Preface

Thank you for choosing SINEE's EM650E Permanent magnet screw air compressor dedicated inverter.

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The EM650E Permanent magnet screw air compressor dedicated inverter is a high-reliable and small-sized universal inverter launched by SINEE. They support a variety of drive control technologies speed sensorless vector control (SVC); Our company continuously improves the reliability, stability, and usability of our products, which are widely used in the permanent magnet screw air compressor industry.

Features of the EM650E Permanent magnet screw air compressor dedicated inverter:

- Supports V/F control technology (VVF) and speed sensorless vector control technology (SVC), capable of driving permanent magnets
- Rich and convenient PC background software functions;
- No need for derating at the ambient temperature of 50 ℃;
- Support "one-key shuttle" for fast and accurate speed adjustment;
- Built in PID, simple PLC, multi-point V/F folding line, multiple braking modes, instant stop, torque control, automatic voltage regulation function (AVR) and other functions, meeting complex industrial field applications;

Before using the EM650E Permanent magnet screw air compressor dedicated inverter, please read this manual carefully and keep it properly.

While connecting the inverter to motor for the first time, please select the motor type (synchronous) correctly and set the motor nameplate parameters: rated power, rated voltage, rated current, rated frequency, rated speed, motor connection, rated power factor, etc.

Since we are committed to continuously improving our products and product data, the data provided by us may be modified without prior notice.

For the latest changes and contents, please visit www.sinee.cn.

Safety precautions

Safety definition: Safety precautions are divided into the following two categories in this manual:

Danger: The dangers caused by nonconforming operations may include serious injuries and even deaths.

Warning: The danger caused by nonconforming operations, including moderate or minor injuries and equipment damage.

During the installation, commissioning and maintenance, please read this chapter carefully, and follow the safety precautions herein. Our company will not be liable for any injury or loss arising from nonconforming operations.

Precautions

Before installation:

Danger
1. Do not install the product in the case of water in the package or missing or damaged components found in unpacking! 2. Do not install the product in the case of inconsistency between the actual product name and identification on the outer package.

Warning
1. Handle the controller with care; otherwise, it may be damaged! 2. Never use the inverter damaged or with some parts missing; otherwise, injuries may be caused! 3. Do not touch the components of the control system with your hands; otherwise, there is a danger of static damage!

During installation:

Danger
1. Please install the inverter on a metal retardant object (e.g. metal) and keep it away from combustibles; otherwise, a fire may be caused! 2. Do not loosen the fixing bolts of components, especially those with red marks!

Warning

1. Never make wire connectors or screws fall into the inverter; otherwise, the inverter may be damaged!
2. Install the inverter in a place with little vibration and exposure to direct sunlight.
3. When the inverter is installed a relatively closed cabinet or space, pay attention to the installation gap to ensure the effects of heat dissipation.

During wiring:

Danger

1. Follow the instructions in this manual, and appoint professional and electrical engineering personnel to complete wiring; otherwise, unexpected dangers may be caused!
2. The inverter and power supply must be separated by a circuit breaker (recommendation: greater than or equal to and closest to twice the rated current); otherwise, a fire may be caused!
3. Before wiring, make sure that the power supply is in the zero energy status; otherwise, electric shock may be caused!
4. Never connect the input power supply to the output terminals (U, V, W) of the inverter. Pay attention to the marks of wiring terminals, and connect wires correctly! Otherwise, the inverter may be damaged!
5. Make the inverter grounded correctly and reliably according to the standards; otherwise, electric shock and fire may be caused!

Warning

1. Make sure that the lines meet the EMC requirements and local safety standards. For wire diameters, refer to the recommendations. Otherwise, an accident may occur!
2. Never connect the braking resistor directly between the DC bus＋ and － terminal. Otherwise, a fire may be caused!
3. Tighten the terminals with a screwdriver of specified torque; otherwise, there is a risk of fire.
4. Never connect the phase-shifting capacitor and LC/RC noise filter to the output circuit.
5. Do not connect the electromagnetic switch and electromagnetic contactor to the output circuit. Otherwise, the overcurrent protection circuit of the inverter will be enabled. In severe cases, the inverter may be subject to internal damage.
6. Do not dismantle the connecting cable inside the inverter; otherwise, internal damage may be caused to the inverter.

Before power-on:

Danger

1. Make sure that the voltage level of the input power supply is consistent with the rated voltage of the inverter; and the input terminals (R, S, T) and output terminals (U, V, W) of the power supply are connected correctly. Check whether there is short circuit in the peripheral circuits connected to the inverter and whether all connecting lines are tightened; otherwise, the inverter may be damaged!
2. The withstand voltage test has been performed to all parts of the inverter, so it is not necessary to carry it out again. Otherwise, an accident may be caused!

Warning

1. The inverter must not be powered on until it is properly covered; otherwise, electric shock may be caused!
2. The wiring of all peripheral accessories must be in line with the instructions in this manual. All wires should be connected correctly according to the circuit connections in this manual. Otherwise, an accident may occur!

After power-on:

Danger

1. Never touch the inverter and surrounding circuits with wet hands; otherwise, electric shock may occur!
2. If the indicator is not ON and the keyboard has no response after power-on, immediately turn off the power supply. Never touch the inverter terminals (R, S, T) and the terminals on the terminal block with your hands or screwdriver; otherwise, electric shock may be caused. Upon turning off the power supply, contact our customer service personnel.
3. At the beginning of power-on, the inverter automatically performs a safety test to external strong current circuits. Do not touch the inverter terminals (U, V, W) or motor terminals; otherwise, electric shock may be caused!
4. Do not disassemble any parts of the inverter while it is powered on.

Warning

1. When parameter identification is required, please pay attention to the danger of injury during motor rotation; otherwise, an accident may occur!
2. Do not change the parameters set by the inverter manufacturer without permission; otherwise, the inverter may be damaged!

During operation:

Danger
1. Do not touch the cooling fan, radiator and discharge resistor to feel the temperature; otherwise, burns may be caused! 2. Non-professional technicians must not test signals when the controller is in operation; otherwise, personal injury or equipment damage may be caused!

Warning
1. Prevent any object from falling into the inverter in operation; otherwise, the inverter may be damaged! 2. Do not start or stop the inverter by turning on or off the contactor; otherwise, the inverter may be damaged!

During maintenance:

Danger
1. Never carry out repair and maintenance in the live state; otherwise, electric shock may be caused! 2. Maintenance of the inverter must be carried out 10 min after the main circuit is powered off and the display interface of the keyboard is disabled; otherwise, the residual charge in the capacitor will do harm to the human body! 3. Personnel without professional training are not allowed to repair and maintain the inverter; otherwise, personal injury or inverter damage may be caused! 4. The parameters must be set after the inverter is replaced. Plugs in all interfaces must be operated in the power-off status! 5. The synchronous motor generates electricity while rotating. Inverter maintenance and repair must be performed 10 min after the power supply is turned off and the motor stops running; otherwise, electric shock may be caused!

Cautions

Motor insulation inspection

When the motor is used for the first time or after long-term storage or subject to regular inspection, its insulation should be checked to prevent the inverter from damage caused by failure of the motor winding insulation. During the insulation inspection, the motor must be disconnected from the inverter. It is recommended to use a 500V megohmmeter. The measured insulation resistance must not be less than 5 MΩ.

Thermal protection of motor

If the motor used does not match the rated capacity of the inverter, especially when the rated power of the inverter is greater than that of the motor, the motor must be protected by adjusting the motor protection parameters of the inverter or installing a thermal relay in front of the motor.

Operation above power frequency

This inverter can provide the output frequency of 0.00Hz to 600.00Hz/0.0Hz to 3000.0Hz. When the motor needs to operate above the rated frequency, please consider the capacity of the mechanical device.

About motor heat and noise

Since the inverter outputs PWM waves, containing some harmonics, the temperature rise, noise and vibration of the motor will be slightly more than those in operation at the power frequency.

Presence of voltage-dependent device or capacitor increasing the power factor on output side

The inverter outputs PWM waves. If there is a capacitor increasing the power factor or voltage-dependent resistor for lightning protection on the output side, the inverter may be subjected to instantaneous overcurrent and even damage. Do not use these devices.

Use beyond rated voltage

The EM650E Permanent magnet screw air compressor dedicated open-loop vector inverter should not be used beyond the allowable working voltage range specified in this manual; otherwise, the components inside the inverter are prone to damage. If necessary, use the appropriate step-up or step-down device for voltage transformation.

Lightning impulse protection

The inverter of this series is equipped with a lightning overcurrent protector, which has certain capabilities in self-protection against induced lightning. Where lightning strikes occur frequently, a protective device should be added in front of the inverter.

Altitude and derating

In areas with an altitude of more than 1,000 m, where heat dissipation of the inverter is poor due to thin air, derating is required (derating by 1% per 100 m altitude increase to maximum 3,000 m; for ambient temperature above 50 ℃, derating by 1.5% per 1 ℃ temperature rise to maximum 60℃). Contact us for technical advice.

Precautions for scrapping of inverter

Burning of the electrolytic capacitors of the main circuit and printed circuit board may result in explosion, and burning of plastic parts may generate toxic gases. Please dispose of the controller as a kind of industrial waste.

Contents

Chapter 1 Overview

1.1 Model and Specification of EM650E Permanent magnet screw air compressor dedicated Inverter

- Rated voltage of power supply:

  Three-phase AC 340~460V;

- Applicable motor: Three-phase AC synchronous motor

The model and rated output current of EM650E Permanent magnet screw air compressor dedicated inverter are as shown in Table 1-1.

Table 1-1 EM650E Permanent magnet screw air compressor dedicated Inverter

Rated voltage of power supply	Model	Applicable motor power (kW)	Heavy-duty rated output current (A)
Three-phase AC 340~460V	EM650E-5R5-3B	5.5	13
	EM650E-7R5-3B	7.5	17
	EM650E-011-3B	11	25
	EM650E-015-3B	15	32
	EM650E-018-3B	18.5	38
	EM650E-022-3B	22	45
	EM650E-030-3B	30	60
	EM650E-037-3B	37	75
	EM650E-045-3	45	90
	EM650E-055-3	55	110
	EM650E-075-3	75	150
	EM650E-090-3	90	176
	EM650E-110-3	110	210
	EM650E-132-3	132	253
	EM650E-160-3	160	304
	EM650E-185-3	185	340
	EM650E-200-3	200	380
	EM650E-220-3	220	426
	EM650E-250-3	250	465
	EM650E-280-3	280	520
	EM650E-315-3	315	585
	EM650E-355-3	355	650

	EM650E-400-3	400	725

★ Correct selection of the inverter: The rated output current of the inverter is greater than or equal to the rated current of the motor, taking into account the overload capacity.

★ The difference between the rated power of the inverter and that of the motor is usually recommended not to exceed two power segments.

★ When a high-power inverter is provided with a low-power motor, the motor parameters must be entered accurately to prevent the motor from damage as a result of overload.

The technical specifications of the EM650E Permanent magnet screw air compressor dedicated inverter are shown in Table 1-2.

Table 1-2 Technical Specifications of EM650E Permanent magnet screw air compressor dedicated Inverter

Item		Specification
Power supply	Rated voltage of power supply	Three-phase 340V-10% to 460V+10%, 50-60Hz ± 5%; voltage unbalance rate: <3%
Output	Maximum output voltage	The maximum output voltage is the same as the input power voltage.
	Rated output current	Continuous output of 100% rated current
	Maximum overload current	150% heavy-duty rated current: 60s （185~450kw 140% heavy-duty rated current: 60s); 120% light-duty rated current: 60s; 150% light-duty rated current: 10s; 180% light-duty rated current: 2s
Basic control functions	Drive mode	speed sensorless vector control (SVC)
	Input mode	Frequency (speed) input, torque input
	Start and stop control mode	Keyboard, control terminal (two-line control and three-line control), communication
	Frequency control range	0.00~600.00Hz
	Input frequency resolution	Digital input: 0.01Hz/0.1Hz Analog input: 0.1% of maximum frequency
	Speed control range	1:200 (SVC)

	Speed control accuracy	Rated synchronous speed ± 0.2%
	Acceleration and deceleration time	0.01 s to 600.00 s / 0.1 s to 6,000.0 s / 1 s to 60,000 s
	Voltage/frequency characteristics	Rated output voltage: 20% to 100%, adjustable Reference frequency: 1Hz to 600Hz
	Torque boost	Fixed torque boost curve Any V/F curve is acceptable.
	Starting torque	150%/0.25Hz (SVC)
	Torque control accuracy	±5% rated torque (SVC)
	Self-adjustment of output voltage	When the input voltage changes, the output voltage will basically remain unchanged.
	Automatic current limit	Output current is automatically limited to avoid frequent overcurrent protection actions.
	DC braking	Braking frequency: 0.01 to maximum frequency Braking time: 0～30s Braking current: 0% to 150% rated current
	Signal input source	Communication, multi-speed, analog, etc.
Input and output function	Reference power supply	10V/20mA
	Terminal control power	24V/100mA
	Digital input terminal	5-channel digital multi-function input: X1~X5 X5 can be used as the high-speed pulse input (max 100kHZ).
	Analog input terminal	2-channel analog inputs: One (AI1) voltage source: -10 to 10V input; One channel (AI2): 0 to 10V input voltage or 0 to 20mA input current optional;
	Digital output	Multi-function output of one open collector and one relay

	terminal	Maximum output current of the collector: 50mA; Relay contact capacity: 250VAC/3A or 30VDC/1A, EA-EC: normally open; EB-EC: normally closed
	Analog output terminal	One multi-function analog terminal output M1: 0-10V/0-20mA multi-function analog output terminal
Keyboard	LED display	The LED digital tube displays relevant information about the inverter.
Protection	Protective Function	Short circuit, overcurrent, overvoltage, undervoltage, phase loss, overload, overheat, load loss, external protection, etc.
Use conditions	Location	Indoor, at an altitude of less than 1 km, free of dust, corrosive gases and direct sunlight. When the altitude is higher than 1km, it is derated by 1% per 100m. The maximum allowable altitude is 3km.
	Applicable environment	-10℃ to +50℃, 5% to 95%RH (no condensation). When the ambient temperature exceeds 50°C, it needs to be derated by 3% per 1°C temperature rise. The maximum allowable ambient temperature is 60°C.
	Vibration	Less than 0.5g
	Storage environment	-40℃～+70℃
	Installation method	Wall-mounted or installed in the cabinet
Levels of protection		IP20
Cooling method		Forced air cooling

1.2 Detailed Introduction to Running Status of EM650E Permanent magnet screw air compressor dedicated Inverter

1.2.1 Working status of inverter

The working status of EM650E Permanent magnet screw air compressor dedicated inverter is divided into: parameter setting status, normal running status, jog running status, self-learning running status, stop status, jog stop status and protection status.

- Parameter setting status: After being powered on and initialized, the inverter will be in the standby status with no trip protection or start command, and have no output.
- Normal running status: Upon receiving a valid start command (from the keyboard,

control terminal and communication), the inverter will have the output based on the set input requirements, driving the motor to rotate.

- Jog running status: This is enabled by the keyboard, external terminal or communication, driving the motor to rotate at the jog input speed.
- Self-learning running status: This is enabled by the keyboard, detecting relevant parameters of the motor in the stationary or rotating status.
- Stop status: It is a process for the output frequency to decrease to zero according to the set deceleration time in the case of invalid operating commands.
- Jog stop status: It is a process for the output frequency to decrease to zero according to the jog deceleration time in the case of invalid jog operating commands.
- Protection status: Refer to the inverter status in the case of any protection.

1.2.2 Running mode of inverter

The running mode of the inverter refers to the control law of the inverter to drive the motor to rotate at the required speed and torque. The running mode includes:

- General open-loop space vector control-VVF control: suitable for applications where the speed is not changing fast and there are not high requirements for the accuracy of rotating speed, and most AC motor drives.
- Speed sensorless vector control-SVC control: advanced speed estimation algorithm, involving open-loop vector control and high control accuracy but no encoder.

1.2.3 Operation method of inverter

The operation method of the inverter refers to the operating conditions for the inverter to enable the running status. It includes: keyboard operation, terminal operation and communication operation. Terminal operation is divided into two-line control (RUN, F/R) and three-line control (RUN, F/R, Xi (i=1-5) (change the definition of Xi to three-line operation stop control). The control logic of this operation method is shown in Fig. 1-6 (take the NPN input mode as an example).

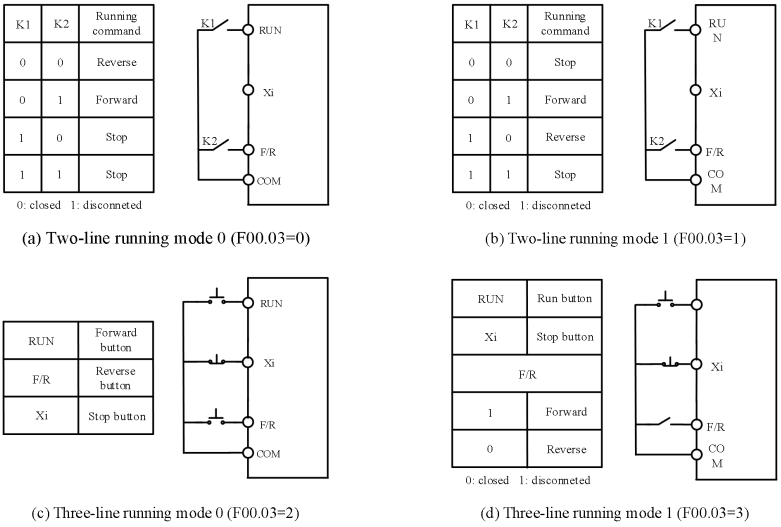


Fig. 1- 6 Control Logic Diagram of Terminal Operation

Chapter 2 Installation

2.1 Product check

Danger
● **Never install the inverter damaged or with some parts missing.** Otherwise, injuries may be caused.

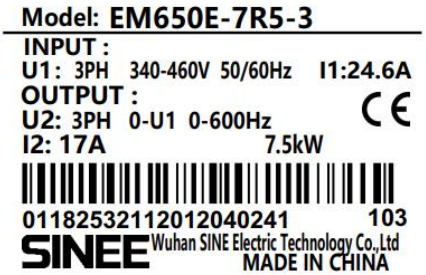
When you get the product, please check it according to Table 2-1.

Table2- 1 Check Items

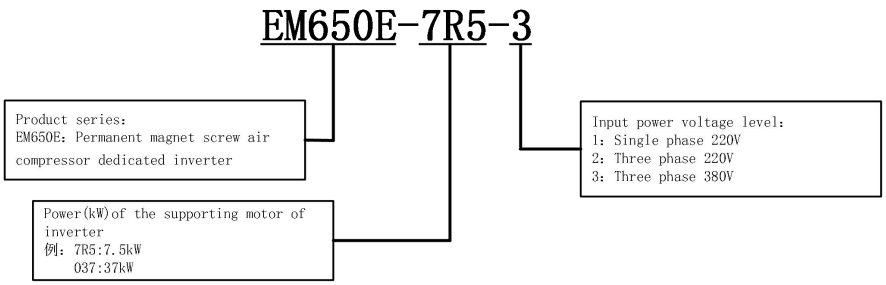
Item to be confirmed	Confirming methods
Check whether the product is consistent with the order.	Check the nameplate on the side face of the inverter.
Check whether any part is damaged.	Check the overall appearance for damage caused in transportation.
Check whether the fastened parts (e.g. screws) are loose.	If necessary, check the product with a screwdriver.

In the case of any defect, contact the agent or our Marketing Department.

- **Nameplate**

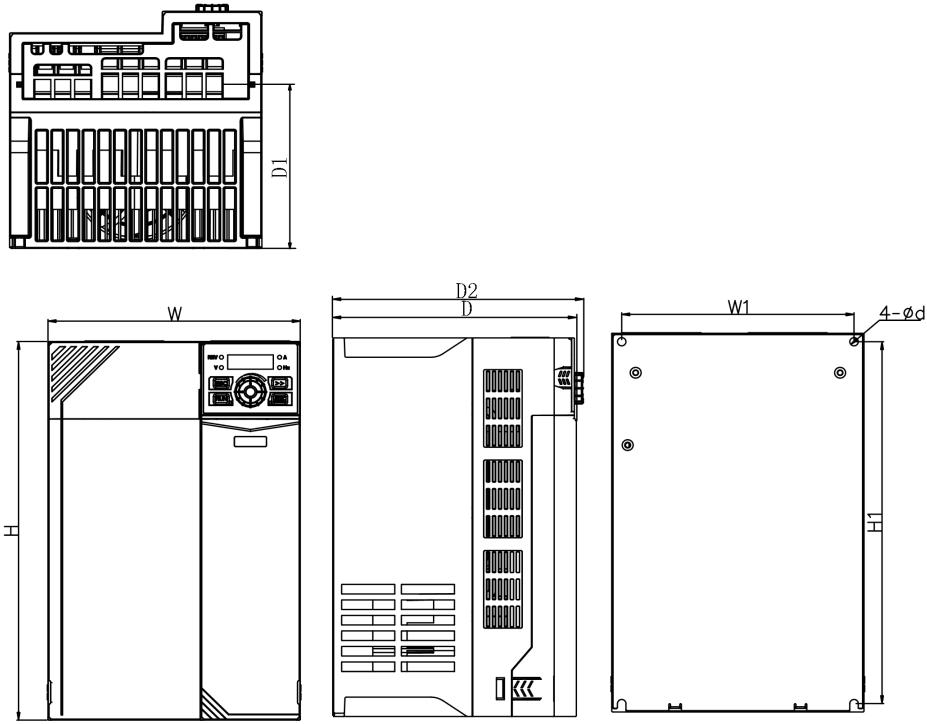


- **Description of inverter model**

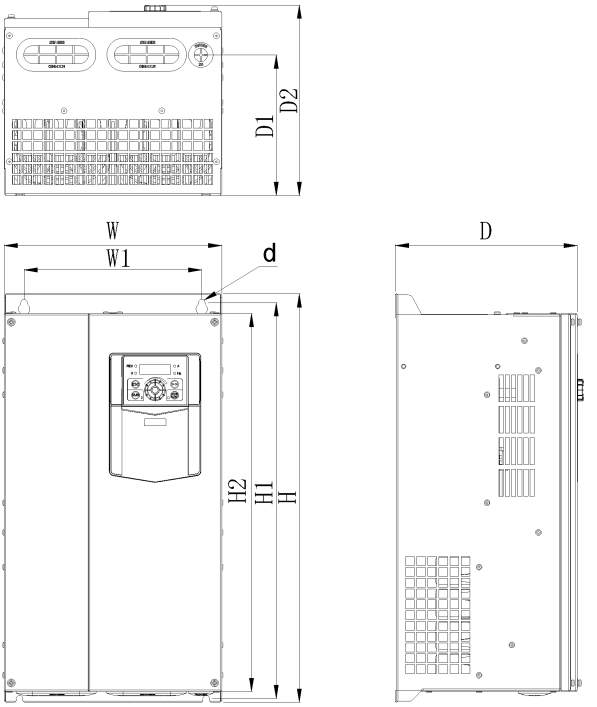


2.2 Outline dimensions and installation dimensions

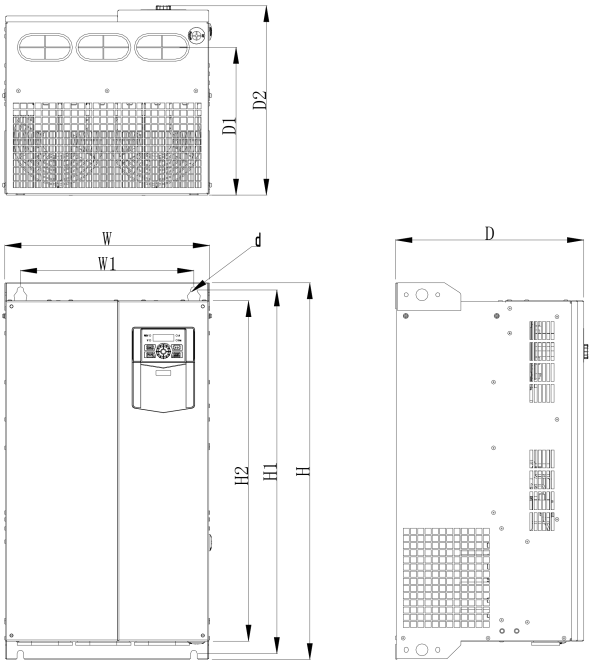
EM650E Permanent magnet screw air compressor dedicated inverters involve 25 specifications, 2 types of appearance and 10 installation sizes, as shown in Fig. 2-1 and Table 2-2.



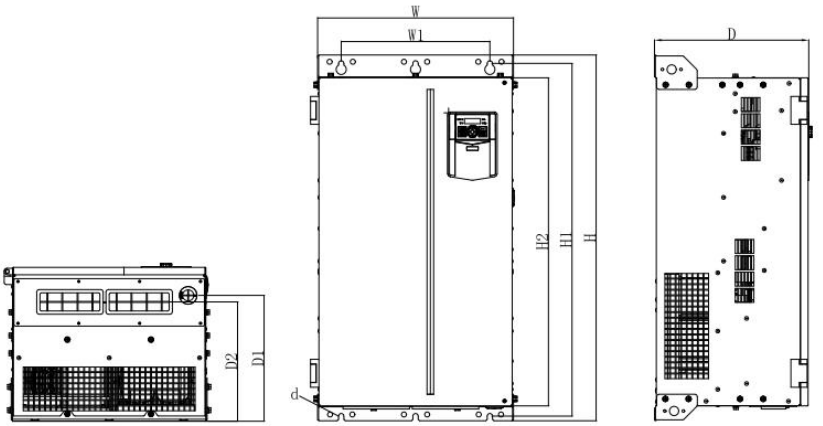
(a) Appearance of EM650E-0R7-3B to EM650E-022-3B inverters



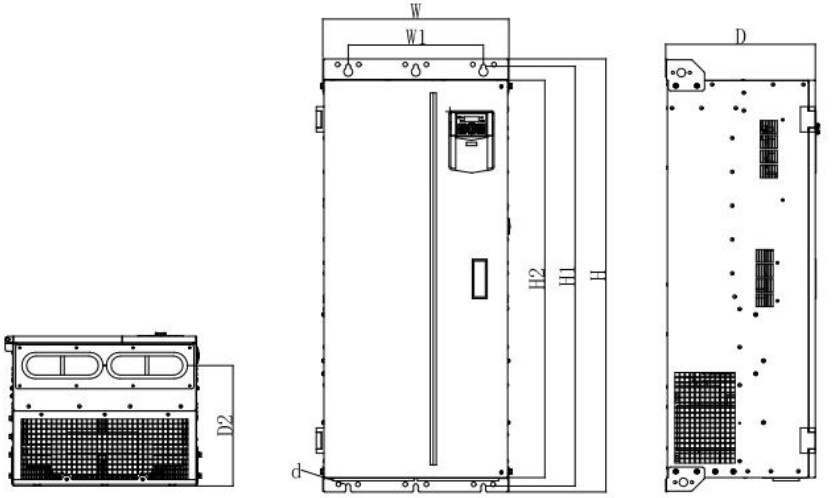
(b) Appearance of EM650E-030-3B to EM650E-075-3 inverters



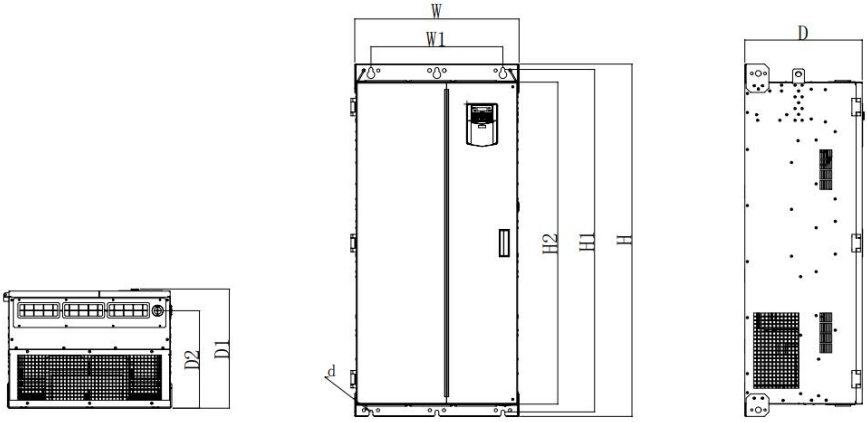
(c) Appearance of EM650E-090-3 to EM650E-160-3 inverters



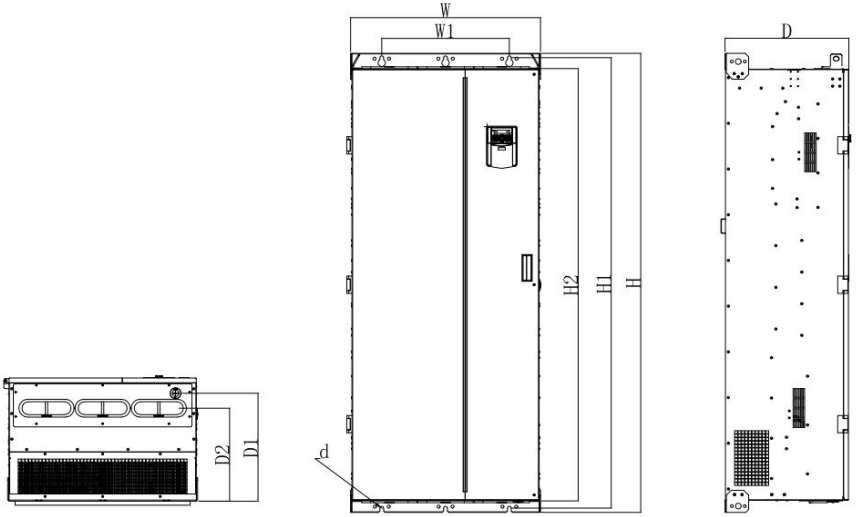
(d) Appearance of EM650E-185-3 to EM650E-220-3 inverters



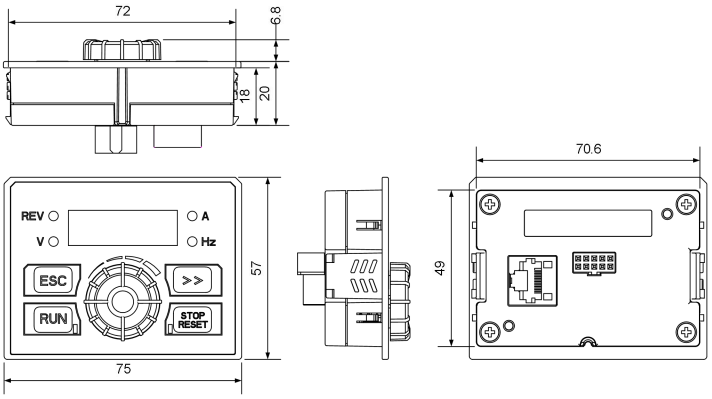
(e) Appearance of EM650E-250-3 inverters



(f) Appearance of EM650E-280-3 to EM650E-315-3 inverters



(g) Appearance of EM650E-355-3 to EM650E-450-3 inverters



(h) EM650E keyboard appearance

Fig.2- 1 Outline Dimensions of EM650E Permanent magnet screw air compressor dedicated Inverter and Keyboard

Table 2- 2 Outline and Installation Dimensions of EM650E Permanent magnet screw air compressor dedicated Inverter

Specifications	W	W1	H	H1	H2	D	D1	D2	d
EM650E-7R5-3B	109	98	207	196		154	103	160	5.5
EM650E-011-3B	136	125	250	240		169	115	174	5.5
EM650E-015-3B									
EM650E-018-3B	190	175	293	280		184	145	189	6.5
EM650E-022-3B									
EM650E-030-3	245	200	454	440	420	205	156	212	7.5
EM650E-030-3B									
EM650E-037-3									
EM650E-037-3B									
EM650E-045-3	300	266	524	508	480	229	174	236	9
EM650E-055-3									
EM650E-075-3	335	286	580	563	536	228	177	235	9
EM650E-090-3	335	286	630	608	570	310	247	317	11
EM650E-110-3									
EM650E-132-3	430	330	770	747	710	311	248	319	13
EM650E-160-3									
EM650E-185-3	422	320	786	758	709	335	271	256.4	11.5
EM650E-200-3	441	320	1025	989	942	357		285	11.5
EM650E-220-3									
EM650E-250-3									
EM650E-280-3	560	450	1024	1170.5	1100	400		333	13
EM650E-315-3									
EM650E-355-3	660	443	1597	1567	1504	430	375.5	325.5	13
EM650E-400-3									

2.3 Installation Site Requirements and Management

Attention

1、 **When carrying the inverter, hold its bottom.**
If you hold the panel only, the body main fall to hit your feet.

2、 **Install the inverter on non-flammable boards (e.g. metal).**
If the inverter is installed on a flammable object, a fire may occur.

3、 **When two or more inverters are installed in one control cabinet, please install a cooling fan and keep the air temperature below 50 ℃ at the air inlet.**
Overheating may cause fire and other accidents.

2.3.1 Installation site

The installation site should meet the following conditions:

1. The room is well ventilated.
2. The ambient temperature should be -10°C to 50°C. When the plastic case is used at the ambient temperature above 40℃, remove the top baffle.
3. The controller should be free from high temperature and humidity (less than 90% RH) or rainwater and other liquid droplets.
4. Please install the inverter on a fire-retardant object (e.g. metal). Never install it on flammable objects (e.g. wood).
5. No direct sunlight.
6. There should be no flammable or corrosive gas and liquid.
7. There should be no dust, oily dust, floating fibers or metal particles.
8. The installation foundation should be secured and vibration-free.
9. Avoid electromagnetic interference and keep the controller away from interference sources.

2.3.2 Environment temperature

In order to improve the operational reliability, please install the inverter in a well-ventilated place. When it is used in a closed cabinet, a cooling fan or cooling air conditioner should be installed to keep the ambient temperature below 50°C.

2.3.3 Preventive measures

Take protective measures to the inverter during installation to prevent metal fragments or dust generated in drilling and other processes from falling into the inverter. Remove the protection after installation.

2.4 Installation Direction and Space

The EM650E-1R5-3B inverters and above are equipped with the cooling fan for forced air cooling. To ensure good cyclic cooling effects, the inverter must be installed in a vertical direction, and sufficient spaces must be reserved between the inverter and adjacent objects or baffles (walls). Refer to Fig. 2-2.

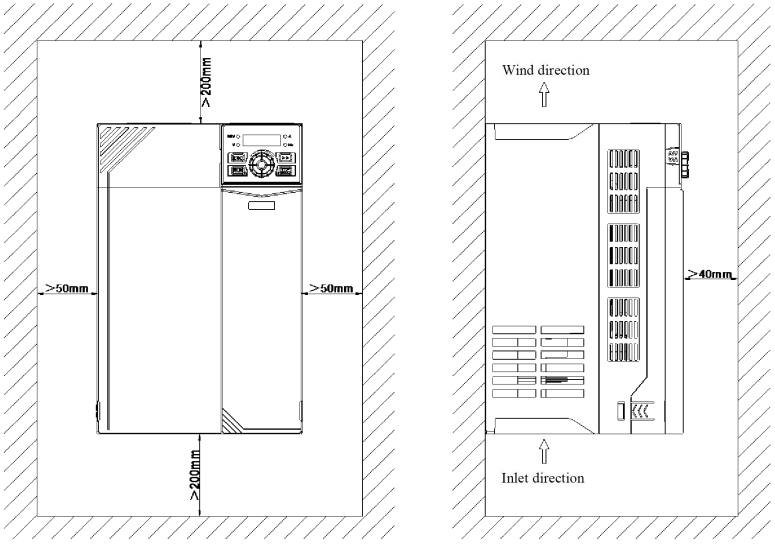


Fig.2- 2 Inverter Installation Direction and Space

Chapter 3 Wiring

3.1 Connection of Peripheral Device

The standard connection between the EM650E Permanent magnet screw air compressor dedicated inverter and peripheral devices is shown in Fig.3- 1.

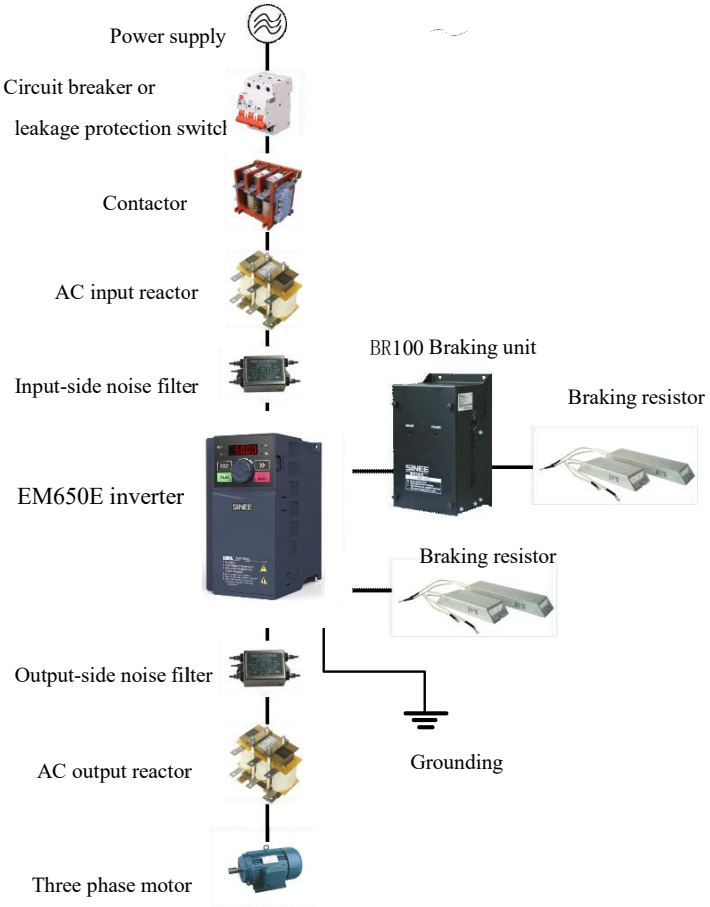


Fig.3- 1 Connection of Inverter and Peripheral Devices

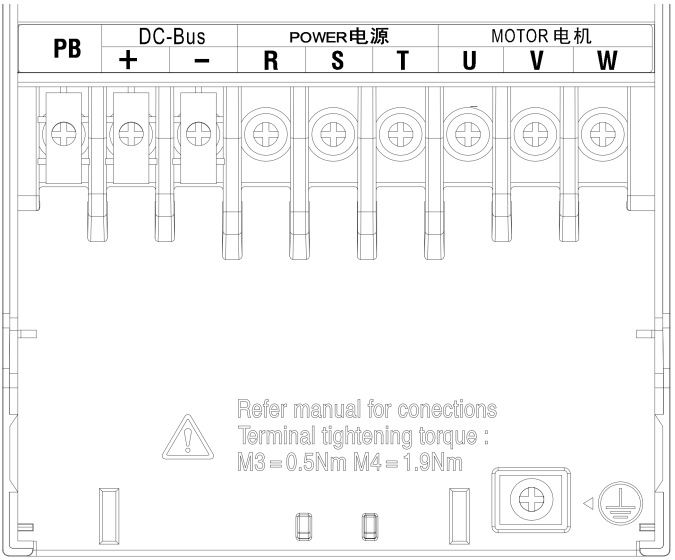
3.2 Wiring of Main Circuit Terminal

3.2.1 Composition of main circuit terminal

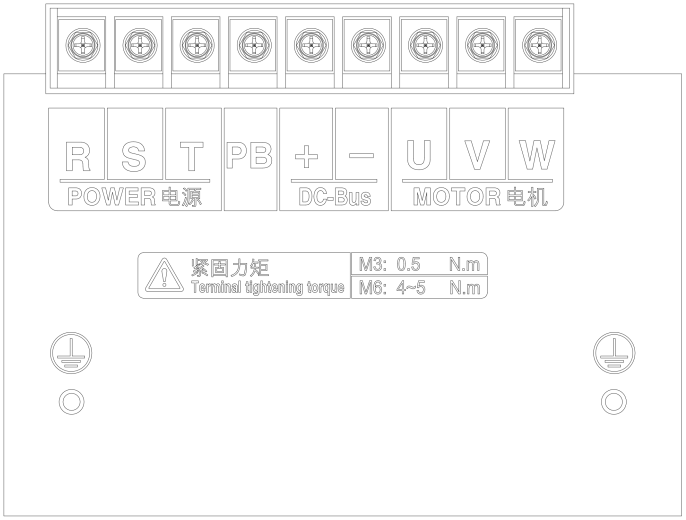
The main circuit terminal of the EM650E Permanent magnet screw air compressor dedicated inverter consists of the following parts:

- Three-phase AC power input terminals: R, S, T
- Earth terminal: ⏚
- DC bus terminals: ⊕、⊖
- Terminals of dynamic braking resistor: PB, ⊕
- Motor terminals: U, V, W

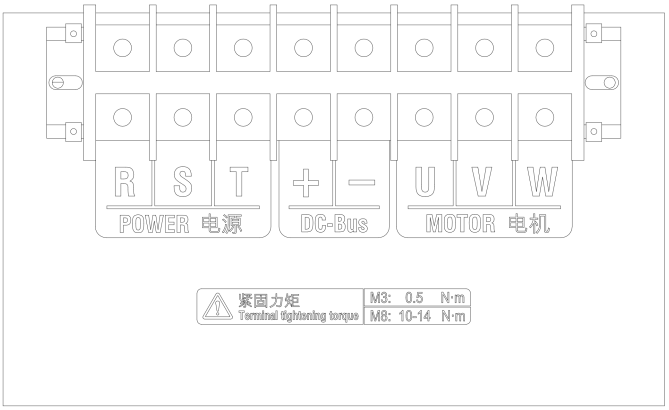
The layout of main circuit terminals is shown in Fig. 3-2.



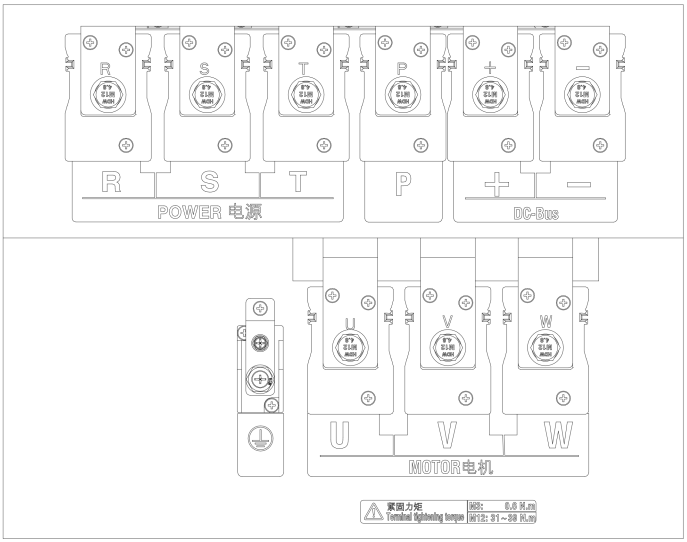
a) Schematic Diagram of Terminals (EM650E-7R5-3B～EM650E-022-3B)
(with slight difference in the grounding position)



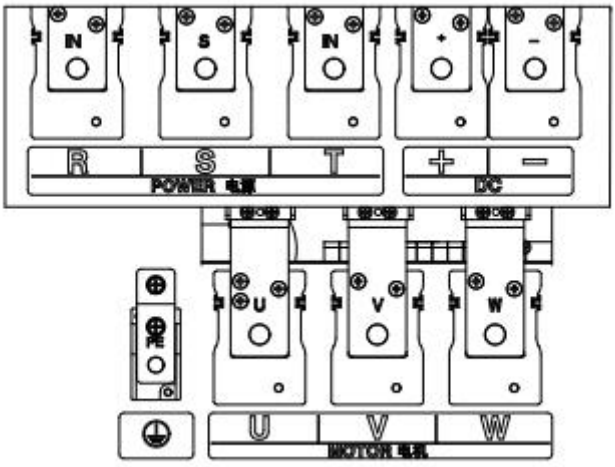
d) Schematic Diagram of Terminals (EM650E-030-3/3B～EM650E-037-3/3B)



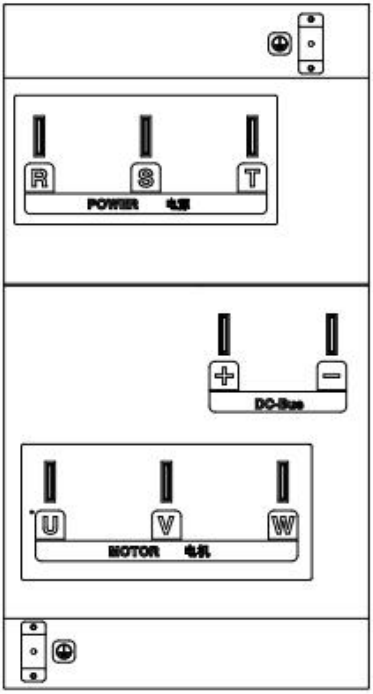
e) Schematic Diagram of Terminals (EM650E-045-3～EM650E-110-3)



f) Schematic Diagram of Terminals (EM650E-132-3～EM650E-160-3)



（g）Schematic Diagram of Terminals (EM650E-185-3～EM650E-250-3)



（h）Schematic Diagram of Terminals (EM650E-280-3～EM650E-400-3)

3.2.2 Functions of main circuit terminals

The functions of the main circuit terminals of the EM650E Permanent magnet screw air compressor dedicated inverter are shown in the following table. Please connect wires correctly according to the corresponding functions.

Functions of main circuit terminals

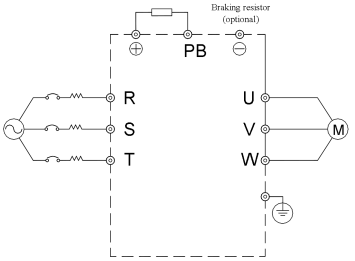
Terminal label	Function description
R/L1, S/L2, T/L3	AC power input terminal, connected to three-phase AC power supply (the single-phase power input terminal can be connected with any two terminals)
U, V, W	AC output terminal of the inverter, connected to three-phase AC motor
⊕⊖	Positive and negative terminals of the internal DC bus, connected to external braking unit

⊕, PB	Braking resistor terminal, with one end of the braking resistor connected to ⊕ and the other end to PB
P,⊕	DC reactor terminal, for the external DC reactor of EM650E-090-3 and above
⏚	Grounding terminal, connected to earth

3.2.3 Standard wiring diagram of main circuit

The standard wiring diagram of the main circuit of the EM650E Permanent magnet screw air compressor dedicated inverter is shown in Fig. 3-3.

● Wiring of built-in brake unit



● Wiring of external brake unit

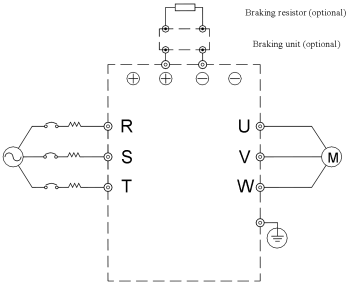


Fig.3-3 Standard Wiring of Main Circuit

3.2.4 Cable and screw dimensions of main circuit

The cable and screw dimensions of the main circuit are shown in Table 3-3.

Table3-3 Cable Dimensions and Terminal Screw Specifications

Frequency converter model	Terminal Symbol	Terminal Screw	Tightening Torque (N.m)	Wire diameter (mm^2)	Wire Type
EM650E-5R5-3B	PB, +, -, R, S, T, U, V, W	M4	1.5-2.0	6	
EM650E-7R5-3B					
EM650E-011-3B		M5	3.0～4.0	10	
EM650E-015-3B					
EM650E-018-3B					
EM650E-022-3B				16	
EM650E-030-3B					
EM650E-037-3B					

EM650E-030-3	R, S, T, PB, +, -, U, V, W,	M6	4.0～5.0	25	
EM650E-037-3					
EM650E-045-3	R, S, T, +, -, U, V, W,	M8	9.0～10.0	35	
EM650E-055-3				35	
EM650E-075-3		M10	17.0～22.0	60	
EM650E-090-3				60	
EM650E-110-3				90	
EM650E-132-3	R, S, T, P, +, -, U, V, W			90	
EM650E-160-3				120	
EM650E-185-3	R, S, T, P, +, -, U, V, W	M12	30.0～40.0	180	
EM650E-200-3					
EM650E-220-3				2*120	
EM650E-250-3					
EM650E-315-3				2*150	
EM650E-355-3					
EM650E-400-3					

Table 3- 1 Cable Dimensions and Terminal Screw Specifications **Note:** 1: The specifications of the wire are dependent on its voltage drop. Under normal circumstances, the voltage drop calculated by the following formula should be less than 5V.

Voltage drop = $\sqrt{3}$ * wire resistivity (Ω/KM) * wire length (m) * rated current (A) * 10^{-3}

2: If the wire is in a plastic slot, it should be enlarged by one level.

3: The wire should be crimped to the round terminal suitable for the wire and terminal screw.

4: The specification of the ground wire should be the same as that of the power cable smaller than 16mm^2. When the power cable is 16mm^2 or larger, the ground wire should not be smaller than 1/2 of the power cable.

3.2.5 Ground wire

- The ground terminal ⏚ must be grounded.
- Pay special attention to the third type of grounding (grounding resistance: less than 10Ω).

- The ground wire must not be shared by the welding machine and power devices.
- Select the ground wire according to the technical specifications for electrical equipment, and minimize the length of the ground wire connected to the grounding point.
- Where two or more inverters are used, the ground wires must not form a loop. The correct and incorrect grounding methods are shown in Table 3-10.

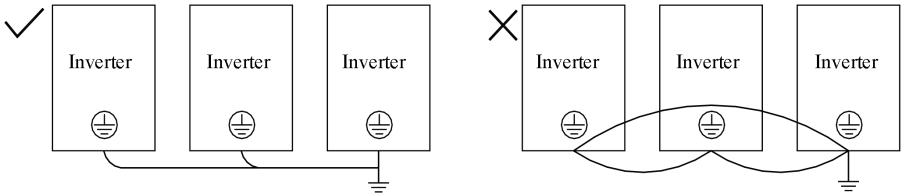


Fig.3- 10 Connection of Ground Wire

3.2.6 Installation and wiring of braking resistor and braking unit

Refer to Chapter 10 for the selection and wiring of the braking resistor and braking unit.

For the inverter with a built-in braking unit, connect the braking resistor between the inverter terminal (+) and PB terminal. For the inverter with no built-in braking unit, connect the terminals (+ and -) of the braking unit to those (+ and -) of the DC bus of the inverter, and the braking resistor to the PB+ and PB- terminals of the braking unit. Refer to the user manual of the BR100 braking unit for more information.

3.3 Wiring of Control Circuit Terminal

3.3.1 Composition of control circuit terminal

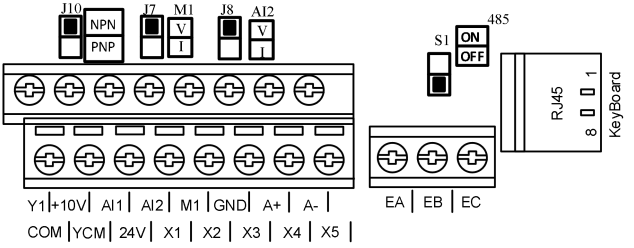


Fig.3- 11 Layout of Control Circuit Terminals 1

3.3.2 Functions and wiring of control circuit terminals

Table 3-3 Functions of Control Circuit Terminals

Category	Terminal label	Terminal name	Function description
Power supply	24V	External power supply	Supply 24V power to external devices, with the maximum output current of 100mA.
	COM	Power grounding terminal	Power grounding terminal of the external power supply, and common side of the digital input terminal
Analog input	±10V	Analog terminal power supply	Supply 10V power to external devices. Maximum output current: 10.5±0.5V/20mA, usually as the power supply of the external potentiometer
	GND	Analog power grounding terminal	Grounding terminal of analog input and output
	AI1	Analog voltage input	-10V to 10V, 50kΩ input impedance, bipolar analog voltage input
	AI2	Analog current/voltage input	Current or voltage type Input range: 0/4-20mA or 0-10V
Analog output	M1	Analog voltage/current output	0-10V/0-20mA; output accuracy: ±2%
Digital input port	X1	Multi-function input terminal	Program the corresponding terminals by setting function codes, to realize the input control of the set functions. The input terminal supports PNP and NPN input modes, and the default mode is the NPN input mode. X5 can also be used as the high-frequency pulse input, with the input frequency up to
	X2		
	X3		
	X4		
	X5		

			100kHz.
Multi-function digital output	Y1	Open collector output terminal	It can be programmed as the multi-function output terminal.
	YCM	Common side of Y terminal	The common side YCM of Y terminal and the common side COM of the digital input terminal are independent of each other.
Communication	A+	RS485 communication terminal	positive terminal of RS485 differential signal
	A-		negative terminal of RS485 differential signal
Relay output	EA	Relay output terminal	EA-EC: Normally open EB-EC: Normally closed
	EB		
	EC		
External keyboard port	RJ45	External keyboard terminal	For the external operation panel The upper computer can also be connected through this port for background software debugging.

3.3.3 Wiring of analog input terminal

Wiring of AI1 and AI2 terminals with analog voltage signal:

When the AI2 terminal is in the mode of analog voltage signal input, the switch J8 on the control panel is set to the voltage mode, as shown in Fig. 3-12

When the analog voltage input signal is powered by an external power supply, the wiring of terminals AI1 and AI2 is shown in Fig. 3-12-a.

When the analog voltage input signal is sent by a potentiometer, the terminals AI1 and AI2 are connected as shown in Fig. 3-12-b.

In addition, F02.62 (AI1 input type) and F02.63 (AI2 input type) should be set according to actual needs (0: 0-10V; 1: 4-20mA; 2: 0-20mA; 4: 0-5V).

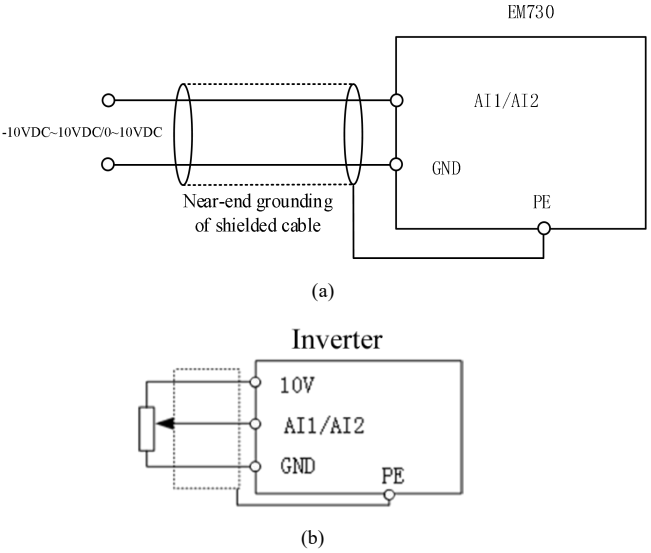


Fig.3- 12 AI1/AI2 Terminal Wiring Diagram

Wiring of the input analog current signal of AI2 terminal:

When the AI2 terminal is in the mode of analog current signal input, the switch J8 on the terminal block is set to the current mode.

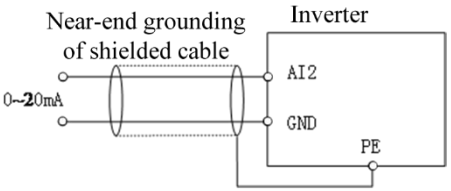
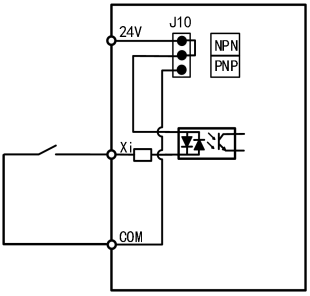


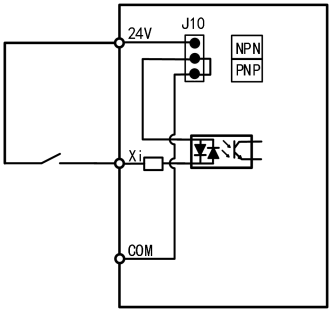
Fig.3- 13 Wiring Diagram of External Current Source and AI2 Terminal

3.3.4 Wiring of multi-function input terminal

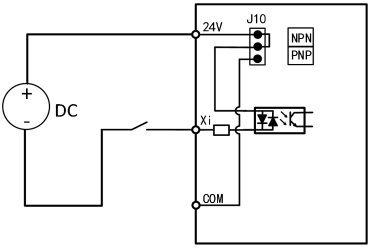
The multi-function input terminals of EM650E Permanent magnet screw air compressor dedicated inverters support the access in the NPN or PNP mode. The terminals X1~X5 can be flexibly connected with external devices. The NPN or PNP mode (NPN by default) can be selected via the jumper cap J10 on the control panel. The wiring of the multi-function input terminal in different modes is shown below:



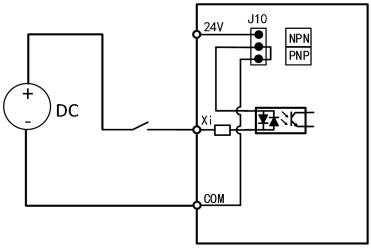
a: Use of internal power supply in NPN mode



b: Use of internal power supply in PNP mode



c: Use of external power supply in NPN mode

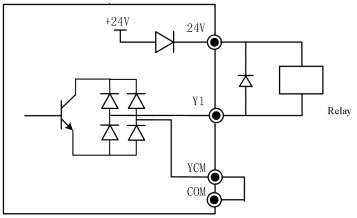


d: Use of external power supply in PNP mode

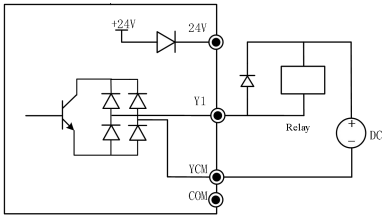
Fig. 3-14 Wiring Diagram of Multi-function Input Terminals

3.3.5 Wiring of multi-function output terminals

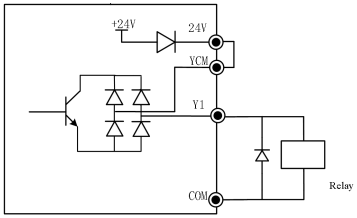
The multi-function output terminal Y1 is powered on by the internal 24V power supply of the inverter or an external power supply, as shown in Fig. 3-15:



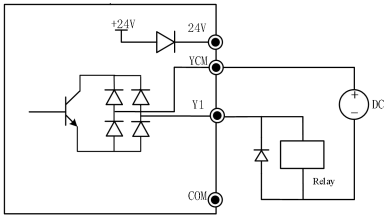
a: Use of internal power supply NPN



b: Use of external power supply NPN



a: Use of internal power supply PNP



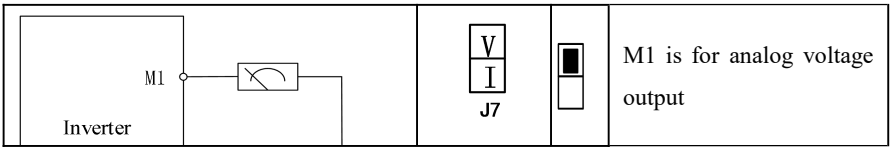
b: Use of external power supply PNP

Fig.3- 15 Wiring of Multi-function Output Terminals

Note: An anti-parallel diode must be included in the relay wire package. The absorption circuit components should be installed at both ends of the coil of the relay or contactor.

3.3.6 Wiring of analog output terminals

The external analog meter connected to the analog output terminal M1 indicates a variety of physical quantities. Choose the output current (0~20mA) or (0~10V) via the jumper cap, M1 corresponding to J7. Set F03.34 as needed (0: 0~10V; 1: 4-20mA; 2: 0~20mA). The jumper cap and terminal wiring is as follows:



			M1 is for analog current output

3.3.7 Wiring of 485 communication terminals

The communication terminals A+ and A- are the RS485 communication interfaces of the inverter. The online control of the host (PC or PLC controller) and inverter is performed through the connection and communication with the host. The connection of the RS485 and RS485/RS232 adapters to EM650E Permanent magnet screw air compressor dedicated inverter is shown in Fig. 3-16, Fig. 3-17 and Fig. 3-18.

- Direct connection of the RS485 terminal of a single inverter to the host for communication:

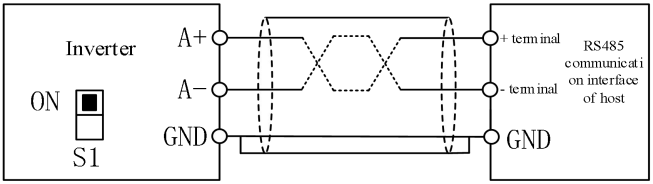


Fig.3- 16 Communication Terminal Wiring of Single Inverter

- Connection of the RS485 terminals of multiple inverters to host for communication:

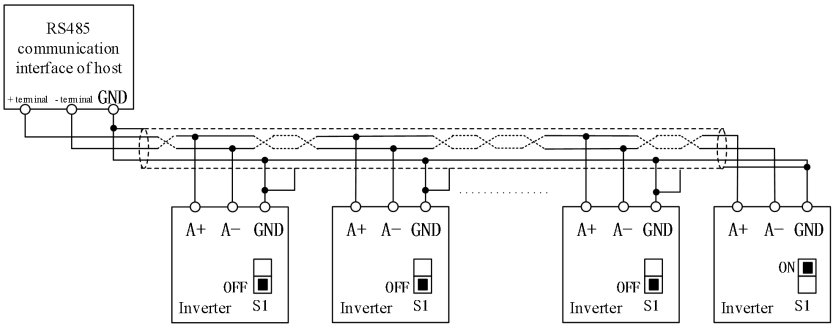


Fig. 3- 17 Wiring of Communication Terminals of Multiple Inverters

- Connection to the host via RS485/RS232 adapter for communication:

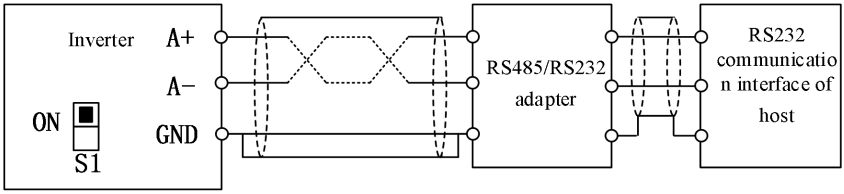


Fig. 3- 18 Communication Terminal Wiring

3.3.8 Wire and screw dimensions of control circuit

- In order to reduce the interference and attenuation of the control signal, the control signal connection cable should be less than 50m long, and the distance between the control signal connection cable and power line should be greater than 30cm. Use the twisted-pair shielded cable when analog signals are externally inputted.
- It is recommended to use the wire with a diameter of 0.5-1 mm2 in the control circuit.
- The terminal block of the EM650E Permanent magnet screw air compressor dedicated inverter is composed of through-type control circuit terminals. Install it with the PH0 Phillips screwdriver. The tightening torque should be 0.5N.m.

3.3.9 Precautions for control circuit wiring

- Connect the control circuit connection wires and other wires separately.
- Connect the control circuit terminals EA, EB, EC, and Y1 separately from other control circuit terminals.
- In order to avoid malfunction caused by interference, use the twisted shielded cables in the control circuit. The wiring distance should be less than 50m.
- Prevent the shield screen from contact with other signal lines and enclosures. The exposed shield screen can be wrapped with insulating tapes.
- It is prohibited to touch the ports and components of the control panel without static electricity protection measures.

3.3.10 Standard Wiring Diagram of Control Circuit

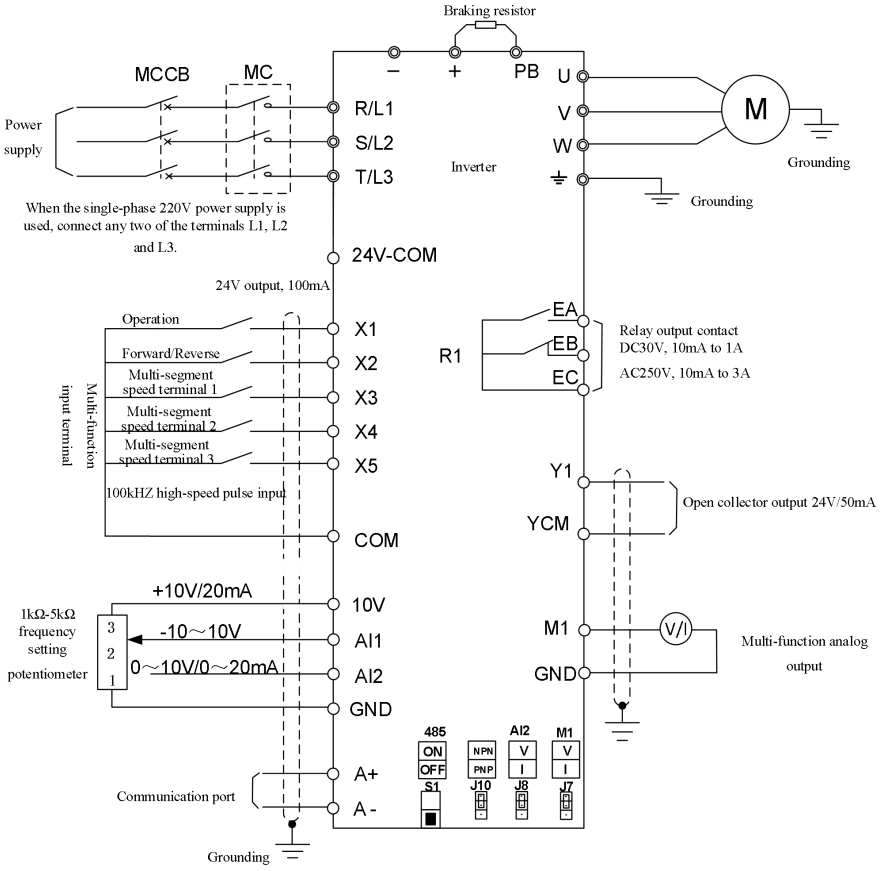


Fig. 3- 19 Standard Wiring Diagram of Control Circuit

- It is recommended to use the wires with a diameter of 0.5-1mm^2 in the control circuit.
- Install the control circuit terminals with the PH0 Phillips screwdriver. The tightening torque should be 0.5N.m.

3.4 Extension wirin

3.5 g of keyboard

1) The external keyboard needs to be ordered separately.
2) The external keyboard is connected to the RJ45 port via an ordinary network cable (plug: meeting the EIA/TIA568B standards) prepared by the customer.
3) Connect the RJ45 port of the keyboard to that of the control panel via a network cable. The keyboard extension cable should be no longer than 3m. Then extension cable may be 10m long in the presence of Cat5E wires and good electromagnetic environments.

3.6 Connection test

After wiring, check the following items.

- Check whether wiring is incorrect.
- Check whether there are screws, terminals and wire scraps inside the inverter.
- Check whether the screws are loose.
- Check whether the exposed wire at the stripped end of the terminal is in contact with other terminals.

Chapter 4 KEYBOARD OPERATIONS

4.1 Keyboard Functions

4.1.1 Structure of LED keyboard

The control panel of EM650E Permanent magnet screw air compressor dedicated inverter is a pluggable LED keyboard The LED keyboard has one five-digit LED digital display, four operation buttons, one digital potentiometer, and six status and unit indicators. Users can perform parameter setting, status monitoring and start/stop of the inverter via the keyboard.

Fig. 4- 1 LED Keyboard

4.1.2 Functions of keys and indicators on LED keyboard

The functions of the keys and indicators on the LED keyboard are as shown in Table 4- 1.

Table 4- 1 Functions of Keys and Indicators on LED Keyboard

Key/Indicator	Name	Function
	Right	Select the group number and function number of the currently modified function code. Change the monitoring parameters.
	Back	Go back to the previous menu. Cancel the current parameter modification when the menu mode selection level is enabled from the monitoring level.
	Run	When the keyboard control is enabled, press this key to start the inverter.
	Stop/Reset	When the keyboard control is enabled, press this key to stop the inverter. Reset the protection in use.
	Potentiometer/ Confirm key	Turn it clockwise to select the function code and menu group or increase the parameter value. Increase the currently valid reference digital input data.
		Turn it counterclockwise to select the function code and menu group or decrease the parameter value. Decrease the currently valid reference digital input

		data.
		Click it to enter the lower-level menu. Confirm and save the parameter modification, and enable the function code following the current function code.
	Unit indicator	It is ON when the frequency, current, and voltage are displayed.
	Running direction indicator	This indicator is ON during reverse running. It is OFF during forward running. It is ON when a certain frequency is being monitored or displayed.
 (Green)	Running indicator	It is ON when the inverter is running, flickering when the inverter is being stopped, and OFF after the inverter is stopped.
 (Red)	Protection indicator	When the inverter is in the protection status, this indicator will be ON in red.

( and  below means that the potentiometer rotates clockwise and counterclockwise.)

4.2 Operation Mode of Keyboard with Digital Tube Display

The LED keyboard menu is divided into the monitoring level (Level 0), menu mode selection level (Level 1), function code selection level (Level 2) and parameter level (Level 3) from low to high. The menu levels mentioned below are represent by numbers.

There are five parameter display modes: menu mode (--A--), used to display all function codes; user-defined mode (--U--), used to display only function codes selected by the user based on the F11 group; non-default mode (--C--), used to display only the function codes that differ from the default settings;

Protection information display mode (--E--): display the current protection information; version information mode (--P--): display software and product serial numbers.

When the keyboard is powered on, the first monitoring parameter of Level 0 is displayed by default. Press the ESC key  to open the Level 1 menu. Users can use the keyboard  to select different menu modes. The process of menu mode selection is shown in Fig. 4-2.

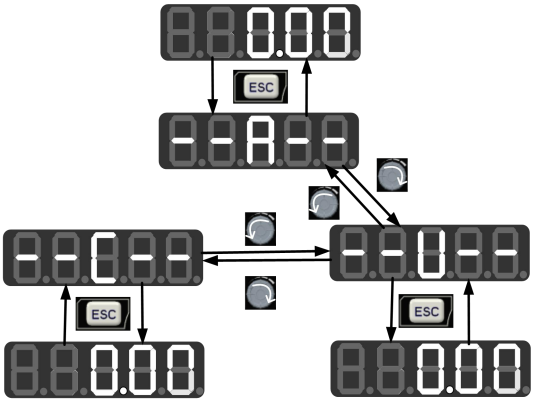


Fig. 4-2 Flowchart of Menu Mode Selection

4.2.1 Full menu mode (--A--)

In the full menu mode, press the ENTER key to enter the Level 2 menu and select any function code. Then press the ENTER key to enter the Level 3 menu and view or modify the function code. Except for a few special ones, the function codes needed by general users can be modified.

The entire process from the initial status of power-on to change of the value of the function code F03.28 to 5.28 in the full menu mode is shown in Fig. 4-3.

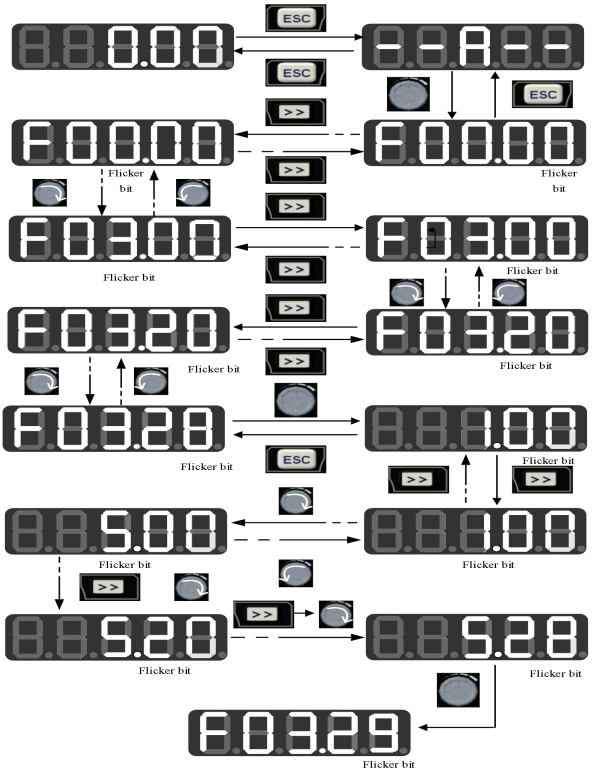


Fig. 4- 3 Flowchart from Power-on to F03.28=5.28 Setting

In all menu modes, the user needs to press the ENTER key to save parameter modifications. Differences after parameter saving are as follows: In the full menu mode, enter the function code following the function code that has been successfully modified. In the user-defined mode, enter the user-defined function code (according to the sequence defined in F11.00-F11.31) following the function code that has been successfully modified. In the non-default mode, enter the non-default function code following the non-default function code that has been successfully modified. In the protection information display mode, enter the protection information function code following the protection information function code that has been successfully modified. In the version information display mode, enter the serial number

function code following the serial number function code has been successfully modified.

In the Level 3 menu, press the ESC key ESC to abandon parameter modifications.

4.2.2 User-defined mode (--U--)

Enter the F11 group of function codes from the full menu mode. Then the user can arbitrarily set the shortcut for the parameter to be accessed frequently. When F11.00 is enabled for the first time, U00.00 will be displayed by default, meaning that the function code defined by default for F11.00 is F00.00. The lowest cursor bit will flicker. The user can set any function code, similar to the function code selection in the Level 2 menu. After setting, press the ENTER key to save it and enter the user-defined menu mode to display the set function code.

For example, F11.00 is set to U00.07 and F11.01 to U00.09. F11.00 and F11.01 will be defined as F00.07 and F00.09, respectively. They are distinguished by U and F. U indicates that this function code is user-defined, as shown in Fig. 4-4.

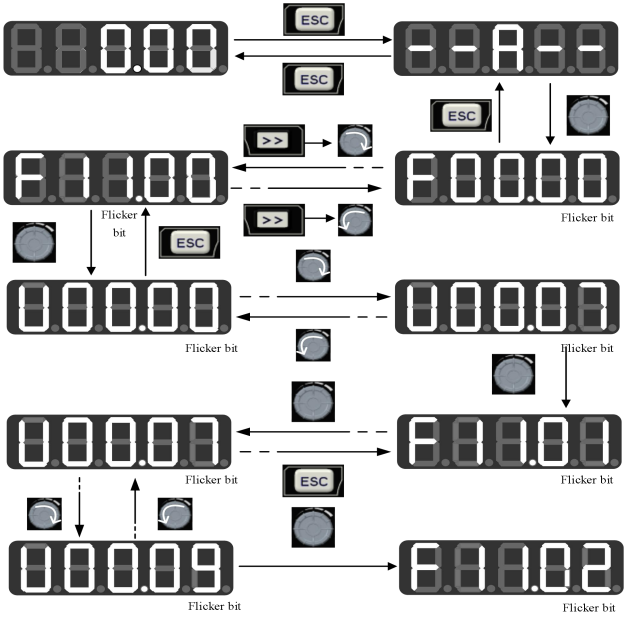


Fig. 4-4 Example of User-defined Mode Setting

In the user-defined mode, press the ENTER key to enter the Level 2 menu. The Level 2 menu only display 32 user-defined parameters in the F11 group. The user can enter the F11 group from the full menu mode to set these function codes.

After the function codes are defined in the F11 group, enter the user-defined mode. Then

we can see F00.07 defined by the first function code F11.00, F00.09 defined by the first function code F11.01, and so on to F11.31, 32 in total. Function code modification in the Level 3 menu is equivalent to that in the full menu mode, and the modification method is also the same.

In the Level 2 menu of the user-defined mode, turn the potentiometer key on the keyboard, to change the function code defined by F11.00 to that defined by F11.31.

When the right shift key >> is pressed in the Level 2 menu, the cursor will not shift. Press the ENTER key to enter the Level 3 menu. If the displayed function code is modifiable currently, the lowest bit indicated by the cursor will flicker. Parameter modification is the same as that in the Level 3 menu under the full menu mode. After modification, press the ENTER key to confirm and save the parameters and enable next user-defined parameter. Function code modifications in the Level 3 menus under different menu modes have equivalent effects.

4.2.3 Non-default mode (--C--)

In the non-default mode, press the ENTER key to enter the Level 2 menu. The first parameter different from the default settings of the inverter will be displayed, starting from F00.00. When the right shift key >> is pressed in the Level 2 menu, the cursor will not shift. If the increment or decrement key on the keyboard is pressed, the function group and function code will not be modified, and the non-default function code following and in front of the current function code will be displayed respectively. If the displayed function code is modifiable currently in the Level 3 menu, the lowest bit indicated by the cursor will flicker. In this case, parameters can be modified in the Level 3 menu under the full menu mode. After modification, press the ENTER key to confirm and save the parameters and enable next non-default parameter.

For example, change F00.03 to 1 and F00.07 to 40.00 in the full menu mode, which are not default values. Then enable the non-default mode. F00.03 will be displayed first. When the potentiometer key on the keyboard is turned clockwise, F00.07 will be displayed; and when the potentiometer key on the keyboard is turned counterclockwise, F00.03 will be returned, as shown below:

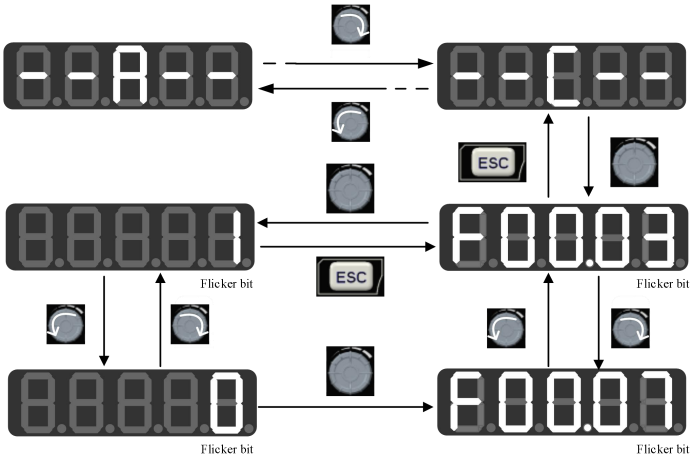


Fig. 4- 5 Function Code Modification in Non-default Mode

4.2.4 Protection information display mode (--E--)

In the protection information display mode, press the ENTER key to enter the Level 2 menu. The Level 2 menu will only display the fault record group under the F19 group, which is conducive to direct viewing of protection record information.

Turn the potentiometer key on the keyboard in the Level 2 menu under this mode to increase or decrease the function code of the protection group, and the shift key >> will be unavailable. In case of protection, you can press the shift key >> on the keyboard in the Level 3 menu to switch the display of the protection code, protection output frequency, protection output current, protection bus voltage, and protection operation status.

4.3 Protection Monitoring

When the inverter is in the protection status, you can directly press the right shift key >> to switch the current protection type and the output frequency, output current, output voltage, running status and working time during the protection.

4.4 Operation Monitoring

4.4.1 Normal monitoring

In the monitoring status mode 1 of EM650E, you can set any function code to be viewed between F12.33 and F12.37. When F12.32=1, the monitoring mode 1 will be enabled. If the Level 0 monitoring menu appears, you can press the right shift key >> to switch the monitoring parameters according to the order set for each function code between F12.33 and F12.37. When the inverter changes from the stop status to running status, the monitoring

parameter will automatically change from the current value to that indicated by F12.33. When the inverter changes from the running status to stop status, the monitoring parameter will automatically change from the current value to that indicated by F12.34.

4.4.2 Editing Mode

Quick change in the monitoring mode:

When F00.04 is set to "0: digital frequency setting F00.07", turn the potentiometer key to directly change the offset;

When F00.04 is set to "8: digital potentiometer", turn the potentiometer key to change the set frequency of F12.42 digital potentiometer. In this case, turn the potentiometer key to enter the editing mode. The value will change from the second digit of the digital tube by default. The digital tube corresponding to the changed digit will flash. Press the right shift key >> to move to next digit on the right. Press the ESC key ESC to cancel change and return to the original value. Or, press the ENTER key to confirm the change and exit the editing mode. The indicator will not be flicker. Press the right shift key >> to enable the normal monitoring mode: switch to next monitoring parameter. Fig. 4-6 shows the editing status in the monitoring mode.

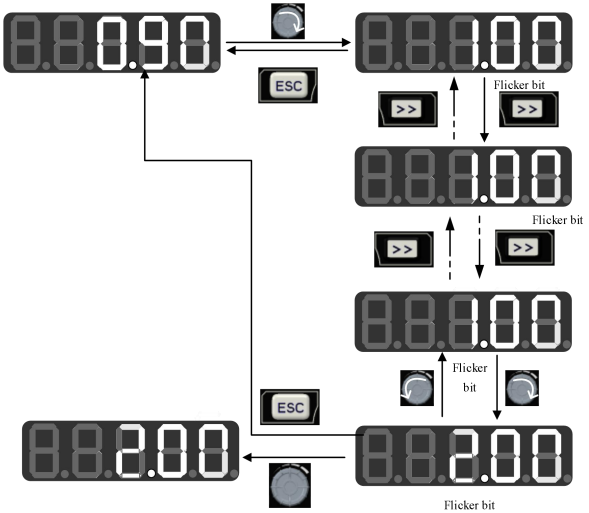


Fig. 4-6 Editing Status in the Monitoring Mode

4.5 Run/Stop

After setting the parameters, press the RUN key RUN to enable the normal operation of

the inverter, and the STOP/RESET key  to stop the inverter.

4.6 Other Warning Prompts

4.6.1 P.-ON prompt

The P.-ON prompt will be displayed after power-on initialization.

4.6.2 P.-OFF prompt

When the voltage drops to 250V (with the soft start disconnected), P-OFF will be displayed, and the keyboard can be operated freely to exit the P.-OFF display and display normal information. In case of no keyboard operation within 5s, P-OFF will be displayed again. After the voltage is restored and the soft start is engaged, P.-ON will be displayed again.

4.6.3 SOFT.E warning

If the soft start is not engaged and the inverter is started, the SOFT.E warning will appear. After the voltage is restore and the soft start is engaged, normal operation will be enabled.

Chapter 5 Trial run

5.1 Inverter Commissioning Process

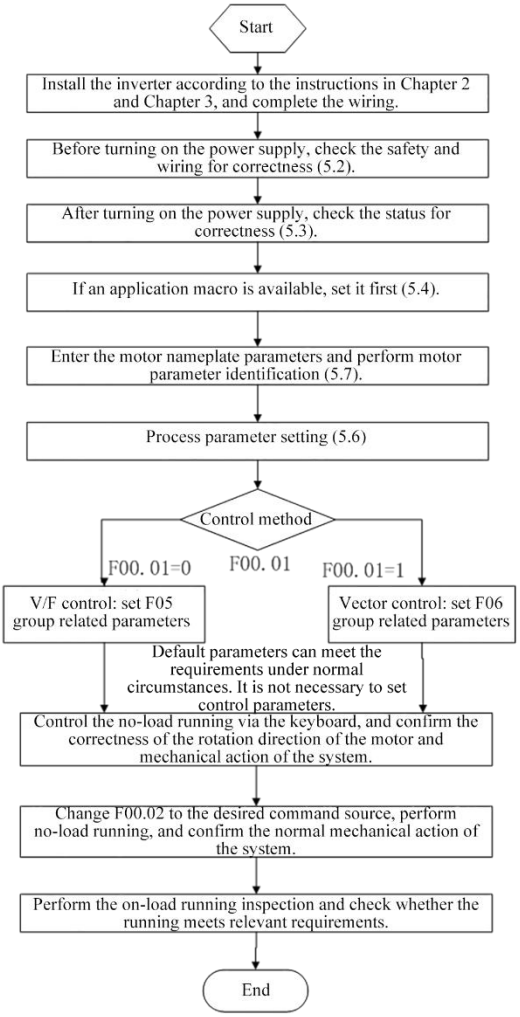


Fig. 5-1 Inverter Commissioning Flowchart

The debugging steps for synchronous machine SVC are as follows:

(1) Check the motor nameplate and set the type, rated power, rated voltage, rated current, rated frequency, and rated speed of the motor according to the nameplate markings. If the motor nameplate already indicates the back electromotive force, it is necessary to input the back electromotive force of the motor into F01.22. If it is not marked on the motor nameplate, it is not necessary to input it.

(2) Perform static self-learning of motor parameters. After completing the static self-learning, check if the stator resistance (F01.19), d-axis inductance (F01.20), and q-axis inductance (F01.21) have been learned.

(3) Rotating self-learning is not necessary if the back electromotive force of the motor is accurately indicated on the motor nameplate. If not specified, you can choose to do rotation self-learning or choose not to do rotation self-learning. Rotating self-learning can more accurately obtain the back electromotive force of the motor.

(4) Run without load, press to run, the motor starts smoothly without reverse rotation, press to stop, the motor stops smoothly, indicating that the no-load start stop is normal at this time.

(5) Run with load, set the relevant functional parameters, and then perform load based joint debugging.

(6) If there is a large and short "thumping" sound at the moment of startup, F06.61 can be reduced appropriately, and then F06.58 and F06.61 can be reduced proportionally.

(7) If the low-frequency current is found to be too high during the no-load test, F06.29 can be reduced.

(8) If the no-load high-frequency frequency is 30Hz or above and the no-load current is too high, F06.33 can be reduced, but it is not recommended to be too small, otherwise there may be an increase in no-load noise

5.2 Confirmation before Power-on

Please confirm the following items before turning on the power supply:

Item to be confirmed	Confirmation content
Power wiring confirmation	Check whether the input power voltage is consistent with the voltage of the inverter.
	Confirm that the circuit breaker has been connected to the power supply circuit, and the power cables are correctly connected to the input terminals (R, S, T) of the inverter.
	Make sure that the inverter and motor are properly

	grounded.
Motor wiring confirmation	Confirm that the motor is correctly connected to the output terminals (U, V, W) of the inverter, and the motor wiring is secured.
Confirmation of braking unit and braking resistor	Make sure that the braking resistor and braking unit are connected as shown in Fig. 3-3 (use the dynamic braking resistor if necessary during operation).
Control terminal wiring confirmation	Check whether the control terminals of the inverter are correctly and reliably connected to other controls.
Control terminal status confirmation	Make sure that the control terminal circuit of the inverter is disconnected to prevent operation upon powering on.
Mechanical load confirmation	Confirm that the machinery is in the no-load state and free of danger in operation.

5.3 Inverter Status Confirmation after Power-on

After the power supply is turned on, the control panel (keyboard) of the inverter displays the following information in the normal status.

Status	Display	Note
During normal operation	0	The digital setting 0Hz is displayed by default
Protection	Protection code in character or Exx format	The protection code is displayed in the protection status. See the protection measures in Chapter 6.

5.4 Precautions for Application Macro Setting

F16.00 is an industry application macro option. Select the application macro according to the specific application, and press the Enter key to automatically restore default settings. See Chapter 10 for details on application macros.

5.5 Start and Stop Control

Function code	Function code name	Parameter description	Default setting	Attribute
F00.02	Options of command source	0: keyboard control 1: Terminal control 2: Communication control	2	○

F00.02=0: keyboard control

The start and stop of the inverter are controlled by the RUN key, STOP key on the keyboard. In the case of no trip protection, press the RUN key to enter the running status. If the green LED indicator above the RUN key is normally ON, it indicates that the inverter is running. If this

indicator is flickering, it indicates that the inverter is in the status of deceleration to stop.

F00.02=1: terminal control

The inverter start and stop are controlled by the start and stop control terminals defined by the function code F02.00 to F02.04. Terminal control is dependent on F00.03.

F00.02=2: communication control

The inverter start and stop are controlled by the host through the RS485 communication port.

Function code	Function code name	Parameter description	Default setting	Attribute
F04.00	Start-up method	0: direct start 1: start of speed tracking	0	○

F04.00=0: direct start

The inverter is started at the starting frequency, following the DC braking (not suitable when F04.04=0) and pre-excitation (not suitable when F04.07=0). The starting frequency will change to the set frequency after the holding time.

F04.00=1: start with speed tracking

The inverter is smoothly started at the current rotating frequency of the motor, following the speed tracking.

Function code	Function code name	Parameter description	Default setting	Attribute
F04.19	Stop mode	0: Slow down to stop 1: Free stop	0	○

F04.19=0: deceleration to stop

The motor decelerates to stop according to the set deceleration time [default setting: based on F00.15 (deceleration time 1)].

F04.19=1: free stop

When there is a valid stop command, the inverter will stop output immediately, and the motor will freely coast to stop. The stop time depends on the inertia of the motor and load.

5.5.1 Terminal control of start and stop

Function code	Function code name	Parameter description	Default setting	Attribute
F00.03	Options of terminal control mode	0: terminal RUN (running) and F/R (forward/reverse) 1: terminal RUN (forward) and F/R (reverse) 2: terminal RUN (forward), Xi (stop) and F/R (reverse) 3: terminal RUN (running), Xi (stop) and F/R (forward/reverse)	0	○

Terminal RUN: Xi terminal is set to “1: terminal RUN”

Terminal F/R: Xi terminal is set to “2: running direction F/R”

Terminal control can be divided into two types: two-line control and three-line control.

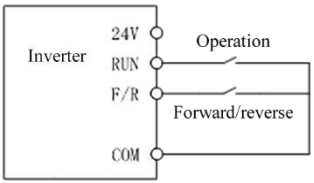
Two-line control:

F00.03=0: the terminal RUN is enabled and the terminal F/R controls forward/reverse running.

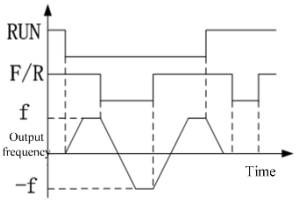
Enable/Disable the terminal RUN to control the start and stop of the inverter, and the terminal F/R to control the forward/reverse running. If F00.21 is set to 1 and reverse running is disabled, the F/R terminal will not be available. When the mode of deceleration to stop is selected, the logic diagram is as shown in Fig. 5-2 (b).

F00.03=1: the terminal RUN controls forward running, and the terminal F/R is in the reverse mode.

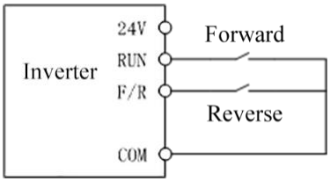
Enable/Disable the terminal RUN to control the forward running and stop of the inverter, and the terminal F/R to control the reverse running and stop. When the terminals RUN and F/R are enabled simultaneously, the inverter will be stopped. If reverse running is disabled, the terminal F/R will not be available. When the mode of deceleration to stop is selected, the logic of forward/reverse running is as shown in Fig. 5-2 (d);



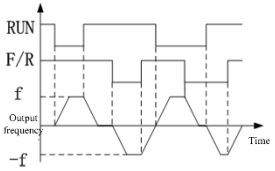
(a) Wiring diagram of two-line control (F00.03=0)



(b) F04.19=0, F00.03=0, run the forward/reverse logic



(c) F00.03=1 two-line control wiring



(d) F04.19=0, F00.03=1: forward/reverse running logic

Fig. 5-2 Two-line Control

When the start/stop value of F00.03 is set to 0 or 1, even if the terminal RUN is

available, the inverter can be stopped by pressing the STOP key or sending an external stop command to the terminal. In this case, the inverter will not be in the running status until the terminal RUN is disabled and then enabled.

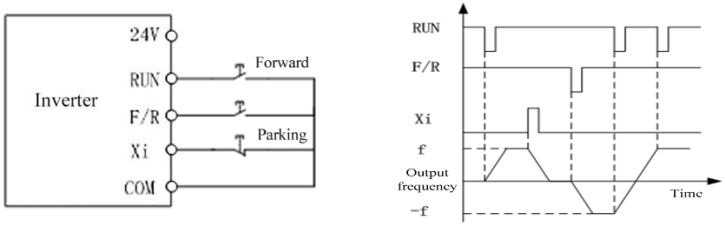
Three-line control:

F00.03=2: the terminal RUN controls forward running, the terminal Xi is for stop, and the terminal F/R is in the reverse status.

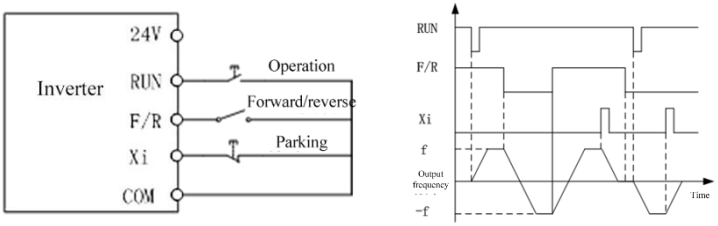
The terminal RUN is normally ON for forward running, and the terminal F/R is normally ON for reverse running, with valid pulse edges. The terminal Xi is normally closed for stop, with the valid level. When the inverter is in the running status, press Xi to stop it. In the case of deceleration to stop (F04.19=0), the logic diagram is as shown in Fig. 5-3Fig. 7-7(b). The terminal Xi is for "three-line running and stop control" as defined by F02.00 to F02.04.

F00.03=3: the terminal RUN is for running, Xi for stop and F/R for forward/reverse control.

The terminal RUN is normally ON for running, with the valid pulse edge, F/R for forward/reverse switching (forward in the OFF status and reverse in the ON status), and Xi is normally OFF for stop, with the valid level. In the case of deceleration to stop (F04.19=0), the logic diagram is as shown in Fig. 5-3(d).



(a) Wiring diagram of three-line control (F00.03=2) (b) Forward/reverse control logic (F04.19=0, F00.03=2)



(c) Wiring diagram of three-line control (F00.03=3) (d) Forward/reverse running logic (F04.19=0, F00.03=3)

Fig. 5-3 Three-line Control

The three-line control logic of the EM650E Permanent magnet screw air compressor dedicated inverter is consistent with the conventional electrical control. The keys and knob switches should be used correctly as shown in the schematic diagram. Otherwise, operation errors may be caused.

5.6 Common Process Parameters of Inverter

Function code	Function code name	Parameter description	Unit	Default setting	Attribute
F00.01	Drive control mode of motor 1	0: V/F control (VVF) 1: Speed sensorless vector control (SVC)		0	○
F00.04	Options of main frequency source A	0: digital frequency setting F00.07 1：AI1 2：AI2 5: high frequency pulse input (X5) 6: percentage setting of main frequency communication 7: direct setting of main frequency communication 8: digital potentiometer setting		8	○
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	0.00	●
F00.14	Acceleration time 1	0.00～650.00（F15.13=0）	s	15.00	●
F00.15	Deceleration time 1	0.00～650.00（F15.13=0）	s	15.00	●
F00.16	Maximum frequency	1.00～600.00	Hz	50.00	○
F00.18	Upper frequency limit	lower frequency limit F00.19 to maximum frequency F00.16	Hz	50.00	●
F00.19	Lower frequency limit	0.00 to upper frequency limit F00.18	Hz	0.00	●
F00.21	Reverse control	0: allow forward/reverse running 1: prohibit reversing		0	○

Note: Common process parameters may also include the input and output terminal function settings. Refer to the F02 and F03 groups in the function table.

5.7 Motor Parameter Identification

For the better control performance, motor parameters must be identified.

Identification Method	Application	Identification Effect
F01.34=1 Static self-learning of asynchronous motor	It is applied where the motor and load cannot be separated easily and rotary self-learning is not allowed.	General
F01.34=11 Static self-learning of synchronous motor		

F01.34=2 Rotary self-learning of asynchronous motor	It is applied when the motor and load can be separated easily. Before operation, the motor shaft should be separated from the load. The motor under load must not be put into rotary self-learning.	Optimal
F01.34=12 Rotary self-learning of synchronous motor		

- Prior to self-identification, make sure that the motor is stopped; otherwise, self-identification cannot be performed properly.

5.7.1 Parameter identification steps

- Where the motor and load can be separated, the mechanical load and motor should be completely separated in the power-off status.
- After the power-on, set the command source of the inverter to keyboard control (F00.02=0).
- Enter the nameplate parameters of the motor accurately.

Motor	Corresponding Parameter
Motor 1	F01.00 Motor type F01.01 Rated power of electric motor F01.02 Rated voltage of motor F01.03 Rated current of motor F01.04 Rated frequency of motor F01.05 Rated speed F01.06 Motor winding connection
Motor 2	F14.00 Motor type F14.01 Rated power of electric motor F14.02 Rated voltage of motor F14.03 Rated current of motor F14.04 Rated frequency of motor F14.05 Rated speed F14.06 Motor winding connection

- For the asynchronous motor:
- Set F01.34=1 for confirmation and press the RUN key. The inverter will start the static self-identification of the motor.
- Or, set F01.34=2 and press the RUN key. The inverter will start the rotary self-identification of the motor.
- For the synchronous motor:
- Set F01.34=11 and press the RUN key. The inverter will start the static self-identification of the motor.
- Or, set F01.34=12 and press the RUN key. The inverter will start the rotary self-identification of the motor.

- It takes about two minutes to complete the self-identification of the motor. Then the system will return to the initial power-on status from the “tune” interface.
- If multiple motors are used in parallel, the rated power and rated current input of the motors should be the sum of power and current of these motors.
- If two motors are used alternately, the parameters of the motor 2 in the F14 group need to be set separately, and identified based on F14.34.

Chapter 6 Function Code Table

6.1 Description of Function Code Table

The function codes of the EM650E Permanent magnet screw air compressor dedicated inverter (hereinafter referred to as the “function codes”) are divided into 22 groups in Table 6-2, and each group contains several function codes. Among them, the F18 group is a monitoring parameter group used to view the inverter status; the F19 group is a protection record group used to view the details of the last three protections; and other groups are parameter setting groups to meet different functional requirements.

Table 6-2 Introduction to Function Code Groups

F00	Basic function parameter group	F01	Parameter group of motor 1
F02	Input terminal function group	F03	Output terminal function group
F04	Start/stop control parameter group	F05	V/F control parameter group
F06	Vector control parameter group	F07	Protection function setting group
F08	Multi-segment speed and simple PLC	F09	PID function group
F10	Communication function group	F11	User-selected parameter group
F12	Keyboard and display function group	F13	Torque control parameter group
F14	Parameter group of motor 2	F15	Auxiliary function group
F16	Customization function group	F17	Virtual I/O function group
F18	Monitoring parameter group	F19	Protection record group
F27	Winding/unwinding application macro parameter group	F45	Modbus free mapping parameter group

★ Some parameters of the current series are reserved, and their readings are 0. Some options of parameters are reserved and settable, but this may result in abnormal operation of the inverter. Please avoid misuse of such parameters.

The table below provides the details of the function code table.

<table>
<tr><td>Function code</td><td>F00.00 to F99.99: function code number</td></tr>
<tr><td>Function code name</td><td>Full name of the function code. “Reserved” means that the corresponding function code is temporarily reserved and has no practical meaning.</td></tr>
<tr><td>Parameter description</td><td>Brief description of the function code. It is mainly divided into the following three types:
<table>
<tr><td>Integral</td><td>The value of the integral function code represents the current parameter selection or meaning.</td></tr>
<tr><td>Quantifier</td><td>The ones, tens, hundreds, thousands and tens of thousands represent one option or the current meaning of the function code.</td></tr>
<tr><td>Binary</td><td>Each binary bit represents one option or the current meaning of the function code.</td></tr>
</table></td></tr>
<tr><td>Unit</td><td>Metric units of the function code. The units and abbreviations are as follows:
<table>
<tr><td>Hz</td><td>Hertz</td><td>kW</td><td>kilowatt</td><td>us</td><td>Microsecond</td></tr>
<tr><td>kHz</td><td>Kilohertz</td><td>kWh</td><td>Kilowatt-hour★</td><td>ms</td><td>Millisecond</td></tr>
<tr><td>%</td><td>Percent★</td><td>MWh</td><td>Megawatt hour</td><td>s</td><td>Second</td></tr>
<tr><td>V</td><td>Volt</td><td>mΩ</td><td>Milliohm</td><td>min</td><td>min</td></tr>
<tr><td>A</td><td>Amp</td><td>mH</td><td>Millihenry</td><td>h</td><td>h</td></tr>
<tr><td>rpm</td><td>rpm</td><td>℃</td><td>°C</td><td>m</td><td>m</td></tr>
</table>
★: %: The benchmarks are different for physical quantities;
kWh: Kilowatt hour, commonly known as the degree.</td></tr>
<tr><td>Default setting</td><td>Function code settings before delivery, or values after parameter restoration (F12.14=1). This is mainly described by the following three categories.
<table>
<tr><td>Number (e.g. 50.00)</td><td>Refer to each power segment. The function code is set to the current value by default.</td></tr>
<tr><td>Depending on the motor type</td><td>The default setting of this function code varies based on the power segments.</td></tr>
<tr><td>XXX</td><td>The default setting of this function code varies based on the power segments and batches.</td></tr>
</table></td></tr>
<tr><td>Attribute</td><td>Change attribute of the function code (permission and condition of change), as described below:
<table>
<tr><td>●</td><td>Changeable in running: The current function code can be changed in any status.</td></tr>
<tr><td>○</td><td>Non-changeable in running: The current function code can be changed except in the running status.</td></tr>
<tr><td>×</td><td>Read-only: The current function code cannot be changed in</td></tr>
</table></td></tr>
</table>

		any status.

6.2 Table of functional parameters

Function code	Function code name	Parameter description	Unit	Default setting	Attribute
F00	**Basic function parameter group**				
F00.00	Reserved				
F00.01	Drive control mode of motor 1	0: v/f control (VVF) 1: speed sensorless vector control (SVC)		1	○
F00.02	Options of command source	0: keyboard control (LOC/REM indicator: ON) 1: terminal control (LOC/REM indicator: OFF) 2: communication control (LOC/REM indicator: flicker)		2	○
F00.03	Options of terminal control mode	0: terminal RUN (running) and F/R (forward/reverse) 1: terminal RUN (forward) and F/R (reverse) 2: terminal RUN (forward), Xi (stop) and F/R (reverse) 3: terminal RUN (running), Xi (stop) and F/R (forward/reverse)		0	○
F00.04	Options of main frequency source A	0: digital frequency setting F00.07 1：AI1 2：AI2 3：reserved 4：reserved 5: high frequency pulse input (X5) 6: main frequency communication setting (percentage) 7: main frequency communication setting (direct frequency) 8: digital potentiometer setting		7	○
F00.05	Options of auxiliary frequency source B	0: digital frequency setting F00.07 1：AI1 2：AI2 3: reserved 4: reserved 5: high frequency pulse input (X5)		0	○

		6: auxiliary frequency communication setting (percentage) 7: auxiliary frequency communication setting (direct frequency) 8: digital potentiometer setting 9: reserved 10: process PID 11: simple PLC			
F00.06	Options of frequency source	0: main frequency source A 1: auxiliary frequency source B 2: main and auxiliary operation results 3: switching between main frequency source A and auxiliary frequency source B 4: switching between main frequency source A and main and auxiliary operation results 5: switching between auxiliary frequency source B and main and auxiliary operation results 6: auxiliary frequency source B + feedforward calculation (winding application)		0	○
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	50.00	●
F00.08	Options of main and auxiliary operation	0: main frequency source A + auxiliary frequency source B 1: main frequency source A - auxiliary frequency source B 2: larger value of main and auxiliary frequency sources 3: smaller value of main and auxiliary frequency sources 4: main frequency source A - auxiliary frequency source B, the operation result is greater than or equal to zero 5: main frequency source A + auxiliary frequency source B, the operation result is greater than or equal to zero		0	○
F00.09	Reference options of auxiliary frequency source B in main and auxiliary operation	0: relative to he maximum frequency 1: relative to main frequency source A		0	○
F00.10	Gain of main frequency source	0.0～300.0	%	100.0	●

F00.11	Gain of auxiliary frequency source	0.0～300.0	%	100.0	●
F00.12	Synthetic gain of main and auxiliary frequency sources	0.0～300.0	%	100.0	●
F00.13	Analog adjustment of synthetic frequency	0: synthetic frequency of main and auxiliary channels 1: AI1 * synthetic frequency of main and auxiliary channels 2: AI2 * synthetic frequency of main and auxiliary channels 3: reserved 4: reserved 5: high frequency pulse (PULSE) * synthetic frequency of main and auxiliary channels		0	○
F00.14	Acceleration time 1	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	30.00	●
F00.15	Deceleration time 1	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	20.00	●
F00.16	Maximum frequency	1.00~600.00/1.0~3000.0	Hz	150.00	○
F00.17	Options of upper frequency limit control	0: set by F00.18 1：AI1 2：AI2 3: reserved 4: reserved 5: high frequency pulse input (X5) 6: communication setting (percentage) 7: communication setting (direct frequency)		0	○
F00.18	Upper frequency limit	lower frequency limit F00.19 to maximum frequency F00.16	Hz	150.00	●
F00.19	Lower frequency limit	0.00 to upper frequency limit F00.18	Hz	70.00	●
F00.20	Running direction	0: consistent direction 1: opposite direction		0	●
F00.21	Reverse control	0: allow forward/reverse running 1: prohibit reversing		0	○
F00.22	Duration of forward and reverse dead zone	0.00～650.00	s	0.01	●
F00.23	Carrier frequency	1.0 ~ 16.0 (rated power of the inverter:	kHz	4.0	●

		0.75-4.00kW) 1.0 ~ 10.0 (rated power of the inverter: 5.50~7.50kW) 1.0 ~ 8.0 (rated power of inverter 11.00 - 45.00kW) 1.0 ~ 4.0 (rated power of inverter 55.00 - 90.00kW) 1.0 ~ 3.0 (rated power of inverter: 110.00 and above)		(0.75 and below) /2.0	
F00.24	Automatic adjustment of carrier frequency	0: invalid 1: valid 1 2: valid 2		0	○
F00.25	Noise suppression of carrier frequency	0: invalid 1: noise suppression of carrier frequency mode 1 2: noise suppression of carrier frequency mode 2		0	○
F00.26	Noise suppression width	1～20	Hz	40	●
F00.27	Noise suppression intensity	0: invalid 0~10: noise suppression of carrier frequency mode 1 0~ 4: noise suppression of carrier frequency mode 2	%	100	●
F00.28	Options of motor parameter group	0: parameter group of motor 1 1: parameter group of motor 2		0	○
F00.29	User password	0 ~ 65535		0	○
F00.31	Frequency resolution	0：0.01Hz 1: 0.1Hz (speed unit: 10rpm)		0	○
F00.35	Power supply voltage selection	0: 380V 1: 440V		0	○
F01	**Parameter group of motor 1**				
F01.00	Motor type	0: ordinary asynchronous motor 1: variable-frequency asynchronous motor 2: permanent magnet synchronous motor		0	○
F01.01	Rated power of electric motor	0.10～650.00	kW	Depending on the motor type	○
F01.02	Rated voltage of motor	50～2000	V	Depending on the	○

				motor type	
F01.03	Rated current of motor	1~ 60000 (rated power of motor: ≤ 75 kW) 0.1~6000.0 (rated power of motor: > 75kW)	A	Depending on the motor type	○
F01.04	Rated frequency of motor	0.01～600.00	Hz	Depending on the motor type	○
F01.05	Rated speed	1～60000	rpm	Depending on the motor type	○
F01.06	Motor winding connection	0:Y 1:Δ		Depending on the motor type	○
F01.07	Rated power factor of motor	0.600～1.000		Depending on the motor type	○
F01.08	Motor efficiency	30.0～100.0	%	Depending on the motor type	○
F01.09	Stator resistance of asynchronous motor	1~ 60000 (rated power of motor: ≤ 75 kW) 0.1~6000.0 (rated power of motor: > 75kW)	mΩ	Depending on the motor type	○
F01.10	Rotor resistance of asynchronous motor	1~ 60000 (rated power of motor: ≤ 75 kW) 0.1~6000.0 (rated power of motor: > 75kW)	mΩ	Depending on the motor type	○
F01.11	Leakage inductance	0.01 to 600.00 (rated power of motor: ≤ 75 kW)	mH	Depend	○

	of asynchronous motor	0.001 to 60.000 (rated power of motor: > 75 kW)		ing on the motor type	
F01.12	Mutual inductance of asynchronous motor	0.1 to 6000.0 (rated power of motor: ≤ 75 kW) 0.01 to 600.00 (rated power of motor: > 75 kW)	mH	Depen-ding on the motor type	○
F01.13	No-load excitation current of asynchronous motor	0.01 to 600.00 (rated power of motor: ≤ 75 kW) 0.1 to 6000.0 (rated power of motor: > 75 kW)	A	Depend ing on the motor type	○
F01.14	Flux weakening coefficient 1 of asynchronous motor	10.00 ~ 100.00	%	87.00	○
F01.15	Flux weakening coefficient 2 of asynchronous motor	10.00 ~ 100.00	%	80.00	○
F01.16	Flux weakening coefficient 3 of asynchronous motor	10.00 ~ 100.00	%	75.00	○
F01.17	Flux weakening coefficient 4 of asynchronous motor	10.00 ~ 100.00	%	72.00	○
F01.18	Flux weakening coefficient 5 of asynchronous motor	10.00 ~ 100.00	%	70.00	○
F01.19	Stator resistance of synchronous motor	1~ 60000 (rated power of motor: ≤75kW) 0.1 to 6000.0 (rated power of motor: > 75 kW)	mΩ	Depend ing on the motor type	○
F01.20	d-axis inductance of synchronous motor	0.01 to 600.00 (rated power of motor: ≤ 75 kW) 0.001 to 60.000 (rated power of motor: > 75 kW)	mH	Depend ing on the motor	○

				type	
F01.21	q-axis inductance of synchronous motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.001~60.000 (rated power of motor: > 75kW)	mH	Depending on the motor type	○
F01.22	Counter electromotive force of synchronous motor	10.0 ~ 2000.0 (counter electromotive force of rated speed)	V	Depending on the motor type	○
F01.23	Initial electrical angle of synchronous motor	0.0 ~ 359.9 (valid for synchronous motor)			○
F01.34	Motor parameter self-learning	00: no operation 01: static self-learning of asynchronous motor 02: rotation self-learning of asynchronous motor 03: inertia self-learning of asynchronous motor 11: static self-learning of synchronous motor 12: rotary self-learning of synchronous motor 13: encoder self-learning of synchronous motor		00	○
F02	**Input terminal function group**				
F02.00	Options of X1 digital input function	0: no function 1: terminal running (RUN) 2: running direction (F/R) 3: stop control in three-line operation 4: forward jog (FJOG) 5: reverse jog (RJOG) 6: terminal UP 7: terminal DOWN 8: clear UP/DOWN offset 9: free stop 10: reset protection 11: multi-segment speed terminal 1 12: multi-segment speed terminal 2 13: multi-segment speed terminal 3 14: multi-segment speed terminal 4 15: multi-segment PID terminal 1 16: multi-segment PID terminal 2 17: multi-segment torque terminal 1		1	○
F02.01	Options of X2 digital input function			0	○
F02.02	Options of X3 digital input function			0	○
F02.03	Options of X4 digital input function			0	○
F02.04	Options of X5 digital input function			0	○
F02.07	Options of AI1 digital input function			0	○

F02.08	Options of AI2 digital input function	18: multi-segment torque terminal 2 19: acceleration and deceleration time terminal 1 20: acceleration and deceleration time terminal 2 21: acceleration and deceleration prohibition 22: operation pause 23: external protection input 24: switching of RUN command to keyboard 25: switching of RUN command to communication 26: frequency source switching 27: clearing of regular running time 28: speed control/torque control switching 29: torque control prohibition 30: motor 1/motor 2 switching 31: resetting of simple PLC status (running from the first segment, with the running time cleared) 32: simple PLC time pause (keep running at current segment) 33: reserved 34: counter input (≤250Hz) 35: high-speed count input (≤100kHz, only valid for X5) 36: count clearing 37: length counter input (≤250Hz) 38: High-speed length counting input (≤100kHz, only valid for X5) 39: reset length (clear by meter) 40: pulse input (≤100kHz, only valid for X5) 41: process PID pause 42: process PID integral pause 43: PID parameter switching 44: PID positive/negative switching 45: stop and DC braking 46: DC braking at stop 47: immediate DC braking 48: fastest deceleration to stop 49: reserved 50: external stop 51: switching of main frequency source to digital frequency setting 52: switching of main frequency source to AI1		0	○

<table>
<tr><td></td><td></td><td>53: switching of main frequency source to AI2
54: reserved
55: switching of main frequency source to high-frequency pulse input
56: switching of main frequency source to communication setting
57: inverter enabling
58: prohibit reversing and prohibit enabling
68: disable reversal
69: prohibit reversing
70: input terminal expansion
121: external material cutoff signal
122: wiring detection signal
123: brake reset terminal</td><td></td><td></td><td></td></tr>
<tr><td>F02.15</td><td>Positive/negative logic 1 of digital input terminal</td><td><table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>*</td><td>*</td><td>*</td><td>X5</td><td>X4</td><td>X3</td><td>X2</td><td>X1</td></tr></table>0: positive logic, valid in the closed state/invalid in the open state
1: negative logic, invalid in the closed state/valid in the open state</td><td></td><td>00000</td><td>○</td></tr>
<tr><td>F02.16</td><td>Positive/negative logic 2 of digital input terminal</td><td><table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>AI2</td><td>AI1</td></tr></table>0: positive logic, valid in the closed state/invalid in the open state
1: negative logic, invalid in the closed state/valid in the open state</td><td></td><td>00</td><td>○</td></tr>
<tr><td>F02.17</td><td>Filtering times of digital input terminal</td><td>0~100, 0: no filtering; n: sampling every n ms</td><td></td><td>2</td><td>○</td></tr>
<tr><td>F02.18</td><td>X1 valid delay time</td><td>0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.19</td><td>X1 invalid delay time</td><td>0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.20</td><td>X2 valid delay time</td><td>0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.21</td><td>X2 invalid delay time</td><td>0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.22</td><td>X3 valid delay time</td><td>0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
</table>

F02.23	X3 invalid delay time	0.000~30.000	s	0.000	●
F02.24	X4 valid delay time	0.000~30.000	s	0.000	●
F02.25	X4 invalid delay time	0.000~30.000	s	0.000	●
F02.31	Options of analog input function	Ones place: AI1 0: analog input 1: digital input (0 below 1V, 1 above 3V, the same as last time under 1-3V) Tens place: AI2 0: analog input 1: digital input (the same as above)		00B	○
F02.32	Options of analog input curve	Ones place: Options of AI1 curve 0: curve 1 1: curve 2 2: curve 3 3: curve 4 Tens place: AI2 curve selection 0: curve 1 1: curve 2 2: curve 3 3: curve 4		10	○
F02.33	Minimum input of curve 1	-10 ~ F02.35	V	0.10	●
F02.34	Minimum input setting of curve 1	–100.0 ~ +100.0	%	0.0	●
F02.35	Maximum input of curve 1	-10~10.00V	V	9.90	●
F02.36	Maximum input setting of curve 1	–100.0~ +100.0	%	100.0	●
F02.37	Minimum input of curve 2	-10.00V~F02.39	V	0.10	●
F02.38	Minimum input setting of curve 2	–100.0 ~ +100.0	%	0.0	●
F02.39	Maximum input of curve 2	F02.37~10.00V	V	9.90	●

F02.40	Maximum input setting of curve 2	–100.0 ~ +100.0	%	100.0	●
F02.41	Minimum input of curve 3	-10.00V ~ F02.43	V	0.10	●
F02.42	Minimum input setting of curve 3	–100.0 ~ +100.0	%	0.0	●
F02.43	Input of inflection point 1 of curve 3	F02.41 ~ F02.45	V	2.50	●
F02.44	Input setting of inflection point 1 of curve 3	–100.0 ~ +100.0	%	25.0	●
F02.45	Input of inflection point 2 of curve 3	F02.43 ~ F02.47	V	7.50	●
F02.46	Input setting of inflection point 2 of curve 3	–100.0 ~ +100.0	%	75.0	●
F02.47	Maximum input of curve 3	F02.45 ~ 10.00	V	9.90	●
F02.48	Maximum input setting of curve 3	–100.0 ~ +100.0	%	100.0	●
F02.49	Minimum input of curve 4	-10.00 ~ F02.51	V	-9.90	●
F02.50	Minimum input setting of curve 4	–100.0 ~ +100.0	%	-100.0	●
F02.51	Input of inflection point 1 of curve 4	F02.49 ~ F02.53	V	-5.00	●
F02.52	Input setting of inflection point 1 of curve 4	–100.0 ~ +100.0	%	-50.0	●
F02.53	Input of inflection point 2 of curve 4	F02.51 ~ F02.55	V	5.00	●
F02.54	Input setting of inflection point 2 of curve 4	–100.0 ~ +100.0	%	50.0	●
F02.55	Maximum input of curve 4	F02.53 ~ 10.00	V	9.90	●
F02.56	Maximum input setting of curve 4	–100.0 ~ +100.0	%	100.0	●
F02.57	AI1 filtering time	0.00 ~ 10.00	s	0.10	●
F02.58	AI2 filtering time	0.00 ~10.00	s	0.10	●
F02.60	Reserved				
F02.61	AD hysteresis code	2 ~ 50		2	○
F03	**Output terminal function group**				

<table>
<tr><td>F03.00</td><td>Options of Y1 output function</td><td>0: no output
1: inverter running (RUN)</td><td></td><td>1</td><td>○</td></tr>
<tr><td>F03.02</td><td>Options of R1 output function (EA-EB-EC)</td><td>2: up to output frequency (FAR)
3: output frequency detection FDT1
4: output frequency detection FDT2
5: reverse running (REV)
6: jog
7: inverter protection
8: inverter ready to run (READY)
9: reach the upper frequency limit
10: reach the lower frequency limit
11: valid current limit
12: valid overvoltage stall
13: complete simple PLC cycle
14: reach the set count value
15: reach the specified count value
16: length reached (in meters)
17: motor overload pre-alarm
18: inverter overheat pre-alarm
19: reach the upper limit of PID feedback
20: reach the lower limit of PID feedback
21: analog level detection ADT1
22: analog level detection ADT2
24: undervoltage state
26: up to the set time
27: zero-speed running
38: off-load
47: PLC output
67: brake control
68: material cutoff detection output
69: FDT1 lower limit (pulse)
70: FDT2 lower limit (pulse)
71: FDT1 lower limit (pulse, invalid in JOG)
72: FDT2 lower limit (pulse, invalid in JOG)
73: output overcurrent</td><td></td><td>7</td><td>○</td></tr>
<tr><td>F03.05</td><td>Options of output signal type</td><td><table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>R1</td><td>*</td><td>Y1</td></tr></table>0: level
1: single pulse</td><td></td><td>0*0</td><td>○</td></tr>
<tr><td>F03.06</td><td>Positive/negative logic of digital output</td><td><table><tr><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td><td>*</td><td>R1</td><td>*</td><td>Y1</td></tr></table>0: positive logic, valid in the closed state/invalid in the open state</td><td></td><td>0*0</td><td>○</td></tr>
</table>

		1: Negative logic, invalid in the closed state/valid in the open state									
F03.08	Output status control in jog	D7	D6	D5	D4	D3	D2	D1	D0	00000	○
		*	*	*	REV	FDT2	FDT1	FAR	RUN		
		0: valid in jogging 1: invalid in jogging									
F03.09	Y1 valid delay time	0.000～30.000								s	0.000	●
F03.10	Y1 invalid delay time	0.000～30.000								s	0.000	●
F03.13	R1 valid delay time	0.000～30.000								s	0.000	●
F03.14	R1 invalid delay time	0.000～30.000								s	0.000	●
F03.17	Single pulse time of Y1 output	0.001～30.000								s	0.250	●
F03.19	Single pulse time of R1 output	0.001～30.000								s	0.250	●
F03.21	Options of analog output M1	0: running frequency (absolute value) 1: set frequency (absolute value) 2: output torque (absolute value) 3: set torque (absolute value) 4: output current 5: output voltage 6: bus voltage 7: output power 8：AI1 9：AI2 12: high-frequency pulse input (with 100% corresponding to 100.00kHz) 13: communication setting 1 14: count value 15: length value 16: PID output 18: PID feedback 19: PID setting 30: communication setting 2									0	○
F03.27	M1 output bias	-100.0～100.0								%	0.0	●
F03.28	M1 output gain	-10.000～10.000									1.000	●

F03.31	Control logic options of PLC output terminal	D7	D6	D5	D4	D3	D2	D1	D0		00 000	●
		*	*	*	*	*	R1	*	Y1			
		0: no output 1: output										
F03.34	Selection of analog output M1 type	0: 0~10V 1: 4~20mA 2: 0~20mA									0	○
F04	**Start/stop control parameter group**											
F04.00	Start-up method	0: direct start 1: start of speed tracking									0	○
F04.01	Start frequency	0.00 ~ 10.00								Hz	5.00	○
F04.02	Start frequency hold time	0.00 ~ 60.00, 0.00 is invalid								s	0.01	○
F04.03	Starting current of DC braking	0.0～100.0 (100.0 = Rated current of motor)								%	50.0	○
F04.04	Starting time of DC braking	0.00～30.00 0.00: invalid								s	0.00	○
F04.06	Pre-excitation current	50.0 ~ 500.0 (100.0 = no-load current)								%	100.0	○
F04.07	Pre-excitation time	0.00 ~ 10.00								s	0.10	○
F04.08	Speed tracking mode	Ones place: tracking start frequency 0: maximum frequency 1: stop frequency 2: power frequency Tens place: selection of search direction 0: search only in command direction 1: search in the opposite direction if the speed cannot be found in the command direction									0	○
F04.10	Deceleration time of speed tracking	0.1 ~ 20.0								s	2.0	○
F04.11	Speed tracking current	30.0 ~ 150.0 (100.0 = rated current of inverter)								%	50.0	○
F04.12	Speed tracking compensation gain	0.00 ~ 10.00									1.00	○

F04.14	Acceleration and deceleration mode	0: linear acceleration and deceleration 1: acceleration and deceleration of continuous S curve 2: acceleration and deceleration of intermittent S curve		0	○
F04.15	Starting time of S curve in acceleration	0.00~30.00(F15.13=0) 0.0~300.0(F15.13=1) 0~3000(F15.13=2)	s	1.00	●
F04.16	Ending time of S curve in acceleration	0.00~30.00(F15.13=0) 0.0~300.0(F15.13=1) 0~3000(F15.13=2)	s	1.00	●
F04.17	Starting time of S curve in deceleration	0.00~30.00(F15.13=0) 0.0~300.0(F15.13=1) 0~3000(F15.13=2)	s	1.00	●
F04.18	Ending time of S curve in deceleration	0.00~30.00(F15.13=0) 0.0~300.0(F15.13=1) 0~3000(F15.13=2)	s	1.00	●
F04.19	Stop mode	0: slow down to stop 1: free stop		1	○
F04.20	Starting frequency of DC braking in stop	0.00Hz to maximum frequency F00.16	Hz	35.00	○
F04.21	DC braking current in stop	0.0～100.0 (100.0 = Rated current of motor)	%	0	○
F04.22	DC braking time in stop	0.00～30.00 0.00: invalid	s	0.10	○
F04.26	Start mode after protection/free stop	0: start according to F04.00 setting mode 1: start of speed tracking		0	○
F04.27	Second confirmation of terminal start command	0: Not required for confirmation 1: to be confirmed 2: Not required for confirmation of mode 2(also not required during fault reset)		0	○
F04.29	Zero speed check frequency	0.00 ~ 5.00	Hz	0.25	●
F05	**V/F control parameter group**				
F05.13	Oscillation suppression gain	0 ~ 10000		100	●

F05.14	Oscillation suppression cutoff frequency	0.00~600.00	Hz	0.5	●
F05.18	Flux compensation gain of synchronous motor	0.00 ~500.00	%	0.00	●
F05.19	Filtering time constant of flux compensation of synchronous motor	0.00 ~ 10.00	s	0.50	●
F06	**Vector control parameter group**				
F06.00	Speed proportional gain ASR_P1	0.00 ~ 100.00		10.00	●
F06.01	Speed integral time constant ASR_T1	0.000-30.000 0.000: no integral	s	0.500	●
F06.02	Speed proportional gain ASR_P2	0.00 ~ 100.00		5.00	●
F06.03	Speed integral time constant ASR_T2	0.000-30.000 0.000: no integral	s	0.500	●
F06.04	Switching frequency 1	0.00 to switching frequency 2	Hz	5.00	●
F06.05	Switching frequency 2	Switching frequency 1 to maximum frequency F00.16	Hz	10.00	●
F06.06	No-load current gain	50.0~300.0	%	100.0	●
F06.07	Filtering time constant of speed loop output	0.000 ~ 0.100	s	0.005	●
F06.08	Vector control slip gain	50.00 ~ 200.00	%	100.00	●
F06.09	Upper limit source selection of speed control torque	0: set by F06.10 and F06.11 1: AI1 2: AI2 3: reserved 4: reserved 5: communication setting (percentage)		0	○

		6: The larger of AI1 and AI2 7: The smaller of AI1 and AI2			
F06.10	Upper limit of speed control motor torque	0.0 ~ 250.0	%	150.0	●
F06.11	Upper limit of speed control brake torque	0.0 ~ 250.0	%	150.0	●
F06.12	Excitation current proportional gain ACR-P1	0.00 ~ 100.00		0.80	●
F06.13	Excitation current integral time constant ACR-T1	0.00-600.00 0.00: no integral	ms	10.00	●
F06.14	Torque current proportional gain ACR-P2	0.00 ~ 100.00		0.60	●
F06.15	Torque current integral time constant ACR-T2	0.00 ~ 600.00 0.00: no integral	ms	10.00	●
F06.17	SVC zero-frequency processing	0: braking 1: not processed 2: seal the tube		2	○
F06.18	SVC zero-frequency braking current	50.0 ~ 400.0 (100.0 is the no-load current of the motor)	%	100.0	○
F06.20	Voltage feedforward gain	0 ~ 100	%	0	●
F06.21	Flux weakening control options	0: invalid 1: direct calculation 2: automatic adjustment		1	○
F06.22	Flux weakening voltage	70.00 ~ 100.00	%	95.00	●
F06.23	Maximum field weakening current of synchronous motor	0.0 ~ 150.0 (100.0 is the rated current of the motor)	%	100.0	●

F06.24	Proportional gain of flux weakening regulator	0.00 ~ 10.00		2.50	●
F06.25	Integral time of flux weakening regulator	0.01 ~ 60.00	s	0.05	●
F06.26	MTPA control option of synchronous motor	0: invalid 1: valid		1	○
F06.27	Self-learning gain at initial position	0 ~ 200	%	100	●
F06.28	Frequency of low frequency band of injection current	0.00 ~ 100.00 (100.00 is the rated frequency of the motor)	%	10.00	●
F06.29	Injection current of low frequency band	0.0 ~ 60.0 (100.0 is the rated current of the motor)	%	20.0 40.0-(F16.00=2)	●
F06.30	Regulator gain of low frequency band of injection current	0.00 ~ 10.00		0.50	●
F06.31	Regulator integral time of low frequency band of injection current	0.00 ~ 300.00	ms	10.00	●
F06.32	Frequency of high frequency band of injection current	0.00 ~ 100.00 (100.00 is the rated frequency of the motor)	%	20.00	●
F06.33	Injection current of high frequency band	0.0 ~ 30.0 (100.0 is the rated current of the motor)	%	8.0	●
F06.34	Regulator gain of high frequency band of injection current	0.00 ~ 10.00		0.50	●
F06.35	Regulator integral time of high frequency band of injection current	0.00 ~ 300.00	ms	10.00	●
F06.36	Magnetic saturation coefficient of synchronous motor	0.00~1.00		0.75	○

F06.41	Open-loop low-frequency processing of synchronous motor	0: VF 1: IF 2: IF in start and VF in stop		3	○
F06.42	Open-loop low-frequency processing range of synchronous motor	0.0 ~ 50.0	%	8.0	○
F06.43	IF injection current	0.0 ~ 600.0	%	5.0	○
F07	**Protection function setting group**				
F07.00	Protection shield	E20 * E13 E06 * E04 E07 E08 0: valid protection 1: shielded protection		0*0 0*000	○
F07.01	Motor overload protection gain	0.20 ~ 10.00		1.00	●
F07.02	Motor overload pre-alarm coefficient	50 ~ 100	%	80	●
F07.06	Bus voltage control options	Ones place: instantaneous stop/no-stop function options 0: invalid 1: deceleration 2: deceleration to stop Tens place: overvoltage stall function options 0: invalid 1: valid		10	○
F07.07	Voltage of overvoltage stall control	110.0 ~ 150.0 (380V, 100.0=537V)	%	131.0 (703V)	○
F07.08	Instantaneous stop/no-stop operating voltage	60.0 to instantaneous stop/no-stop recovery voltage (100.0 = standard bus voltage)	%	76.0	○
F07.09	Instantaneous stop/no-stop recovery voltage	instantaneous stop/no-stop operating voltage to 100.0	%	86.0	●
F07.10	Check time for instantaneous stop/no-stop	0.00 ~ 100.00	s	0.50	●

	recovery voltage				
F07.11	Current limit control	0: invalid 1: limit mode 1 2: limit mode 2		2	○
F07.12	Current limit level	20.0-180.0(100.0 = the rated current of inverter	%	150.0	●
F07.13	Quick current limit options	0: invalid 1: valid		0	○
F07.14	Protection retries	0-20; 0: Disable protection retry		0	○
F07.15	Options of digital output action in protection retries	0: no action 1: action		0	○
F07.16	Interval of protection retries	0.01 ~ 30.00	s	0.50	●
F07.17	Restoration time of protection retries	0.01 ~ 30.00	s	10.00	●
F07.18	Action option of protection	E08 * E07 * E02 E06 E05 E04 0: allow protection retry 1: disable protection retry		0 *0 *0000	○
F07.19	Action option 1 of protection	E21 E16 E15 E14 E13 * E08 E07 0: free stop 1: stop according to stop mode		000 00*00	○
F07.20	Action option 2 of protection	E28 E27 * E23 0: free stop 1: stop according to stop mode		00*0	○
F07.21	Options of load loss protection	0: invalid 1: valid		0	●
F07.22	Load loss detection level	0.0 ~ 100.0	%	20.0	●
F07.23	Load loss detection time	0.0 ~ 60.0	s	1.0	●
F07.24	Options of load loss protection action	0: trip protection, free stop 1: trip protection, stop according to stop mode		1	○

		2: continue to run, with DO status output			
F07.25	Motor overspeed detection level	0.0 ~ 50.0 (reference: maximum frequency F00.16)	%	20.0	●
F07.26	Motor overspeed detection time	0.0 ~ 60.0, 0.0: disable motor overspeed protection	s	1.0	●
F07.27	AVR function	0: invalid 1: valid 2: automatic		1	○
F07.28	Stall protection detection time	0.0~6000.0(0.0: no stall protection detection)	s	0.0	○
F07.29	Stall control intensity	0 ~ 100	%	20	○
F07.30	Instantaneous stop/no-stop deceleration time	0.00 ~ 300.00	s	20.00	○
F07.32	Action option 2 of protection	E10 E13 E15 E16 * E19 E20 * 0: allow protection retry 1: disable protection retry		000 00000	○
F07.36	Action option 3 of protection	* * * * * * E09 E17 0: allow protection retry 1: disable protection retry		**** *00	○
F07.37	Save the initial voltage during power-off	60.0～100.0	%	76.0	○
F07.38	Power-on read and judge the voltage	60.0～100.0	%	86.0	○
F07.39	Power-on read judgment delay time	0～100.00	S	5.00	○
F07.40	Steady-state undervoltage judgment delay time	5～6000	ms	20	○

F07.42	Short-circuit the ground to judge the setting value of the current	0.0～100.0	%	20	○
F08	**Multi-segment speed and simple PLC**				
F08.00	Multi-segment speed 1	0.00 to maximum frequency F00.16	Hz	0.00	●
F08.01	Multi-segment speed 2	0.00 to maximum frequency F00.16	Hz	5.00	●
F08.02	Multi-segment speed 3	0.00 to maximum frequency F00.16	Hz	10.00	●
F08.03	Multi-segment speed 4	0.00 to maximum frequency F00.16	Hz	15.00	●
F08.04	Multi-segment speed 5	0.00 to maximum frequency F00.16	Hz	20.00	●
F08.05	Multi-segment speed 6	0.00 to maximum frequency F00.16	Hz	25.00	●
F08.06	Multi-segment speed 7	0.00 to maximum frequency F00.16	Hz	30.00	●
F08.07	Multi-segment speed 8	0.00 to maximum frequency F00.16	Hz	35.00	●
F08.08	Multi-segment speed 9	0.00 to maximum frequency F00.16	Hz	40.00	●
F08.09	Multi-speed 10	0.00 to maximum frequency F00.16	Hz	45.00	●
F08.10	Multi-segment speed 11	0.00 to maximum frequency F00.16	Hz	50.00	●
F08.11	Multi-segment speed 12	0.00 to maximum frequency F00.16	Hz	50.00	●
F08.12	Multi-segment speed 13	0.00 to maximum frequency F00.16	Hz	50.00	●
F08.13	Multi-segment speed 14	0.00 to maximum frequency F00.16	Hz	50.00	●
F08.14	Multi-segment speed 15	0.00 to maximum frequency F00.16	Hz	50.00	●

F08.15	Simple PLC running mode	0: stop after a single run 1: stop after a limited number of cycles 2: run at the last segment after a limited number of cycles 3: continuous cycles		0	●
F08.16	Limited number of cycles	1 ~ 10000		1	●
F08.17	Simple PLC memory options	Ones place: stop memory options 0: no memory (from the first segment) 1: memory (from the moment of stop) Tens place: power-down memory options 0: no memory (from the first segment) 1: memory (from the power-down moment)		0	●
F08.18	Simple PLC time unit	0: s (second) 1: min (minute)		0	●
F08.19	Setting of the first segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.20	Running time of the first segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.21	Setting of the second segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.22	Running time of the second segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.23	Setting of the third segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options		0	●

		0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4			
F08.24	Running time of the third segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.25	Setting of the fourth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.26	Running time of the fourth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.27	Setting of the fifth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.28	Running time of the fifth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.29	Setting of the sixth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.30	Running time of the sixth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.31	Setting of the seventh segment	Ones place: running direction options 0: forward 1: reverse		0	●

		Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4			
F08.32	Running time of the seventh segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.33	Setting of the eighth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.34	Running time of the eighth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.35	Setting of the ninth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.36	Running time of the ninth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.37	Setting of the tenth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.38	Running time of the tenth segment	0.0 ~ 6000.0	s/ min	5.0	●

F08.39	Setting of the eleventh segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.40	Running time of the eleventh segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.41	Setting of the twelfth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.42	Running time of the twelfth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.43	Setting of the thirteenth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.44	Running time of the thirteenth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.45	Setting of the fourteenth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●

F08.46	Running time of the fourteenth segment	0.0 ~ 6000.0	s/ min	5.0	●
F08.47	Setting of the fifteenth segment	Ones place: running direction options 0: forward 1: reverse Tens place: acceleration and deceleration time options 0: acceleration and deceleration time 1 1: acceleration and deceleration time 2 2: acceleration and deceleration time 3 3: acceleration and deceleration time 4		0	●
F08.48	Running time of the fifteenth segment	0.0 ~ 6000.0	s/ min	5.0	●
F09	**PID function group**				
F09.00	PID setting source	0: digital PID setting 1: AI1 2: AI2 3: reserved 4: reserved 5: PULSE, high-frequency pulse (X5) 6: communication setting		0	○
F09.01	Digital PID setting	0.0 to PID setting feedback range F09.03		0.0	●
F09.02	PID feedback source	1: AI1 2: AI2 3: reserved 4: reserved 5: PULSE, high-frequency pulse (X5) 6: communication setting		1	○
F09.03	PID setting feedback range	0.1 ~ 6000.0		100.0	●
F09.04	PID positive and negative action selection	0: positive 1: negative		0	○
F09.05	Proportional gain 1	0.00 ~ 100.00		0.40	●
F09.06	Integral time 1	0.000 ~ 30.000, 0.000: no integral	s	2.000	●
F09.07	Differential time 1	0.000 ~ 30.000	ms	0.000	●

F09.08	Proportional gain 2	0.00 ~ 100.00		0.40	●
F09.09	Integral time 2	0.000 ~ 30.000, 0.000: no integral	s	2.000	●
F09.10	Differential time 2	0.000 ~ 30.000	ms	0.000	●
F09.11	PID parameter switching conditions	0: no switching 1: switching via digital input terminal 2: automatic switching according to deviation 3: automatic switching by frequency		0	●
F09.12	PID parameter switching deviation 1	0.00 ~ F09.13	%	20.00	●
F09.13	PID parameter switching deviation 2	F09.12 ~ 100.00	%	80.00	●
F09.14	Initial PID value	0.00~100.00	%	0.00	●
F09.15	PID initial value holding time	0.00～650.00	s	0.00	●
F09.16	Upper limit of PID output	F9.17~ +100.0	%	100.0	●
F09.17	Lower limit of PID output	–100.0~F9.16	%	0.0	●
F09.18	PID deviation limit	0.00~100.00 (0.00: invalid)	%	0.00	●
F09.19	PID differential limit	0.00~100.00	%	5.00	●
F09.20	PID integral separation threshold	0.00~100.00 (100.00% = invalid integral separation)	%	100.00	●
F09.21	PID setting change time	0.000~30.000	s	0.000	●
F09.22	PID feedback filtering time	0.000~30.000	s	0.000	●
F09.23	PID output filtering time	0.000~30.000	s	0.000	●
F09.24	Upper limit detection value of PID feedback	0.00~100.00; 100.00 = invalid feedback disconnection	%	100.00	●

	disconnection				
F09.25	Lower limit detection value of PID feedback disconnection	0.00~100.00; 0.00 = invalid feedback disconnection	%	0.00	●
F09.26	Detection time of PID feedback disconnection	0.000 ~ 30.000	s	0.000	●
F09.27	PID sleep control options	0: invalid 1: sleep at zero speed 2: sleep at lower frequency limit 3: sleep with tube sealed		0	●
F09.28	Sleep action point	0.00-100.00 (100.00 corresponds to the PID setting feedback range)	%	100.00	●
F09.29	Sleep delay time	0.0 ~ 6500.0	s	0.0	●
F09.30	Wake-up action point	0.00 ~100.00 (100.00 corresponds to the PID setting feedback range)	%	0.00	●
F09.31	Wake-up delay time	0.0 ~ 6500.0	s	0.0	●
F09.32	Multi-segment PID setting 1	0.0 to PID setting feedback range F09.03		0.0	●
F09.33	Multi-segment PID setting 2	0.0 to PID setting feedback range F09.03		0.0	●
F09.34	Multi-segment PID setting 3	0.0 to PID setting feedback range F09.03		0.0	●
F09.35	Upper limit of feedback voltage	lower limit of feedback voltage to 10.00	V	10.00	●
F09.36	Lower limit of feedback voltage	0.00 to upper limit of feedback voltage	V	0.00	●
F09.37	Integral action option within set PID change time	0: always calculate the integral term 1: calculate the integral term after the F09.21 set time is reached 2: calculate the integral term when the error is less than F09.38		0 Straight -2	●
F09.38	Integral within set PID change time	0.00-100.00	%	0	●

	Input deviation				
F09.39	Wake-up option	0: target pressure F09.01* coefficient of wake-up action point 1: wake-up action point (F09.30)		0	○
F09.40	Coefficient of wake-up action point	0.0~100.0 (100% corresponds to PID setting)	%	90.0	●
F09.41	Pipeline network alarm overpressure	0.0 to pressure sensor range F09.03	%	90.0	●
F09.42	Overpressure protection time	0 ~ 3600 (0: invalid)	s	6	●
F09.43	PID reverse limit	0: no limit 1: limit		1	○
F10	**Communication function group**				
F10.00	Local Modbus communication address	1-247; 0: broadcast address		1	○
F10.01	Baud rate of Modbus communication	0:4800 1:9600 2:19200 3:38400 4:57600 5:115200		1	○
F10.02	Modbus data format	0: 1-8-N-1 (1 start bit + 8 data bits + 1 stop bit) 1: 1-8-E-1 (1 start bit + 8 data bits + 1 even parity check bit + 1 stop bit) 2: 1-8-O-1 (1 start bit + 8 data bits + 1 odd parity check bit + 1 stop bit) 3: 1-8-N-2 (1 start bit + 8 data bits + 2 stop bits) 4: 1-8-E-2 (1 start bit + 8 data bits + 1 even parity check bit + 2 stop bits) 5: 1-8-O-2 (1 start bit + 8 data bits + 1 odd parity check bit + 2 stop bits)		0	○
F10.03	485 communication timeout	0.0s ~ 60.0s; 0.0: invalid (valid for the master-slave mode)	s	0.0	●
F10.04	Modbus response delay	1 ~ 20	ms	2	●

F10.05	Options of master-slave communication function	0: invalid 1: valid		0	○
F10.06	Master-slave options	0: slave 1: host (Modbus protocol broadcast transmission)		0	○
F10.07	Data sent by host	0: output frequency 1: set frequency 2: output torque 3: set torque 4: PID setting 5: output current		1	○
F10.08	Proportional factor of slave reception	0.00 ~ 10.00 (multiple)		1.00	●
F10.09	Host sending interval	0.000 ~ 30.000	s	0.200	●
F10.10	Communication protocol option	0: Modbus-RTU protocol		0	×
F10.56	Options of 485 EEPROM writing	0-10: default operation (for commissioning) 11: writing not triggered (available after commissioning)		0	○
F10.57	Enabling of SCI sending timeout resetting	0: invalid resetting 1: valid resetting		1	●
F10.58	Delay time of SCI sending timeout resetting	110 ~10000	mS	150	●
F10.61	SCI response option	0: reply to both read and write commands 1: reply to write commands only 2: no reply to both read and write commands		0	○
F11	**User-selected parameter group**				
F11.00	User-selected parameter 1	The displayed content is Uxx.xx, which means that the Fxx.xx function code is selected When the function code F11.00 is enabled, the keyboard displays U00.00, indicating that the first selected parameter is F00.00.		U 00.00	●
F11.01	User-selected parameter 2			U 00.01	●
F11.02	User-selected parameter 3			U 00.02	●

F11.03	User-selected parameter 4			U 00.03	●
F11.04	User-selected parameter 5			U 00.04	●
F11.05	User-selected parameter 6			U 00.07	●
F11.06	User-selected parameter 7			U 00.14	●
F11.07	User-selected parameter 8			U 00.15	●
F11.08	User-selected parameter 9			U 00.16	●
F11.09	User-selected parameter 10			U 00.18	●
F11.10	User-selected parameter 11			U 00.19	●
F11.11	User-selected parameter 12			U 00.29	●
F11.12	User-selected parameter 13			U 02.00	●
F11.13	User-selected parameter 14			U 02.01	●
F11.14	User-selected parameter 15			U 02.02	●
F11.15	User-selected parameter 16			U 03.00	●
F11.16	User-selected parameter 17			U 03.02	●
F11.17	User-selected parameter 18			U 03.21	●
F11.18	User-selected parameter 19			U 04.00	●
F11.19	User-selected parameter 20			U 04.20	●
F11.20	User-selected parameter 21			U 05.00	●
F11.21	User-selected parameter 22			U 05.03	●

F11.22	User-selected parameter 23			U 05.04	●
F11.23	User-selected parameter 24			U 08.00	●
F11.24	User-selected parameter 25			U 19.00	●
F11.25	User-selected parameter 26			U 19.01	●
F11.26	User-selected parameter 27			U 19.02	●
F11.27	User-selected parameter 28			U 19.03	●
F11.28	User-selected parameter 29			U 19.04	●
F11.29	User-selected parameter 30			U 19.05	●
F11.30	User-selected parameter 31			U 19.06	●
F12	**Keyboard and display function group**				
F12.00	Reserved			1	○
F12.01	Options of stop function of STOP key	0: valid only in keyboard control 1: with all command channels valid		1	○
F12.02	Parameter locking	0: do not lock 1: reference input not locked 2: all locked, except for this function code		0	●
F12.03	Parameter copying	0: no operation 1: parameter upload to keyboard 2: download parameters to inverter(F01 and F14 groups do not download) 3: download parameters to inverter		0	○
F12.09	Load speed display coefficient	0.01～600.00		30.00	●
F12.10	UP/DOWN acceleration and deceleration rate	0.00: automatic rate 0.05~500.00Hz/s		5.00Hz/s	○
F12.11	Options of UP/DOWN offset clearing	0: not clear (clear changes in main frequency setting) 1: clear in non-running state		0	○

		2: clear by releasing the UP/DOWN button 3: clear once in non-running state			
F12.12	Options of UP/DOWN power-down saving of offset	0: do not save 1: save (valid after the offset is modified)		1	○
F12.13	Power meter resetting	0: do not clear 1: clear		0	●
F12.14	Restoration of factory defaults	0: no operation 1: restoration of factory defaults (excluding the motor parameters, inverter parameters, manufacturer parameters, running and power-on time record)		0	○
F12.15	Cumulative power-on time (h)	0~65535	h	XXX	×
F12.16	Cumulative power-on time (min)	0 ~ 59	min	XXX	×
F12.17	Cumulative running time (h)	0 ~ 65535	h	XXX	×
F12.18	Cumulative running time (min)	0 ~ 59	min	XXX	×
F12.19	Rated power of inverter	0.40 ~ 650.00	kW	Depending on the motor type	×
F12.20	Rated voltage of inverter	60 ~ 690	V	Depending on the motor type	×
F12.21	Rated current of inverter	0.1 ~ 1500.0	A	Depending on the motor type	×
F12.22	Performance software S/N 1	XXX.XX		XXX.XX	×
F12.23	Performance software S/N2	XX.XXX		XX.XXX	×
F12.24	Functional software S/N 1	XXX.XX		XXX.XX	×

F12.25	Functional software S/N 2	XX.XXX		XX.XXX	×
F12.26	Keyboard software serial number 1	XXX.XX		XXX.XX	×
F12.27	Keyboard software serial number 2	XX.XXX		XX.XXX	×
F12.28	Serial No. 1	XX.XXX		XX.XXX	×
F12.29	Serial No. 2	XXXX.X		XXXX.X	×
F12.30	Serial No. 3	XXXXX		XXXXX	×
F12.31	LCD language options	0: Chinese 1: English 2: reserved		0	●
F12.33	Running status display parameter 1 of Mode 1 (LED stop status display parameter 5)	0.00 ~ 99.99		18.00	●
F12.34	Running status display parameter 2 of Mode 1 (LED stop status display parameter 1)	0.00 - 99.99		18.01	●
F12.35	Running status display parameter 3 of Mode 1 (LED stop status display parameter 2)	0.00 ~ 99.99		18.06	●
F12.36	Running status display parameter 4 of Mode 1 (LED stop status display parameter 3)	0.00 ~ 99.99		18.08	●
F12.37	Running status display parameter 5 of Mode 1 (LED stop status display parameter	0.00 ~ 99.99		18.09	●

<table>
<tr><td></td><td>4)</td><td colspan="5"></td><td></td><td></td><td></td></tr>
<tr><td>F12.38</td><td>LCD large-line display parameter 1</td><td colspan="5">0.00 ~ 99.99</td><td></td><td>18.00</td><td>●</td></tr>
<tr><td>F12.39</td><td>LCD large-line display parameter 2</td><td colspan="5">0.00 ~ 99.99</td><td></td><td>18.06</td><td>●</td></tr>
<tr><td>F12.40</td><td>LCD large-line display parameter 3</td><td colspan="5">0.00 ~ 99.99</td><td></td><td>18.09</td><td>●</td></tr>
<tr><td>F12.41</td><td>Options of UP/DOWN zero crossing</td><td colspan="5">0: invalid
1: valid</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F12.42</td><td>Frequency setting of digital potentiometer</td><td colspan="5">0.00 to maximum frequency F00.16</td><td>Hz</td><td>0.00</td><td>×</td></tr>
<tr><td>F12.43</td><td>Digital potentiometer torque setting</td><td colspan="5">0.00-|Digital torque setting F13.02|</td><td>%</td><td>0.0</td><td>×</td></tr>
<tr><td>F12.45</td><td>UP/DOWN function options of keyboard</td><td>Communication</td><td>High-speed pulse</td><td>Analog quantity</td><td>Digital frequency</td><td>Multi-segment speed</td><td></td><td>00000</td><td>○</td></tr>
<tr><td></td><td></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="5">0: invalid
1: valid</td><td></td><td></td><td></td></tr>
<tr><td>F12.48</td><td>Output frequency display</td><td colspan="5">0： absolute value
1： positive/negative</td><td></td><td>1</td><td>●</td></tr>
<tr><td>F13</td><td colspan="9">Torque control parameter group</td></tr>
<tr><td>F13.00</td><td>Speed/torque control options</td><td colspan="5">0: speed control
1: torque control</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F13.01</td><td>Options of torque setting source</td><td colspan="5">0: digital torque setting F13.02
1: AI1
2: AI2
3: reserved
4: reserved
5: high frequency pulse input (X5)
6: communication setting
7: reserved
8: digital potentiometer setting
(Full range of the items 1-6, corresponding to</td><td></td><td>0</td><td>○</td></tr>
</table>

		F13.02 digital torque setting)			
F13.02	Digital torque setting	-200.0 ~ 200.0	%	100.0	●
F13.03	Multi-segment torque 1	-200.0 ~ 200.0	%	0.0	●
F13.04	Multi-segment torque 2	-200.0 ~ 200.0	%	0.0	●
F13.05	Multi-segment torque 3	-200.0 ~ 200.0	%	0.0	●
F13.06	Torque control acceleration and deceleration time	0.00 ~ 120.00	s	0.00	●
F13.08	Upper frequency limit options of torque control	0: set by F13.09 1: AI1 2: AI2 3: reserved 4: reserved 5: high frequency pulse input (X5) 6: communication setting (percentage) 7: communication setting (direct frequency)		0	○
F13.09	Positive upper limit of torque control frequency	0.50 to maximum frequency F00.16	Hz	50.00	●
F13.10	Upper frequency limit offset	0.00 to maximum frequency F00.16	Hz	0.00	●
F13.11	Static friction torque compensation	0.0 ~ 100.0	%	0.0	●
F13.12	Frequency range of static friction compensation	0.00 ~ 50.00	Hz	1.00	●
F13.13	Dynamic friction torque compensation	0.0 ~ 100.0	%	0.0	●
F13.18	Reverse speed limit options	0 ~ 100	%	100	●
F13.19	Reverse torque control options	0 ~ 1		0	●
F14	**Parameter group of motor 2**				

F14.00	Motor type	0: ordinary asynchronous motor 1: variable-frequency asynchronous motor 2: permanent magnet synchronous motor		0	○
F14.01	Rated power of electric motor	0.10～650.00	kW	Depending on the motor type	○
F14.02	Rated voltage of motor	50～2000	V	Depending on the motor type	○
F14.03	Rated current of motor	0.01 to 600.00 rated power of motor: ≤ 75 kW) 0.1 to 6000.0 (rated power of motor: > 75 kW)	A	Depending on the motor type	○
F14.04	Rated frequency of motor	0.01～600.00	Hz	Depending on the motor type	○
F14.05	Rated speed	1～60000	rpm	Depending on the motor type	○
F14.06	Motor winding connection	0:Y 1:Δ		Depending on the motor type	○
F14.07	Rated power factor of motor	0.600～1.000		Depending on the motor type	○
F14.08	Motor efficiency	30.0～100.0	%	Depending on the motor type	○
F14.09	Stator resistance of asynchronous motor	1~ 60000 (rated power of motor: ≤ 75 kW) 0.1~ 6000.0 (rated power of motor: > 75kW)	mΩ	Depending on the motor type	○

F14.10	Rotor resistance of asynchronous motor	1~60000 (rated power of motor: ≤ 75 kW) 0.1~6000.0 (rated power of motor: > 75kW)	mΩ	Depending on the motor type	○
F14.11	Leakage inductance of asynchronous motor	0.01 to 600.00 (rated power of motor: ≤ 75 kW) 0.001 to 60.000 (rated power of motor: > 75 kW)	mH	Depending on the motor type	○
F14.12	Mutual inductance of asynchronous motor	0.1 to 6000.0 (rated power of motor: ≤ 75 kW) 0.01 to 600.00 (rated power of motor: > 75 kW)	mH	Depending on the motor type	○
F14.13	No-load excitation current of asynchronous motor	0.01 to 600.00 (rated power of motor: ≤ 75 kW) 0.1 to 6000.0 (rated power of motor: > 75 kW)	A	Depending on the motor type	○
F14.14	Flux weakening coefficient 1 of asynchronous motor	10.00 ~ 100.00	%	87.00	○
F14.15	Flux weakening coefficient 2 of asynchronous motor	10.00 ~ 100.00	%	80.00	○
F14.16	Flux weakening coefficient 3 of asynchronous motor	10.00 ~ 100.00	%	75.00	○
F14.17	Flux weakening coefficient 4 of asynchronous motor	10.00 ~ 100.00	%	72.00	○
F14.18	Flux weakening coefficient 5 of asynchronous motor	10.00 ~ 100.00	%	70.00	○
F14.19	Stator resistance of synchronous motor	1~60000 (rated power of motor: ≤75kW) 0.1 to 6000.0 (rated power of motor: > 75 kW)	mΩ	Depending on the motor type	○
F14.20	d-axis inductance of synchronous motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.001~60.000 (rated power of motor: > 75kW)	mH	Depending on the	○

				motor type	
F14.21	q-axis inductance of synchronous motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.001~60.000 (rated power of motor: > 75kW)	mH	Depending on the motor type	○
F14.22	Counter electromotive force of synchronous motor	10.0~2000.0 (counter electromotive force of rated speed)	V	Depending on the motor type	○
F14.23	Initial electrical angle of synchronous motor	0.0~359.9 (valid for synchronous motor)			○
F14.34	Motor parameter self-learning	00: no operation 01: static self-learning of asynchronous motor 02: rotation self-learning of asynchronous motor 03: inertia self-learning of asynchronous motor 11: static self-learning of synchronous motor 12: rotary self-learning of synchronous motor 13: encoder self-learning of synchronous motor		00	○
F14.35	Drive control mode of motor 2	0: v/f control (VVF) 1: speed sensorless vector control (SVC)		0	○
F14.36	Speed proportional gain ASR_P1	0.00~100.00		12.00	●
F14.37	Speed integral time constant ASR_T1	0.000~30.000 0.000: no integral	s	0.200	●
F14.38	Speed proportional gain ASR_P2	0.00~100.00		8.00	●
F14.39	Speed integral time constant ASR_T2	0.000~30.000 0.000: no integral	s	0.300	●
F14.40	Switching frequency 1	0.00 to switching frequency 2	Hz	5.00	●
F14.41	Switching frequency 2	switching frequency 1 to maximum frequency F00.16	Hz	10.00	●
F14.42	No-load current gain of motor 2	50.0~300.0	%	50.0	●

F14.43	Filtering time constant of speed loop output	0.000 ~ 0.100	s	0.001	●
F14.44	Vector control slip gain	50.00~200.00	%	100.00	●
F14.45	Upper limit source selection of speed control torque	0: set by F06.10 and F06.11 1: AI1 2: AI2 3: reserved 4: reserved 5: communication setting (percentage) 6: The larger of AI1 and AI2 7: The smaller of AI1 and AI2		0	○
F14.46	Upper limit of speed control motor torque	0.0 ~ 250.0	%	165.0	●
F14.47	Upper limit of speed control brake torque	0.0 ~ 250.0	%	165.0	●
F14.48	Excitation current proportional gain ACR-P1	0.00 ~100.00		0.50	●
F14.49	Excitation current integral time constant ACR-T1	0.00 ~ 600.00 0.00: no integral	ms	10.00	●
F14.50	Torque current proportional gain ACR-P2	0.00 ~ 100.00		0.50	●
F14.51	Torque current integral time constant ACR-T2	0.00 ~ 600.00 0.00: no integral	ms	10.00	●
F14.52	Stiffness coefficient of speed loop of motor 2	0~20		12	●
F14.53	SVC zero-frequency processing	0: braking 1: not processed 2: seal the tube		2	○
F14.54	SVC zero-frequency braking current	50.0 ~ 400.0 (100.0 is the no-load current of the motor)	%	100.0	○
F14.56	Voltage feedforward gain	0 ~ 100	%	0	●
F14.57	Flux weakening control options	0: invalid 1: direct calculation		2	○

		2: automatic adjustment			
F14.58	Flux weakening voltage	70.00 ~ 100.00	%	95.00	●
F14.59	Maximum field weakening current of synchronous motor	0.0 ~ 150.0 (100.0 is the rated current of the motor)	%	100.0	●
F14.60	Proportional gain of flux weakening regulator	0.00 ~ 10.00		0.50	●
F14.61	Integral time of flux weakening regulator	0.01 ~ 60.00	s	2.00	●
F14.62	MTPA control option of synchronous motor	0: invalid 1: valid		0	○
F14.63	Self-learning gain at initial position	0 ~ 200	%	100	●
F14.64	Frequency of low frequency band of injection current	0.00 ~ 100.00 (100.00 is the rated frequency of the motor)	%	10.00	●
F14.65	Injection current of low frequency band	0.0 ~ 60.0 (100.0 is the rated current of the motor)	%	20.0	●
F14.66	Regulator gain of low frequency band of injection current	0.00 ~ 10.00		0.50	●
F14.67	Regulator integral time of low frequency band of injection current	0.00 ~ 300.00	ms	10.00	●
F14.68	Frequency of high frequency band of injection current	0.00 ~ 100.00 (100.00 is the rated frequency of the motor)	%	20.00	●
F14.69	Injection current f high frequency band	0.0 ~ 30.0 (100.0 is the rated current of the motor)	%	8.0	●
F14.70	Regulator gain of high frequency band of injection current	0.00 ~ 10.00		0.50	●
F14.71	Regulator integral time of high frequency band of injection current	0.00 ~ 300.00	ms	10.00	●

F14.77	Acceleration/deceleration time options of motor 2	0: the same as motor 1 1: acceleration and deceleration time 1 2: acceleration and deceleration time 2 3: acceleration and deceleration time 3 4: acceleration and deceleration time 4		0	○
F14.78	Maximum frequency of motor 2	20.00 ~ 600.00	Hz	50	○
F14.79	Upper frequency limit of motor 2	lower limit frequency F00.19 to maximum frequency F14.78	Hz	50	●
F14.80	V/F curve setting of motor 2	0: straight line V/F 1: multi-point broken line V/F 2: 1.3-power V/F 3: 1.7-power V/F 4: square V/F 5: VF complete separation mode (Ud = 0, Uq = K * t = voltage of separation voltage source) 6: VF semi-separation mode (Ud = 0, Uq = K * t = F/Fe * 2 * voltage of separation voltage source)		0	○
F14.81	Multi-point VF frequency F1 of motor 2	0.00 ~ F14.83	Hz	0.50	●
F14.82	Multi-point VF voltage V1 of motor 2	0.0～100.0 (100.0 = Rated voltage)	%	1.0	●
F14.83	Multi-point VF frequency F2 of motor 2	F14.81 ~ F14.85	Hz	2.00	●
F14.84	Multi-point VF voltage V2 of motor 2	0.0 ~ 100.0	%	4.0	●
F14.85	Multi-point VF frequency F3 of motor 2	F14.83 to rated frequency of motor (reference frequency)	Hz	5.00	●
F14.86	Multi-point VF voltage V3 of motor 2	0.0 ~ 100.0	%	10.0	●
F14.87	Stop mode of motor 2	0: slow down to stop 1: free stop		0	○
F14.96	Low speed correction factor of stator resistor of asynchronous motor 2	10.0 ~ 500.0	%	100.0	●

F14.97	Low speed correction factor of rotor resistor of asynchronous motor 2	10.0 ~ 500.0	%	100.0	●
F14.98	Slip gain switching frequency of asynchronous motor 2	0.10 ~ Fmax	Hz	5.00	○
F15	**Auxiliary function group**				
F15.00	Jog frequency	0.00 to maximum frequency F00.16	Hz	5.00	●
F15.01	Jog acceleration time	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	5.00	●
F15.02	Jog deceleration time	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	5.00	●
F15.03	Acceleration time 2	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	15.00	●
F15.04	Deceleration time 2	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	15.00	●
F15.05	Acceleration time 3	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	15.00	●
F15.06	Deceleration time 3	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	15.00	●
F15.07	Acceleration time 4	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	15.00	●
F15.08	Deceleration time 4	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	15.00	●
F15.09	Fundamental frequency of acceleration and deceleration time	0: maximum frequency F00.16 1: 50.00Hz 2: set frequency		0	○
F15.10	Automatic switching of	0: invalid 1: valid		0	○

	acceleration and deceleration time				
F15.11	Switching frequency of acceleration time 1 and 2	0.00 to maximum frequency F00.16	Hz	0.00	●
F15.12	Switching frequency of deceleration time 1 and 2	0.00 to maximum frequency F00.16	Hz	0.00	●
F15.13	Acceleration and deceleration time unit	0:0.01s 1:0.1s 2:1s		0	○
F15.14	Frequency hopping point 1	0.00 ~ 600.00	Hz	600.00	●
F15.15	Hopping range 1	0.00 ~ 20.00, 0.00 is invalid	Hz	0.00	●
F15.16	Frequency hopping point 2	0.00 ~ 600.00	Hz	600.00	●
F15.17	Hopping range 2	0.00 ~ 20.00, 0.00 is invalid	Hz	0.00	●
F15.18	Frequency hopping point 3	0.00 ~ 600.00	Hz	600.00	●
F15.19	Hopping range 3	0.00 ~ 20.00, 0.00 is invalid	Hz	0.00	●
F15.20	Detection width of output frequency arrival (FAR)	0.00 ~ 50.00	Hz	2.50	○
F15.21	Output frequency detection FDT1	0.00 to maximum frequency F00.16	Hz	30.00	○
F15.22	FDT1 hysteresis	-(Fmax-F15.21)～F15.21	Hz	2.00	○
F15.23	Output frequency detection FDT2	0.00 to maximum frequency F00.16	Hz	20.00	○
F15.24	FDT2 hysteresis	-(Fmax-F15.23)～F15.23	Hz	2.00	○
F15.25	Options of analog level detection ADT	0：AI1 1：AI2		0	○

F15.26	Analog level detection ADT1	0.00 ~ 100.00	%	20.00	●
F15.27	ADT1 hysteresis	0.00 to F15.26 (valid down in one direction)	%	5.00	●
F15.28	Analog level detection ADT2	0.00 ~ 100.00	%	50.00	●
F15.29	ADT2 hysteresis	0.00 to F15.28 (valid down in one direction)	%	5.00	●
F15.30	Options of energy consumption braking function	0: invalid 1: valid		0	○
F15.31	Energy consumption braking voltage	110.0 ~ 140.0 (380V, 100.0 = 537V)	%	125.0	○
F15.32	Braking rate	20 ~ 100 (100 means that duty ratio is 1)	%	100	●
F15.33	Operating mode with set frequency less than lower frequency limit	0: running at the lower frequency limit 1: shutdown 2: zero-speed running		0	○
F15.34	Fan control	Ones place: fan control mode 0: running after power-on 1: running at startup 2: intelligent operation, subject to temperature control Tens place: power on fan control 0: run for 1 minute and then run in fan control mode 1: directly operate in fan control mode Hundreds place: Fan low speed mode enable (above 280kW) 1: the operation at low speed is invalid 2: low speed operation is valid		101	○
F15.35	Overmodulation intensity	1.00 ~ 1.10		1.05	●
F15.36	Switching options of PWM modulation mode	0: invalid (7-segment PWM modulation) 1: valid (5-segment PWM modulation)		0	○
F15.37	Switching frequency of PWM modulation mode	0.00 to maximum frequency F00.16	Hz	15.00	●

F15.38	Options of dead zone compensation mode	0: no compensation 1: compensation mode 1 2: compensation mode 2		1	○
F15.39	Terminal jog priorityv	0: invalid 1: valid		0	○
F15.40	Deceleration time for quick stop	0.00 ~ 650.00 (F15.13=0) 0.0 ~ 6500.0 (F15.13=1) 0 ~ 65000 (F15.13=2)	s	1.00	●
F15.55	The current reaches the measured value	0.0～300.0（100.0% corresponding to rated motor current）	%	100.0	●
F15.56	The current reaches the hysteresis	0.0～F15.44	%	5.0	●
F15.57	Torque reaches test value	0.0～300.0（100.0% corresponding to rated motor torque）	%	100.0	●
F15.58	The torque reaches the hysteresis ring	0.0～F15.46	%	5.0	●
F15.62	PG card feedback frequency display filtering time	0～20000	ms	300	●
F15.63	The speed reaches the limit of rise	0.00～Fmax	Hz	30.00	●
F15.64	The speed reaches filtering time	0～60000	ms	500	●
F15.65	The speed reaches the limit of descent	0.00～Fmax	Hz	0.00	●
F15.66	Overcurrent detection level	0.1~ 300.0 (0.0: no detection; 100.0%: corresponding to the rated current of motor)	%	200.0	●
F15.67	Overcurrent detection delay time	0.00 ~ 600.00	s	0.00	●
F15.68	Market price	0.00 ~ 100.00		1.00	○
F15.69	Power-frequency load factor	30.0 ~ 200.0	%	90.0	○
F16	**Customization function group**				
F16.00	Industry application	0：universal model 1：water supply application 2：air compressor application		0	○

		3：winding application 4：fan application 5：spindle application of machine tool 6：extruder application 7：high-speed motor application 8：plastic extruding machine 9：EM100 comm macro 10: EM303B comm macro			
F16.01	Set length	1 ~ 65535 (F16.13=0) 0.1 ~ 6553.5 (F16.13=1) 0.01~ 655.35 (F16.13=2) 0.001 ~ 65.535 (F16.13=3)	m	1000	●
F16.02	Pulses per meter	0.1 ~ 6553.5		100.0	●
F16.03	Set count value	F16.04 ~ 65535		1000	●
F16.04	Specified count value	1 ~ F16.03		1000	●
F16.05	Set time of regular running	0.0~ 6500.0, 0.0 is invalid	min	0.0	●
F16.06	Agent password	0~65535		0	●
F16.07	Setting of cumulative power-on arrival time	0-65535; 0: disable the protection when the power-on time is up	h	0	●
F16.08	Setting of cumulative running arrival time	0-65535; 0: disable the protection when the running time is up	h	0	●
F16.09	Factory password	0~65535		XXXX	●
F16.10	Analog output percentage corresponding to the count value 0	0.00 ~100.00	%	0.00	○
F16.11	Analog output percentage corresponding to the set count value	0.00 ~100.00	%	100.00	○
F16.13	Set length resolution	0:1m 1:0.1m		0	○

<table>
<tr><td></td><td></td><td colspan="8">2:0.01 m
3:0.001m</td><td></td><td></td><td></td></tr>
<tr><td>F17</td><td colspan="12">Virtual I/O function group</td></tr>
<tr><td>F17.00</td><td>VX1 virtual input function options</td><td colspan="8" rowspan="8">The same as the function options of digital input terminal of F02 group</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.01</td><td>VX2 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.02</td><td>VX3 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.03</td><td>VX4 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.04</td><td>VX5 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.05</td><td>VX6 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.06</td><td>VX7 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F17.07</td><td>VX8 virtual input function options</td><td></td><td>0</td><td>○</td></tr>
<tr><td rowspan="3">F17.08</td><td rowspan="3">Virtual input positive/negative logic</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td><td rowspan="3"></td><td rowspan="3">000
00000</td><td rowspan="3">○</td></tr>
<tr><td>VX8</td><td>VX7</td><td>VX6</td><td>VX5</td><td>VX4</td><td>VX3</td><td>VX2</td><td>VX1</td></tr>
<tr><td colspan="8">0: positive logic, valid in the closed state/invalid in the open state
1: negative logic, invalid in the closed state/valid in the open state</td></tr>
<tr><td rowspan="3">F17.09</td><td rowspan="3">VX1-VX8 status setting options</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td><td rowspan="3"></td><td rowspan="3">000
00000</td><td rowspan="3">○</td></tr>
<tr><td>VX8</td><td>VX7</td><td>VX6</td><td>VX5</td><td>VX4</td><td>VX3</td><td>VX2</td><td>VX1</td></tr>
<tr><td colspan="8">0: the VXn status is the same as VYn output status
1: status set by F17.10</td></tr>
<tr><td>F17.10</td><td>VX1-VX8 status setting</td><td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td><td></td><td>000
00000</td><td>●</td></tr>
</table>

		VX8	VX7	VX6	VX5	VX4	VX3	VX2	VX1			
		0: invalid 1: valid										
F17.11	VX1 valid delay time	0.000~30.000								s	0.000	●
F17.12	VX1 invalid delay time	0.000~30.000								s	0.000	●
F17.13	VX2 valid delay time	0.000~30.000								s	0.000	●
F17.14	VX2 invalid delay time	0.000~30.000								s	0.000	●
F17.15	VX3 valid delay time	0.000~30.000								s	0.000	●
F17.16	VX3 invalid delay time	0.000~30.000								s	0.000	●
F17.17	VX4 valid delay time	0.000~30.000								s	0.000	●
F17.18	VX4 invalid delay time	0.000~30.000								s	0.000	●
F17.19	VY1 virtual output function options	The same as the function options of digital output terminal of F03 group									0	○
F17.20	VY2 virtual output function options										0	○
F17.21	VY3 virtual output function options										0	○
F17.22	VY4 virtual output function options										0	○
F17.23	VY5 virtual output function options										0	○
F17.24	Reserved											
F17.25	Reserved											
F17.26	Reserved											
F17.27	Virtual output positive/negative	D7	D6	D5	D4	D3	D2	D1	D0		00000	○

	logic	VY8	VY7	VY6	VY5	VY4	VY3	VY2	VY1			
		0: positive logic, valid in the closed state/invalid in the open state 1: negative logic, invalid in the closed state/valid in the open state										
F17.28	Control options of virtual output terminal	D7	D6	D5	D4	D3	D2	D1	D0		11111	○
		VY8	VY7	VY6	VY5	VY4	VY3	VY2	VY1			
		0: depending on the status of terminal X1-X5 (without VY6-8) 1: depending on the output function status										
F17.29	VY1 valid delay time	0.000~30.000								s	0.000	●
F17.30	VY1 invalid delay time	0.000~30.000								s	0.000	●
F17.31	VY2 valid delay time	0.000~30.000								s	0.000	●
F17.32	VY2 invalid delay time	0.000~30.000								s	0.000	●
F17.33	VY3 valid delay time	0.000~30.000								s	0.000	●
F17.34	VY3 invalid delay time	0.000~30.000								s	0.000	●
F17.35	VY4 valid delay time	0.000~30.000								s	0.000	●
F17.36	VY4 invalid delay time	0.000~30.000								s	0.000	●
F17.37	Virtual input terminal status	VX8	VX7	VX6	VX5	VX4	VX3	VX2	VX1		000 00000	×
		0: invalid 1: valid										
F17.38	Virtual output terminal status	VY8	VY7	VY6	VY5	VY4	VY3	VY2	VY1		00000	×
		0: invalid 1: valid										
F18	**Monitoring parameter group**											

F18.00	Output frequency	0.00 to upper frequency limit	Hz	XXX	×
F18.01	Set frequency	0.00 to maximum frequency F00.16	Hz	XXX	×
F18.03	Estimate feedback frequency	0.00 to upper frequency limit	Hz	XXX	×
F18.04	Output torque	-200.0 ~ 200.0	%	XXX	×
F18.05	Torque setting	-200.0 ~ 200.0	%	XXX	×
F18.06	Output current	0.00 to 650.00 (rated power of motor: ≤ 75 kW) 0.0 to 6500.0 (rated power of motor: > 75 kW)	A	XXX	×
F18.07	Output current percentage	0.0~300.0 (100.0 = the rated current of inverter)	%	0	×
F18.08	Output voltage	0.0 ~ 690.0	V	XXX	×
F18.09	DC bus voltage	0 ~ 1200	V	XXX	×
F18.10	Simple PLC running times	0 ~ 10000		XXX	×
F18.11	Simple PLC operation stage	1 ~ 15		XXX	×
F18.12	PLC running time at the current stage	0.0 ~ 6000.0		XXX	×
F18.14	Load rate	0~65535	rpm	XXX	×
F18.15	UP/DOWN offset frequency	0.00 to 2 * Maximum frequency F00.16	Hz	XXX	×
F18.16	PID setting	0.0 to PID maximum range		XXX	×
F18.17	PID feedback	0.0 to PID maximum range		XXX	×
F18.18	Power meter: MWh	0~65535	MWh	XXX	×
F18.19	Watt-hour meter: kWh	0.0 ~ 999.9	kWh	XXX	×

F18.20	Output power	-650.00~650.00					kW	XXX	×
F18.21	Output power factor	-1.000 ~ 1.000						XXX	×
F18.22	Digital input terminal status 1	X5	X4	X3	X2	X1		XXX	×
		0/1	0/1	0/1	0/1	0/1			
F18.23	Digital input terminal status 2	*	AI2	AI1	*	*		XXX	×
		*	0/1	0/1	*	0/1			
F18.25	Output terminal state	*	*	R1	*	Y1		XXX	×
		*	*	0/1	*	0/1			
F18.26	AI1	0.0~100.0					%	XXX	×
F18.27	AI2	0.0~100.0					%	XXX	×
F18.31	High-frequency pulse input frequency: kHz	0.00~100.00					kHz	XXX	×
F18.32	High-frequency pulse input frequency: Hz	0~65535					Hz	XXX	×
F18.33	Count value	0~65535						XXX	×
F18.34	Actual length	0~65535					m	XXX	×
F18.35	Remaining time of regular running	0.0 ~ 6500.0					min	XXX	×
F18.36	Rotor position of synchronous motor	0.0~359.9°						XXX	×
F18.39	VF separation target voltage	0 ~ 690					V	XXX	×
F18.40	VF separation output voltage	0 ~ 690					V	XXX	×

F18.45	Speed setting	0～65535	rpm	XXX	×
F18.46	Output frequency symbol	0～65535		XXX	×
F18.51	PID output	-100.0 ~ 100.0	%		×
F18.60	Inverter temperature	-40 to 200	℃	0	×
F18.67	Saved electric energy (MWH)	cumulative energy saving MWH	0～65535	MWh	×
F18.68	Saved electric energy (KWH)	cumulative energy saving KWH	0.0～999.9	kWh	×
F18.69	Saved electric charge (1,000 yuan)	high cumulative cost saving (*1000)	0～65535		×
F18.70	Saved electric charge (yuan)	low cumulative cost saving	0.0～999.9		×
F18.71	Power-frequency power consumption MWh	power-frequency power consumption MWH	0～65535	MWh	×
F18.72	Power-frequency power consumption KWh	power-frequency power consumption KWH	0.0～999.9	kWh	×
F19	**Protection record group**				
F19.00	Category of last protection	0: no protection E01: output short circuit protection E02: instantaneous overcurrent E04: steady-state overcurrent E05: overvoltage E06: undervoltage E07: input phase loss E08: output phase loss E09: inverter overload E10: inverter overheat protection E11: parameter setting conflict		0	×

		E13: motor overload E14: external protection E15: inverter memory protection E16: communication abnormality E17: temperature sensor abnormality E18: abnormal disconnection of soft start relay E19: current detection circuit abnormality E20: stall protection E21: PID feedback disconnection E22: reserved E24: parameter identification abnormality E25: reserved E26: load loss protection E27: up to the cumulative power-on time E28: up to the cumulative running time E43: material cutoff protection E44: cable protection E57: overpressure in pipeline network E58: under-pressure in pipeline network E76: short-circuit protection to ground			
F19.01	Output frequency in protection	0.00 to upper frequency limit	Hz	0.00	×
F19.02	Output current in protection	0.00 to 650.00 (rated power of motor: ≤ 75 kW) 0.0 to 6500.0 (rated power of motor: > 75 kW)	A	0.00	×
F19.03	Bus voltage in protection	0 ~ 1200	V	0	×
F19.04	Operating status in protection	0: not running 1: forward acceleration 2: reverse acceleration 3: forward deceleration 4: reverse deceleration 5: constant speed in forward running 6: reverse constant speed in reverse running		0	×
F19.05	Working time in protection		h	0	×
F19.06	Category of previous protection	same as F19.00 parameter description		0	×
F19.07	Output frequency in protection		Hz	0.00	×

F19.08	Output current in protection		A	0.00	×
F19.09	Bus voltage in protection		V	0	×
F19.10	Operating status in protection	same as F19.04 parameter description		0	×
F19.11	Working time in protection		h	0	×
F19.12	Category of two previous protections	same as F19.00 parameter description		0	×
F19.13	Output frequency in protection		Hz	0.00	×
F19.14	Output current in protection		A	0.00	×
F19.15	Bus voltage in protection		V	0	×
F19.16	Operating status in protection	same as F19.04 parameter description		0	×
F19.17	Working time in protection		h	0	×
F27	**Winding/unwinding application macro parameter group**				
F27.00	Application macro	0: winding mode 1: unwinding mode 2: wire drawing mode 3: straight wire drawing machine mode		0	○
F27.01	Feedforward gain action channel	0: feedforward gain * set source B 1: feedforward gain * set source A 2: feedforward gain * 10V		1	○
F27.02	Feedforward gain input mode	0: no change in feedforward gain 1: 0.00 to upper limit of feedforward gain 2: - upper limit of feedforward gain to + upper limit of feedforward gain		1	○
F27.03	Feedforward control	Ones place: feedforward reset option 0: automatic reset 1: terminal reset Tens place: feedforward power-off stop option 0: save after power failure 1: not save after power failure		10	○

		Hundreds place: options of continuous feedforward calculation 0: not calculate 1: calculate			
F27.04	Upper limit of feedforward gain	0.00~500.00	%	500.00	○
F27.05	Initial feedforward gain	0.00~500.00	%	50.00	●
F27.06	Feedforward gain filter time	0~1000	ms	0	●
F27.07	Feedforward range 0	0.00 to feedforward range 1	%	4.00	●
F27.08	Feedforward range 1	feedforward range 0 to feedforward range 2	%	12.00	●
F27.09	Feedforward range 2	feedforward range 1 to feedforward range 3	%	23.00	●
F27.10	Feedforward range 3	feedforward range 2 to feedforward range 4	%	37.00	●
F27.11	Feedforward range 4	feedforward range 3 to feedforward range 5	%	52.00	●
F27.12	Feedforward range 5	feedforward range 4 to 100.00	%	72.00	●
F27.13	Soft start increment	0.00 ~ 50.00	%/S	0.60	●
F27.14	Feedforward increment 1	0.00 ~ 50.00	%/S	0.11	●
F27.15	Feedforward increment 2	0.00 ~ 50.00	%/S	0.30	●
F27.16	Feedforward increment 3	0.00 ~ 50.00	%/S	0.75	●
F27.17	Feedforward increment 4	0.00 ~ 50.00	%/S	1.55	●
F27.18	Feedforward increment 5	0.00 ~ 50.00	%/S	4.00	●
F27.19	Feedforward increment 6	0.00 ~ 50.00	%/S	11.00	●
F27.20	Material cutoff control mode	Ones place: disconnection detection mode 0: automatic detection 1: external signal		01201	○

		Tens place: material cutoff detection control 0: detect when the output is greater than the lower limit of material cutoff detection 1: no detection Hundreds place: material cutoff handling mode 0: protection of terminal action only 1: delayed stop and trip protection 2: material cutoff protection 3: automatic reset after protection shutdown 4: material cutoff detection terminal output only (straight wire drawing machine) 5: automatic reset of cutoff detection terminal (straight wire drawing machine) Thousands place: brake mode 0: mode 0 1: mode 1 Myriabit: reverse unwinding mode 0: no speed limit 1: reverse speed limit by F27.24			
F27.21	Material cutoff detection delay	0.0~10.0	S	6.0	●
F27.22	Lower limit of material cutoff detection after parking	0.00 ~ 60.00	Hz	5.00	●
F27.23	Time of continuous running after material cutoff	0.0 ~ 60.0	S	10.0	●
F27.24	Frequency of continuous running after material cutoff	0.00~Fmax	Hz	5.00	●
F27.25	Brake signal output frequency	0.00~FUP	Hz	2.50	●
F27.26	Braking signal duration	0.0~100.0	S	5.0	●
F27.27	Minimum frequency of wiring detection	0.00~20.00	Hz	10.00	●
F27.28	Judgment time for invalid cable signal	0.1 ~ 20.0	S	10.0	●

F27.29	Judgment time for valid cable signal	0.1 ~ 20.0	S	2.0	●
F27.30	Filtering time for material cutoff detection	1~100	ms	5	●
F27.36	Current value of feedforward gain	-500.0~500.0	%		×
F45	**Modbus free mapping parameter group**				
F45.00	Modbus communication mapping	0：invalid 1：valid	-	0	●
F45.01	Source address 1	0～65535	-	0	●
F45.02	Destination address 1	0～65535	-	0	●
F45.03	Mapping coefficient 1	0.00～100.00	-	1.00	●
F45.04	Source address 2	0～65535	-	0	●
F45.05	Destination address 2	0～65535	-	0	●
F45.06	Mapping coefficient 2	0.00～100.00	-	1.00	●
F45.07	Source address 3	0～65535	-	0	●
F45.08	Destination address 3	0～65535	-	0	●
F45.09	Mapping coefficient 3	0.00～100.00	-	1.00	●
F45.10	Source address 4	0～65535	-	0	●
F45.11	Destination address 4	0～65535	-	0	●

F45.12	Mapping coefficient 4	0.00～100.00	-	1.00	●
F45.13	Source address 5	0～65535	-	0	●
F45.14	Destination address 5	0～65535	-	0	●
F45.15	Mapping coefficient 5	0.00～100.00	-	1.00	●
F45.16	Source address 6	0～65535	-	0	●
F45.17	Destination address 6	0～65535	-	0	●
F45.18	Mapping coefficient 6	0.00～100.00	-	1.00	●
F45.19	Source address 7	0～65535	-	0	●
F45.20	Destination address 7	0～65535	-	0	●
F45.21	Mapping coefficient 7	0.00～100.00	-	1.00	●
F45.22	Source address 8	0～65535	-	0	●
F45.23	Destination address 8	0～65535	-	0	●
F45.24	Mapping coefficient 8	0.00～100.00	-	1.00	●
F45.25	Source address 9	0～65535	-	0	●
F45.26	Destination address 9	0～65535	-	0	●
F45.27	Mapping coefficient 9	0.00～100.00	-	1.00	●

F45.28	Source address 10	0～65535	-	0	●
F45.29	Destination address 10	0～65535	-	0	●
F45.30	Mapping coefficient 10	0.00～100.00	-	1.00	●
F45.31	Source address 11	0～65535	-	0	●
F45.32	Destination address 11	0～65535	-	0	●
F45.33	Mapping coefficient 11	0.00～100.00	-	1.00	●
F45.34	Source address 12	0～65535	-	0	●
F45.35	Destination address 12	0～65535	-	0	●
F45.36	Mapping coefficient 12	0.00～100.00	-	1.00	●
F45.37	Source address 13	0～65535	-	0	●
F45.38	Destination address 13	0～65535	-	0	●
F45.39	Mapping coefficient 13	0.00～100.00	-	1.00	●
F45.40	Source address 14	0～65535	-	0	●
F45.41	Destination address 14	0～65535	-	0	●
F45.42	Mapping coefficient 14	0.00～100.00	-	1.00	●
F45.43	Source address 15	0～65535	-	0	●

F45.44	Destination address 15	0～65535	-	0	●
F45.45	Mapping coefficient 15	0.00～100.00	-	1.00	●
F45.46	Source address 16	0～65535	-	0	●
F45.47	Destination address 16	0～65535	-	0	●
F45.48	Mapping coefficient 16	0.00～100.00	-	1.00	●
F45.49	Source address 17	0～65535	-	0	●
F45.50	Destination address 17	0～65535	-	0	●
F45.51	Mapping coefficient 17	0.00～100.00	-	1.00	●
F45.52	Source address 18	0～65535	-	0	●
F45.53	Destination address 18	0～65535	-	0	●
F45.54	Mapping coefficient 18	0.00～100.00	-	1.00	●
F45.55	Source address 19	0～65535	-	0	●
F45.56	Destination address 19	0～65535	-	0	●
F45.57	Mapping coefficient 19	0.00～100.00	-	1.00	●
F45.58	Source address 20	0～65535	-	0	●
F45.59	Destination address 20	0～65535	-	0	●

F45.60	Mapping coefficient 20	0.00～100.00	-	1.00	●
F45.61	Source address 21	0～65535	-	0	●
F45.62	Destination address 21	0～65535	-	0	●
F45.63	Mapping coefficient 21	0.00～100.00	-	1.00	●
F45.64	Source address 22	0～65535	-	0	●
F45.65	Destination address 22	0～65535	-	0	●
F45.66	Mapping coefficient 22	0.00～100.00	-	1.00	●
F45.67	Source address 23	0～65535	-	0	●
F45.68	Destination address 23	0～65535	-	0	●
F45.69	Mapping coefficient 23	0.00～100.00	-	1.00	●
F45.70	Source address 24	0～65535	-	0	●
F45.71	Destination address 24	0～65535	-	0	●
F45.72	Mapping coefficient 24	0.00～100.00	-	1.00	●
F45.73	Source address 25	0～65535	-	0	●
F45.74	Destination address 25	0～65535	-	0	●
F45.75	Mapping coefficient 25	0.00～100.00	-	1.00	●

F45.76	Source address 26	0～65535	-	0	●
F45.77	Destination address 26	0～65535	-	0	●
F45.78	Mapping coefficient 26	0.00～100.00	-	1.00	●
F45.79	Source address 27	0～65535	-	0	●
F45.80	Destination address 27	0～65535	-	0	●
F45.81	Mapping coefficient 27	0.00～100.00	-	1.00	●
F45.82	Source address 28	0～65535	-	0	●
F45.83	Destination address 28	0～65535	-	0	●
F45.84	Mapping coefficient 28	0.00～100.00	-	1.00	●
F45.85	Source address 29	0～65535	-	0	●
F45.86	Destination address 29	0～65535	-	0	●
F45.87	Mapping coefficient 29	0.00～100.00	-	1.00	●
F45.88	Source address 30	0～65535	-	0	●
F45.89	Destination address 30	0～65535	-	0	●
F45.90	Mapping coefficient 30	0.00～100.00	-	1.00	●