## Preface

Thank you for purchasing FR30 series vector control inverter developed and produced by FRECON.

FR30 series vector control inverter is mainly positioned for OEM customers in the middle and high-end market and specific requirements of the fan, water pump load applications, its design is flexible, embedded SVC, VF control in one, can be widely used in speed control accuracy, torque response speed, low frequency output characteristics have higher requirements for applications.

This user manual INTRODUCES THE PRODUCT features, structure features, parameter setting, operation and debugging, maintenance and inspection of FR30 series vector control inverter in detail. Please carefully read the safety precautions in this manual before use, and use the product under the premise of ensuring the safety of people and equipment.

| IMPORTANT NOTES |
| --- |
| ◆ In order to explain the details of the product, the legend in this manual sometimes refers to the condition of removing the outer cover or safety cover. When using this product, please be sure to install the shell or cover according to the regulations, and operate according to the contents of the manual. ◆ The legend in this manual is for illustration only and may be different from the product you ordered. ◆ The company is committed to the continuous improvement of products, product functions will continue to upgrade, the provided information is subject to change without notice. ◆ If you have any problem, please contact our regional agents or our customer service center. Customer service Tel :0755-88605930. ◆ Please refer to our website for other product information. http://www.frecon.com.cn |

# Contents

# Chapter 1 Product Information

## 1.1 Nameplate information



**Fig.1-1 Nameplate information**

**Model Explanation**

Model show on product nameplate contains information below.

# FR30□-4T-7.5B

**Product Series Code:**
**FR30: Vector control inverter**

**Industry-specific series code:**
**Null: Standard machine**
**A~Z: Industry-specific reservations**

**Input voltage level:**
**4: 380V(-15%~+30%)**

**Brake unit:**
**Empty: No built-in brake unit**
**B: Built-in brake unit (built-in under 30kW, optional built-in 37~110kW, no built-in above 110kW)**

**Suitable motor power and model:**
**7.5G: 7.5kW (general-purpose model)**
**011P: 11kW (fan, pump model)**

**Input voltage phase number:**
**S: Single phase**
**T: Three-phase**

**Fig.1-2 Model Explanation**

## 1.2 Information of Product Model

**Table 1-1 FR30 T Product model and technical data**

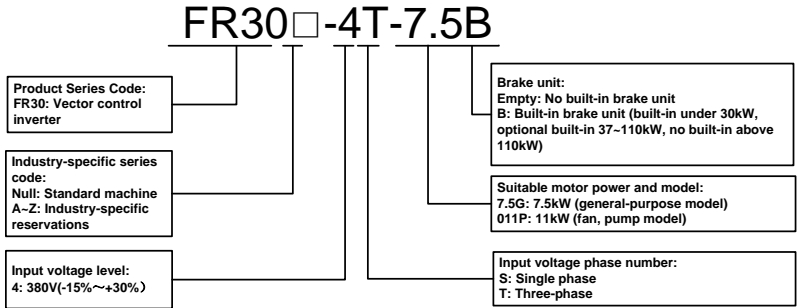| volume | Model No. | Power capacity KVA | LD light load application | | HD reloads the application | | Applicable motor | |
|---|---|---|---|---|---|---|---|---|
| | | | incoming currentA | current outputA | incoming curreA | current outpuA | kW | HP |
| | | 3-Phase:380V，50/60Hz　Range:-15%～+30% | | | | | | |
| T1 | FR30-4T-0.7B | 1.5 | 1.7 | 2.5 | 0.9 | 1.5 | 0.75 | 1 |
| | FR30-4T-1.5B | 3 | 3.1 | 4.2 | 1.7 | 2.5 | 1.5 | 2 |
| | FR30-4T-2.2B | 4 | 4.5 | 5.5 | 3.1 | 4.2 | 2.2 | 3 |
| | FR30-4T-3.0B | 4.8 | 6.0 | 7.5 | 4.5 | 5.5 | 3.0 | 4 |
| | FR30-4T-4.0B | 6 | 8 | 9.5 | 6.0 | 7.5 | 4.0 | 5 |
| T2 | FR30-4T-5.5B | 8.9 | 10.5 | 13 | 8 | 9.5 | 5.5 | 7.5 |
| | FR30-4T-7.5B | 11 | 14.1 | 17 | 10.5 | 13 | 7.5 | 10 |
| T3 | FR30-4T-011B | 17 | 20.6 | 25 | 14.1 | 17 | 11 | 15 |
| | FR30-4T-015B | 21 | 27.7 | 32 | 20.6 | 25 | 15 | 20 |
| T4 | FR30-4T-018B | 24 | 34.1 | 37 | 27.7 | 32 | 18.5 | 25 |
| | FR30-4T-022B | 30 | 40.5 | 45 | 34.1 | 37 | 22 | 30 |
| | FR30-4T-030B | 40 | 54.8 | 60 | 40.5 | 45 | 30 | 40 |
| T5 | FR30-4T-037(B) | 57 | 67.1 | 75 | 54.8 | 60 | 37 | 50 |
| | FR30-4T-045(B) | 69 | 81.4 | 91 | 67.1 | 75 | 45 | 60 |
| T6 | FR30-4T-055(B) | 85 | 98.9 | 112 | 81.4 | 91 | 55 | 70 |
| | FR30-4T-075(B) | 114 | 134.3 | 150 | 98.9 | 112 | 75 | 100 |
| T7 | FR30-4T-090(B) | 134 | 170 | 176 | 134.3 | 150 | 90 | 125 |
| | FR30-4T-110(B) | 160 | 201 | 210 | 170 | 176 | 110 | 150 |
| T8 | FR30-4T-132 | 192 | 237 | 253 | 201 | 210 | 132 | 175 |
| | FR30-4T-160 | 231 | 284 | 304 | 237 | 253 | 160 | 210 |

## 1.3 Technical Features

**Table 1-2 Technical features**

| project | | specification |
|---|---|---|
| Power input | Rated input voltage (V) | 3-phase 380 V (-15%～+30%) |
| | Rated input current (A) | See table 1-1 |
| | Rated input frequency (Hz) | 50Hz/60Hz，tolerance±5% |
| Power output | Applicable motor(kW) | See table 1-1 |
| | Rated output current (A) | See table 1-1 |
| | The maximum output voltage (V) | 0～rated input voltage, error<±3% |
| | The maximum output frequency (Hz) | 0.00～599.00 Hz,unit0.01Hz |
| Control characteristics | V/F patterns | V/F control<br>No PG vector control 1<br>No PG vector control 2 |
| | Speed range | 1:50 (V/f control)<br>1:100 (sensor-less vector control 1)<br>1:200（sensor-less vector control 2） |
| | Speed accuracy | ±0.5% (V/F control)<br>±0.2% (sensor-less vector control 1 & 2) |
| | Speed fluctuation | ±0.3% (sensor-less vector control 1 & 2) |
| | Torque response | < 10ms (sensor-less vector control 1 & 2) |
| | Starting torque | 1Hz: 150% (V/F control, no PG vector control 1)<br>0.25Hz: 150% (without PG vector control 2) |
| Basic function | Carrier frequency | 0.7kHz～16kHz |
| | Overload capacity | Heavy duty applications:<br>150% rated current allowed to last 60S every 5min<br>Light load applications: |

| | | 110% rated current allows 60S per 5min |
|---|---|---|
| | Torque boost | Automatic torque boost; Manual torque increase 0.1%~30.0% |
| | V/F curve | Three ways: straight; multi-point type; N Th-type V / F curve (1.2 Th -type, 1.4 Th -type, 1.6 Th -type, 1.8 Th -type, 2 Th –type) |
| | Acceleration and deceleration Curve | Line or curve acceleration and deceleration mode. Four kinds of acceleration and deceleration time，Ramp Time Range :0.0~6000.0s |
| | DC brake | DC brake start frequency: 0.00~599.00Hz DC brake time:0.0s~10.0s DC brake current:0.0%~150.0% |
| Basic function | Jog brake | Jog frequency range:0.00Hz~50.00Hz. Jog deceleration time: 0.0s~6000.0s. |
| | Simple PLC, Multi-speed | Through the built-in PLC or control terminal to achieve up to 16 speed running |
| | Built-in PID | Facilitate the realization of process control loop control system |
| | Automatic voltage adjustment（AVR） | When the grid voltage changes, can automatically maintain a constant output voltage |
| | Fast current limit function | Minimize over current fault protection inverter running |
| | Over voltage Over current | System automatically limits of current and voltage during operation to prevent frequent |
| Run | Command source | Given the control panel, control terminal, serial communication port given. |
| | Frequency given | 7 kinds of frequency sources: digital setting, keyboard potentiometer setting, analog Voltage, given analog current reference pulse is given, the serial port is given, multi-speed given, PLC is given, the process PI D reference. There are several ways to switch |
| | Input terminal | 7 Switch input terminals, one way to make high-speed pulse input. 3-channel analog inputs, including 2-way 0~10V / 0~20mA voltage and current options, a way to support -10~+10 V input |
| | output terminal | 2-way switch output terminal, which supports a maximum road speed 100kHz pulse output. 2 relay output terminals. 2 analog output terminal, and optional voltage and current. |
| Featured functions | | Parameter copy, parameter backup, flexible parameter displayed & hidden. Common DC bus（Contains below 30 KW）. Various master & auxiliary command and switchover. Reliable speed search started. A variety of Accel / Decel curves programmable. Timing control,　fixed length control, count function. Three faults recorded. Over excitation brake, overvoltage stall protection programmable, under voltage stall protection programmable, restart upon power loss. Four kinds of Accel/Decel time. Motor thermal protection. Flexible fan control. Process PID control, simple PLC, 16-step speed control programmable. Wobble frequency control. Multi-functional key programmable, field-weakening control. |

| | | | |
|---|---|---|---|
| | High-precision torque control, V/f separated control, torque control at sensor-less vector control. | | |
| Protection function | Provide more than a dozen fault protection functions: overcurrent, overvoltage, undervoltage, overtemperature, overload and other protection functions. Braking resistor short-circuit protection | | |
| Display and keyboard | LCD display | Chinese/English prompts for operation content | |
| | Copy of parameters | Fast reproduction of parameters via LCD panel | |
| | Key lock and function selection | Realize some or all of the keys locked, scope definition section keys to prevent misuse | |
| | Run and stop monitoring information | In the run or stop can be set to monitor U00 group four objects were. | |
| Environment | Place of operation | Indoors, no direct sunlight, free from dust, corrosive gases, flammable gases, oil mist, water vapor, water drop and salt, etc. | |
| | Altitude | 0～3000m De-rate 1% for every 100m when the altitude is above 1000 meters | |
| | Ambient temperature | -10℃～50℃　If it exceeds 40℃, it should be derated by 1.5% for every 1℃ increase | |
| | Relative humidity | 5～95%, no condensation | |
| | Vibration | Less than 5.9m/s2 (0.6g) | |
| | Storage temperature | -20℃～+70℃ | |
| Others | Efficiency | 93% ≥ at rated power | |
| | Installation method | Wall or rail mounting | |
| | Degree of protection | IP20 | |
| | Cooling method | Forced air cooling | |
| | Overvoltage level | OVCⅢ | |
| | Pollution level | PD2 | |
| | EMC filter | Below 45kW, meet the requirements of C2 level (motor line 50m); Above 55kW, meet the requirements of C3 level (motor line 150m); | |
| | Brake unit | Built-in under 30kW, 37kW-110kW is optional | |

## 1.4 Configuration, Mounting Dimensions and Weight

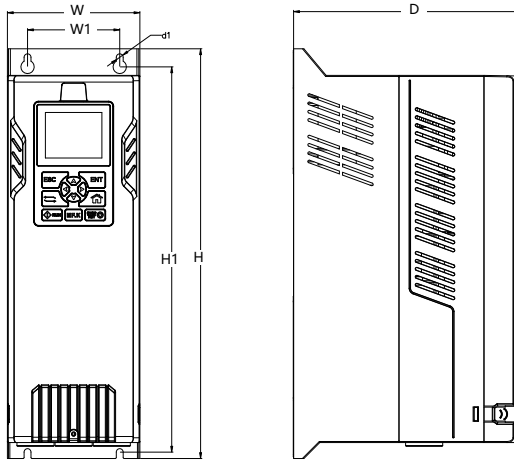◆7.5KW Dimensions and wall mounting dimensions (scheme One):



**Figure 1-3 Schematic diagram of 7.5kW wall mounting**

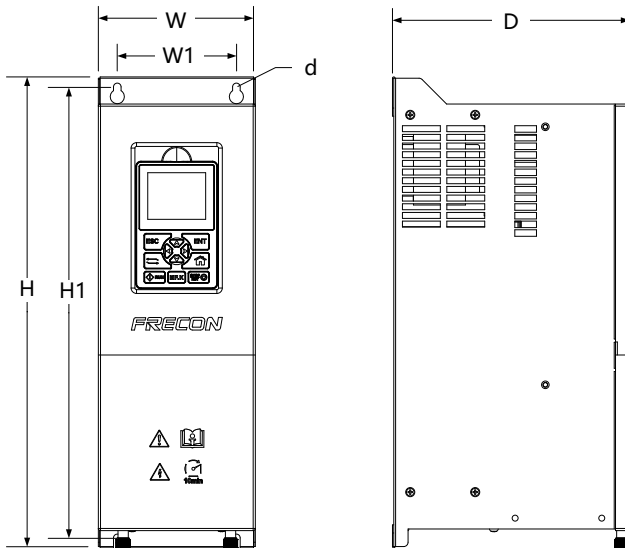◆75KW Dimensions and wall mounting dimensions (scheme One):



**Figure 1-4 Schematic diagram of 75kW wall mounting**

Table 1-3 Product size

| vol | Inverter model | Shape and installation size (mm) | | | | | | weight（Kg） | structure type |
|---|---|---|---|---|---|---|---|---|---|
| | | W | W1 | H | H1 | D | d | | |
| Three-phase power supply: 380V, 50/60Hz Range: -15%~+30% | | | | | | | | | |
| T1 | FR30-4T-0.7B | | | | | | | | plastic |
| | FR30-4T-1.5B | | | | | | | | |
| | FR30-4T-2.2B | | | | | | | | |
| | FR30-4T-3.0B | | | | | | | | |
| | FR30-4T-4.0B | | | | | | | | |
| T2 | FR30-4T-5.5B | 125 | 87 | 385 | 371 | 214 | 6.5 | 5.34 | plastic |
| | FR30-4T-7.5B | | | | | | | | |
| T3 | FR30-4T-011B | 145 | 110 | 423 | 416 | 220 | 6.5 | 14 | Sheet metal |
| | FR30-4T-015B | | | | | | | | |
| T4 | FR30-4T-018B | 195 | 150 | 485.4 | 470 | 232 | 7.0 | 19 | Sheet metal |
| | FR30-4T-022B | | | | | | | | |
| | FR30-4T-030B | | | | | | | | |
| T5 | FR30-4T-037(B) | 210 | 150 | 588.4 | 570 | 258 | 7.0 | 23 | Sheet metal |
| | FR30-4T-045(B) | | | | | | | | |
| T6 | FR30-4T-055(B) | 250 | 200 | 550 | 534 | 368.8 | 6.5 | 31.54 | Sheet metal |
| | FR30-4T-075(B) | | | | | | | | |
| T7 | FR30-4T-090(B) | | | | | | | | Sheet metal |
| | FR30-4T-110(B) | | | | | | | | |
| T8 | FR30-4T-132 | | | | | | | | Sheet metal |
| | FR30-4T-160 | | | | | | | | |

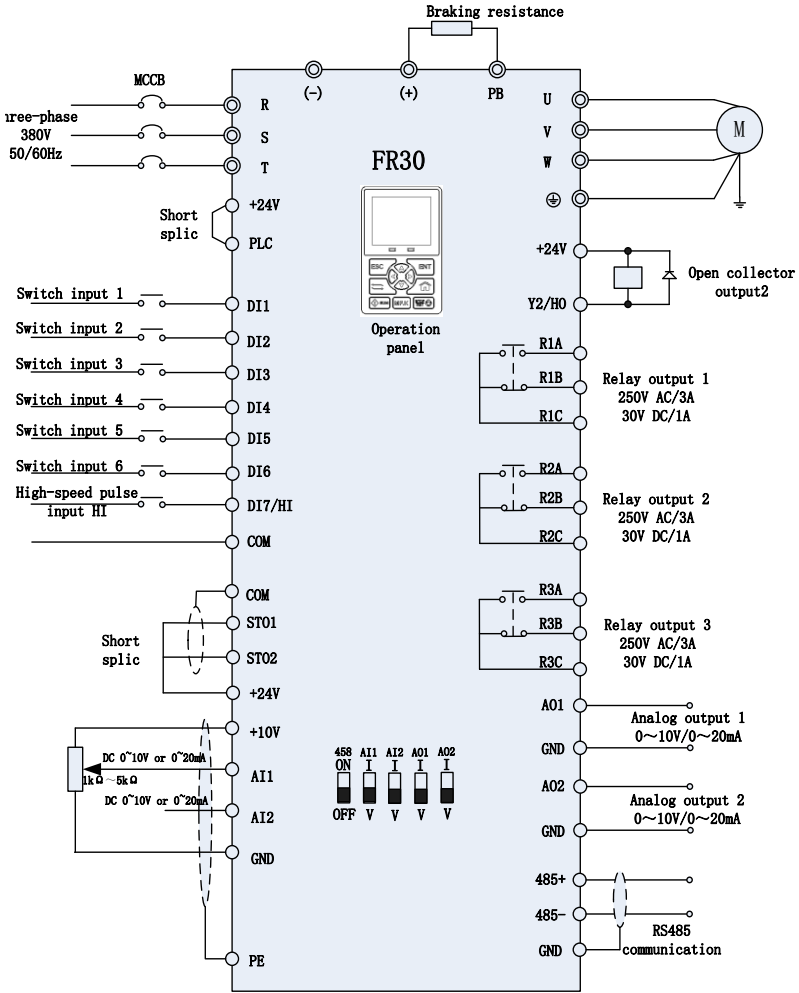## 1.5 Product terminal configuration



**Figure 1-6 Schematic diagram of FR30 inverter wiring**

Table 1-4 Main circuit terminal function of inverter

| Terminal marks | Designation and function of terminals. |
|---|---|
| R, S, T | AC power input terminals for connecting to 3-phase AC380V power supply. |
| U, V, W | AC output terminals of inverter for connecting to 3-phase induction motor. |
| (+), (-) | Positive and negative terminals of internal DC bus. |
| PB | Positive and negative terminals of internal DC bus. Connecting terminals of braking resistor. One end connected to + and the other to PB. |
| ⏚ | Grounding terminal. |

Remarks: No phase sequence requirements on wiring of the input side of inverter. Wiring

Table 1-5 Inverter control loop terminal function

| Type | Terminal | Name | Function Description |
|---|---|---|---|
| Power supply | +10V-GND | External +10 V power supply | Provide +10 V power supply to external unit. Generally, it provides power supply to external potentiometer with resistance range of 1–5 kΩ. Maximum output current: 10 mA |
| | +24V-COM | External +24V power supply Applying to Overvoltage Category II circuit | Provide +24 V power supply to external unit. Generally, it provides power supply to DI/Do terminals and external sensors. Maximum output current: 200 mA (GND below 4.0kW) |
| | PLC | Input terminal of external power supply | Connect to +24 V by default. When DI1-DI7 need to be driven by external signal, PLC needs to be connected to external power supply and be disconnected from +24 V. |
| Analog input | AI1-GND | Analog input 1 | Input voltage range: DC 0～10V/0～20mA，decided by toggle switches AI1, AI2 on the control board Impedance: 250 kΩ (voltage input), 250 Ω (current input) |
| | AI2-GND | Analog input 2 | |
| | AI3-GND | Analog input 3 | Input Voltage Range: DC -10～+10V Input impedance:250kΩ |
| Switch input | DI1- COM | Switch input terminals 1 | Maximum input frequency:200Hz Impedance:2.4kΩ Voltage range for level input:9V～30V (GND below 4.0kW) |
| | DI2- COM | Switch input terminals 2 | |
| | DI3- COM | Switch input terminals 3 | |
| | DI4- COM | Switch input terminals 4 | |
| | DI5- COM | Switch input terminals 5 | |
| | DI6- COM | Switch input terminals 6 | |
| | DI7/HI-COM | Switch input terminals 7 OR | Besides features of DI1–DI6, it can be used for high-speed pulse input. |

| | | High-speed pulse input | Maximum input frequency: 100 kHz |
|---|---|---|---|
| Analog output | AO1-GND | Analog output terminal 1 | Output voltage range:DC 0～10V/0～20mA，decided by toggle switches |
| | AO2-GND | Analog output terminal 2 | AO1, AO2 on the control board Impedance requirements≥10kΩ |
| Switch output | Y1-COM | Open collector output 1 | Voltage range:0～24V Current range:0～50mA |
| | Y2/HO-COM | Open collector output 2 OR High-speed pulse output | Besides features of Y1, it can be used for High-speed pulse output channels. The maximum output frequency:100kHz |
| Relay output | R1A/R1B/R1C | RA-RC normally open terminals | Contact driving capacity: AC250V，3A，COSØ=0.4. DC 30V，1A |
| | R2A/R2B/R2C | | |
| | R3A/R3B/R3C | RB-RC normally closed terminals | |
| 485 Communication | 485+-485- | 485 Communication Terminals | Rate: 4800/9600/19200/38400/57600/115200bps Termination resistor is set by the toggle switch on the control panel RS485 |
| | GND | 485 Communication shielded ground | |
| STO | STO1 | STO channel 1 | Internal: factory STO1, STO2 are connected with +24V short splices by default; External: STO1, STO2, +24V can be externally led to the external 24V power supply, and the specific wiring can refer to STO related functions. |
| | STO2 | STO channel 2 | |
| | +24V | STO channel 1/2 power supply+ | |
| | COM | STO channel 1/2 power ground | |
| Shield | PE | Shield Ground | Ground terminal for shield |
| Auxiliary Interface | | External operation panel interface | Use standard network cable Maximum cable distance: 50m |

# Chapter 2 List of Parameter

Group F00~F17 are standard function parameters. Group U00 is status monitoring parameters. Group U01 is fault record parameters.

The symbols in the function code table are described as follows:

"△ " means the value of this parameter can be modified in stop and running status of drive;

"×" means the value of this parameter cannot be modified when drive is running;

"⊙" means this parameter is a measured value that cannot be modified;

Default: The value when restored to factory default. Neither measured parameter value nor recorded value will be restored.

Setting Range: the scope of setting and display of parameters

FR30 parameter groups are listed below:

| Category | Parameter Group |
|---|---|
| System Parameters | F00: System Parameters |
| Basic Parameters | F01: Frequency Command |
| | F02: Start/Stop Control Start/Stop Control |
| | F03: Accelerate/Decelerate    Parameters |
| Input & Output Terminals | F04: Digital Input |
| | F05: Digital Output |
| | F06: Analog and Pulse Input |
| | F07: Analog and Pulse Output |
| | F22: Virtual IO |
| Motor and Control 1Parameters | F08: Parameters of Motor 1 |
| | F09: V/f Control Parameters of Motor 1 |
| | F10: Vector Control Parameters of Motor 1 |
| Protection Parameters | F11: Protection Parameters |
| Application Parameters | F12: Multi-Reference and Simple PLC Function |
| | F13: Process PID |
| | F14: Swing Frequency, Fixed Length , Count and Wakeup |
| Communication Parameters | F15: Communication Parameters |
| Keys and Display of Keypad Parameters | F16: Keys and Display of Keypad Parameters |
| User-defined Display Parameters | F17: User-defined Display Parameters |
| Motor and Control 2Parameters | F18: Motor 2 basic parameters |
| | F19: Motor 2VF control parameters |
| | F20: Motor 2 vector control |
| | F21: Position contro |
| Monitoring Parameters | U00: Status monitoring |
| | U01: Fault record |

Table 2-1 Summary of basic function parameters

| Param. | Parameter Name | Setting Range | Default | Attr |
|--------|----------------|---------------|---------|------|
| **Group F00: System Parameters** | | | | |
| F00.00 | Setting of User Password | 0～65535 | 0 | × |
| F00.01 | Display of Parameters | 0: Display all parameters<br>1: Only display F00.00, F00.01 and user-defined parameters<br>2: Only display F00.00, F00.01, and the parameters different with factory default | 0 | × |
| F00.02 | Parameter Protection | 0: All parameter programmable<br>1: Only this function code is allowed to be modified | 0 | × |
| F00.03 | Inverter model selection | 0: G type (Constant torque load model)<br>1: P type (Fan and pump load models) | 0 | × |
| F00.04 | Parameter Initialization | 0: No operation<br>1: Restore all parameters to factory default<br>(excluding motor parameters)<br>2: Clear fault record<br>3: Back up current user parameters<br>4: Restore user backup parameters<br>5: Restore factory default.<br>(include motor parameter)<br>6: Power consumption zero clearing | 0 | × |
| F00.06 | Parameter editing mode | 0:Editable via keypad and RS485.<br>1:Editable via keypad<br>2:Editable via RS485 | 0 | × |
| F00.07 | Motor selection | 0: Motor 1<br>1: Motor 2 | 0 | × |
| F00.08 | Motor 1 control mode | Unit's place: Motor 1 control mode<br>0: V/F control<br>1:Sensor-less vector control 1<br>2: Sensor-less vector control 2<br>3: Vector control with PG card<br>Ten's place: Motor 2 control mode<br>0: V/F control<br>1:Sensor-less vector control 1<br>2: Sensor-less vector control 2<br>3. Vector control with PG card | 1 | × |
| F00.09 | DI7/HI input mode | 0: Digital input terminal 7<br>1: Pulse input | 0 | × |
| F00.10 | AI1\AI2\AI3 input mode | Unit's place: AI1<br>  0: Analog input<br>  1: Digital input<br>Ten's place: AI2<br>(same as AI1)<br>Hundred's place: AI3<br>(same as AI1) | 000 | × |
| F00.11 | Y2/HO input mode | 0: Digital 0utput terminal 2<br>1: Pulse output | 0 | × |

| | | | | |
|---|---|---|---|---|
| F00.12 | PWM optimization | Unit's place: PWM modulation mode<br>  0: Fixed carrier<br>  1: Random carrier<br>  2: Derating of fixed carrier<br>  3: Derating of random carrier | 500 | × |
| | | Ten's place: PWM modulation mode<br>  0: Seven-segment mode<br>  1: Five-segment mode<br>  2: Five-segment and<br>    seven-segment automatic<br>    switchover | | |
| | | Hundred's place: over-modulation<br>coefficient<br>  0: Invalid<br>  1~9: 1.01~1.09 times of<br>  over-modulation | | |
| F00.13 | Carrier frequency | 0.700~16.000kHz | Model defined | △ |
| F00.14 | Upper carrier frequency | 0.700~16.000kHz | 8.000kHz | × |
| F00.15 | Lower carrier frequency | 0.700~16.000kHz | 2.000kHz | × |
| F00.16 | Output voltage | 5.0~150.0% | 100.0% | × |
| F00.17 | AVR | 0: Disabled | 1 | × |
| | | 1: Enabled | | |
| | | 2: AVR is disabled if the DC bus voltage > the rated voltage of DC bus, and it will be enabled if the DC bus voltage≤the rated voltage of DC bus. | | |
| F00.18 | Fan control | 0: Run at power-on | 1 | × |
| | | 1: Fan working during running | | |
| F00.19 | Factory password | 0~65535 | 0 | × |
| F00.20 | Inverter rated power | 0.2~1000.0kW | Model defined | ⊙ |
| F00.21 | Inverter rated voltage | 60~660V | Model defined | ⊙ |
| F00.22 | Inverter rated current | 0.1~1500.0A | Model defined | ⊙ |
| F00.23 | Software version | 0.00~655.35 | Model defined | ⊙ |
| F00.24 | Dealer password | 0~65535 | 0 | × |
| F00.25 | Run time setting | 0~65535h(0: Invalid) | 0h | × |
| **Group F01: Frequency Command** | | | | |
| F01.00 | Frequency source selection | 0: Master frequency source | 0 | × |
| | | 1: Auxiliary frequency source | | |
| | | 2: Master +Auxiliary | | |
| | | 3: Master - Auxiliary | | |
| | | 4: MAX{Master, Auxiliary } | | |
| | | 5: MIN {Master, Auxiliary } | | |
| | | 6: AI1 ( Master + Auxiliary ) | | |
| | | 7: AI2 ( Master +Auxiliary ) | | |
| F01.01 | Master Frequency Command Source | 0:Master digital setting (F01.02) | 1 | × |
| | | 1: keypad potentiometer | | |
| | | 2: Analog input AI1 | | |
| | | 3: Communication | | |
| | | 4: Multi-reference | | |
| | | 5: PLC | | |

| | | | | |
|---|---|---|---|---|
| | | 6: Process PID output | | |
| | | 7: X7/HI pulse input | | |
| | | 8: AI2 | | |
| | | 9: AI3 | | |
| F01.02 | Master Frequency Digital setting | 0.00~Fmax | 50.00Hz | △ |
| F01.03 | Auxiliary Frequency Command Source | 0: Auxiliary digital setting (F01.04) | 0 | × |
| | | 1: keypad potentiometer | | |
| | | 2: Analog input AI1 | | |
| | | 3: Communication | | |
| | | 4: Multi-reference | | |
| | | 5: PLC | | |
| | | 6: Process PID output | | |
| | | 7: X7/HI pulse input | | |
| | | 8: Analog input AI2 | | |
| | | 9: Analog input AI3 | | |
| F01.04 | Auxiliary frequency digital setting | 0.00~Fmax | 50.00Hz | △ |
| F01.05 | Auxiliary frequency range | 0: Relative to maximum frequency | 0 | × |
| | | 1: Relative to master frequency | | |
| F01.06 | Auxiliary frequency coeff | 0.0~150.0% | 100.0% | △ |
| F01.07 | Jog frequency | 0.00~Fmax | 5.00Hz | △ |
| F01.08 | Maximum frequency | 20.00~600.00Hz | 50.00Hz | × |
| F01.09 | Upper limit frequency | Fdown~Fmax Lower limit frequency~maximum frequency | 50.00Hz | × |
| F01.10 | Lower limit frequency | 0.00~Fup | 0.00Hz | × |
| F01.11 | Operation when command frequency lower than lower limit frequency | 0: Run at lower limit frequency | 0 | × |
| | | 1: Run at 0 Hz would be activated after the time delay set by F01.12 | | |
| F01.12 | Lower limit frequency running time | 0.0~6000.0s | 60.0s | × |
| F01.13 | Up to this frequency, start frequency compensation | 0.00~600.00Hz | 50.00Hz | △ |
| F01.14 | Frequency compensation per 50Hz | 0.00~50.00Hz | 0.00Hz | △ |
| **Group F02: Start/Stop Control** | | | | |
| F02.00 | Run command | 0: Keypad control (LED off) | 0 | × |
| | | 1: Terminal control (LED on) | | |
| | | 2: Communication control (LED blinking) | | |
| F02.01 | Running direction | 0: Forward | 0 | △ |
| | | 1: Reverse | | |
| F02.02 | Reverse-proof action | 0: Reverse enabled | 0 | × |
| | | 1: Reverse disabled | | |
| F02.03 | Dead time between forward and reverse | 0.0~6000.0s | 0.0s | × |
| F02.04 | Start mode | Unit's place: Start Mode 0:Start directly 1:Rotational speed track and restart | 30000 | × |
| | | Ten's place: short-circuit detection function 0:Ungrounded short-circuit | | |

| | | detection<br>1:Grounding short-circuit<br>   detection before the first starts<br>2:Grounding short-circuit<br>   detection before each starts | | |
|---|---|---|---|---|
| | | Hundred's place: Speed tracking<br>   0:Track from zero speed<br>   1:Track from max frequency | | |
| | | Thousand's place: Select if Jog<br>function takes the priority<br>   0:Disable<br>   1:Enable | | |
| | | Ten thousand's place: Tracking<br>direction<br>   0: Last direction when stop<br>   1: Positive direction<br>   2: Negative direction<br>   3: Starting direction | | |
| F02.05 | Start frequency | 0.00~10.00Hz | 0.00Hz | × |
| F02.06 | Startup frequency holding time | 0.0~100.0s | 0.0s | × |
| F02.07 | Startup DC brakin current | 0.0~150.0% | 0.0% | × |
| F02.08 | DC braking time at start | 0.0~100.0s | 0.0s | × |
| F02.09 | Speed search current | 0.0~180.0% | 130.0% | △ |
| F02.10 | Sped search decel time | 0.0~10.0s | 1.0s | × |
| F02.11 | Sped search coefficient | 0.01~5.00 | 0.30 | △ |
| F02.12 | Stop mode | 0: Ramp to stop<br>1: Coast to stop | 0 | × |
| F02.13 | Initial frequency of stop DC braking | 0.01~50.00Hz | 2.00Hz | × |
| F02.14 | Stop DC braking current | 0.0~150.0% | 0.0% | × |
| F02.15 | Waiting time of stop DC braking | 0.0~30.0s | 0.0s | × |
| F02.16 | Stop DC braking time | 0.0~30.0s | 0.0s | × |
| F02.17 | Dynamic brake | 0: Disabled<br>1: Enabled<br>2: Enabled at running<br>3: Enabled at deceleration | 0 | × |
| F02.18 | Voltage of dynamic braking | 480~800V(380V inverter)<br>280~400V(220V inverter) | 730V<br>350V | × |
| F02.19 | Brake use ratio | 5.0~100.0% | 100.0% | × |
| F02.20 | 0Hz output selection | 0: No voltage output<br>1: Voltage output | 0 | × |
| F02.21 | Auto-start of power-on again | 0: Invalid<br>1: Valid | 0 | △ |
| F02.22 | Waiting time between auto-start and power-on again | 0.0~10.0s | 0.5s | △ |
| **Group F03: Accel/Decel Parameters** | | | | |
| F03.00 | Accel time 1 | 0.0~6000.0s | Model confirmed | △ |
| F03.01 | Decel time 1 | 0.0~6000.0s | Model confirmed | △ |

| F03.02 | Accel time 2 | 0.0~6000.0s | 15.0s | △ |
|---|---|---|---|---|
| F03.03 | Decel time 2 | 0.0~6000.0s | 15.0s | △ |
| F03.04 | Accel time 3 | 0.0~6000.0s | 15.0s | △ |
| F03.05 | Decel time 3 | 0.0~6000.0s | 15.0s | △ |
| F03.06 | Accel time 4 | 0.0~6000.0s | 15.0s | △ |
| F03.07 | Decel time 4 | 0.0~6000.0s | 15.0s | △ |
| F03.08 | Jog accel time | 0.0~6000.0s | 15.0s | △ |
| F03.09 | Jog decel time | 0.0~6000.0s | 15.0s | △ |
| F03.10 | Accel/Decele curve | 0: Linear Accel/Decel<br>1: S-curve Accel/Decel | 0 | × |
| F03.11 | Initial segment time of acceleration of S curve | 0.0~6000.0s | 0.0s | × |
| F03.12 | Time unit of acceleration and deceleration | 0: 0.1s<br>1: 0.01s | 0 | × |
| F03.13 | Frequency switchover point between acceleration time 1 and acceleration time 2 | 0.00~Fmax | 0.00Hz | × |
| F03.14 | Frequency switchover point between deceleration time 1 and deceleration time 2 | 0.00~Fmax | 0.00Hz | × |
| F03.15 | End segment time of acceleration of S curve | 0.0~6000.0s | 0.0s | × |
| F03.16 | Initial segment time of deceleration of S curve | 0.0~6000.0s | 0.0s | × |
| F03.17 | End segment time of deceleration of S curve | 0.0~6000.0s | 0.0s | × |
| **Group F04 Digital Input** | | | | |
| F04.00 | Function of terminal DI1 | 00: No function | 1 | × |
| F04.01 | Function of terminal DI2 | 01: Running forward (FWD) | 2 | × |
| F04.02 | Function of terminal DI3 | 02: Running reverse (REV) | 7 | × |
| F04.03 | Function of terminal DI4 | 03: Three-wire control | 13 | × |
| F04.04 | Function of terminal DI5 | 04: JOG forward | 0 | × |
| F04.05 | Function of terminal DI6 | 05: JOG reverse | 0 | × |
| F04.06 | Function of terminal DI7 | 06: Coast to stop | 0 | × |
| F04.07 | Function of terminal AI1 | 07: Fault reset (RESET) | 0 | × |
| F04.08 | Function of terminal AI2 | 08: Running suspended | 0 | × |
| F04.09 | Function of terminal AI3 | 09: External fault input<br>10: Terminal UP<br>11: Terminal DOWN<br>12: UP/DOWN (including ∧/∨key) adjustment clear<br>13: Multi-step frequency terminal 1<br>14: Multi-step frequency terminal 2<br>15: Multi-step frequency terminal 3<br>16: Multi-step frequency terminal 4<br>17: Accel/Decel time determinant 1<br>18: Accel/Decel time determinant 2<br>19: Accel/Decel disabled(ramp stop not inclusive)<br>20: Switch to auxiliary speed setting<br>21: PLC status reset<br>22: Simple PLC paused<br>23: Simple PLC paused<br>24: PID adjustment direction<br>25: PID integration paused | 0 | × |

| | | 26: PID parameter switch<br>27: Swing frequency pause(output the current frequency)<br>28: Swing frequency reset(output the central frequency)<br>29: Run command switched to keypad control<br>30: Run command switched to terminal control<br>31: Run command switched to communication control<br>32: Count input<br>33: Count clear<br>34: Length count<br>35: Length clear<br>36: DC brake input command at Stop<br>37: Speed/torque control switch<br>38: No reverse<br>39: No forward<br>40: zero-serve<br>41: Enable spindle orientation<br>42: Orientation position selection 1<br>43: Orientation position selection 2<br>44: Simple carry origin signal input<br>45: FWD carry<br>46: REV carry<br>47: Carry amount selection terminal 1<br>48: Carry amount selection terminal 2<br>49: Carry amount selection terminal 3<br>70: Position given X7 direction input<br>71: Position Pulse Zero Clearing<br>72: Forward position offset enable<br>73: Reverse position offset enable<br>74: Pulse proportion selection of Ho output encoder<br>75: Current overrun switching<br>76: Carry enable | | |
| F04.10 | Filtering time of digital input terminal | 0.000~1.000s | 0.010s | △ |
| F04.11 | Delay time before terminal<br>DI1 is valid | 0.0~300.0s | 0.0s | △ |
| F04.12 | Delay time before terminal<br>DI2 is valid | 0.0~300.0s | 0.0s | △ |
| F04.13 | Terminal DI1~DI5 positive/negative logic | DI5, DI4, DI3, DI2, DI1<br>0: Positive logic(Terminals are on at 0V/off at 24V)<br>1: Negative Logic (Terminals are off at 0V/on at 24V) | 00000 | × |
| F04.14 | Terminal DI6~AI3 positive/negative logic | AI3, AI2, AI1, DI7, DI6<br>0: Positive logic<br>1: Negative Logic | 00000 | × |
| F04.15 | FWD/REV terminal control mode | 0: Two-wire mode 1<br>1: Two-wire mode 2<br>2: Three-wire mode 1<br>3: Three-wire mode 2 | 0 | × |

| | | Unit's place: action when stop<br>    0: Clear<br>    1: Holding | 00001 | × |
|---|---|---|---|---|
| F04.16 | Terminal UP/DOWN frequency adjustment control | Ten's place: action on power loss<br>    0: Clear<br>    1: Holding | | |
| | | Hundreds place: integral function<br>    0: No integral function<br>    1: Integral function enabled | | |
| | | Thousand's place: Select if it can be reduced to negative frequency<br>    0: Disable<br>    1: Enable | | |
| | | Ten thousand's place: Jog action to clear UP/DOWN<br>    0: Not Clear<br>    1: Clear | | |
| F04.17 | Terminal UP/DOWN frequency change step size | 0.00～50.00Hz    0.00:Disabled | 1.00Hz/<br>200ms | △ |
| F04.18 | Terminal action selection when power on | 0: Level effective<br>1: Edge trigger +Level effective(When power on)<br>2: Edge trigger +Level effective(Every start) | 0 | × |
| F04.19 | Delay time before terminal<br>DI1 is invalid | 0.0～300.0s | 0.0s | △ |
| F04.20 | Delay time before terminal<br>DI2 is invalid | 0.0～300.0s | 0.0s | △ |
| **Group F05    Digital Output** | | | | |
| F05.00 | Y1 output function | 00: No output | 1 | × |
| F05.01 | Y2 output function | 01: Drive is running | 3 | |
| F05.02 | Relay 1 output function | 02: Fault output | 2 | × |
| F05.03 | Relay 2 output function | 03: Frequency-level detection FDT1 output<br>04: Frequency-level detection FDT2 output<br>05: Drive in 0Hz running 1(no output at stop)<br>06: Drive in 0Hz running 2(output at stop)<br>07: Upper limit frequency attained<br>08: Lower limit frequency attained<br>09: Frequency attained<br>10: Inverter is ready to work<br>11: Drive (motor) overloaded alarm<br>12: Inverter overheat warning<br>13: Current running time attained<br>14: Accumulative power-on time attained<br>15: Consecutive running time attained<br>16: PLC cycle completed<br>17: Set count value attained<br>18: Designated count value attained<br>19: Length attained | 11 | × |

| | | 20: Under load alarm<br>21:Brake output<br>22: DI1<br>23: DI2<br>24:When reach the range of set frequency(FDT1)<br>25: Spindle orientation completion (FR510A only)<br>26: PID feedback loss<br>27: operation status (inching without output)<br>28: communication setting (address 2007h)<br>30~39: Special machine output function<br>40: The current exceeds the limit | | |
|---|---|---|---|---|
| F05.04 | Y1 output delay time | 0.0～6000.0s | 0.0s | △ |
| F05.05 | Y2 output delay time | 0.0～6000.0s | 0.0s | △ |
| F05.06 | R1 output delay time | 0.0～6000.0s | 0.0s | △ |
| F05.07 | R2 output delay time | 0.0～6000.0s | 0.0s | △ |
| F05.08 | Enabled state of digital output | Unit's place: Y1 | 0000 | × |
| | | 0: Positive logic | | |
| | | 1: Negative logic | | |
| | | Ten's place: Y2 (same as unit's place) | | |
| | | Hundreds place: Relay 1 output (same as unit's place) | | |
| | | Thousands place: Relay 2 output (same as unit's place) | | |
| F05.09 | Detection width of frequency attained | 0.00～20.00Hz | 5.00Hz | × |
| F05.10 | FDT1 upper bound | 0.00～Fmax | 30.00Hz | × |
| F05.11 | FDT1 lower bound | 0.00～Fmax | 30.00Hz | × |
| F05.12 | FDT2 upper bound | 0.00～Fmax | 30.00Hz | × |
| F05.13 | FDT2 lower bound | 0.00～Fmax | 30.00Hz | × |
| F05.14 | Consecutive running time | 0.0～6000.0Min   0.0:Disabled | 0.0Min | × |
| F05.15 | Accumulative power-on time setting | 0～65535h   0:Disabled | 0h | × |
| F05.16 | Accumulative running time setting | 0～65535h   0:Disabled | 0h | × |
| F05.17 | Brake control selection | 0: Disabled | 0 | × |
| | | 1: Enabled | | |
| F05.18 | Brake opened frequency | Closed frequency ~30.00Hz | 2.50Hz | × |
| F05.19 | Brake opened current | 0.0~200.0% | 0.0% | △ |
| F05.20 | Brake open waiting time | 0.00~10.00s | 0.00s | × |
| F05.21 | Brake open operating time | 0.00~10.00s | 0.50s | × |
| F05.22 | Brake closed frequency | 0.00Hz~opened frequency | 2.00Hz | × |
| F05.23 | Brake close waiting time | 0.00~10.00s | 0.00s | × |
| F05.24 | Brake close operating time | 0.00~10.00s | 0.50s | × |
| F05.26 | Current overrun 1 | 0.1～1500.0A | 0.0A | △ |
| F05.27 | Current overrun 2 | 0.1～1500.0A | 0.0A | △ |
| **Group F06   Analog and Pulse Input** | | | | |
| F06.00 | Minimum input of curve | 0.0%～input of inflection point1 | 1.0% | △ |

| | AI1 | of curve AI1 | | |
|---|---|---|---|---|
| F06.01 | Set value corresponding to minimum input of curve AI1 | -100.0～100.0% | 0.0% | △ |
| F06.02 | Input of inflection point 1 of curve AI1 | Minimum input of curve AI1～Input of inflection point 2 of curve AI1 | 100.0% | △ |
| F06.03 | Set value corresponding to input of inflection point 1 of curve AI1 | -100.0～100.0% | 100.0% | △ |
| F06.04 | Input of inflection point 2 of curve AI1 | Input of inflection point 1 of curve AI1～Maximum input of curve AI1 | 100.0% | △ |
| F06.05 | Set value corresponding to input of inflection point 2 of curve AI1 | -100.0～100.0% | 100.0% | △ |
| F06.06 | Maximum input of curve AI1 | Input of inflection point 2 of curve AI1～100.0% | 100.0% | △ |
| F06.07 | Set value corresponding to maximum input of curve AI1 | -100.0～100.0% | 100.0% | △ |
| F06.08 | Minimum input of curve AI2 | 0.0%～input of inflection point1 of curve AI2 | 1.0% | △ |
| F06.09 | Set value corresponding to minimum input of curve AI2 | -100.0～100.0% | 0.0% | △ |
| F06.10 | Input of inflection point 1 of curve AI2 | Minimum input of curve AI1～Input of inflection point 2 of curve AI2 | 100.0% | △ |
| F06.11 | Set value corresponding to input of inflection point 1 of curve AI2 | -100.0～100.0% | 100.0% | △ |
| F06.12 | Input of inflection point 2 of curve AI2 | Input of inflection point 1 of curve AI2～Maximum input of curve AI2 | 100.0% | △ |
| F06.13 | Set value corresponding to input of inflection point 2 of curve AI2 | -100.0～100.0% | 100.0% | △ |
| F06.14 | Maximum input of curve AI2 | Input of inflection point A of curve AI2～100.0% | 100.0% | △ |
| F06.15 | Set value corresponding to maximum input of curve AI2 | -100.0～100.0% | 100.0% | △ |
| F06.16 | Minimum input of curve AI3 | 0.0%～input of inflection point1 of curve AI3 | 0.0% | △ |
| F06.17 | Set value corresponding to minimum input of curve AI3 | -100.0～100.0% | -100.0% | △ |
| F06.18 | Input of inflection point 1 of curve AI3 | Minimum input of curve AI1～Input of inflection point 2 of curve AI3 | 25.0% | △ |
| F06.19 | Set value corresponding to input of inflection point 1 of curve AI3 | -100.0～100.0% | -50.0% | △ |
| F06.20 | Input of inflection point 2 of curve AI3 | Input of inflection point 1 of curve AI3～Maximum input of curve AI3 | 75.0% | △ |
| F06.21 | Set value corresponding to input of inflection point 2 of curve AI3 | -100.0～100.0% | 25.0% | △ |
| F06.22 | Maximum input of curve AI3 | Input of inflection point A of curve AI3～100.0% | 100.0% | △ |

| F06.23 | Set value corresponding to maximum input of curve AI3 | -100.0～100.0% | 100.0% | △ |
|--------|--------|--------|--------|---|
| F06.24 | Minimum input of curve keypad potentiometer | 0.0～Maximum input of curve keypad potentiometer | 0.5% | △ |
| F06.25 | Set value corresponding to minimum input of curve keypad potentiometer | -100.0～100.0% | 0.0% | △ |
| F06.26 | Maximum input of curve keypad potentiometer | Minimum input of curve keypad potentiometer～100.0 | 99.9% | △ |
| F06.27 | Set value corresponding to maximum input of curve keypad potentiometer | -100.0～100.0% | 100.0% | △ |
| F06.28 | AI1 terminal filtering time | 0.000～10.000s | 0.100s | △ |
| F06.29 | AI2 terminal filtering time | 0.000～10.000s | 0.100s | △ |
| F06.30 | AI3 terminal filtering time | 0.000～10.000s | 0.100s | △ |
| F06.31 | Keypad potentiometer filtering time | 0.000～10.000s | 0.100s | △ |
| F06.32 | Minimum input of curve HI | 0.00 kHz～Maximum input of curve HI | 0.00kHz | △ |
| F06.33 | Set value corresponding to minimum input of curve HI | -100.0～100.0% | 0.0% | △ |
| F06.34 | Maximum input of curve HI | Minimum input of curve HI～100.00kHz | 50.00kHz | △ |
| F06.35 | Set value corresponding to maximum input of curve HI | -100.0～100.0% | 100.0% | △ |
| F06.36 | HI terminal filtering time | 0.000～10.000s | 0.100s | △ |
| **Group F07　Analog and Pulse Output** | | | | |
| F07.00 | AO1 output function | 00: No output | 1 | × |
| F07.01 | AO2 output function | 01: Output frequency | 2 | × |
| F07.02 | Y2/HO output function (when used as HO) | 02: Command frequency<br>03: Output current<br>04: Output voltage<br>05: Output power<br>06: Bus voltage<br>07: +10V<br>08: keypad potentiometer<br>09: AI1<br>10: AI2<br>11: AI3<br>12: HI<br>13: Output torque<br>14: Ao communication given 1<br>15: Ao communication given 2<br>16: Encoder input<br>17~99: retain | 3 | × |
| F07.03 | AO1 offset | -100.0～100.0% | 0.0% | △ |
| F07.04 | AO1 gain | -2.000～2.000 | 1.000 | △ |
| F07.05 | AO1 filtering time | 0.000～10.000s | 0.000s | △ |
| F07.06 | AO2 offset | -100.0～100.0% | 0.00% | △ |
| F07.07 | AO2 gain | -2.000～2.000 | 1.000 | △ |
| F07.08 | AO2 filtering time | 0.000～10.000s | 0.000s | △ |

| F07.09 | HO maximum output pulse frequency | 0.01～100.00kHz | 50.00kHz | △ |
|--------|-----------------------------------|-----------------|----------|---|
| F07.10 | HO output filtering time | 0.000～10.000s | 0.010s | △ |
| F07.11 | Ho output encoder pulse proportion 1 | 0.00～10.00 | 1.00 | △ |
| F07.12 | Ho output encoder pulse proportion 2 | 0.00～10.00 | 1.00 | △ |
| **Group F08 Parameters of Motor 1** | | | | |
| F08.00 | Motor 1 type selection | 0: Three phase asynchronous motors<br>1: PMSM (FR510A only)<br>2: Single phase asynchronous motors (Remove capacity)<br>3: Single phase asynchronous motors (No need to remove capacity) | 0 | × |
| F08.01 | Power rating of motor 1 | 0.1～1000.0kW | Model defined | × |
| F08.02 | Rated voltage of motor 1 | 60～660V | Model defined | × |
| F08.03 | Rated current of motor 1 | 0.1～1500.0A | Model defined | × |
| F08.04 | Rated frequency of motor 1 | 20.00～Fmax | Model defined | × |
| F08.05 | Rated speed of motor 1 | 1～30000 | Model defined | × |
| F08.07 | Motor 1 rated power factor | 0.50~0.99 | Model defined | × |
| F08.08 | Stator resistance R1 of async motor 1 | 0.001～65.535Ω | Model defined | × |
| F08.09 | Rotor resistance R2 of async motor 1 | 0.001～65.535Ω | Model defined | × |
| F08.10 | Leakage inductance L1 of async motor 1 | 0.01～655.35mH | Model defined | × |
| F08.11 | Mutual inductance L2 of asynchronous motor 1 | 0.1～6553.5mH | Model defined | × |
| F08.12 | No-load current of async motor 1 | 0.1～1500.0A | Model defined | × |
| F08.13 | Field weakening coeff 1 of async motor 1 | 0.0～100.0 | 87% | × |
| F08.14 | Field weakening coeff 2 of async motor 1 | 0.0～100.0 | 75% | × |
| F08.15 | Field weakening coeff 3 of async motor 1 | 0.0～100.0 | 70% | × |
| F08.16 | PMSM stator resistance | 0.001～65.535Ω | Model defined | × |
| F08.17 | PMSM d-axis inductance | 0.01～655.35mH | Model defined | × |
| F08.18 | PMSM d-axis inductance | 0.01～655.35mH | Model defined | × |
| F08.19 | PMSM back EMF | 0～65535V | Model defined | × |
| F08.20 | Installation angle of encoder | 0.0～359.9° | 0.0° | × |
| F08.21 | Pole number of motor | 0～1000 | 4 | × |
| F08.22 | Find encoder origin at beginning | 0: Not find<br>1: Find | 1 | × |
| F08.23 | Encoder line number | 0～10000 | 1024 | × |
| F08.24 | Encoder type | 0: ABZ encoder | 0 | × |

| | | 1: UVW encoder<br>2: Rotary encoder<br>3: ECN1313<br>4: Sine-cosine encoder | | |
|---|---|---|---|---|
| F08.25 | AB Phase Sequence of ABZ Incremental Encoder | 0: Positive<br>1: Negative | 0 | × |
| F08.26 | Speed feedback PG disconnection detection | 0.0：Invalid<br>0.1～10.0s | 0.0s | × |
| F08.27 | Speed Ratio of Motor to Encoder | 0.001～60.000 | 1.000 | × |
| F08.28 | Pole pairs of rotary encoder | 1～100 | 1 | × |
| F08.29 | Reserved for PG card parameters | | | |
| F08.30 | Autotuning of motor 1 | 0: No autotuning<br>1: Static autotuning of motor<br>2: Rotary autotuning of motor | 0 | × |
| **Group F09   V/f Control Parameters of Motor 1** | | | | |
| F09.00 | V/f curve setting | 00: Linear V/F<br>01: Multi-stage V/F<br>02: 1.2nd power V/F<br>03: 1.4nd power V/F<br>04: 1.6nd power V/F<br>05: 1.8nd power V/F<br>06: 2.0nd power V/F<br>07: V/F complete separation<br>08: V/F half separation<br>09: 1.2 power inverse curve V/F<br>10: 1.4 power inverse curve V/F<br>11: 1.6 power inverse curve V/F<br>12: 1.8 power inverse curve V/F<br>13: 2.0 power inverse curve V/F | 0 | × |
| F09.01 | Torque boost | 0.0%–30.0%   0.0% (fixed torque boost) | 0.0% | △ |
| F09.02 | Cut-off frequency of torque boost | 0.00～Fmax | 50.00Hz | △ |
| F09.03 | Multi-point V/F frequency 1(F1) | 0.00～F09.05 | 0.00Hz | △ |
| F09.04 | Multi-point V/F voltage 1 (V1) | 0.0～100.0 | 5.0% | △ |
| F09.05 | Multi-point V/F frequency 2(F2) | F09.03～F09.05 | 5.00Hz | △ |
| F09.06 | Multi-point V/F voltage 2 (V2) | 0.0～100.0 | 14.0% | △ |
| F09.07 | Multi-point V/F frequency 3(F3) | F09.05～F09.09 | 25.00Hz | △ |
| F09.08 | Multi-point V/F voltage 3 (V3) | 0.0～100.0 | 50.0% | △ |
| F09.09 | Multi-point V/F frequency 4(F4) | F09.07～rated motor frequency | 50.00Hz | △ |
| F09.10 | Multi-point V/F voltage 4 (V4) | 0.0～100.0      Ue=100.0% | 100.0% | △ |
| F09.11 | V/F slip compensation gain | 0.0～300.0% | 80.0% | △ |
| F09.12 | Stator voltagedrop compensation gain | 0.0～200.0% | 100.0% | △ |

| | | | | |
|---|---|---|---|---|
| F09.13 | Excitation boost gain | 0.0～200.0% | 100.0% | △ |
| F09.14 | Oscillation Suppression | 0.0～300.0% | 100.0% | △ |
| F09.15 | Voltage source for V/F separation | 0: Digital setting (F09.16) | 0 | × |
| | | 1: keypad potentiometer | | |
| | | 2: AI1 | | |
| | | 3: Multi-reference | | |
| | | 4: Pulse setting ( DI7/HI ) | | |
| | | 5: PID | | |
| | | 6: AI2 | | |
| | | 7: AI3 | | |
| F09.16 | Voltage digital setting for V/F separation | 0 V to rated motor voltage | 0.0% | △ |
| F09.17 | Voltage rise time of V/F separation | 0.0～6000.0s<br>It indicates the time for the voltage rising from 0 V to rated Motor voltage. | 0.1s | △ |
| F09.18 | Set the IQ filter time below 0.5Hz in VVF mode | F09.19～3000ms | 500ms | × |
| F09.19 | Set the IQ filter time above 2Hz in VVF mode | 1ms～F09.18 | 100ms | × |
| F09.20 | Torque revision when run forward | 0.0～5.0% | 0.0% | △ |
| F09.21 | Torque revision when run reverse | 0.0～5.0% | 1.0% | △ |
| F09.22 | PMSM acceleration current compensation setting (FR510A only) | 0.0～200.0% | 0.0% | △ |
| F09.23 | PMSM compensation time decreased after acceleration (FR510A only) | 0.0～100.0s | 2.0s | △ |
| F09.24 | PMSM ID current value will be maintained after accelerating. (FR510A only) | 0.0～200.0% | 0.0% | △ |
| **Group F10 Vector Control Parameters of Motor 1** | | | | |
| F10.00 | Speed/torque control | 0: speed control | 0 | × |
| | | 1: torque control | | |
| F10.01 | ASR low-speed proportional gain Kp1 | 0.0～100.0 | 30.0 | △ |
| F10.02 | ASR low-speed integration time Ti1 | 0.001～30.000s | 0.100s | △ |
| F10.03 | ASR switching frequency 1 | 0.00～F10.06 | 5.00Hz | △ |
| F10.04 | ASR high-speed proportional gain Kp2 | 1～100.0 | 10.0 | △ |
| F10.05 | ASR high-speed integration time Ti2 | 0.001～30.000s | 0.500s | △ |
| F10.06 | ASR switching frequency 2 | F10.03～Fmax | 10.00Hz | △ |
| F10.07 | ASR input filtering time | 0.0～500.0ms | 3.0ms | △ |
| F10.08 | ASR output filtering time | 0.0～500.0ms | 0.0ms | △ |
| F10.09 | Vector control slip gain | 50～200% | 100% | △ |
| F10.10 | Digital setting of torque upper limit in speed control mode | 80.0～200.0% | 165.0% | × |

| F10.11 | Excitation adjustment proportional gain Kp1 | 0.00~10.00 | 0.50 | △ |
|---|---|---|---|---|
| F10.12 | Excitation adjustment integral gain Ki1 | 0.000~10.0000 0.0: No points | 0.800 | △ |
| F10.13 | Torque adjustment proportional gain Kp2 | 0.00~10.00 | 0.50 | △ |
| F10.14 | Torque adjustment integral gain Ki2 | 0.000~10.0000 0.0: No points | 0.800 | △ |
| F10.15 | Excitation gain coefficient | 50.0~200% | 100% | △ |
| F10.16 | Torque setting source under torque control | 0: Set by F10.17<br>1: Keypad potentiometer<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse setting（DI7/HI）<br>6: Communication setting | 0 | × |
| F10.17 | Digital setting of torque | -200.0~200.0% | 50.0% | △ |
| F10.18 | Forward speed limited value under torque control | 0.00~Fmax | 50.00Hz | △ |
| F10.19 | Reverse speed limited value under torque control | 0.00~ Fmax | 50.00Hz | △ |
| F10.20 | Set torque accel time | 0.0~6000.0s | 0.0s | △ |
| F10.21 | Set torque decel time | 0.0~6000.0s | 0.0s | △ |
| F10.22 | Static friction torque compensation | 0.0~100.0% | 5.00% | △ |
| F10.23 | Static friction frequency range | 0.00~50.00Hz | 5.00Hz | △ |
| F10.24 | Static Frequency of Open-Loop Torque | 1.00~10.00Hz | 1.00Hz | △ |
| F10.25 | SVC optimization method | 0: Optimization method 1<br>1: Optimization method 2<br>2: Optimization method 3 | 1 | × |
| F10.26 | Max Frequency source under torque control | 0: Set by F10.18 & F10.19<br>1: Keypad potentiometer<br>2: AI1<br>3: AI2<br>4: AI3<br>5: Pulse setting（DI7/HI） | 0 | × |
| F10.27 | PMSM Start Excitation Current | 0.0~150.0% | 30.0% | × |
| F10.28 | PMSM Flux weakening control | 0: Invalid<br>1: Valid | 1 | × |
| F10.29 | PMSM Flux weakening Voltage | 70.0~100.0% | 95.0% | △ |
| F10.30 | PMSM Flux weakening gain(Kp) | 0.0~500.0% | 50.0% | △ |
| F10.31 | PMSM Flux weakening integral(Ti) | 0.00~60.00s | 0.5s | △ |
| F10.32 | PMSM Flux weakening limit | 0.0~200.0% | 100.0% | △ |
| F10.33 | PMSM excitation current frequency high point | F10.34~600.00Hz | 15.00Hz | △ |
| F10.34 | PMSM excitation current frequency low point | 0.0~F10.33 | 10.00Hz | △ |

| F10.35 | PMSM excitation current conversion delay | 0.0~10.0s | 1.0s | △ |
|--------|------|------|------|------|
| F10.36 | PMSM speed estimation Kp | 0.00~10.00 | 2.00 | △ |
| F10.37 | PMSM speed estimation Ti | 0.1~1000.0ms | 20.0ms | △ |
| F10.38 | Sliding mode filtering ratio of synchronous motor | 0.0001~2.0000 | 0.1057 | △ |
| **Group F11 Protection Parameters** | | | | |
| F11.00 | Current limit control | 0: Current limit disabled<br>1: Current limit mode 1<br>2: Current limit mode 2 | 2 | × |
| F11.01 | Current limit | 100.0~200.0% | 150.0% | × |
| F11.02 | Frequency decreasing time(limit current in constant speed operation) | 0.0~6000.0s | 5.0s | △ |
| F11.03 | Current limit mode 2 proportion gain | 0.1~100.0% | 3.0% | △ |
| F11.04 | Current limit mode 2 integral time | 0.00~10.00s | 1.00s | △ |
| F11.05 | Overvoltage Stall Control | 0: Overvoltage stall disabled<br>1: Overvoltage stall mode 1<br>2: Overvoltage stall mode 2 | 2 | × |
| F11.06 | Overvoltage stall voltage | 600~800V(380V Inverter)<br>320~400V(220V Inverter) | 730V<br>370V | × |
| F11.07 | Overvoltage Stall Mode 2 Proportion Gain | 0.0~300.0% | 50.0% | △ |
| F11.08 | Overvoltage stall mode 2 frequency limit | 0.00~50.00Hz | 5.00Hz | × |
| F11.09 | Retain | | 0 | |
| F11.10 | Protection action 1 | Unit's place: Bus undervoltage<br>　0: Fault reported and coast to stop<br>　1: Stop according to the stop mode<br>　2: Fault reported but continue to run<br>　3: Fault protection disabled<br><br>Ten's place: Power input phase Loss (Err09)<br>(Same as unit's　place )<br>Hundred's place: Power output phase loss(Err10)<br>(Same as unit's　place )<br>Thousand's place: Motor overload (Err11)(Same as unit's place )<br>Ten thousand's place: Inverter overload(Err12)<br>(Same as unit's place ) | 03330 | × |
| F11.11 | Protection action 2 | External equipment fault（Err13）<br>　0: Fault reported and coast to stop<br>　1: Stop according to the stop mode<br>　2: Fault reported but continue to run<br>Ten's place: EEPROM read/write fault (Err15) | 00000 | × |

| | | (Same as unit's place) | | |
|---|---|---|---|---|
| | | Hundred's place: Communication overtime error (Err18) (Same as unit's place) | | |
| | | Thousand's place: PID feedback loss (Err19) (Same as unit's place) | | |
| | | Ten thousand's place: Continuous running time reached (Err20) (Same as unit's place) | | |
| F11.12 | Protection action 3 | Unit's place: Module temperature detection disconnection（Err24) 0: Fault reported and coast to stop 1: Stop according to the stop mode 2: Fault reported but continue to run | 00030 | × |
| | | Ten's place: Load becoming 0 (Err25) (Same as unit's place) | | |
| F11.13 | Protection action 4 | Retain | 0000 | × |
| F11.14 | Frequency selection for continuing to run upon fault | 0: Current running frequency | 1 | × |
| | | 1: Set frequency | | |
| | | 2: Frequency upper limit | | |
| | | 3: Frequency lower limit | | |
| | | 4: Backup frequency upon abnormality | | |
| F11.15 | Backup frequency upon abnormality | 0.00～Fmax | 0.00Hz | × |
| F11.16 | Retain | | | |
| F11.17 | Motor overload protection time | 30.0～300.0s | 60.0s | × |
| F11.18 | Overload alarm | Unit's place: detection option: 0: Always detect 1: Detect at constant speed only | 00010 | × |
| | | Ten's place: compared object 0: Rated current of motor 1: Rated current of drive 2: Relative motor rated power 3:Relative frequency converter rated power | | |
| | | Hundred's place: Fault reported 0:No fault reported 1:Fault reported 2: Display warning | | |
| | | Thousand's place: whether to decelerate or not when overload alarm 0: No deceleration 1: Deceleration 2: PI adjustment (PI parameters are F13.08 and F13.09) | | |
| | | Ten thousand's place: given mode for overload threshold 0: F11.19 set 1: F11.19*VP 2: F11.19*AI1 3: F11.19*AI2 4: F11.19*AI3 | | |

| | | | | |
|---|---|---|---|---|
| F11.19 | Overload alarm threshold | 20.0～200.0% | 130.0% | × |
| F11.20 | Overload alarm activated time that exceeding threshold | 0.1～60.0s | 5.0s | × |
| F11.21 | Inverter overheat warning threshold | 50～overheat Temperature | Model defined | × |
| F11.22 | Detection level of load loss | 5.0～100.0% | 20.0% | × |
| F11.23 | Detection time of load loss | 0.1～60.0s | 5.0s | × |
| F11.24 | Action selection at instantaneous power failure | 0: Disabled<br>1: Deceleration<br>2: Bus voltage constant control | 0 | × |
| F11.25 | Decel time at instantaneous power failure | 0.0～6000.0s | 5.0s | △ |
| F11.26 | Rapid current limit | 0: Disabled<br>1: Rapid current limiting mode 1<br>2: Rapid current limiting mode 2 | 2 | × |
| F11.27 | Times of automatic trip(fault) reset | 0～20 | 0 | × |
| F11.28 | Interval of automatic trip(fault) reset | 0.1～100.0s | 1.0s | × |
| F11.29 | DO action during fault auto reset | 0: Not act<br>1: Act | 0 | × |
| F11.30 | Instantaneous power off bus voltage | 60.0%～Recovery voltage | 80.0% | △ |
| F11.31 | Instantaneous power off recovery voltage | Power off voltage～100.0% | 85.0% | △ |
| F11.32 | Instantaneous power off voltage detection time | 0.01～10.00s | 0.10s | △ |
| F11.33 | Instantaneous power off Kp | 0.1～100.0% | 40.0% | △ |
| F11.34 | Instantaneous power off integration time Ti | 0.00～10.00s （0.00: Integration invalid） | 0.10s | △ |
| F11.35 | Motor temperature sensor type | 0:None<br>1:PT100<br>2:PT1000<br>3:KTY84 | 0 | × |
| F11.36 | Zero drift value of motor temperature sensor | -100～100℃ | 0 | △ |
| F11.37 | Reserved | | | |
| F11.38 | Motor temperature warning action threshold | 0～200℃ | 90℃ | △ |
| F11.39 | Motor temperature protection action threshold | 0～200℃ | 110℃ | △ |
| F11.40 | Action selection of Excessive Speed and Excessive Speed Deviation | Unit's place: Overspeed Action Selection<br>0:Report error and coast to stop<br>1:Warning and ramp to stop<br>2: Alarm and continue run with failure frequency<br>3:No protection | 00 | × |

| | | Ten's place: Selection of Excessive Speed Deviation<br>0:Report error and coast to stop<br>1:Warning and ramp to stop<br>2: Alarm and continue run with failure frequency<br>3:No protection | | |
|---|---|---|---|---|
| F11.41 | Overspeed detection value (FR510A only) | 0.0～150.0% | 120.0% | × |
| F11.42 | Overspeed detection time (FR510A only) | 0.0～60.0s | 1.0s | × |
| F11.43 | Detection value of excessive velocity deviation (FR510A only) | 0.0～50.0% | 20.0% | × |
| F11.44 | Detection time of excessive velocity deviation (FR510A only) | 0.0～60.0s | 5.0s | × |
| **Group F12: Multi-Reference and Simple PLC Function** | | | | |
| F12.00 | Reference 0 | -100.0～100.0% | 0.0% | △ |
| F12.01 | Reference 1 | -100.0～100.0% | 0.0% | △ |
| F12.02 | Reference 2 | -100.0～100.0% | 0.0% | △ |
| F12.03 | Reference 3 | -100.0～100.0% | 0.0% | △ |
| F12.04 | Reference 4 | -100.0～100.0% | 0.0% | △ |
| F12.05 | Reference 5 | -100.0～100.0% | 0.0% | △ |
| F12.06 | Reference 6 | -100.0～100.0% | 0.0% | △ |
| F12.07 | Reference 7 | -100.0～100.0% | 0.0% | △ |
| F12.08 | Reference 8 | -100.0～100.0% | 0.0% | △ |
| F12.09 | Reference 9 | -100.0～100.0% | 0.0% | △ |
| F12.10 | Reference 10 | -100.0～100.0% | 0.0% | △ |
| F12.11 | Reference 11 | -100.0～100.0% | 0.0% | △ |
| F12.12 | Reference 12 | -100.0～100.0% | 0.0% | △ |
| F12.13 | Reference 13 | -100.0～100.0% | 0.0% | △ |
| F12.14 | Reference 14 | -100.0～100.0% | 0.0% | △ |
| F12.15 | Reference 15 | -100.0～100.0% | 0.0% | △ |
| F12.16 | Reference 0 source | 0: Digital setting（F12.00）<br>1: keypad potentiometer<br>2: AI1<br>3: Process PID output<br>4: X7/HI pulse input<br>5: AI2<br>6: AI3 | 0 | × |
| F12.17 | Running mode of simple PLC | Unit's place: PLC running mode<br>　0: Stop after a single cycle<br>　1: Continue to run with the last frequency after a single cycle<br>　2: Repeat cycles<br><br>Ten's place: started mode<br>　0: Continue to run from the step of stop (or fault)<br>　1: Run from the first step "multi-step frequency 0"<br>　2: Run from the eighth step "multi-step frequency 8"<br>　3: Run from the fifteenth step "multi-step frequency 15" | 00000 | × |

| | | | | |
|---|---|---|---|---|
| | | Hundreds place: power loss memory<br>  0: Memory disabled on power loss<br>  1: Memory enabled on power loss | | |
| | | Thousands place: unit of simple PLC running time<br>  0: Second (s)<br>  1: Minute (min) | | |
| F12.18 | Running time of step 0 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.19 | Running time of step 1 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.20 | Running time of step 2 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.21 | Running time of step 3 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.22 | Running time of step 4 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.23 | Running time of step 5 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.24 | Running time of step 6 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.25 | Running time of step 7 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.26 | Running time of step 8 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.27 | Running time of step 9 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.28 | Running time of step 10 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.29 | Running time of step 11 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.30 | Running time of step 12 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.31 | Running time of step 13 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.32 | Running time of step 14 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.33 | Running time of step 15 | 0.0～6000.0s(h) | 0.0s(h) | △ |
| F12.34 | Acceleration/deceleration time of simple PLC reference 0 | 0～3 | 0 | △ |
| F12.35 | Acceleration/deceleration time of simple PLC reference 1 | 0～3 | 0 | △ |
| F12.36 | Acceleration/deceleration time of simple PLC reference 2 | 0～3 | 0 | △ |
| F12.37 | Acceleration/deceleration time of simple PLC reference 3 | 0～3 | 0 | △ |
| F12.38 | Acceleration/deceleration time of simple PLC reference 4 | 0～3 | 0 | △ |
| F12.39 | Acceleration/deceleration time of simple PLC reference 5 | 0～3 | 0 | △ |
| F12.40 | Acceleration/deceleration time of simple PLC reference 6 | 0～3 | 0 | △ |
| F12.41 | Acceleration/deceleration time of simple PLC reference 7 | 0～3 | 0 | △ |
| F12.42 | Acceleration/deceleration time of simple PLC reference 8 | 0～3 | 0 | △ |
| F12.43 | Acceleration/deceleration time of simple PLC reference 9 | 0～3 | 0 | △ |
| F12.44 | Acceleration/deceleration time of simple PLC reference 10 | 0～3 | 0 | △ |

| F12.45 | Acceleration/deceleratio n timeof simple PLC reference 11 | 0~3 | 0 | △ |
|--------|------------------------------------------------------------|-----|---|---|
| F12.46 | Acceleration/deceleratio n time of simple PLC reference 12 | 0~3 | 0 | △ |
| F12.47 | Acceleration/deceleratio n time of simple PLC reference 13 | 0~3 | 0 | △ |
| F12.48 | Acceleration/deceleratio n time of simple PLC reference 14 | 0~3 | 0 | △ |
| F12.49 | Acceleration/deceleratio n time of simple PLC reference 15 | 0~3 | 0 | △ |
| F12.50 | UP/DOWN function selection of Multi-reference | Unit's place: Action selection when power off<br>  0:Zero clearing when power off<br>  1:Hold when power off | 00 | × |
| | | Ten's place: select if it can be reduced to negative<br>  0:Disable<br>  1:Enable | | |
| F12.51 | UP/DOWN speed of Multi-reference | 0.0~100.0% (0.0%Invalid) | 0.0% | △ |
| **Group F13 Process PID** | | | | |
| F13.00 | PID setting | 0: F13.01 digital setting | 0 | × |
| | | 1:keypad potentiometer | | |
| | | 2: AI1 | | |
| | | 3: Communication | | |
| | | 4: Multi-Reference | | |
| | | 5: DI7/HI pulse input | | |
| | | 6: AI2 | | |
| | | 7: AI3 | | |
| F13.01 | PID digital setting | 0.0~100.0% | 50.0% | △ |
| F13.02 | PID feedback | 0: AI1 | 0 | × |
| | | 1: AI2 | | |
| | | 2: Communication | | |
| | | 3: AI1+AI2 | | |
| | | 4: AI1-AI2 | | |
| | | 5: Max{AI1，AI2} | | |
| | | 6: Min{AI1，AI2} | | |
| | | 7: DI7/HI pulse input | | |
| | | 8: AI3 | | |
| F13.03 | PID setting feedback range | 0.0~6000.0 | 1000.0 | △ |
| F13.04 | PID action direction | 0: Forward action | 0 | × |
| | | 1: Reverse action | | |
| F13.05 | Filtering time of PID setting | 0.000~10.000s | 0.000s | △ |
| F13.06 | Filtering time of PID feedback | 0.000~10.000s | 0.000s | △ |
| F13.07 | Filtering time of PID output | 0.000~10.000s | 0.000s | △ |
| F13.08 | Proportional gain Kp1 | 0.0~1000.0 | 1.0 | △ |
| F13.09 | Integration time Ti1 | 0.01~10.00s | 0.10s | △ |
| F13.10 | Differential time Td1 | 0.000~10.000s | 0.000s | △ |

| F13.11 | Proportional gain Kp2 | 0.0～100.0 | 20.0 | △ |
|--------|------------------------|------------|------|---|
| F13.12 | Integration time Ti2 | 0.01～10.00s | 2.00s | △ |
| F13.13 | Differential time Td2 | 0.000～10.000s | 0.000s | △ |
| F13.14 | PID parameter switch | 0: No switch, determined by parameters Kp1, Ti1 and Td1<br>1: Auto switch on the basis of input offset<br>2: Switched by terminal | 0 | × |
| F13.15 | PID parameter switchover deviation 1 | 0.0～100.0% | 20.0% | × |
| F13.16 | PID parameter switchover deviation 2 | 0.0～100.0% | 80.0% | × |
| F13.17 | PID offset limit | 0.0～100.0% | 0.0% | × |
| F13.18 | PID integral property | Unit's place (Whether to stop integral operation when the output reaches the limit)<br>　0: Continue integral operation<br>　1: Stop integral operation<br>Ten's place (Integral separated)<br>　0: Invalid<br>　1: Valid | 00 | × |
| F13.19 | PID differential limit | 0.0～100.0% | 0.5% | × |
| F13.20 | PID initial value | 0.0～100.0% | 0.0% | × |
| F13.21 | Holding time of PID initial value | 0.0～6000.0s | 0.0s | × |
| F13.22 | PID output frequency upper limit | PID output frequency lower limit～100.0%（100.0% corresponds to maximum frequency ） | 100.0% | × |
| F13.23 | PID output frequency lower limit | −100.0%～PID output frequency lower limit | 0.0% | × |
| F13.24 | Low value of PID feedback loss | 0.1～100.0%<br>0.0%: Not judging feedback loss | 0.0% | × |
| F13.25 | Detection time for low value of PID feedback loss | 0.0～30.0s | 1.0s | × |
| F13.26 | PID operation selection | Unit's place: PID operation selection when stop<br>　0:Do not operate when stop<br>　1:Operate when stop<br>Ten's place: output is limited by output frequency<br>　0:No limited<br>　1:limited<br>Hundred's place: UP/DOWN digital given of PID<br>　0:Zero clearing when power off<br>　1:Hold when power off<br>Thousand's place: PID feedback loss detection when stop<br>　0:Not detect when stop<br>　1:detect when stop<br>Then thousand's place: action for PID feedback loss<br>　0:Report fault<br>　1:Ramp to stop | 00000 | × |

| F13.27 | UP/DWON speed of PID digital given | 0.0～100.0% (0.0% Invalid) | 0.0% | △ |
|--------|------------------------------------|----------------------------|------|---|
| F13.28 | High value of PID feedback loss | 0.1～100.0%<br>0.0%: Not judging feedback loss | 100.0% | × |
| F13.29 | Detection time for high value of PID feedback loss | 0.0～30.0s | 1.0s | × |
| F13.30 | PID upper limit source | 0:F13.22<br>1:F13.22*VP<br>2:F13.22*AI1<br>3:F13.22*AI2<br>4:F13.22*HI<br>5:F13.22*AI3 | 0 | × |
| F13.31 | PID lower limit source | 0:F13.23<br>1:F13.23*VP<br>2:F13.23*AI1<br>3:F13.23*AI2<br>4:F13.23*HI<br>5:F13.23*AI3 | 0 | × |
| **Group F14: Swing Frequency, Fixed Length , Wakeup and Count** | | | | |
| F14.00 | Swing frequency setting mode | 0: Relative to the setting frequency<br>1: Relative to the maximum frequency | 0 | × |
| F14.01 | Swing frequency amplitude | 0.0～100.0% | 0.0% | △ |
| F14.02 | Jump frequency amplitude | 0.0～50.0% | 0.0% | △ |
| F14.03 | Rising Time of Swing frequency | 0.0～6000.0s | 5.0s | △ |
| F14.04 | Dropping Time of Swing frequency | 0.0～6000.0s | 5.0s | △ |
| F14.05 | Set length | 0m～65535m | 1000m | × |
| F14.06 | Number of pulses per meter | 0.1～6553.5 | 100.0 | × |
| F14.07 | Command when the length attained | Unit's place: stop when the length reaches<br>0: Not stop<br>1: Stop<br>Ten's place: length calculation method<br>0: pulse by pulse<br>1: Reference maximum frequency<br>2: Refer to Ai1 channel<br>3: Refer to AI2 channel<br>4: Refer to AI3 channel | 00 | × |
| F14.08 | Set count value | 1～65535 | 1000 | × |
| F14.09 | Designated count value | 1～65535 | 1000 | × |
| F14.10 | Wakeup frequency | Dormant frequency (F14.12)～Fmax | 0.00Hz | △ |
| F14.11 | Wakeup delay time | 0.0～6000.0s | 0.0s | △ |
| F14.12 | Dormant frequency | 0.00～Wakeup frequency | 0.00Hz | △ |
| F14.13 | Dormant delay time | 0.0～6000.0s | 0.0s | △ |
| F14.14 | Wake up mode selection | 0: Frequency<br>1: Pressure | 0 | × |
| F14.15 | Dormancy mode selection | 0: Frequency<br>1: Pressure | 0 | × |

| F14.16 | Voltage feedback source | Unit's place: pressure feedback<br>  0: AI1<br>  1: AI2<br>  2: DI7/HI pulse input<br>  3: AI3<br>Ten's place: pressure dormancy mode<br>  0:Positive direction, dormancy on big pressure and wakeup on small pressure<br>  1:Negative direction, dormancy on small pressure and wakeup on big pressure | 0 | × |
|---|---|---|---|---|
| F14.17 | Wake up pressure | 0.0%～100.0% | 10.0% | △ |
| F14.18 | Dormancy pressure | 0.0%～100.0% | 50.0% | △ |
| **Group F15: Communication Parameters** | | | | |
| F15.00 | Baud rate | 0: 4800bps<br>1: 9600bps<br>2: 19200bps<br>3: 38400bps<br>4: 57600bps<br>5: 115200bps | 1 | × |
| F15.01 | Data format | No check, data format (1-8-N-2) for RTU<br>1: Even parity check, data format (1-8-E-1) for RTU<br>2: Odd Parity check, data format (1-8-O-1) for RTU<br>3: No check, data format(1-8-N-1) for RTU | 0 | × |
| F15.02 | Local address | 1～247    0: Broadcast address | 1 | × |
| F15.03 | Communication timeout | 0.0～60.0s | 0.0s | × |
| F15.04 | Response time delay | 0～200ms | 1ms | × |
| F15.05 | Master-slave Communication Mode | 0:The inverter is the slave<br>1:The inverter is the master | 0 | × |
| F15.06 | The Master Communication Sending Data | 0: Set frequency<br>1: Current running frequency | 0 | × |
| F15.07 | Message return when communication error | 0: No return<br>1: Return | 1 | |
| F15.08 | U group return value | 0: Positive and negative<br>1: Absolute value | 0 | △ |
| **Group F16 Keys and Display of Keypad Parameters** | | | | |
| F16.00 | MF.K key setting | 0: No function<br>1: Jog<br>2: Forward/reverse switchover<br>3: Run command sources shifted<br>4: Jog reverse | 1 | × |
| F16.01 | Keyboard operation display | Unit's digit: Function selection of STOP/RESET key<br>  0: stop function of STOP/RESET key is valid only in keyboard operation mode<br>  1: Stop function of STOP/RES key is valid in any operation mode | 0001 | × |

| | | Ten's digit: Speed display（U00.05）<br>　0: According to the actual speed<br>　1: Multiply frequency by speed coefficient(F16.11) | | |
| :--- | :--- | :--- | :--- | :--- |
| | | Hundred's digit: Decimal places<br>　0: No decimal places<br>　1: One decimal places<br>　2: Two decimal places<br>　3: Three decimal places | | |
| | | Thousands: U00.04 power display<br>　0: Total power<br>　1: Active power | | |
| F16.02 | Keys locked option | 0: Not locked | 0 | × |
| | | 1: Full locked | | |
| | | 2: Keys locked other than RUN, STOP/RST | | |
| | | 3: Keys locked other than STOP/RST | | |
| | | 4: Keys locked other than >> | | |
| F16.03 | LED displayed parameters setting 1 on running status | 0～99(correspond U00.00～U00.99) | 0 | △ |
| F16.04 | LED displayed parameters setting 2 on running status | 0～99(correspond U00.00～U00.99) | 6 | △ |
| F16.05 | LED displayed parameters setting 3 on running status | 0～99(correspond U00.00～U00.99) | 3 | △ |
| F16.06 | LED displayed parameters setting 4 on running status | 0～99(correspond U00.00～U00.99) | 2 | △ |
| F16.07 | LED displayed parameters setting 1 on stop status | 0～99(correspond U00.00～U00.99) | 1 | △ |
| F16.08 | LED displayed parameters setting 2 on stop status | 0～99(correspond U00.00～U00.99) | 6 | △ |
| F16.09 | LED displayed parameters setting 3 on stop status | 0～99(correspond U00.00～U00.99) | 15 | △ |
| F16.10 | LED displayed parameters setting 4 on stop status | 0～99(correspond U00.00～U00.99) | 16 | △ |
| F16.11 | Speed display coefficient | 0.00~100.00 | 1.00 | △ |
| F16.12 | Power display coefficient | 0.0~300.0% | 100.0% | △ |
| F16.13 | The enable difference range of U00.00 and U00.01 | 0.00Hz~5.00Hz | 0.10Hz | △ |
| **Group F17 User-defined Display Parameters** | | | | |
| F17.00 | User-defined Display Parameter 0 | 00.00～49.99 | 00.00 | △ |
| F17.01 | User-defined Display Parameter 1 | 00.00～49.99 | 00.00 | △ |
| F17.02 | User-defined Display Parameter 2 | 00.00～49.99 | 00.00 | △ |
| F17.03 | User-defined Display Parameter 3 | 00.00～49.99 | 00.00 | △ |
| F17.04 | User-defined Display Parameter 4 | 00.00～49.99 | 00.00 | △ |

| F17.05 | User-defined Display Parameter 5 | 00.00～49.99 | 00.00 | △ |
|---|---|---|---|---|
| F17.06 | User-defined Display Parameter 6 | 00.00～49.99 | 00.00 | △ |
| F17.07 | User-defined Display Parameter 7 | 00.00～49.99 | 00.00 | △ |
| F17.08 | User-defined Display Parameter 8 | 00.00～49.99 | 00.00 | △ |
| F17.09 | User-defined Display Parameter 9 | 00.00～49.99 | 00.00 | △ |
| F17.10 | User-defined Display Parameter 10 | 00.00～49.99 | 00.00 | △ |
| F17.11 | User-defined Display Parameter 11 | 00.00～49.99 | 00.00 | △ |
| F17.12 | User-defined Display Parameter 12 | 00.00～49.99 | 00.00 | △ |
| F17.13 | User-defined Display Parameter 13 | 00.00～49.99 | 00.00 | △ |
| F17.14 | User-defined Display Parameter 14 | 00.00～49.99 | 00.00 | △ |
| F17.15 | User-defined Display Parameter 15 | 00.00～49.99 | 00.00 | △ |
| F17.16 | User-defined Display Parameter 16 | 00.00～49.99 | 00.00 | △ |
| F17.17 | User-defined Display Parameter 17 | 00.00～49.99 | 00.00 | △ |
| F17.18 | User-defined Display Parameter 18 | 00.00～49.99 | 00.00 | △ |
| F17.19 | User-defined Display Parameter 19 | 00.00～49.99 | 00.00 | △ |
| F17.20 | User-defined Display Parameter 20 | 00.00～49.99 | 00.00 | △ |
| F17.21 | User-defined Display Parameter 21 | 00.00～49.99 | 00.00 | △ |
| F17.22 | User-defined Display Parameter 22 | 00.00～49.99 | 00.00 | △ |
| F17.23 | User-defined Display Parameter 23 | 00.00～49.99 | 00.00 | △ |
| F17.24 | User-defined Display Parameter 24 | 00.00～49.99 | 00.00 | △ |
| F17.25 | User-defined Display Parameter 25 | 00.00～49.99 | 00.00 | △ |
| F17.26 | User-defined Display Parameter 26 | 00.00～49.99 | 00.00 | △ |
| F17.27 | User-defined Display Parameter 27 | 00.00～49.99 | 00.00 | △ |
| F17.28 | User-defined Display Parameter 28 | 00.00～49.99 | 00.00 | △ |
| F17.29 | User-defined Display Parameter 29 | 00.00～49.99 | 00.00 | △ |
| **Group F18 Parameters of Motor 2 (Refer to Group F08)** | | | | |
| **Group F19 V/f Control Parameters of Motor 2 (Refer to Group F09)** | | | | |
| **Group F20 Vector Control Parameters of Motor 2 (Refer to Group F10)** | | | | |
| **Group F21 Position Control** | | | | |
| F21.00 | Selection of Position Control Mode | 0: Non-position control | 0 | × |
| | | 1: Zero Servo (Frequency Achievement Effective) | | |

| | | 2: Zero Servo (Terminal Effective) | | |
|---|---|---|---|---|
| | | 3: Spindle orientation | | |
| | | 4: Simple carry | | |
| | | 5: Pulse train | | |
| F21.01 | Position loop gain | 0.000~40.000 | 1.000 | △ |
| F21.02 | Zero Servo Initiation Frequency | 0.00Hz~Fmax | 1.00Hz | × |
| F21.03 | Location completion width | 0~3000 | 10 | × |
| F21.04 | Location completion time | 0.000~40.000s | 0.200s | × |
| F21.05 | Spindle orientation position 1 | 0~40000 | 0 | △ |
| F21.06 | Spindle orientation position 2 | 0~40000 | 0 | △ |
| F21.07 | Spindle orientation position 3 | 0~40000 | 0 | △ |
| F21.08 | Spindle orientation position 4 | 0~40000 | 0 | △ |
| F21.09 | Spindle orientation | Unit's place: spindle orientation direction<br>0: Orient from current direction of rotation<br>1: Direction from positive direction<br>2: Orient from reverse direction | 00 | ✕ |
| | | Ten's place: positioning when parking<br>0: Do not locate when parking<br>1: Positioning when parking | | |
| F21.10 | Spindle orientation speed | 0.00Hz~Fmax | 10.00Hz | × |
| F21.11 | Spindle orientation deceleration time | 0.0~60.0s | 2.0s | × |
| F21.12 | Orientation position confirmation time | 0.000~6.000s | 0.010s | × |
| F21.13 | Regression Origin Selection | Unit's place: back to origin selection<br>0: Invalid<br>1: Valid | 00 | × |
| | | Ten's place: whether carry requires terminal enable signal<br>0: no need<br>1: Need | | |
| F21.14 | Regression Origin Direction | 0:Forward | 0 | × |
| | | 1:Reverse | | |
| F21.15 | Regression Origin Frequency 1 | 0.00Hz~600.00Hz | 10.00Hz | × |
| F21.16 | Regression Origin Frequency 2 | 0.00Hz~60.00Hz | 1.00Hz | × |
| F21.17 | Carry amount 0 high | 0~9999 | 0 | △ |
| F21.18 | Carry amount 0 low | 0~9999 | 0 | △ |
| F21.19 | Carry amount 1 high | 0~9999 | 0 | △ |
| F21.20 | Carry amount 1 low | 0~9999 | 0 | △ |
| F21.21 | Carry amount 2 high | 0~9999 | 0 | △ |
| F21.22 | Carry amount 2 low | 0~9999 | 0 | △ |
| F21.23 | Carry amount 3 high | 0~9999 | 0 | △ |
| F21.24 | Carry amount 3 low | 0~9999 | 0 | △ |
| F21.25 | Carry amount 4 high | 0~9999 | 0 | △ |

| F21.26 | Carry amount 4 low | 0～9999 | 0 | △ |
|--------|---------------------|---------|---|---|
| F21.27 | Carry amount 5 high | 0～9999 | 0 | △ |
| F21.28 | Carry amount 5 low | 0～9999 | 0 | △ |
| F21.29 | Carry amount 6 high | 0～9999 | 0 | △ |
| F21.30 | Carry amount 6 low | 0～9999 | 0 | △ |
| F21.31 | Carry amount 7 high | 0～9999 | 0 | △ |
| F21.32 | Carry amount 7 low | 0～9999 | 0 | △ |
| F21.33 | Selection of Position-Given Mode | 0:X7 pulse input<br>1: Encoder gives A/B phase pulse, A phase ahead B phase 90 reads forward<br>2: Encoder gives A/B phase pulse, B phase ahead A phase 90 reads forward | 0 | × |
| F21.34 | Electronic Gear Ratio Molecule | 1～9999 | 1000 | × |
| F21.35 | Electronic gear denominator | 1～9999 | 1000 | × |
| F21.36 | feed forward gain | 0.000～7.000 | 1.000 | △ |
| F21.27 | Feedforward filtering time | 0.000～7.000s | 0.001s | △ |
| F21.38 | Position offset change rate | 0～9999 | 800 | × |
| **F22Group:Virtual IO** | | | | |
| F22.00 | Function selection of virtual VDI1 terminal | The same as function code F04.00 | 0 | × |
| F22.01 | Function selection of virtual VDI2 terminal | The same as function code F04.00 | 0 | × |
| F22.02 | Function selection of virtual VDI3 terminal | The same as function code F04.00 | 0 | × |
| F22.03 | Function selection of virtual VDI4 terminal | The same as function code F04.00 | 0 | × |
| F22.04 | Function selection of virtual VDI5 terminal | The same as function code F04.00 | 0 | × |
| F22.05 | Valid status setting mode of virtual VDI terminals | VDI5, VDI4, VDI3, VDI2, VDI1<br>0:Validity of VDI depends on virual VDOx's status<br>1:Validity of VDI set by function code F22.06 | 00000 | × |
| F22.06 | Settings of virtual VDI terminal status | VDI5, VDI4, VDI3, VDI2, VDI1<br>0: Invalid<br>1: Valid | 00000 | △ |
| F22.07 | Function selection of virtual VDO1 terminals output | 0 : Internal short circuited to physics DIx<br>Other: The same as function code F05.00 | 0 | △ |
| F22.08 | Function selection of virtual VDO2 terminals output | 0 : Internal short circuited to physics DIx<br>Other: The same as function code F05.00 | 0 | △ |
| F22.09 | Function selection of virtual VDO3 terminals output | 0 : Internal short circuited to physics DIx<br>Other: The same as function code F05.00 | 0 | △ |
| F22.10 | Function selection of | 0 : Internal short circuited to | 0 | △ |

| | virtual VDO4 terminals output | physics DIx<br>Other: The same as function code F05.00 | | |
|---|---|---|---|---|
| F22.11 | Function selection of virtual VDO5 terminals output | 0 : Internal short circuited to physics DIx<br>Other: The same as function code F05.00 | 0 | △ |
| F22.12 | Virtual VDO1 output delay time | 0.0s~6000.0s | 0.0s | △ |
| F22.13 | Virtual VDO2 output delay time | 0.0s~6000.0s | 0.0s | △ |
| F22.14 | Virtual VDO3 output delay time | 0.0s~6000.0s | 0.0s | △ |
| F22.15 | Virtual VDO4 output delay time | 0.0s~6000.0s | 0.0s | △ |
| F22.16 | Virtual VDO5 output delay time | 0.0s~6000.0s | 0.0s | △ |
| F22.17 | VDO output terminal positive and negative logic | VDO5, VDO4, VDO3, VDO2, VDO1<br>0: Positive logic<br>1: Negative logic | 00000 | △ |
| **Group U00   Status Monitoring** | | | | |
| U00.00 | Running frequency | 0.00~Fup | 0.00Hz | ⊙ |
| U00.01 | Set frequency | 0.00~Fmax | 0.00Hz | ⊙ |
| U00.02 | Output voltage | 0~660V | 0.0V | ⊙ |
| U00.03 | Output current | 0.0~3000.0A | 0.0A | ⊙ |
| U00.04 | Output power | -3000.0~3000.0kW | 0.0kW | ⊙ |
| U00.05 | Estimated Motor Speed | 0~60000rpm | 0rpm | ⊙ |
| U00.06 | Bus voltage | 0~1200V | 0V | ⊙ |
| U00.07 | Synchronous Frequency | 0.00~Fup | 0.00Hz | ⊙ |
| U00.08 | PLC step | 1~15 | 1 | ⊙ |
| U00.09 | Program Operation Time | 0.0~6000.0s(h) | 0.0s(h) | ⊙ |
| U00.10 | PID set | 0~60000 | 0 | ⊙ |
| U00.11 | PID feedback | 0~60000 | 0 | ⊙ |
| U00.12 | Status of DI1~DI5 digital input terminal | DI5 DI4 DI3 DI2 DI1 | 00000 | ⊙ |
| U00.13 | Status of DI6~DI7 digital input terminal | DI7 DI6 | 00 | ⊙ |
| U00.14 | Status of digital output terminal | R2 R1 Y2 Y1 | 0000 | ⊙ |
| U00.15 | AI1 input | 0.0~100.0% | 0.0% | ⊙ |
| U00.16 | AI2 input | 0.0~100.0% | 0.0% | ⊙ |
| U00.17 | AI3 input | -100.0~100.0% | 0.0% | ⊙ |
| U00.18 | Keypad potentiometer input | 0.0~100.0% | 0.0% | ⊙ |
| U00.19 | HI input | 0.00~100.00kHz | 0.00kHz | ⊙ |
| U00.20 | AO1 output | 0.0~100.0% | 0.0% | ⊙ |
| U00.21 | AO2 output | 0.0~100.0% | 0.0% | ⊙ |
| U00.22 | HO output | 0.00~100.00kHz | 0.00kHz | ⊙ |
| U00.23 | Temperature of inverter | -40.0℃~120.0℃ | 0.0℃ | ⊙ |
| U00.24 | Accumulative power-on time | 0~65535min | 0min | ⊙ |
| U00.25 | Accumulative running time | 0~6553.5min | 0.0min | ⊙ |
| U00.26 | Cumulative power-on | 0~65535h | 0h | ⊙ |

| | | time | | | |
|---|---|---|---|---|---|
| U00.27 | Cumulative running time | 0～65535h | 0h | ⊙ |
| U00.28 | Count value | 0～65535 | 0 | ⊙ |
| U00.29 | Length value | 0～65535m | 0m | ⊙ |
| U00.30 | Linear speed | 0～65535m/min | 0m/Min | |
| U00.31 | Output torque | 0.0～300.0% | 0.0% | ⊙ |
| U00.32 | PTC motor temperature detection | -40℃～200℃ | 0℃ | ⊙ |
| U00.33 | Speed that detected by encoder | 0～60000rpm | 0rpm | ⊙ |
| U00.34 | Monitoring of encoder line number | 0～65535 | 0 | ⊙ |
| U00.35 | Power consumption | 0～65535kWh | 0kWh | ⊙ |
| U00.36 | VDI1～VDI5 input status | VDI5 VDI4 VDI3 VDI2 VDI1 | 00000 | ⊙ |
| U00.37 | VDO1～VDO5output status | VDO5 VDO4 VDO3 VDO2 VDO1 | 00000 | ⊙ |
| U00.38 | High speed pulse X7 or the line number of extension card monitoring | 0～65535 | 0 | ⊙ |
| U00.39 | Sine cosine encoder C signal | 0～4096 | 0 | ⊙ |
| U00.40 | Sine cosine encoder D signal | 0～4096 | 0 | ⊙ |
| U00.41 | UVW encoder UVW signal | U V W | 000 | ⊙ |
| U00.42 | Output excitation ratio | 0.0～100.0% | 0.0% | ⊙ |
| U00.43 | Output torque | 0.0～6553.5 N.m | 0.0 N.m | ⊙ |
| **Group U01   Fault Record** | | | | | |
| U01.00 | Code of the latest fault | Err00~Err44 | 0 | ⊙ |
| U01.01 | Running frequency when the latest fault occurred | 0.00～Fup | 0.00Hz | ⊙ |
| U01.02 | Output current when the latest fault occurred | 0.0～3000.0A | 0.0A | ⊙ |
| U01.03 | Bus voltage when the latest fault occurred | 0～1200V | 0V | ⊙ |
| U01.04 | Cumulative running time when the latest fault occurred | 0～65535h | 0h | ⊙ |
| U01.05 | Code of previous fault | Same as U01.00 | 0 | ⊙ |
| U01.06 | Running frequency when previous fault occurred | 0.00～Fup | 0.00Hz | ⊙ |
| U01.07 | Output current when previous fault occurred | 0.0～3000.0A | 0.0A | ⊙ |
| U01.08 | Bus voltage when previous fault occurred | 0～1200V | 0V | ⊙ |
| U01.09 | Cumulative running time when previous fault occurred | 0～65535h | 0h | ⊙ |
| U01.10 | Before-previous fault code | Same as U01.00 | 0 | ⊙ |
| U01.11 | Running frequency when before-previous fault occurred | 0.00～Fup | 0.00Hz | ⊙ |

| U01.12 | Output current when before-previous fault occurred | 0.0～3000.0A | 0.0A | ⊙ |
|--------|---|---|---|---|
| U01.13 | Bus voltage when before-previous fault occurred | 0～1200V | 0V | ⊙ |
| U01.14 | Cumulative running time when before-previous fault occurred | 0～65535h | 0h | ⊙ |
| U01.15 | Previous 3 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.16 | Previous 4 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.17 | Previous 5 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.18 | Previous 6 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.19 | Previous 7 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.20 | Previous 8 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.21 | Previous 9 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.22 | Previous 10 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.23 | Previous 11 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.24 | Previous 12 categories of faults | The same with U01.00 | Err00 | ⊙ |
| U01.25 | Previous 13 categories of faults | The same with U01.00 | Err00 | ⊙ |

## Chapter 3 Maintenance and Troubleshooting

FR30 inverter provides a number of warning information and protection, when a fault occurs, the protective function is activated, the inverter will stop output, inverter fault relay contact, and in the inverter displays the fault code on the display panel. Before seeking service user can press the self-examination tips in this section, analyze problems, and identify solutions. If the problem still cannot be excluded, seek services, or contact the dealer you purchase the drive with my company.

| Display | Fault Name | Possible Causes | Solutions |
|---------|-----------|-----------------|-----------|
| Err01 | Accel overcurrent | 1: The output circuit is grounded or short circuited.<br>2: The acceleration time is too short.<br>3: Manual torque boost or V/F curve is not appropriate.<br>4: The voltage is too low.<br>5: The startup operation is performed on the rotating motor.<br>6: A sudden load is added during acceleration.<br>7: The AC drive model is of too small power class. | 1: Eliminate external faults.<br>2: Increase the acceleration time.<br>3: Adjust the manual torque boost or V/F curve.<br>4: Adjust the voltage to normal range.<br>5: Select rotational speed tracking restart or start the motor after it stops.<br>6: Remove the added load.<br>7: Select an AC drive of higher power class |
| Err02 | Decel overcurrent | 1: The output circuit is grounded or short circuited.<br>2: The deceleration time is too short.<br>3: The voltage is too low.<br>4: A sudden load is added during deceleration.<br>5: The braking unit and braking resistor are not installed. | 1: Eliminate external faults.<br>2: Increase the deceleration time.<br>3: Adjust the voltage to normal range.<br>4: Remove the added load.<br>5: Install the braking unit and braking resistor. |
| Err03 | Constant-speed overcurrent | 1: The output circuit is grounded or short circuited.<br>2: The voltage is too low.<br>3: A sudden load is added during operation.<br>4: The AC drive model is of too small power class. | 1: Eliminate external faults<br>2: Adjust the voltage to normal range.<br>3: Remove the added load<br>4: Select an AC drive of higher power class. |
| Err04 | Accel overvoltage | 1: The input voltage is too high.<br>2: An external force drives the motor during acceleration.<br>3: The acceleration time is too short.<br>4: The braking unit and braking resistor are not installed. | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install a braking resistor.<br>3: Increase the acceleration time.<br>4: Install the braking unit and braking resistor. |

| | | | |
|---|---|---|---|
| Err05 | Decel overvoltage | 1: The input voltage is too high.<br>2: An external force drives the motor during deceleration.<br>3: The deceleration time is too short.<br>4: The braking unit and braking resistor are not installed. | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install the braking resistor.<br>3: Increase the deceleration time.<br>4: Install the braking unit and braking resistor. |
| Err06 | Constant-speed overvoltage | 1: The input voltage is too high<br>2: An external force drives the motor during deceleration. | 1: Adjust the voltage to normal range.<br>2: Cancel the external force or install the braking resistor. |
| Err07 | Bus undervoltage | 1: Instantaneous power failure occurs on the input power supply.<br>2: The AC drive's input voltage is not within the allowable range.<br>3: The bus voltage is abnormal.<br>4: The rectifier bridge and buffer resistor are faulty.<br>5: The drive board is faulty.<br>6: The main control board is faulty. | 1: Reset the fault.<br>2: Adjust the voltage to normal range.<br>3: Contact the agent or Frecon. |
| Err08 | Short circuit | 1: The output circuit is grounded or short circuited.<br>2: The connecting cable of the motor is too long.<br>3: The module overheats.<br>4: The internal connections become loose.<br>5:The main control board is faulty<br>6: The drive board is faulty.<br>7: The inverter module is faulty. | 1: Eliminate external faults.<br>2: Install a reactor or an output filter.<br>3: Check the air filter and the cooling fan.<br>4: Connect all cables properly.<br>5: Contact the agent or Frecon. |
| Err09 | Power input phase loss | 1: The three-phase power input is abnormal.<br>2: The drive board is faulty.<br>3: The lightening board is faulty.<br>4: The main control board is faulty. | 1: Eliminate external faults.<br>2: Contact the agent or FRECON. |
| Err10 | Power output phase loss | 1: The cable connecting the AC drive and the motor is faulty.<br>2: The AC drive's three-phase outputs are unbalanced when the motor is running.<br>3: The drive board is faulty.<br>4: The module is faulty. | 1: Eliminate external faults.<br>2: Check whether the motor Three-phase winding is normal.<br>3: Contact the agent or Frecon. |
| Err11 | Motor overload | 1: F11-17 is set improperly.<br>2: The load is too heavy or locked-rotor occurs on the motor.<br>3: The AC drive model is of too small power class. | 1: Set F11-17 correctly.<br>2: Reduce the load and check the motor and the mechanical condition.<br>3: Select an AC drive of higher power class. |

| Err12 | Inverter overload | 1: The load is too heavy or locked-rotor occurs on the motor.<br>2: The AC drive model is of too small power class. | 1: Reduce the load and check the motor and mechanical condition.<br>2: Select an AC drive of higher power class. |
|---|---|---|---|
| Err13 | External equipment fault | 1: External fault signal is input via DI. | Reset the operation. |
| Err14 | Module overheat | 1: The ambient temperature is too high.<br>2: The air filter is blocked.<br>3: The fan is damaged.<br>4: The thermally sensitive resistor of the module is damaged.<br>5: The inverter module is damaged. | 1: Lower the ambient temperature.<br>2: Clean the air filter.<br>3: Replace the damaged fan.<br>4: Replace the damaged thermally sensitive resistor.<br>5: Replace the inverter module. |
| Err15 | EEPROM read/write fault | The EEPROM chip is damaged. | Replace the main control board. |
| Err16 | Motor auto-tuning cancelled | Since the identification process, press STOP / RST key | Press STOP / RST key to reset |
| Err17 | Motor auto-tuning fault | 1: the motor and the inverter output terminals are not connected<br>2: The motor does not disengage the load<br>3: The electrical fault | 1: check the connection between the inverter and motor<br>2: The motor is disengaged load<br>3: Check the motor |
| Err18 | Communication overtime error | 1: The PC is not working properly<br>2: The communication line is not normal<br>3: F15 set communication parameters set incorrectly | 1: Check the PC Connection<br>2: Check the communication cable<br>3: The communication parameters are set correctly |
| Err19 | PID feedback loss | PID feedback set value is less than F13.24 | Check the PID feedback signal or set to an appropriate value F13.24 |
| Err20 | Continuous running time reached | Set the running time to reach this function | reference F05.14 Description |
| Err21 | Parameter upload fault | 1: Is not installed or is not plugged parameter copy card<br>2: Parameter copy card anomalies<br>3: The control board abnormalities | 1: a copy of the card is properly installed parameters<br>2: for technical support<br>3: for technical support |
| Err22 | Parameter download fault | 1: Is not installed or is not plugged parameter copy card<br>2: Parameter copy card anomalies<br>3: The control board abnormalities | 1: A copy of the card is properly installed parameters<br>2: For technical support<br>3: For technical support |
| Err23 | Braking unit fault | 1: The brake line failure or damage the brake pipe<br>2: An external braking resistor is too small | 1: Check the brake unit, replace the brake pipe<br>2: Increasing the braking resistor |
| Err24 | Module temperature detection | The temperature sensor failure or cable break | For technical support |

| | | disconnection | | |
|---|---|---|---|---|
| Err25 | Load becoming 0 | The AC drive running current is lower than F11.22 | Check that the load is disconnected or the setting F11-22 and F11-23 is correct. |
| Err26 | With-wave current limit fault | 1: The load is too heavy or locked rotor occurs on the motor. 2: The AC drive model is of too small power class. | 1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class. |
| Err27 | Inverter soft-start relay is off | 1: The grid voltage is too low 2: Rectifier module failure | 1: Check the grid voltage 2: Demand for technical support |
| Err28 | Software version compatibility fault | 1: The upper and lower transmission module parameters in the parameter version of the control panel version mismatch. | re-upload module parameters to pass down |
| Err29 | Instantaneous overcurrent | 1. Inverter output circuit being grounded or short-circuit; 2. The acceleration and deceleration time is too short; 3. Manually torque boost or V/F curve not appropriate; 4. Voltage too low; 5. Start the running motor; 6. Sudden-load in the acceleration process; 7. Model selection of inverter power is too small. | 1. Troubleshooting peripheral problems; 2. To increase the acceleration time; 3. Adjust the manually torque boost or V/F curve; 4. Adjust the voltage to normal range; 5. Select RPM track start or start after motor stopped; 6. Cancel sudden-load; 7. Select the inverter with larger power. |
| Err30 | Instantaneous overvoltage | 1: Input voltage is too high; 2: There is external force drag the motor to run in deceleration process; 3: The deceleration time is too short; 4: No installation of braking resistor. | 1: Adjust the voltage to normal range; 2: Cancel external force or install brake resistor; 3: To increase the deceleration time; 4: Install braking resistor |
| Err36 | PG card is disconnection (close loop) | PG card detects that the encoder signal is disconnected | Check the cable of encoder |
| Err37 | Over Speed (close loop) | 1. Encoder parameters not right 2. F11.41 and F11.42 not unreasonable. 3. No parameter tuning | 1. check encoder parameters 2. check the value of F11.41 and F11.42 3. Perform parameter tuning |
| Err38 | Excessive speed deviation (close loop) | 1. Motor Locked Rotor 2. Encoder parameters not right 3. F11.43 and F11.44 not unreasonable. 4. Output circuit is abnormal | 1. check encoder parameters 2. check the value of F11.43 and F11.44 3. check drive output circuit |

| | | | |
|---|---|---|---|
| Err39 | Motor temperature too high | 1, PTC sensor configuration not right<br>2, Motor temperature protection value too small<br>3, Motor temperature too high | 1, Reset PTC sensor parameter<br>2, Increase motor temperature protection value<br>3, Waiting until motor is cooled |
| Err40 | The setting running time ends | 1, Running time more than F00.25 | 1.  Contact the dealer |
| Err41 | Overload warning | 1, when F11.18 = 00100 and the current output amp is more than   F11.19 | 1, Check the current load |
| Err44 | Short circuit to ground | When the ten's place of F02.04 is set and the drive output is circuited to the ground. | 1. Check the value of F02.04 and the output circuit of drive |
| Err45 | Dry pumping fault (multi-pump constant pressure water supply special machine) | 1. The water supply source is dry | 1. Check the water source |
| Err46 | STO fault 1 | 1. STO1 is activated, and STO2 is normal<br>2. STO2 is activated, and STO1 is normal<br>3. STO1 and STO2 are activated at the same time | 1. Check whether STO1 and STO2 have 24VDC inputs<br>2.   Check   whether   the positive   and   negative polarities of STO1 or STO2 24VDC input are reversed<br>3. Seek technical support |
| Err47 | STO fault 2 | 1. STO supply voltage is abnormal<br>2. STO-L pulse optocoupler self-test is abnormal<br>3. STO-Buffer self-test is abnormal<br>4. The STO-RAM self-test is abnormal<br>5. STO-FLASH self-test is abnormal | 1. Check whether the power supply is normal<br>2. Seek technical support |

## Appendix A: Modbus Communication Protocol

### 1. Application Scope

1. Applicable series: FRECON FR series inverter.

2. Applicable network: Support Modbus protocol, RTU format, withsingle-master/multi-slave Communication network of RS485 bus.

The typical RTU message frame format:

| Start Bit | Device Address | Function Code | Data | CRC | Stop Bit |
|---|---|---|---|---|---|
| T1-T2-T3-T4 | 8Bit | 8Bit | n*8Bit | 16Bit | T1-T2-T3-T4 |

### 2. Physical Interface

RS485 is asynchronous half-duplex Communication mode. LSB has transmission priority.

Default data format of RS485 terminal: 1-8-N-1，bits rate: 9600bps.

Data format 1-8-N-1, 1-8-O-1, 1-8-E-1, optional bits rates 4800bps, 9600bps, 19200bps, 38400bps, 57600bps and 115200bps can be selected.

Shielded twisted-pair cable is recommended Communication cable to lower external interference.

### 3. Protocol Format
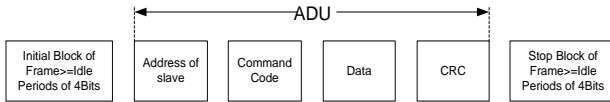


The parity in ADU (Application Data Unit) is obtained via the CRC16 parity of the 1st three Parts of ADU and switch the low bytes and high bytes. Low bytes of CRC parity go first, and high bytes of it follow in the protocol format.

### 4. Description of Protocol Format

#### 4.1 Address Code

Address of slave inverter. The setting range: 1～247, 0 is broadcast address.

#### 4.2 Command Code

| Command Code | Function |
|---|---|
| 03H | Read parameters and status byte of inverter |
| 06H | Write single function code or control parameter of inverter |
| 08H | Circuit diagnosis and setting |

**4.3 Allocation of Register Addresses**

| name | Description |
|---|---|
| Function Code (F00.00～U01.99) | High byte function code group number, F00 ～ F31, U00, U01, respectively, corresponding to the high byte address is 00H～1FH, 30H, 31H. Low byte of the group function code number, from 0 to 99 corresponding to the low byte address is 00H～63H. For example: Modify F01.02 function code value, no power-down when storing the corresponding register address (referred to as RAM address) to 0102H. EEPROM is frequently modified, will reduce the life of the EEPROM. If you modify the value of the function code-down storage needs, you can make this function code is the highest position a high address. Note that this address is only to write, not read. For example: Modify F01.02 function code value, and the corresponding need to power down when storing the register address (referred to as EEPROM address) to 8102H. |

| Function code group | RAM address high byte | EEPROM address high byte |
|---|---|---|
| F00 | 0x00 | 0x80 |
| F01 | 0x01 | 0x81 |
| F02 | 0x02 | 0x82 |
| F03 | 0x03 | 0x83 |
| F04 | 0x04 | 0x84 |
| F05 | 0x05 | 0x85 |
| F06 | 0x06 | 0x86 |
| F07 | 0x07 | 0x87 |
| F08 | 0x08 | 0x88 |
| F09 | 0x09 | 0x89 |
| F10 | 0x0A | 0x8A |
| F11 | 0x0B | 0x8B |
| F12 | 0x0C | 0x8C |
| F13 | 0x0D | 0x8D |
| F14 | 0x0E | 0x8E |
| F15 | 0x0F | 0x8F |
| F16 | 0x10 | 0x90 |
| F17 | 0x11 | 0x91 |
| F18 | 0x12 | 0x92 |
| F19 | 0x13 | 0x93 |
| F20 | 0x14 | 0x94 |
| F21 | 0x15 | 0x95 |
| F22 | 0x16 | 0x96 |
| U00 (Read Only) | 0x30 | -- |
| U01 (Read Only) | 0x31 | -- |

**4.4 Address and control command functions: (write only)**

| Command word address | Command Function |
|---|---|
| 2000H | 0001: Forward run<br>0002: Reverse Run<br>0003: Inching Forward<br>0004: Reverse Jog<br>0005: Slowdown stop<br>0006: Freewheel<br>0007: Fault reset |
| 2001H | Communication setting frequency (0~Fmax (Unit: 0.01Hz)) |
| 2002H | PID given range (0 to 1000, 1000 corresponds to 100.0%) |
| 2003H | PID feedback range (0~1000, 1000 corresponds to 100.0%) |
| 2004H | Torque set point (-3000~3000, 1000 corresponds to 100.0% motor rated current) |
| 2005H | AO output 1 (0~1000 corresponds to 0~100.0%) |
| 2006H | AO output 2 (0~1000 corresponds to 0~100.0%) |
| 2007H | DO output control<br>Bit0：Y1<br>Bit1：Y2<br>Bit2：R1<br>Bit3：R2<br>Bit4~Bit15: Reserved |

**4.5 The status and function of the read address Description: (read only)**

| Status word address | functional status word |
|---|---|
| 2100H | 0000H: parameter setting<br>0001H: slave run<br>0002H: JOG operation<br>0003H: learning run<br>0004H: Slave parking<br>0005H: JOG parking<br>0006H: Fault Status |
| 2101H | Bit0: 0 are given effective<br>     1 Given negative effective<br>Bit1:0 frequency output Forward<br>     1 frequency output inversion<br>Bit2~3:<br>   00 Keyboard start-stop<br>   01 terminal start-stop<br>   10 start-stop communication<br>   11 Reserved<br>Bit4:<br>   0 Factory password is invalid<br>   1 factory password is valid<br>Bit5:<br>   0   user password is invalid<br>   1   valid user password<br>Bit6~7:<br>   00 basic function code group<br>   01 user-defined function code group<br>   10 different functions with the factory default code group<br>   11 Others |
| 2102H | The current fault type of the inverter |
| 2103H | The current warning type of the frequency converter |

## 5 Illustration

1, No. 01 reads the output frequency value (U00.00), returned 5000, that 50.00Hz.

To send data:

01 03 30 00 00 01 8B 0A

The received data is:

01 03 02 13 88 B5 12

2, No. 01 Drive communication given frequency 30.00Hz, send the data content of 3000.

To send data:

01 06 20 01 0B B8 D4 88

The received data is:

01 06 20 01 0B B8 D4 88

3, communications sent on the 1st drive forward run command, write to the address 2000H 01

To send data:

01 06 20 00 00 01 43 CA

The received data is:

01 06 20 00 00 01 43 CA

4, No. 01 communications sent inverter deceleration stop command, the address to write to 2000H 05

To send data:

01 06 20 00 00 05 42 09

The received data is:

01 06 20 00 00 05 42 09

## Appendix B: Braking Resistor

When the inverter with large inertia load deceleration or need to slow down sharply, the motor will be in the power generation state, the load energy through the inverter bridge to the inverter DC link, causing the inverter bus voltage rise, when more than a certain value, the inverter will report overvoltage fault, and even lead to the inverter internal power module overvoltage damage, in order to prevent the occurrence of this phenomenon, must be configured with brake components.

The following is the recommended brake resistor power and resistance value. According to the load situation, the user can change the value appropriately, but it must be within the recommended range.

| Inverter Model No. | Brake unit | | 125% braking torque (10% ED, 10 sec max) | | inimum enabled brake resistance |
| --- | --- | --- | --- | --- | --- |
| | Model | quantity | Recommended brake resistance specifications | Number of brake resistors | |
| FR30-4T-0.7B | Standard built-in | | 200W 600Ω | 1 | 100Ω |
| FR30-4T-1.5B | | | 300W 360Ω | 1 | 100Ω |
| FR30-4T-2.2B | | | 300W 180Ω | 1 | 100Ω |
| FR30-4T-3.0B | | | 300W 180Ω | 1 | 100Ω |
| FR30-4T-4.0B | | | 400W 150Ω | 1 | 100Ω |
| FR30-4T-5.5B | | | 600W 100Ω | 1 | 80Ω |
| FR30-4T-7.5B | | | 800W 75Ω | 1 | 60Ω |
| FR30-4T-011B | | | 1.1kW 50Ω | 1 | 43Ω |
| FR30-4T-015B | | | 1.6kW 40Ω | 1 | 31Ω |
| FR30-4T-018B | | | 4.0kW 32Ω | 1 | 24Ω |
| FR30-4T-022B | | | 4.5kW 27Ω | 1 | 24Ω |
| FR30-4T-030B | | | 6.0kW 20Ω | 1 | 19.2Ω |
| FR30-4T-037(B) | Built-in optional | | 7.0kW 20Ω | 1 | 19.2Ω |
| FR30-4T-045(B) | | | 9.0kW 13Ω | 1 | 12.8Ω |
| FR30-4T-055(B) | | | 11.0kW 10.2Ω | 1 | 9.6Ω |
| FR30-4T-075(B) | | | 15.0kW 7.5Ω | 1 | 6.8Ω |
| FR30-4T-090(B) | | | 18.0kW 6.5Ω | 1 | 6.3Ω |
| FR30-4T-110(B) | | | 26.0kW 6Ω | 1 | 6Ω |
| FR30-4T-132 | FRBU-4T-315 | 1 | 26.0kW 4Ω | 1 | 4Ω |
| FR30-4T-160 | | | 26.0kW 4Ω | 1 | 4Ω |

Note: The wire should be above voltage-resistant AC450V and temperature-resistant 105°C.

## Appendix C: Peripheral Device Selection

| Inverter Model No. | Circuit breaker (A) | Contactor (A) | Power terminal cable specificationsmm2 | Grounding terminal cable specificationsmm2 | Terminal screw specifications |
|---|---|---|---|---|---|
| Three-phase power supply: 380V, 50/60Hz Range: -15%~+30% | | | | | |
| FR30-4T-0.7B | 10 | 10 | 2.5 | 2.5 | M4 |
| FR30-4T-1.5B | 16 | 10 | 2.5 | 2.5 | M4 |
| FR30-4T-2.2B | 16 | 10 | 2.5 | 2.5 | M4 |
| FR30-4T-3.0B | 16 | 10 | 2.5 | 2.5 | M4 |
| FR30-4T-4.0B | 25 | 16 | 4.0 | 4.0 | M4 |
| FR30-4T-5.5B | 32 | 25 | 4.0 | 4.0 | M4 |
| FR30-4T-7.5B | 40 | 32 | 4.0 | 4.0 | M4 |
| FR30-4T-011B | 63 | 40 | 6.0 | 6.0 | M4 |
| FR30-4T-015B | 63 | 40 | 6.0 | 6.0 | M5 |
| FR30-4T-018B | 100 | 63 | 10 | 10 | M5 |
| FR30-4T-022B | 100 | 63 | 10 | 10 | M5 |
| FR30-4T-030B | 100 | 63 | 16 | 10 | M6 |
| FR30-4T-037(B) | 160 | 100 | 16 | 16 | M8 |
| FR30-4T-045(B） | 200 | 125 | 25 | 16 | M8 |
| FR30-4T-055(B) | 200 | 125 | 35 | 25 | M8 |
| FR30-4T-075(B) | 250 | 160 | 50 | 25 | M8 |
| FR30-4T-090(B) | 250 | 160 | 70 | 35 | M8 |
| FR30-4T-110(B) | 350 | 350 | 120 | 60 | M10 |
| FR30-4T-132 | 400 | 400 | 150 | 75 | M10 |
| FR30-4T-160 | 500 | 400 | 185 | 95 | M10 |

# Appendix D: Keyboard Dimensions

**LCD keyboard size:**
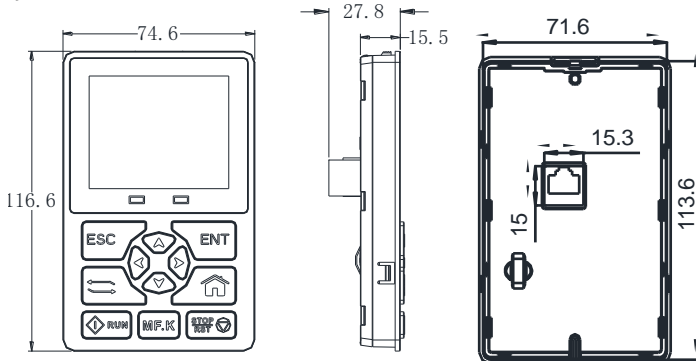


**External keyboard installation:**

External keyboard installation instructions: first open the mounting panel according to the size shown in Figure 2-9 according to the power range of the machine, and then card the keyboard tray into the mounting panel and then load the keyboard assembly into the keyboard tray. (When removing the keyboard tray, please first take out the keyboard first, and then take it out according to the illustration)



Keyboard components

Keyboard tray

Install the panel (This plate thickness is not.) More than 1.5mm)

Press on both sides after installation
Snap to remove from the panel

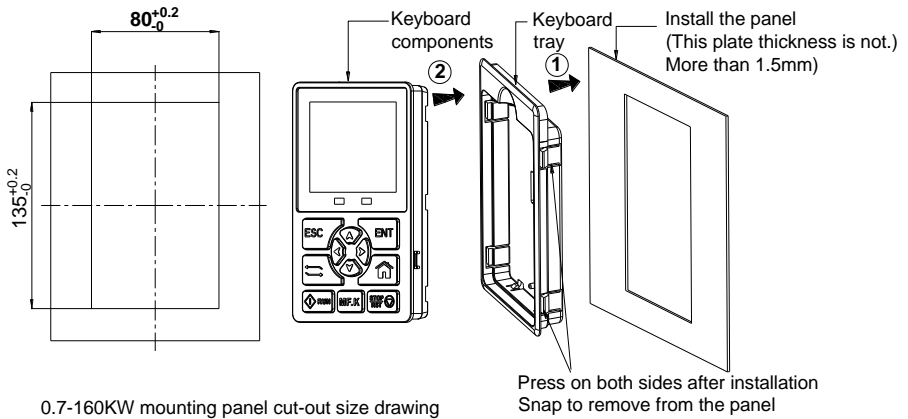0.7-160KW mounting panel cut-out size drawing

**Figure d-3 0.7~160kW keyboard external mounting cut-out size drawing**