Preface

Thank you for choosing SINEE's TC760 tower crane inverter.

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TC760 tower crane inverter is a high-performance inverter launched by SINEE specially for lifting applications. It can be used in closed-loop lifting applications of tower cranes, open-loop lifting applications of construction cranes, as well as in slewing and luffing applications of tower cranes. Factory values of related parameters may change with the F20.00 lifting industry application macro selected.

TC760 tower crane inverter has the following features:

● Equipment of a built-in DC reactor (in case of an inverter of above 11kW) can reduce input current distortion, increase the power factor and promote the product reliability.

● Closed-loop vector control; low-frequency large-torque stable operation: 0Hz/150% steady output of the rated torque to ensure stable operation of lifting equipment in the process of starting, lifting and lowering.

● Zero-servo function: With an encoder connected, the inverter can drive the motor to hold the full load in the air or to lower the full load at a controlled low speed when the brake fails, providing an additional protection for lifting equipment.

● Over-speed protection: With an encoder connected, the inverter can provide protection against parking or running at an excessive speed, so that any abnormality in speed and braking power during lifting can be timely identified to prevent hook slips.

● Special control logic for brake: It controls the brake of lifting equipment to open and close in a reasonable time sequence, so that safe operation of the system can be guaranteed and the service life of the braking system can be prolonged.

● Wide voltage input range with automatic voltage stabilization: it can still meet the torque output requirement upon voltage drop of the power grid;

● Wide speed control range: it can meet the requirements of lifting light load at high speeds and lifting heavy load at low speeds to improve the working efficiency of lifting equipment.

Before using TC760 tower crane 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 (asynchronous or synchronous) correctly and set the motor nameplate parameters: rated power, rated voltage, rated current, rated frequency, rated speed, motor connection, rated power factor, etc. In case of FVC drive control mode, it is required to select the optional PG card and set correct encoder parameters.

We are committed to continuously improving our products and product data, so 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.

Note: 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. When opening the wooden case, do wear gloves; to prevent person injuries, do not contact the sealing plate with hands! 2. When handling the inverter, please hold its bottom. If you hold the front cover, the inverter body may fall down to cause injuries! 3. Handle the controller with care; otherwise, it may be damaged! 4. Never use the inverter damaged or with some parts missing; otherwise, injuries may be caused! 5. Do not touch components of the control system with your hands; otherwise static charge may be generated to cause damage to the inverter! 6. The inverter has undergone withstand voltage testing before delivery. Do not perform withstand voltage testing on your own; otherwise the inverter may be damaged!

During installation:

Danger
1. Please install the controller on metal or other flame-retardant objects and keep it away from combustible materials; otherwise, a fire may be caused! 2. Do not loosen the fixing bolts of components, especially those with red marks!
Warning
1、 The inverter shall not be installed in a place with conductive dust, corrosive gas, salt spray, oily dirt, condensation, vibration or direct exposure to sunlight! 2、 Never allow wire connectors or screws to fall into the inverter; otherwise, the inverter may be damaged! 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. Observe the instructions in this manual and make wiring done by professional electrical personnel;

otherwise, electric shock may be caused!
2. The inverter must be separated from the power supply by using a circuit breaker (it is recommended to use a circuit breaker of greater rated current that is the most approximate to twice the rated current of the inverter); otherwise, a fire may be caused!
3. Before wiring, make sure that the power supply is OFF (zero energy). Do not carry out wiring when the controller is powered on; 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 and even a fire may be caused!
5. Ground the controller correctly and reliably as required; otherwise, electric shock may be caused!

Warning

1. Connect the output terminals (U, V, W) of the inverter to corresponding input terminals (U, V, W) of the motor. An inconsistent phase sequence will cause the motor to reverse.
2. 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!
3. Never connect the braking resistor directly between the DC bus+ and −the terminal; otherwise the inverter may be damaged and a fire may be caused!
4. Use a screwdriver with the specified torque to tighten main circuit terminals; otherwise, a fire may occur!
5. Never connect the phase-shifting capacitor and LC/RC noise filter to the output circuit.
6. Do not connect the electromagnetic switch and electromagnetic contactor to the output circuit. Otherwise, the overcurrent protection circuit of the inverter will be enabled, and internal damage of the inverter may be incurred in severe cases.
7. Do not dismantle the connecting cable inside the inverter; otherwise, internal damage may be caused to the inverter.

Before power-on:

Danger

1、 Check whether the supply voltage is consistent with the rated voltage of the inverter; otherwise, equipment damage or fire may be incurred.
2、 Check whether wiring of power input terminals (R, S and T) and output terminals (U, V and W) is connected correctly;
3、 Check whether there is a short circuit among the peripheral circuits connected to the inverter and whether all connected lines are tightened; otherwise, the inverter may be damaged!

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; otherwise, electric shock may occur!
2. If the indicator does not turn on or the keyboard does not display after electrification, immediately turn off the power switch; 10 minutes later, check if the wiring is connected properly. Do not touch the inverter terminals R, S and T and any power terminal by hand or with a screwdriver; otherwise, electric shock may occur! After eliminating the causes of wiring errors, contact our customer service personnel immediately.
3. Never touch any wiring terminals of the inverter after electrification; otherwise, electric shock may

occur!
4. Do not disassemble any parts of the inverter while it is powered on.

Warning

1. If parameter identification is required, please pay attention to the danger of injury caused by the rotating motor. Check the safety before parameter identification; otherwise, an accident may be caused!
2. Do not change the parameters set by the inverter manufacturer without permission; 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. After replacement of the inverter, it is required to set and check the parameters. Plugging and unplugging operations must be done with power disconnected!
5. The synchronous motor can rotate to generate electricity. For maintenance and repair of the inverter, it is required to wait 10 minutes after the motor stops rotation and have safety measures in place before disconnecting the motor and the inverter; otherwise, electric shock may occur!

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!

Precautions

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

Some inverters can provide 0.00Hz~600.00Hz output frequency. When the motor needs to operate above the rated frequency, please consider the capacity of the mechanical device. Otherwise, equipment damage or even life-threatening accidents may occur.

About motor heat and noise

The PWM wave voltage output by the inverter contains some harmonics, so a motor operating with the inverter may have slightly greater temperature rise, noise and vibration than those it may have when operating 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 inverter should not be used beyond the allowable working voltage range specified in this manual; otherwise, 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

This inverter series is equipped with a surge current protection device for protection against induced lightning. In lightning-prone places, a lightning protection device should be added before the inverter.

Altitude and derating

At places with the altitude exceeding 1,000 m, heat dissipation and safety insulation are poor due to thin air, so the inverter should be subject to derated use. For specific details, please 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.

Scope of application

This product is not designed and manufactured as a device or system of vital importance. Do not use this product in these cases.
This product is manufactured under strict quality management. When failure of this product may cause a major accident or loss, please install a safety device.

Prevention of electric shock

Please read all requirements of safety precautions! 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!

Table of Contents

Chapter 1 Overview

1.1 Model and Specification of TC760 Series Inverter

Rated voltage of power supply: Three-phase AC 380V~415V;

Applicable motor: Three-phase AC asynchronous motor with the power range of 4.0~400KW

Maximum applicable motor power (kW)	Heavy-duty rating	
	Model	Rated current (A)
4.0	TC760-4R0-3B	9.4
5.5	TC760-5R5-3B	13
7.5	TC760-7R5-3B	17
11	TC760-011-3B	25
15	TC760-015-3B	32
18.5	TC760-018-3B	38
22	TC760-022-3/3B	45
30	TC760-030-3/3B	60
37	TC760-037-3/3B	75
45	TC760-045-3/3B	90
55	TC760-055-3/3B	110
75	TC760-075-3/3B	150
90	TC760-090-3	176
110	TC760-110-3	210
132	TC760-132-3	253
160	TC760-160-3	304
185	TC760-185-3	357
200	TC760-200-3	380
220	TC760-220-3	426
250	TC760-250-3	465
280	TC760-280-3	520
315	TC760-315-3	585
355	TC760-355-3	650
400	TC760-400-3	725

Selection principle (for reference only, the actual selection shall be made based on calculations):

- Lifting application: Super heavy duty type refers to amplification of the inverter power by 1~2 levels (in case of closed loop) relative to the motor power
- Slewing application: Super heavy duty type refers to amplification of the inverter power by 1~2 levels (in case of open loop) relative to the motor power
- Trolley luffing application: Heavy duty type refers to inverter power matching the motor power (in case of open loop)

Technical Specifications for TC760 Inverter Series

Item		Specification
Power supply	Rated voltage of power supply	Three-phase 380V-20%~415V+20%, 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
	Overload capacity of heavy-duty type	150% rated current: 60s; 180% rated current: 10s
	Overload capacity of super heavy-duty type	150% rated current: 60s; 200% rated current: 3s
Basic control functions	Driving mode	V/F control (VVF); Speed sensorless vector control (SVC) Speed sensor vector control (FVC)
	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 Analog input: 0.1% of maximum frequency
	Speed control range	1:50 (VVF), 1:1000 (FVC)
	Speed control accuracy	Rated synchronous speed ± 0.2%
	Acceleration and deceleration time	0.01s~600.00s/0.1s~6000.0s/1s~60000s
	Voltage/frequency characteristics	Rated output voltage 20%~100% adjustable, reference frequency 1Hz~600Hz adjustable
	Torque boost	Fixed torque boost curve, any V/F curve optional
	Starting torque	150%/1Hz (VVF), 150%/0.25Hz (SVC), 150%/0Hz (FVC)
	Torque control accuracy	±5% rated torque (FVC)
	Self-adjustment of output voltage	When the AVR function is enabled, the output voltage remains basically the same as the input voltage changes
	Automatic current limit	Output current is automatically limited to avoid frequent overcurrent trips.
	DC braking	Braking frequency: 0.01 to maximum frequency Braking time: 0~30S Braking current: 0%~100% rated current
	Signal input source	Communication, multi-speed, analog, high-speed pulse, etc.
Input and output function	Reference power supply	10V/20mA
	Terminal control power	24V/200mA
	Digital input terminal	7-channel digital multi-functional input terminal

	Analog input terminal	3 (standard configuration AI1~AI3) + 1 (extension card AI4)-channel analog input: One (AI1) voltage source: 0 to 10V input; Two (AI2/AI3) voltage sources: 0 to 10V or 0 to 20mA input;
	Digital output terminal	2 (standard Y1/Y2) + 1 (extension card Y3) open-collector multi-function outputs and 2 (R1: EA/EB/EC and R2:RA/RB/RC) relay multi-function outputs. Maximum output current of the collector: 50mA; relay contact capacity: 250VAC/3A or 30VDC/1A, with EA-EC and RA-RC normally open and EB-EC and RB-RC normally closed
	Analog output terminal	2-channel (M1/M2) multi-function analog output terminals to output 0~10V or 0~20mA
Keyboard display	LED display	The LED digital tube displays relevant information about the inverter.
	Parameter copying	Parameter settings of the inverter can be uploaded and downloaded for fast parameter copying.
Protection	Protective Function	Short circuit, overcurrent, overvoltage, undervoltage, phase loss, overload, overheat, overspeed, load loss, external fault, etc.
Use conditions	Location	Indoor, at an altitude of less than 1 km, free of dust, corrosive gases and direct sunlight
	Applicable environment	-10℃~+40℃, 20%~90%RH (non-condensing)
	Vibration	Less than 0.5g
	Storage environment	-25℃~+65℃
	Installation method	Wall-mounted, floor-standing electrical control cabinet, through-wall
Protection level		IP20/IP21 (450kW and above)
Cooling method		Forced air cooling

Chapter 2 Installation

2.1 Product validation

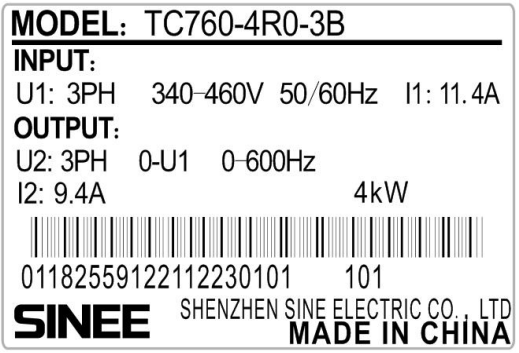
Warning
● **Never install the inverter damaged or with some parts missing.** Otherwise, injuries may be caused.

When you receive the product, please check it against the table below.

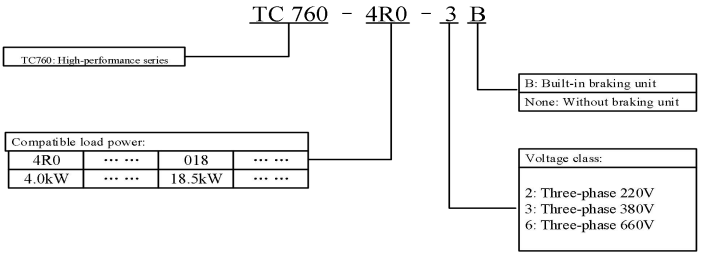
Item to be confirmed	Confirming methods
Check whether the product is consistent with the order.	Check the nameplate on the side face of the inverter.
Check whether any part is damaged.	Check the overall appearance for damage caused in transportation.
Check whether the fastened parts (e.g. screws) are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

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

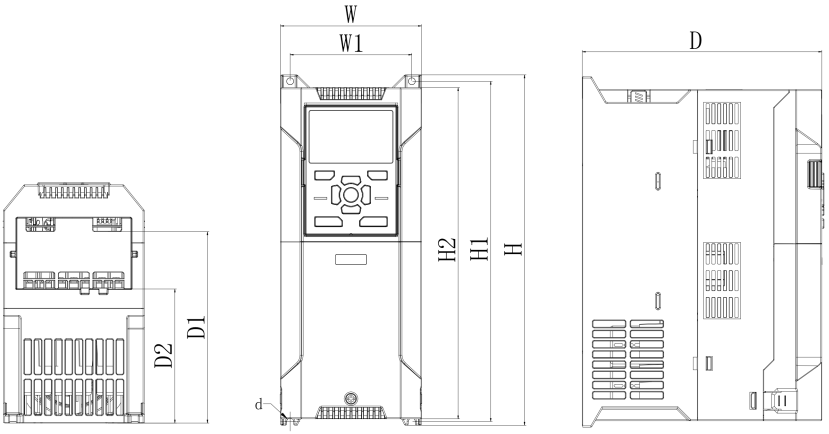
- **Nameplate**



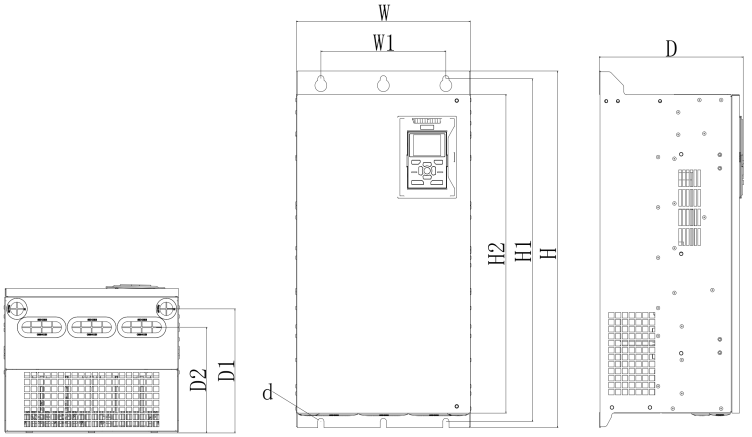
- **Description of inverter model**



2.2 Outline and Installation Dimensions



(a) Appearance of 4kW to 22kW inverters



(b) Appearance of 30kW to 75kW inverters

Fig. 2-1 Overall dimensions of TC760 Series Keyboard and Inverter

Table 2-1 Outer and installation dimensions of TC760 inverters

Specifications	W	W1	H	H1	H2	D	D1	D2	d	Appearance
TC760-4R0-3B	95	82	230	222	218	171	132	96	4.5	(b)
TC760-5R5-3B	110	95	275	267	260	187	146	105	5.5	
TC760-7R5-3B										
TC760-011-3B	140	124	297	289	280	207	163	120	5.5	
TC760-015-3B										
TC760-018-3B	190	171	350	340	330	220	173	128	7	
TC760-022-3B										
TC760-030-3B	254	200	484	465	440	221	180.5	158	9.5	(c)
TC760-037-3B										
TC760-045-3B	304	240	548	524	480	266	225	193	9.5	
TC760-055-3B										
TC760-075-3B	324	230	635	613	570	264	223	190	11.5	
TC760-090-3	339	270	621	600	578	296	243	243	11.5	
TC760-110-3										
TC760-132-3	422	320	786	758	706	335	270	256	11.5	
TC760-160-3										
TC760-200-3	441	320	1025	989	942	358	/	285	11.5	
TC760-220-3										
TC760-250-3	560	450	1204	1171	1100	404	/	333	13	
TC760-280-3										
TC760-315-3	660	443	1597	1567	1504	434	375.5	323.5	13	
TC760-355-3										
TC760-400-3										

2.3 Installation Direction and Space

The TC760 inverters are equipped with cooling fans 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.

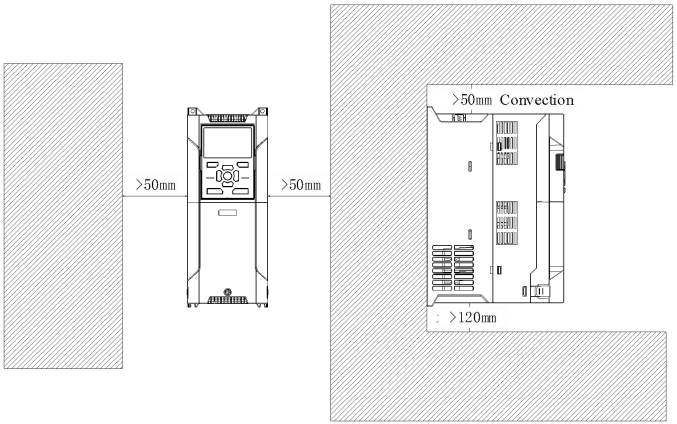


Fig.2-2 Inverter installation direction and space

Installation site

The installation site should meet the following conditions:

- The room is well ventilated.
- The ambient temperature is -10°C~40°C.
- The controller should be free from high temperature and humidity (less than 90% RH) or rainwater and other liquid droplets.
- Please install the inverter on a fire-retardant object (e.g. metal). Never install it on flammable objects (e.g. wood).
- No direct sunlight.
- No flammable or corrosive gas and liquid, dust, oily dust, floating fibers or conductive dust.
- The installation foundation should be secured and vibration-free.
- Avoid electromagnetic interference and keep the controller away from interference sources.

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 Panel removal and installation

Wiring of the main circuit, control circuit and expansion card for the TC760 Series requires removal of the top cover. When wiring is completed, install the wiring ducts and top cover in the reverse order of removal.

（1） 4-22kW panel removal of TC760 series

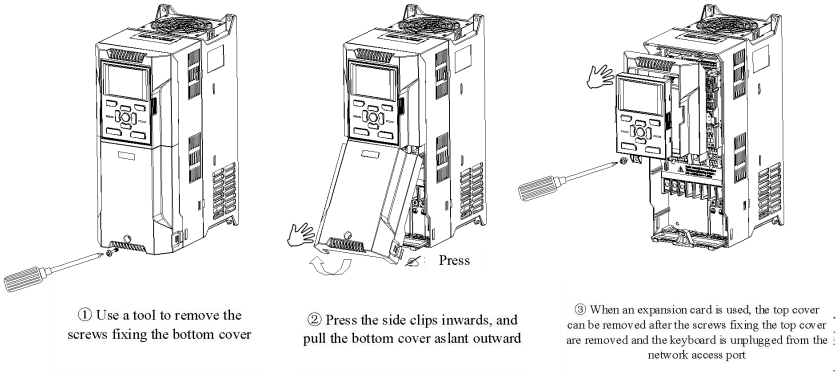


Fig. 2-3 4-22kW panel removal diagram

(2) 30-160kW panel removal of TC760 series

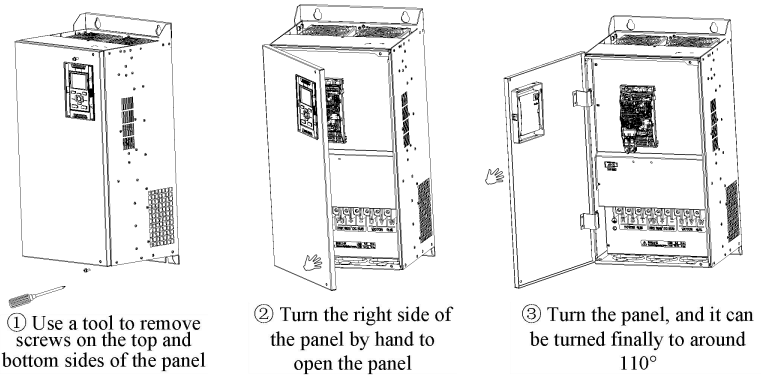


Fig. 2-4 30-160kW panel removal diagram

2.5 Through-wall installation

TC760 4~160kW support through-wall installation, which can realize dissipating 70% of the total heat generated out of the device (cabinet), so as to reduce heat accumulation. Besides, through-wall installation may also prevent entry of wood chips, paper scraps, dust, metal dust and other debris into the inverter and improve reliability of the inverter.

The bracket for through-wall installation is available as an optional part for purchase. If it is needed, please contact us.

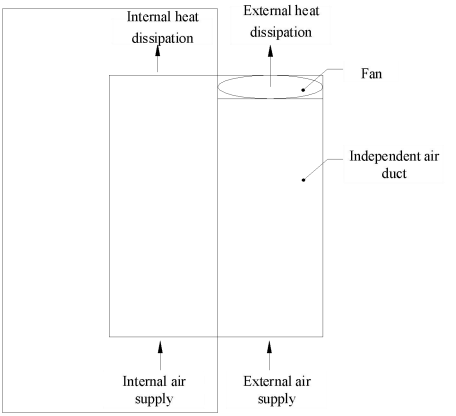


Fig. 2-5 Through-wall installation

Table 2-2 Number of screws and opening dimension for TC760 series 4-160kW through-wall installation

Frequency converter model	Bracket installation screws	Through-wall installation screws	Opening size (LxW)
TC760-4R0-3B	2×M4	6×M6	235mm×100mm
TC760-5R5~7R5-3B	2×M4	6×M6	280mm×115mm
TC760-011~015-3B	2×M4	6×M6	300mm×145mm
TC760-018~022-3B	4×M4	6×M6	355mm×195mm
TC760-030~037-3/3B	14×M5	6×M8	500mm×265mm
TC760-045~055-3/3B	14×M5	6×M8	550mm×320mm
TC760-075-3/3B	14×M5	6×M10	645mm×340mm
TC760-090~110-3	14×M5	6×M10	630mm×350mm
TC760-132~160-3	13×M6	6×M10	715mm×440mm

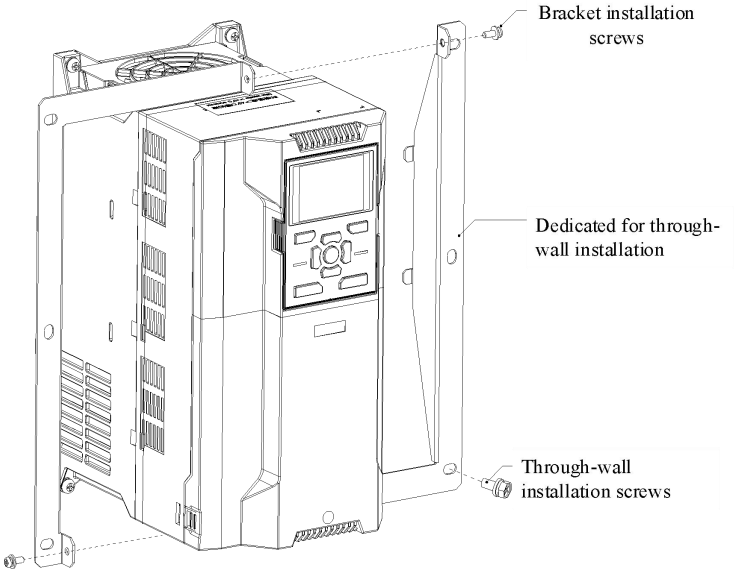


Fig. 2-6 Through-wall installation diagram of 4~22kW

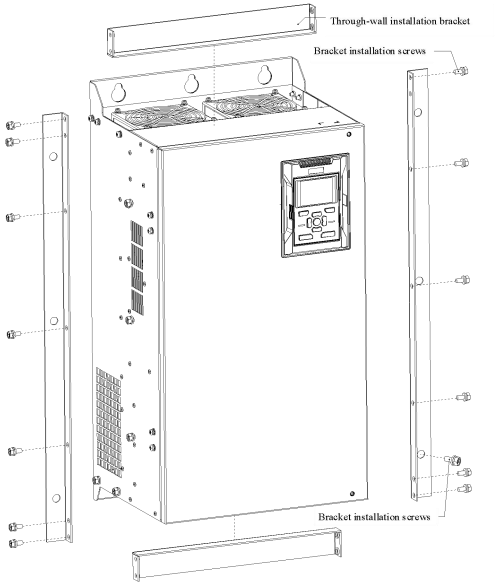


Fig. 2-7 Through-wall installation diagram of 30~110kW

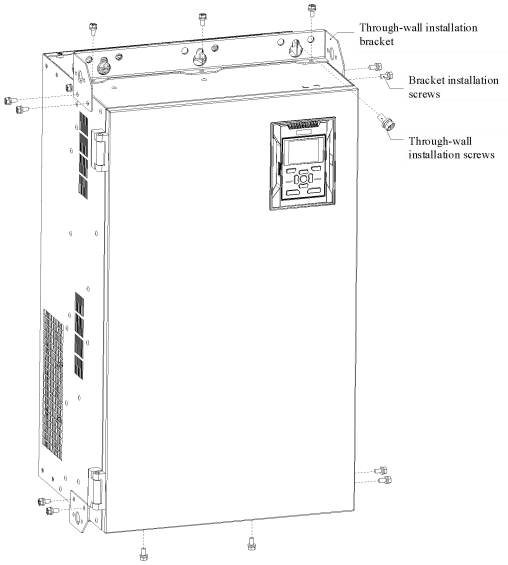


Fig. 2-8 Through-wall installation diagram of 132~160kW

Chapter 3 Connection

3.1 Connection of Peripheral Device

The standard connection between the TC760 series inverter and peripheral devices is shown in Fig 3-1.

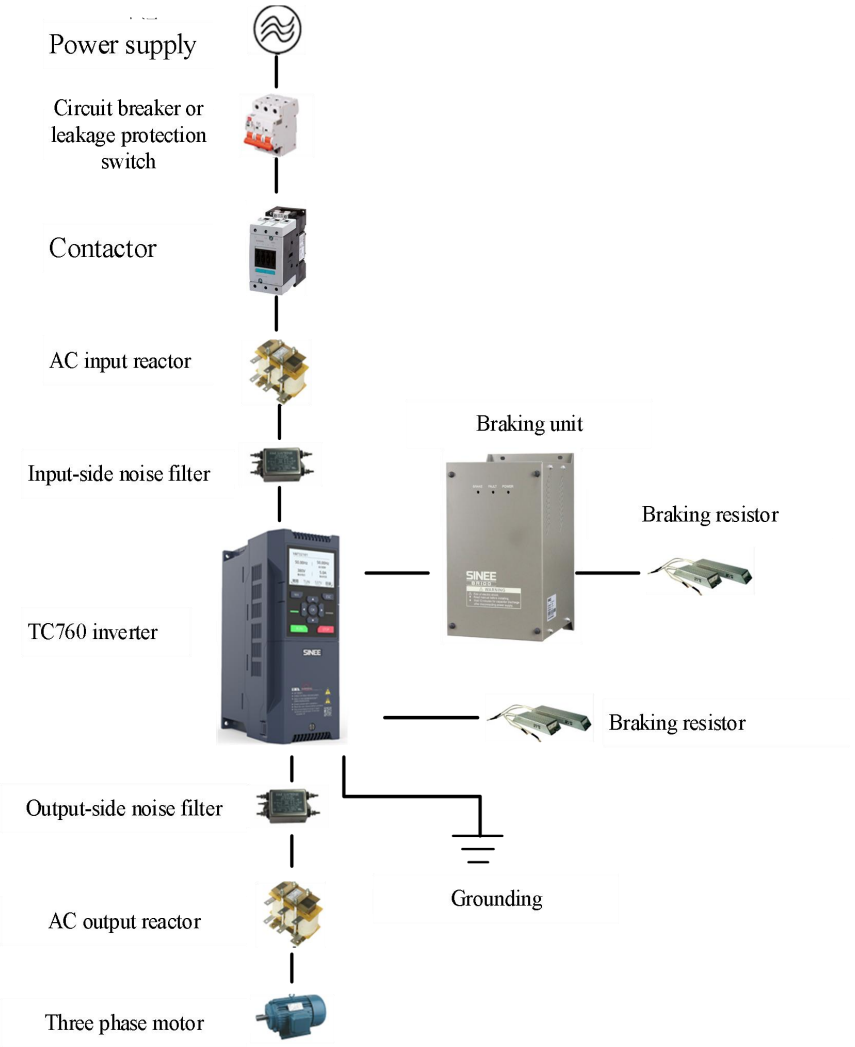
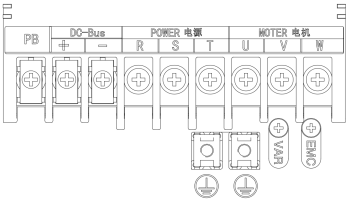


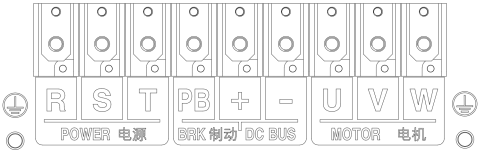
Fig. 3-1 Connection of Inverter and Peripheral Devices

3.2 Wiring of Main Circuit Terminals

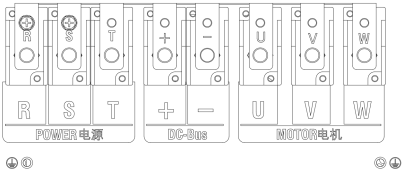
3.2.1 Composition of Main Circuit Terminals



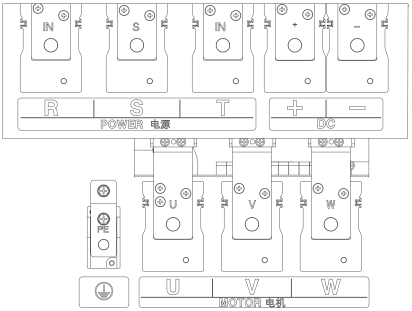
(a) 4-22kW main circuit terminal



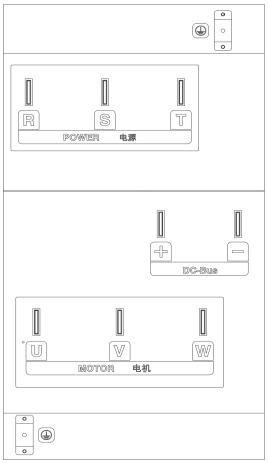
(b) 30-75kW main circuit terminal (the series have no PB terminal)



(c) 90-110kW main circuit terminal



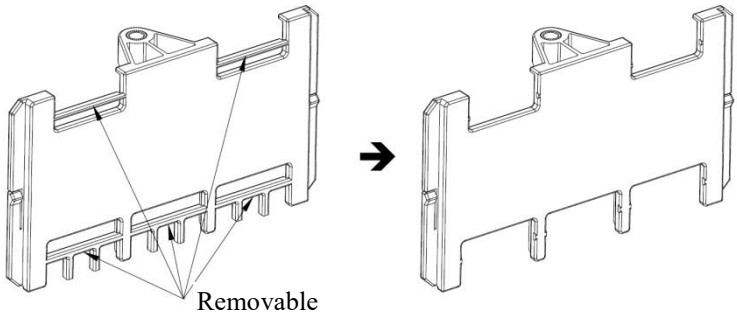
(d) 132-220kW main circuit terminal



(e) 250-400kW main power terminal

Figure 3-2 Schematic Diagram of Main Circuit Terminal Layout

As shown in Fig. 3-3, wiring of 4~22kW inverters may be conducted with the gate on the cable



protector removed in case of a larged-sized cable.

Fig. 3-3 Cable protector

3.2.2 Functions of Main Circuit Terminals

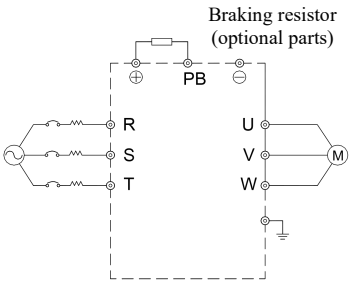
Table 3-1 Functions of Main Circuit Terminals

Terminal label	Function description
R, S, T	AC power input terminal, connected to three-phase AC power supply
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 th other end to PB
⏚	Grounding terminal, connected to earth

Standard wiring diagram of main circuit of TC760 series inverter

See Figure 3-4

- TC760-4R0-3B~TC760-075-3B



TC760-090-3~TC760-400-3

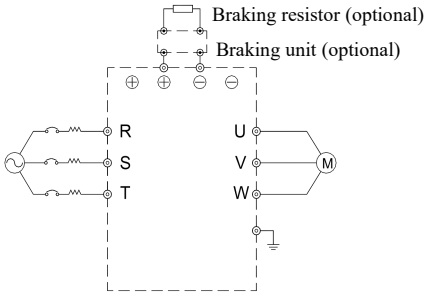


Fig. 3-4 Standard wiring of the main circuit

Input side wiring of main circuit

Measures against interference

The working principle of the inverter determines that it will cause external interference. Please configure the peripheral devices of the inverter as shown in Figure 3-1. Install the filter and inverter on the same iron plate, and shield the inverter and its peripheral device with iron boxes to reduce external interference. Refer to Figure 3-4 for the wiring requirements. For more detailed measures to reduce external interference, refer to the User's Manual of TC760 Inverter.

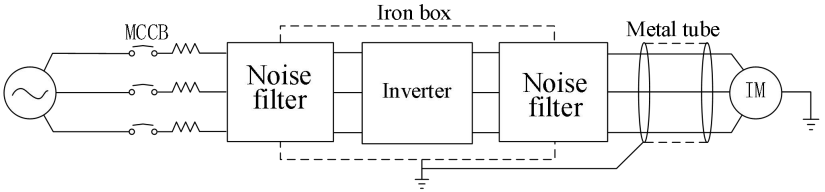


Figure 3-5 Measures for Reduction of External Interference

Cable and screw dimensions of main circuit

For cable size and terminal screw specifications, refer to the user manual for TC760.

Installation and wiring of braking resistor and braking unit

For dynamic braking during operation, it is required to select a braking resistor and a braking unit following Chapter 8.

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 Terminals

3.3.1 Composition of Control Circuit Terminals

The layout of control circuit terminals is shown in Figure 3-6.

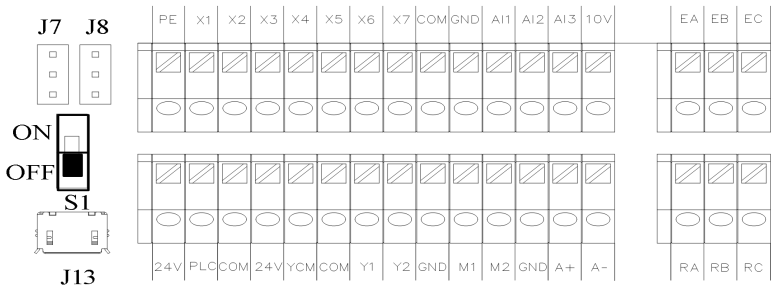


Figure 3-6 Layout of Control Circuit Terminals

3.3.2 Function and Wiring of Control Circuit Terminal

Functions of control circuit terminals are shown in the table 3-3.

Table 3-3 Functions of control circuit terminals

Category	Terminal label	Terminal name	Terminal function description
Auxiliary power supply	10V-GND	+10V power supply	Supply +10V power to external devices. Maximum output current: 20mA
	24V-COM	+24V power supply	Supply +24V power to external devices. It is usually used as the working power supply for digital input and output terminals and also the power supply for external devices. Maximum output current: 200mA
	PLC	Multi-functional common input terminal	Delivery with default connection to 24V When an external power source drives the digital input terminal, it is required to disconnect the 24V terminal and connect the external power source
Analog input	AI1-GND	Analog input terminal 1	Input voltage range: DC 0-10V Input impedance: 1MΩ
	AI2-GND	Analog input terminal 2	Input range: DC 0~10V/0~20mA. The voltage/current mode is selected via switch S4 on the terminal panel. Input impedance: 1MΩ in the voltage mode and 250Ω in the current mode
	AI3-GND	Analog input terminal 3	Input range: DC 0~10V/0~20mA. The voltage/current mode is selected via switch S5 on the terminal panel. Input impedance: 1MΩ in the voltage mode and 250Ω in the current mode
Digital input port	X1-COM	Multi-function input terminal 1	Optocoupler isolation, compatible with NPN and PNP bipolar input Input impedance: 4.5 kΩ Input voltage range: 9~30V
	X2-COM	Multi-function input terminal 2	
	X3-COM	Multi-function input terminal 3	
	X4-COM	Multi-function input terminal 4	
	X5-COM	Multi-function input terminal 5	
	X6-COM	Multi-function input terminal 6	
	X7-COM	High-speed pulse input terminal	Apart from using as a multi-functional input terminal, it can also be used as a high-speed pulse input terminal; the maximum response frequency: 100kHz Input voltage: 12~48V Input impedance: 1 kΩ
Analog output	M1-GND	Analog output terminal 1	Output range: DC 0~10V/0~20mA. The mode is selected via switch S2 on the terminal panel.
	M2-GND	Analog output terminal 2	Output range: DC 0~10V/0~20mA. The mode is selected via switch S3 on the terminal panel.
Multi-function output	Y1-COM	Open output terminal of collector	Optocoupler isolation, open output of the collector Maximum output voltage: DC48V Output current: 50mA
	Y2-COM	High-speed pulse output terminal	Optocoupler isolation, open output of the collector Maximum output voltage: DC48V Maximum output current: 50mA As a high-speed pulse output, the maximum output frequency is: 100kHz

			Output impedance<5 kΩ
Relay output	R1: EA-EB-EC	Relay output terminal	EA-EC: Normally open EB-EC: Normally closed
	R2: RA-RB-RC		RA-RC: Normally open RB-RC: Normally closed
Communication	A+	RS-485 communication terminal	positive terminal of 485 differential signal
	A-		negative terminal of 485 differential signal
Shield	PE	Shield earthing	Used for earthing of the terminal wiring shielding layer

3.4 Wiring of Analog Input Terminals

Wiring of AI1, AI2 and AI3 terminals with analog voltage signal:

When terminals AI2 and AI3 have analog voltage signal input, switches S4 and S5 on the terminal block are set to the voltage mode as shown in the figure:

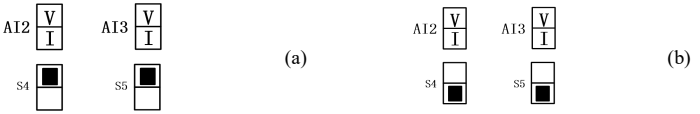
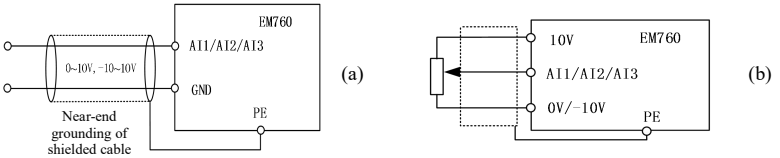


Figure 3-6 Wiring Diagram of Multi-function Input Terminals

When the analog voltage input signal is powered by an external power source, wiring of AI1, AI2 and AI3 are performed as shown in the following figure (a).

When the analog voltage input signal is a potentiometer, the wiring of AI1, AI2 and AI3 terminals is as shown in Figure (b).

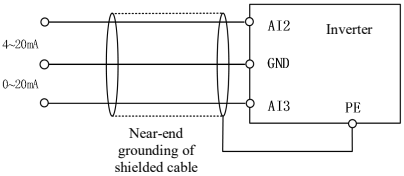
When AI2 and AI3 have analog current signal input, S4 and S5 on the terminal block are set to the current mode.



Wiring of AI2 and AI3 terminals with analog current signal input:

When AI2 and AI3 have analog current signal input, S4 and S5 on the terminal block are set to the current mode, as shown in Fig. (b) 3-6.

The wiring diagram of AI2 and AI3 terminals is shown below:

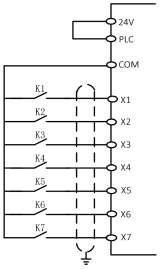


Wiring of multi-function input terminal

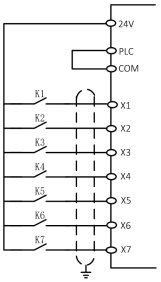
The multi-functional input terminal of the TC760 inverter has a full-bridge rectifier circuit. The PLC

terminal is a common terminal of X1 to X7, through which the current may be forward (NPN mode) or reverse (PNP mode). Thus, the external connection of the terminals X1 to X7 is flexible. Typical wiring is shown in Figure 3-7.

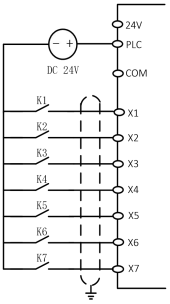
A. Use of internal power supply (+ 24Vd) in NPN mode



B. Use of internal power supply (+ 24Vdc) in PNP mode



C. Use of external power supply in NPN mode



D. Use of external power supply in PNP mode

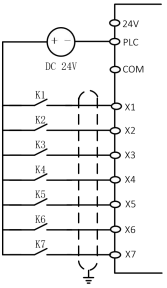
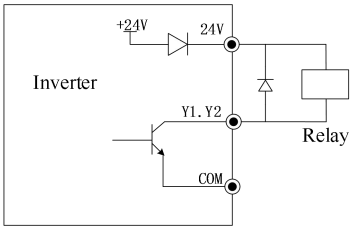


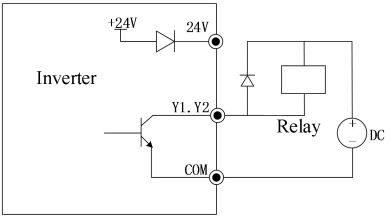
Figure 3-7 Wiring Diagram of Multi-function Input Terminals

Note: When an external power supply is used, remove the short circuit sheet between the 24V power supply and PLC terminal.

Wiring of multi-function output terminals

The multi-function output terminals Y1 and Y2 can be powered on by the internal 24V power supply of the inverter or an external power supply, as shown in Fig. 3-8:





a: Use of internal power supply b: Use of external power supply

Fig. 3-8 Wiring of Multi-function Output Terminals

Note: The relay wire package must include anti-parallel diodes. The components of the absorption circuit should be installed close to both ends of the relay or contactor coil.

Wiring of analog output terminals

The analog output terminals (M1 and M2) are connected with external analog meters to represent physical quantities. The outputs of toggle switches are 0-20mA or 0-10V.

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, as shown in Fig. 3-9 and Fig. 3-10.

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

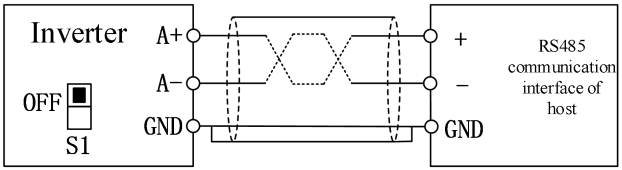


Fig. 3-9 Communication Terminal Wiring of Single Inverter

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

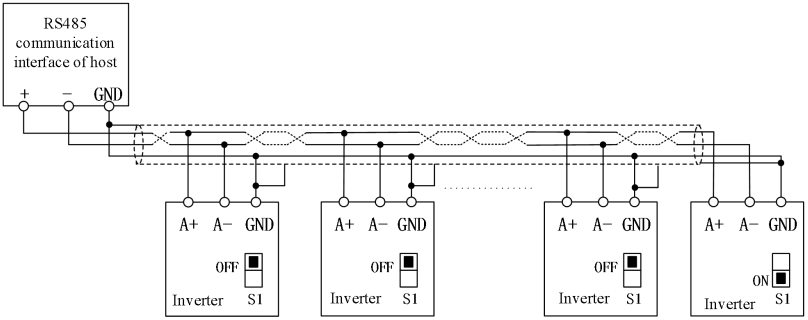


Fig. 3-10 Wiring of Communication Terminals of Multiple Inverters

Standard Wiring Diagram of Control Circuit

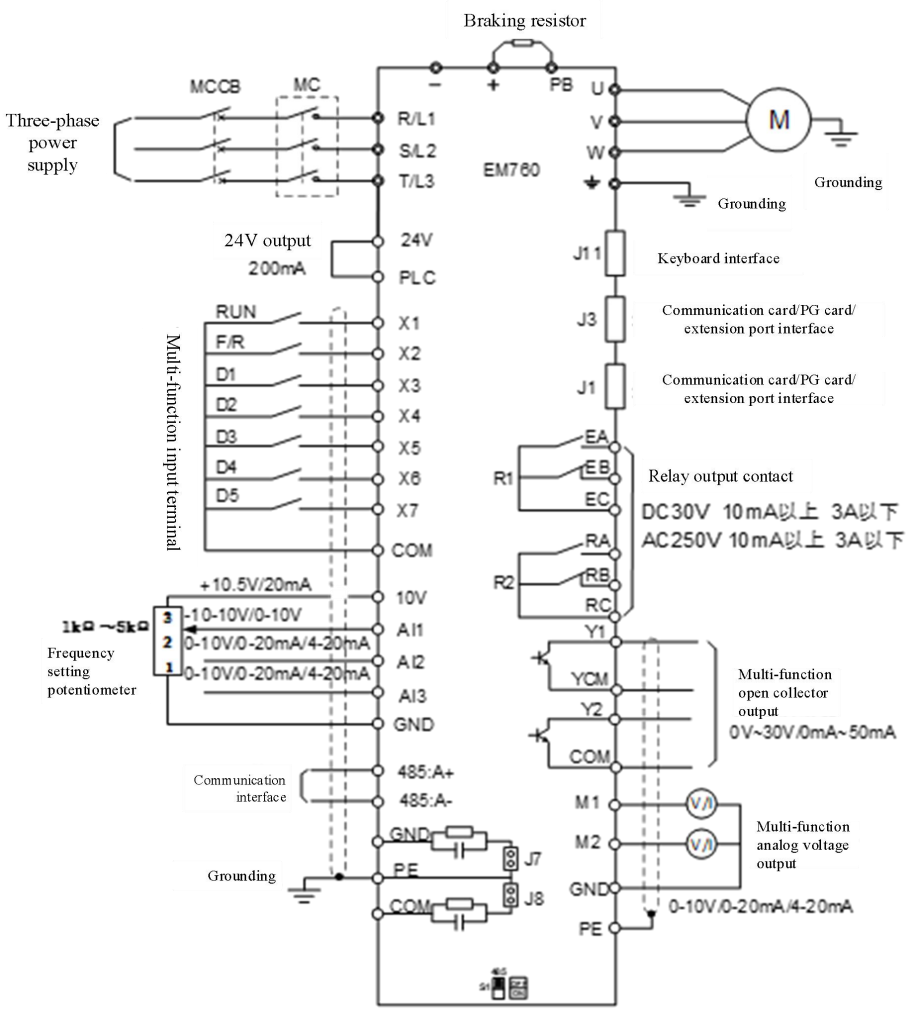


Fig. 3-11 Standard Wiring Diagram of Control Circuit

Extension wiring of keyboard

1) The external keyboard port is an RJ45 port, with an ordinary network cable (plug connection according to EIA/TIA568B) used as the extension line.
2) Connect RJ45 port of the keyboard to RJ45 port on the keyboard mounting plate by using a network cable.
3) The keyboard extension cable should be no longer than 30m. The extension cable may extend up to 50m if Cat5E wire is used in case of sound electromagnetic environments.

Chapter 4 Keyboard Operation

4.1 Keyboard Functions

Structure of LCD keyboard

The LED keyboard of TC760 series inverter consists of an LCD display, nine operation keys, and two status indicators.

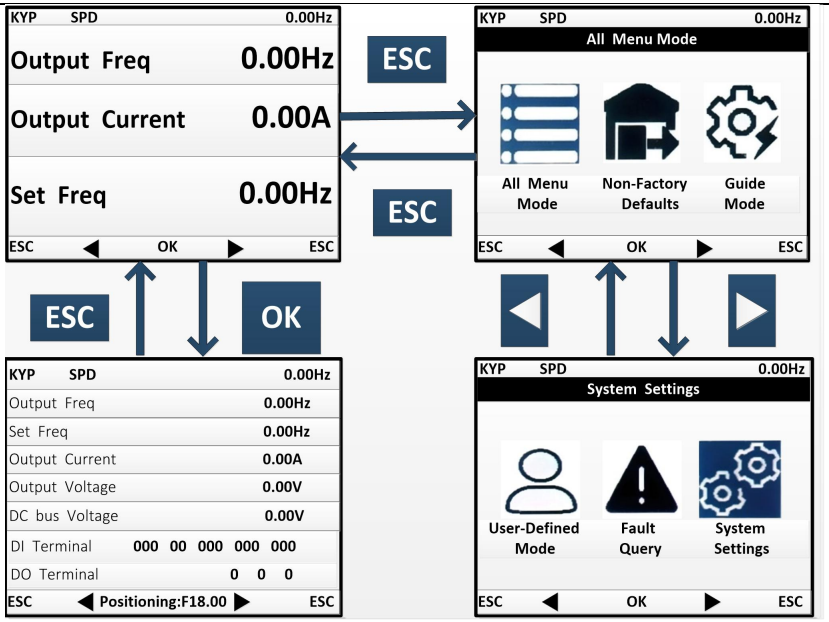
Users can perform parameter setting, status monitoring and start/stop of the inverter via the keyboard.

4.2 LCD Keyboard Operation

The LCD keyboard menu is divided into monitoring (Level 0), menu mode selection (Level 1), the function code selection (Level 2) and the detailed function code (Level 3) from low to high. The menu levels are represented by numbers in subsequent text of this manual.

Menu mode selection has 6 options: **full menu mode** displays all function codes; **user-defined mode** displays only function codes of user group F11; **non-default mode** displays only the function codes that differ from the default settings; **fault query** allows the user to view the latest three fault records saved; **guide mode** allows setting motor parameters-related function codes in order for self-learning operation; **system setting** allows setting the brightness, backlight time, language and view of the software version

When the keyboard is powered on, it shows the level 1 menu, i.e. the monitoring interface (main monitor), by default. On the monitoring interface (main monitor) press the LEFT key ◀ to switch the function code displayed in the second line and press the RIGHT key ▶ to switch the function code displayed in the third line; the function codes for switching is set by using F12.33-F12.37; in the level 1 menu, press the ESC key ESC to enter level 0 menu; in the level 0 menu, use the LEFT key ◀ and the RIGHT key ▶ to select a different menu mode. In the level 0 menu, press the ESC key ESC to go back to the main monitoring interface of level 1 menu. The procedure for menu mode selection is shown in the figure below.



Full menu mode

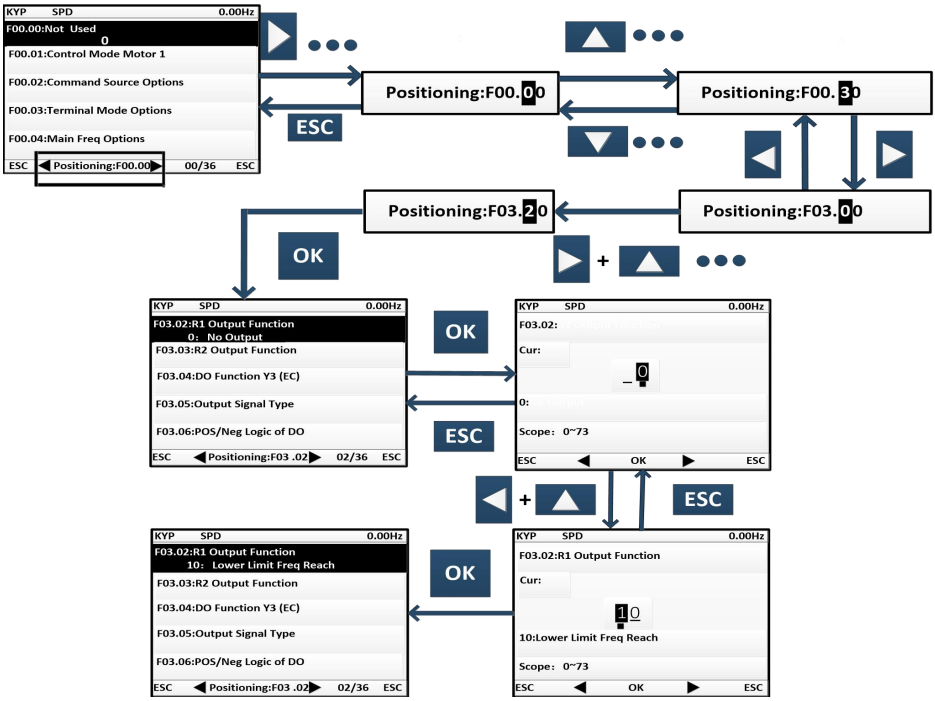
In the full menu mode, press the ENTER key OK to enter the Level 2 menu and select any function code. Then press the ENTER key OK to enter the Level 3 menu and view or modify the function code. Except for a few special ones, the function codes needed by general users can be modified.

In all menu modes, the user needs to press the ENTER key OK to save parameter modifications.

In the Level 3 menu, press the ESC key ESC to abandon parameter modifications: if the function code is equal to the unmodified value, directly exit the Level 3 menu and go back to the Level 2 menu; otherwise, the unmodified value will be restored and displayed, and the user can press the ESC key ESC to exit the Level 3 menu and go back to the Level 2 menu.)

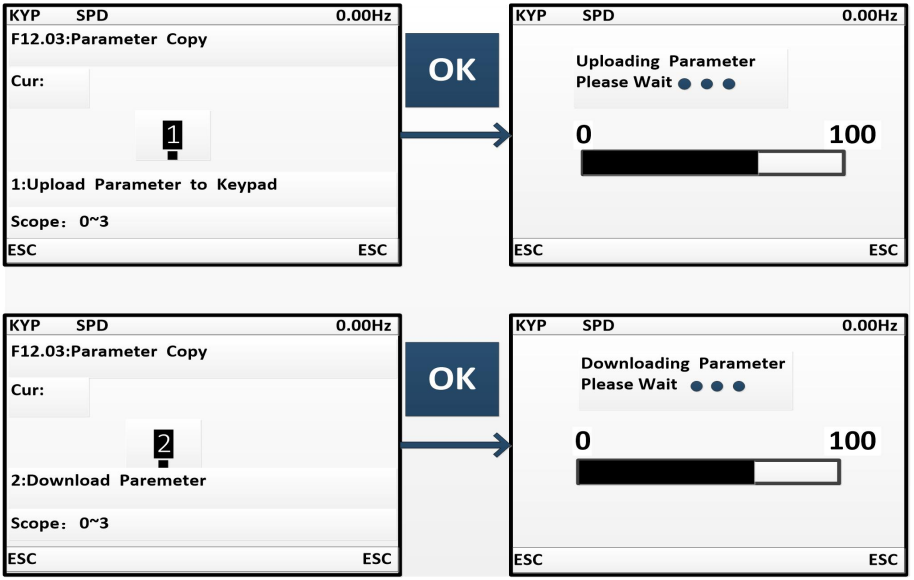
Quick positioning function: The full menu mode displays all groups of function codes and quick positioning can facilitate operations. To locate a function code, it is only required to set the function code to display and press the ENTER key OK to display the function code.

The process of changing the value of the function code F03.02 to 10 from the initial status upon power-on in the full menu mode is shown in the following figure. In level 2 menu, the number of function code groups can be known through the function code progress indication. As shown in the following figure, 02/36 means group F03 consists of 36 function codes, and the cursor is currently located at F03.02.



4.3 Parameter copying

For convenient parameter setting between inverters using the same function parameters, the keyboard is provided with parameter uploading and downloading functions. When function code F12.03 is set to 1 and ENTER is pressed OK for confirmation, inverter-related parameters will be uploaded to the keyboard; upon uploading, the keyboard shows the progress; when uploading is completed, the value of the function code will automatically change to 0. The keyboard with uploading completed may be inserted into another inverter that needs to use the same parameters. Once the keyboard is inserted, you may change the value of the function code F12.03 to 2 and download the parameters to the inverter. If you set the value of the function code to 3, motor parameters will be downloaded in addition to normal parameters. Upon downloading, the keyboard will show the progress. Similarly, upon completion of parameter downloading, the value of the function code will automatically change to 0.



It shall be particularly noted that:

1. No keyboard can be used for parameter downloading before it undergoes parameter uploading, as unknown parameters in the keyboard without parameter uploading may cause failure of an inverter by disturbing existing parameters in the inverter. If a keyboard is used for parameter downloading without parameter uploading, it will prompt presence of no parameter in the keyboard, suggesting parameter downloading is unsuccessful; press ECS to exit; perform uploading again before downloading.
2. For parameter downloading to an inverter with a different version of CPUS software, the keyboard will prompt whether to continue downloading regardless of the different version; at this time, it is required to make clear whether parameter downloading is permitted between the two different versions. If yes, press ENTER key OK to execute the downloading; if no, press ESC to cancel the current operation. Be cautioned that parameter uploading and downloading between two inverters with incompatible parameters are likely to cause operation failure of the inverters.

4.4 Run/Stop

After setting the parameters, press the RUN key RUN to enable the normal operation of the inverter, and the STOP key STOP to stop the inverter. The M.K M.K can be defined to free parking or to stopping inverter operation by changing the function code F12.00 to 5.

When function code F01.34 is set to corresponding self-learning mode, it is required to press RUN RUN so that the inverter can enter corresponding parameter identification status; upon parameter identification, it will show "TUNE"; when identification is done, it will return to the original display, and the function code F01.34 will automatically change to 0. Upon rotation parameter identification by the inverter, the motor may rotate; in emergent cases, the user may press STOP STOP to cancel identification.

Chapter 5 Commissioning

5.1 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. 3-4 (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.

5.2 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	Description
During normal operation	50.00	The digital setting 50.00Hz is displayed by default.
During a fault	Fault code in character or Exx format	If a fault occurs, the fault code will be displayed. Refer to Chapter 6 “Fault Solutions”.

5.3 Start and Stop Control

Function code	Function code name	Parameter description	Default setting	Attribute
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	○

F00.02=0: keyboard control (LOC/REM indicator ON)

The start and stop of the inverter are controlled by the RUN key, STOP key and multi-function key M.K on the keyboard. In the case of no fault, press the multi-function key M.K to enter the jog running status, and 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 (LOC/REM indicator OFF)

The inverter start and stop are controlled by the start and stop control terminals defined by the function code F02.00 to F02.06. Terminal control is dependent on F00.03.

F00.02=2: Communication control (LOC/REM indicator flickering)

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 from the current rotation frequency of the motor, following the speed tracking (size and direction).

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.

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.

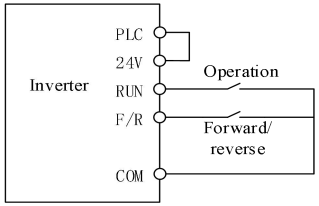
Two-line control:

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

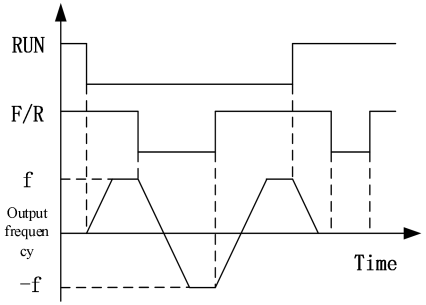
Enable/Disable the terminal RUN to control the start and stop of the inverter, and the terminal F/R to control the forward/reverse running. If F00.21 is set to 1 and reverse running is disabled, the F/R terminal will not be available. When the mode of deceleration to stop is selected, the logic diagram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

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

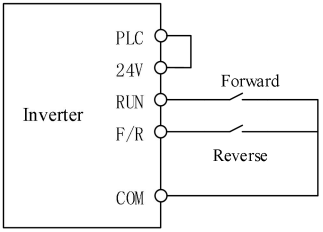
Enable/Disable the terminal RUN to control the forward running and stop of the inverter, and the terminal F/R to control the reverse running and stop. When the terminals RUN and F/R are enabled simultaneously, the inverter will be stopped. If reverse running is disabled, the terminal F/R will not be available. When the mode of deceleration to stop is selected, the logic of forward/reverse running is as shown in Fig. 5-1 (d);



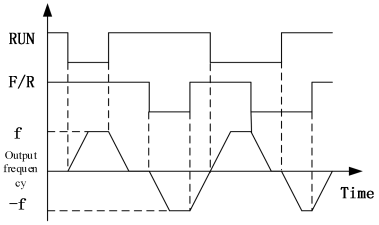
(a) Wiring diagram of two-line control (F00.03=0)



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



(c) Wiring diagram of two-line control (F00.03=1)



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

Fig. 5-1 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 STOP 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.

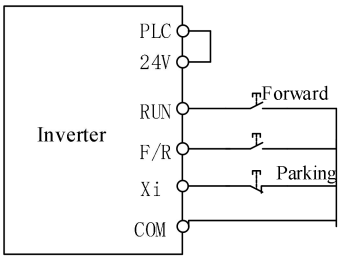
Three-line control:

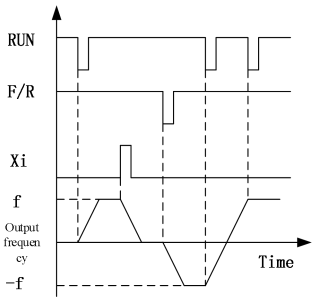
F00.03=2: the terminal RUN controls forward running, the terminal Xi is for stop, and the terminal F/R is in the reverse status.

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. 5-2(b). Xi is the terminal among X1~X7, which is defined by F02.00~F02.06 for “three-line running and stop control”;

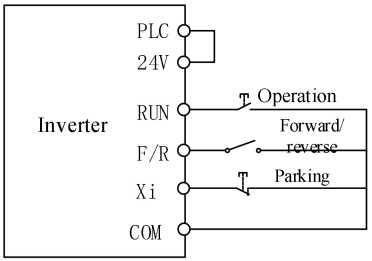
F00.03=3: the terminal RUN is for running, Xi for stop and F/R for forward/reverse control.

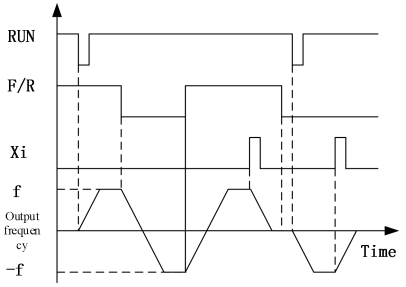
The terminal RUN is normally ON for running, with the valid pulse edge, F/R for forward/reverse switching (forward in the OFF status and reverse in the ON status), and Xi is normally OFF for stop, with the valid level. In the case of deceleration to stop (F04.19=0), the logic diagram is as shown in Fig.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





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





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

Fig. 5-2 Three-line control

5.4 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.

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).
- Correctly enter the motor nameplate parameters and encoder parameters (if closed-loop vector control is required, the encoder parameters shall be set).

Motor/encoder	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~F14.06: same as defined above
Encoder parameters	F01.24 Encoder type; F01.25 Encoder line count; F01.27 AB pulse phase sequence

- For the asynchronous motor:

  Set F01.34=1 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.

5.5 Closed-loop vector adjustment procedures

- Set the command source of the inverter to keyboard control and the frequency source to digital frequency F00.07 (F00.07=5.00Hz); set F12.00 M.K multi-functional key to option: 3 (Forward/Reverse switching); drive control mode of motor F00.01: 0 (VVF).
- Press "RUN" on the keyboard to run the inverter; check F18.02 (PG feedback frequency) - it should fluctuate around 5.00Hz after stabilization, and the running direction indicator on the keyboard is off; then press M.K to make the inverter run reversely, and after stabilization the feedback frequency should fluctuate around 5.00Hz, while the running direction indicator on the keyboard is on. Afterwards, set F00.07 to 10.00Hz, 25.00Hz and 50.00Hz successively (make sure it is safe and technologically allowed!) Repeat the above operations. If all goes normal, it means the PG card and encoder are properly wired and set.
- If the motor rotation direction is opposite to the actual direction, please exchange any pair of motor lines; if the feedback frequency direction of the encoder is opposite to the actual direction, please exchange the encoder phase A and B wiring on the PG card; if the feedback frequency value is incorrect, please check F01.25 encoder line count.
- Set the drive control mode of motor F00.01 to: 2 (FVC) to complete closed-loop commissioning.

5.6 Brake control logic

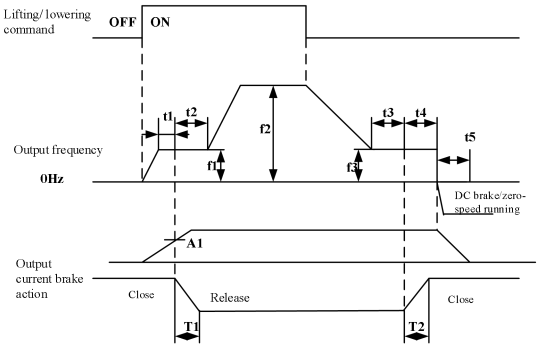


Fig. 5-3 Brake control logic

t1: Delay before F20.07 brake release t2: Delay after F20.08 brake release

t3: Delay before F20.12 brake closing t4: Delay after F20.13 brake closing

t5: DC braking time/zero-speed running time for F04.22 parking

f1: Brake release frequency upon F20.05 lifting/brake release frequency upon F20.06 lowering

f2: Normal given running speed

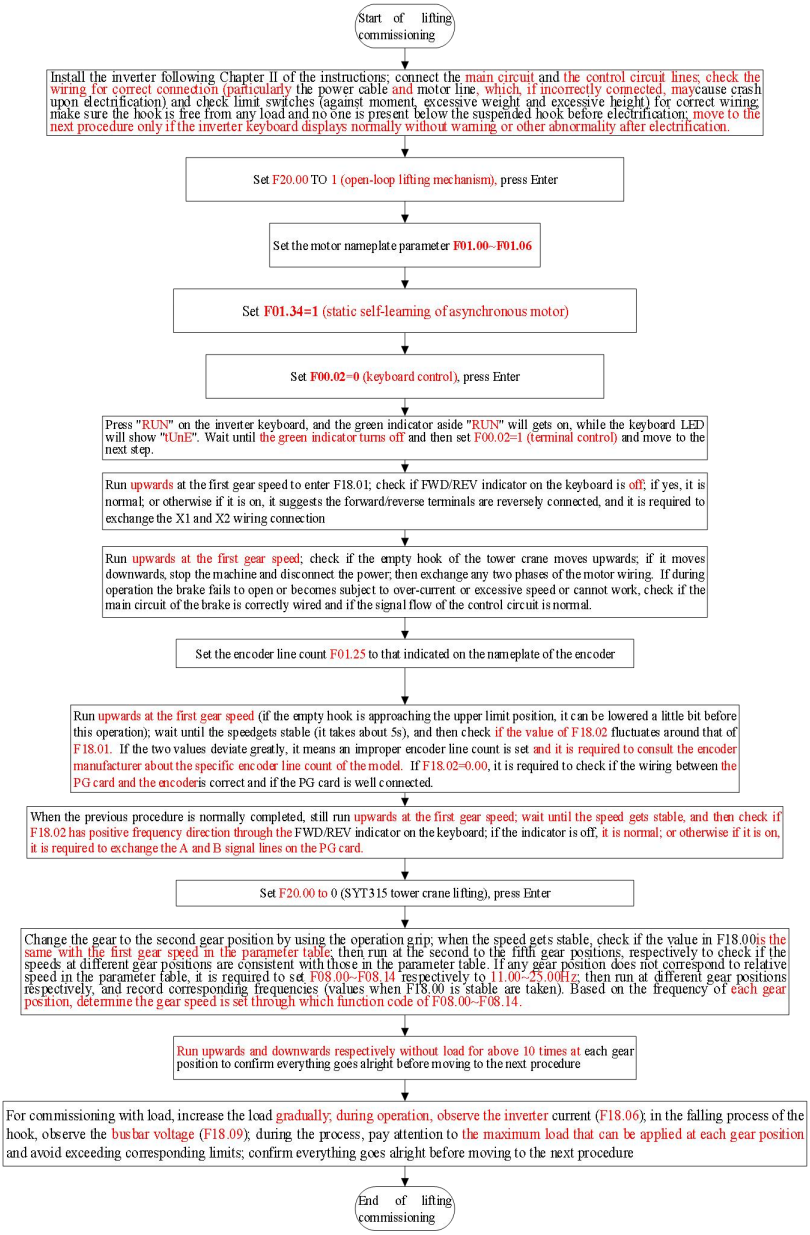
f3: Brake closing frequency upon F20.10 lifting/brake closing frequency upon F20.11 lowering

A1: F20.04 brake release current

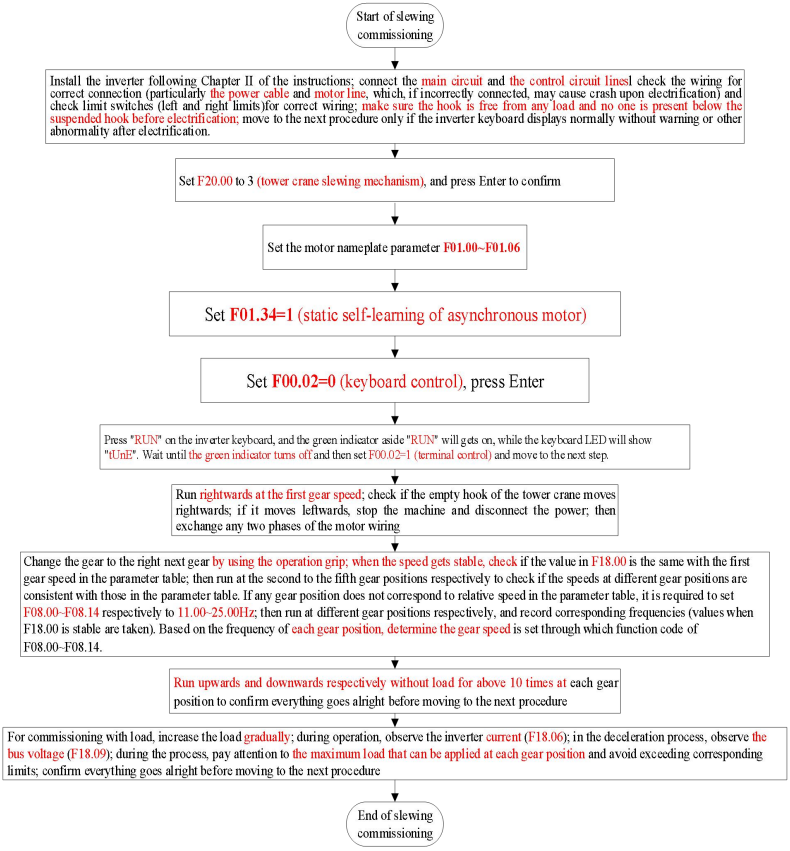
T1: Time required for brake to get fully open T2: Time required for brake to get fully closed

TC760 control brake opens and closes following a proper time sequence for the above time sequence control brake.

5.7 Closed-loop vector adjustment instructions (in case of tower crane closed-loop lifting)



5.8 Open-loop commissioning (in case of tower crane slewing mechanism)



5.9 Ant speed positioning

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F20.51	Selection of low-speed running mode	0: Run at the given frequency multiplied by gain 1: Run at the given frequency minus bias 2: Run at maximum frequency multiplied by gain		0	○
F20.52	Frequency minus gain	0~1000	%	100.0	●

F20.53	Frequency minus bias	0.00~600.00	Hz	0.00	●
F20.54	Selection of frequency reduction rate	0~2		1	○

1. Multiplication: When the ultra-low-speed terminal (No. 172 function) is enabled and the ultra-low-speed running mode is set to “Frequency minus gain” (F20.51=0), the new set frequency will be the product of the original set frequency multiplied by the “set value of frequency minus gain”, which will be the output frequency of the inverter. If the calculated frequency is less than the brake release frequency, the latter will prevail. The inverter will run at the brake release frequency. If the “set value of frequency minus gain” is 0, the inverter will run at the normal set frequency instead of ultra-low-speed running.

2. Subtraction: When the ultra-low-speed terminal (No. 172 function) is enabled and the ultra-low-speed running mode is set to “Frequency minus bias” (F20.51=1), the new set frequency will be the difference of the original set frequency minus the “set value of frequency minus bias”, which will be the output frequency of the inverter. If the calculated frequency is less than the brake release frequency or negative value, the latter will prevail. The inverter will run at the brake release frequency.

3. Multiplication based on the maximum frequency: When the ultra-low-speed terminal (No. 172 function) is enabled and the ultra-low-speed running mode is set to “Frequency minus bias” (F20.51=2), the original set frequency = F20.52 (frequency minus gain) * maximum frequency of motor (F00.16/F14.78), which will be the output frequency of the inverter. If the calculated frequency is less than the brake release frequency, the latter will prevail. The inverter will run at the brake release frequency. If the “set value of frequency minus gain” is 0, the inverter will run at the normal set frequency instead of ultra-low-speed running.

4. If F20.54 “Selection of frequency minus rate” is set to 1, and the ultra-low-speed terminal is enabled, the acceleration and deceleration time will change to the set time of F00.14 and F00.15, and the function of acceleration and deceleration time change with levels (F20.18), the special acceleration (F21.21) and deceleration (F21.22) and the deceleration time of reducer switch optimization (F21.38) will be unavailable.

5. If F20.54 “Selection of frequency minus rate” is set to 1, and the ultra-low-speed terminal is enabled, the acceleration and deceleration time will change to the current set time.

6. If F20.54 “Selection of frequency minus rate” is set to 0, the acceleration and deceleration time will change to the current set time.

7. If No. input terminal function, positioning point shielding, is enabled, the ultra-low-speed running function will be unavailable.

5.10 Introduction to the light load high speed and heavy load low speed functions:

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F21.00	Torque limit for protection against overload	0.0~150.0 (0.0: invalid protection)	%	0.0	●
F21.01	Load detection time	0.0~5.0	s	1.5	●
F21.02	Percentage of load detection frequency	10.0~100.0	%	80.0	●

$f_{detection}$ =motor rated frequency * F21.02; when the inverter output reaches $f_{detection}$, maintain the frequency for the test duration of F21.01. Upon lapse of the duration, the inverter will take the output torque or current detected at the frequency to calculate the maximum frequency that can be reached during the operation. When it is >F21.00 (F21.00 is set to any value other than 0), it means overload has occurred; otherwise it will continue its normal operation.

F21.00 = 0.0 means there is no overload protection.

The light load high speed function refers to that when the given frequency is greater than the motor rated frequency, the inverter will calculate the maximum frequency to be reached based on the current load so as to avoid overload, over-current or other faults as a result of excessive load.

The heavy load low speed function refers to that when the current load is greater than the rated load, the inverter will calculate the maximum frequency to be reached under the heavy duty conditions.

Due to different directions of upward and downward frictions, the rope-loosening torque, allowed torque and heavy-duty torque for upward and downward operations shall be separately set.

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F21.03	Light load high speed multiplier for upward movement	100.0~400.0	%	100.0	○
F21.04	Heavy load high speed multiplier for upward movement	10.0~100.0	%	100.0	○
F21.05	Rope-loosening torque for upward movement	0.0~F21.06	%	0.0	○
F21.06	Allowed load torque for upward movement	F21.05~F21.07	%	100.0	○
F21.07	Heavy load torque for upward	F21.06~250.0	%	100.0	○

	movement				
F21.08	Light load high speed multiplier for downward movement	100.0~400.0	%	100.0	○
F21.09	Heavy load high speed multiplier for downward movement	10.0~100.0	%	100.0	○
F21.10	Rope-loosening torque for downward movement	0.0~F21.11	%	0.0	○
F21.11	Allowed load torque for downward movement	F21.10~F21.12	%	100.0	○
F21.12	Heavy load torque for downward movement	F21.11~250.0	%	100.0	○

Light load high speed:

when the inverter output frequency reaches the detection frequency f_1 (f1 = F21.02 * motor rated frequency), maintain the frequency for t1 (F21.01:load test time). Upon lapse of the duration, test the inverter output torque T (FVC is the output torque, VF is the output current) and use it in the following curve calculation to obtain the allowed target frequency F for the operation. If the given target frequency for the current operation is greater than F, then change the target frequency to F.

Speeds corresponding to different torques are calculated as follows:

When the current torque T < the rope-loosening torque T1, the output frequency F = a (light load high speed multiplier) * motor frequency Fe;

When the current torque T > the allowed load torque T2, the output frequency F = motor frequency Fe;

When the rope-loosening torque T1 < the current torque T < the allowed load torque T2:

The output frequency F = (T2 -T) (a - 1) * Fe/(T2 - T1) + Fe;

Heavy load low speed:

when the inverter output frequency reaches the detection frequency f_1 (f1 = F21.02 * motor rated frequency), maintain the frequency for t1. Upon lapse of the duration, test the inverter output torque T (FVC is the output torque, VF is the output current) and use it in the following curve calculation to obtain the allowed target frequency F for the operation. If the given target frequency for the current operation is greater than F, then change the target frequency to F.

When T2≤T≤T3, and the heavy load low speed multiplier b < 100.0%, the heavy load low speed function can be enabled.

Speeds corresponding to different torques are calculated as follows:

When the current torque T < the allowed load torque T2, the output frequency F = motor frequency Fe;

When the current torque T > the heavy load torque T3, the output frequency F = b (heavy load low speed multiplier) * motor frequency Fe;

When allowed load torque T2 < current torque T < heavy load torque T3:

Output frequency F = Fe -(T-T2) (1-b） Fe / (T3-T2).

Note: In FVC mode, the current torque T = output torque (F18.04); in VF mode, the current torque T = output current (F18.06)/motor rated current.

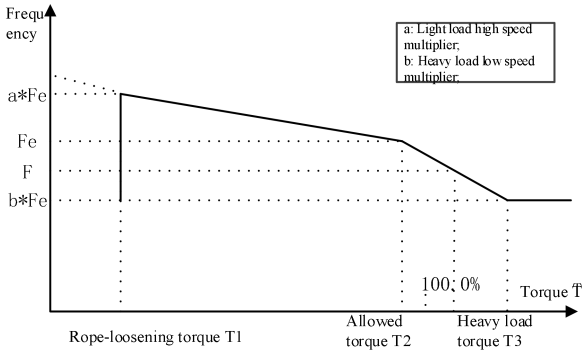


Fig. 5-4 Output torque-frequency curve

5.11 Electrified brake testing:

Function Code	Name of function code	Parameter description	Unit	Default setting	Attribute
F20.25	Pulse count for determining brake fault upon stop	0~10000 (0: Brake inspection and no protection		2000	○
F20.26	Brake inspection torque	0.0~180.0	%	100.0	○
F20.27	Brake inspection torque holding time	0.0~10.0	s	6.0	○
F20.28	Brake inspection upper frequency	Lower frequency limit ~ upper frequency limit, Fup	HZ	2.00	○
F20.29	Forward testing delay of brake inspection	0.0~10.0	s	0.8	○
F20.30	Reverse testing delay of brake inspection	0.0~10.0	s	0.8	○

F20.87	Brake fault testing torque	0.0~F20.26	%	60.0	○
F20.88	Holding time of brake fault testing torque	0.0~F20.27	s	3.0	○
F20.89	Pulse count for electrified brake testing	0.0~F20.20		1000	○
F20.90	Speed limit upon occurrence of fault during electrified brake testing	0.00~Fmax		0	○
F20.91	Selection of brake detection trigger mode	0~1 0: trigger by DI terminal; 1: Automatic trigger		0	○

The electrified brake testing process is shown in Fig. 1.

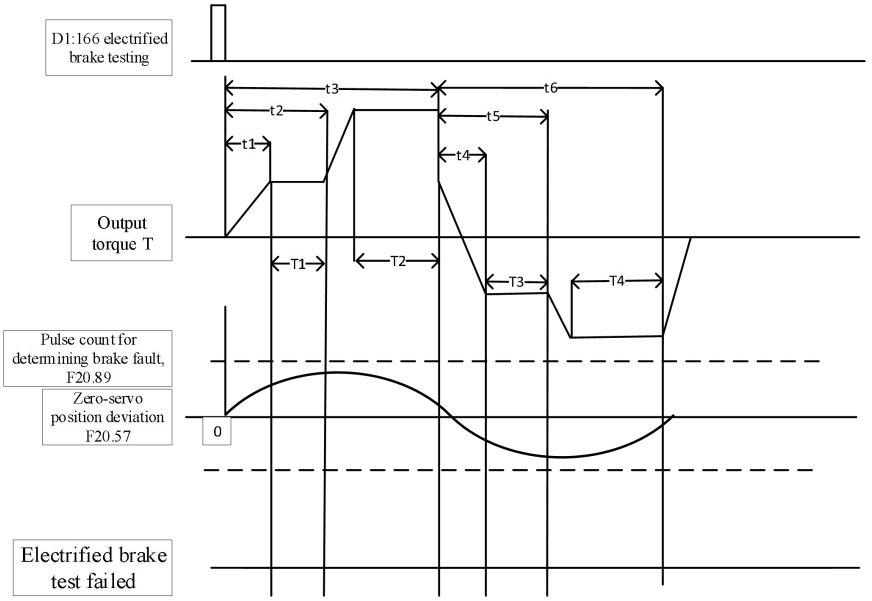


Fig. 5 Electrified Brake Test Logic

t1: F20.29: Forward testing delay of brake inspection;

t2: F20.88: Holding time of brake fault testing torque;

t3: F20.27: Brake inspection torque holding time;

t4: F20.30: Reverse testing delay of brake inspection;

t5: F20.88: Holding time of brake fault testing torque;

t6: F20.27: Brake inspection torque holding time;

T1: F20.87: Brake fault testing torque;

T2: F20.26: Brake inspection torque;

T3: F20.87: Brake fault testing torque;

T4: F20.26: Brake inspection torque;

Function:

Upon electrified brake inspection, torque in forward and reverse directions is used; in each direction, there are two sections of testing torque. When the small torque of the first section acts, and the error pulse is greater than the set value, there will be an E86 fault. In this case, the inverter is faulty (it should be reset manually). When the large torque of the second section acts, and the error pulse is greater than the set value, there will be the C28 warning. The error pulses generated by the large torque of the first section and the small torque of the small section are superimposed. They are not cleared as the torque changes.

When 20.91=0: Electrified for brake testing requires setting the Xi input terminal function to "166: Electrification for brake inspection" in the parameter setting state and close the terminal; the inverter first sets the torque based on F20.87 to run forward for the time set by F20.88 and then based on F20.26 to run forward for the time set by F20.27; thereafter, it sets the torque based on F20.87 to run reversely for the time set by F20.88, and then based on F20.26 to run reversely for the time set by F20.27. To prevent galloping, it is required to set F20.28 to a proper value; generally the default value is used.

When F20.91=1 and the inverter is powered on, this function will be triggered based on the power-on indicator, and the test process is the same as that of terminal triggering.

Coordination between electrified brake test and zero servo:

1. If F20.20 (2000 by default) > zero servo position (F20.57) >F20.87 (1000 by default) during the torque inspection of the first section in the forward and reverse directions (output torque = F20.87: brake fault test torque) after electrified brake testing, an E86 fault will be reported, and DO: (43: brake electrification fault) will be activated. After resetting, DO:43 remains active until the brake passes the test.

2. If F20.20 (2000 by default) > zero servo position (F18.43) >F20.87 (1000 by default) during the torque inspection of the second section in the forward and reverse directions (output torque = F20.26: brake test torque) after electrified brake testing, a C28 warning will be reported, and DO: (43: brake electrification fault) will be activated, until the brake passes the test and DO:43 is inactivated.

3. If the number of error pulses is greater than F20.20, the zero servo mode will be enabled, and C27 will be displayed. Run down once to exit the zero servo mode, and C27 will be inactivated. If C28 is active before the zero servo mode is enabled, C28 will still be displayed.

4. C28 or E86 will not be displayed in next electrification. Instead, testing should be conducted again.

5. When electrified brake testing is completed, the inverter is in the parameter setting status; after the electrified brake testing, if "Di:166: electrified brake inspection" is active, no additional testing will be performed.

6. When F20.91 is set to 0, C28 warning will be immediately inactivated, and DO: (43: Brake electrification fault) will also be inactivated.

5.12 Anti-coupling function:

Function Code	Name of function code	Parameter description	Unit	Default setting	Attribute
F20.92	Percentage of coupling detection frequency	0~100.0 (rated frequency of motor; this function is unavailable when the value is 0)	%	0	○
F20.93	Percentage of coupling frequency error	0~100.0	%	95.0	○
F20.94	Coupling detection torque	0~200.0	%	120	○
F20.95	Reverse running frequency after coupling	0~20.00	HZ	3.00	○
F20.96	Reverse running time after coupling	0~10.0	S	3.0	○

Function:

Special function of lifting mechanism. When F20.92 (percentage of coupling detection frequency) is 0, this function can not be enabled;

When F20.92 is not 0 (20.0% is recommended, that is, the rated frequency of the motor is 50HZ, and the detection starts at 10HZ);

When the output frequency is greater than the percentage of coupling detection frequency (F20.92) * rated motor frequency, detection will be started. When the encoder feedback frequency is less than the acceleration and deceleration frequency (planned natural frequency of the inverter based on acceleration and deceleration time) * f20.93 (percentage of coupling frequency error), and the output torque is greater than F20.94 (coupling detection torque), the inverter will give a reverse command, followed by reverse running to the coupling state. When the reverse running frequency (F20.95) is kept for the reverse running time (F20.96) after coupling, E87 fault will be displayed.

5.13 Open-loop slewing commissioning (F20.00=3):

The latest slewing mechanism design adopts SVC control with the default settings satisfying most scenarios. Tuning, if necessary, may be performed following the procedures below.

S.N.	Phenomenon	Adjustment procedures	Reference range	Unit
1	Springback upon stop	1. Increase the F00.15 value of the deceleration time 1.	12.0~18.0	s
		2. Increase the value of the slewing deformation coefficient F20.68.	0.200~0.400	\
2	Stop failure	1. Increase the zero-gear eddy current value for slewing		\
		2. Add DC braking, and set F04.22 to 20s.	20	s
		3. If springback upon stop occurs after DC braking is added, then reduce the value of F06.18.	10.0~40.0	%
		4. If stop fails after DC braking is added, then increase the value of F06.18.	40.0~100.0	%
		5. If none of the measures above works, please check the eddy current wiring:		
3	Slow start	1. Reduce the value of F00.14 for acceleration time 1	1.0~3.0	s
		2. Reduce the value of the slewing deformation coefficient F20.68.	0.100~0.300	\
4	Shaking upon start	1. Reduce the value of acceleration time F20.75 for the slewing deformation coefficient.	0.100~0.200	s
		2. Increase the value of the slewing deformation coefficient F20.68.	0.200~0.400	\
		3. Increase the value of F00.14 for acceleration time 1	3.0~6.0	s
5	Hard start against wind	1. When the slewing arm gets close to stop during shutdown according to judgment, manually switch the weathercock for stop, and start against the wind when the slewing arm comes to a steady stop.		
		2. Increase the value of the upper electrical torque F06.10 for speed control.	150.0~200.0	%
		3. Increase the value of the upper brake torque F06.11 for speed control.	150.0~200.0	%
		2. If the second-gear speed is too low, then increase the value of F08.01.	15.00~25.00	Hz

Detailed notes to function codes above are shown in the table below:

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F00.14	Acceleration time 1	The acceleration time refers to the time taken by the output frequency to rise from 0.00Hz to F21.23(10.00Hz).	s	3	●

F00.15	Deceleration time 1	The deceleration time refers to the time taken by the output frequency to fall from Fbase (50.0Hz)to 0.00Hz.	s	12	●

The acceleration time from 0 to 10.0Hz can be prolonged by increasing the value of F00.14 or shortened by decreasing the value of F00.14; the actual reference range is 1.0~6.0s;

The deceleration time from 50.0 Hz to 0Hz can be prolonged by increasing the value of F00.15 or shortened by decreasing the value of F00.15; the actual reference range is 12.0~18.0s;

t0 = F21.23/Fbase*F00.14

t1 = F21.23/Fbase*F00.14 +(Fbase-F21.23)/Fbase*F15.03

t2 = F00.15

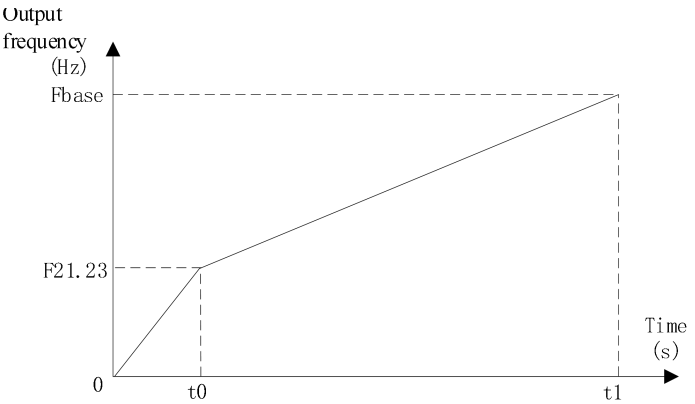


Fig. 5-6: Acceleration time 1

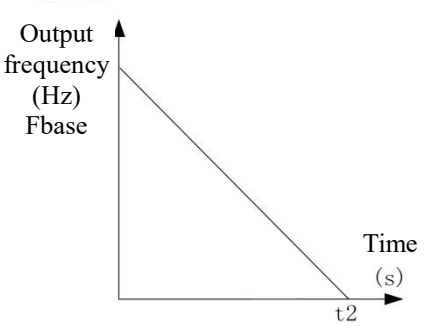


Fig. 5-7: Deceleration time 1

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F04.22	DC braking time in stop	Set the duration of DC braking for stop. If F04.22=0, DC braking for stop will be invalid.	s	0	○

In the presence of heavy loads, the motor cannot be stopped completely through normal deceleration due to inertia. Increasing the DC braking time or the DC braking current may suppress rotation of the motor. The slewing mechanism is a elastic load with large inertia. During actual shutdown, stop failure may occur if the eddy current braking force is insufficient; at this time, it is necessary to add DC braking to ensure steady stop of the motor without slewing.

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F06.10	Upper limit of speed control motor torque	In the electrical state, output the current value of the maximum torque.	%	150	●
F06.11	Upper limit of speed control brake torque	In the braking state, output the current value of the maximum torque.	%	150	●

In slewing applications, the electrical state mainly occurs in the acceleration process, while the braking state mainly occurs in the deceleration process. Upper limit of torque refers to the maximum output torque of the asynchronous motor. In case of strong wind when the wind resistance is greater than the maximum output torque of the current motor, it is required to increase the value of F06.10 and F06.11.

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F06.18	SVC zero-frequency braking current	After entry into the DC braking state, output the set value of current.	%	40	○

After entry the DC braking state, the inverter output current =F06.18*F01.13 (no-load excitation current of asynchronous motor); the larger set value of F06.18 will render more significant braking effect. Excessively large value of F06.18 may cause springback after slewing stop.

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F20.68	Tower body deformation angle coefficient	Major parameters involved in slewing control.	\	0.200	○

Different tower cranes may have different tower body deformation angle due to steel structure strength, tower body height and revolving arm length, among other factors. Generally, the taller a tower body is, the larger the deformation angle is; the greater the steel structure strength is, the smaller the tower body deformation angle is. For the same tower crane in practical applications, a larger value of F20.68 will render

more steady speed control during operation. However, since excessively steady speed control may sacrifice the response time (slow action), the reference value of F20.68 ranges between 0.100~0.400. If necessary, it can be appropriately adjusted on site.

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F21.39	Linear change delay of DC braking current	0.00~30.00 0: No linear switching process	s	0	●
F21.40	Linear switching time of DC braking current	0.00~30.00	s	0	●
F21.41	Linear switching target value of DC braking current	0.0~400.0	%	0	●

In tower crane slewing applications, to solve the hard stop problem of tower cranes in strong wind, the output excitation current for SVC zero-frequency braking is designed to be a linear change process. The following table gives some site parameters for reference. The acting effect of F20.41 is consistent with that of F06.18. When it is set excessively great, springback will occur upon stop; when it is set too small, stop failure will occur.

Shutdown parameters in strong winds

Function code	F04.22	F21.39	F21.40	F21.41
Reference value	15s	0.5s	1.0s	80%

5.14 Closed-loop slewing commissioning (F20.00=4):

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F04.22	DC braking time in stop	0.00~30.00 0.00: Invalid	S	10.00	○
F03.02	Options of R1 output function	1: inverter running		0	○
F03.14	R1 invalid delay time	0.000~30.000	S	3.000	○

The closed-loop slewing mechanism does not stop by eddy current braking. After stop, the inverter will enter DC braking by default for setting the DC braking time; upon the lapse of F03.14 (R1 inactivation delay), the weathercock will cut in. As the run command is active during DC braking and R1 inactivation delay, the inverter will directly start.

Weathercock control requires use of the weathercock control logic in combination with relays EA and EC (normally open contacts) by default; during operation, the normally open EA and EC turn to normally closed, and the weathercock opens;

After stop, 10s DC braking occurs; upon the lapse of 3.0s after DC braking ends, the normally closed EA and EC turn to normally open, and the weathercock cut in. The logic is shown in the following figure:

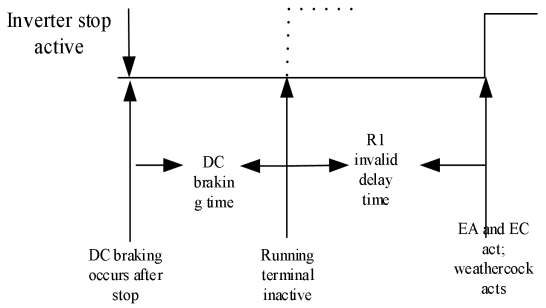


Fig. 5- 8: Weathercock cut-in time sequence diagram for the closed-loop slewing mechanism

The closed-loop slewing mechanism is commissioned in a similar way with the open-loop slewing mechanism, except that the closed-loop slewing mechanism has no eddy current, while the deformation coefficient intervention cuts in fast and withdraws slow. The following function codes needs to be set in a differentiated way:

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F20.74	Low-frequency cut-in point of the slewing deformation coefficient	0~10.00	HZ	2.00	○
F20.75	Acceleration filtering time of the slewing deformation coefficient	0~65.535	S	0.100	○
F20.76	Deceleration filtering time of the slewing deformation coefficient	0~65.535	S	8.000	○

5.15 Application macro of the lifting industry

Function Code	Name of function code	Parameter description of function code	Unit	Default setting	Attribute
F20.00	Lifting mechanism selection	0: Closed-loop lifting mechanism 1: Open-loop lifting mechanism 2: Translation mechanism (trolley luffing) 3: Open-loop slewing mechanism 4: Closed-loop slewing mechanism 7: Construction hoist without speed feedback		0	○

F20.00=0: Closed-loop lifting mechanism

When this value is selected, corresponding function code will be automatically set according to Table 5-1 Special macro for the closed-loop lifting mechanism .

Table 5-1 Special macro for the closed-loop lifting mechanism

Function Code	Name of function code	Parameter description of function code	Unit	Default setting
F00.01	Drive control mode of motor 1	2: Speed sensor vector control (FVC)		2
F00.03	Options of terminal control mode	1: terminal RUN (forward) and F/R (reverse)		1
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	10.00
F00.14	Acceleration time 1		s	6.50
F00.15	Deceleration time 1		s	3.00
F00.16	Maximum frequency		Hz	55.00
F00.18	Upper frequency limit		Hz	55.00
F01.01	Rated power of electric motor	Setting according to the actual motor nameplate	kW	XX
F01.03	Rated current of motor	Setting according to the actual motor nameplate	A	XX
F01.05	Rated speed	Setting according to the actual motor nameplate	rpm	XX
F01.25	Encoder line count	Set based on the actual encoder line count		1024
F02.00	Options of X1 digital input function	Forward running (lifting)		1
F02.01	Options of X2 digital input function	Reverse running (lowering)		2
F02.02	Options of X3 digital input function	Multi-segment speed terminal 1		11
F02.03	Options of X4 digital input function	Multi-segment speed terminal 2		12
F02.04	Options of X5 digital input function	Multi-segment speed terminal 3		13
F02.05	Options of X6 digital input function	Multi-segment speed terminal 4		14
F02.06	Options of X7 digital input function	Fault resetting		10
F02.07	Options of AI1 digital input	Brake inspection input		58

	function			
F04.19	Stop mode	0: slow down to stop		0
F05.00	V/F curve setting	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)		1
F05.02	Voltage point V1 of multi-point VF	0.0~100.0 (100.0 = Rated voltage)	%	3.5
F05.04	Voltage point V2 of multi-point VF	0.0~100.0	%	7.5
F05.06	Voltage point V3 of multi-point VF	0.0~100.0	%	14.0
F05.10	Compensation gain of V/F stator voltage drop	0.00~200.00	%	0.00
F05.12	V/F slip filtering time	0.00~10.00	s	1.00
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		0
F07.11	Current limit control	0: Invalid 1: limit mode 1 2: limit mode 2		0
F08.00	Multi-segment speed 1	0.00 to maximum frequency F00.16	Hz	25.00
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	35.00
F08.03	Multi-segment speed 4	0.00 to maximum frequency F00.16	Hz	15.00
F08.06	Multi-segment speed 7	0.00 to maximum frequency F00.16	Hz	45.00
F08.14	Multi-segment speed 15	0.00 to maximum frequency F00.16	Hz	55.00
F10.12	Communication address of CANopen expansion card	1~127		2
F10.15	Baud rate of communication between the expansion card and the bus	Ones place: CANopen 1: 250K Tens place: Reserved		21
F15.30	Options of energy consumption braking function	0: Invalid 1: valid		1
F20.01	Braking curve type	0: Frequency and current are both		0

		reached for brake control		
F20.02	Start direction	0: Brake release frequency always has the forward direction		1
F20.03	Stop direction	0: The velocity direction upon brake closing is consistent with the running direction		0
F20.04	Brake release current		%	10.0
F20.05	Brake release frequency upon lifting, f1 up		Hz	0.60
F20.06	Brake release frequency upon lowering, f1 up		Hz	0.60
F20.07	Delay before brake release, t1		s	0.1
F20.08	Delay after brake release, t2		s	0.5
F20.10	Brake closing frequency upon lifting, f3 up		Hz	0.20
F20.11	Brake closing frequency upon lowering, f3 down		Hz	0.20
F20.12	Delay before brake closing, t3		s	0.0
F20.13	Delay after brake closing, t4		s	0.5
F21.15	Low-voltage protection function	1: Use low-voltage protection		1

F20.00=1: Open-loop lifting mechanism

When this value is selected, corresponding function code will be automatically set according to Table 5-2 Special macro for the open-loop lifting mechanism.

Note: **For lifting applications, speed open loop is not recommended, as brake failure may easily cause hook slip. Open loop can only be used during commissioning for determining if the feedback procedure in closed-loop applications is normal.**

Table 5-2 Special macro for the open-loop lifting mechanism

Function Code	Name of function code	Parameter description of function code	Unit	Default setting
F00.01	Drive control mode of motor 1	0: V/F control (VVF)		0
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)		1
F00.03	Options of terminal control mode	1: terminal RUN (forward) and F/R (reverse)		1
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	10.00
F00.14	Acceleration time 1		s	6.50
F00.15	Deceleration time 1		s	3.00
F00.16	Maximum frequency		Hz	55.00

F00.18	Upper frequency limit		Hz	55.00
F01.01	Rated power of electric motor	Setting according to the actual motor nameplate	kW	XX
F01.03	Rated current of motor	Setting according to the actual motor nameplate	A	XX
F01.05	Rated speed	Setting according to the actual motor nameplate	rpm	XX
F02.00	Options of X1 digital input function	Forward running (lifting)		1
F02.01	Options of X2 digital input function	Reverse running (lowering)		2
F02.02	Options of X3 digital input function	Multi-segment speed terminal 1		11
F02.03	Options of X4 digital input function	Multi-segment speed terminal 2		12
F02.04	Options of X5 digital input function	Multi-segment speed terminal 3		13
F02.05	Options of X6 digital input function	Multi-segment speed terminal 4		14
F02.06	Options of X7 digital input function	Fault resetting		10
F02.07	Options of AI1 digital input function	Brake inspection input		58
F05.00	V/F curve setting	1: multi-point broken line V/F		1
F05.02	Voltage point V1 of multi-point VF	0.0~100.0 (100.0 = Rated voltage)	%	3.5
F05.04	Voltage point V2 of multi-point VF	0.0~100.0	%	7.5
F05.06	Voltage point V3 of multi-point VF	0.0~100.0	%	14.0
F05.10	Compensation gain of V/F stator voltage drop	0.00~200.00	%	0.00
F05.12	V/F slip filtering time	0.00~10.00	s	1.00
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		0
F07.11	Current limit control	0: Invalid 1: limit mode 1 2: limit mode 2		0
F08.00	Multi-segment speed 1	0.00 to maximum frequency F00.16	Hz	25.00
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	35.00
F08.03	Multi-segment speed 4	0.00 to maximum frequency F00.16	Hz	15.00
F08.06	Multi-segment speed 7	0.00 to maximum frequency F00.16	Hz	45.00
F08.14	Multi-segment speed 15	0.00 to maximum frequency F00.16	Hz	55.00
F15.30	Options of energy consumption	0: Invalid		1

	braking function	1: valid		
F20.01	Braking curve type	0: Frequency and current are both reached for brake control		0
F20.02	Start direction	0: Brake release frequency always has the forward direction		1
F20.03	Stop direction	0: The velocity direction upon brake closing is consistent with the running direction		0
F20.04	Brake release current		%	70.0
F20.05	Brake release frequency upon lifting, f1 up		Hz	3.00
F20.06	Brake release frequency upon lowering, f1 up		Hz	3.00
F20.07	Delay before brake release, t1		s	0.3
F20.08	Delay after brake release, t2		s	0.5
F20.10	Brake closing frequency upon lifting, f3 up		Hz	3.00
F20.11	Brake closing frequency upon lowering, f3 down		Hz	2.00
F20.12	Delay before brake closing, t3		s	0.0
F20.13	Delay after brake closing, t4		s	0.5
F21.15	Low-voltage protection function	1: Use low-voltage protection		1

F20.00=2: translation mechanism (trolley luffing)

Fig. 5-3 Special macro for translation mechanism

Function Code	Name of function code	Parameter description of function code	Unit	Default setting
F00.01	Drive control mode of motor 1	0: V/F control (VVF)		0
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)		1
F00.03	Options of terminal control mode	1: terminal RUN (forward) and F/R (reverse)		1
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	25.00
F00.14	Acceleration time 1		s	3.00
F00.15	Deceleration time 1		s	3.00
F00.16	Maximum frequency		Hz	50.00
F00.18	Upper frequency limit		Hz	50.00
F01.01	Rated power of electric motor	Setting according to the actual motor nameplate	kW	XX

F01.03	Rated current of motor	Setting according to the actual motor nameplate	A	XX
F01.05	Rated speed	Setting according to the actual motor nameplate	rpm	XX
F02.04	Options of X5 digital input function	No function		0
F02.05	Options of X6 digital input function	No function		0
F05.00	V/F curve setting	1: multi-point broken line V/F		1
F05.02	Voltage point V1 of multi-point VF	0.0~100.0 (100.0 = Rated voltage)	%	3.5
F05.04	Voltage point V2 of multi-point VF	0.0~100.0	%	9.0
F05.06	Voltage point V3 of multi-point VF	0.0~100.0	%	15.0
F05.10	Compensation gain of V/F stator voltage drop	0.00~200.00	%	0.00
F05.12	V/F slip filtering time	0.00~10.00	s	1.00
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		0
F07.11	Current limit control	0: Invalid		0
F08.00	Multi-segment speed 1	0.00 to maximum frequency F00.16	Hz	38.00
F08.02	Multi-segment speed 3	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
F10.12	Communication address of CANopen expansion card	1~127		4
F10.15	Baud rate of communication between the expansion card and the bus	Ones place: CANopen 1: 250K Tens place: Reserved		21
F15.30	Options of energy consumption braking function	0: Invalid 1: valid		1
F20.01	Braking curve type	1: Frequency is reached for brake control		1
F20.02	Start direction	0: Brake release frequency has the same direction with running		0
F20.05	Brake release frequency upon lifting, f1 up		Hz	1.00
F20.06	Brake release frequency upon lowering, f1 up		Hz	1.00
F20.07	Delay before brake release, t1		s	0.0
F20.08	Delay after brake release, t2		s	0.2
F20.10	Brake closing frequency upon		Hz	3.00

	lifting, f3 up			
F20.11	Brake closing frequency upon lowering, f3 down		Hz	3.00
F20.13	Delay after brake closing, t4		s	0.3
F21.15	Low-voltage protection function	0: No low-voltage protection		0

F20.00=3: open-loop slewing mechanism

Table 5- 4 Special macro for open-loop slewing mechanism

Function Code	Name of function code	Parameter description of function code	Unit	Default setting
F00.01	Drive control mode of motor 1	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)		1
F00.03	Options of terminal control mode	1: terminal RUN (forward) and F/R (reverse)		1
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	10.00
F00.14	Acceleration time 1		s	3.00
F00.15	Deceleration time 1		s	12.00
F00.16	Maximum frequency		Hz	50.00
F00.18	Upper frequency limit		Hz	50.00
F01.01	Rated power of electric motor	Setting according to the actual motor nameplate	kW	XX
F01.03	Rated current of motor	Setting according to the actual motor nameplate	A	XX
F01.05	Rated speed	Setting according to the actual motor nameplate	rpm	XX
F03.02	Options of R1 output function	Inverter running		1
F03.14	R1 invalid delay time	0.00~650.00	s	3.00
F04.14	Acceleration and deceleration mode	2: acceleration and deceleration of intermittent S curve		2
F04.15	Starting time of S curve in acceleration		s	0.00
F04.16	Ending time of S curve in acceleration		s	0.00
F04.17	Starting time of S curve in deceleration		s	0.00
F04.18	Ending time of S curve in deceleration		s	8.00
F06.08	Vector control slip gain	50.00~200.00	%	50.00
F06.10	Upper limit of speed control motor	0.0~250.0	%	150.0

	torque			
F06.11	Upper limit of speed control brake torque	0.0~250.0	%	150.0
F06.17	SVC zero-frequency processing	0: braking		0
F06.18	SVC zero-frequency braking current	50.0~400.0 (100.0 is the no-load current of the motor)	%	40.0
F06.76	Low-speed correction factor of stator resistor of asynchronous motor	10.0~500.0	%	50.0
F06.78	Slip gain switching frequency of asynchronous motor	0.10~Fmax	Hz	5.00
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		0
F07.11	Current limit control	1: limit mode 1		1
F07.12	Current limit level		%	180.0
F08.00	Multi-segment speed 1	0.00 to maximum frequency F00.16	Hz	20.00
F08.02	Multi-segment speed 3	0.00 to maximum frequency F00.16	Hz	35.00
F08.05	Multi-segment speed 6	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
F10.12	Communication address of CANopen expansion card	1~127		3
F10.15	Baud rate of communication between the expansion card and the bus	Ones place: CANopen 1: 250K Tens place: Reserved		21
F15.03	Acceleration time 2		s	10.00
F15.04	Deceleration time 2		s	18.00
F15.05	Acceleration time 3		s	15.00
F15.06	Deceleration time 3		s	15.00
F15.07	Acceleration time 4		s	15.00
F15.08	Deceleration time 4		s	8.00
F15.30	Options of energy consumption braking function	0: Invalid 1: valid		1
F20.01	Braking curve type	1: Frequency is reached for brake control		1
F20.02	Start direction	0: Brake release frequency has the same direction with running		0
F20.03	Stop direction	0: The velocity direction upon brake		0

		closing is consistent with the running direction		
F20.05	Brake release frequency upon lifting, f1 up		Hz	0.00
F20.06	Brake release frequency upon lowering, f1 up		Hz	0.00
F20.07	Delay before brake release, t1		s	0.0
F20.08	Delay after brake release, t2		s	0.0
F20.10	Brake closing frequency upon lifting, f3 up		Hz	2.00
F20.11	Brake closing frequency upon lowering, f3 down		Hz	2.00
F20.12	Delay before brake closing, t3		s	0.0
F20.13	Delay after brake closing, t4		s	2.0
F20.15	Restart in braking process	0: Restart is not allowed during the braking process 1: Restart is allowed during the braking process		1
F20.20	Pulse count for determining brake fault upon stop	0~10000 (0: brake inspection and protection inactive)		0
F20.59	SVC abnormality detection time	0~60.000	s	30.00
F20.60	SVC abnormality hysteresis torque	0~100.0	%	10.0
F20.61	Threshold for determining SVC abnormality synchronization frequency	0~50.00	Hz	2.00
F20.62	SVC abnormality tube sealing time	0~60.000	s	0.500
F20.66	Effective activation of quick reverse gear deceleration	0~1		1
F20.68	Tower body deformation angle coefficient	0~65.535		0.200
F20.74	Low-frequency cut-in point of the slewing deformation coefficient	0~10.00	HZ	2.00
F20.75	Acceleration filtering time of the slewing deformation coefficient	0~65.535	S	0.100
F20.76	Deceleration filtering time of the slewing deformation coefficient	0~65.535	S	4.000
F21.15	Low-voltage protection function	0: No low-voltage protection		0
F21.21	Special acceleration	1: Use		1
F21.22	Special deceleration	0:Unused		0
F21.23	Acceleration frequency switching point 1		Hz	10.00
F21.25	Acceleration frequency switching point 2		Hz	50.00
F21.27	Deceleration frequency switching		Hz	50.00

	point 3			

F20.00=4: closed-loop slewing mechanism

Table 5- 5 Special macro for closed-loop slewing mechanism

Function Code	Name of function code	Parameter description of function code	Unit	Default setting
F00.01	Drive control mode of motor 1	2: Speed sensor vector control (FVC)		2
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)		1
F00.03	Options of terminal control mode	1: terminal RUN (forward) and F/R (reverse)		1
F00.07	Digital frequency setting	0.00 to maximum frequency F00.16	Hz	8.00
F00.14	Acceleration time 1		s	10.00
F00.15	Deceleration time 1		s	6.00
F00.16	Maximum frequency		Hz	50.00
F00.18	Upper frequency limit		Hz	50.00
F01.01	Rated power of electric motor	Setting according to the actual motor nameplate	kW	XX
F01.03	Rated current of motor	Setting according to the actual motor nameplate	A	XX
F01.05	Rated speed	Setting according to the actual motor nameplate	rpm	XX
F03.02	Options of R1 output function	Inverter running		1
F03.14	R1 invalid delay time		s	3.00
F04.14	Acceleration and deceleration mode	2: acceleration and deceleration of intermittent S curve		2
F04.15	Starting time of S curve in acceleration		s	0.00
F04.16	Ending time of S curve in acceleration		s	0.00
F04.17	Starting time of S curve in deceleration		s	0.00
F04.18	Ending time of S curve in deceleration		s	6.00
F04.22	DC braking time in stop		s	10.00
F06.08	Vector control slip gain	50.00~200.00	%	100.00
F06.10	Upper limit of speed control motor torque	0.0~250.0	%	150.0
F06.11	Upper limit of speed control brake	0.0~250.0	%	150.0

	torque			
F06.17	SVC zero-frequency processing	0: braking		0
F06.18	SVC zero-frequency braking current	50.0~400.0 (100.0 is the no-load current of the motor)	%	100.0
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		0
F07.11	Current limit control	1: limit mode 1		1
F07.12	Current limit level		%	180.0
F08.00	Multi-segment speed 1	0.00 to maximum frequency F00.16	Hz	20.00
F08.02	Multi-segment speed 3	0.00 to maximum frequency F00.16	Hz	35.00
F08.06	Multi-segment speed 7	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
F10.12	Communication address of CANopen expansion card	1~127		3
F10.15	Baud rate of communication between the expansion card and the bus	Ones place: CANopen 1: 250K Tens place: Reserved		21
F15.03	Acceleration time 2		s	10.00
F15.04	Deceleration time 2		s	10.00
F15.05	Acceleration time 3		s	15.00
F15.06	Deceleration time 3		s	15.00
F15.07	Acceleration time 4		s	15.00
F15.08	Deceleration time 4		s	8.00
F15.30	Options of energy consumption braking function	0: Invalid 1: valid		1
F20.01	Braking curve type	1: Frequency is reached for brake control		1
F20.02	Start direction	0: Brake release frequency has the same direction with running		0
F20.03	Stop direction	0: The velocity direction upon brake closing is consistent with the running direction		0
F20.05	Brake release frequency upon lifting, f1 up		Hz	0.00
F20.06	Brake release frequency upon lowering, f1 up		Hz	0.00
F20.07	Delay before brake release, t1		s	0.0

F20.08	Delay after brake release, t2		s	0.0
F20.10	Brake closing frequency upon lifting, f3 up		Hz	2.00
F20.11	Brake closing frequency upon lowering, f3 down		Hz	2.00
F20.12	Delay before brake closing, t3		s	0.0
F20.13	Delay after brake closing, t4		s	2.0
F20.15	Restart in braking process	1: Restart is allowed during the braking process	s	1
F20.20	Pulse count for determining brake fault upon stop	0~10000 (0: brake inspection and protection inactive)		0
F20.59	SVC abnormality detection time	0~60.000	s	30.00
F20.60	SVC abnormality hysteresis torque	0~100.0	%	10.0
F20.61	Threshold for determining SVC abnormality synchronization frequency	0~50.00	Hz	2.00
F20.62	SVC abnormality tube sealing time	0~60.000	s	0.500
F20.66	Effective activation of quick reverse gear deceleration	0~1		1
F20.68	Tower body deformation angle coefficient	0~65.535		0.300
F20.74	Low-frequency cut-in point of the slewing deformation coefficient	0~10.00	HZ	2.00
F20.75	Acceleration filtering time of the slewing deformation coefficient	0~65.535	S	0.100
F20.76	Deceleration filtering time of the slewing deformation coefficient	0~65.535	S	8.000
F21.15	Low-voltage protection function	0: No low-voltage protection		0
F21.21	Special acceleration	1: Use		1
F21.22	Special deceleration	0:Unused		1
F21.23	Acceleration frequency switching point 1		Hz	10.00
F21.24	Deceleration frequency switching point 1		Hz	10.00
F21.25	Acceleration frequency switching point 2		Hz	50.00
F21.26	Deceleration frequency switching point 2		Hz	50.00
F21.27	Acceleration frequency switching point 3		Hz	50.00
F21.28	Deceleration frequency switching point 3		Hz	50.00

F20.00=7: Construction hoist without speed feedback

Table 5-6 Macro for Construction Hoist without Speed Feedback

Function Code	Name of function code	Parameter description of function code	Unit	Default setting
F00.01	Drive control mode of motor 1	0: V/F control (VVF)		0
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)		1
F00.03	Options of terminal control mode	1: terminal RUN (forward) and F/R (reverse)		1
F00.07	Digital frequency setting	First-gear speed	Hz	15.00
F00.14	Acceleration time 1		s	6.00
F00.15	Deceleration time 1		s	2.00
F00.16	Maximum frequency		Hz	50.00
F00.18	Upper frequency limit		Hz	50.00
F00.23	Carrier frequency		kHz	1.5
F01.01	Rated power of electric motor	Power sum of motors	kW	XX
F01.03	Rated current of motor	Rated current sum of motors	A	XX
F01.05	Rated speed	Setting according to the actual motor nameplate	rpm	XX
F02.00	Options of X1 digital input function	Forward running (lifting)		1
F02.01	Options of X2 digital input function	Reverse running (lowering)		2
F02.02	Options of X3 digital input function	Multi-segment speed terminal 1		11
F02.03	Options of X4 digital input function	Multi-segment speed terminal 2		0
F02.04	Options of X5 digital input function	Multi-segment speed terminal 3		0
F02.05	Options of X6 digital input function	9: free stop		9
F02.06	Options of X7 digital input function	Fault resetting		10
F02.07	Options of AI1 digital input function	Brake inspection input		58
F02.18	X1 valid delay time	0.00~650.00	s	0.00
F02.18	X1 valid delay time	0.00~650.00	s	0.00
F02.63	Selection of analog input AI2 type	0: 0~10V 1: 4~20mA 2: 0~20mA 3: reserved (-10~10V) 4: 0~5V		0
F03.00	Options of Y1 output function	Inverter failure output		7
F03.01	Options of Y2 output function	Weighing disconnection or overweight warning		35
F03.02	Options of R1 output function	Brake control		28
F03.03	Options of R2 output function	Inverter failure output		7
F05.00	V/F curve setting	1: multi-point broken line V/F		1
F05.02	Voltage point V1 of multi-point VF		%	3.5

F05.04	Voltage point V2 of multi-point VF		%	7.5
F05.06	Voltage point V3 of multi-point VF		%	14.0
F05.10	Compensation gain of V/F stator voltage drop		%	0.00
F05.12	V/F slip filtering time		s	1.00
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		0
F07.11	Current limit control	0: Invalid		0
F08.00	Multi-segment speed 1	Second-gear speed	Hz	50.00
F08.01	Multi-segment speed 2	0.00 to maximum frequency F00.16	Hz	20.00
F08.02	Multi-segment speed 3	0.00 to maximum frequency F00.16	Hz	20.00
F08.03	Multi-segment speed 4	0.00 to maximum frequency F00.16	Hz	20.00
F08.04	Multi-segment speed 5	0.00 to maximum frequency F00.16	Hz	20.00
F15.30	Options of energy consumption braking function	0: Invalid 1: valid		1
F20.00	Lifting mechanism selection	7: Construction hoist without speed feedback		7
F20.01	Braking curve type	0: Frequency and current are both reached for brake control		0
F20.02	Start direction	0: Brake release frequency always has the forward direction		1
F20.03	Stop direction	0: Brake release frequency always has the forward direction		1
F20.04	Brake release current		%	60.0
F20.05	Brake release frequency upon lifting, f1 up		Hz	3.00
F20.06	Brake release frequency upon lowering, f1 up		Hz	3.00
F20.07	Delay before brake release, t1		s	0.3
F20.08	Delay after brake release, t2		s	0.5
F20.10	Brake closing frequency upon lifting, f3 up		Hz	3.00
F20.11	Brake closing frequency upon lowering, f3 down		Hz	3.00
F20.12	Delay before brake closing, t3		s	0.3
F20.13	Delay after brake closing, t4		s	0.5

F21.15	Low-voltage protection function	1: Use low-voltage protection		1
F21.21	Special acceleration	1: Use		0
F21.22	Special deceleration	0:Unused		0
F21.52	Weighing signal feedback terminal 1	0: None 1: AI1 2: AI2 3: AI3		2
F21.53	Weighing signal feedback terminal 2	0: None 1: AI1 2: AI2 3: AI3		3
F21.67	Reset cage weight by M.K button	0~1		1

The industrial application macro cannot satisfy application demands of all users. Therefore, after the application macro is selected, it may be necessary to adjust related parameters.

Chapter 6 Faults and Solutions

Fault content

When the inverter is in the abnormal status, the digital tube display will show the corresponding fault code and its parameters, the fault relay and fault output terminal will work, and the inverter will stop the output. When a fault occurs, the motor will stop running normally or slow down until it is stopped. Faults of the TC760 inverter and corresponding countermeasures are shown in Table 6- 1.

Table 6-1 Faults of the TC760 inverter and corresponding countermeasures

Fault code	Fault type	Cause	Solution
SC	Short circuit fault /EMC interference	1. Short circuit to the ground. 2. Inter-phase short circuit 3. Short circuit of the external braking resistor. 4. The acceleration and deceleration time is too short. 5. The inverter module is damaged. 6. There is excessive on-site interference.	1. Check the wiring for short circuits. 2. Properly increase the acceleration and deceleration time. 3. Investigate the cause and reset the controller after implementing the corresponding solutions. 4. Seek technical support.
HOC	Instantaneous overcurrent	1. The acceleration and deceleration time is too short. 2. In the V/F drive mode, the V/F curve setting is unreasonable. 3. The motor is running during startup. 4. The motor used is beyond the capacity of the inverter or the load is too heavy. 5. Motor parameters are not suitable and need to be identified. 6. The phases on the output side of the inverter are short-circuited. 7. The inverter is damaged.	1. Increase the acceleration and deceleration time. 2. Reasonably set the V/F curve. 3. Enable speed tracking or start DC braking. 4. Use the appropriate motor or inverter. 5. Identify the motor parameters. 6. Check the wiring for short circuits. 7. Seek technical support.
SOC	Steady-state overcurrent		
HOU	Instantaneous overvoltage	1. The deceleration time is too short, and the motor has too much regenerated energy. 2. The braking unit or braking resistor forms an open circuit. 3. The braking unit or braking resistor does not match. 4. The power voltage is too high.	1. Increase the deceleration time. 2. Check the wiring of the braking unit and braking resistor. 3. Use a suitable braking unit/braking resistor. 4. Reduce the power voltage to the specified range.
SOU	Steady-state overvoltage		
SIU	Steady-state undervoltage	1. The input power supply is subject to phase loss. 2. The terminals of the input power supply are loose. 3. The voltage of the input power supply drops too much. 4. The switch contacts of the input power supply are aging.	1. Check the input power supply and wiring. 2. Tighten the screws of input terminals. 3. Check the air circuit breaker and contactor.
ILP	Input phase loss	1. The input power supply is subject to phase loss.	1. Check the input power supply. 2. Check the wiring of the input

		2. The input power supply fluctuates greatly.	power supply. 3. Check whether the terminal is loose 4. Use a voltage regulator on the input side.
OLP	Output phase loss	1. The output terminals U, V and W have phase losses.	1. Check the connection between the inverter and motor. 2. Check whether the output terminal is loose. 3. Check whether the motor winding is disconnected.
OL	Inverter overload	1. The acceleration and deceleration time is too short. 2. In the V/F drive mode, the V/F curve setting is unreasonable. 3. The load is too heavy. 4. The braking time is too long, the braking intensity is too high, or DC braking is enabled repeatedly.	1. Increase the acceleration and deceleration time. 2. Reasonably set the V/F curve. 3. Use the inverter that matches the load. 4. Reduce the braking time and braking intensity. Do not enable DC braking repeatedly.
OH	Inverter overheat	1. The ambient temperature is too high. 2. The inverter is subject to poor ventilation. 3. The cooling fan fails.	1. The inverter running environment shall meet the requirements. 2. Check whether the air duct is blocked. 3. Replace the cooling fan.
E11	Parameter setting conflict	1. There is a logic conflict in parameter settings.	1. Check whether parameters set are illogical before the occurrence of fault.
E12	Motor overheat	1. The temperature measured by the motor temperature sensor is greater than the set threshold. 2. The motor temperature sensor is disconnected. 3. Excess environment temperature. 4. The load is too heavy. 5. The motor cooling fan fails.	1. Check whether the thermal protection threshold of the motor is appropriate. 2. Check whether the sensor is disconnected. 3. Strengthen the heat dissipation of the motor. 4. The motor model is not suitable. 5. Check the motor cooling fan.
E13	Motor overload	1. The acceleration and deceleration time is too short. 2. In the V/F drive mode, the V/F curve setting is unreasonable. 3. The load is too heavy.	1. Increase the acceleration and deceleration time. 2. Reasonably set the V/F curve. 3. Use a motor matching the load.
E14	External fault	1. The external device fails, resulting in the terminal action.	1. Check the external device.
E15	Inverter memory failure	1. Interference results in memory reading and writing errors. 2. The internal memory of the controller is read and written repeatedly, causing damage to the memory.	1. Press the STOP/RESET key to reset the controller and try again. 2. For the parameters (e.g. frequency) to be modified frequently, write the 0x41 command in the register.
E16	Communication error	1. Communication timeout is	1. F10.03 is set to 0.0 in the

		enabled in the discontinuous communication system. 2. Communication is disconnected.	discontinuous communication system. 2. Adjust the F10.03 communication timeout. 3. Check whether the communication cable is disconnected.
E17	Abnormality of inverter temperature sensor	The inverter temperature sensor is disconnected or short-circuited.	1. Check whether the inverter temperature sensor is connected properly. 2. Seek technical support.
E18	The soft start relay is not engaged.	1. The power supply fails during operation. 2. The input power supply is subject to phase loss. 3. The terminals of the input power supply are loose. 4. The voltage of the input power supply drops too much. 5. The switch contacts of the input power supply are aging.	1. Stop the inverter before power-off, or directly reset the fault. 2. Check the input power supply and wiring. 3. Tighten the screws of input terminals. 4. Check the air circuit breaker and contactor.
E19	Error of current detection circuit	The detection circuit of the drive board or control board is damaged.	1. Seek technical support.
E20	Stall fault	1. The deceleration time is too short. 2. Error of dynamic brake for deceleration. 3. The load is too heavy.	1. Increase the deceleration time. 2. Check the dynamic brake. 3. Check whether the motor cannot be stopped as it is driven by another load.
E21	PID feedback disconnection	1. The PID feedback is greater than the upper limit (F09.24) or less than the lower limit (F09.25), depending on the type of the feedback sensor.	1. Check whether the feedback line falls off. 2. Check whether the sensor is working abnormally. 3. Adjust the detection value of feedback disconnection to a reasonable level.
E22	Encoder fault	1. The wire between the encoder and PG card is not connected properly. 2. The PG card is not properly installed 3. The type of the PG card or F01.24 encoder is not correct. 4. The encoder is damaged. 5. There is on-site interference.	1. Check wiring connection of the PG card and encoder. 2. Check whether the PG card is inserted properly. 3. Confirm the PG card selected and F01.24 parameters 4. Replace the encoder. 5. Take electromagnetic compatibility measures (e.g. use of magnetic ring) for the inverter output cable.
E23	Keyboard memory fails	1. Interference results in memory reading and writing errors. 2. The memory is damaged.	1. Press the STOP/RESET key to reset the controller and try again. 2. Seek technical support.
E24	Self-identification error	1. Press the STOP/RESET key during parameter identification.	1. Press the STOP/RESET key to reset.

		2. The external terminal stops working (FRS = ON) properly during parameter identification. 3. The motor is not connected. 4. The rotary self-learning motor is not disconnected from the load. 5. The motor fails.	2. The external terminal should not be operated during parameter identification. 3. Check the connection between the inverter and motor. 4. Disconnect the rotary self-learning motor from the load. 5. Check the motor.
E25	Moter overspeed protection	1. PG card is not connected 2. Encoder line count F01.25 is not properly set 3. AB phase sequence F01.27 is incorrect 4. Excessive load results in greater motor speed than the given inverter speed or reverse rotation of the motor	1. Connect the PG card or switch to V/F control 2. Set the encoder line count according to the encoder manual 3. Exchange the A and B phase wiring of the encoder. 4. Reduce the load or replace with an inverter and motor of the immediately greater power.
E26	Load loss protection	1. The motor is not connected or does not match the load. 2. Load loss occurs. 3. The parameters of load loss protection are not set reasonably.	1. Check the wiring and use the appropriate motor 2. Check the equipment. 3. Change the off-load detection level F07.22 and detection time F07.23.
E27	Up to cumulative power-on time	The inverter maintenance time is up.	Contact the dealer for technical support.
E28	Up to cumulative running time	The inverter maintenance time is up.	Contact the dealer for technical support.
E29	Internal communication failure	1. Internal SPI communication is abnormal.	1. Disconnect and then connect it to power; check if resetting can eliminate the fault. 2. Seek technical support.
E30	Brake sensor abnormality	1. The brake feedback sensor used has abnormal signal.	1. 1. Check wiring of the brake feedback sensor
E31	The joystick is not set to zero	1. The joystick is caught upon electrification, failing to return to zero 2. The controller has given run command or multi-segment speed command upon electrification of the inverter.	1. Set the joystick to zero to eliminate the fault 2. For non-lifting equipment that can run following electrification, set reconfirmation of the F04.27 start command to 0: Not to confirm, and set the time to 0 for determining F20.37 joystick returning to zero to shield the protection. For lifting applications, it is recommended to change the controller software, so as to avoid danger resulted from operation following electrification.
E32	Start inspection abnormality	1. The motor is not connected for commissioning. 2. The motor power differs greatly	1. In case of a fault attributable to any of the foregoing three reasons, please set F20.01 to 1. For formal

		from the inverter power. 3. The motor is not provided with a brake, and the breaking current threshold of the brake is not reached. 4. The brake release frequency is set too small, and the breaking current threshold of the brake is not reached.	use, change F20.01 to 0 2. Increase the lifting or lowering brake release frequency, F20.05 or F20.06
E81	The encoder line count is incorrect	1. The encoder line count is set improperly 2. The motor shaft carries load upon self-learning of the encoder line count 3. The motor rated frequency is set improperly	1. Make sure encoder self-learning occurs with no load on the motor shaft. 2. Check the motor parameters (F01.01-F01.06) against the motor nameplate and check the encoder parameters (F01.24-F01.25); after check, execute encoder self-learning;
E87	Fault of suspension after tower crane startup	1. Suspension of heavy object on lifting hook after startup	1. Check whether heavy objects are suspended on the lifting hook.
C27	Lifting zero-servo action warning	1. The joystick does not act, and the brake cannot hold the load due to wear; at this time, the inverter automatically enters the zero-servo state to hold the load from falling.	1. First run downwards to lay the main hook onto the ground; then check if the brake is worn.
C28	Electrified brake testing warning	1. The brake is worn; when the large torque of the second section (F20.26) acts during electrified testing, the error pulse > the set value, and C28 warning occurs	1. Immediately check if the brake is worn.

The following numbers are used to read the fault type through communication:

0	SC	HOC	HOU	SOC	SOU	SLU	ILP	OLP	OL	OH
0	1	2	3	4	5	6	7	8	9	10

E11 and subsequent faults are represented by the numbers behind the letter “E”. For example, “E11” corresponds to the number “11”.

Comparison table of English uppercase display:

a	**b**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**l**
A	B	C	D	E	F	G	H	I	L
N	**O**	**P**	**Q**	**r**	**S**	**T**	**U**	**x**	**Y**
N	O	P	Q	R	S	T	U	X	Y

Chapter 7 Maintenance

Daily Maintenance of Inverter

Due to the operating environment, aging of internal components and other factors, the inverter may have various faults. Thus, the inverter must be regularly maintained during storage and use.

- Before use, check if the inverter has intact external conditions and screws are tight after transportation.
- During the normal operation of the inverter, clean dust on a regular basis and check whether the screws are tightened.
- If the inverter is not in use for a long time, it is recommended to power it on (preferably 30 min) once every six months during storage, to prevent the failure of electronic components.
- The inverter should not be used in a place that exposes it to dampness, vibration, oily dirt and conductive dust. When the inverter needs to operate in such a place, it must be set in an electrical cabinet or cabin with protective measures.

Please check the following items during the normal operation of the inverter:

- Check the motor for abnormal noise, vibration and abnormal heating.
- Check whether the ambient temperature is too high.
- Check whether the output current is normal.
- Check whether the cooling fan of the inverter works properly.

Depending on the usage, the user needs to check the inverter on a regular basis to eliminate faults and safety hazards. For inspection, it is required to turn off the power supply; do not perform the inspection until the lapse of 10 minutes after the keyboard LED goes off. The check content is shown in Table 7-1 Content of regular inspection.

Table 7- 1 Content of regular inspection

Check Item	Check Content	Solution
Screws of main circuit terminals and control circuit terminals	Check whether the screws are loose.	Tighten the screws with a screwdriver.
Heat sink and vent PCB (printed circuit board)	Check them for dust, foreign matters and clogging.	Purge them with dry compressed air (pressure: 4-6 kg/cm^2).
Cooling fan	Check it for abnormal noise and vibration. Check whether the cumulative running time is up to 20,000 hours.	Replace the cooling fan
Electrolytic capacitor	Check it for color changes, odor and bubbles.	Replace the electrolytic capacitor.

In order to make the inverter work properly in a long time, regular maintenance and replacement must be performed regularly based on the service life of its internal components. The service life of the components of the inverter varies depending on the operating environment and conditions.

Table 7- 2 Replacement Intervals of Inverter Components

Name of Part	Standard Replacement Interval (Year)
Cooling fan	2~3 years
Electrolytic capacitor	4~5 years

The operating conditions for replacement of the inverter components listed in the above table are as follows:

Ambient temperature: 40°C

Load factor: Less than 80%.

Operating time: less than 12 hours per day.

Instructions for Inverter Warranty

Our company will provide warranty services for the inverter in the following cases.

The warranty applies to the inverter body only. Our company is responsible for the warranty of the inverter that fails or is damaged within 12 months during normal operation, and will charge reasonable maintenance fees after 12 months.

Certain maintenance fees will also be charged within one year in the following cases:

- The inverter is damaged due to noncompliance with the instructions in this manual during operation;
- The inverter is damaged due to flood, fire, abnormal voltage, etc.;
- The inverter is damaged as a result of incorrect wiring;
- The inverter is damaged due to unauthorized modification.
- The warranty does not cover any damage caused to the inverter by severe environmental conditions, particularly by exposure to conductive dust, salt spray, corrosive gas, condensation, oily dirt and obvious vibration.

Relevant service costs are calculated based on the actual amount, and the principles in the separate agreement will prevail.

Chapter 8 Optional Parts

8.1 Braking resistor

When the braking performance does not meet the customer requirement, it is required to connect an external braking unit and braking resistor to realize timely release of energy.

The power of the braking resistor can be calculated by the following formula:

Resistor power Pb = inverter power P × braking frequency D

D - Braking frequency. This is an estimated value, depending on the load conditions. Under normal circumstances, D is as follows:
Generally D＝10%
D=5% for occasional braking loads
D＝10%~15% for elevators
D＝5%~20% for centrifuges
D＝10%~20% for oilfield kowtow machines
D = 50% to 60% for unwinding and winding. It should be calculated based on the system design indicators.
D = 50% to 60% for lifting equipment with a lowering height over 100m

The following braking resistance and resistor power are recommended when TC760 inverters are used as lifting mechanisms. The resistor power is given based on 50% braking frequency.

Inverter Model	Motor (kW)	Resistance (Ω)	Resistor Power (W)	Wire (mm^2) Connected to Resistor
TC760-4R0-3B	4	≧90	≧2000	2.5
TC760-5R5-3B	5.5	≧60	≧3000	4
TC760-7R5-3B	7.5	≧60	≧4000	4
TC760-011-3B	11	≧30	≧6000	6
TC760-015-3B	15	≧30	≧7500	6
TC760-018-3B	18.5	≧30	≧9000	6
TC760-022-3/3B	22	≧15	≧11000	10
TC760-030-3/3B	30	≧15	≧15000	10
TC760-037-3/3B	37	≧10	≧18500	16
TC760-045-3/3B	45	≧10	≧23000	16
TC760-055-3/3B	55	≧7.5	≧28000	25
TC760-075-3/3B	75	≧6	≧38500	35

Note: The wires listed above refer to the outgoing wires of a single resistor. If resistors are connected in parallel, the bus should be enlarged accordingly. The withstand voltage of the wires should be AC300V or above for the single-phase model and AC450V or above for the three-phase model. Cables should be resistant to 105℃.

8.2 Braking unit

TC760 inverters of 18.5kW or above and without built-in braking units need to be optionally equipped with our BR100 braking units (power range: 18.5~315kW). The models of our braking units are as follows.

Model and specification	Application	Minimum Resistance (Ω)	Average Braking Current I_{av}(A)	Peak Current I_{max}(A)	Applicable Inverter Power (kW)
BR100-045	Energy consumption braking	10	45	75	18.5~45
BR100-160	Energy	6	75	150	55~160

	consumption braking				
BR100-315	Energy consumption braking	3	120	300	185~315

★ When BR100 works with the minimum resistance, the braking unit can work continuously at the braking frequency D=33%.

In the case of D>33%, the braking unit will work intermittently. Otherwise, an over-temperature protection fault will occur.

Selection of Connecting Wires

Since all braking units and braking resistors work at high voltage (>400VDC) and in the discontinuous mode, please select appropriate wires.

Specification and model	Average Braking Current I_{av}(A)	Peak Braking Current I_{max}(A)	Cross-section (mm^2) of Copper-core Cable
BR100-045	45	75	10
BR100-160	75	150	16
BR100-315	120	300	25

Flexible cables have higher flexibility. Because cables may be in contact with high-temperature devices, it is recommended to use copper-core and heat-resistant flexible cables or flame-retardant cables. The braking unit should be as close to the inverter and braking resistor as possible with the maximum distance of preferably no more than 2m. Otherwise, the DC-side cables should be twisted and used with magnetic rings to reduce radiation and inductance.

8.3 Optional part card

I/O expansion card

Specification and model	Description	Terminal Function
EC-IO-A1	I/O expansion card	4-channel multi-functional digital signal input: X8~X11 1-channel digital signal output: The function of Y3 is set by function code F03.04 1-channel analog signal input: AI4, support -10V~+10V voltage input or PT100/PT1000 temperature sensor input
EC-IO-A2	I/O expansion card	3-channel multi-functional digital inputs: X8, X9 and X10 2-channel relay outputs R3 and R4 are set by F03.32 and F03.33

Expansion card for communication card

Specification and model	Description	Communication rate
EC-CM-C1	CANopen communication card	125kbps, 250kbps, 500kbps, 1Mbps
EC-CM-D1	DeviceNet communication card	125kbps, 250kbps, 500kbps
EC-CM-P1	Profibus-DP communication card	Self adaptation of baud rate

Encoder expansion card (PG card)

For TC760 inverters, there are multiple types of general PG cards available for the user to choose according to the encoder output mode, as shown in the following table:

Specification and model	Item	Encoder type supported
EC-PG-01	Open-collector PG card	Open-collector, complementary push-pull or voltage output encoder
EC-PG-02	Open-collector PG card, with frequency dividing output	Open-collector, complementary push-pull or voltage output encoder
EC-PG-D1	Differential PG card	Differential output or cable-saving UVW differential output encoder
EC-PG-D3	Differential PG card, with frequency dividing output	Differential output or cable-saving UVW differential output encoder
EC-PG-U1	UVW differential PG card	UVW differential output encoder
EC-PG-R1	Rotary transformer PG card	Rotary transformer output encoder

Chapter 9 Function Code Table

Description of Function Code Table

The function codes of the TC760 series inverter (hereinafter referred to as the "function codes") are divided into 22 groups in Table 9-1, 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 fault record group used to view the details of the last three faults; and other groups are parameter setting groups to meet different functional requirements.

Table 9- 1 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**	Fault record group
F20	Special basic function groups for lifting	**F21**	Special advanced function groups for lifting

★: 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.

★ Parameter properties: ●: Parameters that can be changed in any state; ○: Parameters that cannot be changed in the operating state; ×: Read-only parameters.

Table of functional parameters

Function code	Function code name	Parameter description	Unit	Default setting	Attribute
F00	**Basic function parameter group**				
F00.01	Drive control mode of motor 1	0: V/F control (VVF) 1: Speed sensorless vector control (SVC) 2: Speed sensor vector control (FVC)		0	○
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)		0	○
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: AI3 4: AI4 (expansion card) 6: Percentage setting of main frequency communication 7: Direct setting of main frequency communication		0	○
F00.05	Options of auxiliary frequency source B	0: digital frequency setting F00.07 1: AI1 2: AI2 3: AI3 4: AI4 (expansion card) 5: high frequency pulse input (X7) 6: percent setting of auxiliary frequency communication 7: direct setting of auxiliary frequency communication		0	
F00.06	Options of frequency source	0: main frequency source A 1: auxiliary frequency source B 2: main and auxiliary operation results		0	○
F00.07	Digital frequency setting	0.00Hz to maximum frequency	Hz	0.00	●
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		0	
F00.09	Reference options of auxiliary frequency source B in main and auxiliary operation	0: relative to the 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		0	○

		1: AI1 * synthetic frequency of main and auxiliary channels 2: AI2 * synthetic frequency of main and auxiliary channels 3: AI3* synthetic frequency of main and auxiliary channels 4: AI4* synthetic frequency of main and auxiliary channels 5: High frequency pulse (PULSE) * synthetic frequency of main and auxiliary channels			
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	15.00	●
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	15.00	●
F00.16	Maximum frequency	20.00~600.00	Hz	50.00	○
F00.17	Options of upper frequency limit control	0: set by F00.18		0	○
F00.18	Upper frequency limit	Lower frequency limit F00.19 to maximum frequency F00.16	Hz	50.00	●
F00.19	Lower frequency limit	0.00to upper frequency limit F00.18	Hz	0.00	●
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	0.00	●
F00.23	Carrier frequency	1.0~16.0 (rated power of the inverter: 4kW) 1.0~10.0 (rated power of the inverter: 5.5~7.5kW) 1.0~8.0 (rated power of the inverter: 11.00~45.00kW) 1.0~4.0 (rated power of the inverter: 55.00~90.00kW) 1.0~3.0 (rated power of the inverter: 110.00~400.00kW)	kHz	2.0	●
F00.24	Automatic adjustment of carrier frequency	0: Invalid 1: valid		1	○
F00.28	Options of motor parameter group	0: parameter group of motor 1		0	○
F00.29	User password	0~65535		0	○
F00.30	Model selection	0: G type 1: P type		0	○
F00.31	Frequency resolution	0：0.01Hz 1: 0.1Hz (speed unit: 10rpm)		0	○

F00.32	Frequency point corresponding to the lower limit of carrier frequency	0.00~F0.33	Hz	20.00	○
F00.33	Frequency point corresponding to the upper limit of carrier frequency	10.00~150.00	HZ	50.00	○
F00.34	Lower limit of carrier frequency	1.0~F00.23	kHz	2.0	○
F00.35	Input voltage selection	0: 380V 1: 440V		0	○
F00.36	Start/stop channel selection for communication control	0: Modbus 1: Profinet 2: EtherCAT 3: CANopen 10: All protocols are valid		0	○
F00.37	Communication-specific channel selection			0	○
F00.38	Parameter locking function selection	0: Locked for all command channels 1: Only the keyboard locked		0	○
F00.39	Single-brush and double-brush PWM switch control	0: Single-brush 1: Double-brush 2: Automatic switch		0	○
F01	**Parameter group of motor 1**				
F01.00	Motor type	0: ordinary asynchronous motor 1: variable-frequency asynchronous motor		0	○
F01.01	Rated power of electric motor	0.10~650.00	kW	4.00	○
F01.02	Rated voltage of motor	50~2000	V	380	○
F01.03	Rated current of motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.1~6000.0 (rated power of motor: >75kW)	A	8.80	○
F01.04	Rated frequency of motor	0.01~600.00	Hz	50.00	○
F01.05	Rated speed	50~60000	rpm	1440	○
F01.06	Motor winding connection	0: Y 1: Δ		1	○
F01.07	Rated power factor of motor	0.600~1.000		0.820	○
F01.08	Motor efficiency	30.0~100.0	%	85.0	○
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	4740	○
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	3120	○
F01.11	Leakage inductance of asynchronous motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.001~60.000 (rated power of motor: > 75 kW)	mH	24.60	○

F01.12	Mutual inductance of asynchronous motor	0.1~6000.0 (rated power of motor: ≤75kW) 0.01~600.00 (rated power of motor: >75kW)	mH	481.2	○
F01.13	No-load excitation current of asynchronous motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.1~6000.0 (rated power of motor: >75kW)	A	4.00	○
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 f asynchronous motor	10.00~100.00	%	75.00	○
F01.17	Flux weakening coefficient 4 f asynchronous motor	10.00~100.00	%	72.00	○
F01.18	Flux weakening coefficient 5 f asynchronous motor	10.00~100.00	%	70.00	○
F01.19	Stator resistance of synchronous motor	1~60000 (rated power of motor: ≤ 75 kW) 0.1~60.000 (rated power of motor: > 75 kW)	mΩ	Depending on the motor type	○
F01.20	d-axis inductance of synchronous motor	0.01~600.00 (rated power of motor: ≤ 75 kW) 0.001~60.000 (rated power of motor: > 75 kW)	mH	Depending 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: > 75 kW)	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	○
F01.24	Encoder type	0: ABZ gain encoder 4: Rotary transformer		0	○
F01.25	Encoder line count	1~65535		1024	○
F01.26	Zero-pulse phase angle of encoder	0.0~359.9°		0.0	
F01.27	AB pulse phase sequence	0: forward 1: reverse		0	○

F01.30	Pole pairs of rotary transformer	1~65535		1	○
F01.31	High-frequency filter coefficient of encoder	0~1		10	
F01.32	Detection time of speed feedback disconnection	0.0~10.0 (0.0: inactive detection of speed feedback disconnection)	s	0.0	○
F01.33	Speed feedback filtering time	0.000~30.000	s	0.002	○
F01.34	Motor parameter self-learning	0: No operation 1: static self-learning of asynchronous motor 2: rotation self-learning of asynchronous motor 10: No operation 11: static self-learning of asynchronous motor 12: rotation self-learning of asynchronous motor		0	○
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) 9: free stop 10: reset fault 11: multi-segment speed terminal 1 12: multi-segment speed terminal 2 13: multi-segment speed terminal 3 14: multi-segment speed terminal 4 19: acceleration and deceleration time terminal 1 20: acceleration and deceleration time terminal 2 21: Acceleration and deceleration prohibition 22: operation pause 23: external fault input 30: motor 1/motor 2 switching 33: Zero-servo command		1	○
F02.01	Options of X2 digital input function			2	○
F02.02	Options of X3 digital input function			11	○
F02.03	Options of X4 digital input function			12	○
F02.04	Options of X5 digital input function			13	○
F02.05	Options of X6 digital input function			14	○
F02.06	Options of X7 digital input function			10	○
F02.07	Options of AI1 digital input function			58	○
F02.08	Options of AI2 digital input function			0	○
F02.09	Options of AI3 digital input function			0	○
F02.10	Options of AI4 digital input function (expansion card)			0	○
F02.11	Options of X8 digital input function (expansion card)			0	○
F02.12	Options of X9 digital input function (expansion			0	○

<table>
<tr><td></td><td>card)</td><td colspan="5"></td></tr>
<tr><td>F02.13</td><td>Options of X10 digital input function (expansion card)</td><td colspan="5"></td><td></td><td>0</td><td>○</td></tr>
<tr><td colspan="2">45: stop and DC braking
46: DC braking at stop
47: immediate DC braking
48: fastest deceleration to stop
50: external stop
57: inverter enabling
58: Brake inspection
59: Brake release feedback
60: Brake closing feedback</td><td colspan="5">61: Absolute distance matchup
62: Positioning run
65: Forward stop switch
66: Reverse stop switch
67: Positioning point shielding
68: Motor 1/Motor 2 switching (active when the braking logic is inactive)
166: Electrified brake testing
172: Ultra-low-speed running</td><td colspan="3"></td></tr>
<tr><td rowspan="3">F02.15</td><td rowspan="3">Positive/negative logic 1 of digital input terminal</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>*</td><td>X7</td><td>X6</td><td>X5</td><td>X4</td><td>X3</td><td>X2</td><td>X1</td></tr>
<tr><td colspan="8">0: positive logic is valid in the closed state/invalid in the open state
1: negative logic is valid in the closed state/invalid in the open state</td></tr>
<tr><td rowspan="3">F02.16</td><td rowspan="3">Positive/negative logic 2 of digital input terminal</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>X11</td><td>X10</td><td>X9</td><td>X8</td><td>AI4</td><td>AI3</td><td>AI2</td><td>AI1</td></tr>
<tr><td colspan="8">0: positive logic is valid in the closed state/invalid in the open state
1: negative logic is valid in the closed state/invalid in the open state</td></tr>
<tr><td>F02.17</td><td>Filtering times of digital input terminal</td><td colspan="5">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 colspan="5">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 colspan="5">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 colspan="5">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 colspan="5">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 colspan="5">0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.23</td><td>X3 invalid delay time</td><td colspan="5">0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.24</td><td>X4 valid delay time</td><td colspan="5">0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.25</td><td>X4 invalid delay time</td><td colspan="5">0.000~30.000</td><td>s</td><td>0.000</td><td>●</td></tr>
<tr><td>F02.26</td><td>Minimum input pulse frequency</td><td colspan="5">0.00 to maximum input pulse frequency F02.28</td><td>kHz</td><td>0.00</td><td>●</td></tr>
<tr><td>F02.27</td><td>Minimum input setting</td><td colspan="5">–100.0~+100.0</td><td>%</td><td>0.0</td><td>●</td></tr>
<tr><td>F02.28</td><td>Maximum input pulse frequency</td><td colspan="5">0.01~100.00</td><td>kHz</td><td>50.00</td><td>●</td></tr>
<tr><td>F02.29</td><td>Maximum input setting</td><td colspan="5">–100.0~+100.0</td><td>%</td><td>100.0</td><td>●</td></tr>
<tr><td>F02.30</td><td>Pulse input filtering time</td><td colspan="5">0.00~10.00</td><td>s</td><td>0.10</td><td>●</td></tr>
</table>

F02.31	Options of analog input function	**Ones place:** AI1 **Tens place:** AI2 **Hundreds place:** AI3 **Thousands place:** AI4 (expansion card) 0: analog input 1: digital input (0 below 1V, 1 above 3V, the same as last time under 1-3V)		0000D	○
F02.32	Options of analog input curve	**Ones place:** Options of AI1 curve **Tens place:** AI2 curve selection **Hundreds place:** Options of AI3 curve **Thousands place:** Options of AI4 curve 0: curve 1 1: curve 2 2: curve 3 3: curve 4		3210D	○
F02.33	Minimum input of curve 1	0.00~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	F02.33~10.00	V	9.90	●
F02.36	Maximum input setting of curve 1	–100.0~+100.0	%	100.0	●
F02.37	Minimum input of curve 2	-10.00~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	F02.37~10.00	V	9.90	●
F02.40	Maximum input setting of curve 2	–100.0~+100.0	%	100.0	●
F02.41	Minimum input of curve 3	0.00V~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	0.000~10.000	s	0.100	●
F02.58	AI2 filtering time	0.000~10.000	s	0.100	●
F02.59	AI3 filtering time	0.000~10.000	s	0.100	●
F02.60	AI4 filtering time (expansion card)	0.000~10.000	s	0.100	●
F02.61	AD sampling hysteresis	2~50		2	○
F02.62	Selection of analog input AI1 type	0: 0~10V 3: -10~10V 4: 0~5V		0	○
F02.63	Selection of analog input AI2 type	0: 0~10V 1: 4~20mA 2: 0~20mA 4: 0~5V		1	○
F06.64	Analog input AI3 type selection	0: 0~10V 1: 4~20mA 2: 0~20mA 4: 0~5V		0	○
F02.65	Analog input AI4 type selection (expansion card)	0: 0~10V 2: Reserved 3: -10~10V 4: 0~5V		2	○
F03	**Output terminal function group**				

<table>
<tr><td>F03.00</td><td>Options of Y1 output function</td><td rowspan="4">0: no output
1: inverter running (RUN)
2: up to output frequency (FAR)
3: output frequency detection FDT1
4: output frequency detection FDT2
5: reverse running (REV)</td><td></td><td>7</td><td>○</td></tr>
<tr><td>F03.01</td><td>Options of Y2 output function</td><td></td><td>33</td><td>○</td></tr>
<tr><td>F03.02</td><td>Options of R1 output function</td><td></td><td>28</td><td>○</td></tr>
<tr><td>F03.03</td><td>Options of R2 output function</td><td></td><td>7</td><td>○</td></tr>
<tr><td>F03.04</td><td>Options of Y3 output function (expansion card)</td><td></td><td>0</td><td>○</td></tr>
<tr><td colspan="2">6: jog
7: inverter fault
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</td><td>17: motor overload pre-alarm
18: inverter overheat pre-alarm
23: Zero-servo
24: undervoltage state
27: zero-speed running
28: Brake control
29: Brake inspection prompt
30: Overload protection enabled
31: Low-voltage protection enabled
33: Brake failure
34: Motor fan control
35: Weighing disconnection or overweight warning output
37: Rotray eddy current control
43: Abnormal electrified brake testing</td><td colspan="3"></td></tr>
<tr><td rowspan="3">F03.05</td><td rowspan="3">Options of output signal type</td><td>D7 D6 D5 D4 D3 D2 D1 D0</td><td></td><td rowspan="2">00000</td><td rowspan="2">○</td></tr>
<tr><td>* * * * R2 R1 Y2 Y1</td><td></td></tr>
<tr><td>0: level 1: single pulse</td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">F03.06</td><td rowspan="3">Positive/negative logic of digital output</td><td>D7 D6 D5 D4 D3 D2 D1 D0</td><td></td><td rowspan="2">00000</td><td rowspan="2">○</td></tr>
<tr><td>* R4 R3 * R2 R1 Y2 Y1</td><td></td></tr>
<tr><td>0: positive logic is valid in the closed state/invalid in the open state
1: negative logic is valid in the closed state/invalid in the open state</td><td></td><td></td><td></td></tr>
<tr><td>F03.07</td><td>Options of Y2 output type</td><td>0: ordinary digital output 1: high frequency pulse output</td><td></td><td>0</td><td>○</td></tr>
<tr><td rowspan="3">F03.08</td><td rowspan="3">Output status control in jog</td><td colspan="8">D7 D6 D5 D4 D3 D2 D1 D0</td><td></td><td rowspan="3">00000</td><td rowspan="3">○</td></tr>
<tr><td colspan="8">* * * REV FDT2 FDT1 FAR RUN</td></tr>
<tr><td colspan="8">0: valid in jogging 1: invalid in jogging</td></tr>
<tr><td>F03.09</td><td>Y1 valid delay time</td><td colspan="3">0.000~30.000</td><td>s</td><td>0.00</td><td>●</td></tr>
<tr><td>F03.10</td><td>Y1 invalid delay time</td><td colspan="3">0.000~30.000</td><td>s</td><td>0.00</td><td>●</td></tr>
<tr><td>F03.11</td><td>Y2 valid delay time</td><td colspan="3">0.000~30.000</td><td>s</td><td>0.00</td><td>●</td></tr>
<tr><td>F03.12</td><td>Y2 invalid delay time</td><td colspan="3">0.000~30.000</td><td>s</td><td>0.00</td><td>●</td></tr>
</table>

F03.13	R1 valid delay time	0.000~30.000	s	0.00	●
F03.14	R1 invalid delay time	0.000~30.000	s	0.00	●
F03.15	R2 valid delay time	0.000~30.000	s	0.00	●
F03.16	R2 invalid delay time	0.000~30.000	s	0.00	●
F03.17	Single pulse time of Y1 output	0.000~30.000	s	0.250	●
F03.18	Single pulse time of Y2 output	0.000~30.000	s	0.250	●
F03.19	Single pulse time of R1 output	0.000~30.000	s	0.250	●
F03.20	Single pulse time of R2 output	0.000~30.000	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		0	○
F03.22	Options of analog output M2			2	○
F03.23	Y2 high frequency pulse output function	For details, see the Analog output terminal functions table		11	○
F03.24	Frequency corresponding to 100% of Y2 high frequency pulse output	0.00~100.00	kHz	50.00	●
F03.25	Frequency corresponding to 0% of Y2 high frequency pulse output	0.00~100.00	kHz	0.00	●
F03.27	M1 output bias	-100.0~100.0	%	0.0	●
F03.28	M1 output gain	-10.00~10.00		1.000	●
F03.29	M2 output bias	-100.0~100.0	%	0.0	●
F03.30	M2 output gain	-10.00~10.00		1.000	●
F03.31	Control logic options of PLC output terminal	D7 D6 D5 D4 D3 D2 D1 D0 * R4 R3 * R2 R1 Y2 Y1 0: no output 1: Output		00000	●
F03.32	Options of R3 output function (expansion card)	For details, refer to introduction to F03.02		0	○
F03.33	Options of R4 output function (expansion card)	For details, refer to introduction to F03.02		0	○
F03.34	Output type selection of analog quantity M1	0: 0~10V 1: 4~20mA 2: 0~20mA		0	○
F03.35	Output type selection of analog quantity M2			1	○

F04	Start/stop control parameter group				
F04.00	Start-up method	0: direct start		0	○
F04.01	Start frequency	0.00~10.00	Hz	0.00	○
F04.02	Start frequency hold time	0.00~60.00, 0.00 invalid	s	0.00	○
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	○
F04.05	Demagnetization time for start of DC braking	0.00~30.00	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		01	○
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 = the rated current of inverter)	%	50.0	○
F04.12	Speed tracking compensation gain	1.00~10.00		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	Set the same range as F04.15	s	1.00	●
F04.17	Starting time of S curve in deceleration	Set the same range as F04.15	s	1.00	●
F04.18	Ending time of S curve in deceleration	Set the same range as F04.15	s	1.00	●
F04.19	Stop mode	0: slow down to stop 1: free stop		0	○
F04.20	Starting frequency of DC braking in stop	0.00 to maximum frequency F00.16	Hz	0.00	○

F04.21	DC braking current in stop	0.0~100.0 (100.0 = rated current of motor)	%	50.0	○
F04.22	DC braking time in stop	0.00~30.00 0.00: invalid	s	0.00	○
F04.23	Demagnetization time for DC braking in stop	0.00~30.00	s	0.50	○
F04.24	Flux braking gain	100~200 (100: no flux braking)		100	○
F04.26	Start mode after failure/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		0	○
F04.28	Minimum valid output frequency	0.00~50.00 (0.00: function invalid)	Hz	0	○
F04.29	Zero speed check frequency	0.00~5.00	Hz	0.25	●
F04.30	Initial magnetic pole search mode of synchronous motor	0: Invalid 1: Mode 1		1	●
F05	**V/F control parameter group**				
F05.00	V/F curve setting	0: straight line V/F 1: multi-point broken line V/F		1	○
F05.01	Frequency point F1 of multi-point VF	0.00~F05.03	Hz	0.50	●
F05.02	Voltage point V1 of multi-point VF	0.0~100.0 (100.0 = Rated voltage)	%	1.0	●
F05.03	Frequency point F2 of multi-point VF	F05.01~F05.05	Hz	2.00	●
F05.04	Voltage point V2 of multi-point VF	0.0~100.0	%	4.0	●
F05.05	Frequency point F3 of multi-point VF	F05.03 to rated frequency of motor (reference frequency)	Hz	5.00	●
F05.06	Voltage point V3 of multi-point VF	0.0~100.0	%	10.0	●
F05.07	Voltage source of VF separation mode	0: digital setting of VF separation voltage 1: AI1 2: AI2 3: AI3 4: high frequency pulse (X7) 5: PID 6: Communication setting Note: 100% is the rated voltage of the motor.		0	○
F05.08	Digital setting of VF separation voltage	0.0~100.0 (100.0=Rated voltage of motor)	%	0.0	●
F05.09	Rise time of VF	0.00~60.00	s	2.00	●

	separation voltage				
F05.10	Compensation gain of V/F stator voltage drop	0.00~200.00	%	0.00	●
F05.11	V/F slip compensation gain	0.00~200.00	%	0.00	●
F05.12	V/F slip filtering time	0.00~100.00	s	1.00	●
F05.13	Oscillation suppression gain	0~20000		300	●
F05.14	Oscillation suppression cutoff frequency	0.00~600.00	Hz	55.00	●
F05.15	Droop control frequency	0.00~10.00	Hz	0.00	●
F05.16	Energy saving rate	0.00~50.00	%	0.00	●
F05.17	Energy saving action time	1.00~60.00	s	5.00	●
F05.18	Flux compensation gain of synchronous motor	0.00~500.00	%	100.00	●
F05.19	Filtering time constant of flux compensation of synchronous motor	0.00~10.00	s	0.50	●
F05.20	Change rate of VF separate power supply setting	–50.00~50.00	%	0.00	●
F06	**Vector control parameter group**				
F06.00	Speed proportional gain ASR_P1	0.00~100.00		12.00	●
F06.01	Speed integral time constant ASR_T1	0.000~30.000 0.000: no integral	s	0.250	●
F06.02	Speed proportional gain ASR_P2	0.00~100.00		10.00	●
F06.03	Speed integral time constant ASR_T2	0.000~30.000 0.000: no integral	s	0.300	●
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	0.001	●
F06.08	Vector control slip gain	10.00~200.00	%	100.00	●
F06.09	Upper limit source selection of speed control	0: set by F06.10 and F06.11		0	○

	torque				
F06.10	Upper limit of speed control motor torque	80.0~250.0	%	165.0	●
F06.11	Upper limit of speed control brake torque	80.0~250.0	%	165.0	●
F06.12	Excitation current proportional gain ACR-P1	0.00~10.00		0.50	●
F06.13	Excitation current integral time constant ACR-T1	0.00~300.00 0.00: no integral	s	10.00	●
F06.14	Torque current proportional gain ACR-P2	0.00~10.00		0.50	●
F06.15	Torque current integral time constant ACR-T2	0.00~300.00 0.00: no integral	s	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	0.0~400.0	%	100.0	
F06.20	Voltage feedforward gain	0~100	%	0	●
F06.21	Flux weakening control options	Ones place: Asynchronous flux weakening mode 0: No PI adjustment output 1: PI adjustment output Tens place: Output voltage limiting method of asynchronous motor in the flux weakening mode 0: F06.22 output voltage limiting according to bus voltage 1: F06.22 output voltage limiting according to rated voltage		12	○
F06.22	Flux weakening coefficient	70.00~100.00	%	100.00	●
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		0.50	●
F06.25	Integral time of flux weakening regulator	0.000~60.000	s	0.200	●
F06.26	MTPA control options of synchronous motor	0: Invalid 1: valid		1	○
F06.27	Self-learning gain at	0~200	%	100	●

	initial position				
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	0.0~200.0 (100.0 is the rated current of the motor)	%	40.0	●
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 f 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		0.60	○
F06.37	Stiffness coefficient of speed loop	0~20		11	●
F06.40	Amplitude of injected reactive current of synchronous motor	-50.0~+50.0	%	10.0	○
F06.41	Open-loop low-frequency processing of synchronous motor	0:VF 1:IF 2: IF in start and VF in stop 3: Throughout SVC		0	○
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	%	80.0	○
F06.44	Time constant of pull-in current of magnetic pole	0.0~6000.0	ms	1.0	○
F06.45	Initial lead angle of	0.0~359.9	°	0.0	○

	magnetic pole				
F06.46	Speed tracking proportional gain of synchronous motor	0.00~10.00		1.00	○
F06.47	Speed tracking integral gain of synchronous motor	0.00~10.00		1.00	○
F06.48	Filtering time constant of speed tracking of synchronous motor	0.00~10.00	ms	0.40	○
F06.49	Speed tracking control intensity of synchronous motor	1.0~100.0		5.0	○
F06.50	Speed tracking control threshold of synchronous motor	0.00~10.00		0.20	○
F06.51	Rise time of injected active current of synchronous motor	0.1~50.0	s	5.0	○
F06.76	Low-speed correction factor of stator resistor of asynchronous motor	10.0~500.0	%	100.0	●
F06.77	Low speed correction factor of rotor resistor of asynchronous motor	10.0~500.0	%	100.0	●
F06.78	Slip gain switching frequency of asynchronous motor	0.10~Fmax	Hz	5.00	○
F06.79	Speed ring differential time constant ASR_Td1	0.000~10.000	S	0	●
F06.80	Speed ring differential time constant ASR_Td2	0.000~10.000	S	0	●
F06.81	Speed ring differential limit	0.0~150.0	%	0	●
F06.82	Filtering time constant of bus voltage	0.0~1500.0	ms	8.0	●
F07	**Protection function setting group**				
F07.00	Protection shield	E20 E22 E13 E06 E05 E04 E07 E08 0: valid protection 1: shielded protection		000 00000	○
F07.01	Motor overload protection gain	0.20~10.00		1.00	●
F07.02	Motor overload pre-alarm coefficient	50~100	%	80	●

F07.03	Motor temperature sensor type	0: No temperature sensor 1: PT100 2: PT1000 3: KTY84-130/150 4: PTC-130/150		0	●
F07.04	Motor overheat protection threshold	0~200	℃	110	●
F07.05	Motor overheat pre-alarm threshold	0~200	℃	90	●
F07.06	Bus voltage control options	0: Invalid 1: valid in undervoltage stall 2: valid in overvoltage stall 3: valid in overvoltage and undervoltage stall		0	○
F07.07	Voltage of overvoltage stall control	120.0%~150.0% (380V,100.0%=537V)	%	134.1	○
F07.08	Voltage of undervoltage stall control	60.0 to instantaneous stop/no-stop recovery voltage (100.0 = standard bus voltage)	%	76.0	○
F07.09	Ending voltage of power failure	Instantaneous stop/no-stop recovery voltage~100.0	%	86.0	○
F07.10	Delay time of end of power failure	0.00~100.0	s	0.50	○
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	Number of retries after failure	0~20, 0: disable retry after failure		0	○
F07.15	Options of digital output action in retries after failure	0: no action 1: action		0	○
F07.16	Interval of retries after failure	0.01~30.00	s	0.50	●
F07.17	Restoration time in retries after failure	0.01~30.00	s	10.00	●
F07.18	Options of retries after failure	E08 * E07 * E02 E06 E05 E04 0: allow retry after failure 1: disable retry after failure		000000	○
F07.19	Action option 1 after failure	E21 E16 E15 E14 E13 E12 E08 E07 0: free stop 1: stop according to stop mode		00000000	○
F07.20	Action option 2 after failure	E28 E27 E25 E23 0: free stop 1: stop according to stop mode		0000	○

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: fault reporting and free stop 1: fault reporting and stop according to the stop mode		1	○
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		1	○
F07.28	Stall fault detection time	0.0-6000.0, (0.0: stall faults are not detected)	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	Options of retries after failure 2	E10 E13 E15 E16 * E19 E20 * 0: allow retry after failure 1: disable retry after failure		11111111	○
F07.34	Encoder disconnection detection percentage	0~150.0	%	100.0	○
F07.35	Protection shield 2	* * * * * E18 E81 0: valid protection 1: shielded protection		000 00000	○
F07.36	Options of retries after failure 3	* * * * * * E09 E17 0: allow retry after failure 1: disable retry after failure		11	○
F07.37	Initial voltage for saving upon power disconnection	60.0~F07.38	%	76.0	○
F07.38	Electrification voltage reading and determination	F07.37~100.0	%	86.0	○
F07.39	Delay time of electrification reading and determination	0~100.0	S	5.00	○
F07.40	Delay time of steady undervoltage determination	50~6000	ms	20	○
F07.41	Selection of input phase loss detection method	0: Software detection 1: Hardtware detection 2: Simultaneous software and hardware detection		0	○

F07.42	Setting value of current for determining short to ground	0.00~100.0	%	20.0	○
F07.43	Warning shield	* * * * * C32 C31 C30 0: Warning valid 1: Warning shielded		00000000	○
F07.44	Upper limit of current for output phase loss detection	10.0~100.0	%	30.0	○
F07.45	Times of output phase loss detection	1~60000		10	○
F07.46	Times of determining ILP hardtware detection	5~10000		100	●
F07.47	Soft start disconnection delay time	20~1000	mS	400	○
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 **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	**Ones place:** Running direction options		0	●

	segment	0: forward 1: reverse **Tens place:** Acceleration and deceleration time options 0: acceleration and deceleration time 1 2: acceleration and deceleration time 3 1: acceleration and deceleration time 2 3: acceleration and deceleration time 4			
F08.20	Running time of the first segment	0.0~6000.0	s/min	5.0	●
F08.21	Setting of the second segment	**Same as F08.19**		0	●
F08.22	Running time of the second segment	0.0~6000.0	s/min	5.0	●
F08.23	Setting of the third segment	**Same as F08.19**		0	●
F08.24	Running time of the third segment	0.0~6000.0	s/min	5.0	●
F08.25	Setting of the fourth segment	**Same as F08.19**		0	●
F08.26	Running time of the fourth segment	0.0~6000.0	s/min	5.0	●
F08.27	Setting of the fifth segment	**Same as F08.19**		0	●
F08.28	Running time of the fifth segment	0.0~6000.0	s/min	5.0	●
F08.29	Setting of the sixth segment	**Same as F08.19**		0	●
F08.30	Running time of the sixth segment	0.0~6000.0	s/min	5.0	●
F08.31	Setting of the seventh segment	**Same as F08.19**		0	●
F08.32	Running time of the seventh segment	0.0~6000.0	s/min	5.0	●
F08.33	Setting of the eighth segment	**Same as F08.19**		0	●
F08.34	Running time of the eighth segment	0.0~6000.0	s/min	5.0	●
F08.35	Setting of the nineth segment	**Same as F08.19**		0	●
F08.36	Running time of the ninth segment	0.0~6000.0	s/min	5.0	●
F08.37	Setting of the tenth segment	**Same as F08.19**		0	●

F08.38	Running time of the tenth segment	0.0~6000.0	s/min	5.0	●
F08.39	Setting of the eleventh segment	**Same as F08.19**		0	●
F08.40	Running time of the eleventh segment	0.0~6000.0	s/min	5.0	●
F08.41	Setting of the twelve segment	**Same as F08.19**		0	●
F08.42	Running time of the twelfth segment	0.0~6000.0	s/min	5.0	●
F08.43	Setting of the thirteenth segment	**Same as F08.19**		0	●
F08.44	Running time of the thirteenth segment	0.0~6000.0	s/min	5.0	●
F08.45	Setting of the fourteenth segment	**Same as F08.19**		0	●
F08.46	Running time of the fourteenth segment	0.0~6000.0	s/min	5.0	●
F08.47	Setting of the fifteenth segment	**Same as F08.19**		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 setting4: AI4 (expansion card) 1: AI1 5: PULSE, high-frequency pulse (X7) 2: AI2 6: Communication setting 3: AI3		0	○
F09.01	Digital PID setting	0.0 to PID setting feedback range F09.03		0.0	●
F09.02	PID feedback source	1: AI1 5: PULSE, high-frequency pulse (X7) 2: AI2 6: Communication setting 3: AI3 7: Reserved 4: AI4 (expansion card) 8: output torque		1	○
F09.03	PID setting feedback range	0.1~6000.0		100.0	●
F09.04	PID positive and negative action selection	Ones place: 0: positive 1: negative Tens place: Direction selection of positive and negative action follow-up command 0: Not follow 1: Follow		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	10.000	●
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	10.000	●
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		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	F09.17~+100.0	%	100.0	●
F09.17	Lower limit of PID output	–100.0~F09.16	%	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 disconnection	0.00~100.00 100.00 = invalid feedback disconnection	%	100.00	●
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	Lower limit of feedback voltage	Lower limit of feedback voltage to 10.00	V	10.00	●
F09.36	Upper limit of feedback voltage	0.00 to upper limit of feedback voltage	V	0.00	●
F09.37	Options of integral action within the set change time of PID	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	●
F09.38	Input deviation of integral action within the set change time of PID	0.00~100.00	%	30	●
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	bar	6.0	●
F09.42	Overpressure protection time	0~3600 (0 means that the function is unavailable)	s	0	●
F09.43	PID reverse limit	0: Invalid 1: valid		0	○
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 3: 38400 1: 9600 4: 57600 2: 19200 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		0	○

		check bit + 2 stop bits)			
F10.03	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 (broadcast transmission)		0	○
F10.07	Data sent by host	0: output frequency 3: set torque 1: set frequency 4: PID setting 2: output torque 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 2: CANopen protocol		0	○
F10.11	Profibus-DP card communication address	1~125		1	
F10.12	Communication address of CANopen expansion card	1~127		1	○
F10.13	Communication address of DeviceNet expansion card	1~63		1	
F10.14	Delay time of communication card process data response	0.0~200.0	ms	0.0	○
F10.15	Baud rate of communication between the expansion card and the bus	Ones place: CANopen 0: 125K 1: 250K 2: 500K 3: 1M		23	○
F10.17~ F10.31	Selection of data type received by PZD2~PZD16	When data 65535 is displayed, it means the current PZD remains unused; when other data, say 4609, is displayed, it means the currently selected function code is F18.01 (18D=12H, 01D=01H, 1201H=4609D).		65535	○
F10.32~ F10.46	Selection of data type sent by PZD2~PZD16			65535	○
F10.47	Communication card status	**Ones place: Reserved** **Tens place: CANopen** 0: Initialization 1: Pre-operation 2: Operation		000	×

		3: Stop 4: CANopen communication abnormality 5: Modbus communication abnormality 6: Factory testing **Hundreds place: Reserved**			
F10.48	Communication card software version				×
F10.49	Quantity of process data received	1~16		2	●
F10.50	Quantity of process data sent	1~16		2	●
F10.51	Selection of address setting mode for process data	0: Keyboard setting 1: Master station configuration		0	●
F10.52	Selection of communication card manual resetting	0: Invalid 1: valid		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		150	●
F10.59	CANopen communication timeout	0.10~600.00	S	600.00	S
F10.60	Inverter power-on indicator	0~1		1	×
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	○
F10.62	CANopen self check identification code	0~65535		0	×
F11	**User-selected array (see the user's manual)**				
F12	**Keyboard and display function group**				
F12.00	M.K multi-function key options	0: ESC 1: forward jog 2: reverse jog 3: forward/reverse switching 4: quick stop 5: free stop 6: cursor movement to the left		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		0	○
F12.04	LED display parameter 1	00000000~11111111 (not displayed in case of 0 and displayed in case of 1) bit0: Output frequency bit1: Set frequency bit2: Output current bit3: Output voltage bit4: DC bus voltage bit5: Output power bit6: Output torque bit7: Set torque		00011111	●
F12.05	LED display parameter 2	00000000~01011101 (not displayed in case of 0 and displayed in case of 1) bit0: PG card feedback frequency bit1: Reserved bit2: load speed bit3: Digital input terminal status 1 bit4: Digital input terminal status 2 bit5: Reserved bit6: digital output terminal state bit7: Reserved		00000000	●
F12.09	Load speed display coefficient	0.01~600.00		30.00	●
F12.10	UP/DOWN acceleration and deceleration rate	0.00: automatic rate 0.01~500.00	Hz/s	5.00	○
F12.11	Options of UP/DOWN offset clearing	0: do not clear 1: clear in non-running state 2: clear when UP/DOWN invalid		0	○
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 default setting	0: No operation 1: restoration of factory defaults (excluding the motor parameters, inverter parameters,		0	○

		manufacturer parameters, running and power-on time record)			
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		0	●
F12.32	Keyboard monitoring mode options	0: mode 0 1: mode 1		1	●
F12.33	Running status display parameter 1 of mode 1	0.00~99.99		18.00	●

<table>
<tr><td></td><td>(display parameter 5 of LED stop status)</td><td colspan="8"></td><td></td><td></td><td></td></tr>
<tr><td>F12.34</td><td>Running status display parameter 2 of mode 1 (display parameter 1 of LED stop status)</td><td colspan="8">0.00~99.99</td><td></td><td>18.01</td><td>●</td></tr>
<tr><td>F12.35</td><td>Running status display parameter 3 of mode 1 (display parameter 2 of LED stop status)</td><td colspan="8">0.00~99.99</td><td></td><td>18.06</td><td>●</td></tr>
<tr><td>F12.36</td><td>Running status display parameter 4 of mode 1 (display parameter 3 of LED stop status)</td><td colspan="8">0.00~99.99</td><td></td><td>18.08</td><td>●</td></tr>
<tr><td>F12.37</td><td>Running status display parameter 5 of mode 1 (display parameter 4 of LED stop status)</td><td colspan="8">0.00~99.99</td><td></td><td>18.09</td><td>●</td></tr>
<tr><td>F12.38</td><td>LCD large-line display parameter 1</td><td colspan="8">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="8">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="8">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="8">0: prohibit zero crossing
1: allow zero crossing</td><td></td><td>0</td><td>○</td></tr>
<tr><td>F12.42</td><td>Frequency setting of digital potentiometer</td><td colspan="8">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="8">0.00~|Digital torque setting F13.02|</td><td>%</td><td>0.0</td><td>×</td></tr>
<tr><td>F12.46</td><td>ACLib version number</td><td colspan="8"></td><td></td><td>XXX.XX</td><td>×</td></tr>
<tr><td rowspan="3">F12.45</td><td rowspan="3">UP/DOWN function selection</td><td>Channel sharing</td><td>Range limitation</td><td>Keyboard</td><td>Communication</td><td>High-speed pulse</td><td>Analog quantity</td><td>Digital frequency</td><td>Multi-segment speed</td><td rowspan="3"></td><td rowspan="3">00100010</td><td rowspan="3">○</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td colspan="8">0: Invalid 1: valid</td></tr>
<tr><td>F12.47</td><td>Any address</td><td colspan="8">0~65535</td><td></td><td>28673</td><td>●</td></tr>
<tr><td colspan="12">F13 Torque control parameter group</td></tr>
<tr><td>F13.00</td><td>Speed/torque control options</td><td colspan="8">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</td><td colspan="8">0: digital torque setting F13.02</td><td></td><td>0</td><td>○</td></tr>
</table>

	source				
F13.02	Digital torque setting	-200.0~200.0 (100.0 = the rated torque of motor)	%	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	0.05	●
F13.08	Upper frequency limit options of torque control	0: set by F13.09 1: AI1 2: AI2 3: AI3 4: AI4 (expansion card) 5: high frequency pulse input (X7) 6: Communication setting (percentage) 7: Communication setting (direct frequency setting)		0	○
F13.09	Upper frequency limit of torque control	0.00 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	Speed priority enabling of torque control	0: Disable 1: Enable		0	●
F14	**Parameter group of motor 2**				
F14.00	Motor type	0: ordinary asynchronous motor 1: variable-frequency asynchronous 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	0.01~600.00 (rated power of motor: ≤ 75 kW)	A	Dependin	○

		0.1~6000.0 (rated power of motor: >75kW)		g on the motor type	
F14.04	Rated frequency of motor	0.01~600.00	Hz	Depending on the motor type	○
F14.05	Rated speed	50~60000	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	Set the same range as F14.09	mΩ	Depending on the motor type	○
F14.11	Leakage inductance of asynchronous motor	0.01~600.00 (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	0.1~6000.0 (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	0.01~600.00 (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	%	100.00	○
F14.15	Flux weakening coefficient 2 of asynchronous motor	10.00~100.00	%	100.00	○
F14.16	Flux weakening coefficient 3 f asynchronous motor	10.00~100.00	%	100.00	○
F14.17	Flux weakening coefficient 4 f asynchronous motor	10.00~100.00	%	100.00	○
F14.18	Flux weakening coefficient 5 f asynchronous motor	10.00~100.00	%	100.00	○
F14.24	Encoder type	0: ABZ gain encoder 4: Rotary transformer		0	○
F14.25	Encoder line count	1~65535		1024	○
F14.26	Zero-pulse phase angle of encoder	0.0~359.9°		0.0	○
F14.27	AB pulse phase sequence	0: forward 1: reverse		0	○
F14.28	UVW encoder phase sequence	0: forward 1: reverse		0	○
F14.29	UVW initial offset phase angle	0.0~359.9°		0.0	○
F14.30	Pole pairs of rotary transformer	1~65535		1	○
F14.32	Detection time of speed feedback disconnection	0.0~10.0 (0.0: inactive detection of speed feedback disconnection)		0.0	○
F14.33	Speed feedback filtering time	0.000~0.100	s	0.002	○
F14.34	Motor parameter self-learning	0: No operation 1: static self-learning of asynchronous motor 2: rotation self-learning of asynchronous motor		0	○
F14.35	Drive control mode of motor 2	0: V/F control (VVF) 1: Reserved 2: Speed sensor vector control (FVC)		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	0.250	●

F14.38	Speed proportional gain ASR_P2	0.00~100.00		10.00	●
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 coefficient of motor 2	50.0~300.0	%	100.0	●
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 F14.46 and F14.47		0	○
F14.46	Upper limit of speed control motor torque	80.0~250.0	%	165.0	●
F14.47	Upper limit of speed control brake torque	80.0~250.0	%	165.0	●
F14.48	Excitation current proportional gain ACR-P1	0.00~10.00		0.50	●
F14.49	Excitation current integral time constant ACR-T1	0.00-600.00 0.00: no integral	s	10.00	●
F14.50	Torque current proportional gain ACR-P2	0.00~10.00		0.50	●
F14.51	Torque current integral time constant ACR-T2	0.00~300.00 0.00: no integral	s	10.00	●
F14.52	Position loop gain	0.000~40.000		1.000	●
F14.56	Voltage feedforward gain	0~100	%	0	●
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	50.00	○
F14.79	Upper frequency limit of motor 2	Lower limit frequency F00.19 to maximum frequency F14.78	Hz	50.00	●

F14.80	V/F curve setting of motor 2	0: straight line V/F 1: multi-point broken line V/F		0	○
F14.81	Multi-point VF frequency F1 of motor 2	0.00~600.00	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	0.00~600.00	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	0.00~600.00	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	○
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		s	5.00	●
F15.03	Acceleration time 2		s	15.00	●
F15.04	Deceleration time 2		s	15.00	●
F15.05	Acceleration time 3		s	15.00	●
F15.06	Deceleration time 3		s	15.00	●
F15.07	Acceleration time 4		s	15.00	●
F15.08	Deceleration time 4		s	15.00	●
F15.09	Fundamental frequency of acceleration and deceleration time	0: maximum frequency F00.16 1: 50.00Hz		1	○
F15.10	Automatic switching of acceleration and deceleration time	0: Invalid 1: valid		0	○
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: 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: 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: 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	-70.00~30.00	Hz	28.00	○
F15.23	Output frequency detection FDT2	0.00 to maximum frequency F00.16	Hz	20.00	○
F15.24	FDT2 hysteresis	-80.00~20.00	Hz	18.00	○
F15.25	Options of analog level detection ADT	0: AI1 2: AI3 1：AI2 3: AI4 (expansion card)		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	120.0~140.0 (380V,100.0=537V)	%	128.5 (690V)	○
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		0	○
F15.34	Fan control	0: running after power-on 1: running at startup 2: intelligent operation, subject to temperature control		1	○
F15.35	Overmodulation intensity	1.00~1.10		1.00	●
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		1	○

		2: compensation mode 2			
F15.39	Terminal jog priority	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	●
F15.41	Output power display coefficient	50.00~150.00	%	100.00	●
F15.42	Output current display coefficient	50.00~150.00	%	100.00	●
F15.41	Output voltage display coefficient	50.00~150.00	%	100.00	●
F15.42	Output current display coefficient	50.00~150.00	%	100.0	●
F15.43	Output voltage display coefficient	50.00~150.00	%	100.0	●
F15.44	Current reaches the detection value	0.0~300.0 (100.0% corresponds to the rated current of motor)	%	100.0	●
F15.45	Current reaches the hysteresis	0.0~F15.44	%	5.0	●
F15.46	Torque reaches the detection value	0.0~300.0 (100.0% corresponds to the rated torque of motor)	%	100.0	●
F15.47	Torque reaches the hysteresis	0.0~F15.46	%	5.0	●
F15.48	Divided frequencies of encoder	1~256		1	●
F15.49	High-frequency filtering coefficient of PG card	0~255		0	●
F15.62	PG card feedback frequency filtering time	0.000~30.000	S	0.010	●
F15.63	Speed reaches the rising limit	0.00~Fmax	HZ	30.00	●
F15.64	Speed reaches the filtering time	0~60000	Ms	500	●
F15.65	Speed reaches the falling limit	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 3: Winding and unwinding application		0	○
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		XXXXX	●
F16.10	Analog output percentage when the set length/design count is 0	0.00~100.00	%	0.00	○
F16.11	Analog output percentage when the set length/design count is the set value	0.00~100.00	%	100.00	○
F16.13	Set length resolution	0:1m 1:0.1m 2:0.01m 3:0.001m		0	○
F16.14	Slot 1 type	0: No card 1: PROFINET card 2: EtherCAT card 3: CANopen card 4~9: Reserved 10: Gain encoder PG card 11: Gain encoder PG card with UVW 12: Rotary transformer PG card 13: SinCos PG card 14: Gain encoder PG card with divided frequency 15~19: retention 20: IO expansion card 1 21~29: retention 30: PLC card		XXXX	×

F16.15	Slot 2 type	Same with slot 1						×
F16.16	Slot 1 software S/N 1	0.00~65.335						×
F16.17	Slot 1 software S/N 2	0.00~65.335						×
F16.18	Slot 2 software S/N 1	0.00~65.335						×
F16.19	Slot 2 software S/N 2	0.00~65.335						×
F17	**Virtual I/O function group (refer to the user's manual)**							
F18	**Monitoring parameter group**							
F18.00	Output frequency	0.00 to upper frequency limit					Hz	0.00 ×
F18.01	Set frequency	0.00 to maximum frequency F00.16					Hz	0.00 ×
F18.02	PG feedback frequency	0.00 to upper frequency limit					Hz	0.00 ×
F18.03	Estimate feedback frequency	0.00 to upper frequency limit					Hz	0.00 ×
F18.04	Output torque	-200.0~200.0					%	0.0 ×
F18.05	Torque setting	-200.0~200.0					%	0.0 ×
F18.06	Output current	0.00~650.00 (rated power of motor: ≤ 75 kW) 0.0 to 6500.0 (rated power of motor: > 75 kW)					A	0.00 ×
F18.07	Output current percentage	0.0-300.0 (100.0 = the rated current of inverter)					%	0.0 ×
F18.08	Output voltage	0.0~690.0					V	0.0 ×
F18.09	DC bus voltage	0~1200					V	0 ×
F18.10	Simple PLC running times	0~10000						0 ×
F18.11	Simple PLC operation stage	1~15						1 ×
F18.12	PLC running time at the current stage	0.0~6000.0						0.0 ×
F18.14	Load rate	0~65535					rpm	0 ×
F18.15	UP/DOWN offset frequency	0.00~655.35					Hz	0.00 ×
F18.16	PID setting	0.0 to PID maximum range						0.0 ×
F18.17	PID feedback	0.0 to PID maximum range						0.0 ×
F18.18	Power meter: MWh	0~65535					MWh	0 ×
F18.19	Watt-hour meter: kWh	0.0~999.9					kWh	0.0 ×
F18.20	Output power	-20.00~320.00					kW	0.00 ×
F18.21	Output power factor	-1.000~1.000						0.000 ×
F18.22	Digital input terminal status 1	X5	X4	X3	X2	X1		00000 ×
		0/1	0/1	0/1	0/1	0/1		
F18.23	Digital input terminal status 2	AI3	AI2	AI1	X7	X6		00000 ×
		0/1	0/1	0/1	0/1	0/1		

F18.24	Digital input terminal status 3	AI4	*	X10	X9	X8		XXX	×
		*	0/1	0/1	0/1	0/1			
F18.25	Output terminal state 1	*	R2	R1	Y2	Y1		00000	×
		0/1	0/1	0/1	0/1	0/1			
F18.26	AI1	0.0~100.0					%	0.0	×
F18.27	AI2	0.0~100.0					%	0.0	×
F18.28	AI3	0.0~100.0					%	0.0	×
F18.29	AI4	-100.0~100.0					%	0.0	×
F18.30	Output terminal state 2	*	*	*	R3	R4		XXX	×
		0/1	0/1	0/1	0/1	0/1			
F18.31	High-frequency pulse input frequency: kHz	0.00~100.00					kHz	0.00	×
F18.32	High-frequency pulse input frequency: Hz	0~65535					Hz	0	×
F18.33	Count value	0~65535						0	×
F18.34	Actual length	0~65535					m	0	×
F18.35	Remaining time of regular running	0.0~6500.0					min	0.0	×
F18.36	Rotor position of synchronous motor	0.0~359.9°						0.0	×
F18.37	Rotary transformation location	0~4095						0	×
F18.38	Motor temperature	0~200					℃	0	×
F18.39	VF separation target voltage	0~690					V	0	×
F18.40	VF separation output voltage	0~690					V	0	×
F18.41	View any address							0	×
F18.42	Brake inspection time display	0~0					h	0	×
F18.43	Zero-servo position deviation	0~65535						0	×
F18.45	Brake release torque	-200.0~200.0					%	0.0	×
F18.46	Slewing tower body deformation gain	5.536~60.000						0.000	×
F18.47	Speed loop input	0~100.00						0.00	×
F18.48	Tower body deformation angle specified	0~100.00						0.00	×
F18.51	PID output	-100.0~100.0					%		×
F18.58	Feedback pulse high	0~65535						XXX	×

F18.59	Feedback pulse low	0~65535		XXX	×
F18.60	Inverter temperature	-40~200	℃	0	×
F18.67	Saved electric energy (MWH)	Cumulative energy saving MWH	MWh	0~65535	×
F18.68	Saved electric energy (KWH)	Cumulative energy saving KWH	kWh	0.0~999.9	×
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	MWh	0~65535	×
F18.72	Power-frequency power consumption KWh	Power-frequency power consumption KWH	kWh	0.0~999.9	×
F19	**Fault record group**				
F19.00	Last fault category	0: No failure Refer to Chapter 6 “Faults and Solutions” for fault codes.		0	×
F19.01	Output frequency in failure	0.00 to upper frequency limit	Hz	0.00	×
F19.02	Output current in failure	0.00~650.00 (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 failure	0~1200	V	0	×
F19.04	Running status in failure	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 failure		h	0	×
F19.06	Previous fault category	Same as F19.00 parameter description		0	×
F19.07	Output frequency in failure		Hz	0.00	×
F19.08	Output current in failure		A	0.00	×
F19.09	Bus voltage in failure		V	0	×
F19.10	Running status in failure	Same as F19.04 parameter description		0	×
F19.11	Working time in failure		h	0	×
F19.12	Last two fault categories	Same as F19.00 parameter description		0	×
F19.13	Output frequency in		Hz	0.00	×

	failure				
F19.14	Output current in failure		A	0.00	×
F19.15	Bus voltage in failure		V	0	×
F19.16	Running status in failure	Same as F19.04 parameter description		0	×
F19.17	Working time in failure		h	0	×
F20	**Special basic function groups for lifting**				
F20.00	Lifting mechanism selection	0: Closed-loop lifting mechanism 1: Open-loop lifting mechanism 2: Trolley luffing 3: Open-loop slewing mechanism 4: Closed-loop slewing mechanism 5: Reserved 6: Reserved 7: Construction hoist without speed feedback 8: Concrete mixing station 12: Automatic levelling elevator		0	○
F20.01	Braking curve type	0: Frequency and current are both reached for brake control 1: Frequency is reached for brake control 2: No brake control		0	○
F20.02	Start direction	0: Brake release frequency has the same direction with running 1: Brake release frequency always has the forward direction		1	○
F20.03	Stop direction	0: The velocity direction upon brake closing is consistent with the running direction 1: The velocity is always in the forward rotation direction upon brake closing		0	○
F20.04	Brake release current	0.0~100.0	%	20.0	●
F20.05	F20.00=2: Brake release frequency $fl_{backward}$ in backward movement F20.00=3 or 4: Brake release frequency fl_{left} in turning left F20.00= Other: Brake release frequency upon lifting, fl up	Lower frequency limit ~20.00	Hz	0.40	●

F20.06	F20.00=2: Brake release frequency $f1_{forward}$ in forward movement F20.00=3 or 4: Brake release frequency $f1_{right}$ in turning right F20.00= Other: Brake release frequency upon lowering, f1 down	Lower frequency limit ~20.00	Hz	0.40	●
F20.07	Delay before brake release, t1	0.0~10.0	s	0.1	●
F20.08	Delay after brake release, t2	0.0~10.0	s	0.5	●
F20.09	Time for determining brake release current abnormality	0.0~10.0	s	3.0	●
F20.10	F20.00=2: Brake closing frequency $f3_{backward}$ in backward movement F20.00=3 or 4: Brake closing frequency $f3_{left}$ in turning left F20.00= Other: Brake closing frequency upon lifting, f3 up	Lower frequency limit ~20.00	Hz	0.20	●
F20.11	F20.00=2: Brake closing frequency $f3_{forward}$ in forward movement F20.00=3 or 4: Brake closing frequency $f3_{right}$ in turning right F20.00= Other: Brake closing frequency upon lowering, f3 down	Lower frequency limit ~20.00	Hz	0.20	●
F20.12	Delay before brake closing, t3	0.0~60.0	s	0.0	●
F20.13	Delay after brake closing, t4	0.0~60.0	s	0.5	●
F20.14	Command reverse control	0: Direct reversal is not allowed during operation 1: Direct reversal is allowed during operation		1	○
F20.15	Restart in braking process	0: Restart is not allowed during the braking process 1: Restart is allowed during the braking process		0	○

F20.16	Waiting time for restart	0.0~10.0	s	0.1	○
F20.17	Brake feedback purpose	0: Brake feedback is not used 1: Use for detection upon acting 2: Use for throughout monitoring 3: Two way brake feedback input		0	○
F20.18	Acceleration/deceleration time is selected based on the change of gear positions	0: Invalid 1: valid		0	○
F20.19	Rising time of DC braking current	0.00~20.00	s	0.00	●
F20.20	Pulse count for determining brake fault upon stop	0~10000 (0: Brake inspection and protection inactive)		2000	●
F20.21	Lowering speed upon brake fault	Lower frequency limit ~20.00	Hz	0.00	●
F20.22	Option of prohibition on immediate acceleration following deceleration	0: Invalid 1: valid		0	○
F20.23	Delay of acceleration following deceleration	0.000~20.000	s	1.000	●
F20.24	Output reserving	0: Invalid 1: valid		0	○
F20.25	Option of open-loop zero-servo function	0: Invalid 1: valid 2: automatic		0	●
F20.26	Brake inspection torque	60.0~180.0	%	150.0	●
F20.27	Brake inspection torque holding time	3.0~10.0	s	4.0	●
F20.28	Brake inspection upper frequency	Lower frequency limit ~ upper frequency limit, Fup	Hz	2.00	●
F20.29	Forward testing delay of brake inspection	0.0~10.0	s	0.8	●
F20.30	Reverse testing delay of brake inspection	0.0~10.0	s	0.8	●
F20.31	Brake inspection interval	0~1000 (0: inactive)	h	0	●
F20.32	Eddy current cut-in frequency	0.00~50.00	Hz	5.00	
F20.33	Eddy current control time	0~3600		00	●
F20.34	Option of cancelation after automatic action of zero-servo	0: Cancel after brake inspection is passed 1: Cancel after one downward movement of the grip 2: Exit running		1	○

F20.35	Automatic action times of zero-servo	1~5		1	○
F20.36	Zero-servo holding time per occurrence	1.0~30.0	s	3.0	○
F20.37	Time for determining joystick failing to return to zero	0.0 ~30.3 (0.0 inactive)	s	0.0	○
F20.38	Low-frequency switching frequency of motor (stator/rotor)	0~10.00	Hz	0	●
F20.39	Brake current drop time	0~20.00	s	1.00	○
F20.40	Id low-frequency switching frequency	0.5~10.00	Hz	5.00	●
F20.41	VF curve selection	0: The uplink and downlink are the same. 1: The uplink and downlink separation		0	○
F20.42	Downlink VF voltage V1	0.0~100.0	%	3.5	●
F20.43	Downlink VF voltage V2	0.0~100.0	%	7.5	●
F20.44	Downlink VF voltage V3	0.0~100.0	%	14.0	●
F20.45	Position pulse high	0~65535		0	●
F20.46	Position pulse low	0~9999		0	●
F20.47	Pulse direction	0: direction unchanged 1: opposite direction taken		0	○
F20.48	Initial value of high pulse count	0~65535		20000	○
F20.49	Initial value of low pulse count	0~9999		0	○
F20.50	Clear pulse count	0: No operation 1: Forced clearing		0	○
F20.51	Selection of low-speed running mode	0: Run at the given frequency multiplied by gain 1: Run with reduced bias at the given frequency 2: Run at maximum frequency multiplied by gain		0	○
F20.52	Frequency minus gain	0~1		1000	●
F20.53	Frequency minus bias	0~1		0	●
F20.54	Selection of frequency reduction rate	0~1		1	○
F20.58	Speed limit after zero servo exit	0.00 ~ rated frequency of motor	Hz	0.00	
F20.59	SVC abnormality detection time	0~60.000	s	0.000	●
F20.60	SVC abnormality hysteresis torque	0~100.0	%	10.0	●
F20.61	Threshold for	0~50.00	Hz	2.00	●

	determining SVC abnormality synchronization frequency				
F20.62	SVC abnormality tube sealing time	0~60.000	s	0.500	●
F20.63	Low-frequency gain of stator resistance	1.0~500.0	%	100.0	●
F20.64	Low-frequency gain of rotor resistance	20.0~500.0	%	100.0	●
F20.65	Eddy current control time unit	0: s 1: h		0	○
F20.66	Effective activation of quick reverse gear deceleration	0~1		0	○
F20.67	Rotating inertia of slewing control	0~6.000	Kg*m2	0	○
F20.68	Tower body deformation angle coefficient	0~4.000		0	○
F20.69	Rotary motor torque filtering time	0~65.535	s	0.100	○
F20.70	Rotary motor estimated speed filtering time	0~65.535	s	0.100	○
F20.71	Filtering time of slewing tower body deformation angle		s	0.100	○
F20.72	Filtering time of given slewing deformation angle	0~65.535	s	5.000	○
F20.73	Calculation delay of slewing torque steady state	0~65.535	s	10.000	○
F20.74	Low-frequency cut-in point of the slewing deformation coefficient	0~10.00	HZ	5.00	○
F20.75	Acceleration filtering time of the slewing deformation coefficient	0~65.535	s	2.000	○
F20.76	Deceleration filtering time of the slewing deformation coefficient	0~65.535	s	0.200	○
F20.77	Slewing deformation coefficient switching	0: Kφ is switched by the estimated frequency; 1: Kφ is switched by the output frequency in		0	○

	mode	acceleration and deceleration			
F20.80	Brake release torque filtering time	0~65.535	s	0.020	○
F20.81	Reducer speed ratio	0.0~300.00		0.00	○
F20.82	Reducer fault detection times	0~10		0	○
F20.83	Stop mode upon reducer fault	0~1 0: free stop 1: Quick stop		1	○
F20.84	Roller and host feedback pulse error percentage	0.00~100.00	%	35.00	○
F20.85	Roller encoder line count	1~65535		36	○
F20.86	Set number of turns of reducer fault	1~100		3	○
F20.87	Brake fault testing torque	0.0~F20.26	%	60.0	○
F20.88	Holding time of brake fault testing torque	0.0~F20.27	s	3.0	○
F20.89	Pulse count for electrified brake testing	0.0~F20.20		0	○
F20.90	Speed limit upon occurrence of fault during electrified brake testing	0.00~Fmax		0	○
F20.91	Electrified brake mode selection	0~2 0: no detection; 1: Automatic detection after power-on; 2: Terminal trigger detection;		0	○
F20.92	Percentage of coupling detection frequency	0~100.0 (rated frequency of motor; this function is unavailable when the value is 0)	%	0.0	○
F20.93	Percentage of coupling frequency error	0~100.0	%	0.0	○
F20.94	Coupling detection torque	0~200.0	%	0.0	○
F20.95	Reverse running frequency after coupling	0~20.00	Hz	0.00	○
F20.96	Reverse running time after coupling	0~10.0	s	0.0	○
F21	**Special advanced function groups for lifting**				
F21.00	Torque limit for protection against overload	0.0~150.0 (0.0: inactive protection)	%	0.0	●
F21.01	Load detection time	0.0~5.0	s	1.5	●

F21.02	Percentage of load detection frequency	10.0~100.0	%	80.0	●
F21.03	Light load high speed multiplier for upward movement	100.0~400.0	%	100.0	○
F21.04	Heavy load low speed multiplier for upward movement	10.0~100.0	%	100.0	○
F21.05	Rope-loosening torque for upward movement	0.0~100.0	%	0.0	●
F21.06	Allowed load torque for upward movement	F21.05~F21.07	%	100.0	○
F21.07	Heavy load torque for upward movement	F21.06~250.0	%	100.0	●
F21.08	Light load high speed multiplier for downward movement	100.0~400.0	%	100.0	●
F21.09	Heavy load low speed multiplier for lowering	10.0~100.0	%	100.0	○
F21.10	Rope-loosening torque for downward movement	0.0~100.0	%	0.0	●
F21.11	Allowed load torque for downward movement	F21.10~F21.12	%	100.0	●
F21.12	Heavy load torque for downward movement	F21.11~250.0	%	100.0	●
F21.13	Faulty terminal output selection in case of brake failure	0: no output 1: output		0	○
F21.15	Low-voltage protection function	0:Unused 1: Use low-voltage protection		1	○
F21.16	Low-voltage protection point	70.0~100.0	%	90.0	●
F21.17	Low-voltage protection filtering time	0.0~10.0	s	0.5	●
F21.18	Option of electrification parameter self-learning	0: No self-learning 1: Self-learning		0	○
F21.19	Motor fan control delay	0.0~600.0	s	100.0	●
F21.20	Inching switching judgment time	0.0~20.0	s	0.0	○
F21.21	Special acceleration	0:Unused 1: Use		0	○
F21.22	Special deceleration	0:Unused 1: Use		0	○

F21.23	Acceleration frequency switching point 1	0.00~600.00	Hz	5.00	●
F21.24	Deceleration frequency switching point 1	0.00~600.00	Hz	8.00	●
F21.25	Acceleration frequency switching point 2	0.00~600.00	Hz	50.00	●
F21.26	Deceleration frequency switching point 2	0.00~600.00	Hz	15.00	●
F21.27	Acceleration frequency switching point 3	0.00~600.00	Hz	50.00	●
F21.28	Deceleration frequency switching point 3	0.00~600.00	Hz	30.00	●
F21.30	Inching frequency	0.00~600.00	Hz	5.00	●
F21.31	Inching acceleration time	0.00~600.00	s	6.50	●
F21.32	Inching deceleration time	0.00~600.00	s	3.00	●
F21.33	Option of inching brake release type	0: Have the same frequency with normal brake release 1: Have the same frequency with inching		0	○
F21.34	Option of inching brake closing type	0: Have the same frequency with normal brake closing 1: Have the same frequency with inching		0	○
F21.35	Precise positioning speed limit frequency	0.00 to maximum frequency F00.16	Hz	50.00	●
F21.36	Acceleration/deceleration change rate	0.01~50.00	Hz/s	5.00	○
F21.37	Speed saving	0: Not save 1: Save until disconnection of power 2. Always save		0	○
F21.38	Option of deceleration switch optimization	0: No optimization 1: Deceleration optimization		0	○
F21.39	Linear change delay of DC braking current	0.00~30.00 0: No linear switching process	s	0	●
F21.40	Linear switching time of DC braking current	0.00~30.00	s	0	●
F21.41	Linear switching target value of DC braking current	0.0~400.0	%	0	●
F21.50	Rated load	0~6.00	t	2.00	○
F21.51	Empty cage weight	0~6.00	t	1.50	○
F21.52	Weighing signal feedback terminal 1	0: None 2: AI2 1: AI1 3: AI3		0	○
F21.53	Weighing signal	0: None 2: AI2		0	○

	feedback terminal 2	1: AI1 3: AI3			
F21.54	Weighing sensor range	0~6.00	t	3.00	○
F21.55	Sensor sensitivity	0.0~2.0	mV	1.6	○
F21.56	Magnification factor	0.0~800.0		415.0	○
F21.57	Overload detection delay	0.000~10.000	s	1.000	○
F21.58	Weighing sensor disconnection testing level (single-line)	0~6.00	t	0.30	○
F21.59	Weighing sensor disconnection testing delay	0.000~10.000	s	0.000	○
F21.60	Correction coefficient for weighing test, Kx	0.00~200.00	%	100.00	●
F21.61	Weighting of weighing self-learning	0~6.00	t	0	○
F21.62	Weighing self-learning	0: Disable 1: The first point of weighing self-learning (set to zero) 2: The second point of weighing self-learning (calibration)		0	○
F21.63	Weight according to weighing signal 1 (actual value)	0~6.00	t	0	×
F21.64	Weight according to weighing signal 2 (actual value)	0~6.00	t	0	×
F21.65	Actual weight (net weight)	0~6.00	t	0	×
F21.66	Actual weight percentage (net weight)	0~200.00	%	0.00	×
F21.67	M.K reset the empty cage weight	0~1		0	○
F21.72	Continuous duration of no GPS communication	0~65535	min	0	×
F21.73	Time for locking against no communication	2~200	h	24	○
F21.74	GPS unlock	0: No operation 1: Keyboard unlock command		0	○
F21.75	GPS status	3: Relieve		3	×
F21.76	Control authorized phone number	0~10000		10000	●
F21.77	GPS SIM card ID	0~10000		10000	●

F21.78	GPS software version	0~65535		0	×
F21.79	GPS protocol option	0: Standard GPS controller 1: Old edition of dongle		0	○
F21.83	Locked state of Huaxing device	0: Release state		0	×