Preface

Thank you for purchasing EM330 series crane inverter.

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EM330 is a specially designed inverter for cranes which applies to building hoisting, hoisting, trolley derricking and slewing of tower crane.

EM330 features:

- Stable operation with low frequency and big torque
  Stable output at 0.5Hz/150% of rated torque to ensure stable operation of cranes at start-up, hoisting, and descending.
- Special control function of hoisting brake
  Special control function of motor mechanic brake which will be controlled by rational sequence.
- Autotuning motor parameter
  Dynamically autotuning motor parameter to ensure the stability and precision of system.
- Wide governor deflection
  Meeting the requirements of cranes for high speed with light load and low speed with heavy load, enhancing the working efficiency of cranes.
- Swing-proof function
  Helpful for enhancing the working efficiency and precisely positioning.

Without a special instruction, EM330 represents the common features of EM330A and EM330B in this manual. Parameter defaults vary with F4-28 application macros options. See 6.3 and 7.5 for detail.

It is the duty of any user to perform the appropriate, correct installation or configuration of the optional parameters of the devices. Neither SINEE nor its distributors shall be responsible or liable for misuse of the information contained herein or mismatching the inverter with the motor.

In the interests of commitment to a policy of continuous development and improvement, SINEE reserves the right to update the specification of the product or its performance, or the content herein without notice.

More updates and information are available at www.sinee.cn .

Safety Information

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Safety Precautions

Read and understand these instructions before performing any procedure with this inverter

- **Confirmations upon Delivery**

 Caution

1. **Never install an inverter that is damaged or missing components.**
   Failure to comply can result in injury.

- **Installation**

 Caution

1. **Always hold the case when carrying the inverter.**
   If the inverter is only held by the front cover, the main body of the inverter may fall, possibly resulting in injury.
2. **Installation base shall be a metal plate or other non- flammable material.**
   Installing the inverter on inflammable material may cause fire.
3. **Install a cooling fan when installing more than one inverter in the same cabinet, the temperature of the air entering the inverter shall be lower than 40℃.**
   Overheating may result in fire or other accidents.

- **Wiring**

Danger

1. **Always turn off the input power supply before wiring.**
   Otherwise, an electric shock or fire may occur.
2. **Wiring must be performed by authorized and qualified personnel.**
   Otherwise, an electric shock or fire may occur.
3. **Be sure the ground terminals earthed.**
   Otherwise, an electric shock or fire may occur.
4. **Always verify the function of emergency stop terminal in work after connecting.**
   Otherwise, it may result in injury. (User takes the responsibilities of wiring).
5. **Never touch the input or output terminals directly with bare hands, or connect the terminals of inverter to the housing, or connect the input terminals to output terminals directly.**
   Otherwise, an electric shock or short circuit may occur.

Caution

1. **Always confirm if the voltage of AC input power supply satisfies the rated voltage of inverter.**
   Otherwise, it may result in injury and fire.
2. **Never perform voltage withstanding test.**
   Otherwise, semi-conductors and other devices can be damaged.
3. **Connect braking resistor or braking unit according to required wiring.**
   Otherwise, a fire may occur.
4. **Tighten terminals with screw drivers of specified torque.**
   Otherwise, a fire may occur.
5. **Never connect input power supply cable to output terminals U, V, and W.**
   The interior parts of inverter will be damaged if voltage is applied to the output terminals.
6. **Never connect phase-shifting capacitor and LC/RC noise filter to output circuits.**
   Otherwise, the interior parts of inverter will be damaged.
7. **Never connect the solenoid switch and electromagnetic contactor to output circuits.**
   When inverter is with load, surge current, which is produced by the operation of solenoid switch or electromagnetic contactor, will trigger the overcurrent protection circuit to act. Sometimes the interior parts of inverter will be damaged.
8. **Never take off the interior wires of inverter.**
   Otherwise, the interior parts of inverter will be damaged.

- **Trial Operation**

Danger

1. **Only after installing the front cover, power can be turned on. Never take off the front cover when power is on.**
   An electric shock may occur.
2. **Do not come close to the machine at power failure if fault reset function is active. When power is on, the inverter will restart automatically when power is on.**
   An injury may occur.
3. **Install an emergency switch for a quick brake in case of abnormal conditions.**
   An injury may occur.

Caution

1. **Never touch braking resistor. It will be very hot and with high-voltage when running.**
   Otherwise, an electric shock and a burn injury may occur.
2. **Reconfirm the motor and machine are within the applicable ranges before starting operation.**
   Otherwise, an injury may occur.
3. **Do not check signals while the inverter is running.**
   Otherwise, the inverter will be damaged.
4. **Be careful when editing inverter settings. The inverter is in factory default.**
   Otherwise, the inverter will be damaged.

- **Maintenance and Inspection**


Danger

1. **Do not touch inverter's wiring terminals where high voltage exists.**
   Otherwise, an electric shock may occur.
2. **Always keep the front cover in place before power is supplied to the inverter. Turn off power before taking the front cover off.**
   Otherwise, an electric shock may occur.
3. **Maintenance and check must be performed only after the power supply of main circuit is turned off, and the indicator of CHARGE is off.**
   An electric shock may occur due to the residual voltage on electrolytic capacitor after power is off.
4. **Maintenance and inspection must be performed only by authorized professionals.**
   Otherwise, an electric shock may occur.
5. **Do not change the wiring and uninstall terminal wiring when power is on.**
   Otherwise, an electric shock may occur and the inverter will be damaged.


Caution

1. **CMOS ICs are installed on keypad, control circuit board and drive circuit board respectively. Handle those parts and CMOS ICs carefully.**
   The CMOS IC can be destroyed by ESD if touched directly with bare hands.
5. **Do not check signals while the inverter is running.**
   Otherwise, the inverter will be damaged.

- **Other**


Danger

1. **Never attempt to modify or alter the inverter.**
   Failure to comply can result in electric shock or injury.
2. **User shall take full responsibilities for the damages caused by wrong wiring, improper operation or modifying and altering, and etc.**

CONTENTS

1 Overview

1.1 EM330 Model List and Technical Specifications

- Rated Voltage: 3-phase AC380V/415V
- Applicable motor: 3-phase induction motor, power range: 3.0~400kW
- Output voltage: 3-phase, from 0 to U_{supply}.

1.1.1 EM330 Model and Rated Output Current

Table 1-1 Model List of EM330

Standard Model No.	Model No. (With Integrated Braking Unit)	Motor Power (kW)	Rated Output Current (A)
-	EM330A-3R0-3CB EM330B-3R0-3CB	3.0	8
-	EM330A-4R0-3CB EM330B-4R0-3CB	4.0	10
-	EM330A-5R5-3CB EM330B-5R5-3CB	5.5	13
-	EM330A-7R5-3CB EM330B-7R5-3CB	7.5	17
-	EM330A-9R0-3CB EM330B-9R0-3CB	9.0	20
-	EM330A-011-3CB EM330B-011-3CB	11	26
-	EM330A-015-3CB EM330B-015-3CB	15	34
EM330A-018-3C EM330B-018-3C	EM330A-018-3CB EM330B-018-3CB	18.5	41
EM330A-022-3C EM330B-022-3C	EM330A-022-3CB EM330B-022-3CB	22	48
EM330A-030-3C EM330B-030-3C	EM330A-030-3CB EM330B-030-3CB	30	60
EM330A-037-3C EM330B-037-3C	EM330A-037-3CB EM330B-037-3CB	37	75
EM330A-045-3C EM330B-045-3C	EM330A-045-3CB EM330B-045-3CB	45	90
EM330A-055-3C EM330B-055-3C	EM330A-055-3CB EM330B-055-3CB	55	115
EM330A-075-3C EM330B-075-3C	EM330A-075-3CB EM330B-075-3CB	75	150

Table 1-1 Model of EM330(Continued)			
EM330A-090-3C EM330B-090-3C	-	90	180
EM330A-110-3C EM330B-110-3C	-	110	220
EM330A-132-3C EM330B-132-3C	-	132	265
EM330A-160-3C EM330B-160-3C	-	160	310
EM330A-185-3C EM330B-185-3C	-	185	360
EM330A-200-3C EM330B-200-3C	-	200	380
EM330A-220-3C EM330B-220-3C	-	220	420
EM330A-250-3C EM330B-250-3C	-	250	470
EM330A-280-3C EM330B-280-3C	-	280	530
EM330A-315-3C EM330B-315-3C	-	315	600
EM330A-355-3C EM330B-355-3C	-	355	660
EM330A-400-3C EM330B-400-3C	-	400	740

Remarks:

1.See 2.1 for the model numbering scheme.

2.The difference between EM330A and EM330B is on control PCBA board. Comparing with EM330A, EM330B contains one more multi-function terminal and one more relay output.

1.1.2 EM330 Technical specifications

Table 1-2 EM330 Technical specifications

Items		Specifications
Input	Rated Voltage	3-phase AC380V±20%~415V±20%, 50~60Hz±5%, voltage imbalance rate <3%
Output	Max. Output Voltage	3-phase,from 0 to U_{supply}
	Rated Output Current	100% rated current non-stop output, see Table 1-1.
	Max. Overload Current	150% rated current for 1 minutes, 180% rated current for 2 seconds
Basic Control Functions	Control Mode	V/F, SVC
	Input Mode	Frequency (Speed) input
	Running Mode	Keypad, control terminals (2-wire sequence, 3-wire sequence), RS485

	Frequency Control Range	0.00～600.00Hz
	Input Frequency Resolution	Numeric input:0.01Hz, analog input: 0.1% of maximum frequency
	Governor Deflection	1:50(VF), 1:100(SVC)
	Speed Control Accuracy	±0.5% rated synchronous revolution
	Acceleration/Deceleration Time	0.01~600.00 seconds/minutes
	V/F Features	Rated output voltage: 20%~100% adjustable, Frequency base :20Hz~600Hz adjustable
	Torque Boost	Automatic torque boost, fixed torque boost curve, customer defined V/F curve scaling
	Start-up Torque	150%/0.5Hz
	AVR	AVR is active while output voltage remains unchanged if input voltage is varying
	Current Automatic Limiting	Automatically limit output current, avoid frequent overcurrent tripping (Do not apply this function to hoist and hoisting device)
	DC Brake	Brake frequency:0.1~60Hz, brake time:0~30S, brake current:0~100% rated current
	Signal Input Source	Communications, analog voltage, analog current, preset speed, simple PLC and its group wares
Function of Input and output	Reference Power	10V/20mA
	Terminal Control Power	24V/150mA
	Numeric Input Terminals	7 programmable numeric input terminals(8 programmable numeric input terminals for EM330B)
	Analog Input Terminals	4 analog inputs, 2 voltage inputs (0~10V), and 2 current inputs(0~20mA)
	Numeric Output Terminals	2 OC outputs and 1 relay output (2 relays for EM330B) are programmable. Maximum output current of OC: 50mA. Relay contact capacity: 250VAC/3A or 30VDC/1A. When relay acts, EA-EC is on, and EB-EC is off.
	Analog Output Terminals	2 programmable analog output terminals can output 0~10V or 0~20mA
Keypad Display	LED	Human interactions with displays and control actuators
	Parameter Copy	Upload and download parameter information of the inverter, copy parameters rapidly.
Protections	Protections	Short circuit, overcurrent, overload, overvoltage, undervoltage, phase loss, overheating, external faults, and etc.
Application Conditions	Installation Site	Indoor, with altitude less than1,000 meters, free of dust and corrosive gas, and no direct sunlight
	Ambient Temperature	-10℃～+40℃. In the temperature range +40 °C…+50 °C, the rated output current is decreased by 1% for every additional 1 °C. 20%～90%RH (no condensation)
	Vibration	＜0.5g
	Storage Temperature	-25℃～+65℃
	Installation Method	Wall mounting, or floor mounting
Degree of Protection		IP20
Cooling Method		Forced Air Cooling

1.2 Basic Functions of EM330

1.2.1 Preset Speed Function

16 preset speeds specially designed for EM330 can satisfy the operation needs of different speeds of building hoist, hoisting, and slewing and trolley derricking of tower crane by switching multi-function numeric input terminals.

1.2.2 Frequency Range Detection(FDT)

Multi-function output terminals of EM330 with FDT function can meet the braking sequence requirement of building hoisting, and hoisting, and trolley derricking of tower crane.

1.2.3 Dynamic Brake

Voltage on DC bus will increase due to energy feedback when hoist runs downward. To make motor brakes quickly within given deceleration time, the inverter does not perform overvoltage protection, dynamic braking can be started to consume the energy via braking resistor.

1.2.4 Automatic Voltage Regulation (AVR)

When the input voltage fluctuates, the output voltage remains unchanged basically, and output current will be decreased shortly when heavy load dropping instantaneously.

1.2.5 Multi-function Numeric Input Terminals

7 multi-function numeric input terminals X1～X7 of EM330 (X1～X8 for EM330B) can be programmed based on real needs.

1.2.6 Multi-function Numeric Output Terminals

The functions of multi-function numeric output terminals Y1 and Y2, and Relay R1 of EM330 (One more relay R2 for EM330B) can be programmed based on real needs.

1.2.7 Autotuning Motor Parameter

When autotuning motor parameters is active, the inverter will autotune and save the motor parameters. Autotuning motor parameter is categorized as stationary autotuning and rotational autotuning. When in rotational autotuning, separate motor and load to make motor in idling status.

1.2.8 Parameter Copy

All function parameters of EM330 can be copied through keypad.

1.2.9 Low Noise Operation

Due to the high frequency harmonic wave with the output of inverter, the motor generates the electromagnetic noise inevitably. Usually, electromagnetic noise can be lowered by increasing carrier frequency, which, however, in turn makes the inverter overheat. EM330 achieves low noise operationwith low carrier frequency by carrier frequency modulation.

1.2.10 User Password

User can set password to protect function parameters from unauthorized editing.

1.3 EM330 Operation Status Define

1.3.1 Operation Status of Inverter

- **Parameters setting status:**
  After power is supplied to the inverter, inverter does not output, and enters standby status without fault or start-up command.
- **Normal running status:**
  After receiving active start command through keypad, control terminal or RS485, the inverter drives motor in accordance with the requirements of setting input.
- **JOG running status:**
  Set by keypad, external terminal or RS485 to make motor run per JOG frequency speed.
- **Autotuning status:**
  Set by keypad to autotune motor parameters in stationary or rotational autotuning.
- **Stop status:**
  After running command is not active, the output frequency drops to zero in given deceleration time.
- **Fault status:**
  Status of inverter at protections and all kinds of faults and failures.

1.3.2 Setting Mode of Inverter

The setting mode of inverter refers to that what kind of physical quantity inverter takes as control object when driving motor.

- Speed setting mode is to take motor speed as the control object.
- Torque setting mode is to take motor torque as the control object. (It is not applicable to hoisting.)

Set through various and flexible methods such as numeric setting, analog voltage, and analog current or other mathematical combinations. Jog speed setting mode is prior to other setting modes, i.e. when pressing JOG button on keypad or making control terminals FJOG or RJOG on, no matter what the present setting mode is, the inverter will automatically switch to jog speed setting. See Figure 1-1 for the details of all speed setting modes of EM330.

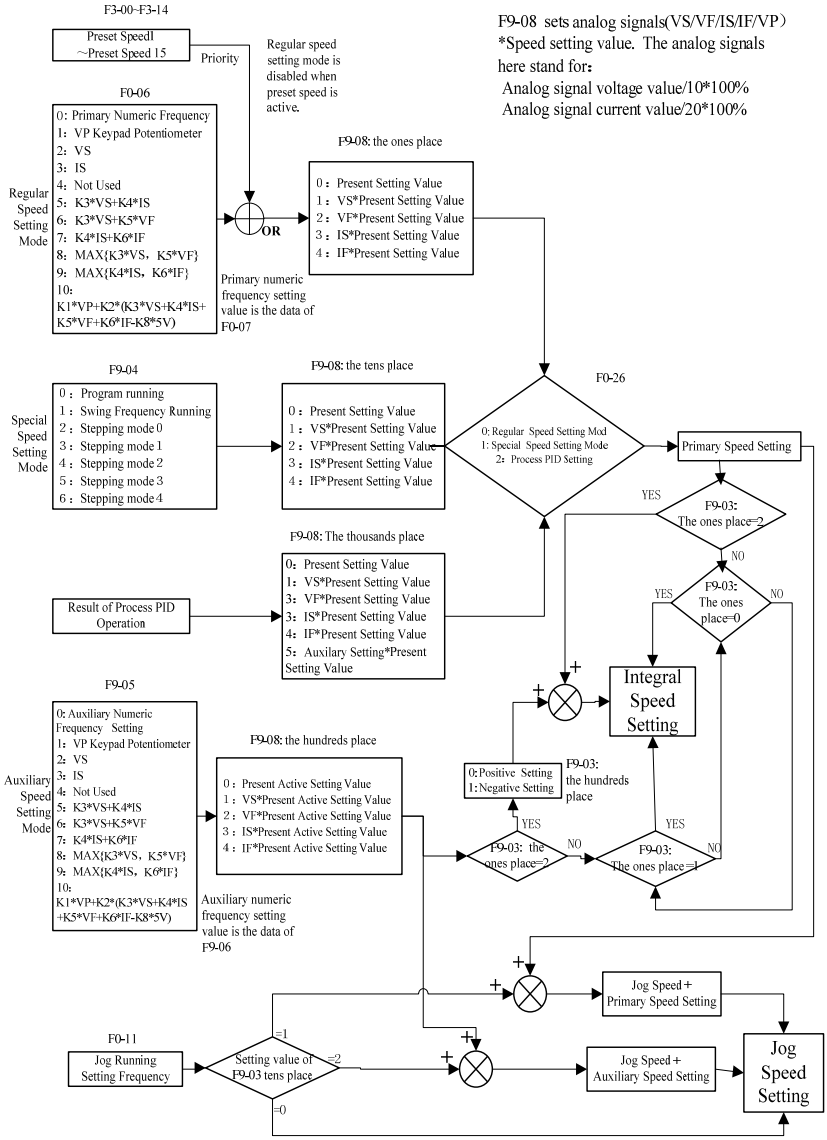


Figure 1-1 Speed Setting Modes

1.3.3 Operation Control Mode of Inverter

The operation control mode of inverter refers to the action conditions when inverter enters operation status, which includes 3 modes as controlled by keypad operation, control terminal or RS485 communication. The terminal operation mode is categorized as 2-wire sequence, and 3-wire sequence. The setting details and control logic of these three modes are shown in the description of function parameters F0-04, F0-05 in 7.1.

1.4 EM330 Outlook

See Figure 1-2 for the outlook of EM330 (Instance: EM330- 4.0kW).

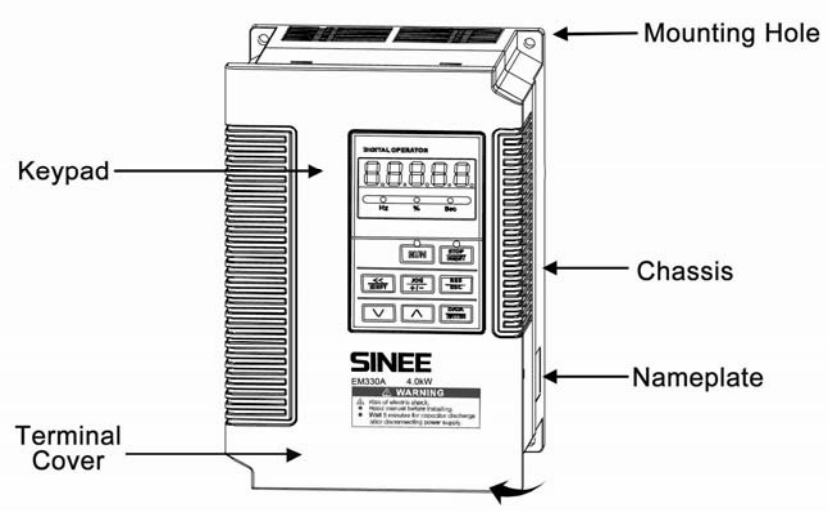


Figure1-2 EM330 Outlook

The face terminal cover can be taken away by following the arrow shown in Figure1-2.

2 Installation

2.1 Verifying Product

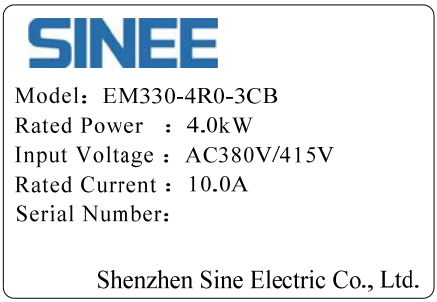
Check and verify the EM330 refer to Table 2-1.

Table 2-1 Check List

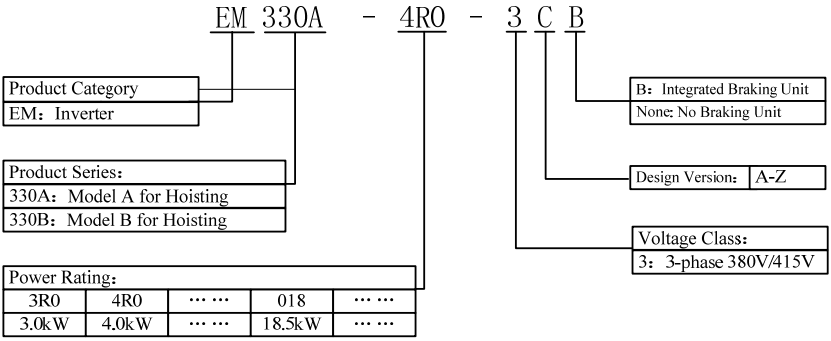
Item	Action
If the products are identical to the purchase order.	Check the devices reference marked on the label.
Any part damaged.	Check the outlook if any damages.
Any screw loosened.	Check with a screw driver if necessary.

Contact the distributor or SINEE directly for quality issue.

- **Nameplate**



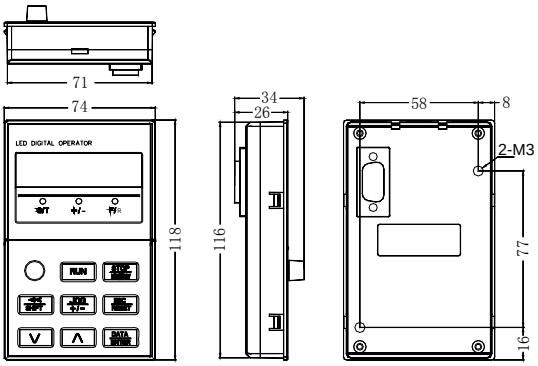
- **Model Numbering Scheme**



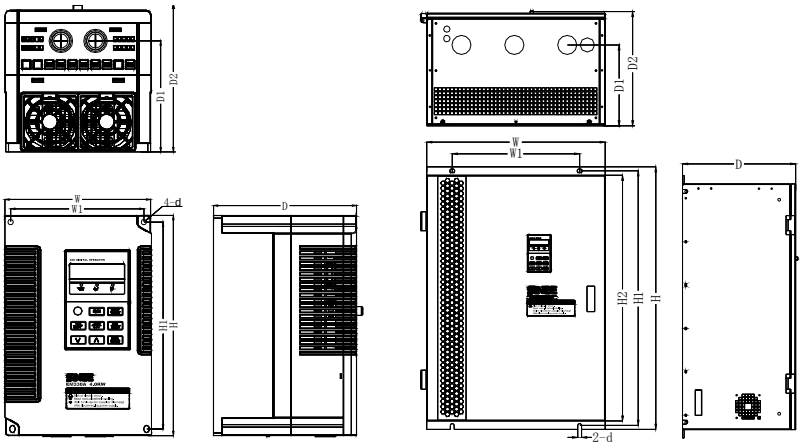
2.2 Overall and Installation Dimensions

Classified to 10 sizes for total 50 EM330 models, installation dimensions as shown in Figure 2-1 and Table 2-2.

The keypad can be installed on the metal panel separately with a hole size of 116.5±0.1(L)*71.5±0.1 (W)mm, and applicable panel thickness:1.2～2.0mm



（a）Keypad Dimensions for Installation



(b) (c)

Figure 2-1 Overall and Keypad Dimensions of EM330 for Installation

Table 2-2 Overall and Installation Dimensions of EM330

Model No.	W	W1	H	H1	H2	D	D1	D2	d	Frame
EM330X-3R0-3XX	140	125	220	205	--	152	120	161	6	(b)
EM330X-4R0-3XX										
EM330X-5R5-3XX	165	148	250	235	--	161	126	170	6	(b)
EM330X-7R5-3XX										
EM330X-9R0-3XX	215	150	352	335	317	215	172	224	7	(c)
EM330X-011-3XX										
EM330X-015-3XX										
EM330X-018-3XX	270	200	470	450	424	245	187	254	10	(c)
EM330X-022-3XX										
EM330X-030-3XX										
EM330X-037-3XX	335	240	550	530	500	245	190	254	10	(c)
EM330X-045-3XX										
EM330X-055-3XX	390	300	695	665	635	250	200	259	12	(c)
EM330X-075-3XX										
EM330X-090-3XX	560	400	828	803	775	355	255	364	12	(c)
EM330X-110-3XX										
EM330X-132-3XX										
EM330X-160-3XX	650	400	1060	1034	1000	400	325	409	13	(c)
EM330X-185-3XX										
EM330X-200-3XX										
EM330X-220-3XX	825	660	1200	1170	1137	400	320	409	13	(c)
EM330X-250-3XX										
EM330X-280-3XX										
EM330X-315-3XX	1068	870	1213	1183	1150	410	330	419	13	(c)
EM330X-355-3XX										
EM330X-400-3XX										

Remarks:

1. X in the table above stands for A, B, or C …Z
2. EM330 X-090 or above: power input terminals are on the top, and power output terminals are at the bottom of the inverter.

   3.5 models: EM330X-055～075X, EM330X-090～132X, EM330X-160～200X, EM330X-220～280X , and EM330X-315～400X can be floor-mounted with a chassis which is in the same width as the inverter. Heights of optional chassis: 120mm, 250mm, 300mm, 300mm and 350mm.

2.3 Considerations of Installation Site

2.3.1 Installation Site

Considerations for installation site:

- Good ventilation indoor
- Ambient temperature: -10°C～40°C
- High temperature and high moisture, humidity:＜90%RH, no water drops or any other condensation.
- Never install on flammable materials.
- No direct sunlight
- No flammable, corrosive gas or liquid.
- No dust, floating fiber or metal particles
- Firm and steady installation base
- No electromagnetic interference, and keep away from interference source.

2.3.2 Ambient Temperature

Install inverter in a place with good ventilation to improve the reliability of inverter operation. When inverter is mounted inside a cabinet, cooling fan or air conditioner is a must. Keep the ambient temperature below 40°C.

2.3.3 Precautions

Take protective measures during installation to prevent foreign matters like metal particles or dust from entering the inverter when drilling. Please take off the protective objects after installation.

2.4 Direction and Space of Installation

Cooling fan(s) installed inside EM330 is for forced air cooling. For good cooling circulation, mount the inverter vertically, and leave sufficient space between the inverter and wall or other objects. See Figure 2-2.

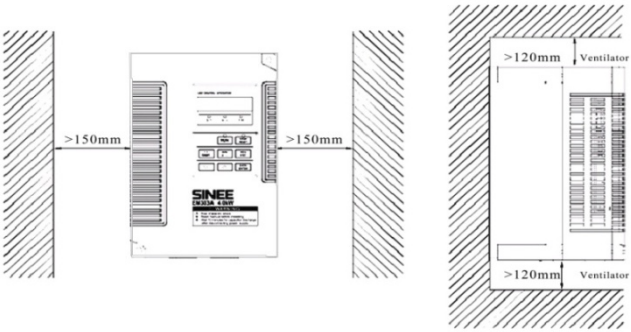


Figure 2-2 Installation Direction and Space

3 Wiring

3.1 Connections to Peripherals

Connections between EM330 and its peripherals are shown in Figure 3-1

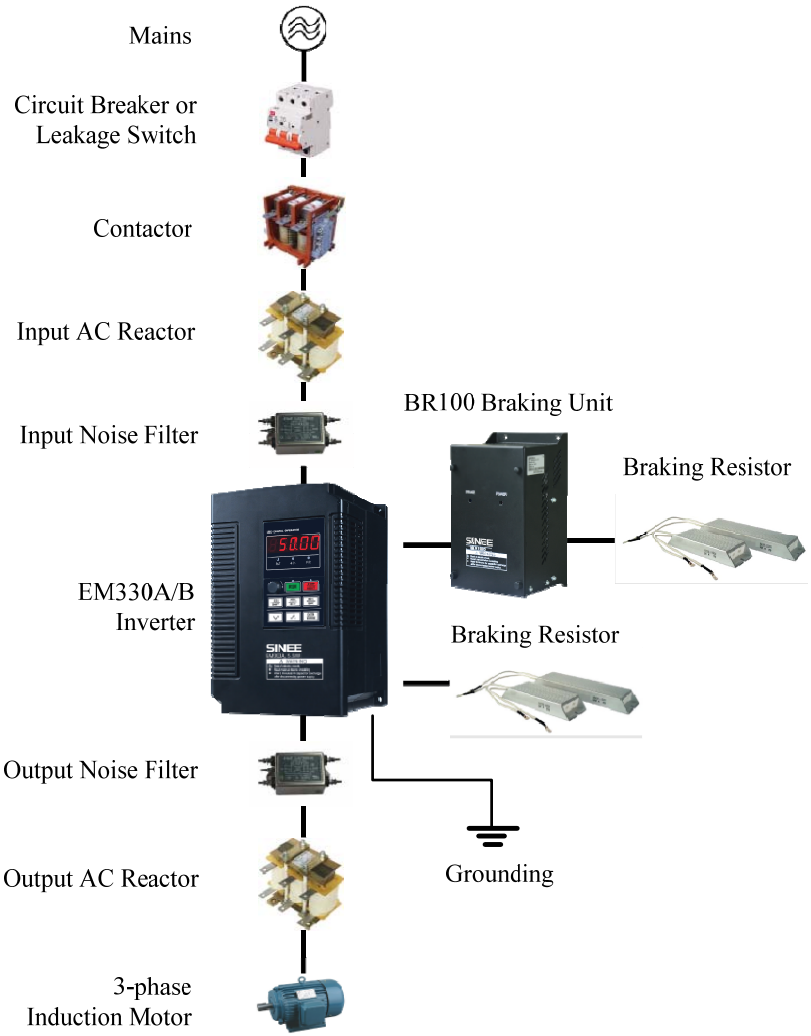
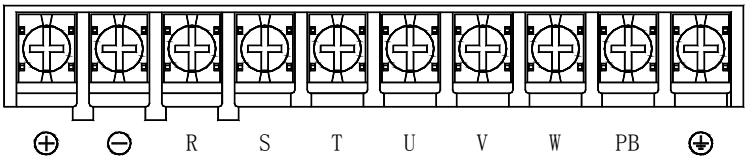


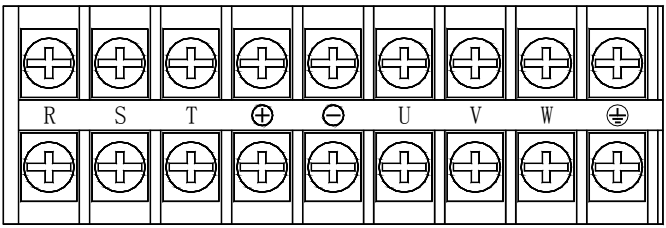
Figure 3-1 EM330 Peripherals Connections

3.2 Wiring Main Circuit Terminals

3.2.1 Main Circuit Terminal Block

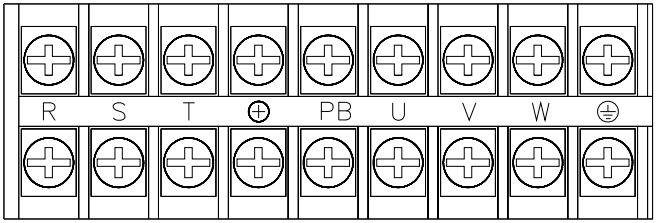


(a) Main Circuit Terminal Block of EM330 X-015 or below



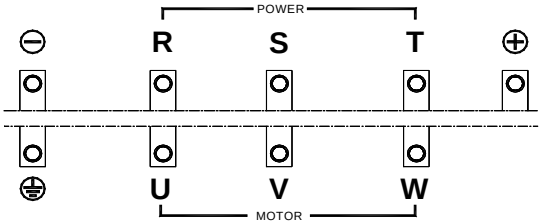
（b）

Main Circuit Terminal Block of EM330 X-018～75 (No Integrated Braking Unit)



（c）

Main Circuit Terminals of EM330 X-018～75 (With Integrated Braking Unit)



(d) Main Circuit Terminals of EM330 X-090 or above

Figure 3-2 Main Circuit Terminal Block

Remarks:

1. EM330 X-090 or above: Power input terminals are on the top, and power output terminals are at the bottom of the inverter.
2. EM330 X-315 or above: There are 2 wiring screws for each terminal.

3.2.2 Main Circuit Terminal Functions

The main circuit terminal functions of EM330 are listed in Table 3-1. Wire the terminals correctly as per corresponding function.

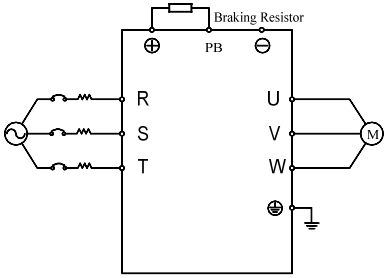
Table 3-1 Main Circuit Terminal Functions

Terminal	Function
R, S, T	AC power input terminals for connecting to 3-phase AC power.
U, V, W	Inverter AC output terminals for connecting to 3-phase induction motor.
⊕⊖	Positive and negative terminals of internal DC bus for connecting to outer braking unit.
⊕ , PB	Connecting terminals of braking resistor, one end connected to ⊕ and the other to PB.
⏚	Grounding terminals

3.2.3 Standard Wiring of Main Circuit

See Figure 3-3 for standard wiring of main circuit.

Inverter with an Integrated Braking Unit



Inverter Without an Integrated Braking Unit

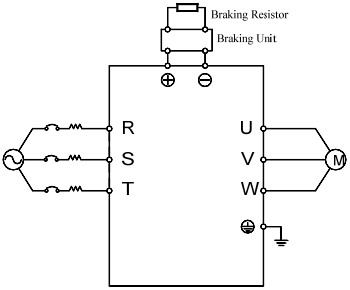


Figure 3-3 Standard Wiring of Main Circuit

3.2.4 Wiring Main Circuit on Input Side

Installing a Circuit Breaker

Always install an air circuit breaker (MCCB) between the power supply and input terminals.

- Choose a MCCB with a capacity of 1.5-2 times of the inverter air circuit.
- The time characteristics of MCCB should meet that of inverter's overheating protection (150% of rated current /1minute).
- If the same MCCB is used for more than one inverter, or other devices, the contact of fault output relay shall be connected to power contactor coil, so that the power supply will be turned off by the fault signals, as shown in Figure 3-4.

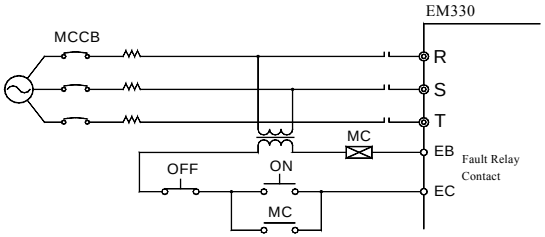


Figure 3-4 Connecting to Input Circuit Breaker

Installing a Leakage Circuit Breaker

High frequency leakage is generated by high frequency PWM signal output of inverter. Select a special purpose leakage breaker with a trigger current≥30mA. For a regular leakage breaker, the trigger current:≥200mA and the active time at 0.1S or above.

Adjust filter frequency to lower high frequency leakage if necessary.

Installing an Electromagnetic Contactor

Install an electromagnetic contactor which is applicable to the power of inverter as shown in Figure 3-4.

- The inverter can be started and stopped by opening and closing the electromagnetic contactor on input side. Inverter may break down if the electromagnetic contactor is on and off frequently. The operation interval between start and stop of the inverter shall ≥ 30 minutes, if electromagnetic contactor on input side must be used for controlling.
- The inverter will not automatically start if power is on after failure.

Connecting to the Terminal Block

No phase sequence requirements for input power supply, R, S, and T on the terminal block, any two of them can be connected randomly.

Installing an AC Reactor

If the inverter is connected to a transformer with big-capacity power (≥600kVA), or power supply is connected to capacitive load, an excessive surge current will occur and rectifier of inverter can be broken down. Install an optional 3-phase AC reactor on input side of inverter to suppress peak current and voltage, and improve power factor of the system.

Installing a Surge Absorber

Install a surge absorber for inductive loads nearby the inverter. These inductive loads include electromagnetic contactors, solenoid valves, solenoid coils, or electromagnetic circuit breakers.

Installing a Noise Filter on Power Supply Side

To filter noise transmitted between power cable and the inverter, and the impact on power grid caused by the noise produced by the inverter.

- A special purpose noise filter is required for the inverter.
- Correct and incorrect noise filter installations as shown in Figure 3-5 and Figure 3-6 respectively.

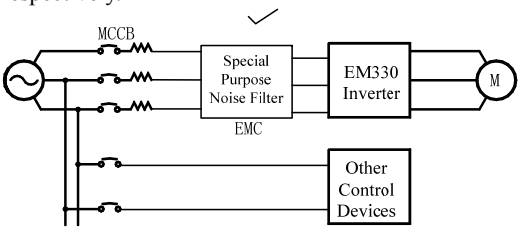
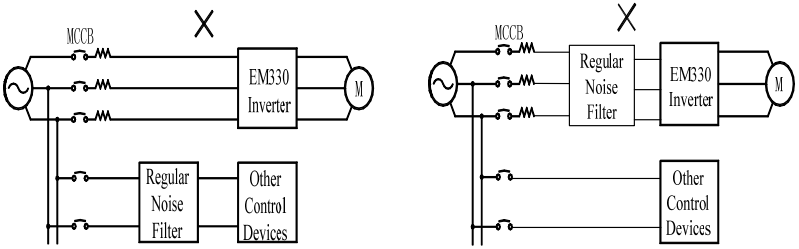


Figure 3-5 Correct Noise Filter Installation



(a) (b)

Figure 3-6 Incorrect Noise Filter Installation

3.2.5 Wiring the Output Side of Main Circuit

Connecting the Inverter and Motor

Connect inverter output terminals U, V, and W to motor input terminals U, V and W.

Check that the motor forwards with the Forward Command. Switch any 2 of the inverter output terminals U, V, or W to each other and reconnect if the motor reverses with the Reverse Command.

Never Connecting Power Supply Cable to Output Terminals

Never connect power supply cable to output terminals. If power is input to the output terminals, the inverter would be damaged.

Never Short-Circuit or Grounding Output Terminals

Never touch output terminals directly with bare hands, or connect the output cable to the housing of inverter. Otherwise, an electric shock and short-circuit may occur. Furthermore, do not short-circuit the output cable.

Never Using a Phase-shifting Capacitor

Never connect phase-shifting electrolytic capacitor or LC/RC filter to the output circuit, otherwise, the inverter will be damaged.

Never Using an Electromagnetic Switch

Never connect electromagnetic switch or electromagnetic contactor to the output circuit. Otherwise, failure to comply will cause overcurrent or overvoltage protection of inverter. Even worse, the inverter will be damaged.

Make sure the inverter and motor stops before installing electromagnetic contactor to switch grid power supply.

Installing a Noise Filter on the Output Side

Install a noise filter on the output side of inverter to reduce inductive interference and radio interference.

- Inductive interference: Electromagnetic induction generates noise on the signal line, so the control device may have malfunctions.
- Radio interference: The high frequency electromagnetic waves generated by inverter and cable cause nearby radio devices to make noise when receiving signals.
- See Figure 3-7 for installing a noise filter on the output side.

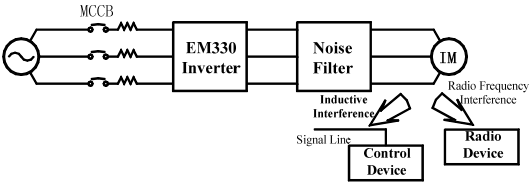


Figure 3-7 Installing a Noise Filter on the Output Side

Countermeasures Against Inductive Interference

As stated previously, except installing a noise filter, all output cables can be routed through a grounded metal pipe to prevent inductive interference on the output side. The distance between output cables and signal line should＞30cm, and the inductive interference will be reduced considerably, as shown in Figure 3-8.

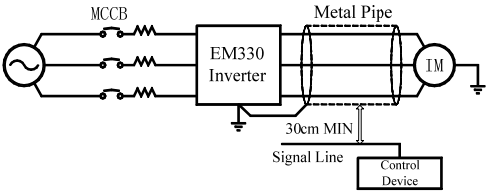


Figure 3-8 Countermeasures against Inductive Interference

Countermeasures Against Radio Frequency Interference (RFI)

RFI will be generated from the inverter as well as the input cable and the output cable. Install noise filters on both input and output sides, and shield inverter with an iron case to reduce RFI. As shown in Figure 3-9.

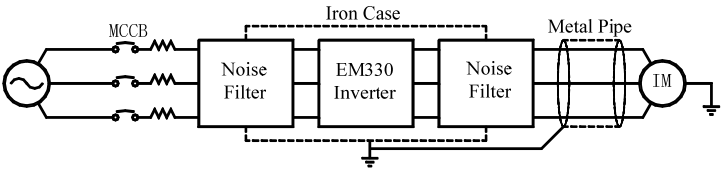


Figure 3-9 Countermeasures Against RFI

Cable Length Between Inverter and Motor

The longer cable between the inverter and motor is, the higher carrier frequency is, and the greater high-frequency harmonic leakage current on its cable is. All of which will affect inverter and its peripherals. See Table 3-2 to reduce the high-frequency harmonic leakage current by regulating carrier frequency.

When motor cable is＞50m, connect a special 3-phase AC reactor of the same capacity as that of the inverter to the output terminals.

Table 3-2 Cable Length Between Inverter and Motor

Cable Length	＜50m	＜100m	＞100m
Carrier Frequency	＜10kHz	＜5kHz	＜2kHz
Function Parameter	10.000	5.000	2.000

3.2.6 Main Circuit Cable and Terminal Screw Size

Table 3-3 Main Circuit Cable and Terminal Screw Specifications

Model No. of Inverter	Terminals	Terminal Screw	Tightening Torque (N.m)	Cable Size (mm2)	Cable Type
EM330X-3R0-3XX	⊕,⊖ ,R,S,T,U,V,W,PB,⏚	M3.5	1.2～1.5	4	750V
EM330X-4R0-3XX		M3.5	1.2～1.5	4	
EM330X-5R5-3XX		M4	1.5～2.0	6	
EM330X-7R5-3XX		M4	1.5～2.0	6	
EM330X-9R0-3XX		M5	3.0～4.0	6	
EM330X-011-3XX		M5	3.0～4.0	10	
EM330X-015-3XX		M5	3.0～4.0	10	
EM330X-018-3XX	No integrated braking unit R,S,T,⊕,⊖,U,V,W,⏚	M6	4.0～5.0	16	
EM330X-022-3XX		M6	4.0～5.0	16	
EM330X-030-3XX		M6	4.0～5.0	25	
EM330X-037-3XX		M8	9.0～10.0	25	
EM330X-045-3XX		M8	9.0～10.0	35	
EM330X-055-3XX		M10	17.0～22.0	35	
EM330X-075-3XX		M10	17.0～22.0	60	
EM330X-090-3XX		M10	17.0～22.0	60	
EM330X-110-3XX		M10	17.0～22.0	90	
EM330X-132-3XX		M10	17.0～22.0	90	
EM330X-160-3XX	With an integrated braking unit R,S,T,⊕,PB,U,V,W,⏚	M12	31.0～39.0	120	
EM330X-185-3XX		M12	31.0～39.0	180	
EM330X-200-3XX		M12	31.0～39.0	180	
EM330X-220-3XX		M16	45.0～55.0	240	
EM330X-250-3XX		M16	45.0～55.0	270	
EM330X-280-3XX		M16	45.0～55.0	270	
EM330X-315-3XX		2*M16	45.0～55.0	2*150	
EM330X-355-3XX		2*M16	45.0～55.0	2*150	
EM330X-400-3XX		2*M16	45.0～55.0	2*180	

Remarks:

1. Take the voltagedrop into consideration for selecting cable. Generally the voltagedrop should be＜5V and calculated according to following formula:
   Voltagedrop=√3* Cable resistance ratio(Ω/KM)*Cable length(m)*Rated current (A)*10^{-3}
2. If placed in plastic duct, the cable should be uprated by one level.
3. The cable should be connected to the applicable cable and wiring terminal.
4. The size of grounding cable should be the same as that of power cable when the size of power cable is less than 16mm^2. However, when it is >16mm^2, the size of grounding cable should not be less than half of 16mm^2, but at least 16mm^2.
5. X in the table above stands for A, B, or C…Z.

3.2.7 Ground Wiring

- Make sure the ground terminal ⏚ grounded.
- Do not share the grounding cable with welding machine or power equipment.
- The size of grounding cable should meet the technical standard of electrical appliances, and the distance to grounding point should be as short as possible.
- Do not form the grounding cable as a circuit whenever two or more inverters are used synchronously. See Figure 3-10 for the correct and incorrect grounding wirings.

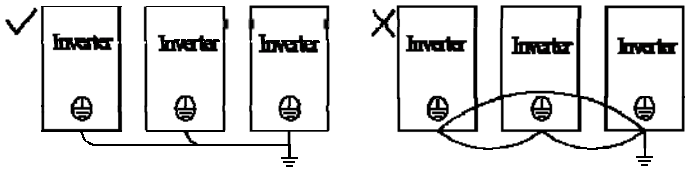


Figure 3-10 Grounding Wiring

3.2.8 Wiring Braking Resistor and Braking Unit

See Chapter 11 for more detail about the selection and wiring of braking resistor and braking unit.

3.3 Wiring Control Circuit Terminals

3.3.1 Control Circuit Terminals

The control circuit terminals of EM330A are located on control PCBA, and consist of the following ports:

- Analog input terminals: Voltage input signals VS and VF. Current input signals IS and IF.
- Numeric input terminals: X1, X2, X3, X4, X5, X6, X7, PLC
- Numeric output terminals: Y1, Y2, EA, EB, EC
- Analog output terminals: M0, M1
- Auxiliary power supply terminals: +24V, COM, +10V, GND.
- RS485 communication interface: A+，A-
- Grounding terminal: PE

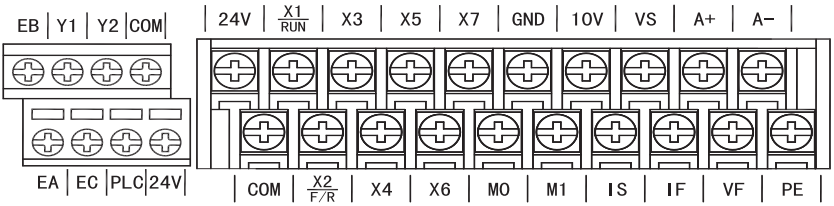


Figure 3-11A EM330A Control Circuit Terminal Block

The control circuit terminals of EM330B are located under of the control PCBA, and consist of the following ports:

- Analog input terminals: Differential voltage input signals VS+, VS-, VF10, and VF-. Current input signals IS+, IS-, IF+, and IF-
- Numeric input terminals: X1, X2, X3, X4, X5, X6, X7, X8, PLC
- Numeric output terminals: EA, EB, EC, RA, RB, RC, Y1, Y2, D0
- Analog output terminals: M0, M1
- Auxiliary power supply terminals: +24V, COM, +10V, GND.
- RS485 communication interface: A+，A-
- Grounding terminal: PE

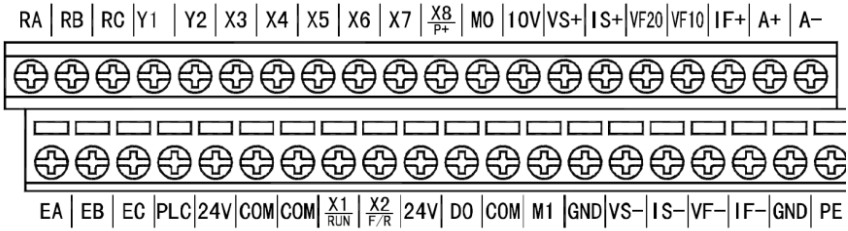


Figure 3-11B EM330B Control Circuit Terminal Block

3.3.2 Function and Wiring of Control Circuit Terminals

Table3-4 Function of Control Circuit Terminals (* Function of EM330B)

Mode	Terminal	Terminal Name	Terminal Function
Analog Input (EM330A)	VS	VS Analog voltage input	0/2~10V（Configured as per F8-00）
	VF	VF Analog voltage input	Input resistance: 40KΩ
	IS	IS Analog current input	0/4～20mA（Configured as per F8-00）
	IF	IF Analog current input	Input resistance: 250Ω

Analog Input (EM330B)	VS+、VS-	VS Analog voltage input*	0/2~10V（Configured as per F8-00） Input resistance: 40KΩ
	VF10、VF-	VF Analog voltage input *	
	VF20	Not used	
	IS+,IS-	IS Analog current input*	0/4～20mA（Configured as per F8-00） Input resistance: 250Ω
	IF+,IF-	IF Analog current input*	
Numeric Input	X1/RUN	Multi-function input terminal	Program the relevant terminals by setting F2-00～F2-07 to achieve the input control of setting function
	X2/ F/R		
	X3～X7		
	X8*	Multi-function input terminal*	
	COM	Multi-function input common terminal	Switching value input/output signal common terminal
	PLC	Multi-function input common terminal	Common terminal for external connection with 24V The default is to connect with 24V supply
Relay Output	EA-EC	NO relay 1 terminal	Contact drive capability AC250V:3A，COSϕ>0.4 DC30V:1A
	EB-EC	NC relay 1 terminal	
	RA-RC*	NO relay 2 terminal*	
	RB-RC*	NC relay 2 terminal*	
Multi-function Output	Y1	OC output terminal 1	Programmable multi-functional output terminals as shown in F2-12, F2-13, F2-18 Maximum output current: 50mA
	Y2	OC output terminal 2	
	D0*	High speed pulse output terminal*	
Analog Output	M0	Analog output terminal 0	Analog output 0~10V or 0~20mA can be defined by setting of F2-16, F2-17.
	M1	Analog output terminal 1	
Auxiliary Power Supply	10V-GND	Analog quantity terminal power supply	+10V/20mA，commonly used for the mains of potentiometer.
	24V-COM	Switching value terminal power supply	Maximum output current: 150mA
	COM	Switching value common terminal	Switching value input/output signal common terminal
Communication	A+	RS485 communication interface terminal	485 differential signal positive terminal
	A-		485 differential signal negative terminal
Shield	PE	Shielded grounding	For shielded terminal cable grounding

3.3.2.1 Wiring the Analog Input Terminals

Wiring terminals VS and VF through analog voltage signal:

When analog voltage input signal is as the external power supply, wire terminals VS and VF as per the method shown in Figure 3-12-a.

When analog voltage input signal is as the potentiometer, wire terminals VS and VF as per the method shown in Figure 3-12-b.

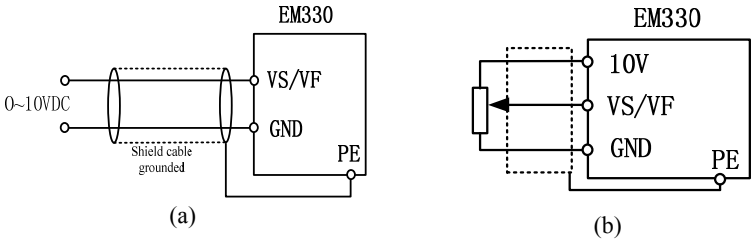


Figure 3-12 Wiring of Terminal VS and VF

Wiring terminals IS and IF through analog current signal:

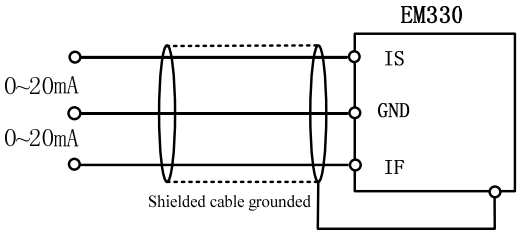


Figure 3-13 Wiring of Terminal IS and IF

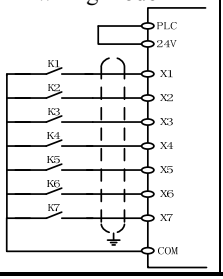
3.3.2.2 Wiring Multi-function Input Terminal

The multi-functional input terminals of EM330 adopt full bridge rectifier circuit. Terminal PLC is the common terminal of X1~X8. The current passed through the PLC terminal can be forward (NPN Mode) or reverse (PNP mode), so that it is flexible to connect terminals X1-X8 to external components. The typical wirings are as shown in the followings:

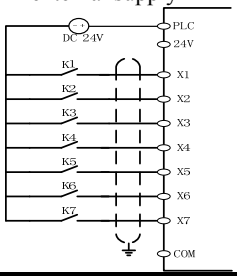
NPN and PNP wirings of multi-functional numeric input terminals(X1～X7)

(See F2 Group for parameter setting)

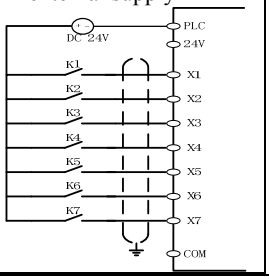
A. Dry contact wiring mode



B. NPN mode with external supply

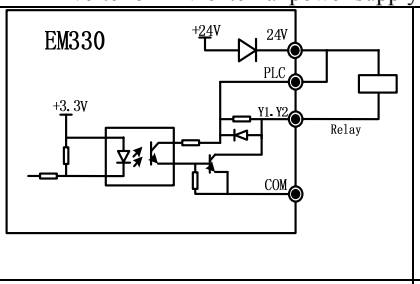


C. PNP mode with external supply

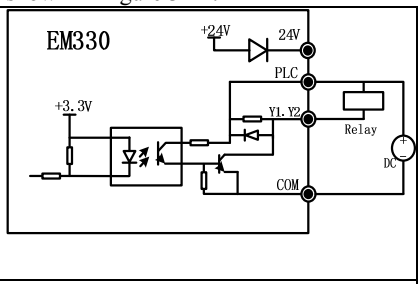


3.3.2.3 **Wiring Multi-function Output Terminal**

Multi-function output terminals Y1 and Y2 can take the internal power supply of inverter or 24V external power supply as shown in Figure 3-14.



a: Internal power supply



b:External power supply

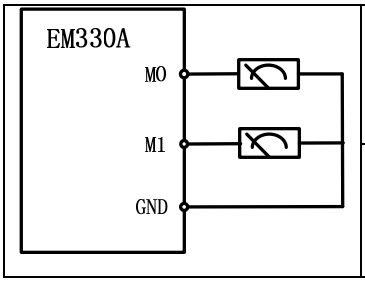
Figure 3-14 Wiring of Multi-function Output Terminals

If multi-function output terminals are used for driving relay (or other inductive loads), fly-wheel diodes shall be installed at both ends of relay coil. (Pay attention to the pole of diode when installing, otherwise, 24V power supply may be damaged.)

3.3.2.4 Wiring Analog Output Terminals

Analog output terminals M0 and M1 can represent various physical quantities when connected to external analog meter. The specifications of jumper are taken as: 0~20mA output current or 0~10V output voltage, here M0 and M1 correspond to JP1 and JP2 respectively.

See the figure below for wiring the jumper and terminals as per the mode.



JP1		M0: Analog voltage output
		M0: Analog current output
JP2		M1: Analog voltage output
		M1: Analog current output

3.3.2.5 Wiring Communication Terminal

Terminals A+ and A- are the RS485 communication interfaces of the inverter. The control network between PC or PLC and inverter can be achieved through connecting communication with PC or PLC. See Figure 3-15.

- Connect to PC or PLC through RS485/RS232 interface converter:

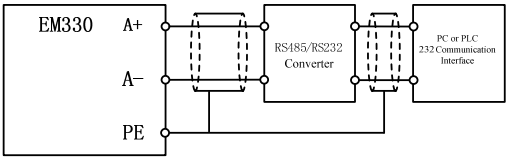


Figure 3-15 Wiring of Communication Terminals

3.3.3 Size of Control Circuit Cable and Screw

To lower interference and attenuation of control signal, the wire length of control signal should be in a maximum of 50m, and the distance between the wire and the power cable should be in a minimum of 30cm. Twisted-pair cable or shielded cable shall be used when inputting analog signal externally.

0.5~1 mm^2 cable as the control circuit cable shall be best.

There are two types of control loop wiring terminals for EM330: clamp terminal and barrier terminal, install them with a PH0 cross head screwdriver. The tightening torque of screw is 0.5N.m. Please pay attention to followings based on different features of these two terminals:

- Clamp wiring terminal
  - ■Take pin terminal or cable strip length by 5~7mm for connection.
  - ■Only after the terminal screw is fully loosened anticlockwise first, the cable can be inserted.
- Barrier wiring terminal
  - ■Take a circular or a U-type clamp terminal with holes of 3.5mm

3.3.4 Control Circuit Wiring Precautions

- Separate the control circuit cable from the other cables.
- Separate the cable on control circuit terminals EA, EB, EC, Y1, and Y2 from the other cables.
- Use shielded twisted-pair cables for control circuit to prevent malfunctions. The wiring distance should be in a maximum of 50m.
- Insulate the shield with tape to prevent from contacting with other signal cables and equipment.

3.4 Extending Keypad Cable

Take off the keypad of EM330 as per the method shown in Figure 2-3, connect to an extension cable, and then install the keypad in a proper place and take it as a control panel. If the extension cable exceeds 10m, a remote control kit is required. If the keypad cable is also a control circuit cable, wiring precautions as stated in 3.3.4.

3.5 Wiring Check

Perform the following checks after wiring has been completed:

- If wiring is correct.
- If anything is left in inverter like screw, or wire clippings.
- If the screw is loose.
- If the bare wire on one terminal connects to other terminals.

3.6 Standard Control Circuit Wiring

Standard control circuit wiring of EM330 as shown in Figure 3-16A and 3-16B.
Typical wiring of various hoist applications as shown in Chapter 12.

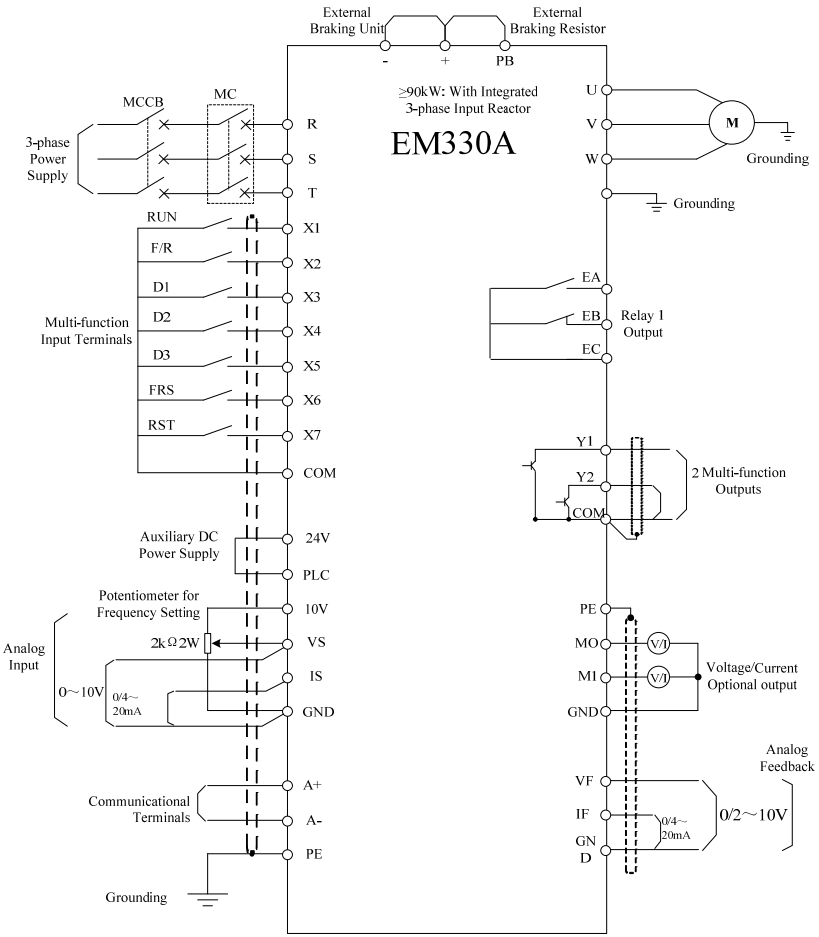


Figure 3-16A Standard Control Circuit Wiring of EM330A

Remarks:

1. EM330 X-090 or above: No PB terminal
2. EM330 X-018～075: No integrated braking unit, no PB terminal
3. EM330 X-018～075: With an integrated braking unit, no⊖terminal.

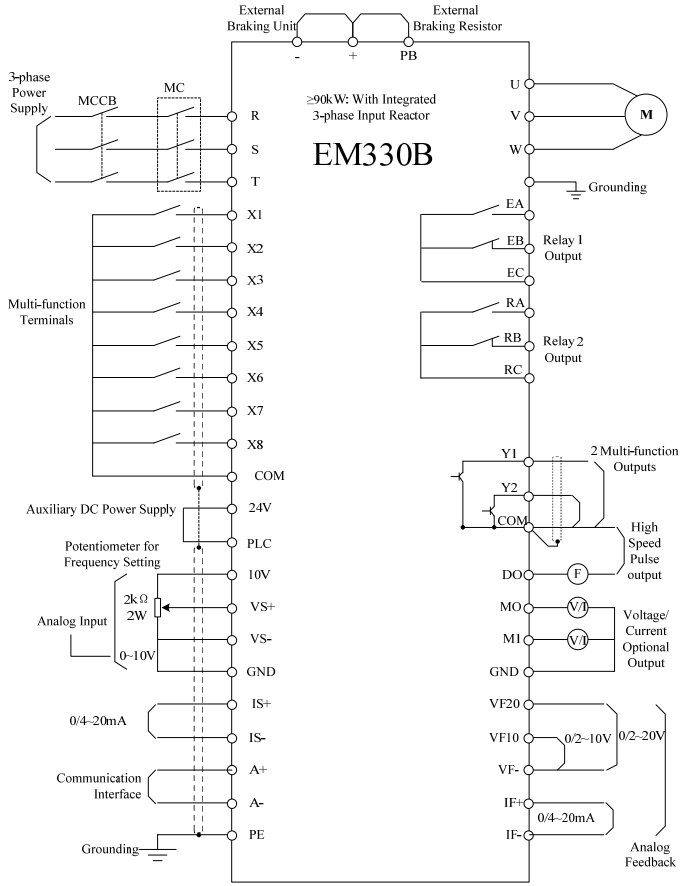


Figure 3-16B Standard Control Circuit Wiring of EM330B

Remarks:

1. EM330 X-090 or above:: No PB terminal
2. EM330 X-018～075: No integrated braking unit, no PB terminal
3. EM330 X-018～075: With an integrated braking unit, no ⊖ terminal.

4 Keypad Operation

4.1 Type and Function of Keypad

EM330 keypad consists of 5-bit LED display, operation buttons and analog potentiometer. As shown in Figure 4-1.

User can perform function setting, status monitor, fault monitor, start/stop control, and jog operation for EM330 through keypad operation.

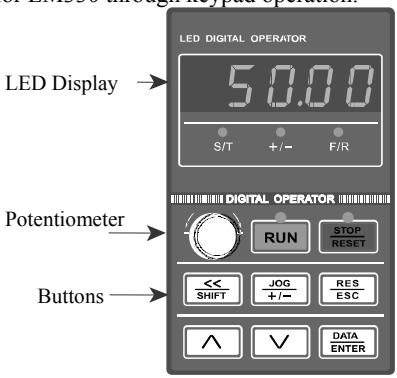
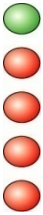


Figure 4-1 LED Keypad

Name and function of each button on the keypad refer to Table 4-1.

Table 4-1Name and function of button on the keypad

Part	Name	Function
<< / SHIFT	Left Shift	Select the bit of setting parameters. Select the row of monitor parameter in operation.
RES / ESC	Reset/Escape	Reset previous status. Escape from editing the present parameter.
JOG / + / −	Button for Multi-functional programming	For programmable JOG or forward/reverse selection
DATA / ENTER	ENTER	Save edited parameter of present function parameter. For entering sub-menu.
RUN	RUN	In keypad control mode, press the button to start inverter.
STOP / RESET	STOP/RESET	In keypad control mode, press the button to stop inverter. Reset setting status from fault status when faults trip.
	LED Display	Display function setting, running monitor, fault monitor parameter and parameters.

	UP	Select function parameter, menu or increase the value of setting parameters, and increase the present effective reference numeric input data.
	DOWN	Select function parameter, menu or reduce the value of setting parameter, and reduce the present effective reference numeric input data.
	Status Indicator	**RUN:Green** On: the inverter is running. Flashing: the inverter is stopping. **STOP: Red** On: the inverter fails. **S/T : Red** Off: in speed control mode On: in torque control mode **+/- : Red** Off: + positive input signal On: - negative input signal **F/R : Red** Off: output frequency≥0, forward On: output frequency<0, reverse.
	Analog Potentiometer	Regulate speed as per analog value.

4.2 LED Keypad Operation Mode

There are 6 keypad operation modes of EM330: function setting, parameter copy, operation monitor, fault monitor, jog running, and start/ stop. Keypad operation modes are as shown in Table 4-2.

Table 4-2 Keypad Operation Modes

Keypad Operation Mode	Key Function
Function Setting	1. Display, edit, save, reset and lock the parameters. 2. Reset default of the parameters. 3. Select relevant parameter when the inverter is running.
Function Parameter Copy	1. Upload parameter: Upload the parameters saved in the inverter to keypad. 2. Download parameter: Download the parameters saved in the keypad to inverter. Combine those above two modes to easily and quickly copy parameters for multi-inverter.
Running Monitor	1. Randomly select function parameters C0-00～C0-31 display when the inverter is running.
Fault Monitor	1. Check fault parameter and status of the inverter when fault occurs.
Jog	In setting status, press JOG button, the inverter runs as per the setting frequency. Release the JOG button, the inverter will stop.
Start/Stop	If in keypad start/stop mode, press RUN and then release, inverter starts to run. When in operation status, press STOP/RESET button, inverter stops.

Function setting, operation monitor and fault monitor are performed by menu setting. Start/stop, jog and keypad numeric potentiometer are operated by single button.

5 Trial Operation

5.1 Trial Operation Procedures

Table 5-1 Procedures of Trial Operation

Procedure		Working Scope
Installation		Check inverter's rated power, and install the inverter as per the requirements stated in Chapter 2.
Wiring the Inverter		Wiring as per the requirements stated in Chapter 3, typical wiring diagrams as shown in Chapter 12.
Check Before Power-on		1. Be sure the input power supply is correct 2. The input power supply connects to a circuit breaker 3. The inverter is grounded. 4. Power supply cable is connected to input terminals R,S and T of the inverter correctly 5. Motor is connected to output terminals U, V, and W of the inverter correctly. 6. Correct control circuit wiring. 7. External switch is at right status. 8. Motor is disconnected to the mechanical system when idling.
Check at Power-on		1. Check if there is unexpected noise, odd smell, or smoke with inverter. 2. When power is on, normal display on control panel, without alarming. 3. Turn off the power immediately if any emergency, and check as per the instruction in Chapter 9.
		After inverter maintained or motor changed, reset the parameters as defaults, and then conduct following operations.
Parameter Setting	Basic Parameter	Set forward/reverse control, acceleration/deceleration time, start/stop mode, setting mode, and fault output correctly based on the working conditions of driving system.
	Special Parameter	F4-28 sets application macros, the default is F4-28=9(Special for hoist). Confirm if F4-28 parameters are applicable to the applications. (Set F4-28 as per the instructions in 6.3 and 7.5.)
	Brake Logic Control Parameter	Set brake release time and frequency, stop DC brake time in accordance with external circuit wiring mode and mechanical configuration.
Input Correct Motor Label Parameter		Input and confirm the parameters listed on motor nameplate. Otherwise, serious damage may occur in operation. Set parameters of motor 1 in F1.
Setting Protection Parameter of Motor and Inverter		Set correct limit parameters, protection parameters and protection modes of inverter and motor, mainly as: maximum frequency, upper-limit frequency, lower-limit frequency, lower-limit frequency running time, fault retry control, relay fault output.

	Current limit and overvoltage stall protection are disabled for hoist devices.
Autotuning Motor Parameter	1. Obtain correct motor parameters by autotuning motor parameter before the initial operation. 2. Use stationary autotuning motor parameter if motor cannot disconnect the load. 3. Do not autotune motor parameters if the motor is running.
Idling Trial Operation Check	When motor is idling, start inverter in keypad or terminal control mode, check and confirm the running status of drive system. 1. Motor: stable operation, normal rotation, correct rotational direction, and acceleration/deceleration process, no unexpected vibration, noise and odd smell. 2. Inverter: correct data displayed on the control panel, fans and relays working stably, no unexpected vibration or odd smell. 3. Turn off the power immediately if anything unexpected.
On-load Trial Operation Check	1. If idling check is normal, connect the drive system to load, and connect braking unit and braking resistor to the hoisting device and hoist. 2. Through terminal switching forward and reverse operation modes, check if the inverter is in normal operation, if mechanical brake is enabled. 3. Observe response of output frequency through the speed signals given by master command controller 4. When high-speed run downward handle returns 0 position, the inverter shall stop immediately without coast-to-stop. Observe if the indicator of braking unit is flashing.

5.2 Trial Operation Precautions

5.2.1 Turn off the Power

Check before power-off:

- Voltage of power supply:3-phase 380V/415V, 50Hz
- Connect the input power supply cable to the input terminals R,S, and T of inverter.
- Connect the output terminals U,V, and W of inverter to the input terminals of motor.
- All control circuit terminals are connected to correct control device, and terminals shall be off.
- Motor is idling.
- Turn the power off after all above setting have been confirmed.
- ⊕,⊖ are the output terminals of inverter's DC bus voltage, ⏚ is grounding terminal, PB is wiring terminal of braking resistor. Any damage resulted from incorrect wiring shall not in warranty.

5.2.2 Check at Power-on

After the inverter starts up, the present working status and parameters will be displayed on the keypad. See Chapter 9 if something unexpected displayed on keypad.

5.2.3 Idling Operation

When motor is idling without mechanical load, the inverter is controlled by keypad or control terminals, make motor have trial operation. The operating procedures of idling trial operation as shown in followings:

- **Setting Reference Frequency**

  The default of reference frequency is 0.00Hz. Before trial operation, confirm the setting frequency of F0-00, and set the expected frequency through F0-07.

- **Starting the Inverter**

  1. In function setting status, press JOG, inverter starts up as per setting frequency of F0-11(The default is 5.00Hz), and motor runs in the direction as presently set, monitor that it runs in a correct direction.
  2. Press RUN on the keypad or enable start terminal, the motor runs to the setting frequency of F0-00 displayed.
  3. When reverse terminal is on, the motor reverses to setting frequency.
  4. Press UP/ DOWN to regulate the speed of motor during running process.
  5. Press STOP to enter ramp-to-stop status, the speed of motor decreases until the motor stops.

- **Operation Status Monitoring**

  1. Change input frequency or rotation direction, and monitor if there is vibration or unexpected noise with the motor or not.
  2. Check if inverter runs stably.

5.2.4 On-Load Operation

After idling operation of motor is succeeded, connect motor to the mechanical load for a trial operation.

- **Connecting Motor to Mechanical Load**

1. After motor stops, turn the power supply of inverter off, and connect the motor to mechanical load.
2. Tighten up screw, and loading the mechanical load to the motor shaft.

- **Starting up the Inverter**

1. Start up the inverter in the same way as that in idling operation.
2. Set the frequency about 1/10 of the normal running speed.

Get ready for pressing STOP in case of anything unexpected.

- **Operation Status Monitoring**

1. Monitor that the motor runs in the correct direction.
2. Increase frequency setting only after load mechanism is stable when running at a low speed.
3. Change the input frequency or rotation direction of motor, and monitor whether there is vibration or unexpected noise with motor or not.
4. Monitor the parameters of C0-12 or C0-13 in running, and confirm whether the output current of the inverter is in normal.

6 Parameter Tables

6.1 Format of Parameter Tables

13 groups of parameter of EM330: F0, F1, F2, F3, F4, F7, F9, Fb, FC, Fd, FE, C0, and E0, 32 items in each group.

F0~FE are setting parameters which consist of two sections. The 1st section F0~F4 are general parameters, and the 2nd section F7~FE are advanced parameters.

Group C0 are status monitor parameters.

Group E0 are fault monitor parameters.

When F0-27=0, the inverter only displays the parameters of Group F0~F4, C0, and E0.

When F0-27=1, the inverter displays all parameters.

The 1st column is number of the parameter.

The 2nd column is function of parameter.

The 3rd column is range of parameter.

The 4th column is parameter unit.

The 5th column is parameter default. For instance, X represents that the parameter default varies with the power ratings of inverter. The defaults of some parameters vary with the F4-28 application macros options, details as shown in 6.2, and 7.5.

The 6th column is type of parameter (whether the parameter is editable or not). Details shown as followings:

"●" : The parameter is editable when the inverter is running.

"○" :The parameter is uneditable when the inverter is running.

"◇": The inverter can process parameter automatically according to its type.

"X": The parameter is read only.

Unit and Its Abbreviation

HOUR	Hour	m	Meter	%	Percentage★	SQRT	Square Root
min	Minute	mm	Millimeter	rpm	Revolutions per minute	A	Ampere
S	Second	Hz	Herz	MAX	Maximum	V	Voltage
mS	Millisecond	kHz	Kilohera	MIN	Minimum	SECT	Program Section
mH	Millihenry	kW	Kilowatt	bps	Bit per second		

★ The basic value of percentage is the rated value.

6.2 Parameter Tables

Section 1 General Parameters

6.2.1 Group F0：General Parameters

No.	Function	Range	Unit	Default	Type
F0-00 (L) F0-01 (H)	Speed Reference Input Monitoring	Frequency: 0.00～Fmax Speed: 0～F*Customer defined scaling	Hz rpm	0.00	X
F0-02	Drive Control Mode	0: V/F open loop Control 1: Not used 2: SVC0 3: SVC1		0	○
F0-03	Setting Input Control Mode	0: Speed input 1: Torque input（Not used）		0	○
F0-04	Start/Stop Control Options	0: Keypad 1: Terminal 2: RS485		1	○
F0-05	Terminal Start/Stop Control Selection	0: RUN-Run，F/R-Forward/Reverse 1: RUN-Run，F/R- Reverse 2: RUN-NO forward, Xi-NC stop, F/R-NO reverse 3: RUN-NO run， Xi-NC stop， F/R- Forward/Reverse		1	○
F0-06	Regular Speed Setting Mode	0: Primary numeric frequency 1: VP 2: VS 3: IS 4: Not used 5: K3*VS+K4*IS 6: K3*VS+K5*VF 7: K4*IS+K6*IF 8: MAX{K3*VS,K5*VF} 9: MAX{K4*IS,K6*IF} 10: K1*VP+K2*(K3*VS+K4*IS+ K5*VF+K6*IF-K8*5V)		0	○
F0-07	Primary Numeric Frequency Setting	0.00～Fmax	Hz	20.00	●
F0-08	Motor Running Direction	0: Forward 1: Reverse		0	●
F0-09	Acceleration Time 1	0.00～600.00	S/min	6.00	●

F0-10	Deceleration Time 1	0.00～600.00	S/min	1.80	●
F0-11	Jog Numeric Frequency	0.00 ～Fmax	Hz	5.00	●
F0-12	Jog Acceleration Time	0.00～600.00	S/min	15.00	●
F0-13	Jog Deceleration Time	0.00～600.00	S/min	15.00	●
F0-14	Carrier Frequency	1.000～16.000	kHz	1.000	●
F0-15	Customer Defined V/F Scaling	0: Automatic Torque Boost 1～10: Fixed Torque Boost 11～34: Not used 35: Customer Defined V/F Curve Scaling		35	●
F0-16	Maximum Frequency	Fmax:20.00～600.00	Hz	50.00	○
F0-17	Upper Limit Frequency	Fup:Fdown～Fmax	Hz	50.00	○
F0-18	Lower Limit Frequency	Fdown:0.00～Fup	Hz	0.00	○
F0-19	Start Mode Options	0: Normal start 1: Speed search start		0	○
F0-20	Stop Mode Options	0: Ramp to stop 1: Coast to stop		0	○
F0-21	Function Setting for JOG/+- Button	0: Jog running 1: Positive/Negative input switching 2: Disabled		0	○
F0-22	Speed Monitoring Options	0: Frequency Hz 1: Speed rpm		0	●
F0-23	Customer Defined Scaling	0.01～600.00		30.00	●
F0-24	Forward/Reverse Control Mode	0: Forward/Reverse Permitted 1: Reverse Prohibited		0	○
F0-25	F/R Deadband	0.00～600.00	S	0.00	○
F0-26	Primary Speed Setting Mode	0: Regular speed setting mode 1: Special speed setting mode 2: Process PID input mode		0	○
F0-27	Menu Mode Options	0: Basic menu mode 1: Advanced menu mode		1	○
F0-28	Default Control	0: Disabled 1: Defaults Reset (Remarks: Defaults reset takes 8S.)		0	○
F0-29	Parameter Setting Control	0: Parameter set allowed 1: Parameter lock 0 2: Parameter lock 1		0	○
F0-30	Inverter Model	0: Model G 1: Model P		0	○
F0-31	User Password	0～65535		XXXXX	○

6.2.2 Group F1:Motor Parameters

No.	Function	Range	Unit	Default	Type
F1-00	Motor Type	0: AC induction motor 1: Not used		0	○
F1-01	Motor Rated Power	0.40～480.00	kW	XXXX	○
F1-02	Motor Rated Voltage	60～660	V	XXX	○
F1-03	Motor Rated Current	0.1～1500.0	A	XXXX	○
F1-04	Motor Rated Frequency	20.00～600.00	Hz	XXXX	○
F1-05	Motor Rated Speed	1～30000	rpm	XXXX	○
F1-06	Motor Wiring Mode	0:Y Wiring 1: Δ Wiring		X	○
F1-07	Motor Rated Power Factor	0.50～0.99		X	○
F1-08	Idling Excitation Current	0.1～1500.0	A	XXXX	○
F1-09	Rated Torque Current	0.1～1500.0	A	XXXX	○
F1-10	Stator Resistance R1	0.01～300.00	Ω	XXXX	○
F1-11	Rotator Resistance R2	0.01～300.00	Ω	XXXX	○
F1-12	Stator& Rotor Leakage Inductance Ls	0.1～3000.0	mH	XXXX	○
F1-13	Stator& Rotor Mutual Inductance Lm	0.1～3000.0	mH	XXXX	○
F1-14	Motor Efficiency	30.0～99.0	%	XXXX	○
F1-15	Autotuning	0:No autotuning 1:Staionary autotuning 2: Rotational autotuning		0	○
F1-16	Inverter Address	0～247, 0: Broadcasting address		1	○
F1-17	Communication Bit Rate	0: 4800 1: 9600 2: 19200 3: 38400	bps	1	○
F1-18	Communication Parity Mode	0: No parity 1+8+1 1: Even parity 1+8+1+1 2: Odd parity 1+8+1+1		0	○
F1-19	Master-slave Communications Mode	0:The inverter is the master 1:The inverter is the slave		0	○
F1-20	Master Writes the Address of Slave Inverter	0:Primary Numeric Frequency F0-07 1:Auxiliary Numeric Frequency F9-06		0	○
F1-21	Inverter Receiving Proportion Coefficient	0.00～600.00	%	100.00	●
F1-22	Analog Input Gain K1	0.00～600.00	%	100.00	●
F1-23	Analog Input Gain K2	0.00～600.00	%	0.00	●
F1-24	Analog Input Gain K3	0.00～600.00	%	100.00	●
F1-25	Analog Input Gain K4	0.00～600.00	%	0.00	●
F1-26	Analog Input Gain K5	0.00～600.00	%	0.00	●
F1-27	Analog Input Gain K6	0.00～600.00	%	0.00	●
F1-28	Analog Input Gain K7	0.00～600.00	%	0.00	●
F1-29	Analog Input Gain K8	0.00～600.00	%	0.00	●
F1-30	Communication Overtime	0 (Disabled) 0.1～60.0	S	0	●
F1-31	Not Used				

6.2.3 Group F2: Input/Output Terminal Parameters

No.	Function	Range	Unit	Default	Type
F2-00	Multi-function Input Terminal X1-RUN	See Table 6-1 Functions of Numeric Multi-function Input Terminals X8 is a unique input terminal of EM330B.		1	○
F2-01	Multi-function Input Terminal X2-F/R			2	○
F2-02	Multi-function Input Terminal X3-D1			3	○
F2-03	Multi-function Input Terminal X4-D2			4	○
F2-04	Multi-function Input Terminal X5-D3			5	○
F2-05	Multi-function Input Terminal X6-FRS			9	○
F2-06	Multi-function Input Terminal X7-RST			10	○
F2-07	Multi-function Input Terminal X8-FJOG			11	○
F2-08	VS Input Function Defining			0	○
F2-09	IS Input Function Defining			0	○
F2-10	VF Input Function Defining			0	○
F2-11	IF Input Function Defining			0	○
F2-12	Multi-function Output Terminal Y1	See Table 6-2 Functions of Numeric Multi-function Output Terminals R2 is a unique input terminal of EM330B.		9	○
F2-13	Multi-function Output Terminal Y2			1	○
F2-14	Relay Output Terminal R1			2	○
F2-15	Relay Output Terminal R2*			9	
F2-16	Analog Output Terminal M0	See Table 6-3 F2-16～F2-20 Analog Output Full Scale	%	0	○
F2-17	Analog Output Terminal M1		%	6	○
F2-18~ F2-21 Not Used					
F2-22	M0 Output Lower Limit	0.00～100.00	%	0.00	●
F2-23	M0 Output Upper Limit	0.00～100.00	%	100.00	●
F2-24	M0 Output Gain	0.00～300.00	%	300.00	●
F2-25	M1 Output Lower Limit	0.00～100.00	%	0.00	●
F2-26	M1Output Upper Limit	0.00～100.00	%	100.00	●
F2-27	M1 Output Gain	0.00～300.00	%	300.00	●

Table 6-1 Functions of Numeric Multi-function Input Terminals

No.	Function	No.	Function
0	Disabled	18	3-wire Sequence Run/Stop Control (Pulse Stop)
1	RUN-run	19	Stop DC Brake Command
2	F/R Forward/Reverse Command	20	Switching Drive Control Mode to V/F Control Mode
3	Preset Speed Terminal 1	21	Switching Run Command to Terminal Control Mode
4	Preset Speed Terminal 2	22	Run Command Channel 0
5	Preset Speed Terminal 3	23	Run Command Channel 1
6	Preset Speed Terminal 4	24	Switching Input Control Mode to Speed Control Mode
7	Acceleration Time Terminal 1	25-26	Not Used
8	Acceleration Time Terminal 2	27	Switching Speed Input Setting to Primary Speed Setting
9	Coast to Stop	28	Switching Speed Input Setting to Auxiliary Speed Setting
10	Inverter Fault Reset	29	Switching Primary Speed Setting to Regular Speed Setting
11	Forward Jog FJOG	30	Switching Regular Speed Input Setting to Numeric Speed Input
12	Reverse Jog RJOG	31	Switching Jog Input Setting to Jog Numeric Speed Input Setting
13	Terminal UP	32-49	Not Used
14	Terminal DOWN	50	Motor Switching Command
15	UP/DOWN Clearing	51	Peripherals Fault Input
16	Acceleration/Deceleration Prohibited	52-54	Not Used
17	Not Used	81*	External Brake Release Confirming Signal Input

Remarks: Only EM330B possesses the function of No. 81.

Table 6-2 Functions of Numeric Multi-function Output Terminals

No.	Function	No.	Function
0	Inverter Runs(Enabled at running)	17	Overload Alarming Output
1	Frequency Reach Signal FAR (Enabled at running)	18	Overvoltage Stall
2	Output Frequency Detection Range FDT1 (Enabled at running)	19	Current Limit
3	Output Frequency Detection Range FDT2 (Enabled at running)	20	Frequency Zero Speed Detection (Output Frequency Detection)
4	Output Frequency Detection Range FDT1 (Disabled at JOG)	21	Motor Zero Speed Detection (Residual Voltage Frequency Detection)
5	Output Frequency Detection Range FDT2 (Disabled at JOG)	22	Motor 2 Enabled
6	Forward/Reverse(Enabled at running)	23	Set running time is up
7	Frequency Input/Output Balance (Enabled at running)	24-25	Not Used
8	JOG	26	Inverter is ready for running
9	Inverter Failures	27	Not Used
10	Upper Limit Frequency Reach	28	FDT1 Lower Limit (Pulse)
11	Lower Limit Frequency Reach	29	FDT2 Lower Limit (Pulse)
12-13	Not Used	30	FDT1 Lower Limit (Disabled at JOG, Pulse)
14	Analog Variables Detection Range ADT1	31	FDT2 Lower Limit (Disabled at JOG, Pulse)
15	Analog Variables Detection Range ADT2	32	ILP Fault
16	Analog Variables Detection Range ADT3		

Table 6-3 F2-16~F2-20 Analog Outputs Full Scales

No.	Signal	Full Scale（100.0%）	No.	Signal	Full Scale（100.0%）
0	Output Frequency	Fmax	9	VS	10.00V
1	Input Frequency	Fmax	10	VF	10.00V
2	Synchronous Frequency	Fmax	11	IS	20mA
3	PG Feedback Frequency	Fmax	12	IF	20mA
4	Estimated Feedback Frequency	Fmax	13	Not used	
5	Estimated Slip Frequency	Fmax	14	+10V	+10V
6	Output Current	Inverter Rated Current	15-19	Not Used	
7	Output Voltage	Inverter Rated Voltage	19	DC Bus Voltage	DC Bus Voltage at Rated Input Voltage
8	VP	10.00V	20	Output Frequency	Inverter Rated Frequency

6.2.4 Group F3: Preset Speed Operation Parameters

No.	Function	Range	Unit	Default	Type
F3-00	Preset Speed 1	0.00～Fmax	Hz	50.00	●
F3-01	Preset Speed 2	0.00～Fmax	Hz	5.00	●
F3-02	Preset Speed 3	0.00～Fmax	Hz	10.00	●
F3-03	Preset Speed 4	0.00～Fmax	Hz	15.00	●
F3-04	Preset Speed 5	0.00～Fmax	Hz	20.00	●
F3-05	Preset Speed 6	0.00～Fmax	Hz	25.00	●
F3-06	Preset Speed 7	0.00～Fmax	Hz	30.00	●
F3-07	Preset Speed 8	0.00～Fmax	Hz	35.00	●
F3-08	Preset Speed 9	0.00～Fmax	Hz	40.00	●
F3-09	Preset Speed 10	0.00～Fmax	Hz	45.00	●
F3-10	Preset Speed 11	0.00～Fmax	Hz	50.00	●
F3-11	Preset Speed 12	0.00～Fmax	Hz	50.00	●
F3-12	Preset Speed 13	0.00～Fmax	Hz	50.00	●
F3-13	Preset Speed 14	0.00～Fmax	Hz	50.00	●
F3-14	Preset Speed 15	0.00～Fmax	Hz	50.00	●
F3-15	Acceleration Time 2	0.00～600.00	S/min	15.00	●
F3-16	Deceleration Time 2	0.00～600.00	S/min	15.00	●
F3-17	Acceleration Time 3	0.00～600.00	S/min	15.00	●
F3-18	Deceleration Time 3	0.00～600.00	S/min	15.00	●
F3-19	Acceleration Time 4	0.00～600.00	S/min	15.00	●
F3-20	Deceleration Time 4	0.00～600.00	S/min	15.00	●
F3-21	Acceleration/Deceleration Time Unit	0: S（Second） 1: min（Minute）		0	○
F3-22	DC Brake Propotion at Start	0.00～30.00 , 30.01～150.00	%	35.00	○
F3-23	DC Brake Time at Start	0.00～30.00	S	0.00	○
F3-24	DC Brake Start Frequency at Stop	0.10～60.00	Hz	2.00	○
F3-25	DC Brake Propotion at Stop	0.00～30.00 , 30.01～150.00	%	35.00	○
F3-26	DC Brake Waiting Time	0.00～30.00	S	0.00	○
F3-27	DC Brake Time at Stop	0.00～30.00	S	0.00	○
F3-28	Lower Limit Frequency Control	0:Run as per Lower Limit Frequency 1:Run at zero speed after lower limit frequency operation time is up.		0	○
F3-29	Lower Limit Frequency Running Time	0.00～600.00	S	60.00	○
F3-30	Open Loop Slip Compensation	0.00～200.00	%	0.00	●
F3-31	Parameter Copy	0: No Copy 1:Upload Parameter(From Inverter to Keypad) 2:Download Parameter(From Keypad to Inverter, F3-31=0 upon completion)		0	○

6.2.5 Group F4: General Parameters of PID

No.	Function	Range	Unit	Default	Type
F4-00～F4-12 Not used		Not applicable to hoist application, the function is not used.			
F4-13	Menu Display Control 1	Fd. FC. Fb. FA. F9. F8. F7. F6. 1 1 1 1 1 1 1 1 0：No Display， 1：Display		11111111	●
F4-14	Menu Display Control 2	*. *. *. *. *. *. FF. FE. 0 0 0 0 0 0 1 1 0：No Display， 1： Display		00000011	●
F4-15	Monitor Reference Selection	* * Estimated Slip Estimated Speed * Sync-Freq. Inp. Freq. Outp. Freq. 0 0 1 1 1 1 1 1 0: Absolute Value， 1: +/-		00111111	○
F4-16	LCD Language Options	0: Chinese，1: English		0	○
F4-17	Not Used				
F4-18	If parameters change with inverter's working status	0: Unchanged 1: Changed		1	○
F4-19	Parameter Setting Display	0～575		0	●
F4-20	Parameters displayed in the 1st row in operation	0～575		512	●
F4-21～F4-23 Not Used					
F4-24	Parameters displayed in the 1st row at stop	0～575		512	●
F4-25～F4-27 Not Used					
F4-28	Application Macros Options	6：Crane hoisting application macros 7：Crane slewing application macros 8：Crane trolley derricking application macros 9：Hoist application macros		9	○

Remarks:

1. F4-28: Application macros, the default is F4-28=9(Hoist application macros), see 6.3 to select set parameter default as per applications.
2. F4-28 is disabled for EM330B. Customer can set parameters as per the instructions in 6.3.4.

6.2.6 Group C0: Monitor Parameters

No.	Function	Range	Unit	Serial No.	Type
C0-00 C0-01	Output Frequency	0.00～Fup	Hz	512	×
C0-02 C0-03	Output Frequency	0.00～Fmax	Hz	514	×
C0-04 C0-05	Synchronous Frequency	0.00～Fup	Hz	516	×
C0-06~ C0-07 Not Used					
C0-08 C0-09	Estimated Feedback Frequency	0.00～Fup	Hz	520	×
C0-10 C0-11	Estimated Slip Frequency	0.00～Fup	Hz	522	×
C0-12	Output Current Percentage	0.00～100.00	%	524	×
C0-13	Effective Output Current Value	0.0～3000.0	A	525	×
C0-14	Output Voltage Percentage	0.00～100.00	%	526	×
C0-15	Effective Output Voltage Value	0.0～660.0	V	527	×
C0-16	DC Bus Voltage	0～1200	V	528	×
C0-17	Overload Count	0.00～100.00	%	529	×
C0-18	Not Used			530	×
C0-19	Program Operation Section	1～7	SECT	531	×
C0-20	Running Time of Present Section of Program Operation	0.0～6000.0	S/min	532	×
C0-21	Output Power	0.0～3000.0	kW	533	×
C0-22~C0-25 Not Used					
C0-26	Input Terminal Status	X7 X6 X5 X4 X3 X2 X1 0 0 0 0 0 0 0		538	×
C0-27	Output Terminal Status	* * * * R1 Y2 Y2 0 0 0 0 0 0 0		539	×
C0-28	VS Input Monitor	0-10000		540	×
C0-29	IS Input Monitor	0-10000		541	×
C0-30	VF Input Monitor	0-10000		542	×
C0-31	IF Input Monitor	0-10000		543	×

6.2.7 Group E0: Fault Parameters

No.	Function	Trip and Parameter Description	Unit	Default	Type
E0-00	Fault Trips	00： No fault SC： Short Circuit HOC：Instantaneous overcurrent HOU：Instantaneous overvoltage SOC：Stable overcurrent SOU：Stable overvoltage SLU：Stable undervoltage ILP：Input Phase Loss OL：Overload OH：Heatsink Overheating OLP：Not Used EXT：External failure EEd：Inverter EEPROM failure EEU：Keypad EEPROM failure STP：Autotuning cancelled SFE：Autotunig coast-to-stop SrE：Stator resistance error SIE：Idling current error INP：Internal failure EST：External wire broken		0	◇
E0-01	Output Frequency at Fault	XX.XX	Hz	0.00	◇
E0-02	Output Current at fault	XXX.X	A	0.0	◇
E0-03	DC Bus Voltage at Fault	XXXX	V	0.0	◇
E0-04	Running Direction at Fault	FOr：Forward, rEV：Reverse		0	◇
E0-05	Running Status at Fault	ACC: Acceleration CON: Constant speed dEC: Deceleration		0	◇
E0-06	Stall Status at Fault	0：Normal UL：Overvoltage stall CL：Overcurrent stall		0	◇
E0-07	Working Time at Fault		HOUR	0	◇
E0-08	Last Fault	Fault trips		0	◇
E0-09	Output Frequency at Fault	XX.XX	Hz	0.00	◇
E0-10	Output Current at Fault	XXX.X	A	0.0	◇

E0-11	DC Bus Voltage at Fault	XXXX	V	0.0	◇
E0-12	Running Direction at Fault	FOr：Forward, rEV：Reverse		0	◇
E0-13	Running Status at Fault	ACC：Acceleration CON：Constant speed dEC：Deceleration		0	◇
E0-14	Stalling Status at Fault	0：Normal UL：Overvoltage stall CL：Overcurrent stall		0	◇
E0-15	Working Time at Fault		HOUR	0	◇
E0-16	Last Two Faults	Fault trips			
E0-17	Output Frequency at Fault	XX.XX	Hz	0.00	◇
E0-18	Output Current at Fault	XXX.X	A	0.0	◇
E0-19	DC Bus Voltage at Fault	XXXX	V	0.0	◇
E0-20	Running Direction at Fault	FOr：Forward, rEV：Reverse		0	◇
E0-21	Running Status at Fault	ACC：Acceleration CON：Constant Speed dEC：Deceleration		0	◇
E0-22	Stall Status at Fault	0：Normal UL：Overvoltage stall CL：Overcurrent stall		0	◇
E0-23	Working Time at Fault		HOUR	0	◇
E0-24	Last Three Faults	Fault trips			
E0-25	Output Frequency at Fault	XX.XX	Hz	0.00	◇
E0-26	Output Current at Fault	XXX.X	A	0.0	◇
E0-27	DC Bus Voltage at Fault	XXXX	V	0.0	◇
E0-28	Running Direction at Fault	FOr：Forward, rEV：Reverse		0	◇
E0-29	Running Status at Fault	ACC：Acceleration CON：Constant Speed dEC：Deceleration		0	◇
E0-30	Stall Status at Fault	0：Normal UL：Overvoltage stall CL：Overcurrent stall		0	◇
E0-31	Working Time at Fault		HOUR	0	◇

Section 2 Advanced Parameters

6.2.8 Group F7: Advanced Parameters for Operation

No.	Function	Range	Unit	Default	Type
F7-00	Overload Alarm Control	Ones place: Overload alarm detection 0: Always detecting 1: Detect at constant speed Tens place: Stop if alarming 0: No alarm, run continuously 1: Delayed Stop after alarm		00	○
F7-01	Overload Alarm Detection Time	0.00～60.00	S	5.00	○
F7-02	Overload Alarm Detection Scaling	0.00～600.00	%	200.00	○
F7-03	Overload Alarm Stop DelayTime	0.00～600.00	S	5.00	○
F7-04	Analog ADT Options	0:VS 0.00～10.00V 1:IS 0.00～10.00V 2:VF 0.00～10.00V 3:IF 0.00～10.00V		2	○
F7-05	Analog ADT1	0.00～100.00	%	20.00	●
F7-06	Analog ADT1 Hysteresis	0.00～100.00 (Monotonic decreasing is active)	%	5.00	●
F7-07	Analog ADT2	0.00～100.00	%	50.00	●
F7-08	Analog ADT2 Hysteresis	0.00～100.00 (Monotonic decreasing is active)	%	5.00	●
F7-09	Analog ADT3	0.00～100.00	%	80.00	●
F7-10	Analog ADT3 Hysteresis	0.00～100.00 (Monotonic decreasing is active)	%	5.00	●
F7-11	Jog M0 Output Lower Limit	0.00～100.00	%	0.00	●
F7-12	Jog M0 Output Upper Limit	0.00～100.00	%	100.00	●
F7-13	Jog M0 Output Gain	0.00～300.00	%	300.00	●
F7-14	Jog M1 Output Lower Limit	0.00～100.00	%	0.00	●
F7-15	Jog M1 Output Upper Limit	0.00～100.00	%	100.00	●
F7-16	Jog M1 Output Gain	0.00～300.00	%	300.00	●
F7-17~F7-19 Not Used					
F7-20	Automatic PWM	0：Disabled 1：Enabled		0	●
F7-21	Lower Limit Carrier Frequency	1.000～16.000	kHz	2.000	●
F7-22	Upper Limit Carrier Frequency	F7-21～16.000	KHz	6.000	●
F7-23	Not Used				
F7-24	Slip Filter Time	0.01～20.00	S	0.30	●
F7-25	Stator Voltagedrop Compensation Gain	0.00～200.00	%	0	●
F7-26	Deadband Compensation Gain	0.00～100.00	%	0	●
F7-27	Current Limit at Constant Power Region	0.00～100.00	%	40.00	●
F7-28	Speed Search Timelag	0.05～30.00	S	0.50	○
F7-29	Minimum Effective Output Frequency	0.00～Fmax	Hz	0.00	○
F7-30	Minimum Acceleration/ Deceleration Time	0.05～30.00	S	0.05	○
F7-31	AVR Base	20.00～180.00（Udc_e）	%	100.00	○

6.2.9 Group F9: Speed Setting Selection Parameters

No.	Function	Range	Unit	Default	Type
F9-00	Function of STOP Button	0: Stop in keypad start/stop mode 1: Stop in all start/stop modes 2: Stop in keypad start/stop mode, external fault trips in other modes		0	○
F9-01	Parameter Edit Mode	0:Editable through keypad and RS485 1:Editable through keypad 2:Editable through RS485		0	○
F9-02	Numeric Input Control Mode	Ones place: Numeric reference input control mode 0: Auto-save the change in RAM(Press DATA/ENTER to save) 1:Auto-save the change in EEPROM(Memory function at power failure) Tens place: Numeric reference input edit mode 0: Editable through UP/DOWN button on keypad 1: Editable through UP/DOWN terminals 2: Interrelate with start/stop mode(F0-04=0，editable through UP/DOWN button on keypad F0-04=1, editable through UP/DOWN terminals) 3: Editable in both modes 4: Not editable in both modes Hundreds place: Keypad UP/DOWN button rate control 0: Automatic rate control (UP/DOWN acting time integration) 1: Correspond to the setting UP/DOWN rate Thousands place: Terminal UP/DOWN rate control 0: Automatically control on rate 1: Correspond to the setting UP/DOWN rate		01000	○
F9-03~F9-08	Not Used				
F9-09	Detection Frequency at Zero Speed	0.00～50.00	Hz	0.00	○
F9-10	Detection Output Delay at Zero Speed	0.00～600.00	S	1.00	○
F9-11	Frequency Reach Signal FAR	0.00～50.00	Hz	2.50	○

F9-12	FDT1 Increasing Threshold	0.00～Fmax	Hz	2.00	○
F9-13	FDT1 Decreasing Threshold	0.00～Fmax	Hz	6.50	○
F9-14	FDT2 Increasing Threshold	0.00～Fmax	Hz	30.00	○
F9-15	FDT2 Decreasing Threshold	0.00～Fmax	Hz	30.00	○
F9-16~F9-23	Not Used				
F9-24	Start Delay Time After Power-on	0.00～10.00 (The time for inverter to wait for the initial operation after power-on)	S	3.00	●
F9-25	Not Used				
F9-26	Magnetic Field Compensation Coefficient	0.00～200.00	%	0.00	●
F9-27	Oscillation Suppression Gain	0～20000		0	●
F9-28	Frequency Droop Control	0.00～60.00	Hz	0.00	●
F9-29	Iqs Filter Time	0.00～10.00	S	0.00	○
F9-30	Undervoltage Detection Scaling	0.00～100.00(Udc_e)	%	65.18	○
F9-31	Undervoltage Detection Time	0.00～30.00	S	0.50	○

6.2.10 Group Fb: Advanced PID Parameters

No.	Function	Range	Unit	Default	Type
Fb-00~ Fb-26	Not Used				
Fb-27*	Brake Release Confirmation	0：Only relevant to :output frequency ≥ FDT setting frequency 1: Enabled only when output frequency and output current ≥FDT setting frequency and current simultaneously.		1	○
Fb-28*	Brake Release Current	10.00%～150.00%	%	10.00%	●

Remarks: Only EM330A possesses the function of Fb-27 and Fb-28

6.2.11 Group FC: Operation Control Parameters

No.	Function	Range	Unit	Default	Type
FC-00	Acceleration/ Deceleration Mode	0：Linear mode 1：Not used		0	○
FC-01~ FC-02 Not Used					
FC-03	Fan Control	0：Run at power-on 1：Run at start-up		1	○
FC-04	Fan Delay Time	0.00～600.00	S	30.00	●
FC-05	Not Used				
FC-06	Reset previous working status at power-on	0：Not Reset 1：Reset		0	○
FC-07	Current Limit Control	0：Current limit disabled 1：Current limit enabled		0	○
FC-08	Current Limit	50.00～180.00	%	165.00	○
FC-09	Electronic Thermal Overload Coefficient	5.00～100.00	%	100.00	○
FC-10～FC-14 Not Used					
FC-15	Output Voltage	5.00～100.00	%	100.00	●
FC-16	Brake Duty Ratio	5.00～100.00	%	80.00	○
FC-17	Constant Power Output Control	0：Constant power output control disabled 1：Constant power output control enabled		0	○
FC-18	Voltage Control	Ones place: AVR 0：Disabled 1：Enabled 2：Disabled if exceeding rated voltage Tens place: Voltage regulation limiting control 0：Limiting Disabled 1：Limiting Enabled Hundreds place: Overmodultaion control 0：Disabled 1：Enabled		001	○
FC-19	Overvoltage Stall Control	Ones place: Overvoltage stall options 0：Dynamic brake+Stall protection 1：Dynamic brake		0001	○

<table>
<tr><td></td><td></td><td>Tens place：Dynamic brake options
0：Enabled at power-on
1：Enabled at running
2：Enabled at deceleration
Hundreds place：Overvoltage stall mode
0：Always enabled
1：Disabled at acceleration, enabled at deceleration
Thousands place：Overvoltage stall mode
0 :Fixed overvoltage thresholds enabled
1: Auto-overvoltage thresholds enabled</td><td></td><td></td><td></td></tr>
<tr><td>FC-20</td><td>Stall Voltage at Overvoltage</td><td>120.00%～135.00%</td><td>%</td><td>128.00</td><td>○</td></tr>
<tr><td>FC-21</td><td>Stall Voltage Hysteresis</td><td>2.00%～30.00% (Monotonic decreasing is active.)</td><td>%</td><td>6.00</td><td>○</td></tr>
<tr><td>FC-22</td><td>Overvoltage Proportion Gain VKP</td><td>0.00～100.00</td><td>%</td><td>1.00</td><td>○</td></tr>
<tr><td>FC-23</td><td>Overvoltage Integration Time VTi</td><td>0.000～30.000， 0.000： No integration</td><td>S</td><td>0.200</td><td>○</td></tr>
<tr><td>FC-24</td><td>Fault Retry Control</td><td>Ones place: Fault retry times
0：Fault retry prohibited
1~3：Fault retry for 1, 2, and 3 times
4: Unlimited fault retry
Tens place: In fault retry, fault output terminals:
0：Off 1：On</td><td></td><td>00</td><td>○</td></tr>
<tr><td>FC-25</td><td>Fault Retry Timelag</td><td>0.01～30.00</td><td>S</td><td>0.50</td><td>○</td></tr>
<tr><td>FC-26</td><td>No Fault Timelag</td><td>0.01～30.00</td><td>S</td><td>10.00</td><td>○</td></tr>
<tr><td>FC-27</td><td>Fault Retry Options</td><td><table><tr><td>EST</td><td>OL</td><td>ILP</td><td>SLU</td><td>SOU</td><td>SOC</td><td>HOU</td><td>HOC</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>0：Fault retry permitted 1：Fault retry prohibited</td><td></td><td>11111111</td><td>○</td></tr>
<tr><td>FC-28</td><td>Disabled Trips 1</td><td><table><tr><td>OL</td><td>ILP</td><td>SLU</td><td>SOU</td><td>SOC</td><td>HOU</td><td>HOC</td><td>SC</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>0：Enabled， 1: Disabled</td><td></td><td>01010000</td><td>○</td></tr>
<tr><td>FC-29</td><td>Disabled Trips 2</td><td><table><tr><td>EEd</td><td>EST</td><td>PdN</td><td>PUP</td><td>EPC</td><td>EXT</td><td>*</td><td>OH</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr></table>0：Enabled， 1: Disabled</td><td></td><td>00000010</td><td>○</td></tr>
<tr><td>FC-30</td><td>Disabled Trips 3</td><td><table><tr><td>SIE</td><td>SrE</td><td>SFE</td><td>STP</td><td>EEU</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>0：Enabled， 1: Disabled</td><td></td><td>00000000</td><td>○</td></tr>
<tr><td>FC-31</td><td>Trip Detection Delay Time*</td><td>0.00～600.00</td><td>S</td><td>0.00</td><td>●</td></tr>
</table>

Remarks: Only EM330B possesses the function of FC-31.

6.2.12 Group Fd: Auxiliary Parameters

No.	Function	Range	Unit	Default	Type
Fd-00	Frequency Base	Fbase：20.00～600.00	Hz	50.00	○
Fd-01	Voltage 1	0.00～100.00	%	4.00	●
Fd-02	Voltage 2	0.00～100.00	%	9.50	●
Fd-03	Voltage 3	0.00～100.00	%	15.50	●
Fd-04	Voltage 4	0.00～100.00 , Ue=100.0%	%	25.00	●
Fd-05	Frequency 1	0.00～Frequency 2 Fbase=100.0%	%	1.00	●
Fd-06	Frequency 2	Frequency 1~ Frequency 3	%	4.00	●
Fd-07	Frequency 3	Frequency 2～Frequency 4	%	10.00	●
Fd-08	Frequency 4	Frequency 3～100.00	%	20.00	●
Fd-09~Fd-20	Not Used				
Fd-21	Inverter Rated Power	0.40～480.00	kW	XXXX	X
Fd-22	Inverter Rated Voltage	60～660	V	XXX	X
Fd-23	Inverter Rated Current	0.1～1500.0	A	XXXX	X
Fd-24	Inverter Running Time	User monitoring	HOUR	XXXX	X
Fd-25	Inverter Running Time	User monitoring	min	XXXX	X
Fd-26	Running Time Control	0:Disabled 1:Enabled		0	-
Fd-27	Set Running Time	0～65535	HOUR	0	-
Fd-28~Fd-29	Not Used				-
Fd-30	Keypad Software Version	X.XX		X.XX	X
Fd-31	DSP Software Version	X.XX		X.XX	X

6.2.13 Group FE: Terminal Function User Defined Parameters

No.	Function	Range	Unit	Default	Type
FE-00	Numeric Input Filter Times	0～100		10	○
FE-01	Terminal Input Positive/ Negative Logic	X7 X6 X5 X4 X3 X2 X1 0 0 0 0 0 0 0 0: Positive Logic On at 0V/Off at 24V 1: Negative Logic Off at 0V/ On at 24V		00000000	○
FE-02	X1 Input Delay Time	0.00～300.00	S	0.00	○
FE-03	X2 Input Delay Time	0.00～300.00	S	0.00	○
FE-04	Analog Input Signal Options	Ones place: VS input signal options 0：Analog signal input 1：Numeric signal input Tens place: IS input signal options 0：Analog signal input 1：Numeric signal input Hundreds place: VF input signal options 0: Analog signal input 1: Numeric signal input Thousands place: IF input signal options 0: Analog signal input 1: Numeric signal input		0000	○
FE-05	Analog Terminal Input Logic	Ones place: Input terminal VS 0：VS is on at high level input 1：VS is off at low level input Tens place: Input terminal IS 0：IS is on at high level input 1：IS is off at low level input Hundreds place: Input terminal VF 0：VF is on at high level input 1：VF is off at low level input Thousands place: Input terminal IF 0：IF is on at high level input 1：IF is off at low level input		0000	○
FE-06	Output Signal Type	Ones place: Y1 output type		000	○

		0：Level signal, 1：Pulse signal Tens place: Y2 output type 0：Level signal, 1：Pulse signal Hundreds place: R1 output type 0：Level signal, 1：Pulse signal			
FE-07	Terminal Output Logic Control	Ones place: Y1 output logic control 0：Y1 is on in positive logic 1：Y1 is off in neginive logic Tens place: Y2 output logic control 0：Y2 is on in positive logic 1：Y2 is off in neginive logic Hundreds place: R1output logic control 0：R1 is on in positive logic 1：R1 is off in neginive logic Thousands place: R2 output logic control 0：R2 is on in positive logic 1：R2 is off in neginive logic		000	○
FE-08	Not Used				
FE-09	Y1 Terminal DelayTime	0.0～600.0	S	0.0	○
FE-10	Y1 Terminal Pulse Width	0.0～600.0	S	0.0	○
FE-11	Y2 Terminal Delay Time	0.0～600.0	S	0.0	○
FE-12	Y2 Terminal Pulse Width	0.0～600.0	S	0.0	○
FE-13	R1Terminal Delay Time	0.0～600.0	S	0.0	○
FE-14	R1 Terminal Pulse Width	0.0～600.0	S	0.0	○
FE-15*	R2 Terminal Delay Time	0.0～600.0	S	0.0	○
FE-16*	R2 Terminal Pulse Width	0.0～600.0	S	0.0	○
FE-17*	X1 Off Delay Time	0.0～300.0	S	0.1	○
FE-18*	X2 Off Delay Time	0.0～300.0	S	0.1	○

Remarks:

1. Only EM330B possesses the function of FE-15 and FE-16.
2. Only EM330A possesses the function of FE-17 and FE-18.

6.3 Application Macros Defaults

6.3.1 Application Macros for Tower Crane Hoisting

No.	Function	Description	Default
F0-02	Drive Control Mode	V/F open loop control	0
F0-04	Start/Stop Control Options	External terminals control start/stop	1
F0-05	Terminal Start/Stop Control Options	Forward when terminal RUN is on. Reverse when terminal F/R is on.	1
F0-06	Regular Speed Setting Mode	Primary numeric frequency setting	0
F0-07	Numeric Setting Frequency	Preset speed 1	10.00Hz
F0-09	Acceleration Time	Acceleration time	6.50S
F0-10	Deceleration Time	Deceleration time	3.00S
F0-14	Carrier Frequency		1.000kHz
F0-16	Maximum Frequency		55.00Hz
F0-17	Upper Limit Frequency		55.00Hz
F0-20	Stop Mode	Coast to stop	1
F0-27	Menu Selection	Advanced menu	1
F2-02	Multi-function Input Terminal X3	Preset speed terminal 1	3
F2-03	Multi-function Input Terminal X4	Preset speed terminal 2	4
F2-04	Multi-function Input Terminal X5	Preset speed terminal 3	5
F2-05	Multi-function Input Terminal X6	Preset speed terminal 4	6
F2-06	Multi-function Input Terminal X7	Fault reset	10
F2-12	Multi-function Input Terminal Y1	Inverter fault	9
F2-14	Relay Output Terminal R1	Output frequency detection range FDT1	2
F3-00	Preset Speed 1	Preset speed 2	25.00 Hz
F3-02	Preset Speed 3	Preset speed 3	35.00 Hz
F3-06	Preset Speed 7	Preset speed 4	45.00 Hz
F3-14	Preset Speed 15	Preset speed 5	55.00 Hz
F3-24	DC Brake Start Frequency at Stop		4.00Hz

F3-25	DC Brake Propotion at Stop		9.50%
F3-27	DC Brake Time at Stop		0.80S
F7-25	Stator Voltagedrop Compensation	Disabled	0.00
F7-26	Deadband Compensation Gain	Disabled	0.00
F9-12	FDT1 Increasing Threshold	Y1,Y2, R1 or R2 is on when the output Frequency Reach the threshold	2.00Hz
F9-13	FDT1 Decreasing Threshold	Y1,Y2, R1 or R2 is off when the output Frequency Reach the threshold	9.50Hz
F9-24	Start-up Delay		3.00S
Fb-27	Brake Release Confirmation	0: Only relevant to :output frequency≥FDT setting frequency 1: Enabled only when output frequency and output current≥FDT setting frequency and current simultaneously.	1
Fb-28	Brake Release Current	10.00%～150.00%	10.00%
FC-07	Current Limit Function	Current limit disabled	0
FC-19	Overvoltage Control Selection	Dynamic brake enabled	0001
FC-28	Disabled Trips 1	Shield input phase loss and stable overcurrent trips	01010000
Fd-01	Voltage 1		4.00%
Fd-02	Voltage 2		10.50%
Fd-03	Voltage 3		17.00%
Fd-04	Voltage 4		26.50%
Fd-08	Frequency 4		20.00%
FE-17	X1 Off Delay		0.2S
FE-18	X2 Off Delay		0.2S

Remarks:

1. Defaults of F4-28*Application Macros for Tower Crane Hoisting* as shown in the table above.
2. Users can define the range of those parameters based on real needs if the defaults may not meet the application needs.

6.3.2 Application Macros for Tower Crane Slewing

No.	Function	Description	Default
F0-02	Drive Control Mode	SVC0	2
F0-04	Start/Stop Control Selection	External Terminals Control Start/Stop	1
F0-05	Terminal Start/Stop Control Selection	Forward when terminal RUN is on. Reverse when terminal F/R is on.	1
F0-06	Regular Speed Setting Mode	Primary numeric frequency setting	0
F0-07	Numeric Setting Frequency	Preset speed 1	10.00Hz
F0-09	Acceleration Time	Acceleration time	1.00S
F0-10	Deceleration Time	Deceleration time	22.00S
F0-14	Carrier Frequency		1.500kHz
F0-20	Stop Mode	Coast to stop	1
F0-27	Menu Selection	Advanced menu	1
F2-02	Multi-function Input Terminal X3	Preset speed terminal 1	3
F2-03	Multi-function Input Terminal X4	Preset speed terminal 2	4
F2-04	Multi-function Input Terminal X5	Preset speed terminal 3	5
F2-05	Multi-function Input Terminal X6	Acceleration/Deceleration time terminal 1	7
F2-06	Multi-function Input Terminal X7	Fault reset	10
F2-12	Multi-function Input Terminal Y1	Inverter fault	9
F2-14	Relay Output Terminal R1	Inverter is running	0
F3-00	Preset Speed 1	Preset speed 2	20.00 Hz
F3-02	Preset Speed 3	Preset speed 3	35.00 Hz
F3-06	Preset Speed 7	Preset speed 4	50.00 Hz
F3-15	Acceleration Time 2	Acceleration time of preset speed 2, 3, 4	20.00S
F3-16	Deceleration Time 2	Deceleration time of preset speed 2, 3, 4	22.00S
F7-25	Stator Voltagedrop Compensation	Disabled	0.00
FC-19	Overvoltage Control Selection	Dynamic brake enabled	0001
FC-28	Disabled Trips 1	Shield input phase loss trip	01000000
Fd-01	Voltage 1		4.00%
Fd-02	Voltage 2		8.00%
Fd-03	Voltage 3		14.00%
Fd-04	Voltage 4		20.00%
Fd-08	Frequency 4		20.00%

Remarks:

1. Defaults of F4-28 *Application Macros for Tower Crane Slewing* as shown in the table above.
2. Users can define the range of those parameters based on real needs if the defaults may not meet the application needs.

6.3.3 Application Macros for Trolley Derricking of Tower Crane

No.	Function	Description	Default
F0-02	Drive Control Mode	SVC0	2
F0-04	Start/Stop Control Selection	External Terminals Control Start/Stop	1
F0-05	Terminal Start/Stop Control Selection	Forward when terminal RUN is on. Reverse when terminal F/R is on.	1
F0-06	Regular Speed Setting Mode	Primary numeric frequency setting	0
F0-07	Numeric Setting Frequency	Preset Speed 1	25.00Hz
F0-09	Acceleration Time	Acceleration Time	3.00S
F0-10	Deceleration Time	Deceleration Time	3.00S
F0-14	Carrier Frequency		1.000kHz
F0-27	Menu Selection	Advanced Menu	1
F2-02	Multi-function Input Terminal X3	Preset speed terminal 1	3
F2-03	Multi-function Input Terminal X4	Preset speed terminal 2	4
F2-06	Multi-function Input Terminal X7	Fault reset	10
F2-12	Multi-function Input Terminal Y1	Inverter fault	9
F2-14	Relay Output Terminal R1	Defined as FDT1	2
F3-00	Preset Speed 1	Preset speed 2	38.00 Hz
F3-02	Preset Speed 3	Preset speed 3	50.00 Hz
F7-25	Stator Voltagedrop Compensation	Disabled	0.00
F9-12	FDT1 Increasing Threshold	Y1,Y2,R1or R2 is on when the output Frequency Reach the threshold	1.00Hz
F9-13	FDT1 Decreasing Threshold	Y1,Y2,R1or R2 is off when the output Frequency Reach the threshold	3.00Hz
FC-19	Overvoltage Control Selection	Dynamic brake enabled	0001
FC-28	Disabled Trips 1	Shield input phase loss trip	01000000
Fd-01	Voltage 1		4.00%
Fd-02	Voltage 2		9.00%
Fd-03	Voltage 3		15.00%
Fd-04	Voltage 4		25.00%
Fd-08	Frequency 4		20.00%

Remarks:

1. Defaults of F4-28 *Application Macros for Trolley Derricking of Tower Crane* as shown in the table above.
2. Users can define the range of those parameters based on real needs if the defaults may not meet the application needs.

6.3.4 Applications Micro for Construction Hoist

No.	Function	Description	Default
F0-02	Drive Control Mode	V/F open loop control	0
F0-04	Start/Stop Control Selection	External terminals control start/stop	1
F0-05	Terminal Start/Stop Control Selection	Forward when terminal RUN is on. Reverse when terminal F/R is on.	1
F0-06	Regular Speed Setting Mode	Primary numeric frequency setting	0
F0-07	Numeric Setting Frequency	Preset speed 1	20.00Hz
F0-09	Acceleration Time	Acceleration time	6.00S
F0-10	Deceleration Time	Deceleration time	1.80S
F0-14	Carrier Frequency		1.000kHz
F0-27	Menu Selection	Advanced menu	1
F2-02	Multi-function Input Terminal X3	Preset speed terminal 1	3
F2-06	Multi-function Input Terminal X7	Fault reset	10
F2-12	Multi-function Output Terminal Y1	Y1 is on at fault	9
F2-14	Relay Output Terminal R1	Defined as FDT function	2
F3-00	Preset Speed 1	Preset speed 2	50.00Hz
F7-25	Stator Voltagedrop Compensation	Disabled	0.00
F7-26	Deadband Gain	Disabled	0.00
F9-12	FDT1 Increasing Threshold	Y1,Y2,R1or R2 is on when the output Frequency Reach the threshold	2.00Hz
F9-13	FDT1 Decreasing Threshold	Y1,Y2,R1or R2 is off when the output Frequency Reach the threshold	6.50Hz
F9-24	Start-up Delay		3.00S
FC-07	Current Limit Function	Current limit disabled	0
FC-18	AVR	AVR enabled	001
FC-19	Overvoltage control selection	Dynamic brake enabled	0001
FC-28	Disabled Trips 1	Shield input phase loss and stable overcurrent trips	01010000
Fd-01	Voltage 1		4.00%
Fd-02	Voltage 2		9.50%
Fd-03	Voltage 3		15.50%
Fd-04	Voltage 4		25.00%
Fd-08	Frequency 4		20.00%
FE-17	X1 Off Delay		0.1S
FE-18	X2 Off Delay		0.1S

Remarks:

1. Defaults of F4-28 *Application Macros for Trolley Derricking of Tower Crane* as shown in the table above.
2. Users can define the range of those parameters based on real needs if the defaults may not meet the application needs.

7 Parameter Description

7.1 Group F0: General Parameters

No.	Function	Range	Unit	Default	Type
F0-00	Speed Reference Input Monitoring	Frequency：0.00～Fmax	Hz	0.00	×
F0-01		Speed: 0～F*Customer defined scaling	rpm	0.0	

F0-00/F0-01 Only for reference. F0-00 and F0-01 are optional. Their parameters are the setting values in present control mode. Symbol "-" shall be displayed if the value is negative. When the reference input control mode is different, the unit indicated by F0-00/F0-01 is also different.

Speed Reference Input Monitoring:

The unit of F0-00/F0-01 is Hz or rpm which indicates that the present control objective is the motor speed, its value is the present setting objective value of speed. When objective value is reverse input, then symbol "-"shall be displayed.

No.	Function	Range	Unit	Default	Type
F0-02	Drive Control Mode	0：V/F open loop control 1：Not used 2：SVC0 3：Not used		2	○

F0-02=0 V/F Open Loop Control: Applicable to the occasions when one inverter drives multi-motors, and speed regulations without high requirements for speed and accuracy.

▲**F0-02=2 SVC0**: Open loop vector control mode 0(without feedback on speed) which only estimates real-time speed, but no feedback control. The whole process of output current is under real-time closed loop control. Motor 0.5 Hz output reaches 150% of rated torque, inverter will autosearch the load variables, and autolimit the output current to make it not exceed the permitted maximum current. Even if load varies suddenly, or there is a quick acceleration or deceleration, inverter would not trip overcurrent, so that a general inverter can achieve high performance and reliability.

Remarks: This mode is only applied to speed control mode, not for torque control.

1. Before running in vector control mode, inverter needs to autotune motor parameter for obtaining the correct motor parameters

2. In vector control mode, the inverter only applies to one motor. The capacity gap between motor and inverter cannot be excessively big. Otherwise, it may lower control standard or the system cannot function normally.

3. The section with ▲ mark is switchable control mode. When running in this mode, V/F open loop control status can be switched to meet different drive needs through multi-function input terminals X1~X7. See 7.3 for program mode of multi-function input terminals. For example, set F2-02=20, and when terminal X3=ON, the drive mode is switched to V/F mode, and when X3=OFF, it returns to the previous drive mode.

No.	Function	Range	Unit	Default	Type
F0-03	Setting Input Control Mode	0： Speed input 1：Torque input（Not used）		0	○

F0-03=0 Input control mode is speed input, the input is frequency.

No.	Function	Range	Unit	Default	Type
F0-04	Start/Stop Control Options	0：Keypad 1：Terminal 2：RS485		0	○
F0-05	Terminal Start/Stop Control Options	0：RUN-Run，F/R-Forward/Reverse 1：RUN-Run，F/R- Reverse 2：RUN-NO forward, Xi-NC stop, F/R-NO reverse 3：RUN-NO run， Xi-NC stop， F/R- Forward/Reverse		0	○

F0-04=0 Keypad Control Mode:

Control start/stop of inverter through RUN, STOP/RESET, JOG/+- buttons on the keypad. When there is no fault, press JOG/+- to enter jog status, and press RUN to enter running status. When the green LED indicator on the RUN button is on, the inverter is in running status, but when it flashes, the inverter is in ramp-to-stop status. No matter the setting input control mode is speed or torque, JOG is always running in jog speed input control mode.

F0-04=1 Terminal Control Mode：

Start/Stop of inverter is under control of Start/Stop control terminal(defined by F2-00～F2-06). When multi-function terminals are set as defaults, the terminal control wiring is as shown in Figure 7-1. Specific setting of terminal control is determined by F0-05.

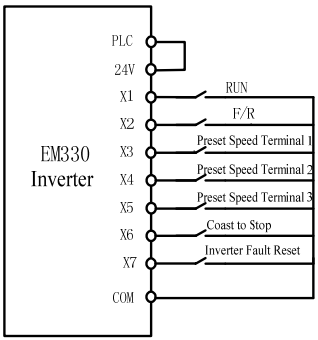


Figure 7-1

Wiring of Terminal Control

F0-04=2 RS485 Control Mode：

Start/Stop of inverter controlled by PC or PLC through RS485 communication interface.

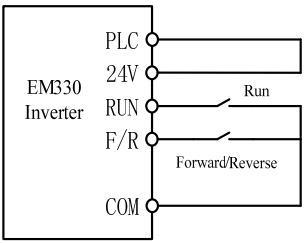
1. The terminal set as JOG can control inverter to run in jog speed setting mode in all start/stop modes.
2. No matter in what drive control mode, JOG always runs in jog speed setting control mode.

Two terminal control modes: 2-wire sequence and 3-wire sequence

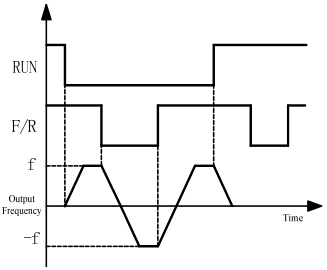
2-wire sequence：

F0-05=0 ON/OFF of terminal RUN controls start/stop of inverter, and OFF/ON of terminal F/R controls forward/reverse. If F0-24=1, when reverse is prohibited, terminal F/R is off. When stop mode is selected as ramp-to-stop, the sequence diagram is as shown in Figure 7-2 (b).

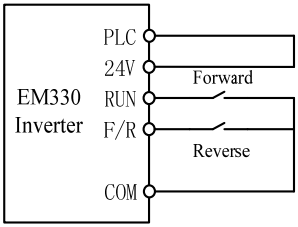
F0-05=1 ON/OFF of terminal RUN controls forward/stop of inverter, and ON/OFF of terminal F/R controls reverse/stop. If terminals F/R and RUN are ON simultaneously, the inverter stops according to the setting mode. When reverse is prohibited, terminal F/R is off. When stop mode is selected as ramp-to-stop, the sequence diagram is as shown in Figure 7-2 (d).



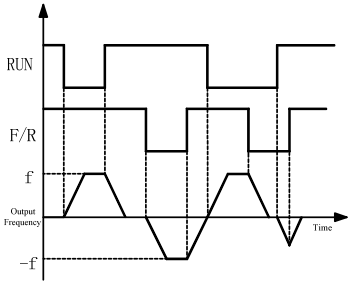
(a)F0-05=0 2-wire sequence



（b）F0-20=0，F0-05=0 Forward/Reverse running sequence



(c)F0-05=1 2-wire sequence



（d）F0-20=0，F0-05=1 Forward/Reverse running sequence

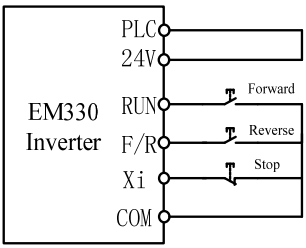
Figure 7-2 2-Wire Sequence

When F0-05 start/stop is selected as 0 or 1, even if terminal RUN is ON, and single circulation time of PLC is up, inverter can be stopped by pressing STOP button or external stop command of terminal. Meanwhile, inverter reenters running status only after terminal RUN is required to be OFF once and then ON again.

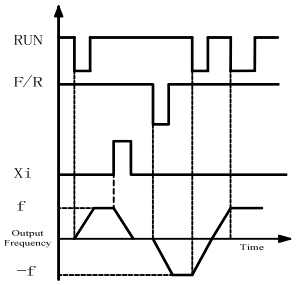
3-wire sequence：

F0-05=2 RUN is NO forward running button, F/R is NO reverse running button, Xi is NC stop button, and all of them will be on at pulse edge. In running status, press Xi button, the inverter stops. When stop mode is selected as ramp-to-stop (F0-20=0), the sequence diagram refers to Figure 7-3 (b). Xi among X1~X7 is defined as the terminal of 3-Wire Sequence Run/Stop Control by F2-00～F2-06.

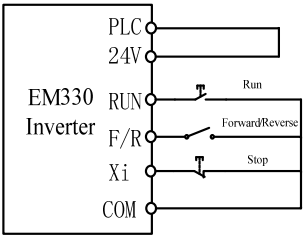
F0-05=3 F/R is forward/reverse switching button（Forward when F/R is off, and reverse when F/R is on.）RUN is NO running button, Xi is NC stop button, all of them will be on at pulse edge. When stop mode is selected as ramp-to-stop (F0-20=0), the sequence diagram is as shown in Figure 7-3(d).



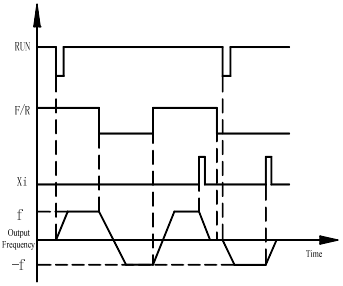
（a）F0-05=2 3-wire sequence



（b）F0-20=0，F0-05=2 Forward/Reverse running sequence



（c）F0-05=3 3-wire sequence



（d）F0-20=0, F0-05=3 Forward/Reverse running sequence

Figure 7-3 3-Wire Sequence

Use the buttons and switches correctly by following the mode illustrated in the above diagrams of EM330 3-wire sequences, otherwise, malfunctions may occur.

No.	Function	Range	Unit	Default	Type
F0-06	Regular Speed Setting Mode	0：Primary numeric frequency 1：VP 2：VS 3：IS 4：Not used 5：K3*VS+K4*IS 6：K3*VS+K5*VF 7：K4*IS+K6*IF 8：MAX{K3*VS,K5*VF} 9：MAX{K4*IS,K6*IF} 10:K1*VP+K2*(K3*VS+K4*IS+K5*VF+K6*IF-K8*5V)		0	○

F0-06 For selecting the source of regular speed setting signal.
F0-06=0 Primary numeric frequency setting mode is defined by the value of F0-07.
F0-06=1 Setting frequency is set by VP keypad potentiometer.
F0-06=2 Setting frequency is set by the voltage of analog terminal VS.
F0-06=3 Setting frequency is set by the current of analog terminal IS.
F0-06=4 Not used
F0-06=5 Setting frequency is set by: K3*VS+K4*IS (Input signals VS and IS)
F0-06=6 Setting frequency is set by: K3*VS+K5*VF
(Input voltage signals VS and VF)
F0-06=7 Setting frequency is set by: K3*VS+K5*VF (Input current signals IS and IF)
F0-06=8 Setting frequency is set by the greater value between K3*VS and K5*VF (Inputs of 2 terminals)
F0-06=9 Setting frequency is set by the greater value between K4*IS and K6*IF (Inputs of 2 terminals)
F0-06=10 Setting frequency is set by:
K1*VP+K2*(K3*VS+K4*IS+K5*VF+K6*IF-K8*5V) (All input signals)

★ The combination of analog voltage signal and analog current signal can be considered as that the current signal linearly switched to voltage signal of 0-10V first, and then calculate.

1. The default of analog voltage input VS, VF is 0～10V.
2. The default of analog current input is 4～20mA.
3. K1～K8 are analog signal gains which can be set by F1-22～F1-29.

No.	Function	Range	Unit	Default	Type
F0-07	Primary Numeric Frequency Setting	0.00～Fmax	Hz	0.00	●
F0-08	Motor Running Direction	0：Forward 1：Reverse		0	●

F0-07 The primary numeric frequency setting value is set by F0-07, and its range: 0.00～Fmax

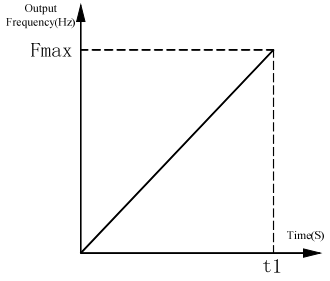
F0-08 Motor running direction: F0-08=0 is forward. Reverse is allowed when F0-24=0, the running direction will be switched as reverse when F0-08=1.

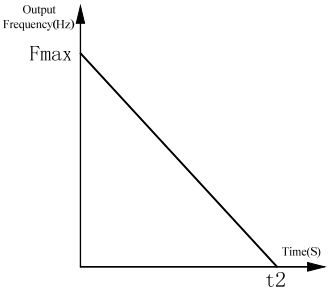
★Press UP/DOWN button to define the value of F0-07 in running preparation, and running status.

1. When reverse is permitted, inverter will judge present running direction based on the setting of F0-08 and the status of terminal F/R. If F0-08=1, and terminal F/R is on, then inverter runs forward.
2. Switch any two of output cables (U, V, and W) of inverter to make the inverter forwards in the same direction as the expected running direction of motor, or set F0-08=1.

No.	Function	Range	Unit	Default	Type
F0-09	Acceleration Time 1	0.00～600.00	S/min	15.00	●
F0-10	Deceleration Time 1	0.00～600.00	S/min	15.00	●

Acceleration time is the time taken for the output frequency to rise from 0Hz up to maximum frequency Fmax set by F0-16. Deceleration time is the time taken for the output frequency to drop from Fmax down to 0Hz, which are not relevant to forward and reverse. As shown in Figure 7-4.





（a）Acceleration Time 1　　（b）Deceleration Time 1

Figure 7-4 Acceleration/Deceleration Time

No.	Function	Range	Unit	Default	Type
F0-11	Jog Numeric Frequency	0.00～Fmax	Hz	5.00	●
F0-12	Jog Acceleration Time	0.00～600.00	S/min	15.00	●
F0-13	Jog Deceleration Time	0.00～600.00	S/min	15.00	●

In JOG running mode, inverter runs at the frequency set by F0-11, the acceleration/deceleration time taken for running to Fmax is set by F0-12/F0-13.

★ Jog acceleration time is the time taken for the output frequency to rise from 0Hz up to maximum frequency Fmax. Deceleration time is the time taken for the output frequency to drop from Fmax down to 0Hz.

★ In jog running mode, keep pressing the JOG button or terminal JOG is on. Otherwise, it will be considered as the jog command cancelled.

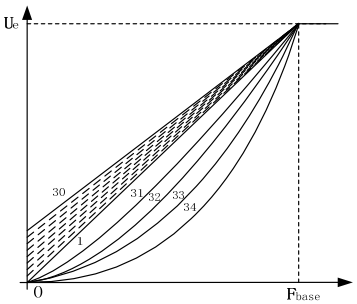
Note that the unit of acceleration /deceleration time is second or minute, defined by F3-21.

No.	Function	Range	Unit	Default	Type
F0-14	Carrier Frequency	1.000～16.000	kHz	2.000	●

Increasing carrier frequency could reduce motor noise, but it will result in inverter heating up. When carrier frequency is higher than the default, the rated power of inverter should decrese 5% as each increment of 1 kHz carrier frequency.

Correlation between motor rated power and carrier frequency is suggested as following:

Motor Rated Power Pe	≤15kW	≤30kW	≤75kW	≤132kW	＞132KW
Carrier Frequency F_c	≤10.0kHz	≤8.0kHz	≤6.0kHz	≤4.0kHz	≤2.5kHz

No.	Function	Range	Unit	Default	Type
F0-15	Customer Defined V/F Scaling			35	●

F0-15=0： Automatic torque boost

F0-15=1～10： Fixed torque boost

F0-15=11～34： Not used

F0-15=35： Customer defined V/F curve scaling（Defined via Fd-01～Fd-08）

No.	Function	Range	Unit	Default	Type
F0-16	Maximum Frequency	Fmax: 20.00～600.00	Hz	50.00	○
F0-17	Upper Limit Frequency	Fup: Fdown ～Fmax	Hz	50.00	○
F0-18	Lower Limit Frequency	Fdown: 0.00～Fup	Hz	0.00	○

F0-16 Fmax indicates the maximum setting frequency permitted by inverter. Range of Fmax: 20.00-600.00Hz.

F0-17 Fup indicates the maximum permitted running frequency after inverter start-up. Range of Fup: Fdown~Fmax.

F0-18 Fdown indicates the minimum permitted running frequency after inverter start-up. Range of Fdown: 0.00Hz~Fup.

1. Upper limit frequency and lower limit frequency should be prudently set as per the actual parameters on controlled motor nameplate and operational status. Do not make the motor run for a long time in the lower frequency status. Otherwise, the service lifespan of motor will be reduced due to overheating.
2. Correlation of maximum frequency, upper limit frequency, and lower limit frequency: 0.00Hz≤Fdown≤Fup≤Fmax≤600.00Hz

No.	Function	Range	Unit	Default	Type
F0-19	Selecting Start Mode	0：Normal start 1：Speed search start		0	○

F0-19=0 Start as per setting mode: Zero speed start, or DC brake first, and then zero speed start.

F0-19=1 Speed search start: Before inverter starts, the motor may be rotating. Detecting motor speed and direction when inverter starts running, the speed and direction of motor can be directly searched base on the detection result. Smooth start can be applied to the motor which is rotating. The process of speed search is as shown on Figure 7-5.

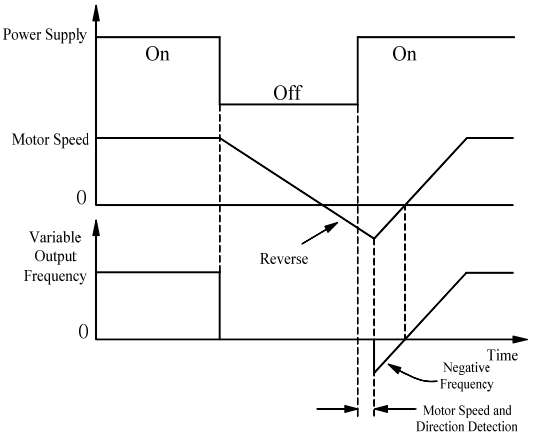


Figure7-5 Speed Search Start

1. Load inertia shall be taken into consideration when increasing the setting value of acceleration/deceleration time in speed search start mode.
2. Speed search start mode is applicable to the occasion when one inverter drives one motor.

No.	Function	Range	Unit	Default	Type
F0-20	Selecting Stop Mode	0：Ramp to stop 1：Coast to Stop		0	○

Stop Mode Setting:

Ramp to Stop

F0-20=0 Inverter stops motor using the setting deceleration time.

【Default is F0-10 Deceleration Time 1】

Coast to Stop

F0-20=1 The drive output is switched off and the motor coasts to stop. The stop time is up to load inertia.

If there is a coast-to-stop terminal, when it is on, the inverter enters coast-to-stop status immediately, and when it is off, the inverter will not restart only if regiving the run command.

No.	Function	Range	Unit	Default	Type
F0-21	Function Setting for JOG/+- button	0:Jog running 1:Positive/Negative input switching 2: Disabled		0	○

F0-21=0 JOG/+- button on keypad is for jog function.

F0-21=1 JOG/+- button on keypad is for positive/negative input switching function, i.e. when the settings are positive speed, positive PID, and positive torque JOG/+- button is for switching to negative speed, negative PID, and negative torque.

F0-21=2 JOG/+- button on keypad is disabled.

No.	Function	Range	Unit	Default	Type
F0-22	Speed Monitoring Selection	0：Frequency Hz 1：Speed rpm		0	X
F0-23	Customer Defined Scaling	0.01～600.00		30.00	●

F0-22 For setting speed display. If F0-22=0, then the reference input value displayed on keypad is the target output frequency of inverter. If F0-22=1, then the reference input value is the target output speed of inverter.

F0-23 Customer defined scaling. Mechanical speed = Mechanical speed coefficient (Customer defined scaling) * Output frequency. When the unit of setting speed is rpm, adjust the parameter to make the displayed value of motor speed match the actual value.

No.	Function	Range	Unit	Default	Type
F0-24	Forward/Reverse Control	0：Forward/Reverse permitted 1：Forward/Reverse prohibited		0	○
F0-25	F/R Deadband	0.00～600.00	S	0.00	●

Permission of Motor Forward/Reverse

F0-24=0 Reverse permitted:

Motor's running direction is set by F0-08, or controlled by terminal F/R.

F0-24=1 Reverse prohibited:

Motor can only run in one direction, F0-08 parameters are disabled, and terminal F/R is off.

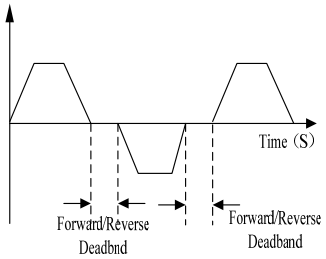


Figure 7-6 Forward/Reverse Deadband

Deadband of Switching the Forward/Reverse of Motor

If F0-25=0.00, there is no deadband of forward/reverse.

If F0-25≠0, when forward/reverse switches, the inverter runs at 0Hz using the time set by F0-25 as the motor speed drops to 0Hz, and then runs to setting frequency in opposite direction. As shown in Figure7-6.

No.	Function	Range	Unit	Default	Type
F0-26	Primary Speed Setting Mode	0：Regular Speed Setting Mode 1：Special Speed Setting Mode 2：Process PID Input Mode		0	○

F0-26=0 Primary speed setting mode is regular speed setting mode. Primary numeric speed setting mode or analog signal setting mode can be set by selecting parameter of F0-06.

F0-26=1 Primary speed setting mode is special speed setting mode. Special speed setting mode can be selected as program running or stepping speed setting mode by advanced running mode.

F0-26=2 Primary speed setting mode is process PID input mode. Numeric PID setting mode or analog signal setting mode can be selected via F4-00.

No.	Function	Range	Unit	Default	Type
F0-27	Menu Mode Options	0：Basic Menu Mode 1：Advanced Menu Mode		0	○

F0-27=0 Keypad only displays the basic setting parameters of F0~F5.
(6-group parameters could meet the needs of most of applications.)

F0-27=1 Keypad displays 17-group parameters of F0~FF for users to set parameters.

No.	Function	Range	Unit	Default	Type
F0-28	Default Control	0: Disabled 1: Defaults Reset		0	○
F0-29	Parameter Setting Control	0: Parameter set allowed 1: Parameter lock 0 2: Parameter lock 1			

Reset Default

F0-28=1 Reset Default: Except motor parameters in Group F1, inverter parameter in Group Fd, and application macros of F4-28, the parameters will reset to default. After reset completed, F0-28=0.

Parameter Lock

F0-29=0 All parameters are allowed to be edited.

F0-29=1Parameter lock 0: Lock parameters except numeric settings. The numeric settings are primary numeric frequency setting F0-07, auxiliary numeric frequency setting F9-06, jog running frequency F0-11, preset speed 1~15(F3-00 ～ F3-14), PID numeric setting F4-01, preset PID setting 1~7(Fb-20～Fb-26), numeric torque current F5-12, and preset torque setting 1~7(F5-15～F5-21).

F0-29=2 Parameter locked 1: Lock all parameters except F0-29, inverter will remain the setting before unlocked.

No.	Function	Range	Unit	Default	Type
F0-30	Inverter Model	0: Model G 1: Model P		0	○

F0-30=0 Set inverter as Model G which is applicable to mechanical or constant torque load.

F0-30=1 Set inverter as Model P which is applicable to square or cubic torque load like blower, and water pump.

★ Set inverter as Model P, applicable motor power detailed on the Nameplate.

Note: The constant torque load is not applicable to Model P.

No.	Function	Range	Unit	Default	Type
F0-31	User Password	0～65535		XXXX	○

F0-31 Set a new password to start password protection and prevent unqualified personnel from editing the inverter parameters incorrectly. When password is 0, the password function is disabled.

7.2 Group F1:Motor Parameters

No.	Function	Range	Unit	Default	Type
F1-00	Motor Type	0：AC induction motor 1：Not used		0	○
F1-01	Motor Rated Power	0.40～480.00	kW	XXXX	○
F1-02	Motor Rated Voltage	60～660	V	XXX	○
F1-03	Motor Rated Current	0.1～1500.0	A	XXXX	○
F1-04	Motor Rated Frequency	20.00～600.00	Hz	XXXX	○
F1-05	Motor Rated Speed	1～30000	rpm	XXXX	○
F1-06	Motor Wiring Mode	0：Y Wiring 1：Δ Wiring		X	○
F1-07	Motor Rated Power Factor	0.50～0.99		X	
F1-14	Motor Efficiency	30.0～99.00	%	XXX	○

Remarks: When connecting the inverter to the motor at the first time, set the above parameters as per the motor nameplate before operation.

No.	Function	Range	Unit	Default	Type
F1-08	Idling Excitation Current	0.1～1500.0	A	XXXX	○
F1-09	Rated Torque Current	0.1～1500.0	A	XXXX	○
F1-10	Stator Resistance R1	0.01～300.00	Ω	XXXX	○
F1-11	Rotator Resistance R2	0.01～300.00	Ω	XXXX	○
F1-12	Stator& Rotor Leakage Inductance Ls	0.1～3000.0	mH	XXXX	○
F1-13	Stator& Rotor Mutual Inductance Lm	0.1～3000.0	mH	XXXX	○

F1-08～F1-13 are motor parameters. Autotune motor parameter to obtain the above parameters.

Before autotuning motor parameter, inverter will set the nameplate parameters(set by F1-00～F1-07) as the standard motor parameters automatically.

The T Equivalent Model of motor is as shown in Figure7-7.

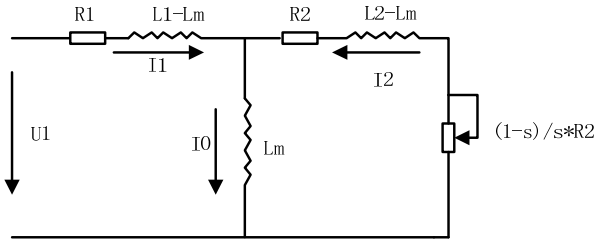


Figure 7-7 T Equivalent Model of Induction Motor

R1, L1, R2, L2, Lm, and I0 in Figure 7-7 refers to stator resistance, stator inductance, rotor resistance, rotor inductance, stator and rotor mutual inductance, idling excitation current respectively.

No.	Function	Range	Unit	Default	Type
F1-15	Autotuning	0: No autotuning 1: Staionary autotuning (R_1,R_2,Ls,Lm,I_0) 2: Rotational autotuning (R_1,R_2,Ls,Lm,I_0)		0	○

F1-15=0 No autotuning

F1-15=1 Motor remains motionless in the process of autotuning parameters F1-07 and F1-10～F1-14.

F1-15=2 Motor is rotating in the process of autotuning parameters F1-07 and F1-10～F1-14.

- After parameters autotuning completed, F9-15=0 will be set automatically.
- When slip compensation is active, autotune motor parameter first so that the motor will obtain the optimum operation status.

ModBus protocol will not be introduced in this manual because communicational control mode will not be applied in hoisting.

No.	Function	Range	Unit	Default	Type
F1-22	Analog Input Gain K1	0.00～600.00	%	100.00	●
F1-23	Analog Input Gain K2	0.00～600.00	%	100.00	●
F1-24	Analog Input Gain K3	0.00～600.00	%	0.00	●
F1-25	Analog Input Gain K4	0.00～600.00	%	100.00	●
F1-26	Analog Input Gain K5	0.00～600.00	%	0.00	●
F1-27	Analog Input Gain K6	0.00～600.00	%	0.00	●
F1-28	Analog Input Gain K7	0.00～600.00	%	0.00	●
F1-29	Analog Input Gain K8	0.00～200.00	%	0.00	●

Set analog gain Ki for proportional zooming of analog signals. The setting analog value of inverter: Analog input*Analog input gain Ki（i=1～8）.

The description of F0-06, F5-11, and F9-05 shows the correlation of 8 analog gain coefficients Ki and VP, VS, VF, IS, IF.

7.3 Group F2: Input/Output Terminal Parameters

The multi-function input terminals of EM330 are also called as numeric input terminals because of working in PWL or pulse mode.

No.	Function	Range	Unit	Default	Type
F2-00	Multi-function Input Terminal X1-RUN	See Table 6-1 Functions of Numeric Multi-function Input Terminals X8 is a unique input terminal of EM330B.		1	○
F2-01	Multi-function Input Terminal X2-F/R			2	○
F2-02	Multi-function Input Terminal X3-D1			3	○
F2-03	Multi-function Input Terminal X4-D2			4	○
F2-04	Multi-function Input Terminal X5-D3			5	○
F2-05	Multi-function Input Terminal X6-FRS			X	○
F2-06	Multi-function Input Terminal X7-RST			10	○
F2-07	Multi-function Input Terminal X8-FJOG			11	○

Multi-function input terminals X1～X7 are 7 programmable numeric input terminals. The function of X1~X7 can be defined by the setting value of F2-00～F2-06. (F2-07 defines the functions of X8 of EM330B.)

For example, set F2-00=1, then the function of terminal X1 is RUN. If start/stop control mode is in terminal control mode, when terminal X1 is on, inverter runs.

Xi=0 No function

This function can be used to block the terminal when its hardware breaks down.

Xi=1 RUN

When start/stop control mode is terminal control (F0-04=1), if the function terminal is on, the inverter will run as per the setting value of F0-05.

Xi=2 F/R Forward/Reverse

When start/stop control mode is in terminal control mode (F0-04=1), if the function terminal is on, the inverter will forward/reverse as per the setting value of F0-05.

Xi=3 Preset Speed Terminal 1
Xi=4 Preset Speed Terminal 2
Xi=5 Preset Speed Terminal 3
Xi=6 Preset Speed Terminal 4

In preset speed control mode, define 4 function input terminals as the preset speed terminals. A preset speed set in F3-00～F3-14 is selected as the present setting frequency of inverter by the programming coding of these 4 terminals. See 7.4 for preset speed options setting.

Xi=7 Acceleration/Deceleration Time Terminal 1
Xi=8 Acceleration/Deceleration Time Terminal 2

F0-09，F0-10，F3-15～F3-20 set acceleration/deceleration time 1～4, and select corresponding acceleration/deceleration time 1 ～ 4 through programming acceleration/deceleration terminals. See 7.4 for the correlation of acceleration/deceleration time and its terminal.

Xi=9 Coast to stop

Inverter is running, if the function terminal is on, PWM output is locked immediately, and then motor coasts to stop.

Xi=10 Inverter fault reset input

Inverter can be reset through fault reset terminal after inverter fault is cleared.

Xi=11 Forward Jog FJOG
Xi=12 Reverse Jog RJOG

Inverter will forward when terminal FJOG is on, reverse when terminal RJOG is on, and will stop when FJOG and RJOG are on simultaneously. See 7.1 for details of Jog operation.

★ Reverse jog is disabled when reverse is prohibited.

Xi=13 UP: Terminal controls numeric frequency, stepping frequency rises.
Xi=14 DOWN: Terminal controls numeric frequency, stepping frequency drops.

During operation, if input frequency is in numeric frequency input mode, set Xi=13, or Xi=14, its function changes the numeric frequency, its speed rate can be set by UP/DOWN frequency and speed rate setting of F9-07. If it is in stepping mode, the terminals are hot keys for stepping frequency. Its speed rate can be set as acceleration /deceleration time.

Xi=16 Acceleration/Deceleration prohibited

When acceleration/deceleration prohibiting terminal is on, acceleration/

deceleration command is prohibited, and the output frequency of inverter remains unchanged and is beyond control of input frequency, and output frequency = input frequency. When current is higher than the current limit, the output frequency drops as per setting mode, meanwhile, output frequency= input frequency until current is lower than the current limit, inverter keeps present output frequency.

Xi=18 3-wire sequence run/stop control

The function is NC stop button of 3-wire sequence. See F0-05 for details of terminal start/stop options.

Xi=19 DC brake command at stop

When inverter is in ramp-to-stop and the running frequency is smaller than the frequency of DC brake set in F3-24, DC brake enabled. DC brake ends until the terminal is off. If the terminal is on and the setting time of DC brake is active, select the greater value between them to perform DC brake command at stop. See F3-24～F3-27 for detail of DC brake setting at stop(See 7.4).

Xi=20 Switch drive control mode to V/F control mode

No matter what drive mode F0-02 is in, if the terminal is on, the drive control mode will be switched to V/F control mode, and its function is equivalent to F0-02=0. When the terminal is off, it returns the previous control mode automatically.

Xi=21 Switch run command control mode to terminal control mode

When the terminal is on, no matter what run command mode F0-04 is in, and what status of the run command input 0 or input 1is, it is always in terminal control mode which is placed in the highest priority. The terminal control mode is set by F0-05.

Xi=22 Run command input 0

Xi=23 Run command input 1

The run command control modes can be selected through programming the run command inputs. See Table 7-1 for the correlation between run command control mode and run command input.

Table 7-1Correlation between run command control mode and run command input

Run Command Input 0	Run Command Input 1	Run Command Control Mode
OFF	OFF	Unchanged
OFF	ON	Keypad
ON	OFF	RS485
ON	ON	External Terminal

Programming mode of run command inputs is prior to F0-04 run command mode selection.

Xi=24 Switch input control mode to speed control mode

When the terminal is on, the present input control mode is switched to the speed control mode, and its function is equivalent to F0-03=0. After it is off, it returns to the previous input control mode automatically.

Xi=27 Switch speed input setting mode to primary speed setting mode

In speed control mode, if the terminal is on, and then integrated speed input mode is switched to primary speed setting mode. After it is off, it returns to the previous input mode automatically. It is equivalent to set the ones place of F9-03=0 when it is on.

Xi=28 Switch speed input setting mode to auxiliary speed setting mode

In speed control mode, if the terminal is on, then the speed input setting mode is switched to auxiliary speed setting mode. Its function is equivalent to set the ones place of F9-03=1. After the terminal is off, it returns the previous setting mode automatically.

Xi=29 Switch primary speed setting mode to regular speed setting mode

In speed control mode, if the f terminal is on, then the primary speed setting mode is switched to regular speed setting mode. Its function is equivalent to set F0-26=0. After the terminal is off, it returns the previous setting mode automatically.

Xi=30 Switch regular speed input setting mode to numeric speed input setting mode

In regular speed control mode, if the terminal is on, then the present regular speed setting mode of F0-06 is switched to the numeric speed input setting mode. Its function is equivalent to set F0-06=0. After the terminal is off, it returns the previous setting mode automatically.

Xi=31 Switch jog input setting mode to jog numeric speed input setting mode

In regular speed control mode, if the terminal is on, then the present jog speed setting mode is switched to jog numeric speed input setting mode. Its function is equivalent to set the tens place of F9-03=0. After the terminal is off, it returns the previous setting mode automatically.

Xi=44 Preset current limit terminal 1

Xi=45 Preset current limit terminal 2

Xi=46 Preset current limit terminal 3

When selecting preset current limit, 3 input terminals can be defined as the preset current limit terminals. A preset current limit set in FA-07～FA-13 is

selected correspondingly through programming these 3 terminals. See Table 7-2 for correlation between preset current limit and the corresponding terminals.

Table 7-2 Correlation between preset current limit and the corresponding terminals

Terminal 3	Terminal 2	Terminal 1	Preset Torque Current Setting	Corresponding Torque Current Code
OFF	OFF	OFF	Non-preset current limit	Defined by FC-08
OFF	OFF	ON	Preset current limit 1	FA-07
OFF	ON	OFF	Preset current limit 2	FA-08
OFF	ON	ON	Preset current limit 3	FA-09
ON	OFF	OFF	Preset current limit 4	FA-10
ON	OFF	ON	Preset current limit 5	FA-11
ON	ON	OFF	Preset current limit 6	FA-12
ON	ON	ON	Preset current limit7	FA-13

Xi=51 External device fault input

During running, after the terminal receives external device fault signal, inverter stops and enters fault status. The default is NO input of external fault, and it can be set as NC input by terminal positive/negative logic of FE-01.

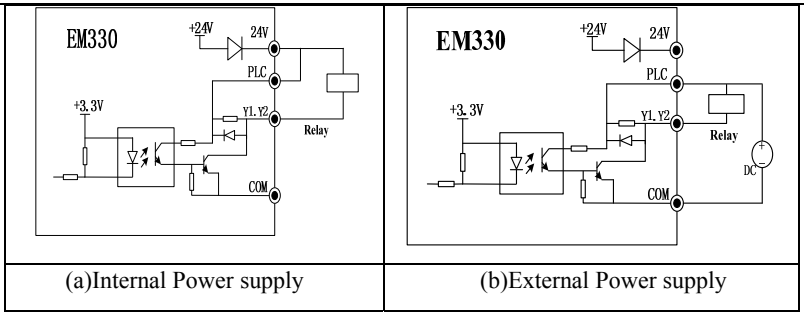
Xi=81 External brake release confirm signal input

As FDT output signal is enabled, after the set time of FC-31 is up, if Xi=81 does not receive any active input signal, inverter trips EST wire broken fault. This function is only enabled at EM330B.

No.	Function	Range	Unit	Default	Type
F2-12	Multi-function Output Terminal Y1	See Table 6-2 Functions of Numeric Multi-function Output Terminals		0	○
F2-13	Multi-function Output Terminal Y1			1	○
F2-14	Relay Output Terminal R1			9	○

EM330 provides 3 programmable output terminals including 2 multi-function output terminals and 1 relay output terminal. There are 0～32 program codes, user can define output variables of terminals.

Two multi-function output terminals are in OC output mode, output common port is connected to COM. When selected program code is enabled, the electronic switch is ON, and when it is disabled, the electronic switch is OFF. OC can be powered either internally or externally, as shown in Figure 7-8(a) and 7-8(b) respectively. If it is externally powered, the voltage range is required to be within 8~24V.



(a)Internal Power supply (b)External Power supply

Figure 7-8 Power Supply Modes of Programmable Terminals

Relay output is provided by the internal relay of inverter.

Relay has 1 set of NO contacts and 1 set of NC contacts. When selected program code is disabled, EB-EC is NC, and EA-EC is NO. When selected program code is enabled, the coil of internal relay is power-on, EB-EC is off, and EA-EC is on, as shown in Figure 7-9.

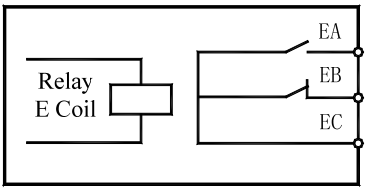


Figure7-9 Relay Contacts

No.	Function	Range	Unit	Default	Type
F2-16	Analog Output Terminal M0	See Table 6-3		0	●
F2-17	Analog Output Terminal M1	Analog Output Full Scale		6	●

EM330 provides 2 programmable analog output terminals: M0 and M1 which can output 0～10V voltage signal or 0-20mA current signal by jump line selection.

No.	Function	Range	Unit	Default	Type
F2-22	M0 Output Lower Limit	0.00～100.00	%	0.00	●
F2-23	M0 Output Upper Limit	0.00～100.00	%	100.00	●
F2-24	M0 Output Gain	0.00～300.00	%	300.00	●
F2-25	M1 Output Lower Limit	0.00～100.00	%	0.00	●
F2-26	M1 Output Upper Limit	0.00～100.00	%	100.00	●
F2-27	M1 Output Gain	0.00～300.00	%	300.00	●

Upper limit/lower limit of analog output can be set to meet different requirements.

Final analog output signal=Output gain*analog output

Analog output gain and its upper/lower limit F2-22~F2-27 are for terminal M0 and M1, irrelevant to the current running status.

1. In order to meet different needs, the actual full scale voltage of M0/M1 is 10.9V, and the actual full scale current is 22mA.
2. Default of M0 and M1 is 0～10V.
3. If there is high demand for accuracy of analog output in application, check idling output of M0 and M1 with multimeter.

7.4 Group F3: Preset Speed Parameters

No.	Function	Range	Unit	Default	Type
F3-00	Preset Speed 1	0.00～ Fmax	Hz	0.00	●
F3-01	Preset Speed 2	0.00～Fmax	Hz	5.00	●
F3-02	Preset Speed 3	0.00～Fmax	Hz	10.00	●
F3-03	Preset Speed 4	0.00～Fmax	Hz	15.00	●
F3-04	Preset Speed 5	0.00～Fmax	Hz	20.00	●
F3-05	Preset Speed 6	0.00～Fmax	Hz	25.00	●
F3-06	Preset Speed 7	0.00～Fmax	Hz	30.00	●
F3-07	Preset Speed 8	0.00～Fmax	Hz	35.00	●
F3-08	Preset Speed 9	0.00～Fmax	Hz	40.00	●
F3-09	Preset Speed 10	0.00～Fmax	Hz	45.00	●
F3-10	Preset Speed 11	0.00～Fmax	Hz	50.00	●
F3-11	Preset Speed 12	0.00～Fmax	Hz	50.00	●
F3-12	Preset Speed 13	0.00～Fmax	Hz	50.00	●
F3-13	Preset Speed 14	0.00～Fmax	Hz	50.00	●
F3-14	Preset Speed 15	0.00～Fmax	Hz	50.00	●

Through preset speed control terminals and 15 preset frequency commands, EM330 can provide 16 preset speeds by combining keypad numeric setting mode and analog setting mode. Furthermore, it can be adjusted at any time through repeated addition analog input.

Setting Preset Speed Terminals

Terminal	No.	Default	Function
X3	F2-02	3	Preset Speed Terminal 1
X4	F2-03	4	Preset Speed Terminal 2
X5	F2-04	5	Preset Speed Terminal 3
X6	F2-05	6	Preset Speed Terminal 4
X7	F2-06	10	Inverter Fault Reset

Preset Speed Commands and Preset Speed Terminals

Speed	Preset Speed Terminal 4	Preset Speed Terminal 3	Preset Speed Terminal 2	Preset Speed Terminal 1	Selected Frequency	No.
1	OFF	OFF	OFF	OFF	Keypad or Analog	Defined

					Setting	by F0-06
2	OFF	OFF	OFF	ON	Preset Speed 1	F3-00
3	OFF	OFF	ON	OFF	Preset Speed 2	F3-01
4	OFF	OFF	ON	ON	Preset Speed 3	F3-02
5	OFF	ON	OFF	OFF	Preset Speed 4	F3-03
6	OFF	ON	OFF	ON	Preset Speed 5	F3-04
7	OFF	ON	ON	OFF	Preset Speed 6	F3-05
8	OFF	ON	ON	ON	Preset Speed 7	F3-06
9	ON	OFF	OFF	OFF	Preset Speed 8	F3-07
10	ON	OFF	OFF	ON	Preset Speed 9	F3-08
11	ON	OFF	ON	OFF	Preset Speed 10	F3-09
12	ON	OFF	ON	ON	Preset Speed 11	F3-10
13	ON	ON	OFF	OFF	Preset Speed 12	F3-11
14	ON	ON	OFF	ON	Preset Speed 13	F3-12
15	ON	ON	ON	OFF	Preset Speed 14	F3-13
16	ON	ON	ON	ON	Preset Speed 15	F3-14

Precautions for setting:

★ F0-04 defines start/stop of inverter in preset speed operation mode.

★ External terminals set the acceleration/deceleration time in preset speed operation mode.

★ Terminals F/R and RUN determines the running direction of motor in preset speed operation mode.

No.	Function	Range	Unit	Default	Type
F3-15	Acceleration Time 2	0.00～600.00	S/min	15.00	●
F3-16	Deceleration Time 2	0.00～600.00	S/min	15.00	●
F3-17	Acceleration Time 3	0.00～600.00	S/min	15.00	●
F3-18	Deceleration Time 3	0.00～600.00	S/min	15.00	●
F3-19	Acceleration Time 4	0.00～600.00	S/min	15.00	●
F3-20	Deceleration Time 4	0.00～600.00	S/min	15.00	●

Acceleration time is the time taken for output frequency to rise from 0Hz up to the maximum frequency Fmax set by F0-16. Deceleration time is the time taken for output frequency to drop from Fmax down to 0Hz. Both of them are not related to forward/reverse.

EM330 provides 4 kinds of acceleration times and 4 kinds of deceleration times. Each of them is set by independent parameter. There are 2 multi-function input terminals which can be set as acceleration/deceleration time terminal 1 and 2. They are programmable when inverter is running, and acceleration/deceleration time can be changed immediately. See Table 7-3 for the programming mode of acceleration/deceleration time terminal 1 and 2.

Table 7-3 Programming mode of acceleration/deceleration time terminals

Acceleration/Deceleration Time Terminal 1	Acceleration/Deceleration Time Terminal 2	Acceleration Time/No.	Deceleration Time/No.
OFF	OFF	1 F0-09	1 F0-10
ON	OFF	2 F3-15	2 F3-16
OFF	ON	3 F3-17	3 F3-18
ON	ON	4 F3-19	4 F3-20

As shown in Table 7-3, acceleration/deceleration time refers to acceleration time 1 and deceleration time 1 in regular operation mode (without using acceleration/deceleration terminal).

No.	Function	Range	Unit	Default	Type
F3-21	Acceleration/Deceleration Time Unit	0:S 1:min		0	○

F3-21=0 The unit of acceleration/deceleration time is second. The acceleration/deceleration time can be set continuously in the range of 0.00～600.00 seconds.

F3-21=1 The unit of acceleration/deceleration time is minute. The acceleration/deceleration time is can be set continuously in the range of 0.00～600.00 minutes.

No.	Function	Range	Unit	Default	Type
F3-22	DC Brake Propotion at Start	0.00～30.00 30.01～150.00	%	35.00	○
F3-23	DC Brake Time at Start	0.00～30.00	S	0.00	○

Before inverter starts, the motor may run in low speed. If inverter starts immediately at mean time, overcurrent may occur. In order to avoid such faults, start DC brake to stop motor before inverter starts, and then the inverter runs to setting frequency as per setting direction.

F3-22 Different setting values can define different start DC brake torques.

★ When the parameter≤30.00, the percentage base is the rated output voltage of inverter. While, the DC brake controls the DC voltage generated by motor windings.

★ When the parameter≥30.01, the percentage base is the rated output current of inverter. While, the DC brake controls the DC current generated by motor windings.

F3-23 Set the DC brake time at start. Inverter runs immediately when the time is up. If F3-23=0.00, DC brake is disabled at start.

★ The DC brake process at start is as shown in Figure 7-10.

The function is applied to that one inverter drives multi-motors.

No.	Function	Range	Unit	Default	Type
F3-24	DC Brake Start Frequency at Stop	0.10~60.00	Hz	2.00	○
F3-25	DC Brake Propotion at Stop	0.00~30.00. 30.01~150.00	%	35.00	○
F3-26	DC Brake Waiting Time	0.00~30.00	S	0.00	○
F3-27	DC Brake Time at Stop	0.00~30.00	S	0.00	○

F3-24 Set the frequency for DC brake to start in the process of ramp-to-stop. Once the output frequency is lower than this frequency in the process of ramp-to-stop, if DC brake time≠0, then DC brake enabled.

F3-25 Different setting values can define different DC brake torques at stop.

★ When the parameter≤30.00, the percentage base is the rated output voltage of inverter. While, the DC brake controls the DC voltage generated by motor windings.

★ When the parameter≥30.01, the percentage base is the rated output current of inverter. While, the DC brake controls the DC current generated by motor windings.

F3-26 When DC brake command at stop given by the terminal is active or the output frequency reaches the setting value of F3-24 in the process of ramp to stop. DC brake starts after the time set by F3-26 is up.

F3-27 Set the DC brake time at stop. If F3-27=0.00, the DC brake is disabled at stop.

1. If there is a DC brake signal of external terminal at stop, then the DC brake time takes the greater between the active time of the terminal and the setting time in F3-27.
2. DC brake process at stop is as shown in Figure 7-11.

- For heavy load, regular deceleration cannot stop motor fully due to inertia, and motor could stop by prolonging the DC brake time or increasing DC brake current at stop.
- For potential energy load, DC brake current control mode cannot be applied due to the rising time of current.

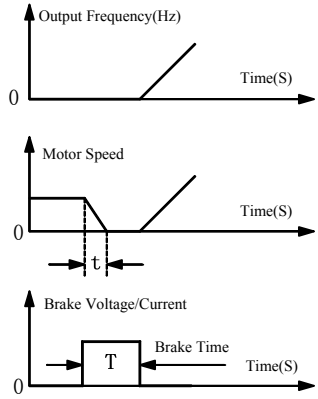


Figure 7-10 DC Brake Process at Start

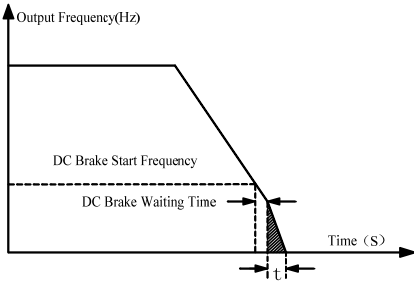
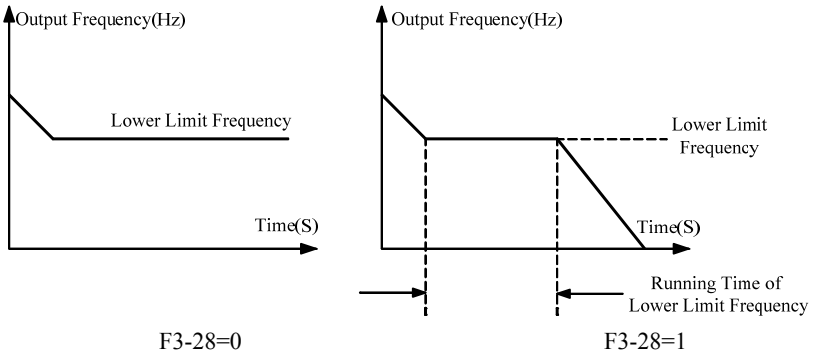


Figure 7-11 DC Brake Process at Stop

No.	Function	Range	Unit	Default	Type
F3-28	Lower Limit Frequency Control	0:Run as per lower limit frequency 1:Run at zero speed after lower limit frequency running time is up		0000	○
F3-29	Lower Limit Frequency Running Time	0.00～600.00	S	60.00	○

F3-28=0 When the output frequency is lower than the lower limit frequency, the inverter will always run as per lower limit frequency. The lower limit frequency is set by F0-18.

See Figure 7-12 for lower limit frequency control.



F3-28=0 F3-28=1

Figure 7-12 Lower Limit Frequency Control

No.	Function	Range	Unit	Default	Type
F3-30	Open Loop Slip Compensation	0.00～200.00	%	0.00	•

The speed of motor rotor decreases as load increases. In order to ensure that the speed of rotor is close to synchronous speed, motor could start slip frequency when motor is on rated load. When the speed of motor is far lower than the objective value, increase the setting value of F3-30.

★ F3-30=0 Slip compensation is disabled.

No.	Function	Range	Unit	Default	Type
F3-31	Parameter Copy	0: No Copy 1:Upload Parameter (From Inverter to Keypad) 2:Download Parameter (From Keypad to Inverter, F3-31=0 upon completion)		0	○

F3-31=0 No copy.

F3-31=1 Upload the parameters from the control panel of inverter to the EEPROM on keypad. Upon the completion of uploading, F3-31=0 set automatically.

F3-31=2 Download the parameters from the EEPROM on keypad to the control panel of inverter. Upon the completion of downloading, F3-31=0 set automatically.

The function may be applied to the setting parameter copy between different inverters, and to save the initial parameters defined by user. When the parameters are edited by mistake, the inverter cannot work normally, please download the parameter to reset *User Parameters.*

7.5 Group F4: Gernal Parameters of PID

Since PID functions will not be applied to cranes and hoists, it will not be introduced in this manual.

No.	Function	Range								Unit	Default	Type
F4-15	Monitor Reference Selection	*	*	Estimated Slip	Estimated Speed	*	Sync-Freq.	Inp. Freq.	Outp. Freq.		00111111	○
		0	0	1	1	1	1	1	1			
		0：Absolute Value， 1：+/-										

Bit setting value=0 Monitoring frequency shows absolute value when motor forwards/reverses.

Bit setting value=1 Monitoring frequency shows positive/negative value when motor forwards/ reverses.

F4-15 is bit operation, only set corresponding bit of monitoring frequency = 0/1. For

instance: when motor forwards/reverses, the monitoring output frequency and estimated slip frequency shows positive/negative value respectively, but monitoring the other frequency shows absolute value, only set the 0^{th} bit=1 (corresponding to the output frequency) and the 5^{th} bit=1 (corresponding to the estimated slip), and set other bits = 0, i.e. F4-15=XX10X001.

No.	Function	Range	Unit	Default	Type
F4-16	LCD Language Options	0：Chinese 1：English		0	○

F4-16=0 Chinese displayed on LCD keypad.
F4-16=1 English displayed on LCD keypad.

No.	Function	Range	Unit	Default	Type
F4-18	If parameters change with inverter's working status	0：Unchanged 1：Changed		0	○
F4-19	Parameters Setting Display	0～575		0	●

F4-18=0 When setting parameters, press RUN/JOG button on keypad, the one which remains unchanged is the monitor parameter. For example, set F0-07=50Hz, and press JOG key, the setting value F0-07 displays as 50Hz, then it shows monitor parameter of JOG.

F4-18=1 When setting parameters, press RUN/JOG button on keypad, the one changed is monitor parameter.

F4-19 For setting the parameter displayed on keypad, when inverter does not run in parameter setting status. For example: when inverter stops, the parameter displayed on keypad. The setting value is corresponding to the value in C0 Group.

No.	Function	Range	Unit	Default	Type
F4-20	Parameters displayed in the 1^{st} row at running status	0～575		512	●
F4-24	Parameters displayed in the 1^{st} row at stop	0～575		512	●

Selecting the parameters need to be displayed in running and at stop

1. Default selection displays C0-00(512).

No.	Function	Range	Unit	Default	Type
F4-28	Application Macros Options	6:Crane hoisting application macros 7:Crane slewing application macros 8:Crane trolley derricking application macros 9:Hoist application macros		9	○

F4-28 Default of F4-28= 9 which can be adjusted based on different applications.

F4-28=6 Defaults of corresponding parameters will be crane hoisting application macros.
See 6.3.1 for details.

F4-28=7 Defaults of corresponding parameters will be crane slewing application macros.
See 6.3.2 for details.

F4-28=8 Defaults of corresponding parameters will be crane trolley derricking application macros. See 6.3.3 for details.

F4-28=9 Defaults of corresponding parameters will be building hoist application macros. See 6.3.4 for details.

★ F4-28 is disabled for EM330B. Customer can define the parameters of F4-28 as per 6.3.4

Application macros cannot meet all application needs. Therefore, the parameters have to be slightly adjusted after the application macros selected.

7.6 Group C0: Monitor Parameters

When EM330 is running, operation parameters can be acquired by checking monitor parameters in Group C0. Details of all monitor parameters are read only.

When inverter is running, F4-20 defines the default of displayed monitor parameter.

No.	Function	Range and Description	Serial No.	Unit
C0-00 C0-01	Output Frequency	Present output frequency of inverter	512	Hz
C0-02 C0-03	Output Frequency	Present setting frequency of inverter	514	Hz
C0-04 C0-05	Synchronous Frequency	Estimated motor sync-frequency of inverter	516	Hz
C0-06~C0-07	Not Used			
C0-08 C0-09	Estimated Feedback Frequency	Present output frequency calculated by inverter based on the output voltage and output current.	520	Hz
C0-10 C0-11	Estimated Slip Frequency	Inverter calculates present slip frequency based on the output voltage and output current.	522	Hz

C0-12	Output Current Percentage	The percentage of inverter's present output current and rated output current	524	%
C0-13	Effective Output Current Value	Effective value of inverter's present output current	525	A
C0-14	Output Voltage Percentage	Percentage of inverter's present output voltage and rated output voltage	526	%
C0-15	Effective Output Voltage Value	Effective value of inverter's present output voltage	527	V
C0-16	DC Bus Voltage	Present DC bus voltage of inverter	528	V
C0-17	Overload Count	When the output current exceeds the rated current, count based on the current variables, overload fault trips until count value reaches 100%.	529	%
C0-18	Not Used		530	S/min
C0-19	Program Operation Section	Monitor the present program operation section of inverter.	531	SECT
C0-20	Running Time of Present Section of Program Operation	In program operation, the unit of running time at present operation section is up to the ten thousand's place of F6-00.	532	S/min
C0-21	Output Power	Output power calculated by inverter	533	kW
C0-22~C0-25	Not Used			
C0-26	Input Terminal Status	X7 X6 X5 X4 X3 X2 X1 0 0 0 0 0 0 0 X1 is the LSB.(Monitor the logic status of external input terminals)	538	
C0-27	Output Terminal Status	R1 Y2 Y1 0 0 0 Y1 is the LSB. (Monitor the logic status of output terminals)	539	
C0-28	VS Input Monitor	0～10000	540	
C0-29	IS Input Monitor	0～10000	541	
C0-30	VF Input Monitor	0～10000	542	
C0-31	IF Input Monitor	0～10000	543	

7.7 Description of Advanced Parameters

No.	Function	Range	Unit	Default	Type
F7-25	Stator Voltagedrop Compensation Gain	0.00～200.00	%	60.00	●
F7-26	Deadband Compensation Gain	0.00～100.00	%	100.00	●

F7-25 Stator voltagedrop compensation gain. It is for compensating stator resistance and voltagedrop generated by cable. Generally, those voltagedrops has the greater influences at low frequency.

F7-26 Deadband compensation gain. It is for compensating PWM deadband effect.

No.	Function	Range	Unit	Default	Type
F9-12	FDT1 Increasing Threshold	0.00～Fmax	Hz	X	○
F9-13	FDT1 Decreasing Threshold	0.00～Fmax	Hz	X	○
F9-14	FDT2 Increasing Threshold	0.00～Fmax	Hz	30.00	○
F9-15	FDT2 Decreasing Threshold	0.00～Fmax	Hz	30.00	○

Output Frequency Detection Range FDT

When Y1/Y2=2 or R1=2(Output Frequency Detection Range FDT1)and when the output frequency reaches the value of F9-12 (FDT1 Increasing Threshold), the output terminals are on, and they will be off until the output frequency drops to the value of F9-13(FDT1 Decreasing Threshold). See Figure 7-13. The function of FTD2 is the same as that of FDT1.

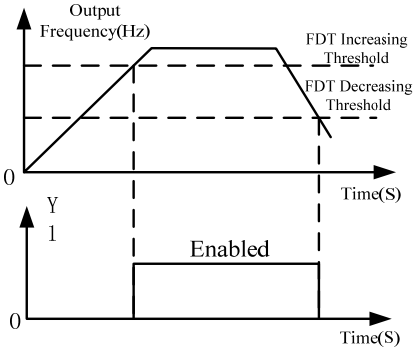


Figure 7-13 Output Frequency Detection Range FDT

No.	Function	Range	Unit	Default	Type
F9-24	Start Delay Time After Power-on	0.00～10.00	S	1.00	●

Set the time to wait for system initialization after power is on. If inverter is required to run immediately after power is on, set F9-24=0.

No.	Function	Range	Unit	Default	Type
Fb-27	Brake Release Confirmation	0:Only relevant to :output frequency ≥FDT setting frequency 1:Enabled only when output frequency and output current ≥FDT setting frequency and current simultaneously.		1	○
Fb-28	Brake Release Current	10.00%～150.00%	%	10%	●

Fb-27 Brake release confirmation: FDT output reference selection
Fb-27=0 FDT output is only relevant to: output frequency≥FDT setting frequency
Fb-27=1 FDT output enabled only when output frequency and output current≥FDT setting simultaneously.
Fb-28 Brake release current. To be used with Fb-27, set the current limit threshold when Fb-27=1.

No.	Function	Range	Unit	Default	Type
FC-07	Current Limit Control	0:Current limit disabled 1:Current limit enabled		0	○
FC-08	Current Limit	50.00～180.00	%	165.00	○
FC-09	Electronic Thermal Overload Coefficient	5.00～100.00	%	100.00	○

Current Limit Control

FC-07 =0 Current limit disabled
FC-07 =1 Current limit enabled
During operation, when the current of motor reaches current limit (Set by FC-08), and if current limit is enabled, current limit will start to limit the increase of output current by lowering output frequency, and to make the inverter work at current stall status. When output current is lower than the current limit, the inverter will return its original running status.
See Figure7-14 for the process of current limit.

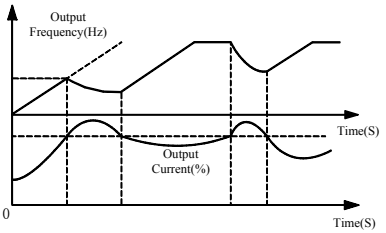


Figure7-14 Process of Current Limit

Current limit is only enabled in V/F drive mode, and applicable to the applications of big inertia, blower, or one inverter drives multi-motor.

FC-08 For setting current limit. If inverter output current＞the setting value of FC-08, then current limit starts, and keeps the inverter output current limit.

- FC-08 parameters refer to the ratio of the output current in current limit to the rated output current of inverter.
- User can set current limit to protect motor or to meet working requirements based on real needs. Current limit varies with the change of electric thermal overload coefficient proportionally.
  Real current limit = FC-08*FC-09*Inverter Rated Current.

FC-09=100.00 Defaulted to operate with an allowance of 150% overload current operation for 60 seconds, and 180% overload current operation for 2 seconds, which are in inverse timelag.

FC-09＜100.00 Rated overload current will drop as per the proportion detailed in FC-09, the feature of inverse timelag keeps unchanged.

- This function is generally applied to the occasion when an inverter of high power drives a motor of low power for controlling the output current of the motor and preventing the motor from overheating resulted from a long time high current.

No.	Function	Range	Unit	Default	Type
FC-16	Brake Duty Ratio	5.00～100.00	%	80.00	○
FC-18	Voltage Control	Ones place: AVR 0:Disabled 1:Enabled 2:Disabled if exceeding rated voltage Tens place: Voltage regulation limiting control 0:Limiting Disabled 1:Limiting Enabled Hundreds place: Overmodultaion control 0:Disabled 1:Enabled		X	○

FC-19	Overvoltage Stall Control	Ones place: Overvoltage stall options 0：Dynamic brake+Stall protection 1：Dynamic brake Tens place：Dynamic brake options 0：Enabled at power-on 1：Enabled at running 2：Enabled at deceleration Hundreds place： Overvoltage stall mode 0: Always enabled 1:Disabled at acceleration, enabled at deceleration Thousands place: Overvoltage stall mode 0: Fixed overvoltage thresholds enabled 1: Auto-overvoltage thresholds enabled		0001	○
FC-20	Stall Voltage at Overvoltage	120.00%～135.00%	%	128.00	○
FC-21	Stall Voltage Hysteresis	2.00%～30.00% （Monotonic decreasing is active.）	%	6.00	○
FC-22	Overvoltage Proportion Gain VKP	0.00～100.00	%	1.00	○
FC-23	Overvoltage Integration Time VTi	0.000～30.000 0.000: No integration	S	0.200	○

FC-16 Brake Duty Ratio: In dynamic brake, braking unit works in PWM mode. FC-16 is for setting the duty ratio of braking unit. If the bigger value of FC-16 is, the stronger brake capacity would be. This function is only applied to integrated braking unit.

FC-18 Ones place=0 AVR disabled.

FC-18 Ones place=1AVR enabled.

If power supply voltage＜rated input voltage, and output frequency＞the frequency corresponding to the voltage on V/F curve, then inverter will output the maximum voltage to enable the motor to work at its maximum frequency. If power supply voltage＞rated input voltage, then inverter will drop the output voltage to keep V/F proportion.

FC-19 Ones place=0 When overvoltage occurs on DC bus, both dynamic brake and overvoltage stall are enabled.

FC-19 Ones place=1 When overvoltage occurs on DC bus, dynamic brake is enabled, and overvoltage stall are disabled.

DC bus overvoltage is generally generated by deceleration. In deceleration, DC bus voltage increases due to energy feedback. When DC bus voltage(DCBV)＞ upper limit threshold of overvoltage stall(OVSULT):

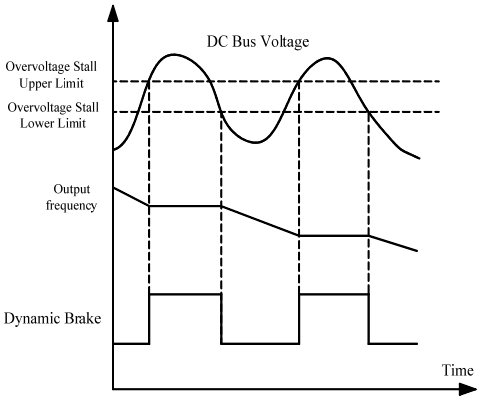


Figure 7-15 Overvoltage Stall Protection

★ If dynamic brake is enabled, the integrated braking unit works, and the external braking resistor will consume part of the feedback energy until DCBV ＜ the lower limit threshold of overvoltage stall(OVSLLT), and then braking unit will be turned off automatically.

★ If overvoltage protection is enabled, inverter stops deceleration and keeps output frequency unchanged, and then energy feedback stops. Inverter will start deceleration until DCBV ＜ OVSLLT. See Figure 7-15 for the process of overvoltage stall protection at deceleration.

★ Two protection methods are active in all control modes.

Do not set FC-19 ones place=1, if there is no integrated braking unit or there is a braking unit but not connect to a braking resistor.

FC-19 Tens place=0 Dynamic brake is enabled when inverter is power-on. When DCBV＞OVSULT, braking unit works. When DCBV＜OVSLLT, dynamic braking unit is turned off.

FC-19 Tens place=1 Dynamic brake is enabled when inverter is running. When DCBV＞OVSULT, braking unit works. When DCBV＜OVSLLT, dynamic braking unit is turned off immediately.

FC-19 Tens place=2 Dynamic brake is enabled when inverter is in deceleration. When DCBV＞OVSULT, braking unit works. When DCBV＜OVSLLT or deceleration ends, dynamic braking unit is turned off.

FC-19 Hundreds place=0 Overvoltage stall is enabled in acceleration/deceleration. In acceleration/deceleration, when DCBV＞OVSULT, overvoltage stall is active, and will stop when DCBV＜OVSLLT.

FC-19 Hundreds place=1 Overvoltage stall is enabled in deceleration, and disabled in acceleration. In deceleration, when DCBV＞OVSULT, overvoltage stall is active, and will stop when DCBV＜OVSLLT.

FC-19 Thousands place=0 When fixed overvoltage thresholds are enabled, and when DCBV＞OVSULT, overvoltage stall is active, and will stop when DCBV＜OVSLLT.

FC-19 Thousands place=1 Auto-overvoltage thresholds are enabled. Based on

working status and input grid voltage, inverter will calculate present overvoltage thresholds automatically to make itself work in an optimized status, and to reduce overvoltage trips caused by sudden load change or rapid acceleration/deceleration.

FC-20 For setting OVSULT. Its default: 380*1.414*128%=687V

FC-21 For setting stall voltage hysteresis. After overvoltage stall is active, overvoltage stall will stop when DCBV＜OVSLLT.

Default: 380*1.414*6%=32V. OVSLLT=FC-20-FC-21

FC-22 and FC-23 are the auto-regulated parameters of internal overvoltage stall. Generally, the defaults can meet needs of applications.

No.	Function	Range								Unit	Default	Type
FC-28	Disabled Trips 1	OL	ILP	SLU	SOU	SOC	HOU	HOC	SC		X	○
		0	0	0	0	0	0	0	0			
		0：Enabled， 1: Disabled										
FC-29	Disabled Trips 2	EEd	EST	PdN	PUP	*	EXT	OLP	OH		00000010	○
		0	0	0	0	0	0	1	0			
		0：Enabled， 1: Disabled										
FC-30	Disabled Trips 3	*	*	*	SIE	SrE	SFE	STP	EEU		00000000	○
		0	0	0	0	0	0	0	0			
		0：Enabled， 1: Disabled										

Bit setting value=0 When the fault corresponding to this bit is detected, inverter stops to output and enters fault status.

Bit setting value=1 When the fault corresponding to this bit is detected, inverter will keep its original status without tripping.

FC-28, FC-29, and FC-30 are in bit operation. Set the bits corresponding to the trips as 0 or 1.As shown in the following tables:

FC-28 Disabled Trips 1:

Trip Code	OL	ILP	SLU	SOU	SOC	HOU	HOC	SC
Bit	7	6	5	4	3	2	1	0
Setting Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

FC-29 Disabled Trips 2:

Trip Code	EEd	EST	PdN	PUP	*	EXT	OLP	OH
Bit	7	6	5	4	3	2	1	0
Setting Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

FC-30 Disabled Trips 3:

Trip Code	Not used	Not used	Not used	SIE	SrE	SFE	STP	EEU
Bit	7	6	5	4	3	2	1	0
Setting Value	0/1	0/1	0/1	0/1	0/1	0/1	0/1	X

For example, set Bit 6=1(Corresponding to ILP) to disable ILP trip, FC-28=01000000. Set Bit 1=1(Corresponding to OLP) to disable OLP trip, and set Bit 6=1(Corresponding to EST) to disable EST trip, FC-29=01000010.

1. Unless required, do no disable any trip in case any damage occurred when inverter would not trip at faults.
2. Press SHIFT button to shift 3 bits higher for any binary bit operation exceeding 5 bits.

No.	Function	Range	Unit	Default	Type
Fd-00	Frequency Base	Fbase：20.00～600.00/20.0～6000.0	Hz	50.00	○
Fd-01	Voltage 1	0.00～100.00	%	X	●
Fd-02	Voltage 2	0.00～100.00	%	X	●
Fd-03	Voltage 3	0.00～100.00	%	X	●
Fd-04	Voltage 4	0.00～100.00 Ue=100.0%	%	X	●
Fd-05	Frequency 1	0.00～Frequency 2, Fbase=100.0%	%	1.00	●
Fd-06	Frequency 2	Frequency 1~ Frequency 3	%	4.00	●
Fd-07	Frequency 3	Frequency 2～Frequency 4	%	10.00	●
Fd-08	Frequency 4	Frequency 3～100.00	%	X	●

Customer Defined V/F Curve Scaling

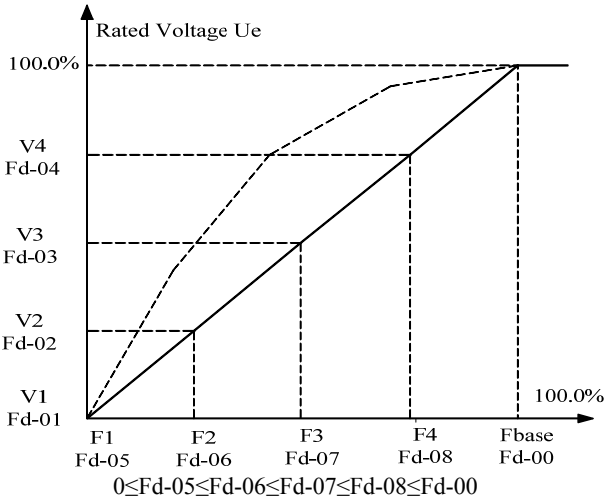


Figure7-16 Customer Defined V/F Curve Scaling

Fd-01～Fd-08 parameters are enabled when F0-15=35, customer defined V/F scaling. Customer defined V/F scaling is defined by the curve set by input frequency percentage and output voltage percentage which are in piecewise linearization. Frequency base Fd-00 is the last frequency on V/F curve corresponding to the maximum output voltage.

Input frequency percentage: F_{base}=100.0%, F_{base}=Motor rated frequency

Output voltage percentage: Rated voltage U_e=100.0%

If the ratio of voltage to frequency is set excessively big, overcurrent may trip.

No.	Function	Range	Unit	Default	Type
FE-00	Numeric Input Filter Times	0～100		10	○

Since multi-function terminals adopt level-triggered or pulse-triggered mode, numeric filter treatment shall be carried out to avoid interference when reading terminal status.

★ Generally, FE-00 parameters do not need adjustment. If required, please pay attention to the correlation between filter time and terminal response speed, avoid being easily interfered by insufficient filter times, or avoid slow response of terminals and command loss by excessive filter times.

No.	Function	Range								Unit	Default	Type
FE-01	Terminal Input Positive/Negative Logic	XX	X7	X6	X5	X4	X3	X2	X1		0	○
		0	0	0	0	0	0	0	0			
		0:Positive Logic On at 0V/Off at 24V 1:Negative Logic Off at 0V/ On at 24V										

0: Positive Logic: On at 0V/Off at 24V

1: Negative Logic: Off at 0V/ On at 24V

★ This function is applicable to other peripherals' logic.

No.	Function	Range	Unit	Default	Type
FE-17	X1 Off Delay Time	0.00～300.00	S	X	○
FE-18	X2 Off Delay Time	0.00～300.00	S	X	○

Terminal X1 off delay time: After terminal X1 is off, the time delayed for the inverter to disable terminal X1.

Remarks: Only EM330A possesses functions of FE-17 and FE-18.

8 Autotuning Motor Parameters

8.1 Autotuning Motor Parameters

Autotuning motor parameter is required when the inverter is in vector control mode. However, if the inverter is not in vector control mode, autotuning is also suggested for acquiring higher control precision at initial operation.

Generally, it is not easy for user to obtain the motor parameters that are needed for calculation in vector control mode such as stator resistance R1, rotor resistance R2, stator and rotor inductance L, stator and rotor leakage inductance Ls, idling excitation current. EM330 provides autotuning function. After the function start-up, inverter automatically tests the relevant parameters of connected motor and saves them to EEPROM.

The T equivalent model of motor is as shown in Figure 8-1.

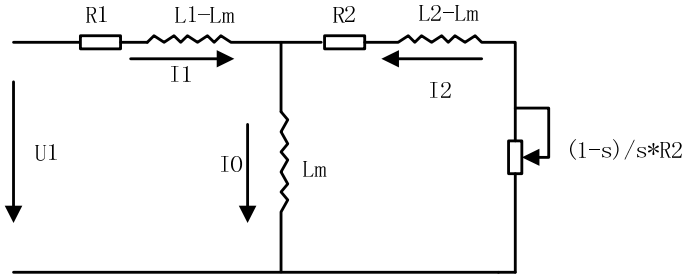


Figure 8-1 T Equivalent Model of 3-phase AC Induction Motor

R1, L1, R2, L2, Lm, and I0 in Figure 8-1 refers to stator resistance, stator inductance, rotor resistance, rotor inductance, stator and rotor mutual inductance, and idling excitation current respectively.

8.2 Precautions Before Autotuning

- Autotuning is a process of autotuning motor parameters. EM330 can autotune motor parameters in 2 modes: stationary autotuning and rotational and rotational autotuning.
  - Stationary autotuning is applied to the occasions when the motor cannot be disconnected from the load, inverter can obtain motor parameters.

■ Rotational autotuning is applied to the occasions when the motor can be disconnected from the load. Before autotuning, the motor should be disconnected from the load. Never perform rotational autotuning for a motor with load.

- Make sure that the motor stops before autotuning, otherwise, autotuning cannot be performed.
- Autotuning is only enabled when the inverter is in keypad control mode. (F0-04=0)
- If overcurrent or overvoltage trips in the process of autotuning, acceleration/deceleration time 1 can be adjusted (F0-09 and F0-10) appropriately.
- To ensure a smooth autotuning, set all motor parameters as per the values listed on Nameplate correctly:
  F1-00: Motor model
  F1-01: Motor rated power
  F1-02: Motor rated voltage
  F1-03: Motor rated current
  F1-04: Motor rated frequency
  F1-05: Motor rated speed
  F1-06: Motor wiring method
  F1-07: Motor rated power factor
  Configure the inverter with an applicable Y-series motor, and the defaults of inverter can meet most of needs.
- To ensure control performance, the motor and the inverter should match in terms of the power rating. Usually the power rating of motor is only allowed to be one level lower than that of the inverter.
- After autotuning is over normally, the setting value of F1-08～F1-13 will be updated and autosaved.
- When F0-28=1 reset the default, the parameters of F1-00～F1-13 remains unchanged.

8.3 Autotuning Procedure

- In parameter setting status, set F0-04=0, and make motor offload.
- Set all motor parameters as per the values listed on nameplate correctly:
  F1-00: Motor model
  F1-01: Motor rated power
  F1-02: Motor rated voltage
  F1-03: Motor rated current
  F1-04: Motor rated frequency

F1-05: Motor rated speed

F1-06: Motor wiring method

F1-07: Motor rated power factor

- Set F1-15=1, inverter performs stationary autotuning.
- Set F1-15=2, inverter performs rotational autotuning.
- It takes about 2 minutes to finish autotuning motor parameter, and the keypad displays returns the initial power-on status.
- In autotuning, press STOP/RESET button to cancel autotuning, and inverter will return parameter setting status.
- If autotuning fails, SrE (Stator Resistance Error) or SIE (Idling Current Error) will trip, and then press STOP/RESET button, inverter will return to parameter setting state.

8.4 Automatic Torque Boost and Slip Compensation

If the load increases, then the motor slippage increases, and motor speed drops. Motor can keep constant speed with help of slip compensation and automatic torque boost.

8.4.1 Automatic Torque Boost

Automatic torque boost F0-15=0, boost the output voltage automatically through detecting load current. The scale of automatic torque boost is up to the voltagedrop of motor stator resistance (F1-10) acquired by motor parameter autotuning. See Figure 8-2 for the scale of automatic torque boost.

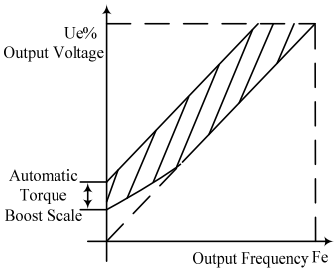


Figure 8-2 Automatic Torque Boost Scale

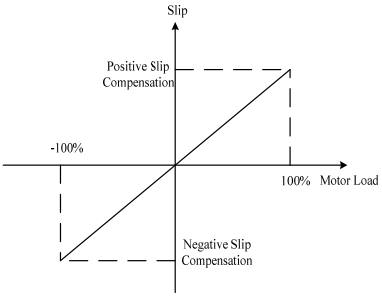


Figure 8-3 Slip Compensation

8.4.2 Slip Compensation

In V/F control mode, the speed of motor rotor drops down as the load increases. To ensure the speed of motor stator is closer to idling speed when motor is with rated load. Slip compensation can be started, set it as per F3-30. Usually slip compensation is not needed in vector control mode.

Motor rated slippage is related to the idling current and pole numbers of motor, and it can be calculated by the following formula:

★ Motor rated slippage [Hz] = Motor rated frequency[Hz] – Rated rotational speed [rpm] x Motor pole numbers/120.

Correct motor rated slippage is required when inverter calculates slip compensation. Input nameplate parameters of motor correctly in F0-00～F1-07 for autotuning or the inverter will calculate the rated slippage of motor automatically after the user inputs motor parameters manually by knowing the motor parameters correctly.

Based on operation needs, slip compensation may need to be adjusted according to the following methods:

- F3-30=0.00～200.00, the slip compensation intensity can be continuously set within 0.00～200.00% the motor rated slippage scale. 0.00% indicates motor slip compensation disabled, i.e. the rated torque current corresponds to the rated slip frequency at mean time. Set F3-30=X, i.e. slip compensation=X% *motor rated slippage, and meanwhile the rated torque current corresponds to (1+X %) * rated slip frequency. The bigger the setting value is, the bigger the compensation is. Therefore:
- When the actual motor speed is far below the objective value, increase the setting value of F3-30. When it is much higher than the objective value, reduce the setting value of F3-30. It is advised to adjust gradually based on unit of 0.10.

Positive slip compensation is applied when the motor is in operation, and negative slip compensation is applied when the motor brake is in operation, as shown in Figure 8-3.

9 Troubleshootings

9.1 Faults

When anything unexpected happens, the corresponding trip code and parameters will be displayed on the keypad, fault relay acts, and fault output terminal is on, and inverter output stops. When fault occurs, if the motor is running, it will coast to stop. See Table 9-1 for EM330 Fault trips and troubleshootings.

Table 9-1 EM330 Fault Trips and Troubleshootings

Trip Code	Trip	Cause	Corrective Action
SC	Short Circuit	1. Short circuit between inverter output phases, or between the output phases and ground. 2. IGBT is damaged.	1. Check, take corrective actions, and then reset. 2. Technical support required.
HOC	Instantaneous Overcurrent	1. Short circuit between inverter output phases or between the output phases and ground. 2. When load is too heavy, the acceleration/deceleration time is too short. 3. In V/F drive mode, the setting value of torque boost is too big. 4. The motor is rotating when inverter starts. 5. The capacity of motor exceeds that of inverter.	1. Check, take corrective actions, and then reset. 2.Prolong acceleration/deceleration time 3.Reduce setting value of torque boost. 4. Setting speed search enabled or start DC brake. 5. Replace with applicable motor or inverter.
SOC	Overcurrent		
HOU	Instantaneous Overvoltage	1. Deceleration time is too short. The motor regenerative energy is too much. 2. Power supply voltage is too high.	1. Prolong deceleration time. 2. Lower the power supply voltage to the rated voltage.
SOU	Stable Overvoltage	1. Voltage of power grid is too high.	1. Lower voltage to the rated voltage.
SLU	Stable Undervoltage	1. Input power phase loss. 2. Wiring terminal of input power is loose. 3. Voltage fluctuation of input power is too big. 4. Switch contact of input power is aging.	1. Check input power supply. 2. Tighten screws on input terminals. 3. Check air switch and contactor.
ILP	Input Phase Loss	1. Input power phase loss.	1. Check input power supply. 2. Check wiring of input power supply. 3. Check if wiring terminal is loose.

OL	Overload	1. Acceleration/deceleration time is too short. 2. In V/F drive mode, the setting value of torque boost is too big. 3. Load is too heavy.	1.Prolong acceleration/deceleration time. 2.Reduce setting value of torque boost. 3.Replace with the inverter which is applicable to the load.
OH	Heatsink Overheat	1. Ambient temperature is too high. 2. Poor ventilation. 3. Cooling fans are broken down.	1.The service environment of inverter should meet requirement. 2.Improve environmental ventilation, and check if the vent of inverter` is blocked. 3.Replace air cooling fan.
EHt	External Fault	1. External device fault terminal acts.	1.Check external device.
PUP	PID Upper Limit	1.Process PID feedback signal exceeds the setting upper limit.	1.Check PID signal and device.
PdN	PID Lower Limit	1.Process PID feedback signal exceeds the setting lower limit.	1.Check PID signal and device.
EEd	Inverter EEPROM Failure	1.Interference makes EEPROM read-write mistakes. 1.EEPROM is damaged.	1.Press STOP/RESET button to reset, and then retry. 2.Technical support required.
EEU	Keypad EEPROM Failure		
StP	Autotuning Cancelled	1.During autotuning, press STOP/RESET button.	1.Press STOP/RESET button to reset.
SFE	Autotunig Coast-to-stop	1.When FRS=ON, the external terminal is off during autotuning.	1.Press STOP/RESET button to reset.
SrE	Stator Resistance Error	1.Motor is not connected to the output terminals of inverter. 2. Motor is on load. 3. Motor fails.	1.Check connection between inverter and motor. 2.Motor is offloaded. 3.Check motor.
SIE	Idling Current Error		
ESt	External Wire Broken	When FDT output signal is enabled, FC-31setting time is up, if terminal Xi=81 does not receive brake release signal, inverter trips EST.	Check brake release feedback circuit.

When inverter trips faults as stated above, press STOP/RESET button or use reset terminal to clear fault. If the fault is cleared, inverter will return the function setting state. Otherwise, the trip code will be displayed on LED continuously.

When faults trip in inverter's operation, if fault retry (set by FC-24) is enabled, after certain setting interval time (set by FC-25), the inverter will reset fault automatically and try to run. FC-24 sets the retry times of fault reset. If the fault times exceeds the setting value within 30 seconds, and then the inverter stops retry and keeps in fault status.

9.2 Fault Analysis

After power is on, due to improper function setting and incorrect wiring between inverter and external control terminals, motor cannot meet the expected working standard. Fault analysis as described in this chapter can be taken as the reference to take as the corrective actions. If trip codes appear, see 9.1 for the corrective actions to clear the trips.

9.2.1 Parameter Setting Failures

- Press UP/DOWN button, the parameters remain unchanged.
  Some parameters can only be edited when the inverter stopped.
- Press UP/DOWN button, parameter changes, but they cannot be saved.
  Some parameters cannot be edited since they are locked.

9.2.2 Abnormal Motor Operation

- Press RUN button, the motor does not run.
  - Start/Stop is in terminal control mode: Check the setting of F0-04.
  - Coast-to-stop terminals FRS is connected to COM: Disconnect FRS to COM.
  - When the terminal (Run Command Switched to Terminal) is on, the run command is only controlled by terminal at mean time: Make the terminal off.
  - Status combination of run command channel is terminal controlled: Change it to keypad control.
  - Setting reference input frequency= 0: Increase reference input frequency.
  - Power supply is abnormal or control circuit fails.
- Control terminals RUN, F/R=ON, the motor does not run.
  - The external terminal start/stop setting is disabled: Check the setting of F0-04.
  - Free stop terminal FRS=ON: Make FRS=OFF.
  - Control switch is disabled: Check control switch.
  - Setting reference input frequency=0: Increase reference input frequency.
- Motor can run in one direction only.
  Reverse prohibited: When F0-24=1, the reverse output is prohibited.
- Motor reverses
  The output phase sequence of inverter is not identical to that of motor input: When power is off, the running direction of motor can be changed by switching any of the two connection wires, or editing F0-08 when power is on.

9.2.3 Excessively Long Acceleration Time

- Excessively low setting of current limit
  When setting current limit is enabled, if the output current of inverter reaches its setting current limit(FC-08), then, the output frequency will remain unchanged in the process of acceleration, and it will rise continuously only until output current is lower than the setting current limit. Therefore, the acceleration time of motor is longer than the setting time. Check if the setting current limit of inverter is excessively low.
- If the setting acceleration time is too long, confirm its parameters.

9.2.4 Excessively Long Deceleration Time

- When dynamic brake enabled
  - The brake resistance is too big. The dynamic brake power is too small, so the deceleration time is prolonged.
  - The setting value (FC-16) of brake duty ratio is too small, and the deceleration time is prolonged. Increase the setting value of brake duty ratio.
  - The setting deceleration time is too long, confirm its parameters.
- When overvoltage stall protection enabled
  - Overvoltage stall protection acts, when DC bus voltage exceeds DC690V, the output frequency remains unchanged. When it is below DC660V, the output frequency drops continuously, therefore the deceleration time is prolonged.
  - The setting deceleration time is too long, please check its parameters.

9.2.5 Inverter Overheating

- Excessively heavy load
  - Heavy load makes inverter work beyond its rated current for a long time. The power of inverter shall be applicable to that of motor.
  - The motor rotor is blocked due to the failure of motor or load.
- Excessively high ambient temperature
  When the ambient temperature of inverter exceeds the permitted value, the temperature might exceed the permitted highest value of inverter when it works in the rated status.

9.2.6 Electromagnetic Interference (EMI) and Radio-frequency Interference (RFI)

- When inverter runs in high frequency switch status, it will generate EMI and RFI on the control devices. Take following countermeasures:
  - Lower the carrier frequency (F0-14) of inverter.
  - Install noise filter on input side of inverter.
  - Install noise filter on output side of inverter.
  - Shield cable with a metal tube, and place the inverter in a metal case.
  - Reliable grounding for the inverter and motor.
  - The main circuit and the control circuit should be separated in terms of wiring. Control circuit should take shielded wire, and see Chapter 3 for wiring.

9.2.7 Leakage Current Circuit Breaker for Leakage Protection

- **When inverter runs, the leakage current circuit breaker is triggered for leakage protection.**

  Since inverter outputs high frequency PWM signal, it will generate high frequency leakage current. Select a special leakage circuit breaker with a trigger current≥30mA, or a regular leakage circuit breaker with a trigger current≥ 200mA and the action time ≥0.1S.

9.2.8 Mechanical Vibration

- The fixed frequency of mechanical system resonates with the carrier frequency of inverter.

  If there is no problem with the motor, but the machine resonates sharp noise due to the resonance between the fixed frequency of mechanical system and the carrier frequency of inverter. Adjust the carrier frequency F0-14, and F7-20~F7-22 of inverter to avoid resonant frequency.
- The fixed frequency of mechanical system resonates with the output frequency of inverter.

  The fixed frequency of mechanic system resonates with the output frequency of inverter which will generate mechanical noise. Please use skip frequency F6-16~F6-21 and its range to avoid resonant frequency, or use oscillation suppression function (F9-27), or install the shake-proof rubber on the chassis of motor or any other shake-proof measures.
- PID Control Oscillation

  Improper setting of PID controller's regulation parameters P, Ti and Td, please reset PID parameters.

9.2.9 Inverter Stops Output While Motor Runs

- Insufficient DC brake at stop
  - DC brake torque at stop is too small. Please increase setting value of DC brake current at stop (F3-25).
  - DC braking time at stop is too short. Please increase setting value of stop DC brake time (F3-27). Generally, please increase the DC brake current at stop first.

9.2.10 Output Frequency Does Not Output as per the Setting Frequency

- The setting frequency is within the range of skip frequency

  The function of skip frequency is to forbid the inverter to output within the skip frequency range. Please check if the skip frequency of F6-16~F6-21and its range are proper.
- Setting frequency exceeds the upper limit frequency

  When the setting frequency exceeds the setting value of upper limit frequency, output frequency outputs as per the upper limit frequency. Reset the setting frequency to make it within the range of upper limit frequency, or check whether F0-16 and F0-17 are proper.

10 Maintenance and Inspection

10.1 Maintenance and Inspection

Due to the service environmental changes such as temperature, humidity, smoke, frost, dust, or the factors as aging of inverter's internal components, various failures of inverter may occur. Therefore, it is required to have daily check and keep regular maintenance on inverter during use and storage.

- Check if the components are broken or the screws are loose during transportation.
- Clean the inverter and periodically check if the screws are loose.
- Power-on the sleeping inverters for 30 minutes once semiannually to prevent electronic components from being disabled.
- Keep inverter away from heavy humidity and metal particles. If necessary, put it in an electric cabinet or a small room with protective measures.

10.2 Daily Inspection

Check the following items with the inverter in operation:

- The motor should not be vibrating or making unusual sound.
- Inverter and motor should not be overheating.
- The ambient temperature should not be too high.
- The output current value shown on the monitor displays should not be higher than normal value.
- The cooling fan at the bottom of the inverter should be in normal operation.

10.3 Periodic Maintenance

Periodic maintenance ensures that the inverter receives the proper care to maintain overall performance. Always turn the power supply off before inspection, and the inspection starts only after the indicator CHARGE on main circuit power supply is off.

Table 10-1 Periodic Maintenances

Items	Checks	Corrective Action
Main circuit terminals, screws on control circuit terminals	Are all screws tight?	Tighten loose screws firmly.
Heatsink	Are there dirty or dusty?	Clean any dirt and dust off with an air gun using dry air at a pressure of 4～6kg/cm2
PCBA		
Cooling fan	Is there any unusual noise or vibration or has the total operating time exceeded 20,000 hours?	Replace the cooling fan.
Power Components	Is there dusty?	Clean any dirt and dust off with an air gun using dry air at a pressure of 4～6kg/cm2
Electrolytic Capacitor	Are there any irregularities such as discoloration or odor?	Replace the capacitor.

10.4 Periodic Maintenance and Replacement of Parts

In order to keep the inverter operating normally over a long period of time, periodic maintenance and replacement are required for the internal parts according to their service lives. Periodic maintenance standards vary from the inverter's service environment and applications. See Table 10-2 for the part replacement guidelines.

Table 10-2 Part Replacement Guidelines

Parts	Standard Replacement Period
Cooling Fan	2～3 Years
Electrolytic Capacitor	4～5 Years
PCBA	5～8 Years

The standard replacement period is based on the following application conditions:

- Ambient temperature: Yearly average of 30℃
- Load factor: 80% maximum
- Operation rate: 12 hours maximum per day

10.5 Outline of Warranty

SINEE will provide warranty service under following circumstances:

1. Warranty is only for inverter.
2. Authorized distributors of SINEE will take responsibilities for local services within 12 months warranty period.
3. There is a maintenance charge for any following damage occurred in 12 months.
   - Due to improper operation.
   - Due to unauthorized installation environment.
   - Due to floods, fires, or abnormal voltage fluctuations.
   - Due to the incorrect wiring.
   - Due to unauthorized modifying or altering.

11 Accessories

11.1 Braking Resistor

EM330 with an integrated braking unit can be connected to braking resistor directly. Select braking resistor for EM330 as per Table 11-1.

Table 11-1 Braking Resistor Selection

Inverter Model No.	Resistor Resistance (Ω)	Resistor Power (kW)	Cable Size (mm^2)
EM330X-3R0-3XX	50	≥0.6	2.5
EM330X-4R0-3XX	50	≥0.6	2.5
EM330X-5R5-3XX	50	≥0.8	4
EM330X-7R5-3XX	40	≥1	4
EM330X-9R0-3XX	60	≥6	4
EM330X-011-3XX	60	≥6	6
EM330X-015-3XX	45	≥8	6
EM330X-018-3XX	30	≥12	10
EM330X-022-3XX	30	≥12	10
EM330X-030-3XX	15	≥24	16
EM330X-037-3XX	15	≥24	16
EM330X-045-3XX	12	≥30	16
EM330X-055-3XX	10	≥36	16
EM330X-075-3XX	10	≥36	16

Remarks:

1. X in the above table refers to A, B, and C.
2. Cable connected to resistor should withstand voltage≥AC450V with a temperature resistance of 105℃.

11.2 Braking Unit

Separate BR100 braking unit is available for EM330 which is without an integrated braking unit, power ratings of BR100: 18.5～315kW. SINEE-make BR100 model specifications are as shown in the following table.

Model No.	Application	Minimum Resistance (Ω)	Average Brake Current I_{av}(A)	Peak Brake Current I_{max}(A)	Inverter Power Range (kW)
BR100-045	Dynamic Brake	10	45	75	18.5～45
BR100-160	Dynamic Brake	6	75	150	55～160
BR100-315	Dynamic Brake	3	120	300	185～315

Remarks:

When BR100-160 is in minimum resistance, when brake duty ratio D≤33%, braking unit can work continuously, and it needs to work non-continuously when brake duty ratio D>33%. Otherwise, braking unit will trip over-heating.

11.3 Connecting Cable

Since all brake unit and braking resistors work at a high voltage (>400VDC) in a non-continuous working status, please select applicable cable. See Table 11-2 for specifications of main circuit cable, and take the cable which meets the insulation and cross-section requirements.

Table 11-2 Cable for Braking Unit and Braking Resistor

Model No.	Average Brake Current I_{av}(A)	Peak Brake Current I_{max}(A)	Cross-section of Copper Cable (mm^2)
BR100-045	45	75	6
BR100-160	75	150	10
BR100-315	120	300	16

Soft cable possesses a better flexibility, so copper cable, soft heat-proof cable or flame-proof cable is suggested because the cable may contact the equipment with high temperature.The distance between braking unit and inverter shall within 2m. Otherwise, the cable on DC side shall be twisted and shielded with magnetic ring to reduce radiation and induction.

Refer to *User Manual of BR100 Braking Unit* for the content in Chapter 11.

12 Typical Applications Wiring

12.1 EM330A Wiring of Hoist Applications

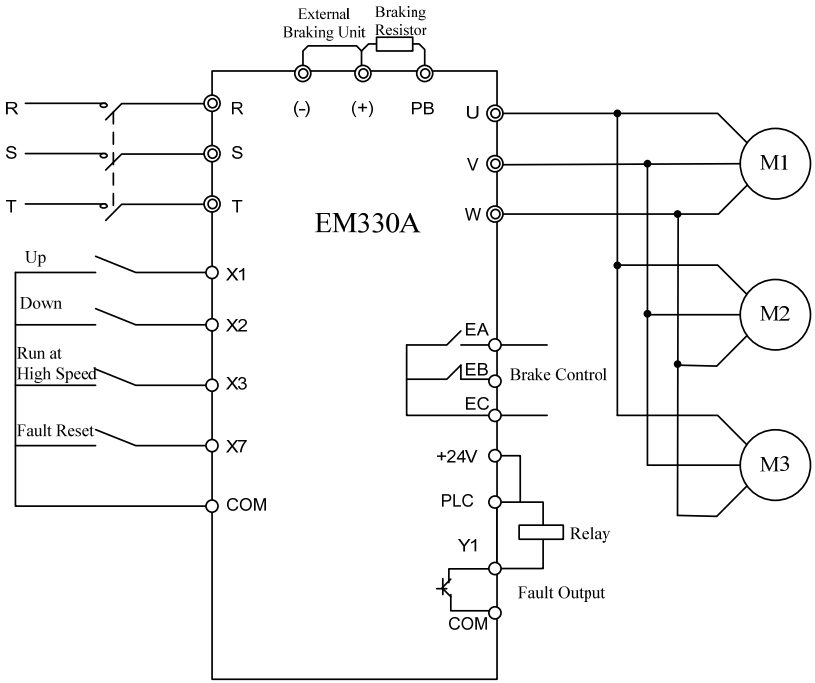


Figure 12-1 EM330A Wiring of Hoist Applications

Remarks:

1. Operation logic control circuit is additional to the control circuits of X1 and X2.
2. When EM330A selects F4-28 as tower crane hoist application macros, please configure terminals Xi, Y1 and R1 as per Figure 12-1.

12.2 EM330B Wiring of Hoist Applications

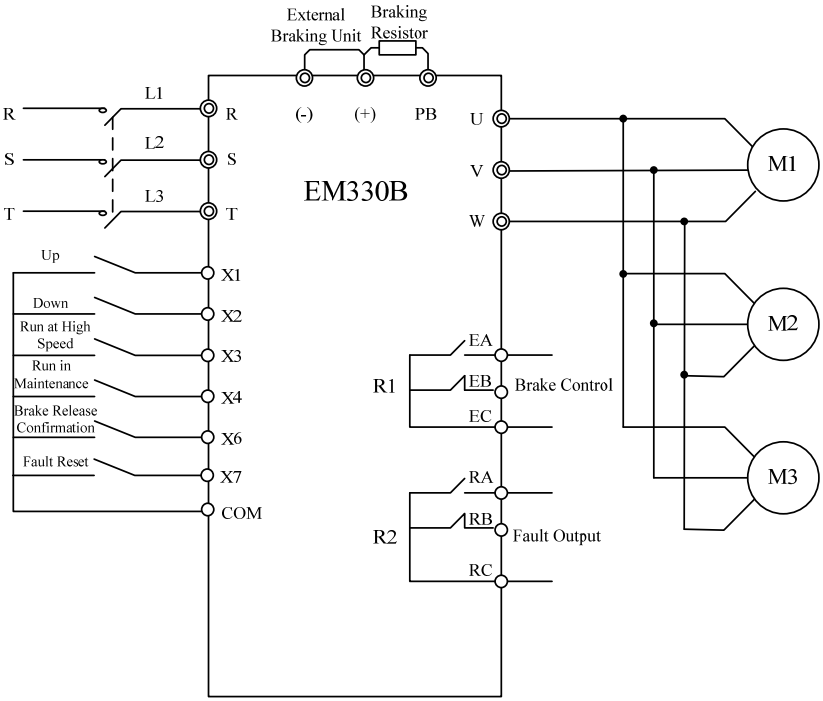


Figure 12-2 EM330B Wiring of Hoist Applications

Remarks:

1. Operation logic control circuit is additional to the control circuits of X1 and X2.
2. Configure functions for EM330B as per Figure 12-2.

12.3 EM330A Wiring of Tower Crane Hoisting

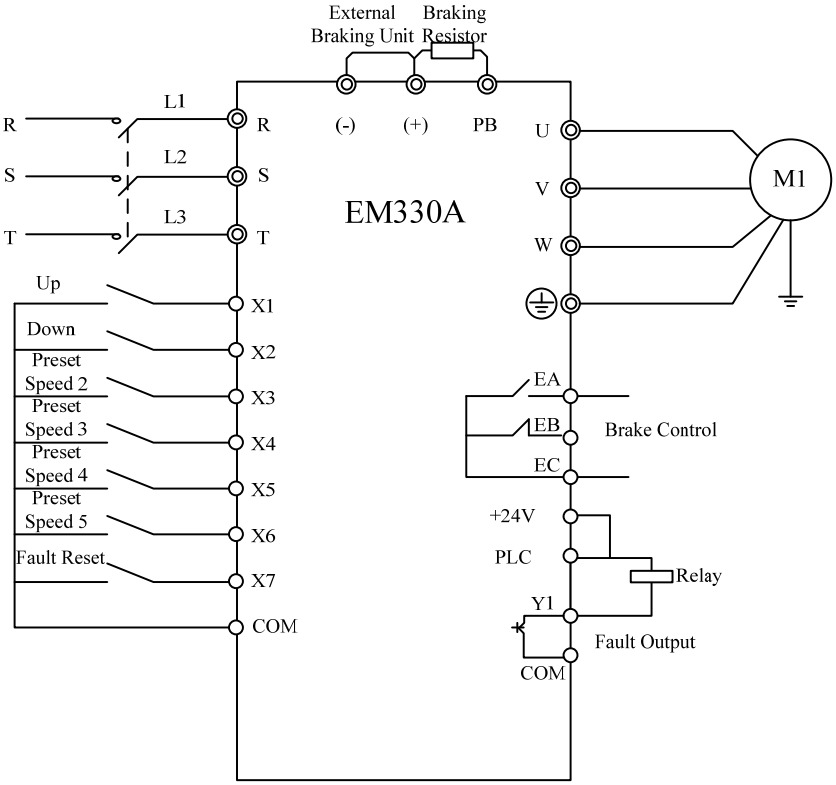


Figure 12-3 EM330A Wiring of Tower Crane Hoisting

Remarks:

1. Operation logic control circuit is additional to the control circuits of X1 and X2.
2. When EM330A selects F4-28 as tower crane hoisting application macros, please configure terminals Xi, Y1 and R1 as per Figure 12-3.

12.4 EM330A Wiring of Tower Crane Slewing

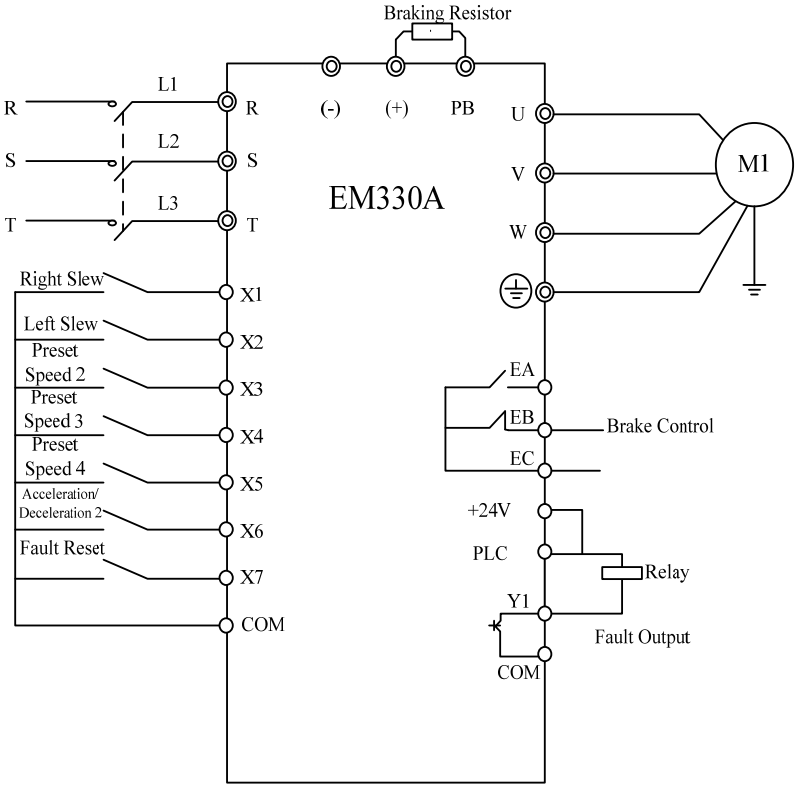


Figure 12-4 EM330A Wiring of Tower Crane Slewing

Remarks:

1. Operation logic control circuit is additional to the control circuits of X1 and X2.
2. When EM330A selects F4-28 as tower crane slewing application macros, please configure terminals Xi, Y1 and R1 as per Figure 12-4.

12.5 EM330A Wiring of Tower Crane Trolley Derricking

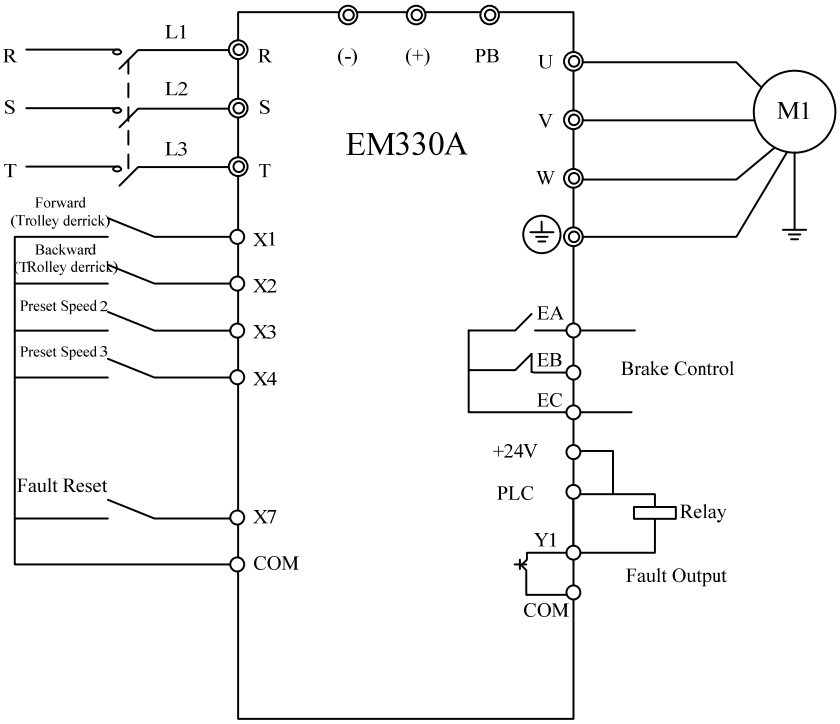


Figure 12-5 EM330A Wiring of Tower Crane Trolley Derricking

Remarks:

1. Operation logic control circuit is additional to the control circuits of X1 and X2.
2. When EM330A selects F4-28 as crane trolley derricking application macros, please configure terminals Xi, Y1 and R1 as per Figure 12-5.