voltage output

## 7-5 Secondary application group

|       |                       |                       |      |                    |
|-------|-----------------------|-----------------------|------|--------------------|
| F4.00 | Jog frequency setting |                       |      | Default value 5.00 |
|       | Range                 | 0.00---max. frequency | Unit | 0.01               |

Jog frequency setting is usually applied to trial run. This function can only be through external terminal.

When JOG function is achieved, other instruction is invalid. When JOG signal is open, inverter decelerate to stop, JOG acceleration/ deceleration time is set in the 4th acceleration/ deceleration parameter.

Control priority level:

Jog → external multi-speed → PLC operation means → PID means → triangle wave (traverse function) → winding → frequency conversion setting means.

|       |                     |                    |
|-------|---------------------|--------------------|
| F4.01 | Acceleration time 2 | Default value 10.0 |
| F4.02 | Decelerate time 2   | Default value 10.0 |
| F4.03 | Acceleration time 3 | Default value 20.0 |
| F4.04 | Decelerate time 3   | Default value 20.0 |
| F4.05 | Acceleration time 4 | Default value 2.0  |

|       |                   |           |                   |     |
|-------|-------------------|-----------|-------------------|-----|
| F4.06 | Decelerate time 4 |           | Default value 2.0 |     |
|       | Range             | 0-6000.0s | Unit              | 0.1 |

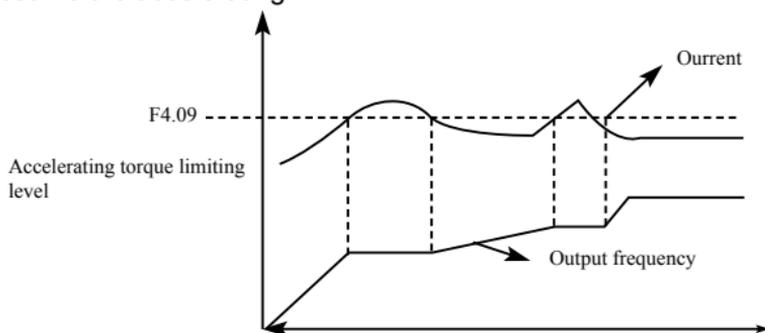
EV100 series inverters can set 4 acceleration/ deceleration time. For normal operation, the default selection is the acceleration/ deceleration time 1. For JOG operation, the default selection is acceleration/ deceleration time 4.

|       |                          |        |                   |   |
|-------|--------------------------|--------|-------------------|---|
| F4.07 | Setting value of counter |        | Default value 100 |   |
| F4.08 | Middle value of counter  |        | Default value 50  |   |
|       | Range                    | 0-6500 | unit              | 1 |

EV100 series inverter designs 2 groups of counters, pulse signal less than 250Hz can be accepted through multi-function terminal, when count value reaches setting value, corresponding multi-function output terminal is ON, input terminal of counter resets signal through counter, counter resets and begins counting again.

|       |                                    |       |                   |   |
|-------|------------------------------------|-------|-------------------|---|
| F4.09 | Acceleration torque limiting level |       | Default value 150 |   |
|       | Range                              | 0-200 | Unit              | 1 |

Parameter F4.09 is the torque limit level during acceleration. When output current reaches the setting value, inverter will stop accelerating, and when current is below the set value, inverter resume the accelerating.

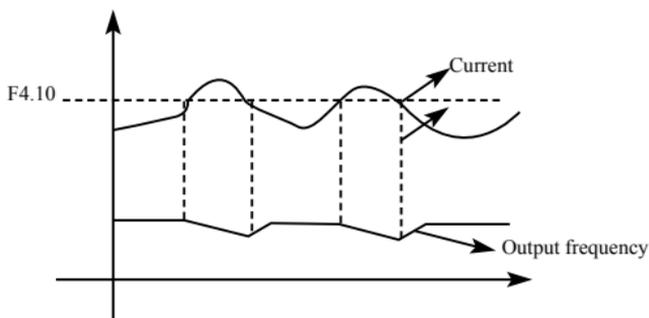


100% current is the rated current of inverter, when F4.09 is set to be 0, then accelerating torque limit is invalid, and it does not have

protecting function.

|       |                                      |       |                  |   |
|-------|--------------------------------------|-------|------------------|---|
| F4.10 | Constant-speed torque limiting level |       | Default value 00 |   |
|       | Range                                | 0-200 | Unit             | 1 |

Parameter F4.09 is the torque limit level during constant speed. When output current reaches the setting value, inverter automatically reduce the output frequency in order to reduce the load. When the output current drops, inverter increase output frequency to the setting (100% current is rated current of inverter). When F4.10 is set to be 0, constant-speed torque limiting level is invalid and cannot protect.



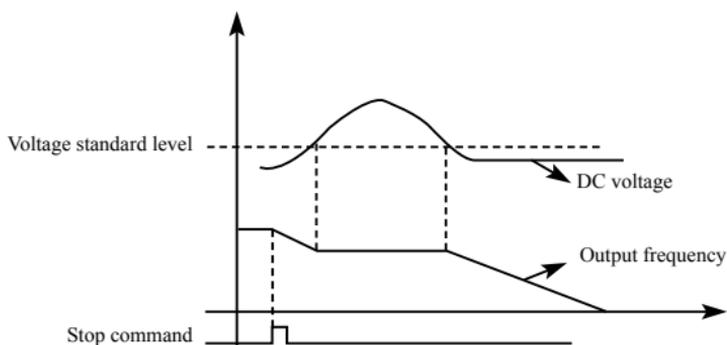
|       |  |                      |                 |  |
|-------|--|----------------------|-----------------|--|
| F4.11 | Deceleration over-voltage prevention selection |                      | Default value 1 |  |
|       | Range  | 0-1                  | Unit            |  |
|       | Settings                                       | 0:Invalid    1:Valid |                 |  |

0: Invalid

During deceleration, the DC-bus voltage may increase, when over-voltage prevention selection is invalid, inverter may trip for over voltage.

1: Valid

During deceleration, when DC-bus voltage reaches the setting value, inverter will stop the deceleration procedure. When DC-bus voltage returns to allowable value, inverter will resume the deceleration.



|       |  |  |                 |   |
|-------|--|--|-----------------|---|
| F4.12 | Automatic voltage regulation selection |  | Default value 1 |   |
|       | Range                                  | 0-2  | Unit            | 1 |
|       | Settings                               | 0: Invalid<br>1: Valid<br>2: Invalid when decelerating |                 |   |

If the input voltage is not stable, temperature of the machinery will increase, insulation may be damaged, and output torque will be instable.

0: Invalid

Select automatic voltage regulation to be invalid, inverter output voltage fluctuates.

1: Automatic voltage regulation is valid.

Automatic voltage regulation function is selected, and under the condition that input electric source is instable, inverter output stable voltage automatically.

2: Invalid when decelerating: when this function is selected, braking function of inverter can be strengthened.

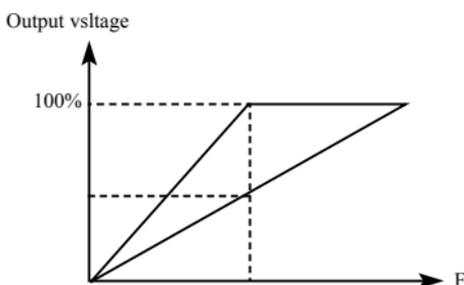
|       |  |  |                   |   |
|-------|--|--|-------------------|---|
| F4.13 | Automatic energy-saving selection                                |  | Default value 0.0 |   |
|       | Range  | 0-100  | Unit              | 1 |
| F4.14 | DC Braking voltage Default value:650V for H3400 / 375V for H3200 |  |                   |   |
|       | Range  | H3400 series: 650V~800V<br>H3200 series: 360V~400V | Unit              | 1 |

|       |              |                   |      |   |
|-------|--------------|-------------------|------|---|
| F4.15 | Braking duty | Default value: 50 |      |   |
|       | Range        | 40-100            | Unit | 1 |

### F4.13 Automatic energy-saving selection

In constant-speed running of automatic energy-saving selection, best voltage value may be calculated by loading condition and provided to load, in order to achieve best energy-saving.

Attention: for running that load changes frequently or is almost at full load, this function is not suitable.

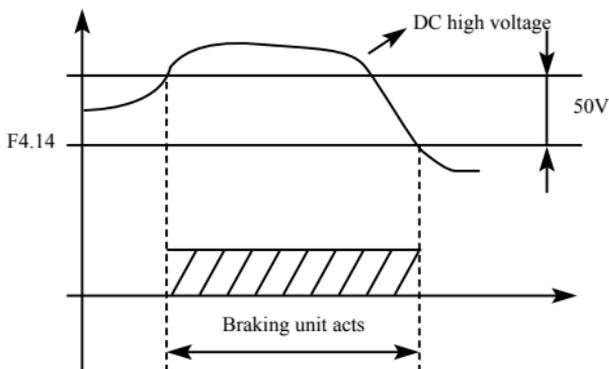


F4.14 and F4.15 are only useful for inverter with built-in braking units, and are invalid for inverter with external braking units.

The two parameters adjust internal DC braking voltage level and braking ratio of inverter.

### F.414 DC Braking voltage

When inverter DC high voltage is higher than set value of F4.14, built-in braking unit is ON. Energy is released through braking resistor, then DC voltage falls back, when DC voltage falls to a certain value, built-in braking unit stop.



If F4.14 is too high, DC voltage may be too high and may cause inverter protection.

If F4.14 is too low, braking resistor maybe too hot.

### F4.15 Braking duty

This parameter decides the working duty of the braking resistor.

Higher duty needs high power of braking resistor.

|       |                                 |  |                 |   |
|-------|---------------------------------|--|-----------------|---|
| F4.16 | Restart after instant power off |  | Default value 0 |   |
|       | Range                           | 0-1  | Unit            | 1 |
|       | Settings                        | 0: Invalid: no restart after instant power failure<br>1: Valid: frequency tracing start-up |                 |   |

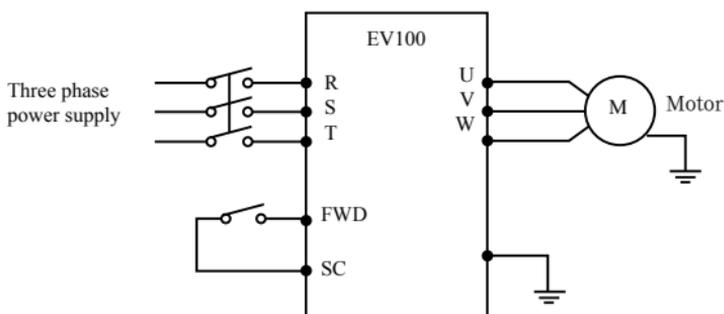
#### 0: Invalid

Inverter clears the running command after power failure. After power is recovered, inverter will not start automatically.

#### 1: Frequency tracing enable

When power is shut-off in short time, inverter keeps the running command as effective. When power is recovered in time, inverter will tracing the motor speed and resume output.

Attention: when instant power failure restarting is enabled, inverter may start the motor automatically. Please take care of the safety when use this function.



Example:

Use K1 (FWD), control running of inverter.

K1 closes, frequency conversion operates, when K1 is cut off, inverter stops. When power is shut off and K1 remains closed, if power is on, inverter starts up suddenly and it may be very

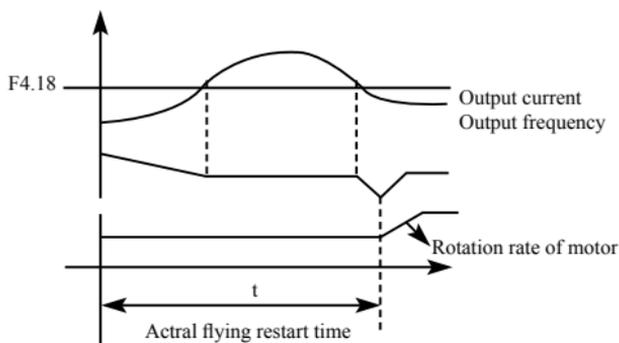
dangerous. Please use other control methods, such as three-wire system connection method.

|       |                             |        |                   |     |
|-------|-----------------------------|--------|-------------------|-----|
| F4.17 | Allowable time of power off |        | Default value 5.0 |     |
|       | Range                       | 0-10.0 | unit              | 0.1 |

F4.17 sets allowable time of power failure, if time of power failure exceeds set value, power failure restart is invalid.

|       |                                      |       |                   |   |
|-------|--------------------------------------|-------|-------------------|---|
| F4.18 | Flank restart current limiting level |       | Default value 150 |   |
|       | Range                                | 0-200 | Unit              | 1 |

When inverter implements flying restart, inverter tracing downwards from setting frequency by highest speed, output current of inverter increases relatively rapid and may exceeds protection unit setting by inverter, at this time, inverter stops tracing, and output current of inverter falls back to common, inverter continues tracing, setting value 100% of this parameter is rated current of inverter, and protection unit when inverter searching may be set through F4.18.



|       |                    |      |                 |  |
|-------|--------------------|------|-----------------|--|
| F4.19 | Flank restart time |      | Default value 5 |  |
|       | Range              | 0-10 | Unit            |  |

When inverter enabled the flying restart function, inverter tracing motor speed downwards within the setting time. If it is not completed within setting time, inverter protects.

In above example, when  $t$  value  $>$  F4.19 setting value, inverter protects.

|       |                                    |       |      |                 |  |
|-------|------------------------------------|-------|------|-----------------|--|
| F4.20 | Fault restart times                |       |      | Default value 0 |  |
|       | Range                              | 0-5   | Unit | 1               |  |
| F4.21 | Delay time for restart after fault |       |      | Default value 2 |  |
|       | Range                              | 0-100 | Unit | 1               |  |

After alarm (such as current, over-voltage and so on) occurs, inverter resets automatically (valid when non-zero as set by F4.20), after the period of time set by F4.21, inverter starts up according to setting start-up means (F2.00).

After start-up, if no alarm happens within 60 seconds, inverter resets F4.20 automatically, after start-up,

If alarm happens again within 60 seconds, inverter records number of alarms, and when number of alarms reaches set value of F4.20, inverter stops output.

Attention: If F4.20=0, fault restart is invalid.

When fault restart function is valid, motor may start suddenly, so when this function is used, please pay attention to safety.

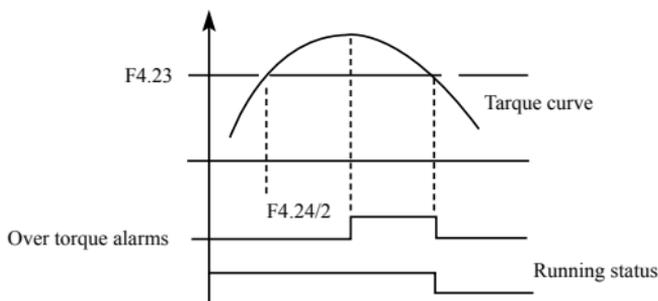
|       |                    |  |      |           |  |
|-------|--------------------|--|------|-----------|--|
| F4.22 | Over torque action |  |      | Default 0 |  |
|       | Range              | 0-3  | unit | 1         |  |
|       | Settings           | 0: Inverter start detecting over torque only in constant speed, inverter continues operation during over torque<br>1: Inverter start detecting over torque only in constant speed, inverter stop during over torque<br>2: Inverter always detecting over torque, inverter continues operation during over torque<br>3: Inverter always detecting over torque, inverter stop during over torque |      |           |  |

|       |                             |        |         |           |  |
|-------|-----------------------------|--------|---------|-----------|--|
| F4.23 | Over torque detection level |        |         | Default 0 |  |
|       | Range                       | 0-200% | Minimum | 1         |  |
| F4.24 | Over torque detection time  |        |         | Default 0 |  |
|       | Range                       | 0-200s | Minimum | 1         |  |

When output current of inverter exceeds setting value of F4.23, inverter start calculate the over torque time. When the duration exceeds half

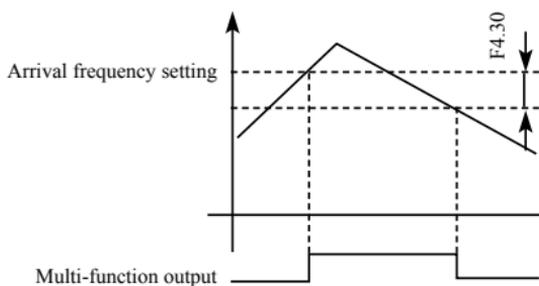
of setting value of F4.24, inverter output pre-alarm signal. Inverter continues output until the over torque time exceeds F4.24 setting, and then inverter protects and output alarm signal.

If F4.23=0, over torque detection is invalid, and 100% is inverter rated current.



|       |                      |                   |      |                   |  |
|-------|----------------------|-------------------|------|-------------------|--|
| F4.25 | Reaching frequency 1 |                   |      | Default value 100 |  |
|       | Range                | 0-Max. frequency  | Unit | 0.1               |  |
| F4.26 | Reaching frequency 2 |                   |      | Default value 5.0 |  |
|       | Range                | 0- Max. frequency | Unit | 0.1               |  |

EV100A series sets two groups of frequencies arrive, when output frequency arrive the setting value of F4.25 and F4.26, corresponding multi-function output terminal is ON. Frequency arrive width is of a hysteresis loop, which is set by F4.30.



|       |             |             |      |                 |  |
|-------|-------------|-------------|------|-----------------|--|
| F4.27 | No. 1 timer |             |      | Default value 0 |  |
|       | Range       | 0.0-6000.0s | Unit | 0.1             |  |
| F4.28 | No. 2 timer |             |      | Default value 0 |  |
|       | Range       | 0.0-6000.0s | Unit | 0.1             |  |

EV100 series have two timers, when time of the timers reaches setting value (set by F4.27 and F4.28), corresponding multi-function terminal is ON.

Timer start is controlled by external multi-function input terminal. Some simple program may be made by using these two timers.

|       |                                     |           |      |                    |
|-------|-------------------------------------|-----------|------|--------------------|
| F4.29 | Constant-speed torque limiting time |           |      | Default value 0.50 |
|       | Range                               | 0-6000.0S | unit | 0.1                |

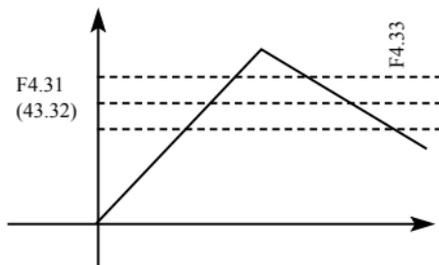
|       |   |           |      |                    |
|-------|---|-----------|------|--------------------|
| F4.30 | Width of arrive of frequency in hqsteretic loop |           |      | Default value 0.50 |
|       | Range   | 0.00-2.00 | unit | 0.01               |

This parameter sets frequency reached width, for details, refer to F4.25-F426 introductions.

|       |                                      |                            |      |                    |
|-------|--------------------------------------|----------------------------|------|--------------------|
| F4.31 | Jump Frequency 1                     |                            |      | Default value 0    |
|       | Range                                | 0.00-frequency upper limit | unit | 0.01               |
| F4.32 | Jump Frequency 2                     |                            |      | Default value 0    |
|       | Range                                | 0.00-frequency upper limit | unit | 0.01               |
| F4.33 | Jump frequency hysteresis loop width |                            |      | Default value 0.50 |
|       | Range                                | 0.00-2.00                  | unit | 0.01               |

If machine resonance occurred at a certain frequency, we can use the frequency jump function to skip the resonance point. EV100A support 2 jump frequencies by parameter F4.31 and F4.32.

Frequency jump hysteresis loop width can be set through F4.33 as below:



## 7.5 Special operation (PLC Control)

|       |                 |                                   |   |                  |
|-------|-----------------|-----------------------------------|---|------------------|
| F5.00 | PLC memory mode |                                   |   | Initial value: 0 |
| Range | 0-1             | Unit                              | 1 |                  |
|       | Content:        | 0: Do not remember<br>1: Remember |   |                  |

0: Do not remember

In the operational process of PLC program, F5.00 will choose not to remember. When machinery stops because of fault or other reasons, inverter will not remember status before the stopping. After restart, running begins from initial state.

1: Remember

In the running of PLC program, F5.00 will select to remember. When it stops because of fault or other reasons, inverter will remember status before stopping. After restart, inverter will continue operating according to program. Attention: power cannot be cut off.

Stop, power cut and power on, inverter will not remember status before power cut off. After restarting, inverter will run according to initial state of program.

|       |                |  |      |                  |
|-------|----------------|--|------|------------------|
| F5.01 | PLC start mode |  |      | Initial value: 0 |
|       | Range          | 0-1  | Unit | 1                |
|       | Content:       | 0: Invalid (PLC can not start)<br>1: Valid (PLC start) |      |                  |

F5.01 determines PLC start mode of inverter.

F5.01=0, means PLC is invalid. The inverter is operated by common mode.

When F5.01=1, PLC will start. The inverter select PLC program to run.

Under the status of PLC start, when various running orders and programs, inverter will choose the highest level to run according to priority level.

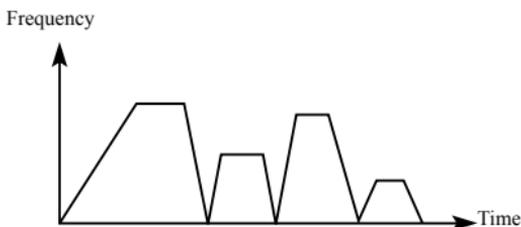
|                  |                |      |
|------------------|----------------|------|
| Precedence level | Priority level | Item |
|------------------|----------------|------|

|           |   |                       |
|-----------|---|-----------------------|
| High→ low | 1 | Jog                   |
|           | 2 | External multi-speed  |
|           | 3 | Internal multi-speed  |
|           | 4 | PID                   |
|           | 5 | Triangular wave       |
|           | 6 | Winding               |
|           | 7 | Inverter setting mode |

|       |                  |  |                  |   |
|-------|------------------|--|------------------|---|
| F5.02 | PLC running mode |  | Initial value: 0 |   |
|       | Range            | 0-4  | Unit             | 1 |
|       | Content:         | 0: PLC stop running after a week<br>1: PLC pause mode, stop running after a week<br>2: PLC cycle running<br>3: Cycle running of PLC pause mode<br>4: After running for a week, PLC continues running by the end of running frequency |                  |   |

PLC running mode determines running status of internal multi-speed, either running one circle or cycle running. F5.02 is only valid when PLC starts up.

PLC pause mode means that when completing every speed in the running process of internal multi-speed, the speed will be down, stop, and accelerate to the next speed. The illustration is as below:



Users may select proper running mode according to actual conditions.

|       |               |                     |
|-------|---------------|---------------------|
| F5.03 | Multi-speed 1 | Initial value: 10.0 |
| F5.04 | Multi-speed 2 | Initial value: 15.0 |

|       |                |                           |
|-------|----------------|---------------------------|
| F5.05 | Multi-speed 3  | Initial value: 20.0       |
| F5.06 | Multi-speed 4  | Initial value: 25.0       |
| F5.07 | Multi-speed 5  | Initial value: 30.0       |
| F5.08 | Multi-speed 6  | Initial value: 35.0       |
| F5.09 | Multi-speed 7  | Initial value: 40.0       |
| F5.10 | Multi-speed 8  | Initial value: 45.0       |
| F5.11 | Multi-speed 9  | Initial value: 50.0       |
| F5.12 | Multi-speed 10 | Initial value: 10.0       |
| F5.13 | Multi-speed 11 | Initial value: 10.0       |
| F5.14 | Multi-speed 12 | Initial value: 10.0       |
| F5.15 | Multi-speed 13 | Initial value: 10.0       |
| F5.16 | Multi-speed 14 | Initial value: 10.0       |
| F5.17 | Multi-speed 15 | Initial value: 10.0       |
|       | Setting range  | 0.00 ----- Max. frequency |
|       | Unit           | 0.01                      |

F5.03 ----- F5.17 are set of 15 speed of rated frequency in the running. Regarding relationship multi speed and external terminal please refer to rated instruction 1,2,3,4 of multifunctional terminal.

|       |                       |                    |
|-------|-----------------------|--------------------|
| F5.18 | PLC operation time 1  | Initial value: 100 |
| F5.19 | PLC operation time 2  | Initial value: 100 |
| F5.20 | PLC operation time 3  | Initial value: 100 |
| F5.21 | PLC operation time 4  | Initial value: 100 |
| F5.22 | PLC operation time 5  | Initial value: 100 |
| F5.23 | PLC operation time 6  | Initial value: 0   |
| F5.24 | PLC operation time 7  | Initial value: 0   |
| F5.25 | PLC operation time 8  | Initial value: 0   |
| F5.26 | PLC operation time 9  | Initial value: 0   |
| F5.27 | PLC operation time 10 | Initial value: 0   |
| F5.28 | PLC operation time 11 | Initial value: 0   |

|       |                       |              |      |                  |
|-------|-----------------------|--------------|------|------------------|
| F5.29 | PLC operation time 12 |              |      | Initial value: 0 |
| F5.30 | PLC operation time 13 |              |      | Initial value: 0 |
| F5.31 | PLC operation time 14 |              |      | Initial value: 0 |
| F5.32 | PLC operation time 15 |              |      | Initial value: 0 |
|       | Setting range         | 0 ---- 65000 | Unit | 1                |

PLC operation time determines internal controlling varying rated running duration for each segment, and the running duration for each segment is corresponding to its rate.

|       |                       |              |      |                  |
|-------|-----------------------|--------------|------|------------------|
| F5.33 | PLC operation time 15 |              |      | Initial value: 0 |
|       | Setting range         | 0 ---- 32767 | Unit | 1                |

F5.33 setting running direction of each segment

Method of setting running direction:

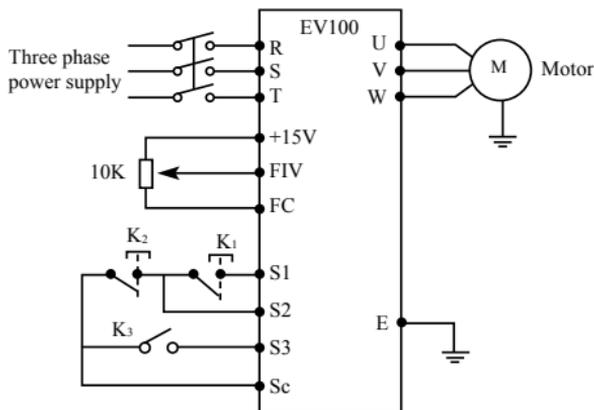
The way of setting running direction: by means of 16-bit binary system, and then transfer to decimal system value; every bit decides the corresponding running direction: 0 is running forward and 1 is running backward, and this parameter is only valid when the PLC is on.

For example: there is a five-segment rate, the circling running is required as follow:

| Items              | Output frequency            | Running direction | Running duration |
|--------------------|-----------------------------|-------------------|------------------|
| Dominant frequency | Potentiometer is adjustable | Forward           |                  |
| Segment 1          | 20.0                        | Reverse           | 20               |
| Segment 2          | 60.0                        | Forward           | 25               |
| Segment 3          | 40.0                        | Reverse           | 30               |
| Segment 4          | 15.0                        | Forward           | 20               |

Two buttons, one is for running, the other one is for ceasing; the main frequency requires adjustable potentiometer.

(1) Connection illustration



## (2) Parameter setting

PLC operation direction setting: (F5.33 setting)

| Rate of segment 1 | Rate of segment 2 | Rate of segment 3 | Rate of segment 4 | Dominant frequency |   |
|-------------------|-------------------|-------------------|-------------------|--------------------|---|
| 4                 | 3                 | 2                 | 1                 | 0                  | → position (bit)                            |
| 0                 | 1                 | 0                 | 1                 | 0                  | → run direction <0 is forward, 1 is Reverse |
| 0×24              | 1×23              | 0×22              | 1×21              | 0×20               | → transfer to decimal system                |

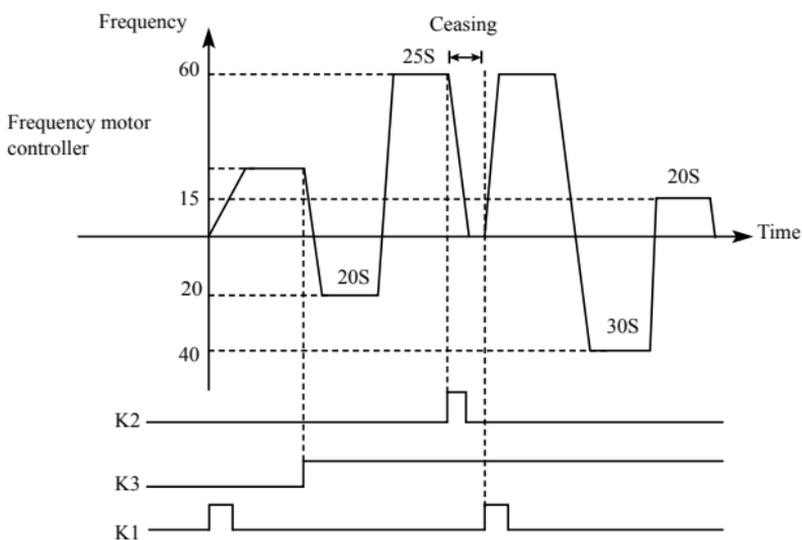
The binary system number 01010 is transferred to decimal system number:  $1 \times 21 + 1 \times 23 + 8 = 10$

Define to: F5.33=10

The parameter defines to:

- F1.01=3 (Keyboard potentiometer setting mode: dominant frequency is controlled by potentiometer)
- F1.02=2 (Running setting option: Multifunction end input)
- F1.05=60 (The max. frequency is 60HZ)
- F1.07=10 F1.08=10 (acceleration/deceleration time 10S)
- F3.14=6 (S1 end is running forward)
- F3.18=8 (S2 end is ceasing)
- F3.19=20 S3 end is PLC starting to running
- F5.00=1 PLC programming memory
- F5.01=1 PLC is on

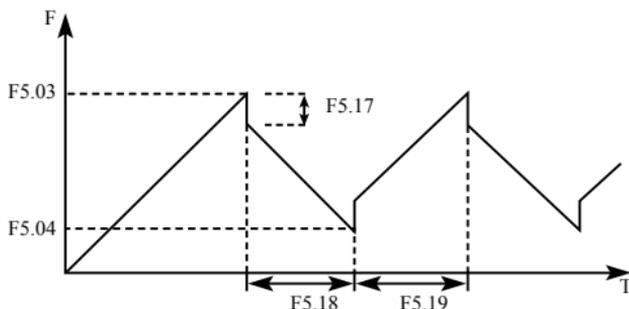
|          |   |
|----------|---|
| F5.02=0  | PLC operation one circle and then ceasing |
| F5.03=1  | Segment 1 rated 20Hz                      |
| F5.04=60 | Segment 1 rated 60Hz                      |
| F5.05=40 | Segment 1 rated 40Hz                      |
| F5.06=15 | Segment 1 rated 15Hz                      |
| F5.18=10 | Segment 1 rated running duration is 10s   |
| F5.19=20 | Segment 1 rated running duration is 20s   |
| F5.20=25 | Segment 1 rated running duration is 25s   |
| F5.21=30 | Segment 1 rated running duration is 30s   |



- Action instruction:
- ① Press K1 to startup the inverter and the potentiometer will set output frequency.
  - ② Press K3, PLC to startup, and from the segment 1 PLC program running one circle and then ceasing
  - ③ If the program is running, press K3, or if there is a fault, and the inverter is ceasing, when the fault is solved, press K1 and the inverter will running forward as the program.
  - ④ If F5.00 is 1 and the program is not memory, so the running will start from the very beginning.

## 7-7 Special operation (PID Control)

The inverter can be used to exercise process control, e.g. flow rate, air volume or pressure.



The terminal FIV/FIC input signal or parameter setting is used as a set point and the terminal FIV/FIC input signal also can be used as a feedback value to constitute a feedback system for PID control.

|       |                   |   |                  |   |
|-------|-------------------|---|------------------|---|
| F6.00 | PID starting mode |   | Initial value: 0 |   |
|       | Setting range     | 0-1   | Unit             | 1 |
|       | Content:          | 0: PID disable<br>1: PID start<br>2: PID start by external terminal |                  |   |

0: PID disable

PID can not use.

1: PID start

PID is working despite the external signal input, and keeps being valid without external input.

2: PID starts up on condition; PID will start when certain external input is ON.

|       |                              |  |                  |   |
|-------|------------------------------|--|------------------|---|
| F6.01 | PID operation mode selection |  | Initial value: 0 |   |
|       | Setting range                | 0-1  | Unit             | 1 |
|       | Content:                     | 0: Negative feedback mode<br>1: Positive feedback mode |                  |   |

0: Negative feedback mode

If feedback value(F6.03)>setting value(F6.02), inverter decrease output frequency

If feedback value(F6.03)<setting value(F6.02), inverter increase

output frequency

1: Positive feedback mode

If feedback value(F6.03)>setting value(F6.02), inverter decrease output frequency

If feedback value(F6.03)<setting value(F6.02), inverter increase output frequency

|       |                      |  |      |                  |  |
|-------|----------------------|--|------|------------------|--|
| F6.02 | PID action set point |  |      | Initial value: 0 |  |
|       | Setting range        | 0-2  | Unit | 1                |  |
|       | Content:             | 0: figure mode (F6.04)<br>1: FIV<br>2: FIC |      |                  |  |

0: Select figure mode as the set point (F6.04)

Set the set value (F6.04) from the operation panel or parameter unit.

1: FIV

Terminal FIV input is the set point (0—10DCV).

2: FIC.

Terminal FIC input is the set point (0—20mA).

|       |                              |                                |      |                  |  |
|-------|------------------------------|--------------------------------|------|------------------|--|
| F6.03 | PID feedback value selection |                                |      | Initial value: 0 |  |
|       | Setting range                | 0-3                            | Unit | 1                |  |
|       | Content:                     | 0: FIV<br>1: FIC<br>2: FIV-FIC |      |                  |  |

3: FIC-FIV

Notes:F6.03 parameter setting: Select PID feedback channel

0:FIV

Input the signal from the detector (measured value signal (0-10DCV) )

1:FIC

Input the signal from the detector (measured value signal (0-20mA) )

2:FIV-FIC

Input the signal from the detector (measured value signal )

3: FIC-FIV

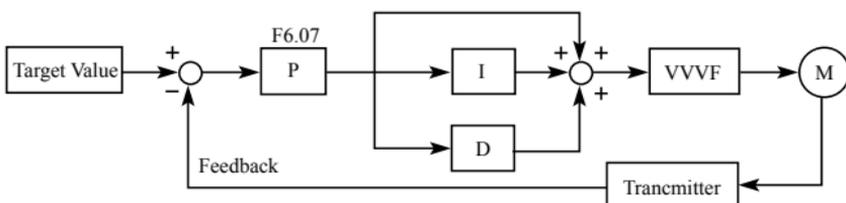
Input the signal from the detector (measured value signal )

|       |                                 |                              |                  |      |
|-------|---------------------------------|------------------------------|------------------|------|
| F6.04 | PID figure target value setting |                              | Initial value: 0 |      |
|       | Setting range                   | 0.0-100%                     | Unit             | 0.01 |
|       | Content:                        | Select FIV as feedback value |                  |      |

100% setting is corresponding to analog input 10V voltage.

PID closed-loop control is widely used to control the process such as pressure and temperature.

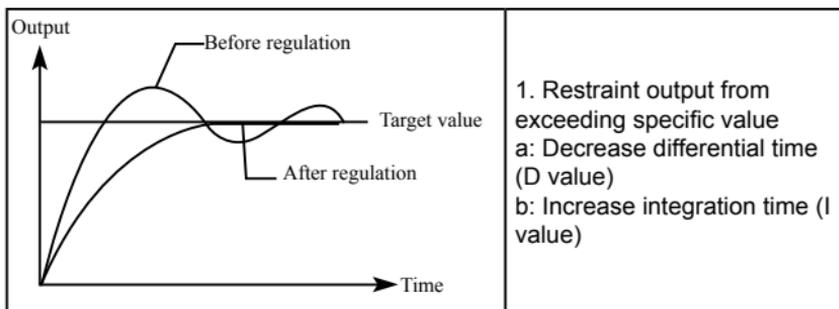
Feedback signal is given from temperature transmitter or pressure transmitter. In case of PID control, the channel of feedback signal input is of analog signal (4 – 20mA or 0 – 10V). There are two channels available for setting.

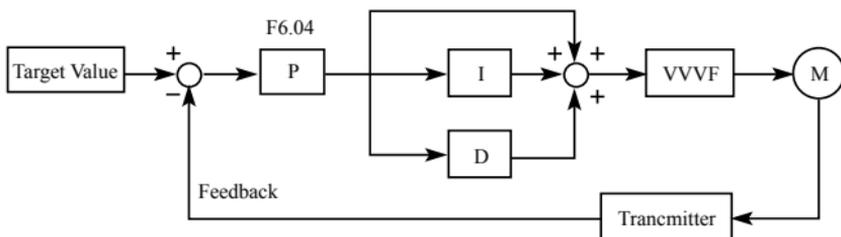
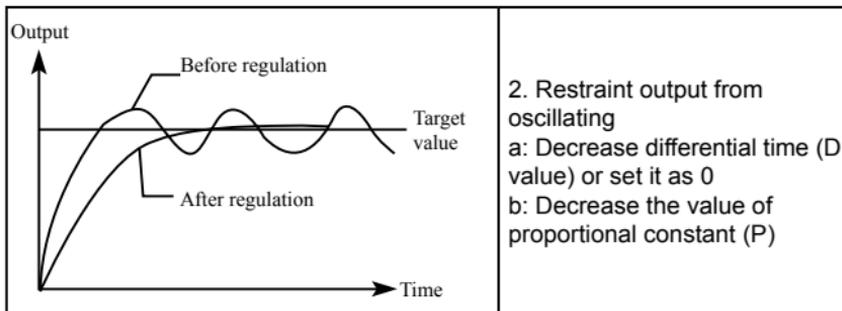


Block diagram of PID control:

General regulation method for PID control:

- (1) Select sensor/transmitter correctly, for which the standard signal of 4 – 20mA or 0 – 10V shall be selected as output specification.
- (2) Set PID action set point correctly.
- (3) Increase proportional constant (P), in case of non-oscillating output.
- (4) Decrease integration time (Ti), in case of non-oscillating output.
- (5) Increase differential (Td), in case of non-oscillating output.





|       |                             |            |                    |     |
|-------|-----------------------------|------------|--------------------|-----|
| F6.05 | PID upper limit alarm value |            | Initial value: 100 |     |
|       | Setting range               | 0.0 – 100% | Unit               | 0.1 |

Set the upper limit value. If the feedback value exceeds the setting, the alarm signal is output. The maximum input (20mA/10V) of the measured value (Terminal FIVFIC) is equivalent to 100%.

|       |                             |            |                  |     |
|-------|-----------------------------|------------|------------------|-----|
| F6.06 | PID lower limit alarm value |            | Initial value: 0 |     |
|       | Setting range               | 0.0 – 100% | Unit             | 0.1 |

Set the lower limit value. If the feedback value falls below the setting range, the alarm signal is output. The maximum input (20mA/10V) of the measured value (Terminal FIVFIC) is equivalent to 100%.

|       |                       |            |                     |     |
|-------|-----------------------|------------|---------------------|-----|
| F6.07 | PID proportional band |            | Initial value: 100% |     |
|       | Setting range         | 0.0 – 200% | Unit                | 0.1 |

If the proportional band is narrow (parameter setting is small), the manipulated variable varies greatly with a slight change of the measured value. Hence, as the proportional band narrows, the response sensitivity (gain) improves but the stability deteriorates, e.g. hunting occurs.

|       |                   |              |      |                     |  |
|-------|-------------------|--------------|------|---------------------|--|
| F6.08 | PID integral time |              |      | Initial value: 0.3s |  |
|       | Setting range     | 0.0 – 200.0S | Unit | 0.1                 |  |

For deviation step input, time( $T_i$ ) required for only the integral (I) action to provide the same manipulated variable as that for the proportional (P) action. As the integral time decreases, the set point is reached earlier but hunting occurs more easily.

|       |                       |             |      |                  |  |
|-------|-----------------------|-------------|------|------------------|--|
| F6.09 | PID differential time |             |      | Initial value: 0 |  |
|       | Setting range         | 0.00 – 20.0 | Unit | 0.01             |  |

For deviation lamp input, time ( $T_d$ ) required for providing only the manipulated variable for the proportional (P) action. As the differential time increases, greater response is made to a deviation change.

|       |                        |               |      |                     |  |
|-------|------------------------|---------------|------|---------------------|--|
| F6.10 | PID action step-length |               |      | Initial value: 0.10 |  |
|       | Setting range          | 0.00 – 1.00HZ | Unit | 0.01                |  |

PID is figured out once every 10ms. Frequency increment will be figured out ( $\Delta$ FHz) every time. While frequency increment is more than value of F6.10 in maximum of frequency increment, F6.10 will work.

|       |                       |                 |      |                     |  |
|-------|-----------------------|-----------------|------|---------------------|--|
| F6.11 | PID standby frequency |                 |      | Initial value: 0.00 |  |
|       | Setting range         | 0.00 – 120.00HZ | Unit | 0.01                |  |
| F6.12 | PID standby duration  |                 |      | Initial value: 10.0 |  |
|       | Setting range         | 0.0 – 200.0     | Unit | 0.1                 |  |
| F6.13 | PID wake-up value     |                 |      | Initial value: 0.0% |  |
|       | Setting range         | 0.0 – 100%      |      |                     |  |

F6.11 PID standby frequency.

F6.11 must reach minimum frequency in PID standby. When running frequency is less than value of F6.10 standby duration will begin counting.

F6.12 PID standby duration.

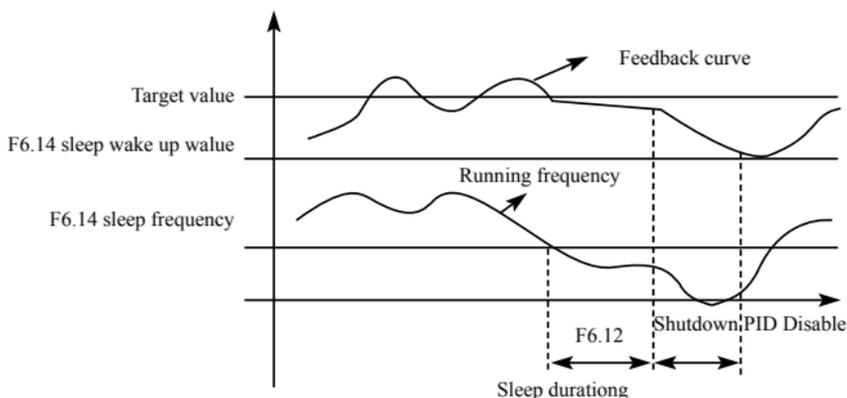
When running duration of inverter is more than standby frequency the value (standby duration) of F6.12, the inverter will be standby.

Then stop output, and disconnect with PID, but monitor the feedback of F6.13 PID.

F6.13: PID wake-up value.

When the inverter detects that feedback value less than wake-up value (F6.13), PID function will be taken action, and then inverter will start.

Example: PID action set point is 60% (0 – 100% is corresponding to 0 – 10V), and the wake-up value is 80%, which is actually corresponding to 0 – 10V, then the actual wake-up value is  $60\% \times 80\% = 48\%$  (corresponding to 0 – 10V).



|       |  |   |   |   |
|-------|--|---|---|---|
| F6.14 | PID corresponding value of display   |   | Initial value: 1000   |   |
|       | Setting range  | 0 – 1000  | Unit  | 1 |
| F6.15 | PID digit of display   |   | Initial value: 4  |   |
|       | Setting range  | 0 – 5   | Unit  | 1 |
|       | 0: Not display PID feedback value<br>1: Display 1 digit<br>2: Display 2 digits |   | 3: Display 3 digits<br>4: Display 4 digits<br>5: Display 5 digits |   |
| F6.16 | PID decimal digit of display   |   | Initial value: 1  |   |
|       | Setting range  | 0 – 4   | Unit  | 1 |
|       | Content:   | 0: Not display after decimal point<br>1: Display 1 digit after decimal point<br>2: Display 2 digits after decimal point<br>3: Display 3 digits after decimal point<br>4: Display 4 digits after decimal point |   |   |

F6.14 PID corresponding value of display.

F6.14 setting value is corresponding to + 10V analog voltage.

If F6.14 is set as 200, then it indicates that full span is 200, corresponding to + 10V voltage.

F6.15 sets the digit display.

0 indicates not displaying feedback value. Users may select the digit displayed according to actual need.

F6.16 PID decimal digit of display.

F6.16 sets the digit displayed after decimal point.

For example: Four-digit display is required, with 1 digit displayed after decimal point, target value is set as 50%, and PID corresponding value of display is 200.

Then, the display value is  $200 \times 50\% = 100.0$  and the parameter group is convenient for users to monitor.

Parameter: F6.14 = 200; F6.15 = 4; F6.16 = 1.

## 7-8 Initial settings and specifications of RS-485 communication

Used to perform required setting for communication between the inverter and personal computer.

|       |                            |  |      |                  |  |
|-------|----------------------------|--|------|------------------|--|
| F7.00 | RS-485 Communication speed |  |      | Initial value: 0 |  |
|       | Setting range              | 0 – 3  | Unit | 1                |  |
|       | Content:                   | 0: 4800bps<br>1: 9600bps<br>2: 19200bps<br>3: 38400bps |      |                  |  |

For example, the communication speed is 19200bps when the setting value is “2”.

|       |                    |  |  |                  |  |
|-------|--------------------|--|--|------------------|--|
| F7.01 | Communication mode |  |  | Initial value: 0 |  |
|       | Setting range      | 0 – 5  | Unit   | 1                |  |
|       | Content:           | 0: 8N1 For ASCII<br>2: 8E1 For ASCII<br>4: 8O1 For RTU | 1: 8O1 For ASCII<br>3: 8N1 For RTU<br>5: 8E1 For RTU |                  |  |

F7.01 sets the format of communication data. Please see related communication specification in detail.

|       |                              |         |                  |   |
|-------|------------------------------|---------|------------------|---|
| F7.02 | RS-485 communication station |         | Initial value: 0 |   |
|       | Setting range                | 0 – 240 | Unit             | 1 |

Each inverter must have a station number, which will be defined through F7.02. Communication control of inverter can connect with 240 others.

If F7.02 is set to “ 0 “ , means communication function is invalid.

Communication exception handling

F7.03 handling of communication failures

Inverter under abnormal conditions in the communication can be handled by communication failures choice

0: No alarm and continue operation;

1: No way to stop the alarm by stopping;

2: alarm, in accordance with the stop means stop.

Note that the drive does not stop processing when a communication failure.

F7.04 Time of Communications timeout

If a communication with the next communication interval beyond the communication fault time-out, the system will be handling communication failures (F7.03) treatment. Setting this parameter to monitor the communication situation

### **EV100 series MODBUS communication protocol**

EV100 series communication agreement is with MODBUS ASCII (American standard code for information inter change) mode: Each byte consists of 2 ASCII characters, for example: The expression of the numerical value of 54Hex ASCII is that “54” consists of “5” (35Hex) and 4(34 Hex).

#### 1. Definition of coding

Communication agreement belongs to hexadecimal system, of which each character represents the following information.

|            |     |     |     |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Character  | "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" |
| ASCII code | 30H | 31H | 32H | 33H | 34H | 35A | 36A | 37A |
| Character  | "8" | "9" | "A" | "B" | "C" | "D" | "E" | "F" |
| ASCII code | 38A | 39H | 41H | 42H | 43A | 44A | 45H | 46H |

## 2. Character structure

### 10 – Bit character box (For ASCII)

Data pattern: 8N1 For ASCII

|                         |                                |   |   |   |   |   |   |   |          |
|-------------------------|--------------------------------|---|---|---|---|---|---|---|----------|
| Start bit               | 0                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Stop bit |
|                         | 8 – Data bits character string |   |   |   |   |   |   |   |          |
| 10 – bits character box |                                |   |   |   |   |   |   |   |          |

### 10 – Bit character box (For RTU)

Data pattern: 8N1 For RTU

|                         |                                |   |   |   |   |   |   |   |          |
|-------------------------|--------------------------------|---|---|---|---|---|---|---|----------|
| Start bit               | 0                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Stop bit |
|                         | 8 – Data bits character string |   |   |   |   |   |   |   |          |
| 10 – bits character box |                                |   |   |   |   |   |   |   |          |

Data pattern: 8O1 For ASCII

|                         |                                |   |   |   |   |   |   |   |            |          |
|-------------------------|--------------------------------|---|---|---|---|---|---|---|------------|----------|
| Start bit               | 0                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Odd parity | Stop bit |
|                         | 8 – Data bits character string |   |   |   |   |   |   |   |            |          |
| 11 – bits character box |                                |   |   |   |   |   |   |   |            |          |

Data pattern: 8E1 For ASCII

|                         |                                |   |   |   |   |   |   |   |             |          |
|-------------------------|--------------------------------|---|---|---|---|---|---|---|-------------|----------|
| Start bit               | 0                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | even parity | Stop bit |
|                         | 8 – Data bits character string |   |   |   |   |   |   |   |             |          |
| 11 – bits character box |                                |   |   |   |   |   |   |   |             |          |

Data pattern: 8O1 For RTU

|                         |                                |   |   |   |   |   |   |   |            |          |
|-------------------------|--------------------------------|---|---|---|---|---|---|---|------------|----------|
| Start bit               | 0                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Odd parity | Stop bit |
|                         | 8 – Data bits character string |   |   |   |   |   |   |   |            |          |
| 11 – bits character box |                                |   |   |   |   |   |   |   |            |          |

Data pattern: 8E1 For RTU

|                                |   |   |   |   |   |   |   |   |             |          |
|--------------------------------|---|---|---|---|---|---|---|---|-------------|----------|
| Start bit                      | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | even parity | Stop bit |
| 8 – Data bits character string |   |   |   |   |   |   |   |   |             |          |
| 11 – bits character box        |   |   |   |   |   |   |   |   |             |          |

### 3. Structure of communication data

#### Data format box

##### ASCII mode:

|             |   |
|-------------|---|
| STX         | Start character = ':'(3AH)                                  |
| Address Hi  | Communication address:                                      |
| Address Lo  | 8-bit address consists of 2 ASCII codes                     |
| Function Hi | Function code:  |
| Function Lo | 8-bit function code consists of 2 ASCII codes               |
| DATA (n-1)  | Data characters:  |
| .....       | $n \times 8$ -bit data content consists of $2n$ ASCII codes |
| DATA 0      | $n \leq 16$ , with the maximum of 32 ASCII codes            |
| LRC CHK Hi  | LRC Check:  |
| LRC CHK Lo  | 8-bit LRC Check consists of 2 ASCII codes                   |
| END Hi      | End character:  |
| END Lo      | END Hi = CR (0DH), END Lo = LF (0AH)                        |

##### RTU mode:

|              |  |
|--------------|--|
| START        | Keep that zero-input signal is more than or equal to 10 ms |
| Address      | Communication address: 8-bit binary address                |
| Function     | Function code: 8-bit binary address                        |
| DATA (n-1)   | Data characters:<br>$n \times 8$ -bit data, $n = 16$       |
| .....        |  |
| DATA 0       |  |
| CRC CHK Low  | CRC Check:   |
| CRC CHK High | 16-bit CRC Check consists of 2 8-bit binary systems        |
| END          | Keep that zero-input signal is more than or equal to 10 ms |

#### Communication Address

00H: All driver Broadcasts

01H: For inverter with 01st address

0FH: For inverter with 15th address

10H: For inverter with 16th address, by analogy, the maximum could reach 240.

Function code and Data Characters

03H: Read out the content of temporary storage

06H: Write a WORD into temporary storage; Function code 03H:

Read out the content of temporary storage.

For example: Driver address 01H, reads out the data characters in 2 successive temporary storages as follows: Initial temporary storage address 2102H

Function code 06H: Write a WORD into temporary storage.

Format of enquiry message character string:

|                                |     |
|--------------------------------|-----|
| STX                            | ':' |
| Address                        | '1' |
|                                | '0' |
| Function                       | '0' |
|                                | '3' |
| Starting address               | '2' |
|                                | '1' |
|                                | '0' |
|                                | '2' |
| Number of data (count by word) | '0' |
|                                | '0' |
|                                | '0' |
|                                | '2' |
| LRC Check                      | 'D' |
|                                | '7' |
| END                            | CR  |
|                                | LF  |

Format of response message character string:

|                                   |     |
|-----------------------------------|-----|
| STX                               | ':' |
| Address                           | '0' |
|                                   | '1' |
| Function                          | '0' |
|                                   | '3' |
| Number of data (count by byte)    | '0' |
|                                   | '4' |
| Content of starting address 2102H | '1' |
|                                   | '7' |
|                                   | '7' |
|                                   | '0' |
| Content of address 2103 H         | '0' |
|                                   | '0' |
|                                   | '0' |
|                                   | '0' |
| LRC Check                         | '7' |
|                                   | '1' |
| END                               | CR  |
|                                   | LF  |

ASCII mode:

RTU mode:

Format of enquiry message:

|                                |     |
|--------------------------------|-----|
| Address                        | 01H |
| Function                       | 03H |
| Starting data address          | 21H |
|                                | 02H |
| Number of data (count by word) | 00H |
|                                | 02H |
| CRC CHK Low                    | 6FH |
| CRC CHK High                   | F7H |

Format of response message:

|                                |     |
|--------------------------------|-----|
| Address                        | 01H |
| Function                       | 03H |
| Number of data (count by byte) | 04H |
| Content of data address 8102H  | 17H |
|                                | 70H |
| Content of data address 8103H  | 00H |
|                                | 00H |
| CRC CHK Low                    | FEH |
| CRC CHK High                   | 5CH |

For example: Driver address 01H, writes 6000 (1770H) into the internal setting parameter 0100H of driver.

LRC Check of ASCII mode

ASCII mode:

Format of enquiry message character string:

|              |     |
|--------------|-----|
| STX          | ':' |
| Address      | '0' |
|              | '1' |
| Function     | '0' |
|              | '6' |
| Data address | '0' |
|              | '1' |
|              | '0' |
|              | '0' |
| Data content | '1' |
|              | '7' |
|              | '7' |
|              | '0' |
| LRC Check    | '7' |
|              | '1' |
| END          | CR  |
|              | LF  |

Format of response message character string:

|              |     |
|--------------|-----|
| STX          | ':' |
| Address      | '0' |
|              | '1' |
| Function     | '0' |
|              | '6' |
| Data address | '0' |
|              | '1' |
|              | '0' |
|              | '0' |
| Data content | '1' |
|              | '7' |
|              | '7' |
|              | '0' |
| LRC Check    | '7' |
|              | '1' |
| END          | CR  |
|              | LF  |

RTU mode:

Format of enquiry message:

|              |     |
|--------------|-----|
| Address      | 01H |
| Function     | 06H |
| Data address | 01H |
|              | 00H |
| Data content | 17H |
|              | 70H |
| CRC CHK Low  | 86H |
| CRC CHK High | 22H |

Format of response message:

|              |     |
|--------------|-----|
| Address      | 01H |
| Function     | 06H |
| Data address | 01H |
|              | 00H |
| Data content | 17H |
|              | 70H |
| CRC CHK Low  | 86H |
| CRC CHK High | 22H |

LRC Check is the value added from Address to Data Content. For example, the LRC Check of the above 3.3.1 enquiry message is as:  $01H + 03H + 21H + 02H + 00H + 02H = 29H$ , then the complement of 2 (D7H) is taken.

CRC Check of RTU mode

CRC Check is from Address to Data content, and its running rule is as follows:

Step 1: Make 16-bit temporary storage (CRC temporary storage) = FFFFH.

Step 2: Exclusive OR first 8-bit byte message instruction and low 16-bit CRC temporary storage: Perform Exclusive OR, and store the result into CRC temporary storage.

Step 3: Move CRC temporary storage one more bit, and fill 0 into high bit position.

Step 4: Check right shift value, if being 0, store the new value for step 3 into CRC temporary storage, otherwise in case of Exclusive OR A001H and CRC temporary storage, store the result into CRC temporary.

Step 5: Repeat Step 3 ~ Step 4, and operate completely for 8-bit.

Step 6: Repeat Step 2 ~ Step 5, and take the message instruction for next 8-bit, till all message instructions are operated completely.

Finally, the value gotten of CRC temporary storage is CRC Check. It is noteworthy that, CRC Check must be placed into the check mode of message instruction interchangeably.

The following is the example of CRC Check running written in C language:

```
Unsigned char * data ←//Message instruction pointer
Unsigned char length ←//Length of message instruction
```

## 7-9 Advanced application parameters

```
unsigned int crc_chk (unsigned char*data, unsigned char length)
{
    int j;
    unsigned int reg_crc=0xffff;
    while( length-- ) {
        reg_crc^=*data ;
        for (j = 0; j<8; j ) {
            if (reg_crc & 0x01) { /*LSB (b0) =1 */
                reg_crc= (reg_crc>>1) ^0xa001;
            }else{
                reg_crc=reg_crc>>1;
            }
        }
        return reg_crc; //Finally feedback the value of CRC temporary
        storage
    }
}
```

|       |                                     |                      |                  |   |
|-------|-------------------------------------|----------------------|------------------|---|
| F8.00 | Advanced application parameter lock |                      | Initial value: 1 |   |
|       | Setting range                       | 0 – 1                | Unit             | 1 |
|       | content                             | 0: Lock<br>1: Unlock |                  |   |

If F8.00 is set to “0”,you can not use the advanced parameters.

|       |                            |                    |                  |   |
|-------|----------------------------|--------------------|------------------|---|
| F8.01 | System 50Hz/60Hz selection |                    | Initial value: 0 |   |
|       | Setting range              | 0 – 1              | Unit             | 1 |
|       | content                    | 0: 50Hz<br>1: 60Hz |                  |   |

50Hz/60Hz system could be set via the parameter according the

condition of electric network.

|       |  |  |                   |   |
|-------|--|--|-------------------|---|
| F8.02 | constant and variable torque selection |  | Initial value : 0 |   |
|       | Setting range                          | 0 – 1                                    | Unit              | 1 |
|       | content                                | 0: Constant torque<br>1: Variable torque |                   |   |

For fan and pump load, you can select “variable torque” for better energy saving.

|       |                                |           |                       |   |
|-------|--------------------------------|-----------|-----------------------|---|
| F8.03 | Overvoltage protection setting |           | Initial value: change |   |
|       | Setting range                  | 760 – 820 | Unit                  | 1 |

F8.03 sets DC-bus overvoltage protection level. This function could be used to avoid over voltage protection during deceleration.

|       |                                 |           |                       |   |
|-------|---------------------------------|-----------|-----------------------|---|
| F8.04 | Undervoltage protection setting |           | Initial value: change |   |
|       | Setting range                   | 380 – 450 | Unit                  | 1 |

F8.04 sets voltage protection level.

If the input voltage is low, inverter is easy to trip for undervoltage. This function could be used to avoid inverter protection undervoltage.

|       |                                     |          |                       |   |
|-------|-------------------------------------|----------|-----------------------|---|
| F8.05 | Over temperature protection setting |          | Initial value: change |   |
|       | Setting range                       | 40 – 120 | Unit                  | 1 |

F8.05 sets the over temperature protection level of inverter. In high temperature environment, the protection level could be improved appropriately, to guarantee the normal running of inverter. However, too high setting value will result in IGBT damage, so the only solution is to improve the effect of heat elimination, so as to achieve the goal of cooling-down.

|       |                             |         |                    |   |
|-------|-----------------------------|---------|--------------------|---|
| F8.06 | Current display filter time |         | Initial value: 2.0 |   |
|       | Setting range               | 0 – 100 | Unit               | 1 |

This parameter setting is relevant to the stabilization of current display, and shall not be modified in general. If the setting is too

small, current display will fluctuate.

|       |  |           |      |                  |
|-------|--|-----------|------|------------------|
| F8.07 | 0-10V analogue output low end calibration coefficient  |           |      | Initial value: * |
|       | Setting range  | 0 – 65535 | Unit | 1                |
| F8.08 | 0-10V analog output high end calibration coefficient   |           |      | Initial value: * |
|       | Setting range  | 0 – 65535 | Unit | 1                |
| F8.09 | 0-20mA analogue output low end calibration coefficient |           |      | Initial value: * |
|       | Setting range  | 0 – 65535 | Unit | 1                |
| F8.10 | 0-20mA analog output high end calibration coefficient  |           |      | Initial value: * |
|       | Setting range  | 0 – 65535 | Unit | 1                |

The above parameters are factory default setting, normally shall not be adjusted, otherwise it may cause abnormal operation.

## Chapter 8

# PRECAUTIONS FOR MAINTENANCE AND INSPECTION

The inverter is a static unit mainly consisting of semiconductor devices. Daily inspection must be performed to prevent any fault from occurring due to the adverse effects of the operating environment. Such as temperature, humidity, dust, dirt and vibration, changes in the parts with time, service life, and other factors.

- Precautions for maintenance and inspection

For some short time after the power is switched off, a high voltage remains in the smoothing capacitor. When accessing the inverter for inspection, wait for at least 10 minutes after the power supply has been switched off, and then make sure that the voltage across the main circuit terminals P/+--N/- of the inverter is not more than 30VDC using a tester, etc.

### 8-1-1 Daily inspection

Basically, check for the following faults during operation.

- (1) Motor operation fault
- (2) Improper installation environment
- (3) Cooling system fault
- (4) Unusual vibration and noise
- (5) Unusual overheat and discoloration

During operation, check the inverter input voltages using a tester.

### 8-1-2 Periodic inspection

Check the areas inaccessible during operation and requiring periodic inspection.

Consult us for periodic inspection.

- (1) Check for cooling system fault ..... Clean the air filter, etc.
- (2) Tightening check and retightening..... The screws and bolts may become loose due to vibration, temperature changes, etc.
- (3) Check the conductors and insulating materials for corrosion and damage.
- (4) Measure insulation resistance.
- (5) Check and change the cooling fan and relay.

### 8-1-3 Daily and periodic inspection

| Inspection item                 | Description  | Corrective Action at Alarm Occurrence                                      |
|---------------------------------|--|--|
| Surrounding environment         | Check the ambient temperature, humidity, dirt, corrosive gas, oil mist, etc.   | Improve environment  |
| Overall unit                    | Check for unusual vibration and noise  | Check alarm location and retighten   |
| Power supply voltage            | Check that the main circuit voltages and control voltages are normal.  | Inspect the power supply   |
| General                         | <ol style="list-style-type: none"> <li>1. Check with megger (across main circuit terminals and earth terminal).</li> <li>2. Check for loose screws and bolts.</li> <li>3. Check for overheat traces on the parts.</li> <li>4. Check for stain</li> </ol> | Contact the manufacturer<br>Retighten<br>Contact the manufacturer<br>Clean |
| Aluminum electrolytic capacitor | <ol style="list-style-type: none"> <li>1. Check for liquid leakage in a capacitor and deformation trace</li> <li>2. Visual check and judge by the life check of the control circuit capacitor.</li> </ol>  | Contact the manufacturer   |
| Cooling system                  | Air filter, fan, etc.  | Clean  |
| Load motor                      | Check for vibration and abnormal increase in operation noise   | Stop the device and contact the manufacturer                               |

### 8-2 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             | Standard replacement interval | Description           |
|-----------------------|-------------------------------|-----------------------|
| Cooling fan           | 3-5 years                     | Replace (as required) |
| Smoothing capacitor   | 5 years                       | Replace (as required) |
| Fuse (18.5kw or more) | 10 years                      | Replace (as required) |
| Relays                | ---                           | as required           |

Replacement years for when the yearly average ambient temperature is 40°C (Without corrosive gas, flammable gas, oil mist, dust and dirt etc.)

### 8-3 Trouble shooting

When an alarm (major failures) occurs in the inverter, the protective function is activated bringing the inverter to an alarm stop and the operation panel display automatically changes to any of the following error (alarm) indications.

If your fault does not correspond to any of the following errors or if you have any other problem, please contact your sales representative.

- Alarm display..... when the protective function is activated, the operation panel display automatically switches to the above indication.
- Resetting method.....when the protective function is activated, the inverter output is kept stopped. Unless reset, therefore, the inverter cannot restart.
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation. Not doing so may lead to the inverter fault and damage.

List of alarm display

| Operation Panel Indication | Name                               | Possible fault reason   | Corrective action   |
|----------------------------|------------------------------------|---|---|
| OC0                        | Over current during stop           | 1: Inverter fault   | Please contact your sales representative.   |
| OC1                        | Over current during acceleration   | 1: Acceleration time is too short<br>2: V/F curve is not set correctly<br>3: Motor or motor wire have short circuit to the ground<br>4: The torque boost is set too fast<br>5: The input voltage is too low<br>6: Directly start up the running motor<br>7: The inverter setting is not correct<br>9: The inverter fails                            | 1: Increase acceleration time<br>2: Correctly set V/F curve.<br>3: Check the insulation of motor and motor wire.<br>4: Reduce the value of torque boost.<br>5: Check input voltage<br>6: Check the load<br>7: Set tracing startup<br>8: Enlarge capacity of inverter<br>9: Sent for repairing |
| OC2                        | Over current during deceleration   | 1: Decelerate time is too short<br>2: Inverter capacity is inappropriately set<br>3: Whether there is any disturbing  | 1: Increase deceleration time<br>2: Enlarge inverter capacity<br>3: Solve disturbing resource   |
| OC3                        | Over current during constant speed | 1: The insulation of motor and motor wire is not good<br>2: Load fluctuation<br>3: Fluctuation of input voltage and the voltage is low<br>4: Inverter capacity is inappropriately set<br>5: Whether there is a large power motor starting up and leads the input voltage goes down<br>6: Whether there is a disturbing resource to disturb inverter | 1: Check the insulation of motor and motor wire<br>2: Check load situation and mechanical lubrication<br>3: Check input voltage<br>4: Enlarge the capacity of inverter<br>5: Increase capacity of transformer<br>6: Solve disturbing resource   |

| Operation Panel Indication | Name                               | Possible fault reason   | Corrective action   |
|----------------------------|------------------------------------|---|---|
| OU0                        | Over voltage during stop           | 1: The deceleration time is short<br>2: Inverter capacity incorrectly set<br>3: Disturbing  | 1: Check the power supply voltage<br>2: Sent for repairing  |
| OU1                        | Over voltage during acceleration   | 1: Abnormal power supply<br>2: Peripheral circuitry is incorrectly set (switch control on or off, etc.)<br>3: Inverter fault  | 1: Check the power supply voltage<br>2: Do not use power supply switch to control the inverter on or off<br>3: Sent for repairing   |
| OU2                        | Over voltage during deceleration   | 1: Power supply voltage abnormal<br>2: Energy feedback load<br>3: Braking resistor incorrectly set  | 1: Check the power supply voltage<br>2: Install braking unit and resistance<br>3: Affirm resistance setting again   |
| OU3                        | Over voltage during constant speed | 1: Decelerate time is too short<br>2: Power supply voltage abnormal<br>3: Over load<br>4: Braking resistor incorrectly set<br>5: Braking parameter is incorrectly set | 1: Increase deceleration time<br>2: Check the power supply voltage<br>3: Check braking unit and resistance<br>4: Set Braking resistor over again<br>5: Correctly set parameter, e.g. braking tube voltage, etc. |
| LU0                        | Under voltage during stop          | 1: Power supply voltage abnormal<br>2: Phase missing  | 1: Check the power supply voltage<br>2: Check power supply and switch whether there is phase missing  |
| LU1                        | Under voltage during acceleration  | 1: Power supply voltage abnormal  |   |
| LU2                        | Under voltage during deceleration  | 2: Phase missing  | 2: Check whether peripheral setting bad connection leads phase missing  |

| Operation Panel Indication | Name                                | Possible fault reason  | Corrective action   |
|----------------------------|-------------------------------------|--|---|
| LU3                        | Under voltage during constant speed | 3: There is large load power start up in the input   | 3: Please use independent power supply  |
| Fb0                        | Fuse broken                         | 1: The inverter fault  | Please contact your sales representative.   |
| Fb1                        |                                     |  |   |
| Fb2                        |                                     |  |   |
| Fb3                        |                                     |  |   |
| OL0 during stop            | Inverter overload                   | 1: Overload<br>2: Acceleration time is too short<br>3: Torque boost is too fast<br>4: V/F curve incorrectly set<br>5: Under voltage of input<br>6: Before motor stops, inverter starts up<br>7: Fluctuation or blocking in loading                 | 1: Reduce the load weight or replace larger capacity inverter.<br>2: Increase acceleration time<br>3: Reduce torque boost rate<br>4: Set V/F curve over again<br>5: Check input voltage, increase inverter capacity<br>6: Adopt tracing startup mode<br>7: Check load condition |
| OL1 during acceleration    |                                     |  |   |
| OL2 during deceleration    |                                     |  |   |
| OL3 during constant speed  |                                     |  |   |
| OT0 during stop            | Motor overload                      | 1: The motor for use under overload<br>2: Acceleration time is too short<br>3: Motor protection setting is too small<br>4: V/F curve is incorrectly set<br>5: Torque boost is too fast<br>6: Bad motor insulation<br>7: Motor setting is too small | 1: Reduce the load weight.<br>2: Increase acceleration time<br>3: Increase protection setting<br>4: Correctly set V/F curve<br>5: Reduce torque boost rate<br>6: Check motor insulation and replace motor<br>7: Use larger inverter or motor                                    |
| OT1 during acceleration    |                                     |  |   |
| OT2 during deceleration    |                                     |  |   |
| OT3 during constant speed  |                                     |  |   |

| Operation Panel Indication | Name                  | Possible fault reason  | Corrective action   |
|----------------------------|-----------------------|--|---|
| OH0 during stop            | Inverter<br>overheat  | 1: Cooling fan broken<br>2: Heatsink clogging<br>3: The ambient temperature is high  | 1: Replace the cooling fan.<br>2: Clean thr heatsink<br>3: Set the ambient temperature to within the specifications.    |
| OH1 during acceleration    |                       |  |   |
| OH2 during deceleration    |                       |  |   |
| OH3 during constant speed  |                       |  |   |
| ES                         | Emergency stop        | 1: Inverter is in Emergency stop condition   | 1: After release Emergency stop, start up as regular procedure  |
| CO                         | Communication error   | 1: Communication line connection has problem<br>2: Communication parameter is incorrectly set<br>3: Transmission format is wrong | 1: Perform wiring of the RS-485 terminals properly.<br>2: Set parameter over again<br>3: Check data transmission format |
| 20                         | 4-20mA wire broken    | 1: Terminal is loose; signal input line is bad connected   | 1: Perform wiring of the 4-20mA terminals properly.   |
| Pr                         | Parameter write error | Parameter setting is wrong   | After stopping operation, make parameter setting.   |
| Err                        | Wrong parameter group | The parameter does not exist or the factory setting parameter  | Quit this parameter   |

### 8-3 Check first when you have troubles

If the causes is still unknown after every check, it is recommended to initialize the parameters (initial value) then reset the required parameter values and check again.

(1) Parameter write cannot be performed

Causes and corrective actions:

a: Check F1.18 parameter write selection.

b: Check F1.01Frequency setting/F1.02 Operation mode setting

selection.

c: Make sure that operation is not being performed. Please stop the inverter and set.

(2) Motor does not rotate as commanded

Causes and corrective actions:

a: Check that the F1.02 Operation mode selection setting is correct.

b: Check that the starting frequency setting is not greater than the running frequency.

c: Check the main circuit and control circuit.

d: Check that the output stop signal or reset signal is not on.

e: Check that F1.04 Reverse rotation prevention selection is not selected.

f: Check that frequency setting of each running frequency (such as multi-speed operation) are not zero.

g: Check that especially the F1.05 Maximum frequency setting is not zero.

h: Check that the F4.00 Jog frequency setting is not lower than the F2.02 starting frequency setting.

i: Check that the load is not too heavy.

(3) Motor generates heat abnormally

Causes and corrective actions:

a: Check that the load is not too heavy. Lighten the load.

b: Is the fan for the motor is running? (check for accumulated dust.)

c: Check that the F2.08 Torque boost setting is correct.

d: Was the motor type set? Check the setting of F2.09 to F2.19 applied motor.

e: When using any other manufacturer's motor, perform offline auto tuning.

(4) Motor generates abnormal noise

Causes and corrective actions:

a: No carrier frequency noises (metallic noises) are generated.

Check the setting of F1.15 applied motor.

b: Check for any mechanical looseness.

c: Contact the motor manufacturer.

(5) Motor rotates in opposite direction

Causes and corrective actions:

a: Check that the phase sequence of output terminals U,V and W is correct.

b: Check that the start signals (forward rotation, reverse rotation) are connected properly.

(6) Speed does not increase

Causes and corrective actions:

a: Check that the maximum frequency (F1.05) setting is correct. (If you want to run the motor at 120Hz or more, set F1.05 High speed maximum frequency.)

b: Check that the load is not too heavy. (In agitators, etc, load may become heavier in winter.)

c: Check that the brake resistor is not connected to terminals P/+ -P/- accidentally.

(7) Inverter may interfere with other devices.

Causes and corrective actions:

The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices used near the inverter. In this case, set EMC filter valid to minimize interference.

a: Decrease carrier frequency (F1.15).

b: Install a noise filter on the inverter output side to reduce the electromagnetic noise generated from the inverter.

c: Install a noise filter on the inverter input side.

d: For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth cable by returning it to the earth terminal of the inverter.

e: To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables.

f: Control circuit cable should use shielded cable, and the cable should be installed in metal tube

## **8-4 Inverter-generated noises and their reduction techniques**

Some noises enter the inverter to malfunction it and others are

radiated by the inverter to malfunction peripheral devices. Though the inverter is designed to be insusceptible to noises, it handles low-level signals, so it requires the flowing basic techniques. Also, since the inverter chops outputs at high carrier frequency, that could generate noises. If these noises cause peripheral devices to malfunction, measures should be taken to suppress noises. These techniques differ slightly depending on noise propagation paths.

① Basic techniques

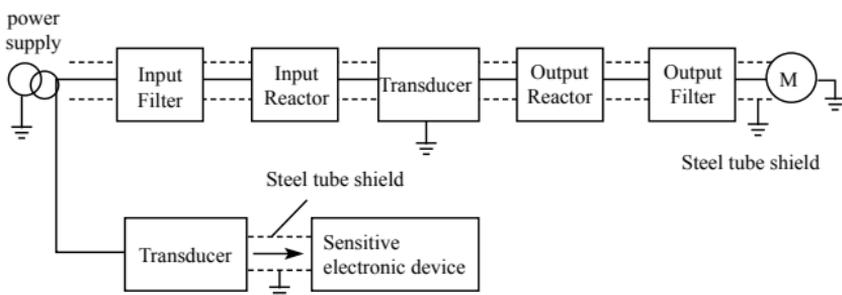
- Do not run the power cables (I/O cables) and signal cables of the inverter in parallel with each other and do not bundle them.
- Use twisted pair shielded cables for the detector connection and control signal cables, and connect the sheathes of the shield cables to terminal SC.
- Earth the inverter, motor, etc, at one point.

② Techniques to reduce noises that enter and malfunction the inverter

When devices that generate many noises (which use magnetic contactors, magnetic brakes, many relays, for example) are installed neat the inverter and the inverter may be malfunctioned by noises, the following measures must be taken:

- Provide surge suppressors for devices that generate many noises to suppress noises.
- Fit data line filters to signal cables.
- Earth the shields of the detector connection and control signal cables with Cable clamp metal.

③ Noise reduction examples



# Chapter 9 Peripheral Devices Selection

Check the motor capacity of the inverter you purchased. Appropriate peripheral devices must be selected according to the capacity. Refer to the following list and prepare appropriate peripheral devices:

## 9-1 Peripheral Devices Description

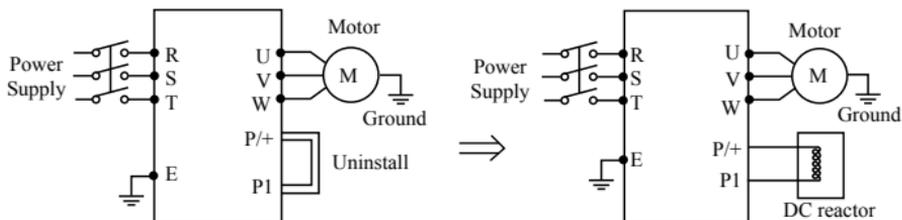
| Peripheral Devices Name  | Description   |
|--|---|
| Moulded case circuit break (MCCB) or earth leakage circuit break (ELB), fuse | The breaker must be selected carefully since an In-rush current flows in the inverter at power on.  |
| Magnetic contactor (MC)  | Install the MC to ensure safety.<br>Do not use this MC to start and stop the inverter. Doing so will cause the inverter life to be shortened.   |
| AC/DC Reactor  | Reactor (option) should be used when power harmonics measures are taken, the power factor is to be improved or the inverter is installed near a large power supply system (1000KVA or more). The inverter may be damaged if you do not use reactors. Select the reactor according to the model. For the 160KW or less, remove the jumpers across terminals P/+--P/- to connect to the DC reactor. For the 185KW or more, a DC reactor is supplied. Please always install the reactor. |
| Noise filter   | Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. When more wires are passed through, a more effective result can be obtained.   |
| Brake resistor and brake unit  | To improve the brake capability at deceleration.  |
| Ferrite ring   | To reduce the disturbance which is generated by inverter  |

## 9-2 Applied DC reactor Specification

| Applicable Inverter Type | Motor Output (kW) | DC Reactor Selection |                       |
|--------------------------|-------------------|----------------------|-----------------------|
|                          |                   | Rated current (A)    | Inductance value (mH) |
| EV100-4T-0370-G          | 37                | 100                  | 0.7                   |
| EV100-4T-0450-G          | 45                | 120                  | 0.58                  |
| EV100-4T-0550-G          | 55                | 146                  | 0.47                  |
| EV100-4T-0750-G          | 75                | 200                  | 0.35                  |
| EV100-4T-0900-G          | 90                | 240                  | 0.29                  |
| EV100-4T-1100-G          | 110               | 290                  | 0.24                  |
| EV100-4T-1320-G          | 132               | 330                  | 0.215                 |
| EV100-4T-1600-G          | 160               | 395                  | 0.177                 |
| EV100-4T-2000-G          | 200               | 495                  | 0.142                 |
| EV100-4T-2200-G          | 220               | 557                  | 0.126                 |
| EV100-4T-2800-G          | 280               | 700                  | 0.10                  |
| EV100-4T-3000-G          | 300               | 800                  | 0.08                  |
| EV100-4T-3150-G          | 315               | 800                  | 0.08                  |

Install connection:

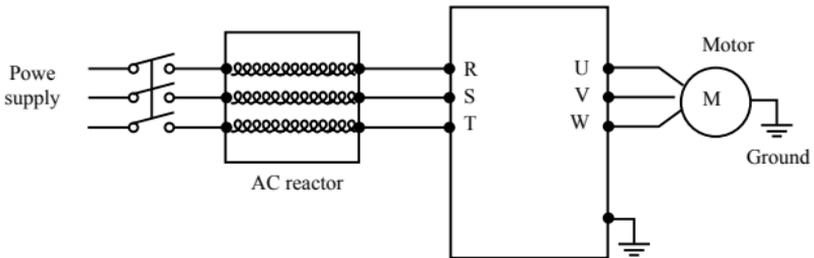
## 9-3 Applied AC reactor Specification



| Applicable Inverter Type | Motor Output (kW) | AC Reactor Selection |                       |
|--------------------------|-------------------|----------------------|-----------------------|
|                          |                   | Rated current (A)    | Inductance value (mH) |
| EV100-4T-0110-G          | 11                | 24                   | 0.52                  |
| EV100-4T-0150-G          | 15                | 34                   | 0.397                 |
| EV100-4T-0180-G          | 18.5              | 38                   | 0.352                 |
| EV100-4T-0220-G          | 22                | 50                   | 0.26                  |

| Applicable Inverter Type | Motor Output (kW) | AC Reactor Selection |                       |
|--------------------------|-------------------|----------------------|-----------------------|
|                          |                   | Rated current (A)    | Inductance value (mH) |
| EV100-4T-0300-G          | 30                | 60                   | 0.24                  |
| EV100-4T-0370-G          | 37                | 75                   | 0.235                 |
| EV100-4T-0450-G          | 45                | 91                   | 0.17                  |
| EV100-4T-0550-G          | 55                | 112                  | 0.16                  |
| EV100-4T-0750-G          | 75                | 150                  | 0.112                 |
| EV100-4T-0900-G          | 90                | 180                  | 0.10                  |
| EV100-4T-1100-G          | 110               | 220                  | 0.09                  |
| EV100-4T-1320-G          | 132               | 265                  | 0.08                  |
| EV100-4T-1600-G          | 160               | 300                  | 0.07                  |
| EV100-4T-2000-G          | 200               | 360                  | 0.06                  |
| EV100-4T-2200-G          | 220               | 400                  | 0.05                  |
| EV100-4T-2800-G          | 280               | 560                  | 0.03                  |
| EV100-4T-3000-G          | 300               | 640                  | 0.0215                |
| EV100-4T-3150-G          | 315               | 640                  | 0.0215                |

Installation:



#### 9-4 Applied Braking resistor Specification

| Applicable Inverter Type | Brake resistor |                           | Brake Unit CDBR | Brake Torque (10% ED) | Motor Output (kW) | Remark |
|--------------------------|----------------|---------------------------|-----------------|-----------------------|-------------------|--------|
|                          | Power (W)      | Resistance value $\Omega$ |                 |                       |                   |        |
| EV100-2S-0004-G          | 80             | 200                       | Embedded        | 125                   | 0.4               |        |
| EV100-2S-0007-G          | 100            | 200                       | Embedded        | 125                   | 0.75              |        |
| EV100-2S-0015-G          | 300            | 100                       | Embedded        | 125                   | 1.5               |        |

| Applicable Inverter Type | Brake resistor |                           | Brake Unit CDBR | Brake Torque (10% ED) | Motor Output (kW) | Remark        |
|--------------------------|----------------|---------------------------|-----------------|-----------------------|-------------------|---------------|
|                          | Power (W)      | Resistance value $\Omega$ |                 |                       |                   |               |
| EV100-2S-0022-G          | 300            | 70                        | Embedded        | 125                   | 2.2               |               |
| EV100-4T-0007-G          | 80             | 750                       | Embedded        | 125                   | 0.75              |               |
| EV100-4T-0015-G          | 300            | 400                       | Embedded        | 125                   | 1.5               |               |
| EV100-4T-0022-G          | 300            | 250                       | Embedded        | 125                   | 2.2               |               |
| EV100-4T-0037-G          | 400            | 150                       | Embedded        | 125                   | 3.7               |               |
| EV100-4T-0055-G          | 500            | 100                       | Embedded        | 125                   | 5.5               |               |
| EV100-4T-0075-G          | 1000           | 75                        | Embedded        | 125                   | 7.5               |               |
| EV100-4T-0110-G          | 1000           | 50                        | Embedded        | 125                   | 11                |               |
| EV100-4T-0150-G          | 1500           | 40                        | Embedded        | 125                   | 15                | Plastic shell |
| EV100-4T-0150-G          | 1500           | 40                        | 4030×1          | 125                   | 15                | Steel shell   |
| EV100-4T-0180-G          | 4800           | 32                        | 4030×1          | 125                   | 18.5              |               |
| EV100-4T-0220-G          | 4800           | 27.2                      | 4030×1          | 125                   | 22                |               |
| EV100-4T-0300-G          | 6000           | 20                        | 4030×1          | 125                   | 30                |               |
| EV100-4T-0370-G          | 9600           | 16                        | 4045×1          | 125                   | 37                |               |
| EV100-4T-0450-G          | 1600           | 13.6                      | 4045×1          | 125                   | 45                |               |
| EV100-4T-0550-G          | 6000×2         | 20×2                      | 4045×2          | 125                   | 55                |               |
| EV100-4T-0750-G          | 9600×2         | 13.6×2                    | 4045×2          | 125                   | 75                |               |
| EV100-4T-0900-G          | 9600×3         | 20×3                      | 4045×3          | 125                   | 90                |               |
| EV100-4T-1100-G          | 9600×4         | 20×3                      | 4045×3          | 125                   | 110               |               |
| EV100-4T-1320-G          | 9600×4         | 13.6×4                    | 4045×4          | 125                   | 132               |               |

| Applicable Inverter Type | Brake resistor |                           | Brake Unit CDBR | Brake Torque (10% ED) | Motor Output (kW) | Remark |
|--------------------------|----------------|---------------------------|-----------------|-----------------------|-------------------|--------|
|                          | Power (W)      | Resistance value $\Omega$ |                 |                       |                   |        |
| EV100-4T-1600-G          | 9600×5         | 13.6×4                    | 4045×4          | 125                   | 160               |        |
| EV100-4T-1850-G          | 9600×5         | 13.6×5                    | 4045×5          | 125                   | 185               |        |
| EV100-4T-2000-G          | 9600×5         | 13.6×5                    | 4045×5          | 125                   | 200               |        |
| EV100-4T-2200-G          | 9600×5         | 13.6×5                    | 4045×5          | 125                   | 220               |        |
| EV100-4T-3000-G          | 9600×6         | 13.6×6                    | 4045×6          | 125                   | 315               |        |

Calculate of Braking resistor value:

The Braking resistor value is related to the DC currency when the inverter braking. For 380V power supply, the braking DC voltage is 800V-820V, and for 220V system, the DC voltage is 400V.

$$R = \frac{U_{dc}^2 \times 100}{P_{Motor} \times M_{br}\% \times \eta_{Transducer} \times \eta_{Motor}}$$

Thereinto:  $U_{dc}$  — Braking DC voltage;

$P_{Motor}$  — Motor power;

$M_{br}$  — Braking torsion;

$\eta_{Motor}$  — Motor efficiency;

$\eta_{Transducer}$  — Transducer efficiency.

The braking power is related to braking torque and braking frequency. the foregoing illustration gives the braking torque as 125% and the frequency is 10%, and according to the different loading situations, the numbers in the illustration are for reference.



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